WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

Final Report

University of California, Riverside

Prepared for

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OVERVIEW

Purpose

This West Campus Infrastructure Development Study (WCIDS) provides the planning of the utilities, hardscape, landscape, and transportation infrastructure necessary to support West Campus development in six phases: Phases 1A, 1B, 1, 2, 3, and 4.

Background

The University of California, Riverside (UC Riverside) is embarking upon an ambitious plan to develop the West Campus for an anticipated student enrollment of 25,000 students (2005 Long Range Development Plan). New buildings on the West Campus will provide space for academic, research, medical school, recreational, residential, and support functions.

The majority of the West Campus land area is currently in use as Agricultural Teaching and Research Fields, mostly citrus groves. The area proposed for development is approximately 227 acres, and includes the area north of Martin Luther King (MLK) Jr. Boulevard, generally bounded by University Avenue or Everton Place on the north, Chicago Avenue on the west, and the I-215/SR-60 freeway to the east. A City Arterial, Iowa Avenue, bisects the site.

Infrastructure

Clearly, to support the ambitious development of West Campus, a deliberate, comprehensive, and phased implementation of utilities, hardscape, landscape, and transportation infrastructure is necessary. The UC Riverside WCIDS analyzes and presents the details of utilities infrastructure development for West Campus. The first table on page 3 presents the specific utilities for development, their associated costs, and the development phases.

Tables 15-3, 15-4, 15-5, 15-6, 15-7, 15-8, 15-9, and 15-10, all in Chapter 15, present the details and costs of eight packaged utilities infrastructure projects.

Sustainability Considerations

West Campus will be developed with significant sustainable design features. This is consistent with the University of California's commitment to climate neutrality. UC signed the ACUPCC climate neutrality pledge, which can be found at http://www.presidentsclimatecommitment.org/. The following selection of guidelines, excerpted verbatim from directives updated in 2007, summarizes key UC system-wide guidelines in support of Sustainable Practices, which will be implemented in West Campus development:

- Incorporate the principles of energy efficiency and sustainability in all planning, capital projects, renovation projects, operations and maintenance within budgetary constraints and programmatic requirements.

- Minimize the use of non-renewable energy sources on behalf of the University's built environment by creating a portfolio approach to energy use, including the use of local renewable energy and purchase of green power from the grid as well as conservation measures that reduce energy consumption.

- Incorporate alternative means of transportation to/from and within the campus to improve the quality of life on campus and in the surrounding community. The campuses will continue their strong commitment to provide affordable on-campus housing, in order to reduce the volume of commutes to and from campus.

- Track, report, and minimize greenhouse gas emissions on behalf of University operations.

- Minimize the amount of University generated waste sent to landfill. Strive to eventually send nothing to landfills.

- Utilize the University's purchasing power to meet its sustainability objectives.

Chapter 16 provides the descriptions of many of the sustainable design features that will be considered in West Campus infrastructure development.

Summary of the Costs and Phasing of the West Campus Utilities Infrastructure Projects[a]

Utilities Traffic Hardscape Landscape System	Phase 1A Housing, dollars	Phase 1A Campus[c], dollars	Phase 1B, dollars	Phase 1, dollars	Phase 2 Housing, dollars	Phase 2 Campus, dollars	Phase 3, dollars	Phase 4, dollars	Total, dollars
Landscape and Hardscape	9,962,000	6,524,000	2,476,000	5,932,000	8,891,000	25,651,000	18,978,000	20,308,000	98,722,000
Domestic Water and Fire Water	128,000	98,000	167,000	448,000	271,000	569,000	2,886,000	583,000	5,150,000
Irrigation Water	197,000	32,000	80,000	70,000	196,000	236,000	387,000	433,000	1,631,000
Sanitary Sewer	583,000	87,000	57,000	5,000	556,000	346,000	483,000	361,000	2,478,000
Storm Drain	253,000	1,000	0	169,000	541,000	254,000	27,000	0	1,245,000
Traffic	625,000	208,000	345,000	0	208,000	208,000	0	0	1,594,000
Central Plants	0	0	0	12,122,000	0	10,443,000	8,026,000	3,037,000	33,628,000
Chilled Water and Heating Hot Water	0	0	0	3,006,000	0	4,521,000	1,908,000	5,489,000	14,924,000
Energy Management System[b]	0	0	0	150,000	0	175,000	90,000	125,000	540,000
Natural Gas	0	11,000	109,000	367,000	0	298,000	82,000	401,000	1,268,000
Electrical Power Distribution	0	2,306,000	2,812,000	3,320,000	0	9,892,000	7,825,000	5,299,000	31,454,000
Data Telecom-munications	880,000	1,164,000	7,675,000	757,000	0	13,504,000	2,425,000	1,951,000	28,356,000
Fire Alarm System	0	364,000	161,000	231,000	0	459,000	295,000	332,000	1,842,000
Totals	12,628,000	10,795,000[c]	13,882,000	26,577,000	10,663,000	66,556,000	43,412,000	38,319,000	222,832,000

a All dollars are in 2008 dollars. Installed unit costs in the cost summary tables include material, sales tax, installation, equipment, programming, subcontractor's mark-up, and design contingency. Costs do not include soft costs, permitting, design fees, and management fees.

b It is important to recognize that only the costs of the EMS front end, the central plants' EMS points, and the EMS backbone around campus are included here. Only these EMS costs are related to utilities infrastructure projects. The vast majority of EMS costs (not included here) will not be part of the utilities infrastructure projects, but rather will be part of the individual building projects.

c The Phase 1A Campus total cost includes the covering (piping) and landscaping of Gage Canal over its entire length on West Campus, including on the CalTrans property.

CHAPTER 1

EXECUTIVE SUMMARY

1.1 Overview (Chapter 1)

1.1.1 Purpose

This West Campus Infrastructure Development Study provides the planning of the utilities, hardscape, landscape, and transportation infrastructure necessary to support West Campus development in six phases: Phases 1A, 1B, 1, 2, 3, and 4.

1.1.2 Background

The University of California, Riverside (UC Riverside) is embarking upon an ambitious plan to develop the West Campus for an anticipated student enrollment of 25,000 students (2005 Long Range Development Plan). The majority of the West Campus land area is currently in use as Agricultural Teaching and Research Fields, mostly citrus groves. The area proposed for development is approximately 227 acres, and includes the area north of Martin Luther King (MLK) Jr. Boulevard, generally bounded by University Avenue or Everton Place on the north, Chicago Avenue on the west, and the I-215/SR-60 freeway to the east. A City Arterial, Iowa Avenue, bisects the site.

A master planning study for the West Campus (Campus Aggregate Master Planning Study (CAMPS)) was previously completed and provides an orderly arrangement of new buildings on land that the UC Riverside has identified for significant future campus growth. New buildings on the West Campus provide space for academic, research, medical school, recreational, residential, and support functions. While graduate and professional schools are a major focus of new development, there is also a significant increase in capacity for additional academic uses in a logical extension for the East Campus undergraduate programs and facilities. Open space and circulation systems are critical components of the study.

1.1.3 Existing West Campus Facilities

As mentioned above, Agricultural Teaching and Research Fields, mostly citrus groves, currently occupy the majority of West Campus. Several other facilities also occupy the West Campus. These include:

- Parking Lot 30, accommodating 2,092 spaces (University-owned)
- University Extension (UNEX), which is a six-story building and an associated parking structure (University-owned)
- Highlander Hall, which is a two-story multi-building complex (University-owned)

- The two-story Human Resources Building, which is a two-story building (University-owned)
- International Village, which is 92 units of housing intended for visiting international students, is a land lease to a private developer with the lease ending in 2047.
- City of Riverside electrical substation
- Embedded in the northeast corner of the West Campus is a State of California Department of Transportation (Caltrans) service yard
- The Gage Canal easement (50 feet wide), with its concrete-lined irrigation viaduct (under the jurisdiction of the Gage Canal Company), traverses the West Campus east of Iowa Avenue in a north-south direction. UC Riverside is a shareholder in the water delivery rights.

1.2 West Campus Facilities Planning (Chapter 2)

UC Riverside is poised to expand enrollments by at least 50% to meet the extraordinary demand for higher education in the state, particularly among minority populations. The 1,121-acre campus will consequently undergo a dramatic transformation, as UC Riverside aims to house at least half of its future student body on campus and dramatically reduce the use of private automobiles.

A particular focus for the University's growth is planning for the West Campus, 227 acres of existing Agricultural Teaching and Research Fields. West Campus will accept the majority of the university's enrollment and facilities expansion, including apartment housing and two family housing neighborhoods each with a Child Development Center, to attract a wider diversity of students. The CAMPS provides space for future professional and graduate schools as well as a potential School of Medicine.

The CAMPS creates a pedestrian-only academic core or heart, which centers on a sinuous open space following the historic Gage Canal (irrigation) right-of-way. This central spine, intended as a climate-appropriate botanical garden to foster a sense of place in what is now a vast landscape of linear citrus groves, is intersected by a series of traditional rectilinear quads. These quads, inspired by their mid-century modern equivalents on the existing East Campus, are framed by new building envelopes and provide logical pedestrian and bicycle access as well as continued views of natural and architectural landmarks.

The CAMPS is framed by a network of roads, which ensures continued automobile, transit, emergency and service access to the campus, with emphasis on creating complete streets that enable walking and bicycling. Key to the success of a pedestrian-friendly campus is clear and safe intersection crossings at Iowa Avenue to link housing areas to academic buildings. A finer grain of pedestrian walks establishes connections within a vehicle-free academic core, with two major spines, the NW and SW Pedestrian Walks, serving as primary east-west circulators.

The CAMPS provides UC Riverside with the capacity to surpass its target enrollment significantly. The end result will be a campus sustainably transformed from agricultural field research to a major multi-disciplinary institution serving a broad cross-section of the California populace.

1.3 Domestic Water and Fire Water Distribution Systems (Chapter 3)

Chapter 3 presents the analyses and recommended plans to serve the West Campus buildings with domestic water and fire water distribution systems. It explores the existing domestic and fire water system, domestic water and fire water demands, and domestic water and fire water points of connections. In addition, the water distribution system criteria for analyses, demand capacities, phasing implementation, and cost considerations are discussed. See Chapter 15 for the phased implementation and costs of the specific recommended domestic water and fire water distribution sub-projects.

1.4 Irrigation Water Distribution Systems (Chapter 4)

Chapter 4 presents the analyses and recommended plans to serve the development of the West Campus, while maintaining the irrigation water distribution system and facilitating the irrigation of new landscaping. This chapter explores the existing irrigation water distribution system, irrigation water demands, and irrigation of developing campus areas and remaining agricultural areas. Use of reclaimed water for irrigation water and points of connection to existing systems are also explored. In addition, irrigation water distribution system alternatives are explored including criteria for analysis, demand and capacities, phasing implications, and cost considerations. See Chapter 15 for the phased implementation and costs of the specific recommended irrigation water distribution sub-projects.

While the West Campus is developing, the agricultural fields will systematically be replaced with developed area that will utilize portions of the existing irrigation system as the major source of irrigation water. Throughout this process, the existing agricultural system in areas not under development shall be protected in place and the operational functionality maintained. As the initial phases are developed, the existing agricultural irrigation water distribution system should be adequate to supply the required landscape irrigation water. As the West Campus nears a fully developed state, the booster pumps may have to be upgraded to meet the required landscape irrigation demand.

1.5 Sanitary Sewer Wastewater Collection System (Chapter 5)

Chapter 5 presents the analyses and recommended conceptual utility plans to serve West Campus buildings with a sanitary sewer wastewater collection system. This chapter explores the existing sanitary sewer (SS) system, sanitary sewer loads, and sanitary sewer points of connections to the existing sewer system. In addition, sanitary sewer system alternatives are explored, including criteria for analysis, demand and capacities, phasing implications, and cost considerations. See Chapter 15 for the phased implementation and costs of the specific recommended sanitary sewer system sub-projects.

1.6 Storm Drain System (Chapter 6)

Chapter 6 presents the analyses and recommended plans to serve West Campus buildings with a storm drain system. This chapter explores the existing storm drain (SD) system, storm drain loads, and storm drain points of connections to the existing storm drain system. In addition, storm drain system alternatives are explored, including criteria for analysis, demand and capacities, phasing implications, and cost considerations. See Chapter 15 for the phased implementation and costs of the specific recommended storm drain system sub-projects.

1.7 Traffic Impact Analysis (Chapter 7)

The purpose of Chapter 7's traffic impact analysis is to evaluate traffic and circulation impacts that may occur with the expansion of UC Riverside to its West Campus.

Study objectives include:

- Evaluation of existing 2007 traffic conditions and levels of service (LOS) in the vicinity of the site during the peak hours of a typical weekday (7:00 to 9:00 AM and 4:00 to 6:00 PM)

- Determination of traffic conditions and LOS for each phase of development in 2010, 2015, 2020, and 2025, with the addition of project traffic for AM and PM peak hours

- Identification of intersections operating at poor levels of service for each phase (LOS E or F)

- Identification of mitigation measures needed for intersections operating at deficient levels of service at build-out of the West Campus, Phase 4. These measures would need to be implemented for these intersections to operate at acceptable levels of service LOS D or better.

- The percent of project's contribution was identified for each intersection operating poorly under Phase 4 conditions.

Eighteen intersections were chosen for evaluation. Three future intersections were also evaluated when infrastructure in later phases is assumed to be constructed.

At full build-out of the West Campus, 13 intersections are projected to operate at LOS E or F and will require mitigation to get operating levels back to acceptable conditions LOS A, B, C or D. These measures may or may not be feasible due to right of way and cost constraints and do not imply that the University is responsible for the implementation of these measures. However, the University may want to implement the mitigation measures for intersections that provide direct access to the West Campus such as Iowa Avenue at Everton Place, NW Mall and SW Mall as well as Cranford Avenue at MLK Jr. Blvd.

1. *Chicago Avenue at Blaine Street* is expected to operate at LOS F during AM and PM peak hours, respectively. With the following mitigation measures the intersection will operate at LOS D for both AM and PM peak periods.
    - Add an additional NB right turn lane; add an additional SB right turn lane; and add an additional WB left turn lane.

2. *I-215 SB Ramps at Blaine/3rd Street* is expected to operate at LOS E during the PM peak period. With the following measures this intersection will operate at LOS C for both AM and PM peak periods.
    - Add an additional SB thru lane. There is a heavy volume of traffic that exits the freeway and gets back on in order to either bypass stopped traffic or merge to other lanes.

4. *Iowa Avenue at Blaine Street* is expected to operate at LOS E during AM and PM peak periods, respectively. With the following mitigation measures the intersection will operate at LOS D for both AM and PM peak periods.
    - Add an additional EB left turn lane; add an additional WB right turn lane.

7. *Chicago Avenue at University Avenue* is expected to operate at LOS E during the PM peak period. With the following mitigation measures the intersection will operate at LOS C and D for AM and PM peak periods, respectively.
    - Add an additional SB right turn lane.

8. *Iowa Avenue at University Avenue* is anticipated to operate at LOS F during the PM peak period. With the following mitigation measures the intersection will operate at LOS D for both AM and PM peak periods.
    - Add an additional SB right turn lane

12. *Iowa Avenue at Everton Place* (unsignalized intersection) will continue to operate at LOS F during both the AM and PM peak period. With the following measures the intersection will operate at LOS A and B for AM and PM peak periods, respectively.
    - Signalize the intersection with 1 NB left, 1 NB thru, 1 NB right turn lane; 1 SB left, 2 SB thru, 1 SB right turn lanes; 1 EB left turn lane with a shared thru and right lane; 1 WB left turn lane with a shared thru and right turn lane.

13. *Chicago Avenue at MLK Jr. Boulevard* will operate at LOS F during the PM peak period. With the following mitigation measure the intersection will operate at LOS D for both AM and PM peak periods.
    - Add an additional EB thru lane and 1 additional EB right turn lane; add an additional WB right turn lane and WB thru lane.

14. *Iowa Avenue at MLK Jr. Boulevard* is expected to operate at LOS E during the PM peak period. With the following mitigation measures the intersection will operate at LOS C during both AM and PM peak periods.
    - Add an additional EB and WB thru lane.

15. *Lot 30 at MLK Jr. Boulevard* is expected to operate at LOS F during the PM peak period. With the following mitigation measures the intersection will operate at B during both AM and PM peak periods.
    - Add an additional EB right turn lane and an additional EB left turn lane.

16. *Canyon Crest Drive at MLK Jr. Boulevard* is expected to operate at LOS F during the PM peak period. With the following mitigation measures the intersection will operate at LOS D during both AM and PM peak periods.
    - Add an additional EB thru lane and EB right turn lane.

18. *I-215 NB Ramps at MLK Jr. Boulevard* will operate at LOS E during the AM peak period. With the following mitigation measures the intersection will operate at LOS B during both AM and PM peak hours.
    - Signalize the intersection

19. *NW Mall at Iowa Avenue* (unsignalized intersection) will operate at LOS F during AM and PM peak periods, respectively. With the following mitigation measures the intersection will operate at LOS A and D during AM and PM peak hours, respectively.
    - Signalize the intersection and provide 1 NB left and 1 NB shared thru and right turn lane; 1 SB left with 1 shared thru and right turn lane and 1 shared EB and WB lane.

20. *SW Mall at Iowa Avenue* (unsignalized intersection) will operate at LOS F during AM and PM peak periods, respectively. With the following mitigation measures the intersection will operate at LOS A and D during AM and PM peak hours, respectively.
    - Signalize the intersection and provide 1 NB left and 1 NB shared thru and right turn lane; 1 SB left with 1 shared thru and right turn lane and 1 shared EB and WB lane.

Since the University is not obligated to mitigate or pay for off-site improvements, costs associated with implementation of the above measures were determined only for those intersections that will provide direct access to the University in the future. These include the four unsignalized intersections of:

- Iowa Avenue at Everton Place
- NW Mall at Iowa Avenue
- SW Mall at Iowa Avenue
- Cranford Avenue at MLK Jr. Boulevard

The timing of implementing signal control at each of the above intersections can be determined by UCR. It is suggested that signals be installed when these intersections begin to operate at unacceptable levels of service. The following provides a guideline:

- Iowa Avenue at Everton Place – Signal installation at Phase 1A
- NW Mall at Iowa Avenue – Signal installation at Phase 1A
- SW Mall at Iowa Avenue – Signal installation at Phase 2
- Cranford Avenue at MLK Jr. Boulevard – Signal installation at Phase 1B

1.8 Cooling and Heating Systems (Chapter 8)

Chapter 8 presents the analyses and recommended means of providing cooling and heating to the West Campus buildings. Cooling and heating loads were estimated for West Campus buildings considering the number, sizes, and types of buildings, designed at least 20% better than Title 24 per UC Riverside's policy, in the Inland Empire region of southern California.

The recommended cooling and heating systems include two campus central plants with chilled water and heating hot water piping distribution to campus buildings. The Main Central Plant will be located between the existing electrical substation and building W6 on the east side of West Campus, and will serve the east side of West Campus, including the Academic Core and Apartments. The Medical School Central Plant will be located in the "Support Area" north of the Medical School section (specifically north of building H1), and will serve the medical school complex. See Chapter 15 for the phased implementation and costs of the specific recommended central plant sub-projects.

The Family Student Housing (Family Apartments and Family Townhouses), and its associated facilities (Child Development Center North (CDC N), Community Center North (CC N), Child Development Center South (CDC S), Community Center South (CC S), to be constructed in Phases 1A and 2, will use building-local cooling and heating (i.e. will use local unitary type HVAC equipment), and will be individually metered for electricity, natural gas, and water. They will not be connected to the central plant. Consequently, these facilities do not have any further campus cooling and heating infrastructure implications.

Buildings W4 (Phase 1A) and M4 (Phase 1B) will have interim building central plants until they can be connected to campus central plant service in Phases 1 and 2 respectively.

The central plants will each include the following general components and the capacities presented in Tables 1-1 and 1-2 below:

- high-efficiency electrical centrifugal chillers
- cooling towers and condenser water pumps
- above-ground, welded-steel, insulated, chilled water, thermal energy storage tanks
- gas-fired boilers
- constant flow primary and variable flow secondary chilled water pumps
- constant flow primary and variable flow secondary heating hot water pumps
- new central plant building

Table 1-1. Recommended Main Central Plant Cooling and Heating System

Phase	Cumulative Chiller Capacity, tons	Cumulative Cooling Tower Capacity, tons	Cumulative CHW TES Capacity, ton-hours	Cumulative Boiler Capacity, MMBtuh	CHW Pumping Capacity, gpm	HHW Pumping Capacity, gpm
Phase 1A	0	0	0	0	0	0
Phase 1B	0	0	0	0	0	0
Phase 1	1,600	3,800	30,000	20	4,000	2,000
Phase 2	3,200	5,700	30,000	60	6,000	3,000
Phase 3	4,800	7,600	60,000	80	8,000	4,000
Phase 4 (Build-Out)	6,400	7,600	60,000	100	12,000	5,000

Table 1-2. Recommended Medical School Central Plant Cooling and Heating System

Phase	Cumulative Chiller Capacity, tons	Cumulative Cooling Tower Capacity, tons	Cumulative CHW TES Capacity, ton-hours	Cumulative Boiler Capacity, MMBtuh	CHW Pumping Capacity, gpm	HHW Pumping Capacity, gpm
Phase 1A	0	0	0	0	0	0
Phase 1B	0	0	0	0	0	0
Phase 1	0	0	0	0	0	0
Phase 2	1,600	2,000	0	20	2,600	1,000
Phase 3	2,400	4,000	24,000	30	3,900	2,000
Phase 4 (Build-Out)	3,200	4,000	24,000	40	5,200	2,500

1.8A Cooling and Heating Systems with Aggressive Sustainability (Chapter 8A)

1.8A.1 Cooling and Heating Loads

UC Riverside is dedicated to aggressively implementing sustainable design features in West Campus development so that it truly can claim the mantle of being a campus of the future. If UC Riverside consistently pursues this policy, then substantially lower energy consumption will be realized as compared to a business-as-usual building implementation approach. Buildings designed with aggressive implementation of sustainable design features are estimated to experience peak diversified cooling and heating loads of 20% to 25% below buildings that are typically designed for 20% better than Title 24 energy efficiency.

The central plants implementation strategy and features are similar to those presented in 1.8 above. However, the cooling and heating loads are significantly lower when sustainable design features are aggressively implemented. In addition to lower on-going energy costs, first costs of the mechanical infrastructure are also reduced since smaller capacity equipment and pipes will suffice. Under an aggressive sustainability implementation regime, the central plant component capacities are as presented in Tables 1-1A and 1-2A below:

Table 1-1A. Recommended Main Central Plant Cooling and Heating System with Aggressive Sustainability

Phase	Cumulative Chiller Capacity, tons	Cumulative Cooling Tower Capacity, tons	Cumulative CHW TES Capacity, ton-hours	Cumulative Boiler Capacity, MMBtuh	CHW Pumping Capacity, gpm	HHW Pumping Capacity, gpm
Phase 1A	0	0	0	0	0	0
Phase 1B	0	0	0	0	0	0
Phase 1	1,600	3,000	21,000	16	3,000	1,600
Phase 2	3,200	4,500	21,000	48	4,500	2,400
Phase 3	4,800	6,000	42,000	64	6,000	3,200
Phase 4 (Build-Out)	4,800	6,000	42,000	80	9,000	4,000

Table 1-2A. Recommended Medical School Central Plant Cooling and Heating System with Aggressive Sustainability

Phase	Cumulative Chiller Capacity, tons	Cumulative Cooling Tower Capacity, tons	Cumulative CHW TES Capacity, ton-hours	Cumulative Boiler Capacity, MMBtuh	CHW Pumping Capacity, gpm	HHW Pumping Capacity, gpm
Phase 1A	0	0	0	0	0	0
Phase 1B	0	0	0	0	0	0
Phase 1	0	0	0	0	0	0
Phase 2	1,600	2,000	0	16	2,200	900
Phase 3	2,400	3,000	18,000	24	3,300	1,350
Phase 4 (Build-Out)	2,400	3,000	18,000	32	4,400	1,800

1.9 Chilled Water and Heating Hot Water Piping Distribution Systems (Chapter 9)

In Chapter 9, it is recommended that the main loops of chilled water supply (CHWS), chilled water return (CHWR), heating hot water supply (HHWS), and heating hot water return (HHWR) piping be the insulated exposed piping type, distributed in utilities tunnels around the Academic Core and the Medical School. Other utilities such as EMS, electrical, data/telecom, fire alarm, and natural gas will use the same tunnels. This is similar to the model being used for the new UC Merced campus.

The CHW and HHW distribution around West Campus will be piping distribution systems designed for variable CHW and HHW flow. CHW for space cooling and HHW for space heating and domestic hot water heating will be used directly in campus buildings in various coils. There will be no booster pumps or tertiary pumps at the buildings. CHW and HHW will be directly pumped from the central plants, around the campus, through building coils, and back to the central plants, using variable flow secondary pumps with variable frequency drives (VFDs).

However, there will be standby CHW and HHW booster pumps in each building that can be manually called into service in the event that additional CHW or HHW flow and/or pressure are required in the building.

See Chapter 15 for the phased implementation and costs of the specific recommended utililties tunnels and CHW and HHW distribution piping.

HHWS will be used to provide domestic hot water (DHW) heating in the Apartments and in buildings with significant DHW loads such as medical buildings and lab buildings. In most Academic buildings however, DHW demand will be non-existent or very low. What DHW load there is would be most cost-effectively served with point-of-use, instantaneous, electric hot water heaters.

In the buildings with significant DHW load, double-wall, shell-and-tube heat exchangers will be used between the HHW and DHW in those buildings.

1.9A Chilled Water and Heating Hot Water Piping Distribution Systems with Aggressive Sustainability (Chapter 9A)

As discussed in 1.8A above, UC Riverside is dedicated to aggressively implementing sustainable design features in West Campus development. If UC Riverside consistently pursues this policy, this will have the significant effect of being able to down-size, or “right-size” the CHW and HHW piping distribution systems. Thus, aggressive sustainability implementation will save first cost, as well as on-going energy costs.

The basic strategy of the CHW and HHW piping distribution systems is the same as that described in 1.9 above, however many of the pipe sizes are reduced in size. This is most evident by comparing Figure 9A-4 with Figure 9-4, and by comparing Figure 9A-8 with Figure 9-8.

1.10 Energy Management System (Chapter 10)

A new energy management system (EMS) will be implemented as part of the West Campus development. It is intended to provide centralized and automatic monitoring and control of HVAC systems campus-wide. The EMS will consist of PC-based workstations and microcomputer controllers of modular design providing distributed processing capability, and allowing future expansion of both input/output points and processing/control functions.

1.11 Natural Gas Distribution System (Chapter 11)

The Academic core, Apartments, and Medical School West Campus buildings will be provided with space heating and domestic hot water (DHW) heating from centrally distributed heating hot water (HHW) that is heated in natural gas-fired boilers at the two central plants.

Natural gas will be used directly for space heating and DHW heating in non-central plant connected buildings. These are the Family Student Housing, Community Centers, Child Development Centers, and Recreation buildings. There will be other natural gas uses in certain buildings on campus. This includes natural gas range and natural gas dryer use in the Apartments, and natural gas used in laboratories, medical facilities, and other science facilities.

Natural gas will not be used for DHW heating, except in the Family Student Housing, Community Centers, Child Development Centers, and Recreation buildings. Heating hot water (HHW) will be used to provide DHW heating in the Apartments and in buildings with significant DHW loads such as medical, and lab buildings. In most Academic buildings however, DHW demand will be non-existent or very low. What DHW load there is would be most cost-effectively served with point-of-use, instantaneous, electric hot water heaters.

Natural gas will be piped from the 60 to 80 psig pressure, Southern California Gas Company (SCG) system, through new gas meter assemblies, and then throughout West Campus.

1.12 Electrical Power Distribution System (Chapter 12)

Initial demand load calculations are based on anticipated power requirements for supporting all buildings and campus functions, including lighting, general power, data-communication equipment, office equipment, appliances, laboratory apparatus, and HVAC equipment. Table 1-3 below summarizes the electrical loads.

Table 1-3. Electrical Loads Summary

Phase	Electrical Demand Utility Grid	Electrical Demand on Campus Grid	Cumulative Electrical Demand on Utility Grid	Cumulative Electrical Demand on Campus Grid
Phase 1A	1.36 MVA	0.85 MVA	1.36 MVA	0.85 MVA
Phase 1B	0 MVA	1.00 MVA	1.36 MVA	1.84 MVA
Phase 1	0 MVA	2.64 MVA	1.36 MVA	4.48 MVA
Phase 2	0 MVA	9.18 MVA	1.36 MVA	13.66 MVA
Phase 3	0 MVA	9.40 MVA	1.36 MVA	23.06 MVA
Phase 4	0 MVA	10.64 MVA	1.36 MVA	33.70 MVA

Table 1-3A below summarizes the electrical loads with aggressive sustainability implementation.

Table 1-3A. Electrical Loads Summary with Aggressive Sustainability Implementation

Phase	Electrical Demand on Utility Grid	Electrical Demand on Campus Grid	Cumulative Electrical Demand on Utility Grid	Cumulative Electrical Demand on Campus Grid
Phase 1A	1.18 MVA	0.67 MVA	1.18 MVA	0.67 MVA
Phase 1B	0 MVA	0.76 MVA	1.18 MVA	1.44 MVA
Phase 1	0 MVA	2.02 MVA	1.18 MVA	3.46 MVA
Phase 2	0 MVA	7.49 MVA	1.18 MVA	10.95 MVA
Phase 3	0 MVA	7.56 MVA	1.18 MVA	18.51 MVA
Phase 4	0 MVA	8.44 MVA	1.18 MVA	26.94 MVA

1.12.2 Electrical Service Requirements

For electrical service requirements, two primary service transformers will be added (by the City) to the existing power substation facility. Alternatively, the two existing 69kV-12kV transformers can be upgraded to serve both the East and West Campus.

1.12.3 Electrical Switchgear

Medium voltage (15 kV rated) metal-clad switchgear with draw-out type SF6 circuit breakers is recommended. Double-ended configuration with 2 main circuit feed is recommended for reliability.

1.12.4 Secondary Unit Substation Transformer

Cast-coil transformers are the recommended transformer types for laboratory buildings, Medical School buildings, computer facilities, and telecommunication hubs. This recommendation is based on the superior performance and reliability characteristics and long term cost value. Unit substations with dry-type transformers will be considered only for non-critical facilities that have extreme constraints on construction cost.

1.12.5 High Voltage Cable

For the West Campus power distribution network, copper conductors with TR-XLP insulation, 133% insulation level, will be used due to its better impulse breakdown strength and lower dielectric loss.

1.12.6 Emergency Power System

For the emergency power system, small distribution plants serving selected clusters of buildings will be the primary approach. Single emergency generators dedicated to individual buildings will also be considered, depending on location and phasing considerations.

1.12.7 Lighting System

State of the art lighting technology, including induction lighting, high power compact fluorescent lamps, and high power LED fixtures, will be applied in place of the conventional high intensity discharge (HID) metal halide and high pressure sodium fixtures when applicable. All common area lighting will be controlled by the campus energy management system.

1.13 Data/Telecommunications Systems (Chapter 13)

1.13.1 Data/Telecommunications Systems

The purpose of this IT Backbone Infrastructure Planning is to establish a strategy to develop the required infrastructure to meet the campus plans, goals and needs for communication and data transmission through to Build-Out. The IT planning effort included an analysis of the campus backbone, and includes the utility connections, data/communication nodes, raceway infrastructure, and cabling to campus buildings.

1.13.2 Data/Telecommunications Systems Nodes

A temporary communication node will be place within the Family Student Housing Area F20 to support Phase 1A housing operation. Another temporary communication node will be established in Building W4 during Phase 1A; this node will also support phase 1 Buildings - W1, W3 and W5. A permanent data/communication node will be established during Phase 1B as part of the M4 Building. This node will be used to serve all the medical school facilities in the future. The West Campus main communication node will be created during Phase 2 development to house all voice electronics, data electronics, academic servers, and administrative servers. Cable and raceway infrastructure will be extended to link data/communication nodes at building M4 (Phase 1B). The temporary nodes created under Phase 1A implementation will be consolidated at this main node location.

1.13.3 Wireless Network Services

The University of California has established a goal of providing wireless network access throughout most, if not all, areas of each campus. Future planning at the UC Riverside West Campus will include wireless access points within each building and installation of antennas inside and outside each building to provide the wireless access to cover the entire campus.

1.13.4 Telephone System

Traditional Time Division Multiplexing (TDM) and limited VoIP protocol will be set up for voice communication on West Campus. Migration towards VoIP will be done cautiously based on technological advances and future analysis. Consideration will be emphasized on a flexible patching scheme to allow seamless transition, as well as cost and downtime reduction.

1.13.5 Data/Communication Raceway Infrastructure

The data/communications raceway infrastructure, installed underground, will be in a multi-loop configuration. Additional loops can be added following the West Campus phased implementation. New and existing loops will share common manholes to allow multiple pathways to each building to enhance flexibility and reliability. A minimum of two Point of Presence (POP) connections shall be included for future planning.

1.14 Fire Alarm System (Chapter 14)

The new West Campus fire alarm systems will be multiplex, solid-state and programmable with addressable devices. The existing Simplex communication protocol will be extended to the West campus to link all new systems. Fire alarm systems will comply with NFPA, CFC, CEC, and University life/safety requirements. System components will include control panels, remote annunciator panels, manual pull stations, audio alarm devices, visual alarm units, sprinkler flow and tamper switches, smoke detectors, heat detectors, terminal cabinets, and wiring.

1.15 Utilities Infrastructure Projects Costs, and Implementation Plan (Chapter 15)

Table 1-4 presents a summary of the estimated costs for the West Campus utilities infrastructure projects.

If an aggressive sustainability implementation strategy for all West Campus buildings is maintained by UC Riverside throughout West Campus development, then there will be an estimated first cost savings of about $5,711,000 in central plant development and CHW and HHW piping distribution. The estimated total first cost for the build-out of the central plants and CHW and HHW distribution systems decreases from $48,552,000 without aggressive sustainability implementation to $42,841,000 with aggressive sustainability. (See Table 1-5.) As such, it can be seen that an aggressive sustainability implementation strategy for all West Campus buildings will have both first cost savings and on-going energy savings.

Table 1-4. Summary of the Costs of the West Campus Utilities Infrastructure Projects[a]

Utilities Traffic Hardscape Landscape System	Phase 1A Housing, dollars	Phase 1A Campus[c], dollars	Phase 1B, dollars	Phase 1, dollars	Phase 2 Housing, dollars	Phase 2 Campus, dollars	Phase 3, dollars	Phase 4, dollars	Total, dollars
Landscape and Hardscape	9,962,000	6,524,000	2,476,000	5,932,000	8,891,000	25,651,000	18,978,000	20,308,000	98,722,000
Domestic Water and Fire Water	128,000	98,000	167,000	448,000	271,000	569,000	2,886,000	583,000	5,150,000
Irrigation Water	197,000	32,000	80,000	70,000	196,000	236,000	387,000	433,000	1,631,000
Sanitary Sewer	583,000	87,000	57,000	5,000	556,000	346,000	483,000	361,000	2,478,000
Storm Drain	253,000	1,000	0	169,000	541,000	254,000	27,000	0	1,245,000
Traffic	625,000	208,000	345,000	0	208,000	208,000	0	0	1,594,000
Central Plants	0	0	0	12,122,000	0	10,443,000	8,026,000	3,037,000	33,628,000
Chilled Water and Heating Hot Water	0	0	0	3,006,000	0	4,521,000	1,908,000	5,489,000	14,924,000
Energy Management System[b]	0	0	0	150,000	0	175,000	90,000	125,000	540,000
Natural Gas	0	11,000	109,000	367,000	0	298,000	82,000	401,000	1,268,000
Electrical Power Distribution	0	2,306,000	2,812,000	3,320,000	0	9,892,000	7,825,000	5,299,000	31,454,000
Data Telecom-munications	880,000	1,164,000	7,675,000	757,000	0	13,504,000	2,425,000	1,951,000	28,356,000
Fire Alarm System	0	364,000	161,000	231,000	0	459,000	295,000	332,000	1,842,000
Totals	12,628,000	10,795,000[c]	13,882,000	26,577,000	10,663,000	66,556,000	43,412,000	38,319,000	222,832,000

a All dollars are in 2008 dollars. Installed unit costs in the cost summary tables include material, sales tax, installation, equipment, programming, subcontractor's mark-up, and design contingency. Costs do not include soft costs, permitting, design fees, and management fees.

b It is important to recognize that only the costs of the EMS front end, the central plants' EMS points, and the EMS backbone around campus are included here. Only these EMS costs are related to utilities infrastructure projects. The vast majority of EMS costs (not included here) will not be part of the utilities infrastructure projects, but rather will be part of the individual building projects.

c The Phase 1A Campus total cost includes the covering (piping) and landscaping of Gage Canal over its entire length on West Campus, including on the CalTrans property.

Table 1-5. Summary of the Costs of the Central Plants with Aggressive Sustainability Implementation

Utilities Traffic Hardscape Landscape System	Phase 1A, dollars	Phase 1B, dollars	Phase 1, dollars	Phase 2, dollars	Phase 3, dollars	Phase 4, dollars	Total, dollars
Central Plants	0	0	10,319,000	9,340,000	6,320,000	2,281,000	28,260,000
Chilled Water and Heating Hot Water	0	0	2,924,000	4,452,000	1,859,000	5,346,000	14,581,000

1.16 Sustainability Considerations (Chapter 16)

West Campus will be developed with significant sustainable design features. This is consistent with the University of California's commitment to climate neutrality. UC signed the ACUPCC climate neutrality pledge, which can be found at http://www.presidentsclimatecommitment.org/. The following selection of guidelines, excerpted verbatim from directives updated in 2007, summarizes key UC system-wide guidelines in support of Sustainable Practices, which will be implemented in West Campus development:

- Incorporate the principles of energy efficiency and sustainability in all planning, capital projects, renovation projects, operations and maintenance within budgetary constraints and programmatic requirements.
- Minimize the use of non-renewable energy sources on behalf of the University's built environment by creating a portfolio approach to energy use, including the use of local renewable energy and purchase of green power from the grid as well as conservation measures that reduce energy consumption.
- Incorporate alternative means of transportation to/from and within the campus to improve the quality of life on campus and in the surrounding community. The campuses will continue their strong commitment to provide affordable on-campus housing, in order to reduce the volume of commutes to and from campus.
- Track, report, and minimize greenhouse gas emissions on behalf of University operations.
- Minimize the amount of University generated waste sent to landfill. Strive to eventually send nothing to landfills.
- Utilize the University's purchasing power to meet its sustainability objectives.

Chapter 16 provides the descriptions of many of the sustainable design features that will be considered in West Campus infrastructure development.

CHAPTER 2

WEST CAMPUS FACILITIES PLANNING

This chapter summarizes the analysis and planning work developed by Walker Macy and UC Riverside for the West Campus portion of the Campus Aggregate Master Planning Study (CAMPS).

2.1 West Campus Existing Conditions

2.1.1 Existing Site Configuration

The land area addressed in this West Campus Infrastructure Development Study is approximately 227 acres, and includes the area north of Martin Luther King Jr. Boulevard, (MLK) generally bounded by University Avenue or Everton Place on the north, Chicago Avenue on the west, and the I-215/SR-60 freeway to the east. A city arterial, Iowa Avenue, bisects the site. The acreage figure is based upon recent parcel data obtained from the City as part of the 2007 Campus GIS data collection effort. (Figure 2-1)

2.1.2 Existing Uses and Facilities

The majority of the West Campus land area is currently in use as Agricultural Teaching and Research Fields, mostly citrus groves. The fields are managed by the Agricultural Operations Department of the University, and host a variety of teaching and research projects. The largest area of fields, 279 acres, lies south of MLK. This area will remain in agricultural teaching and research use. (Figure 2-1)

Several University facilities, besides the teaching and research fields, currently occupy the West Campus. These include Parking Lot 30, accommodating 2,092 spaces, which is located directly to the west of the Canyon Crest Drive under-crossing of the freeway. University Extension (UNEX) occupies a six-story building and has an associated parking structure. It is located on the south side of University Avenue, west of the freeway. Highlander Hall (due to be demolished as seismically unstable), a two-story multi-building complex, is directly adjacent to the freeway, and the two-story Human Resources Building is located between Highlander Hall and UNEX. These three facilities occupy the only parcels the University owns on University Avenue west of the freeway. To their south sits International Village, a housing complex intended for visiting international students attending UNEX programs. This complex was developed as a third-party development under a land lease on University land which will expire in 2047.

A City of Riverside electrical substation also occupies approximately 0.9 acres directly west of the freeway at the northern edge of Parking Lot 30. It is served by a City owned high-voltage electrical transmission line that runs north/south and is located just west of the substation. It is assumed that the substation will remain in operation at this site, possibly with improvements such as partial or full enclosure of the facility. However, relocation of the City-owned transmission poles will be necessary for future development of the West Campus.

A State of California Department of Transportation (Caltrans) service yard occupies a 4.1 acre triangular parcel directly west of the freeway, south of the University Avenue interchange, at the eastern terminus of Everton Place. Preliminary discussions with Caltrans have indicated their willingness to transfer this property to the University at such time as they are able to identify and move to a suitable replacement site. For that reason, it has been assumed in this study that this parcel is included in the future development of the University on the West Campus and has been included in the total acreage figures cited previously.

The Gage Canal traverses the site north to south. A concrete-lined gravity-flow irrigation viaduct, the canal is now partially piped and covered. The Gage Canal Company has signed an Operating Agreement with the City of Riverside and UCR which indicates GCC's wish that the canal be piped across the entire UCR West Campus. UCR paid for piping the segment west of Lot 30. The remaining portions within the West Campus will therefore also be covered as development of the West Campus occurs.

2.1.3 Existing Access

Access to the University Extension facilities is either via University Avenue or Everton Place, which connects to Iowa Avenue. Access to International Village is via Everton Place. Access for agricultural operations occurs via a number of unpaved and paved roads throughout the area, with entry generally through gates off one of the major roadways. This area must remain fenced (or re-fenced) as development occurs adjacent to the agricultural uses. Parking Lot 30, which is used primarily by students, has entries from Canyon Crest Drive and MLK. The substation is entered from Parking Lot 30. Access to all of these facilities must be maintained in the future, with the exception of the teaching and research fields that will be removed over time and replaced with academic, residential, and recreational uses.

The I-215/SR-60 freeway has recently been widened and the MLK interchange has been expanded to allow full northbound and southbound movement. As part of this project, access between UCR's East and West Campuses has been improved with the widening of the Canyon Crest Drive underpass, installation of four travel lanes, two in each direction, and provision of an elevated, widened sidewalk and bicycle path on either side of the roadbed.

2.2 2005 Long Range Development Plan (LRDP) and 2008 Campus Aggregate Master Planning Study (CAMPS)

The master planning study for the West Campus, which tests capacity requirements for the LRDP, intends to provide an orderly arrangement of new buildings on land that the UC Riverside has identified for significant future campus growth. New buildings on the West Campus provide space for academic, research and residential functions, whose basic programmatic requirements are outlined in the CAMPS report. While graduate and professional schools are a major focus of new development, there is also a significant increase in capacity for academic uses in a logical extension to UCR's East Campus undergraduate programs. The open space and circulation systems described below are critical components of the master planning study and should be considered carefully in all infrastructural planning work.

The LRDP land use plan for the West Campus establishes a concentration of academic uses due west of the I-215 freeway, respecting the geographic nexus between West and East Campus academic programs. A block of apartment housing is planned due west of this Academic Core. West of Iowa Avenue, a large area of Family Housing and Recreation Fields is proposed, and a School of Medicine campus is planned for the northeast corner of MLK and Chicago Avenue. Although not being considered in current School of Medicine plans, there is adequate space for a hospital, if the future need arises, due south on existing agricultural research fields.

2.2.1 The West Campus Open Space Concept

Open space on the UCR campus plays a vital role in fostering a spirit of intellectual exchange, contemplation and student community. The quality of open space is also important in recruiting faculty, staff and students. A new concept plan for the West Campus has been proposed through CAMPS which will require an open space amendment to the 2005 LRDP as development occurs on the West Campus. The concept hinges on two distinct features that will continue UCR's tradition of generous, distinctive spaces: (1) a sinuous band of open space, evoking an arroyo or dry wash, following the course of the Gage Canal (which will be piped in an easement) and, (2) a series of formal malls framed by new academic buildings and linked together by this meandering space. (Figure 2-2)

The curving central space, or Gage Canal Mall, will serve a number of roles, providing a range of gathering spaces, a linear pedestrian and bicycle spine and a somewhat organic counterpoint to the formal grid of buildings, streets, malls and quads. This space could become a showcase for plants adapted to the Inland Empire climate. It could be a "botanical walk" that roots this new campus expansion in a landscape blending environmentally responsible and pre-settlement plant palettes, fostering a sense of place and potentially contributing to UCR research activities.

The linear malls intersecting the meander of the Gage Canal easement recognize and emulate the Carillon and Library Malls, the original UCR open spaces. These malls correspond to the width of the East Campus counterparts and may be enclosed by four- and five- story buildings, the heights required to maintain an LRDP density requirement of 1.0 FAR (Floor Area Ratio). These outdoor rooms will terminate on signature buildings on their eastern and western ends. These malls, like the Carillon Mall, will also orient the campus to the distant Box Springs Mountains. The predominant planting material is anticipated to be open lawn, using a turf bred by UCR researchers to withstand Inland Empire heat and drought. Drought-tolerant grass mixes (such as 'Marathon III') require less water and maintenance. Turf areas should be at least 15' wide for efficient irrigation and mowing. The West Campus malls should incorporate climate-adaptive vegetation in appropriate locations, recognizing the imperative for sustainable design and landscape management at UCR. Shade trees on these malls would provide passive solar benefit, campus beauty, character and a sense of place. (Figure 2-3)

Other important open and public spaces on the West Campus are internal, shaded courtyards and the larger, more public malls and Gage Canal open space. Related to these are hardscaped, paved plazas near important building entries and in high-traffic areas such as outdoor dining facilities. These important ancillary spaces should be accounted for in the designs of buildings on the West Campus and will require careful attention when interfacing directly with signature open spaces and circulation systems.

Much of the landscape on the West Campus will consist of transitional or 'structural' spaces between academic buildings serving as foundation planting, screening and buffers. These spaces should continue the themes outlined above, with drought-tolerant, climate-adaptive plants and are described in the 2007 Campus Design Guidelines.

The Campus Design Guidelines should be consulted for all future design of campus sites. Overall goals for the landscape on the West Campus, considering the above categories of uses, include:

- Selecting plants appropriate to climate, specific environments and use
- Focusing irrigated turf on high-use areas such as courtyards and malls
- Using native or climate-adaptive plants
- Minimizing the use of herbicides, fertilizer and physical maintenance
- Use computerized irrigation and drip irrigation systems and time irrigation for early morning hours, not mid-afternoon
- Use graywater as alternative source of irrigation water if possible

2.2.1.1 Landscape Lighting

Lighting of the West Campus landscape and surface parking lots is an important element that must be carefully considered to complement different scales and types of landscape and coordinated with lighting schemes associated with new buildings and roadways. California Title 24 Standards govern lighting for the campus and they require greater consideration of energy-efficiency and night-sky impacts. As a result, most landscape lighting on the West Campus will be cast downward, full-cutoff shades to minimize light trespass, night sky pollution and glare. Exterior lighting will be 277/480V, connecting to nearby building panels. Light levels should use minimum levels required by code (0.5fc or 4w/lf is standard). An important consideration, particularly for safety, is the study of contrast ratios versus standard foot-candle levels. If lighting is too bright, it can actually decrease safety by making edge areas darker.

2.2.2 Circulation System

The West Campus will feature a range of campus streets. The West Campus presents a good opportunity for UCR to create a campus transportation system that encourages several modes of travel. The design of the circulation system should also be carefully considered to include non-standard approaches to mobility through many alternatives, instead of simply private automobiles.

The following categories organize the proposed circulation system for the West Campus:

2.2.2.1 Pedestrian

As UCR moves to create an Academic Core for the West Campus, oriented to pedestrians, it will be critical to provide well-sited and designed paths to encourage safe and comfortable pedestrian circulation. The most important elements of the pedestrian circulation system will be planned in accordance with the open space concept, paralleling the Gage Canal in a sinuous, woven pattern and framing the edges of the more formal malls in a rectilinear pattern as found on the East Campus.

Two important pedestrian axes will traverse the West Campus academic core, extending the NW and SW Malls eastward, while restricting vehicles beyond gateway drop-offs. These pedestrian walks will serve as important organizing elements. The NW Walks will terminate in a building site and this building could be a 'signature building' as described in the Campus Design Guidelines. The SW Walk will terminate in a plaza at Canyon Crest Drive marking the transition for students as they traverse from east to west under the I-215 freeway. Future buildings located on the NW and SW Walks should also be planned to orient major entries to the Walks. The other equally important provision for pedestrian circulation will be the inclusion of sidewalks, preferably not curb-tight, of at least 6' width, on all new West Campus streets. (Figure 2-4)

2.2.2.2 Bicycle

All streets on the West Campus will include painted bicycle lanes or will be designed for slow-enough speeds that cyclists can feel comfortable sharing vehicular lanes. With anticipated pedestrian traffic volume, it is important to avoid forcing cyclists to use sidewalks when they perceive on-street conditions to be unsafe. In the academic core of the West Campus, a regional bike trail established in City of Riverside planning documents will follow the course of the Gage Canal and connect with future trail extensions to the north and south (as-yet unbuilt) as well as bike lanes on city streets. The core campus will require clear regulations for the handling of bike traffic, establishing dismount zones in zones of heavy pedestrian activity, perhaps along the NW and SW Pedestrian Walks and within the Central Mall between these two walks. (Figure 2-5)

2.2.2.3 Service

All academic buildings on the West Campus will require some form of service access, from simple trash and recycling removal to the regular delivery of food and office materials and the management of scientific supplies, which can require extraordinary care. Advance planning for the West Campus may allow for greater efficiencies in service access. Many deliveries could be centralized at UCR Facilities Management yards and distributed to smaller, electric vehicles, thus reducing the footprint of loading docks and service yards associated with new buildings. Where outside delivery trucks require direct access to buildings, service yards and access roads can be sited to minimize their impact on campus circulation (and aesthetics). Service roads can also double as pedestrian/bicycle ways when a lower frequency of delivery traffic allows. (Figure 2-6)

2.2.2.4 Transit

At this early stage in the West Campus development, it is premature to designate specific streets for transit corridors. Most vehicular and limited access streets can be considered as "transit-ready." As buildings and housing units are developed and class schedules are established, UCR Transportation and Parking Services (TAPS) can refine planning for transit based on this general framework and also retain future flexibility in route selection as well as transit vehicle choice. In order to connect the outlying School of Medicine with the West and

East Campus academic cores, transit shuttles should offer frequent headway, rapid and simple connections (down NW or SW Mall or MLK) and access to programs with direct relationships to instruction and research. (Figure 2-7)

2.2.2.5 Private Automobiles

UCR is implementing the recommendations of the Multi-Modal Transportation Management Strategy (MMTMS) and removing private automobiles from the heart of the East Campus, anticipating building a series of parking garages on the periphery of the East Campus academic core and improving the campus for pedestrians, cyclists and transit users. The same vision will apply to the West Campus with some modifications to reflect the physical form of the existing site and proposed concept plan. (Figure 2-8)

The first West Campus parking, other than Lot 30, will probably appear as a surface lot on the site of the future multi-story parking garage at the eastern end of Everton Place adjacent to the I-215 freeway. As campus growth proceeds and this site becomes a parking garage, Everton Place will become a key component of the West Campus' automobile network. Over time, Iowa Avenue will be widened as a 4-lane arterial. Canyon Crest Drive will also be reconfigured in the near-term to accommodate a future parking structure east of Lot 30 and reflect its important role as a principal entry into both the East and West Campuses.

Other vehicular streets will be developed on the West Campus over the next 15 to 20 years. But the academic core of the West Campus, surrounding the proposed open spaces, will be pedestrian-oriented, with three full blocks of apartment housing and associated structures located between the core and Iowa Avenue.

It is anticipated that proposed apartment housing parking will be accessed by private automobile from Iowa along two major elements of the campus circulation system, the Northwest and Southwest Malls. These two malls will serve as dual armatures bisecting and linking the West Campus from east to west. The concept for these two malls was established in the 2005 Long Range Development Plan (LRDP). These two malls are envisioned as multi-use corridors, safe for all users and vehicle types. (Figure 2-9)

2.2.3 Street, Walkway and Intersection Design

In general, new West Campus streets should include the following standard features:

- Minimized vehicular travel lanes (12' maximum, 10' preferred). A clear zone of 20' is usually a minimum required for fire vehicles but there may be instances where streets can be narrower.

- Minimized curb dimensions to reduce cornering speeds (10' radius maximum), keeping in mind service and emergency access requirements.

- On-street parking where appropriate.

- Where there is on-street parking, curb bulbs or extensions at major intersections to reduce crossing distances for pedestrians.

- Bicycle lanes, minimum 5’ width.
- Street trees, in planter strips separating driving surfaces from sidewalks (parkways) or in tree wells incorporated within wide sidewalks.
- Sidewalks should have a 6’ minimum width, with a minimum of 12’ preferred for highly-traveled areas.

These features are described in further detail in the section below and in illustrated cross-sections.

2.2.4 Street Types and Hierarchy

The following hierarchy of streets is proposed for the West Campus.

2.2.4.1 Vehicular Street

2.2.4.1.1 Arterials

2.2.4.1.1.1 Iowa Avenue

Iowa Avenue, between University Avenue and Martin Luther King Jr. Boulevard, is currently a two-lane road with wide dirt shoulders and no sidewalks, reflecting its original role as an access route to UCR agricultural fields. With rapid growth of the region and the development of a full interchange at I-215/SR 60 and MLK, Iowa Avenue will play an increasingly important role in local circulation. The City of Riverside has basic standards for an Arterial classification, based on national standards which emphasize movement of vehicles over pedestrian comfort or safety. The alternative section (Figure 2-10) recognizes that Iowa Avenue will bisect the heart of the future West Campus and must include significant provisions for pedestrians and bicyclists, traveling north-south but also crossing east-west on the NW and SW Malls. Materials will likely be asphalt with concrete curbs and sidewalks. Lighting will probably be vehicular-oriented cobra-heads. The arterial’s landscape will include a planted median and street trees.

2.2.4.1.1.2 Martin Luther King Jr. Boulevard (MLK)

MLK is a wide regional arterial, designed to convey large volumes between a new full interchange at I-215 and downtown Riverside. It is unlikely that its current form will change, although with increased traffic, it is conceivable that there will be future pressure to widen the route to three lanes in each direction. If the widening can occur within the present configuration, the street’s palm trees will continue to serve as wayfinding elements and a recognizable transition between the city and campus. Agricultural fields on the south side of MLK could also be developed in the long-term future of UCR. Perhaps most importantly, the north edge of MLK is envisioned as a roughly 80’ green buffer that will include innovative stormwater treatment (infiltration, evaporation and conveyance), and will minimize traffic noise disturbance for academic buildings and housing on the West Campus.

2.2.4.1.2 Northwest and Southwest Malls

The NW and SW Malls will also become part of the West Campus open space network thanks to their generous central median space linking academic, residential and recreational land uses. The medians will separate a single traffic lane in each direction. Turn pockets at intersections should be avoided to maintain the integrity of the central median, which will also be a critical component of the West Campus' ecological stormwater treatment system. Both Malls will include street trees on each side, in parkways or planting strips. The central median may also include trees, with species more suited to the median's ecological functions. Materials will consist of concrete, but asphalt may be used if cost savings are desired.

On-street parking is recommended on both sides of the Mall, but not adjacent to the median. Concrete sidewalks will serve large numbers of students traversing campus from east to west, continuing from the wide pedestrian walks within the West Campus Academic Core. A path system may also be possible within the median, to allow a more informal route across campus. Street lighting should be pole-mounted, pedestrian-scaled and oriented to sidewalks. The Malls will terminate at the West Campus Academic Core in dramatic new turnarounds/drop-offs that also serve as gateways to UCR. New buildings can also terminate the view down the Malls.

2.2.4.1.3 General Vehicular Street

This category includes portions of Everton Place and Cranford Avenue. These streets are for the most part currently unimproved. Everton has curbs and sidewalks on the north side between Iowa Avenue and the Gage Canal, and on-street parking serves to diminish the excessive street width. Cranford Avenue does not currently exist on UCR property. These two streets will become limited access streets to vehicular traffic. The recommended street section for this type of street is narrower than the existing Everton Place, to discourage speeds and cut-through traffic and foster pedestrian safety. Everton Place should have sidewalks added on its south side east of Iowa Avenue. Street trees should be planted, in planting strips (parkways) or within tree wells under wide sidewalks. On-street parking is recommended, to further slow traffic and informally raise parking capacity of the West Campus. At major intersections, the on-street parking will be replaced with curb bulbs or 'bump-outs' to reduce the crossing distance for pedestrians. Travel lanes (one in each direction) should be no wider than 12' and narrower if possible. The paving material will consist of asphalt with concrete curb and gutter. Turn lanes should be avoided, although turn pockets at intersections may be necessary at major arterials. Street lighting should be pole-mounted, pedestrian-scaled and oriented to sidewalks. (Figure 2-11)

2.2.4.2 Limited Access Street

2.2.4.2.1 Academic Streets (General Vehicular Streets)

There are two streets in this category: a proposed street along the east side of the proposed Apartment Housing blocks and several within the School of Medicine campus. These streets will be identical in cross-section to General Vehicular Streets (described above)

2.2.4.2.2 Residential Streets

This category includes streets through proposed Family Housing neighborhoods, which will be gated to prevent cut-through traffic. These asphalt streets should be designed for very low-speeds, with parking usually on both sides and narrow lane widths of 10' in each direction. A basic dimension of 20' between parked cars will be sufficient to allow access for emergency vehicles. The streets could be even narrower if they adopt the concept of "queuing streets" where cars share the roadway by waiting to one side (in pockets where parking is not permitted) while oncoming cars pass. The streets should include planting strips with street trees to shade the roadway, and sidewalks intersected with walkways to townhouse and apartment entries.

2.2.4.2.3 Service and Restricted Access Streets

Service streets within the West Campus will be basic, narrow streets, up to 24' wide (but 20' is an adequate dimension). Sidewalks are not necessary, as the relatively low volume of traffic will allow pedestrians to share the streets. These streets will be paved with asphalt, concrete curbs and raised sidewalks but could also be surfaced with special unit pavers in recognition of their flexible role. Trees planted adjacent to the right of way as structural plantings for buildings could also shade these streets. The streets will include pole-mounted campus-scale lighting.

2.2.4.3 Pedestrian Walks

2.2.4.3.1 NW and SW Walks

The NW and SW Walks will be very important spines upon which much of the West Campus Academic Core will be oriented. They will continue the route of the NW and SW Malls into the academic area, but private vehicles will not be permitted beyond gateway drop-off points. Special paving, such as scored concrete with unit paver details is preferred for these walks to distinguish them from other walkways on campus. The walks will be at least 30' wide and will be bordered by a climate-adaptive structural landscape adjacent to buildings. The Walks will also be designated bicycle pathways. Emergency vehicles may utilize the walks to access the campus, but standard routes are mapped so this is only a contingency. Service vehicles or transit will not be permitted on the Walks. The Walks should also feature special pole-mounted light standards as wayfinding elements and ample pedestrian furnishing such as seating, bollards and trash cans. (Figure 2-12)

2.2.4.3.2 Gage Canal Walk

The Gage Canal Walk will be a very important spine for the Gage Canal Mall, the central identifying open space for the West Campus Academic Core. The Walk will also serve as a regional bike trail. Special paving, such as scored concrete with unit paver details at seating areas and overlooks is preferred for this walk to distinguish it from other walkways on campus. The walk will be at least 12' wide and will be bordered by a climate-adaptive botanical landscape. Emergency vehicles and Gage Canal Company maintenance vehicles may utilize the Walk to access the campus, but standard routes are mapped so this is only a contingency. Service vehicles or transit will not be permitted on the Walk. The Walk should also feature special pole-mounted light standards as wayfinding elements and ample pedestrian furnishing such as seating, bollards and trash cans.

2.2.4.3.3 General Walks

General walkways on campus will be at least 10' wide and will either traverse irrigated turf on campus quads or will be bordered by a climate-adaptive landscape. Service or emergency vehicles will probably not be permitted on such walks. Materials will consist primarily of scored concrete with special unit paver details. These Walks should also feature campus standard pole-mounted lights and basic pedestrian furnishing such as seating, bollards and trash cans.

2.2.5 Building Program

The new framework for the West Campus will accommodate most, if not all future growth of UCR graduate and professional schools, as directed by the LRDP. The CAMPS team interviewed staff from three of these schools - the Graduate School of Education (GSOE), the Public Policy faculty and the Anderson Graduate School of Management (AGSM). The GSOE is likely to be the first occupant of a new West Campus building and will likely share space in a Graduate Professional Center with the School of Public Policy, a new program. This is detailed as Phase 1A of this report.

The AGSM is currently housed in Anderson Hall, but the program needs additional space. Anderson Hall has also been identified as the future home of the Office of the Chancellor. A DPP was prepared for a new AGSM building on the West Campus but the building was located on a site now occupied by Parking Lot 30. UCR has determined that this recently-built lot should remain for as long as possible to allow for the amortization of UCR's investment in its construction. Most likely, AGSM will instead occupy a new structure in the first phases of West Campus development, to the north of Lot 30.

Two proposed schools that do not yet have faculty positions at UCR, the Law School and the School of Medicine, will also be located on the West Campus if they are approved for UCR. Detailed planning under the direction of new Deans, outlining specific faculty and curricula, will be required to fully understand the requirements of these new programs.

With the programmatic requirements of new graduate and professional schools providing some preliminary footprints to inform West Campus planning, it was also important to consider the potential for collaborative relationships between these graduate and professional programs as well as undergraduate programs and the greater community. These relationships, summarized graphically in Figure 2-13, suggest a range of adjacencies that may prove beneficial to the efficient management of students and the sharing of support services as well as supporting a general exchange of knowledge and resources. Such adjacencies can also inform transportation planning, suggesting when certain schools need easy access to parking or transit for part-time students or visitors.

2.2.6 Plan Capacity

The revised West Campus plan is based on an accurate survey of UCR land ownership and reflects aforementioned programmatic needs for graduate and professional schools. The Master Plan is shown in Figure 2-14. The following Table 2-1 summarizes the West Campus Plan capacity.

Table 2-1: Summary by Building Type, Proposed West Campus Buildings – CAMPS

All numbers are areas in gsf

				Development Phase				
Type	**Description**	**1A**	**1B**	**1**	**2**	**3**	**4**	**Total**
W	Academic	144,000		573,000	985,500	849,900	1,316,600	3,869,000
M	Medical		224,000	0	223,000	602,000	586,000	1,635,000
	Subtotal	144,000	224000	573,000	1,208,500	1,451,900	1,902,600	5,504,000
R	Recreation	0	0	0	65,000	0	0	65,000
C	Child Care & Community Centers	20,000	0	0	19,600	0	0	39,600
H	Graduate Housing, Medical	0	0	0	125,000	125,000	0	250,000
	Family Housing							
F	Apartments	286,200	0	0	288,372	0	0	574,572
F	Townhouses	106,458	0	0	89,052	0	0	195,510
A	Apartments	0	0	0	294,000	300,000	294,000	888,000
	Subtotal	412,658		0	881,024	425,000	294,000	2,012,682
	Total	**556,658**	**224,000**	**573,000**	**2,089,524**	**1,876,900**	**2,196,600**	**7,516,682**
P	Parking Garages	0	0	1,134,700	728,000	336,000	353,500	2,552,200
	Total with Parking Garages	**556,658**	**224,000**	**1,707,700**	**2,817,524**	**2,212,900**	**2,550,100**	**10,068,882**

2.2.7 West Campus Housing: Family Student Housing

Family Student Housing will be developed west of Iowa Avenue, in two phases, north and south of proposed recreation fields. The infrastructure for this housing may tie into future adjacent UCR facilities, if this proves efficient. Several key site plan elements should be considered for infrastructural planning related to West Campus Family Housing. The key elements are as follows:

- The streets have been designed as narrow, pedestrian-friendly neighborhood streets with on-street parking.

- There are inherent limits to the surface and on-street parking spaces possible for the housing types on this site, which will restrict the potential density of the project.
- It is assumed that each entire neighborhood will be gated. This will affect location of parking lot entries and street design on the neighborhood's perimeters.
- The central neighborhood parks are contiguous with housing areas. If play areas are to be located within these parks and they are to serve as community gathering places, the development should include access to the park with minimal street crossings, even if the streets in question are narrow.
- Pathways have been drawn conceptually to suggest appropriate internal circulation within the neighborhoods. Their eventual final locations should consider relationships and connections to paths in the West Campus Academic Core and the School of Medicine.

2.2.8 Recreation Center and Fields

As the East Campus develops, the existing Intramural Athletic Fields will need to be replaced. A large site south of the first phase of Family Housing and west of Iowa Avenue has been identified for future multipurpose recreation fields, including soccer and softball. Synthetic turf could be considered as a water-efficient option for these fields. A new 60,000 gross square foot Recreation Center with an aquatic facility is also planned for the east end of this site, and will be accessed from the NW and SW Malls. The entire complex will also include surface parking, some of which may be shared with Family Housing residents.

2.2.9 West Campus Housing: Apartments

From an infrastructural perspective, West Campus Apartments could be developed by a third party, which would mean private funding and provision of infrastructural elements include landscape and paths. This land use will occupy a large parcel on the West Campus and should consider connections to adjacent academic infrastructure, particularly roads and paths in addition to typical utilities. Given UCR's goals of housing 50% of students on campus and reducing the amount of private vehicle use on campus, UCR could explore reducing parking ratios for these apartments, if feasible from a market perspective and if off-site spillover parking effects are not anticipated.

2.2.10 School of Medicine

The CAMPS examined the School of Medicine as an integral component of the entire West Campus with coordinated circulation and open space systems. The resulting concept for the School follows established campus planning principles, with new buildings bordering generous quadrangles and featuring a fine-grained network of pedestrian, bicycle and vehicular circulation.

The building envelopes shown on the concept, are based on the programmatic requirements and not necessarily indicative of final building form. An overview of the physical form of existing medical schools reveals that they often feature large buildings growing amorphously through relatively continuous additions, linked with skybridges or tunnels, to accommodate sensitive medical functions within. If UCR proceeds with development of the School of Medicine on the 40-acre Campus Reserve, an amendment to the 2005 LRDP will be required.

The first phase of the new School of Medicine will be constructed at the western terminus of the SW Mall, tying the new facility back to the core of the UCR campus. This is designated as Phase 1B in West Campus development, with M4 slated as the initial building to be constructed as part of an early mix of education and research programming (see Figure 2-21). Also, placing this first phase west of the Cranford Avenue extension allows for the orderly disposition of the citrus research groves that currently sit on much of the 40-acre site. These groves can potentially be replaced with surface parking lots while the campus awaits full development and sufficient capacity to justify construction of parking structures. The landscape legacy of the groves could be expressed with planting designs placed within medical campus open spaces.

Subsequent phases of the School of Medicine development would feature more research facilities and ambulatory care clinics for practical application of medical education. The campus would grow to occupy the area with buildings lining vehicular streets and enclosing a quadrangle of open space behind, which will still be open to the larger campus community. A parking structure will eventually be constructed at the corner of Cranford Avenue and MLK, minimizing vehicular intrusion into the campus. This intersection will require improvement, with turn lanes and a probable signal to accommodate future growth. Shuttle transit will connect the main campus and School of Medicine on a regular basis.

The area of the campus along Chicago Avenue is not specifically programmed at this stage. The buildings shown on the master plan will complement the School of Medicine's campus vision and circulation system, but is anticipated to be occupied by Medical Offices which are purely speculative. Such office buildings thrive in the vicinity of medical schools and hospitals and could serve as incubators for technology related to biotechnology and genetic research.

Two apartment buildings are proposed at the corner of the NW Mall and Cranford Avenue, within the School of Medicine. These could serve as higher-density housing units for graduate students, medical students and short-term faculty. These two housing blocks should be included in future refinement studies of West Campus housing.

2.3 Implementation and Recommended Phasing Strategy

The following assumptions underlie the West Campus Phasing for UCR's growth from 2010 – 2025 and beyond. With the planning assumptions in mind, the West Campus is envisioned to grow in a logical progression, beginning in the north and east corner.

- The School of Medicine will occupy a 40-acre parcel at the northeast corner of Chicago Avenue and MLK, and will be primarily accessed by the NW and SW Malls and by a new signalized intersection east of Chicago on MLK at Cranford Avenue.

- The Caltrans Corporation Yard at the east end of Everton Place will remain until a suitable replacement yard is found for Caltrans elsewhere. The site will be available in the future if and when Caltrans vacates the site. Conference facilities are proposed for the northeast corner of the West Campus. Currently, access to the Graduate and

Professional Center from Everton Place is constrained by Caltrans' southern property line.

- Access to proposed parking at the east end of Everton Place will require that Everton be extended east. The alignment of this road will depend on UCR's acquisition of the Caltrans Yard. Everton Place will extend due east if UCR obtains the yard. If Caltrans remains, the road will be adjusted to remain entirely on UCR property with subsequent adjustments in the master plan.

- A temporary pedestrian/bike trail should be considered, to extend from the north end of Lot 30 to the parking lot/structure at the end of Everton and the new Graduate Professional Center adjacent to it.

- The existing parking lot immediately west of UNEX will become a roadway linking University Village to the West Campus. New pedestrian and bicycle pathways will extend into the West Campus via the Gage Canal open space and through a new Conference Center complex.

- Surface parking lots shown at the east end of Everton and at MLK and Canyon Crest Drive, will be replaced by parking structures as West Campus growth progresses.

- As development takes place on Lot 30, any decrease in its parking capacity will need to be replaced elsewhere.

- Under an Operating Agreement with the Gage Canal Company, the City of Riverside and UCR, the Gage Canal will eventually be piped and capped for its entire length between University Avenue and MLK. (No structures/buildings can be built over the canal, however, roads, parking lots, and such can be installed within the 50' easement.)

- The block containing International Village housing (including the parking lot between the housing and Everton Place and the recreation field/storm water detention pond to the south of the housing) will remain in the control of a 3rd party developer for the foreseeable future. The lease expires in 2047.

- Academic uses include future professional and graduate schools, including a potential School of Public Policy and/or Law School. The existing Graduate School of Education and the A. Gary Anderson Graduate School of Management programs will relocate to the West Campus Academic Core.

- The UCR Citrus Collection south of MLK on both sides of Canyon Crest Drive is of critical importance to UCR research and a long-term storehouse for genetic citrus material and will thus remain undeveloped. Fields to the west, south of MLK, may be considered for future development only when replacement lands are acquired and programmatic needs of the College of Natural and Agricultural Sciences (CNAS) are met. Excepting the needs of the CNAS, there are no plans for development south of MLK at this time.

- A major stormwater treatment swale approximately 80 feet wide is proposed along the north side of MLK between Chicago Avenue and Canyon Crest Drive, which will collect stormwater runoff from areas north of MLK, as well as the Northwest Mall and Southwest Mall center landscape medians, which will also act as bio-swales for treatment and detention of stormwater.

- The existing signal at the west entry to parking Lot 30 may be relocated when Lot 30 closes and positioned approximately 400 feet to the west. This location allows new West Campus roadways to be evenly spaced while still allowing access to the agricultural facilities south of MLK. The main entrance may need to be relocated west to correspond to the relocated signal.

- The electrical substation adjacent to the I-215 freeway will remain and UCR will require a buffer between it and any development. City-owned transmission wires leading to this substation will be rerouted along the freeway or placed underground.

- Some orange groves may remain in sizeable blocks north of MLK, while the West Campus is developed incrementally, if their ongoing maintenance does not have negative effects on proposed housing or academic space.

2.3.1 Phase 1A: 2010 (or first 3-5 years of growth)

An initial phase of graduate and professional academic development (the Graduate School of Education and the School of Public Policy) will be built south of Everton Place and immediately east of the Gage Canal easement, served by surface parking accessed either from Everton or the NW Mall, including the area now occupied by Highlander Hall. Water and sewer will be supplied from existing lines under Everton Place. The Gage Canal will be piped and an interim landscape installed until a full design for the Gage Canal Mall is completed.

The existing Caltrans yard will remain, until a replacement is found for that use. The first phases of Family Student Housing will be built on the west side of Iowa Avenue and north of a new NW Mall, and will include a Child Development Center. The proposed Recreation complex will begin development with a series of multi-purpose fields. Housing can then grow to the south as needed, adjusting to reflect student demand and competition from other off-campus housing developments. (Figure 2-15)

2.3.2 Phase 1B: 2010 (or first 3-5 years of growth)

The first building on the School of Medicine campus, M4 on the Key Plan (Figure 2-21), may be constructed, earlier than the CAMPS anticipated. This education and research building will be served by existing services (water, sewer, power, gas) along and under Chicago Avenue and MLK. (Figure 2-16)

2.3.3 Phase 1

Two buildings are proposed north of the Graduate and Professional Center, anticipated to be built in Phase 1A. The existing Highlander Hall and the Human Resources office building to the north of Everton Place would be demolished, providing potential land for temporary surface parking for these buildings. At the same time, the UNEX facility may be refurbished and expanded, perhaps with a first phase of a high-end conference center. New surface parking could be built on the east side of Canyon Crest Drive on the site currently used by Caltrans. A surface lot could be placed at the end of Everton on the future site of the parking structure P2. The first activity towards a new Support Yard at the far west end of the NW Mall could be initiated in the first phase of West Campus development. (Figure 2-17). The new School of Medicine and associated academic and research facilities will continue to grow, which may proceed independent of phasing progress elsewhere on the West Campus.

2.3.4 Phase 2

The graduate and professional schools will continue their expansion onto the West Campus, wrapping around the eastern end of the NW Mall. This will be accompanied, ideally, by the acquisition of the Caltrans Yard for the completion of the Conference Center, with its' own Parking Structure (if it is not accomplished earlier). A first phase of Apartment Housing will be built north of the NW Mall. This will be accompanied by the full construction of the SW Mall linking academic uses and Lot 30 (and the East Campus) with the first phase of the School of Medicine.

The remainder of the Gage Canal will be piped and the new central open space paralleling its course will be established above with a linear open space adjacent to a regional bike trail connecting Lot 30 with the first phases of growth to the north.

Between the two Malls, the Recreation Complex will be developed in this phase. Also, a significant portion of the Family Housing block to the south of the SW Mall will be realized, including another Child Development Center.

The new School of Medicine and associated research facilities will continue to grow, proceeding independent of phasing progress elsewhere on the West Campus. An initial block of housing allocated to medical students could be built at the SW corner of Cranford Avenue and NW Mall. At the same time, the first segment of the stormwater treatment buffer alongside the northern edge of MLK will be established, to begin treating water conveyed from the NW and SW Malls. The buffer will be adjacent (south) to development as development occurs but must always "attach" to the downstream leg in order for stormwater from the West Campus to flow into city storm drains at or near Chicago Avenue. (Figure 2-18)

2.3.5 Phase 3

In Phase 3, most of the remaining West Campus Academic Core outside of the boundaries of Lot 30 will be developed. The landscape buffer along MLK will extend eastward to meet the southern end of the Gage Canal open space. The density of academic uses will now justify the conversion of the surface parking lot at the end of Everton Place into a multi-story parking structure, combined with a new pedestrian bridge across the I-215 freeway from a parking structure on current Lots 1 and 2.

The School of Medicine facilities will continue to grow rapidly after their initial phase and will require a parking structure on the site of their surface lot. The first phases of Medical Office construction may begin in this phase, depending on the progress of the School of Medicine and associated research activities. Family Housing will be completely built out, as well as housing for most of the graduate students and housing for the School of Medicine. A second block of Apartment Housing will be built between the NW and SW Malls east of Iowa Avenue. (Figure 2-19)

2.3.6 Phase 4

It is difficult to predict the precise growth of student enrollment in the next 20 years, when there are a number of variables including statewide policies, demographic changes, and market forces influencing such growth. But continuing the above logic of orderly West Campus growth, this phase should see the replacement of Lot 30 with academic uses and the full realization of a cohesive West Campus. This will include most of parking in structures, a maturing central open space and an established circulation system. The stormwater treatment system will be complete, with a full buffer along the length of MLK linked with the NW and SW Mall spaces. All housing will be complete and much of the speculative Medical Office construction should also be nearing completion. By this point in time, UCR will have revised the LRDP and the CAMPS and may be seeing a dramatic increase in overall campus density through infill development. (Figure 2-20)

2.4 Landscape and Hardscape Cost Summary

This study includes conceptual-level cost estimates for infrastructural improvements. Details of these cost estimates are included in the Appendix to this report. Included in the costs are landscape, trees, lighting, plazas, walks and paths, recreation fields, roadways and surface parking. Costs include mark-ups, sales taxes, and contingencies, but do not include soft costs. See additional notes on the detailed tables.

- Phase 1A Housing: $ 9,962,000
- Phase 1A Campus: $ 6,524,000
- Phase 1B: $ 2,476,000
- Phase 1: $ 5,932,000
- Phase 2 Housing: $ 8,891,000
- Phase 2 Campus: $25,651,000
- Phase 3: $18,978,000
- Phase 4: $20,308,000

Estimated Total for all Conceptual Landscape and Hardscape: $98,722,000

2.4.1 Landscape and Hardscape Cost Item Descriptions

** Landscape, Plaza or Path costs do not include any costs within a 10' offset of each master plan footprint. Such costs assumed to be within building budgets.*

Landscape

- Sod or seeded finish lawn, irrigated (includes soil preparation)
- Shrubs and groundcover, irrigated (where applicable)

Trees

- 3" caliper trees from UCR Plant List

Landscape Lighting

- Pedestrian-scale light poles or bollards
- 277/480V connecting to nearby building panels

Plazas

- Concrete paving with unit paver details
- seat walls
- 3" caliper trees in planters
- furnishings (benches, trash, bike racks)
- pedestrian-scale lighting

Paths

- 6' concrete (housing areas) or 10' concrete (academic areas)
- Limited Furnishings (benches, trash cans, bicycle racks)

NW/SW Pedestrian Walks

- 30' concrete walk with special paver bands or details
- furnishings (benches, trash, bike racks)
- shrubs and groundcover on edges
- 3" caliper trees 30' on-center

Temporary Gage Canal Path

- 10' asphalt path, no furnishings

Gage Canal Piping

- Temporary water diversion dam
- Demolition of the original Gage Canal
- Wet soil removal and disposal
- Sub-grade preparation
- Control points surveying
- Importing of clean fill to meet grades and cover the pipes
- Installation and grouting of two fifty-four inch reinforced concrete pipes
- Upstream and downstream transition structures
- Fencing
- Engineering and testing costs
- City of Riverside and Gage Canal plan check and legal fees.

Interim Gage Canal Landscape

- Sod or seeded finish lawn, irrigated

Final Gage Canal Landscape

- Naturalistic shrubs, trees
- Dry wash/arroyo
- Pedestrian bridges and furnishings

Type 1 Roads

- 24’ concrete paving and sub-grade
- concrete curbs and gutters
- 10’ sidewalks both sides
- 6' tree lawns
- 3" caliper street trees 30' on center
- street lighting 70’ on-center
- signage

Type 2 Roads

- 24’ asphalt paving and sub-grade
- concrete curbs and gutters
- 8’ sidewalks both sides
- 5' tree lawns
- 3" caliper street trees 30' on-center
- street lighting 70’ on-center
- signage

Surface Parking

- Asphalt paving and sub-grade
- Concrete curbs and Gutters
- 3" caliper street trees in planters
- Lighting
- signage and striping
- 6’ internal pedestrian circulation walks

MLK Stormwater Planting

- Naturalistic shrubs, trees

Recreation Fields

- Sod or seeded finish lawn, irrigated
- Athletic furnishings (benches, backstops, goalposts)
- Lighting
- Fencing
- Changing rooms/restrooms/drinking fountains not included

2.5 Conclusion: Key Considerations to Guide West Campus Infrastructure Development

The open space system described here for the West Campus is shaped through the Regulating Plan found in both the 2008 CAMPS report and the 2007 Campus Design Guidelines. Infrastructure should be carefully located to minimize impacts or conflicts on the future public space at the heart of the West Campus. The West Campus Infrastructure Development Study should be considered a dynamic and flexible document, reflecting the dynamic nature of campus growth and change. Along with CAMPS, a consistent process of revision and update is recommended for this document on a regular basis, such as every five years, which fits neatly between the longer horizons of long range development plans. Sustainable strategies that look beyond the typical planning horizon must be considered. The development of infrastructure can shape building location and scale, as well as resource usage, for decades.

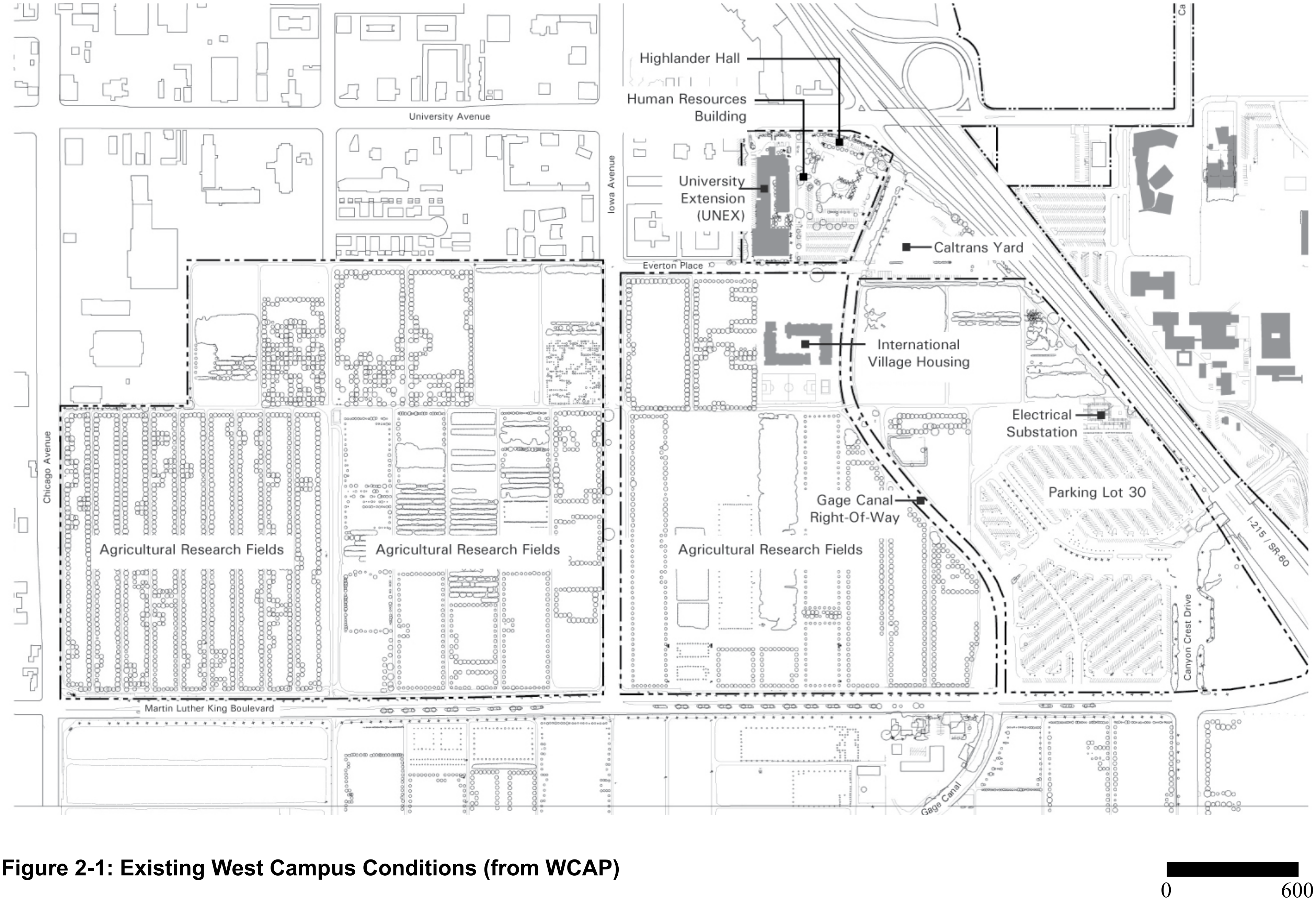

Figure 2-1: Existing West Campus Conditions (from WCAP)

Figure 2-2: Proposed Gage Canal Mall

Figure 2-3: View east down proposed central quad in West Campus Academic Core

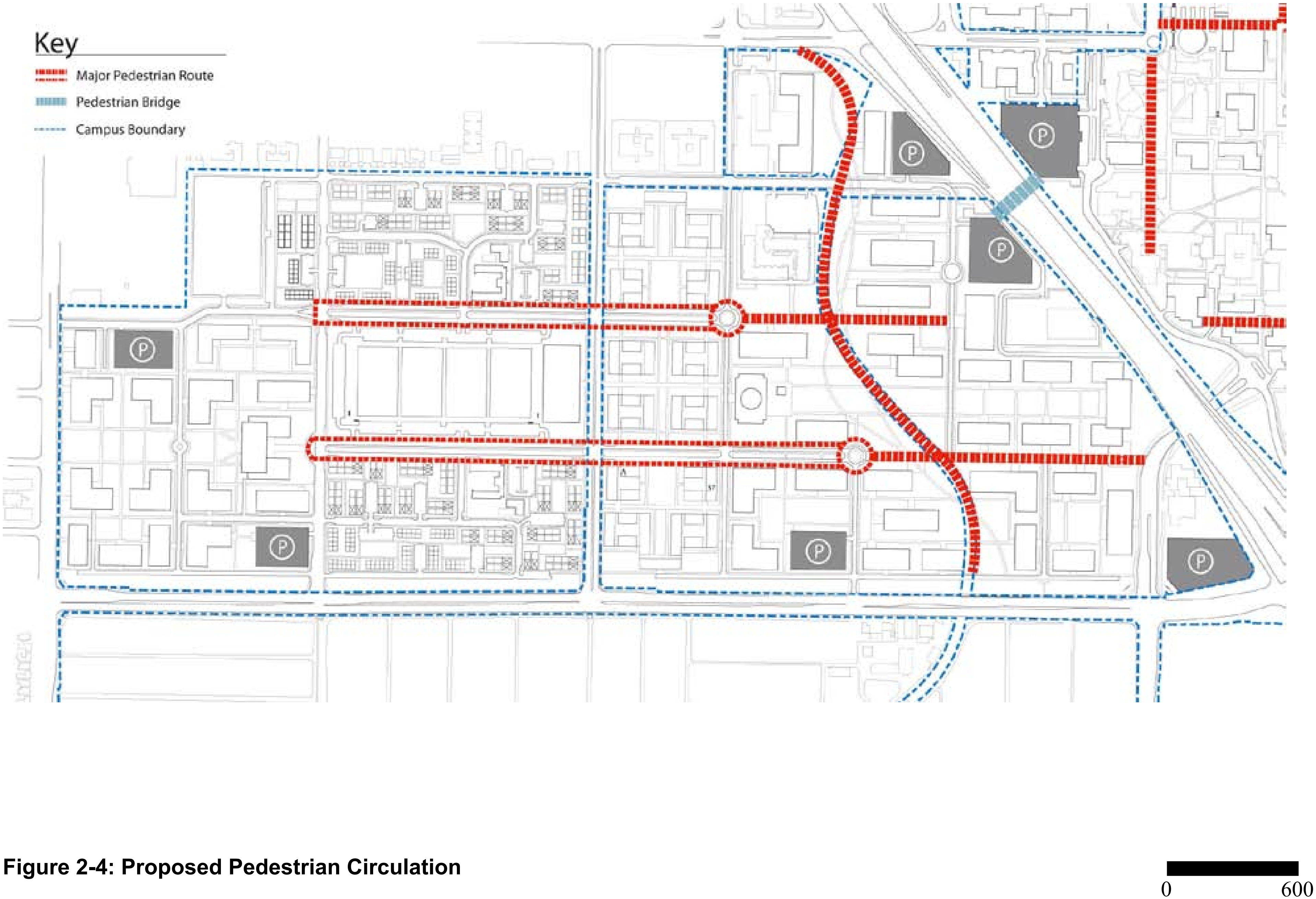

Figure 2-4: Proposed Pedestrian Circulation

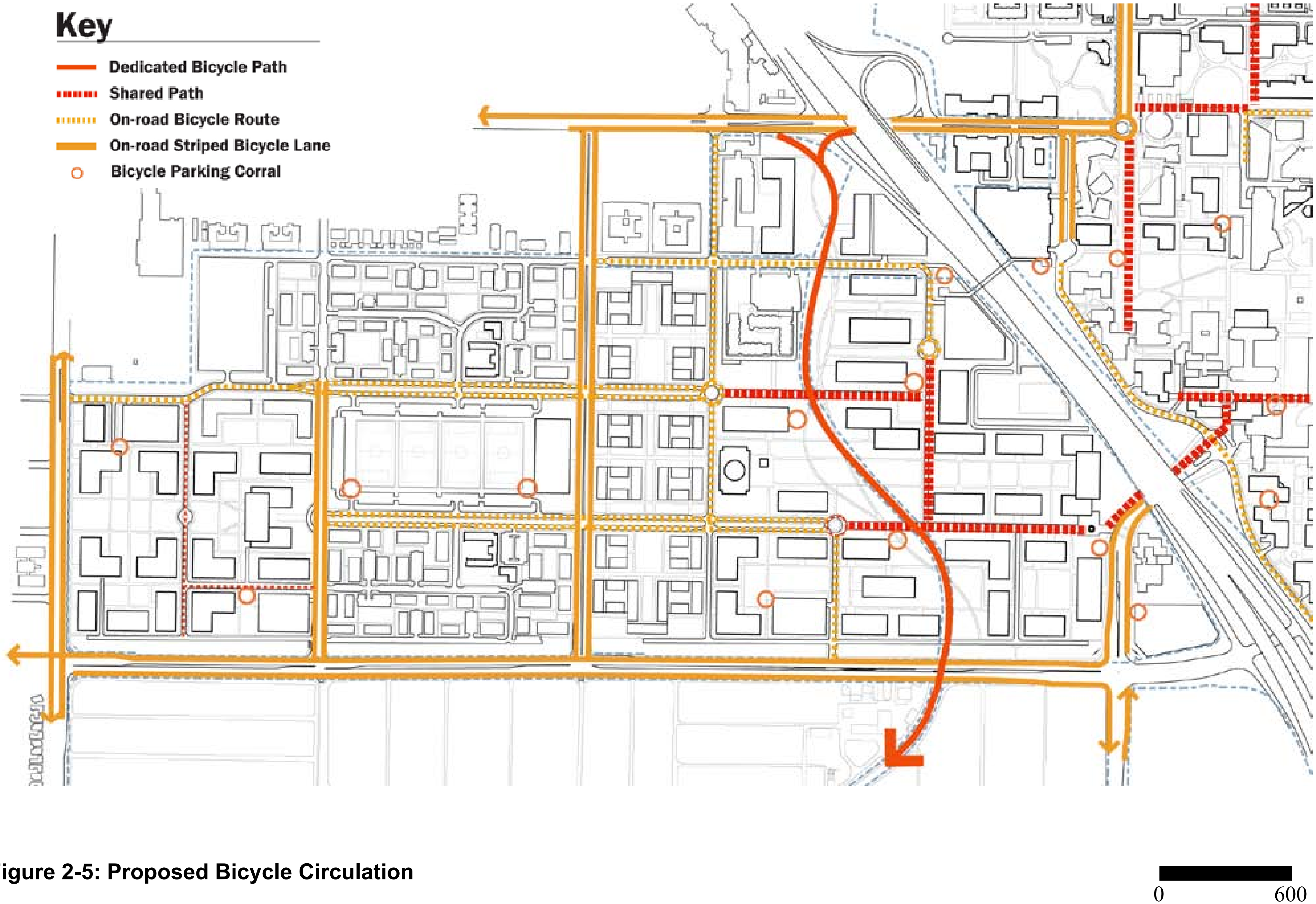

Figure 2-5: Proposed Bicycle Circulation

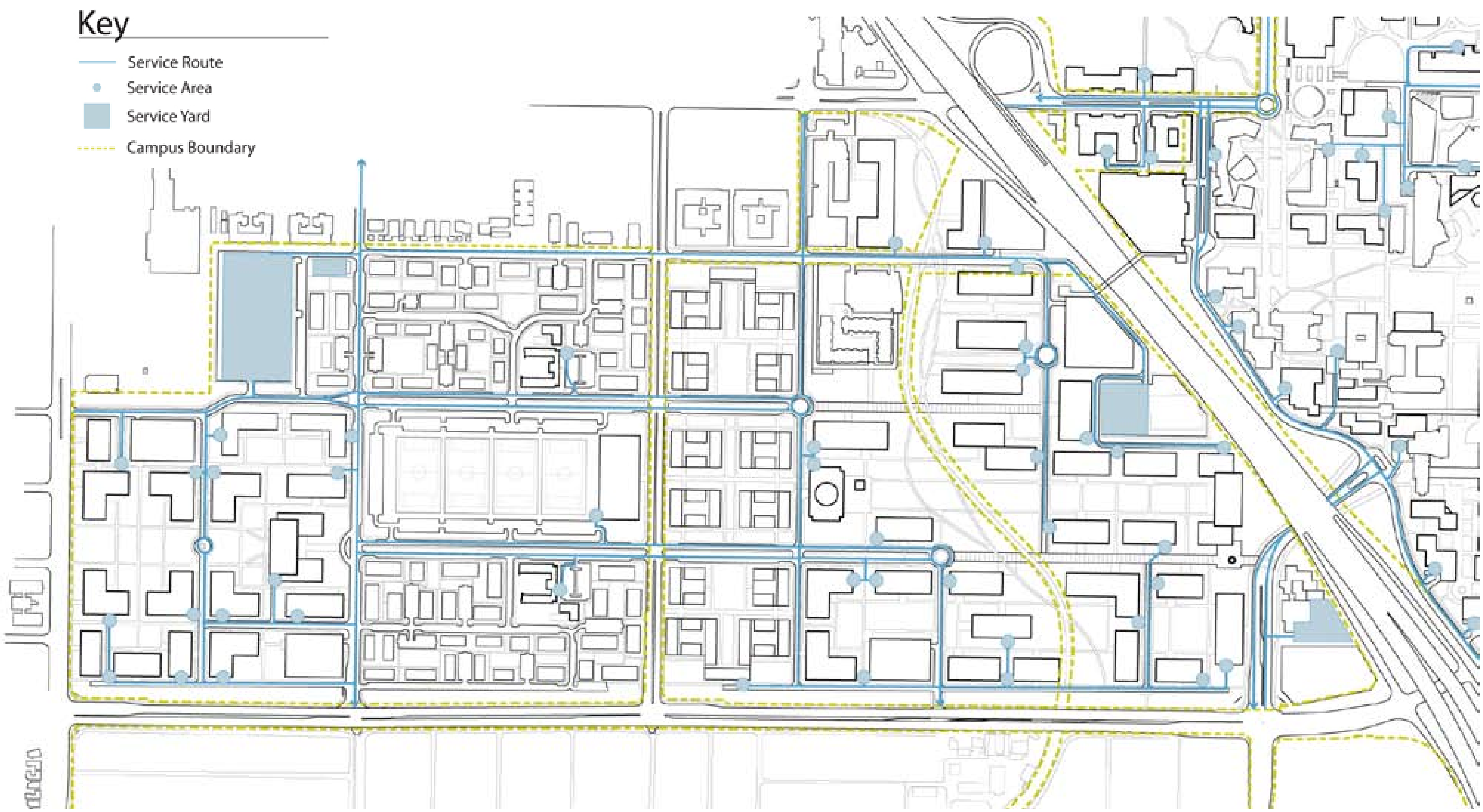

Figure 2-6: Proposed Service Access

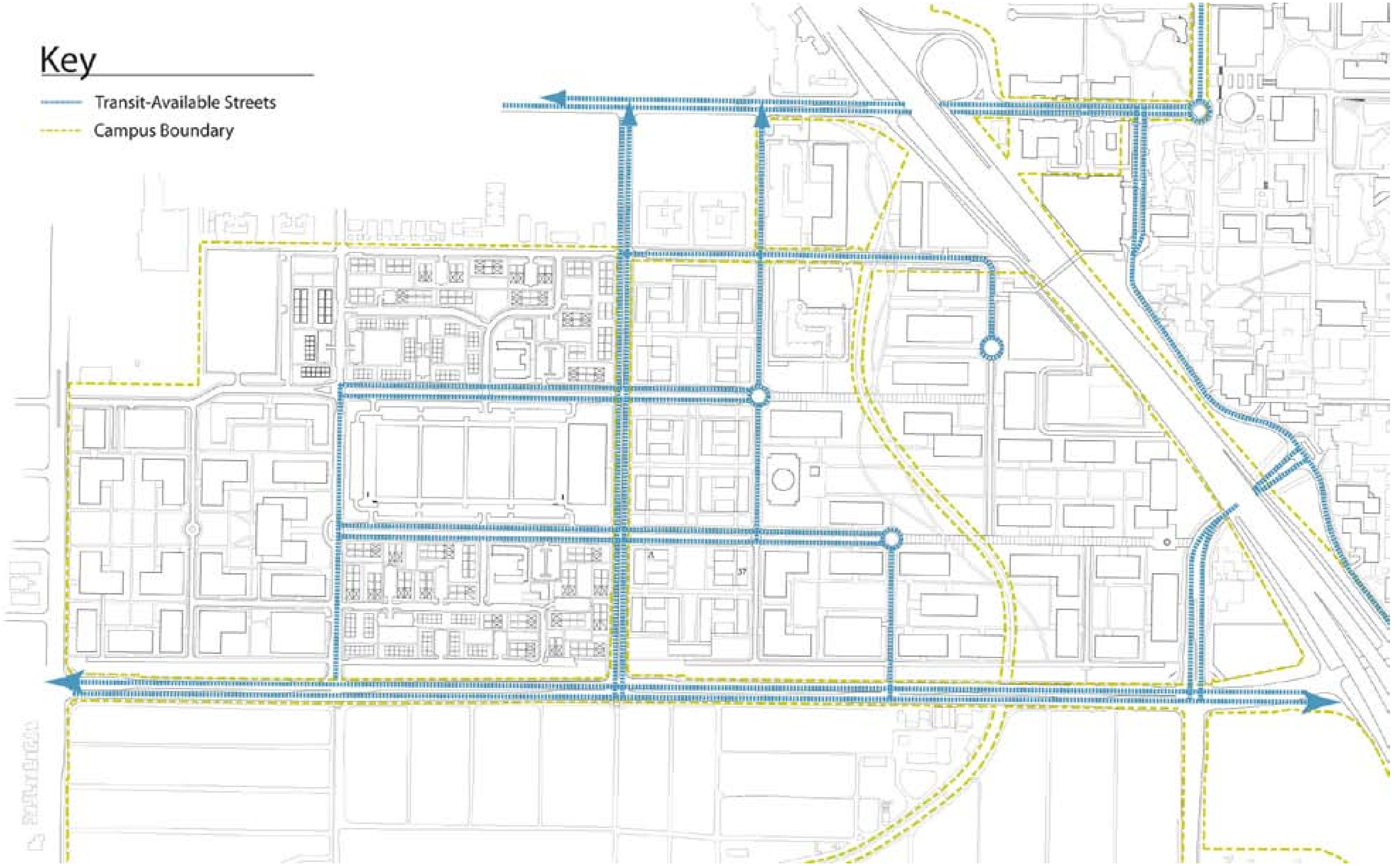

Figure 2-7: Proposed transit-available streets on West Campus

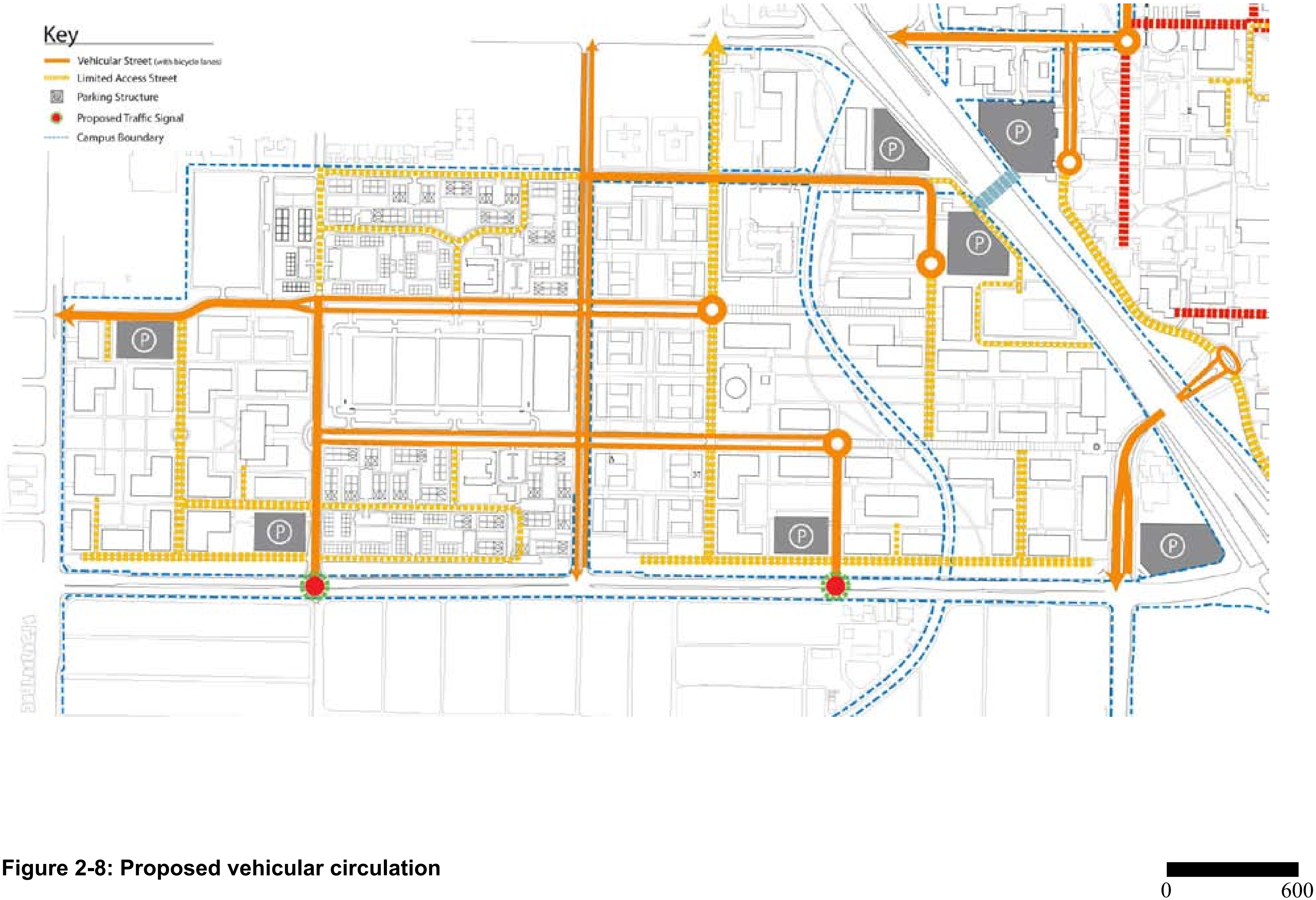

Figure 2-8: Proposed vehicular circulation

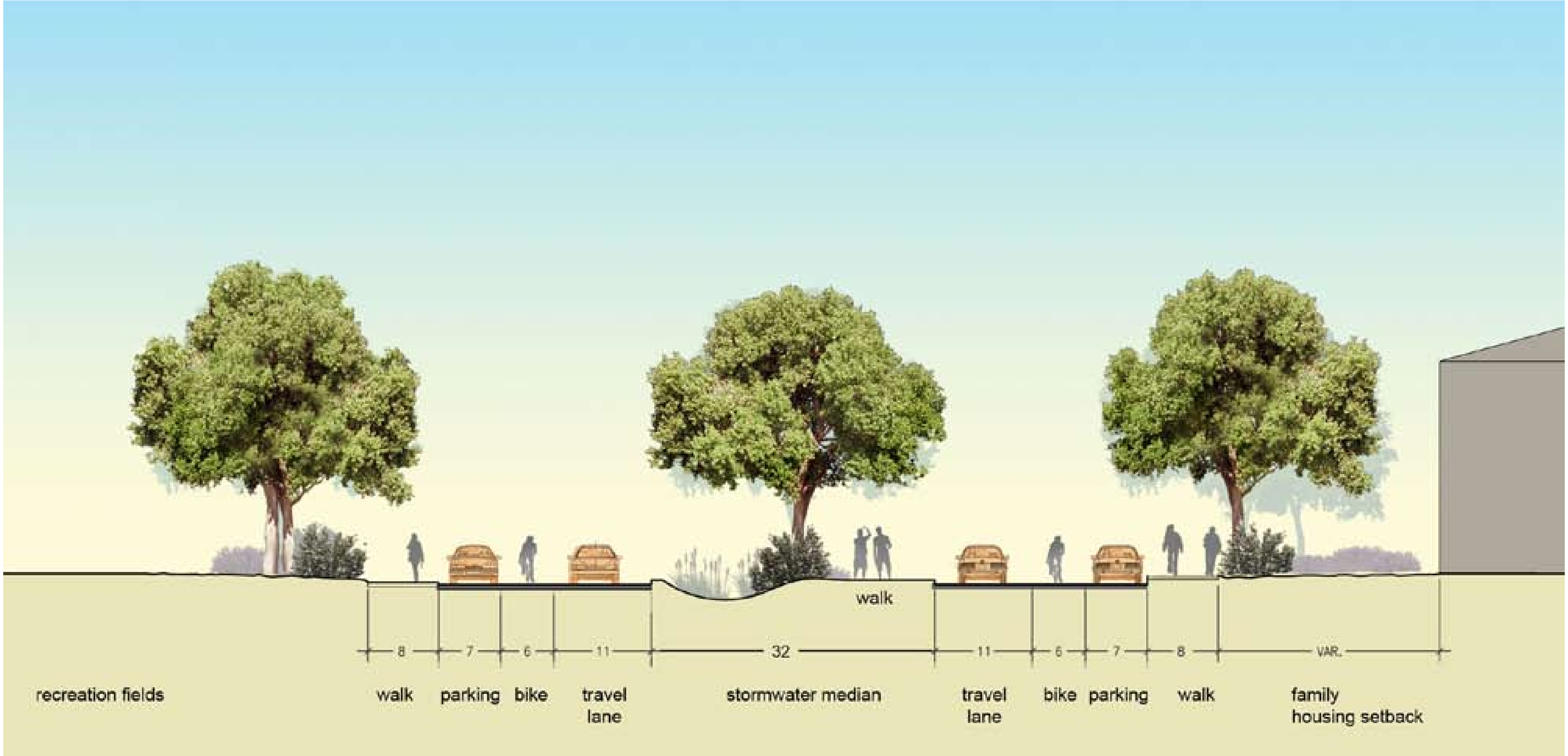

Figure 2-9: Proposed NW Mall Cross-Section

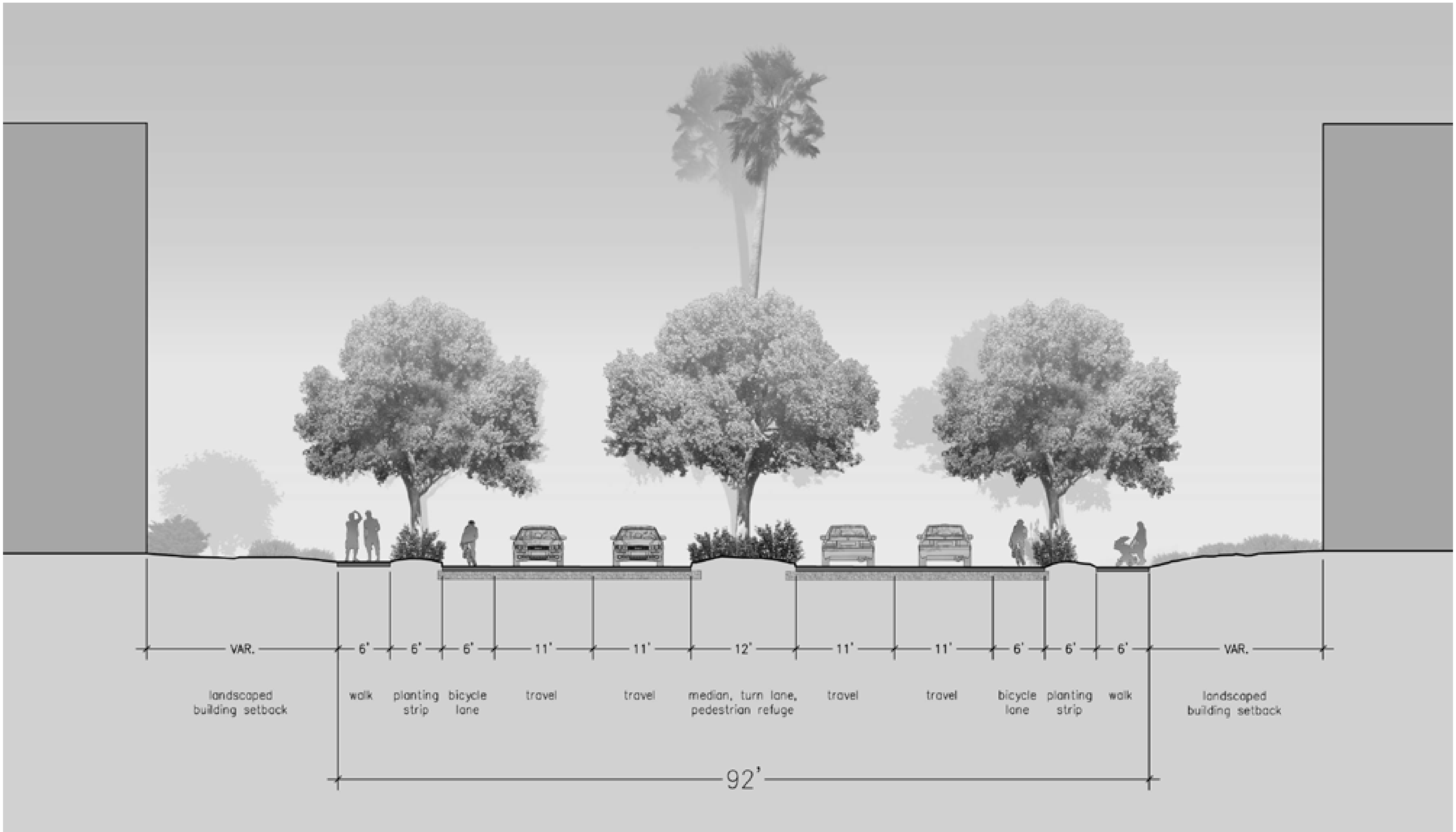

Figure 2-10: Proposed Iowa Avenue Section

Figure 2-11: Proposed General Vehicular Street

Figure 2-12: Proposed SW Pedestrian Walk

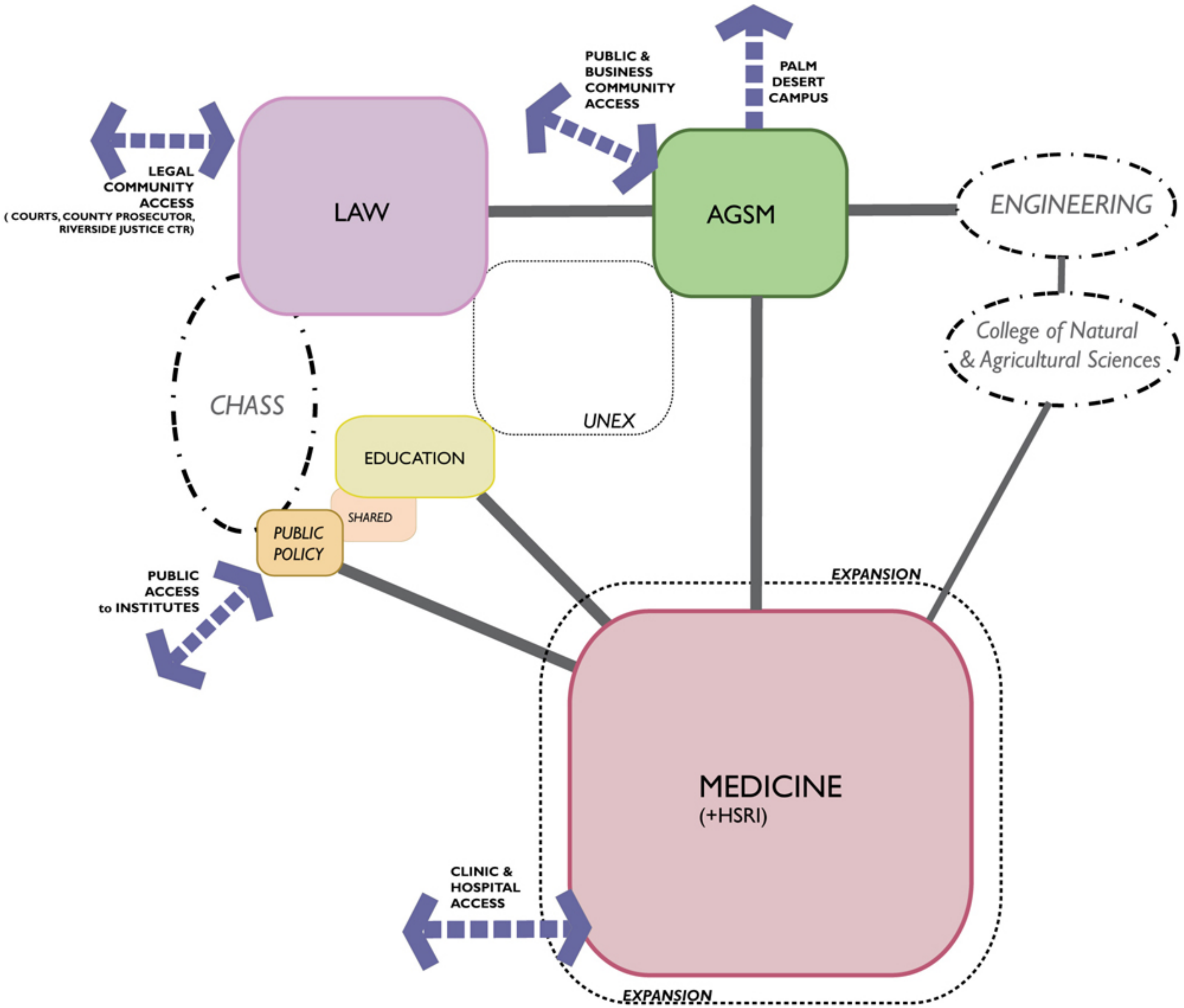

Figure 2-13: Programmatic adjacencies for Graduate and Professional Schools on West Campus

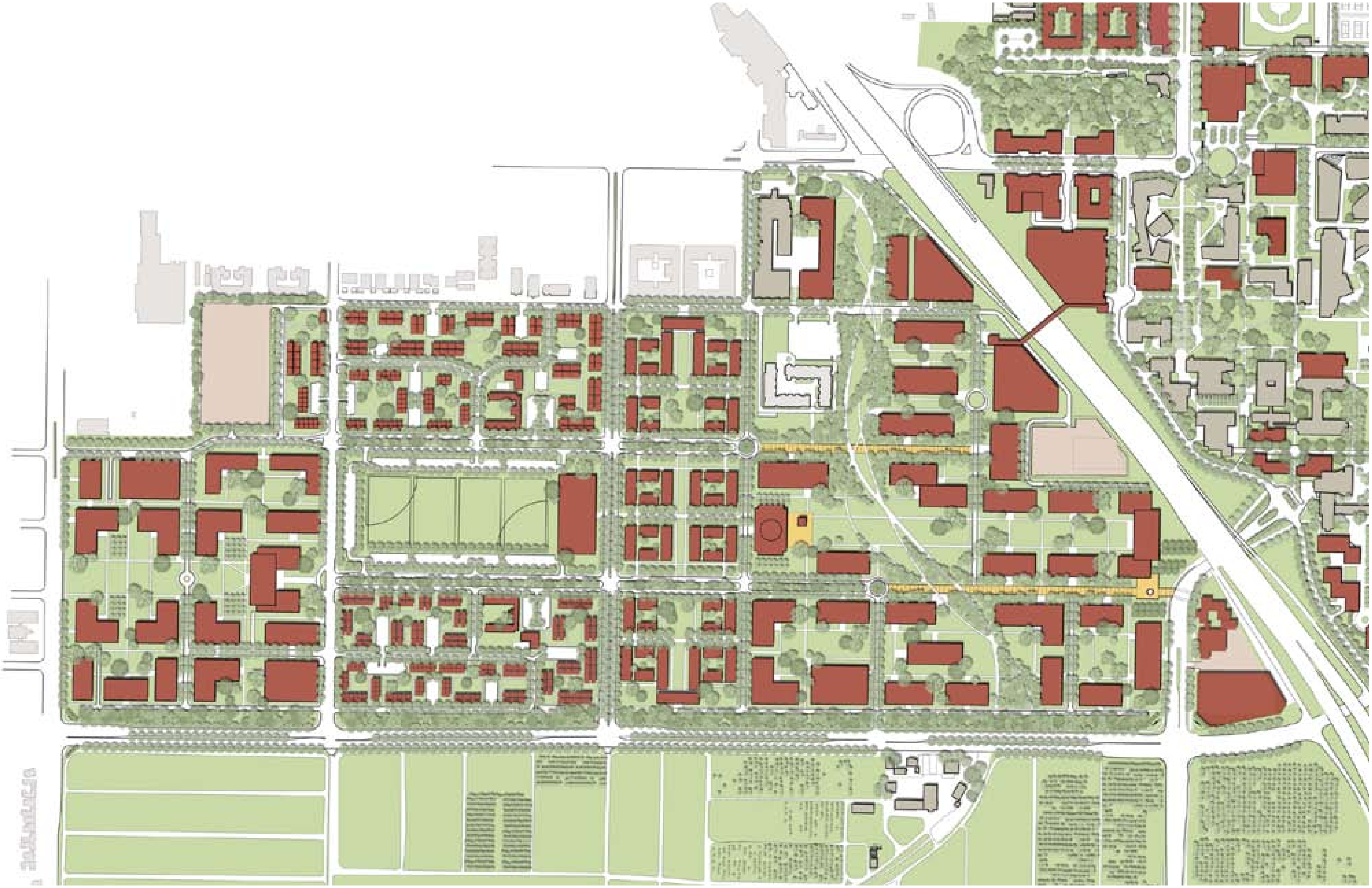

Figure 2-14: West Campus Master Plan

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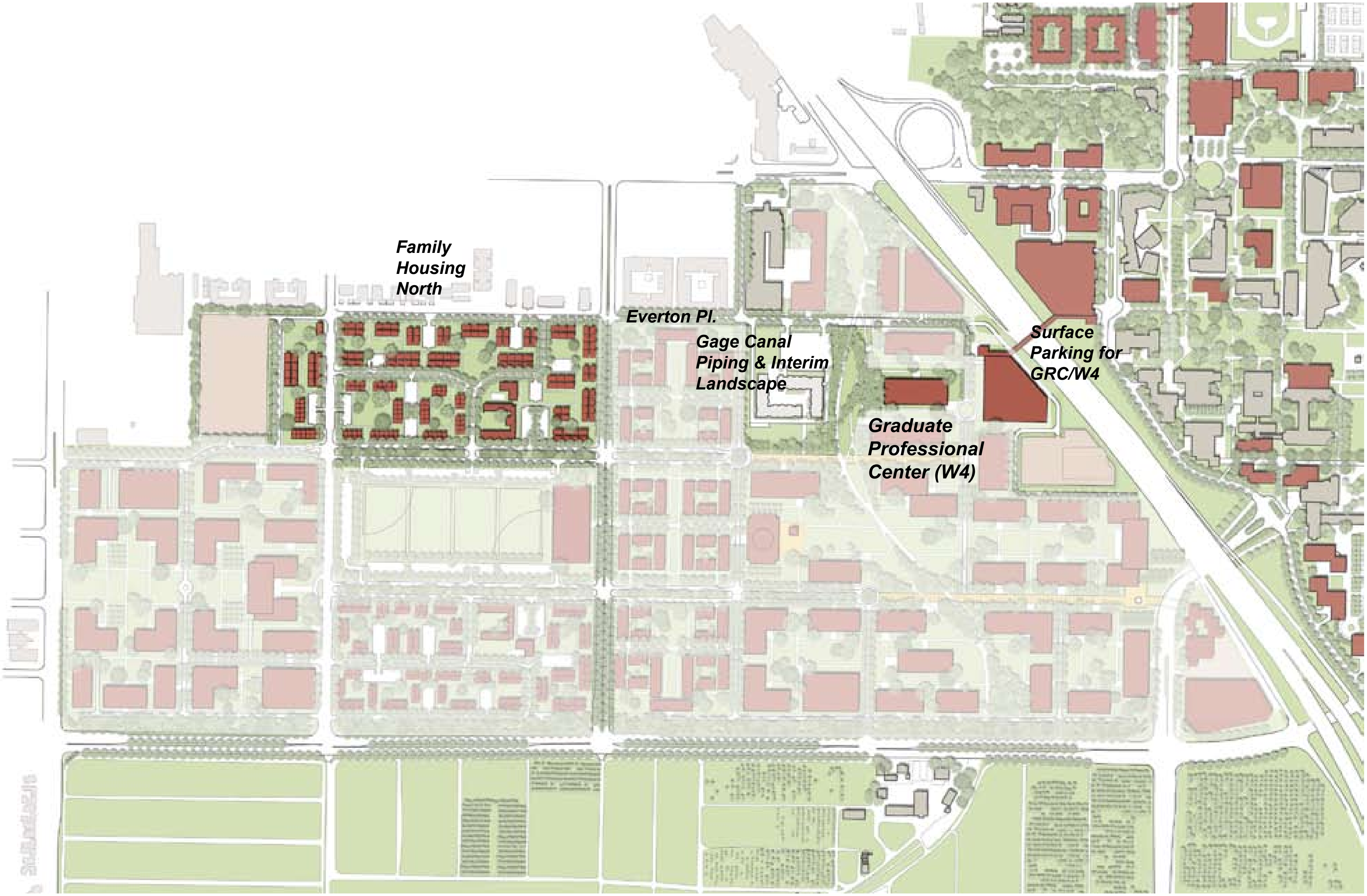

Figure 2-15: Phase 1A Landscape and Hardscape Improvements
***** Includes all improvements outside 10' boundary around each proposed building envelope***

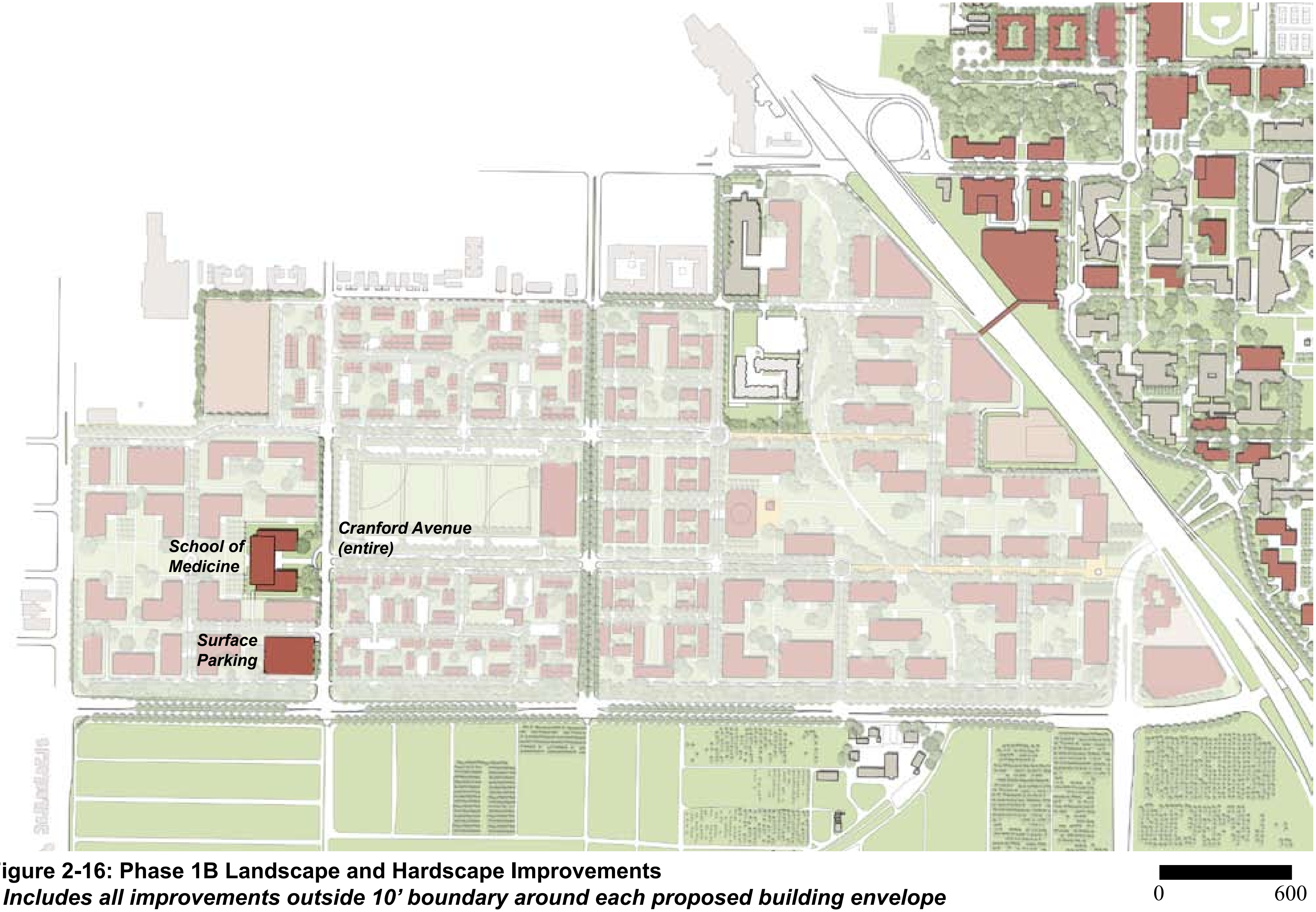

Figure 2-16: Phase 1B Landscape and Hardscape Improvements
**** Includes all improvements outside 10' boundary around each proposed building envelope***

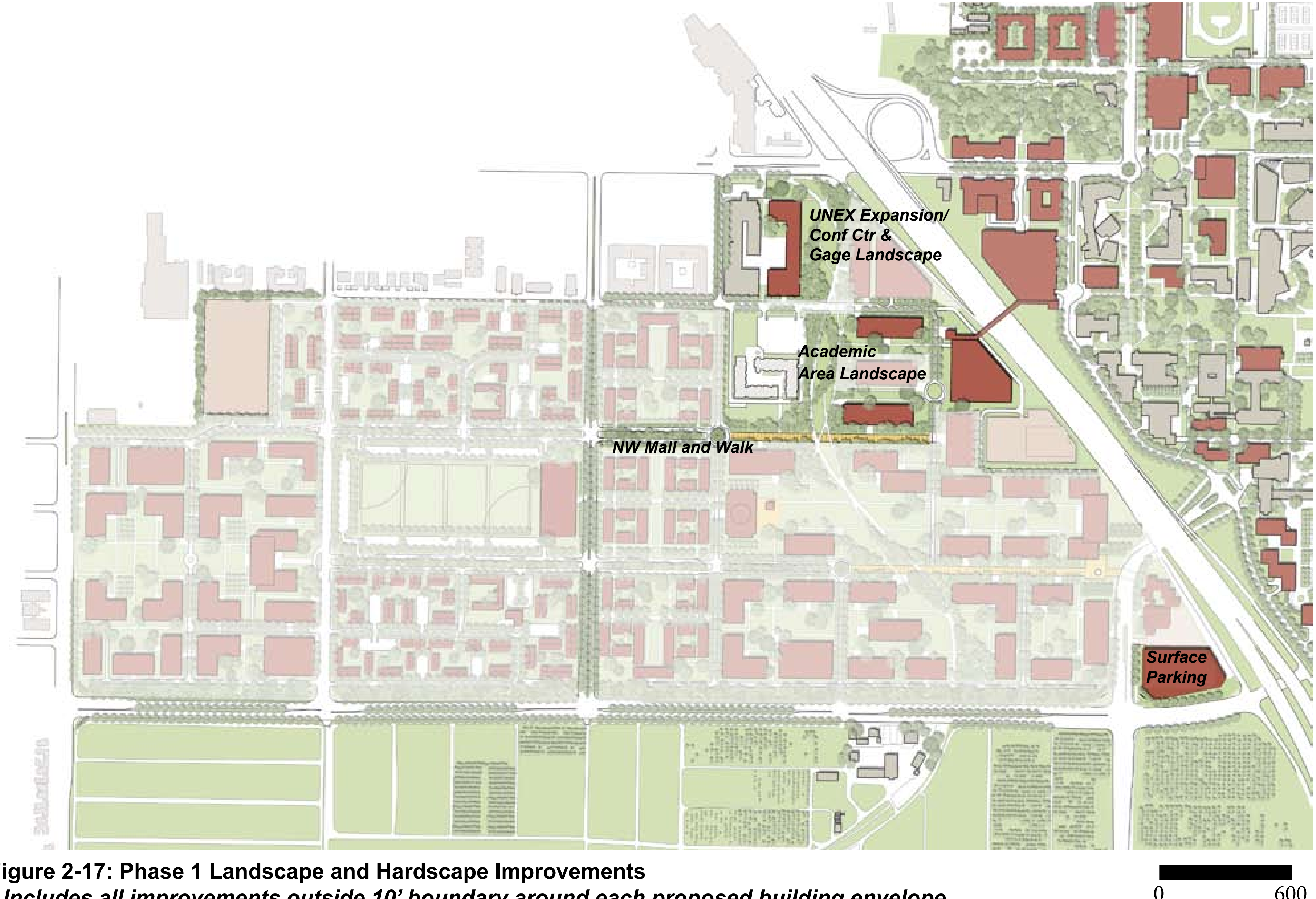

Figure 2-17: Phase 1 Landscape and Hardscape Improvements
**** Includes all improvements outside 10' boundary around each proposed building envelope***

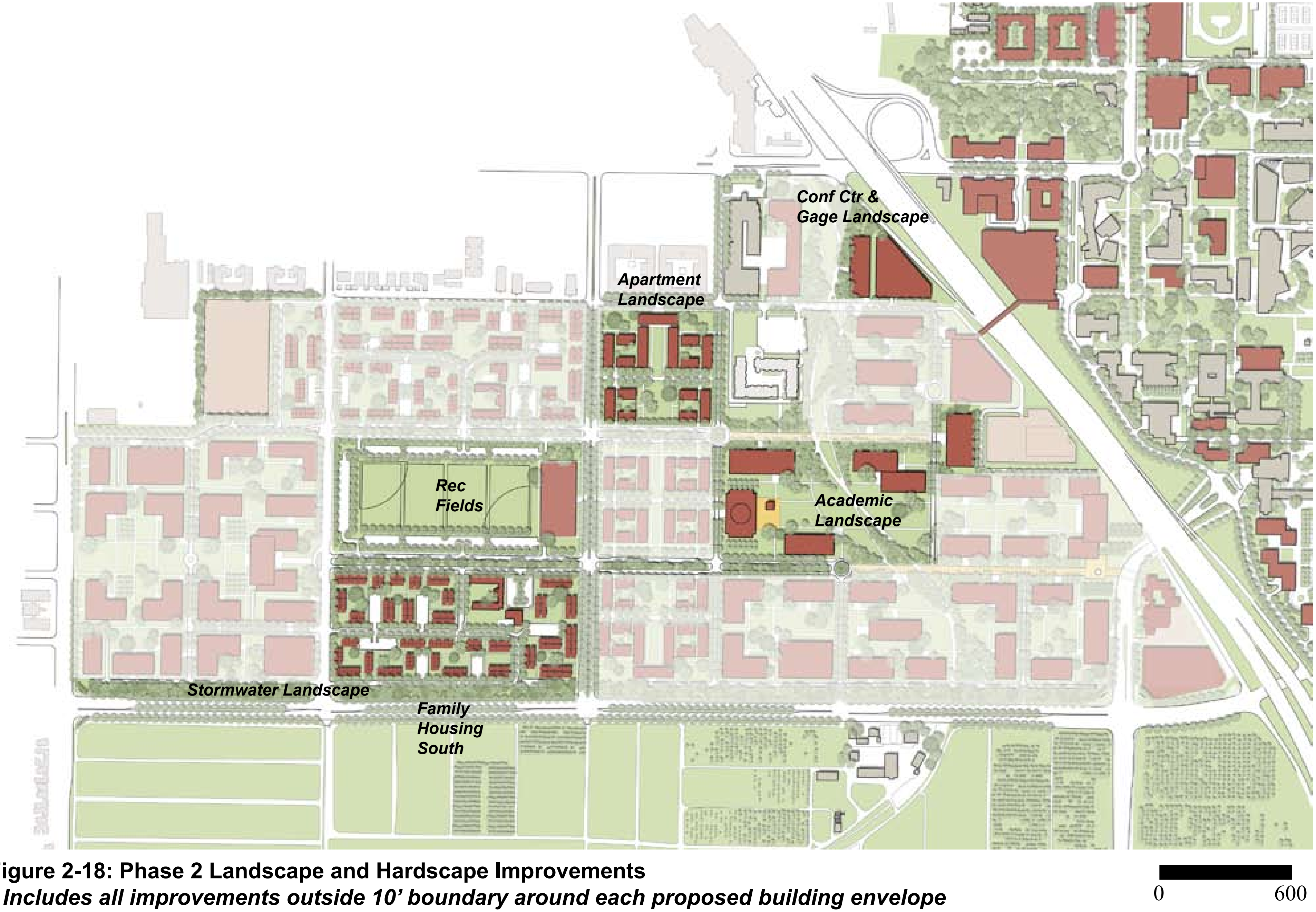

Figure 2-18: Phase 2 Landscape and Hardscape Improvements
**** Includes all improvements outside 10' boundary around each proposed building envelope***

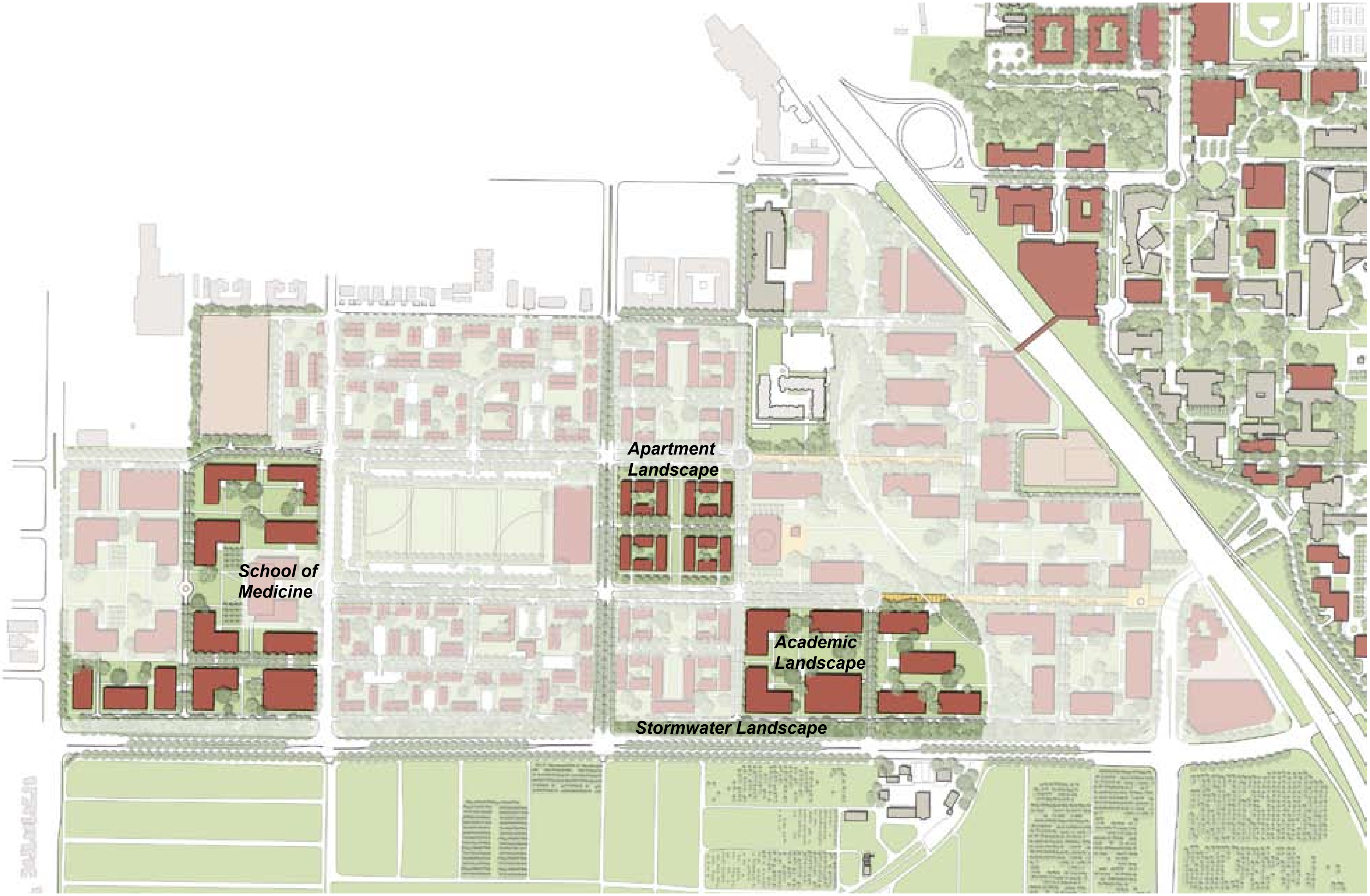

Figure 2-19: Phase 3 Landscape and Hardscape Improvements
***** Includes all improvements outside 10' boundary around each proposed building envelope***

0 600

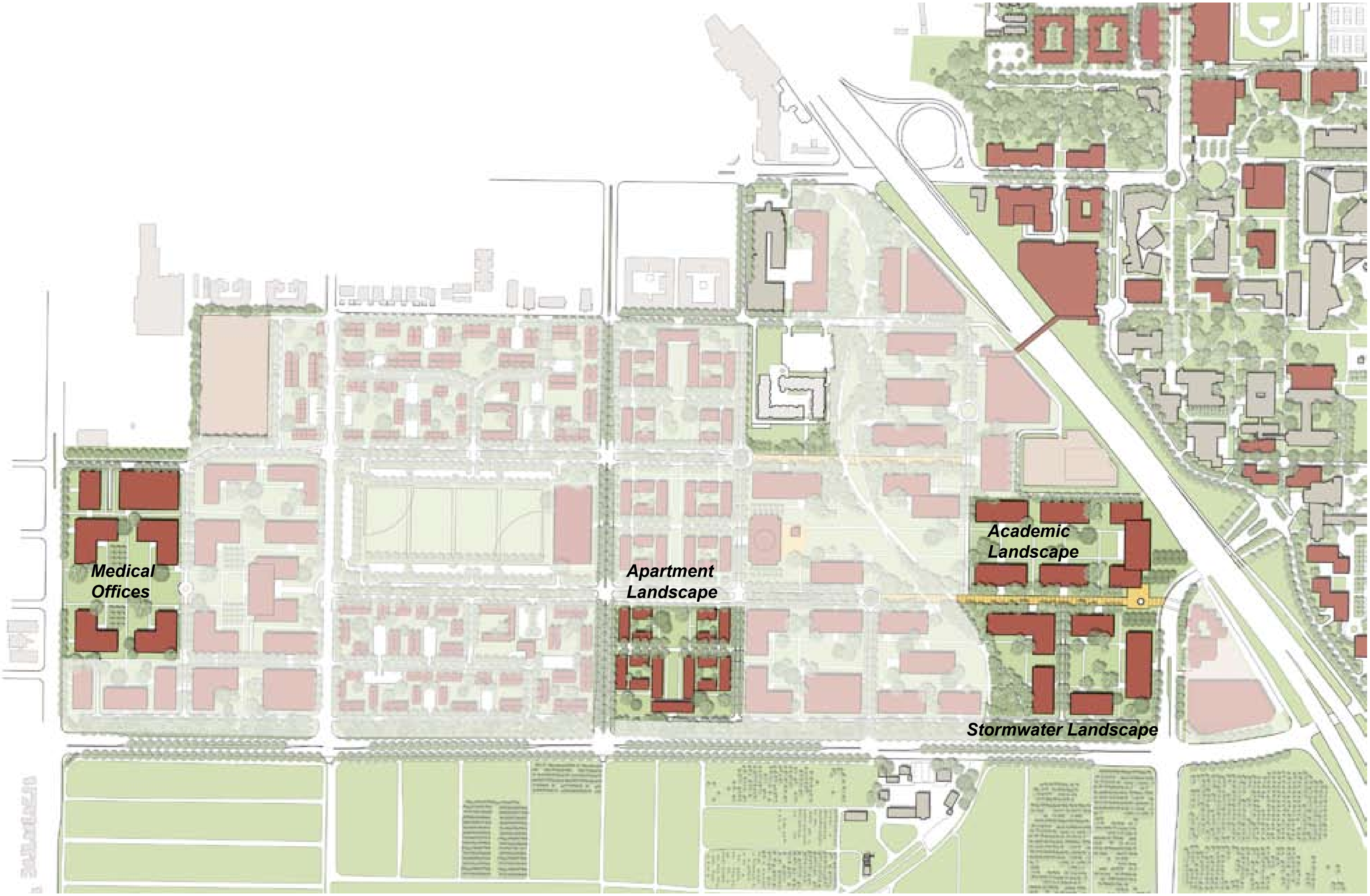

Figure 2-20: Phase 4 Landscape and Hardscape Improvements
**** Includes all improvements outside 10' boundary around each proposed building envelope***

0 600

Legend
W: Academic Building
P: Parking Structure
A: Apartment
F: Family Housing
CC: Family Housing Community Center
CDC: Child Development Center (North and South)
R: Recreation Center
M: School of Medicine Building
MOB: Medical Office Building
PM: School of Medicine Parking Structure
PMOB: Medical Office Parking Structure

KEY PLAN
UC RIVERSIDE CAMPS
WEST CAMPUS CAPACITY

Figure 2-21: West Campus Key Plan

CHAPTER 3

DOMESTIC WATER AND FIRE WATER DISTRIBUTION SYSTEMS

3.1 Purpose

This chapter presents the analyses and recommended plans to serve the West Campus buildings with domestic and fire water distribution systems. This chapter will explore the existing domestic and fire water system, domestic and fire water demands, and domestic and fire water points of connections. In addition, the water distribution system criteria for analyses, demand capacities, phasing implementation, and cost considerations will be discussed. The culmination of this information produces a recommended alternative, conceptual design, and implementation plan.

This study will provide a blueprint for the design of a multi-phased domestic water system for the development of the University of California Riverside West Campus Master Planning Study.

This study has been developed to determine the future domestic water demands over the period of the development of the West Campus and to identify the domestic water system infrastructure requirements that will be necessary to implement the development of the UC Riverside West Campus.

This study will include a discussion of water conservation measures that may be implemented throughout the development of the West Campus in order to reduce water consumption and cost of water acquisition.

3.2 Procedure

The University of California Riverside West Campus domestic water system infrastructure study was developed utilizing the six basic design steps:

1. Define Design Parameters

   The City of Riverside provides a number of design parameters to be used for water projects that are proposed for inclusion into the City of Riverside Water Division's service area. Since it is anticipated the water system infrastructure for the West Campus may be incorporated into the City's water system, these criteria were used as a basis for developing the design parameters. The design parameters for the domestic water system were developed from these criteria presented in "Design Criteria for Water Distribution Systems", published by the City of Riverside Public Works Department. The design parameters used herein are also based upon requirements of the California Fire Code, specifications for the design and installation of Polyvinyl Chloride (PVC) Pipe, AWWA Standard C900/C905 and review of other local design parameters utilized by City and Water Districts within the inland empire geographic area.

2. Define Land Use Types and Locations

   Working in conjunction with the land planning team, the land use types within the West Campus were placed geographically throughout the site, Figure 3.1. The land use categories are based upon the proposed academic and support buildings and housing units anticipated for the West Campus expansion. A mix of academic buildings including a medical school, family housing and apartments, along with open spaces, recreation areas, promenades, courtyards and support facilities are spread throughout the site generally on a block by block basis. A water system model will be developed and processed. The modeling included herein will provide an upper boundary analysis for the ultimate development based upon the flow demands and proposed waterline sizes and locations.

3. Assign Domestic Water Consumption Factors

   Based upon the aforementioned design parameters, specific domestic water consumption rates were applied to each land use based upon the type of land use and proposed facility. The domestic water consumption rates can be seen in Table 3.4.4. The consumption rates were then logically spread out to junctions (nodes) within the domestic water system. The overall demands at each junction can be seen in Table 1 of Appendix A-10.

4. Model Domestic Water System

   After each individual junction received a domestic water consumption rate, the resultant demands were logically linked together in a model. Pipes connecting the various junctions were developed based upon the proposed phasing of the West Campus, demand types and locations, and internal system redundancy. Pipe sizes were iterated between peak hour demand (PHD) modeling and maximum day demand plus fire flow (MDD + FF) modeling to achieve consistency of design parameters as set forth in this report. The results of these models can be seen in Appendix A-10 Tables 1 through 17 for peak hour demand and maximum day demand plus fire flow.

5. Prepare Storage Tank Size Estimate

   After consumption rates were developed for the entire West Campus Expansion, maximum day demands were calculated. From this maximum day value regulatory storage and emergency storage volumes were calculated. The summation of these three volumes became the storage tank volume. The results of these calculations can be seen in Section 3.9. The storage tank volumes can be incorporated with the storage requirements of the East Campus and the amount of storage capacity presently available until such time as growth surpasses existing storage capacity.

6. Prepare Summary Graphics

   After demands were logically linked together in a model a resultant water system graphic was prepared. The results of this model can be seen in Figure 3.2.

3.3 Existing Systems

The UCR Facilities and Maintenance Department operates the domestic water system that provides potable and fire water to the campus. The source of domestic water to the campus is supplied by the City of Riverside. All of the UCR domestic water is supplied to the East Campus from a buried 5,000,000-gallon City reservoir located just south of University Avenue and east of Interstate 215. A 15-inch concrete pipe transfers this treated water from the reservoir to the campus domestic water pumping station, located east of the intersection of University Avenue and Canyon Crest Drive. This pumping station consists of City water metering, reduced backflow preventers and domestic cold water circulation pumps as follows:

(2) 400 horsepower, 3500 gallon per minute pumps
(2) 200 horsepower, 1500 gallon per minute pumps

These pumps have a total pumping capacity of approximately 10,000 gallons per minute at a total dynamic head of approximately 340 feet or 147 pounds per square inch (psi).

The campus has two domestic water storage reservoirs, with capacities of 1,000,000 gallons and 50,000 gallons, both located at an elevation of 1288 feet. The lowest elevation on the proposed West Campus is approximately 964 feet. The highest elevation of the West Campus is approximately 1065 feet. Assuming a building of 5 stories in height, the highest potential building top floor elevation would be approximately 1125 feet. The anticipated maximum building static water pressure is 140 psi and a minimum building static water pressure of 71 psi.

The West Campus domestic water system is connected directly to the City of Riverside water system and is generally independent from the East Campus water system. However, there currently exists a 6-inch water line in a 10-inch steel casing crossing under interstate 215 near East Campus building B8 (Barn Group/University Club) and the electrical substation on the West Campus side of Interstate 215. This 6-inch waterline provides potable water to a number of agricultural buildings on the West Campus and serves fire hydrants near these buildings.

The existing domestic and fire water distribution systems shown on Figure 3.3 in the vicinity of the West Campus are comprised of City of Riverside (City) and University of California Riverside (UCR) water mains, laterals, and fire hydrants.

The City's existing water mains range in size from 8 to 42-inches and are composed of steel or ductile iron pipe (DIP). 42-inch and 10-inch City-owned and maintained water mains run parallel to the centerline of Chicago Avenue. A 20-inch City water main is installed the length of Cranford Avenue and McKinley Avenue. An 8-inch City waterline on West Everton Place serves Tract 4342. Two existing City lines, 8-inch and 16-inch are installed on North Iowa, and an 8-inch City water main was constructed in East Everton Place.

The University of California Riverside's existing potable waterlines are generally 6-inch transite pipes. The existing UCR potable waterlines are south of Everton Place near the proposed Core Academic Area and near parking lot 30. These lines may be used to some extent during the early phases of the development, but will ultimately be removed. There is an existing 8-inch steel waterline in a 24-inch steel casing crossing under Interstate 215 southeasterly of lot 30 and in agricultural field R18B.

3.4 Domestic Water Demand

The total domestic water (DW) demand and fire flow capacities are based upon the proposed land uses and development of the West Campus as indicated in Chapter 2 and depicted on Figure 2-21 Key Plan UC Riverside Campus, West Campus Capacity. The long term estimated water demand for the UCR West Campus expansion based upon land use criteria demand is presented in Table 3.4.4. The estimated demand is based upon land use category of the proposed development. It is necessary to determine an estimated demand by land use category in order to logically distribute the flows throughout the water distribution network.

The long term estimated demands utilized in the water network model were derived using a combination of a number of sources. Domestic water demand estimates were gathered from a number of Southern California cities including Riverside, San Bernardino, San Diego, Corona, Temecula, State of California and the Pacific Institute. Table 3.4.4 indicates the estimated domestic demands by land use utilized in this study. Personnel from the University of Riverside provided some historical data that was used in the analysis. The data provided by the UCR staff was based upon daily usage by the Campus. The water demand use values can be converted to student demand per capita per day. These values are quite useful in setting benchmarks for comparison with the normally accepted land use domestic water demands when the total daily demands are determined. However, peak demands and maximum day demands are difficult to estimate.

Domestic water demand from Stanford University was also used in this study to assist in establishing a benchmark for average daily demand for a university.

Table 3.4.1 Summary of Domestic Water Demand by Existing Consumption

University	No. of Students	Average Daily Consumption	Percent for Irrigation	Average Daily Domestic Demand	Average Daily Demand per Student
University of California Riverside	16,000	2.5 mgd[1]	60%	1.0 mgd	94 gpd
Stanford University	18,400	2.7 mgd[2]	22%	2.1 mgd	114 gpd

(1) Average daily demand provided by UCR staff.
(2) Stanford University, “Water Conservation, Reuse and Recycling Master Plan,” October 2003.

Historical data provided by UCR staff for the East Campus was used to provide a comparison for demand estimates. From this data, the average daily water demand was estimated. The peak hour demands for campus buildings were also provided. Based upon the historical data, a basis for comparison of the land use demand factors could be made and used as a check of the reliability of the design criteria. Three separate gross square foot per gallons per minute (gsf/gpm) rates were provided by the historical data; 1) 1622 gsf/gpm for a typical campus academic building, 2) 880 gsf/gpm for residence halls and 3) 300 gsf/gpm for greenhouses and lath houses. A 60%/40% split between irrigation and domestic water consumption respectively (based upon information provided by UCR personnel) was used to determine domestic water use. Using the data UCR historical data, the peak hour demand was obtained using the following information.

Utilizing the UCR Campus Aggregate Master Planning Study West Campus Plan Capacity Gross Square Footage values, an estimate of the domestic water demand for the future West Campus building construction was prepared. The results of these calculations are presented in Table 3.4.2.

Table 3.4.2 UCR Water Consumption by Building Square Footage

Building/Land Use	GSF	GSF/gpm[1]	Peak gpm
Core Academic Area	3,869,000	1,622	2,385
Medical School	939,000	1,622	579
Housing	1,658,082	880	1,884
Grad Housing	250,000	880	284
Recreation Building	65,000	1,622	40
Child Development and Community Centers	39,600	1,622	24
Medical Offices	696,000	1,622	429
Existing UCR Buildings to Remain	196,641	1,622	121
Other Existing Buildings	163,059	880	185
	7,876,382		5,931

(1) Bechard Long & Associates, Inc., "Section 5, Domestic Water System," University of California Riverside, Detailed Project Program.

The estimated peak hour demand per day using Table 3.4.2 would be 5,931 gpm x 40 percent (domestic percentage) = 2,372 gpm. This value compares favorably with the estimated peak hour domestic water demand calculated based upon land use in Table 3.4.4 of 2,338 gpm.

Using additional data provided by UCR, an estimate of average daily demand can be made. The university estimates current water usage of 2.5 mgd. The University estimates 60 percent of the daily demand is used for irrigation. The current student population as provided by UCR staff is approximately 16,000 students. This equates to 694 gallons per minute based upon 16,000 students. Converting this to an estimated demand for the West Campus with an additional 10,856 students would yield an estimated average daily demand of 472 gallons per minute.

In addition to the above benchmark estimates of future demand from historical data, the UCR staff has provided data of daily demand by student population. West Campus population for purposes of projecting water and sewer demand is estimated to be 10,856 including students, faculty, and visitors. The population includes:

	714	Students living in family student housing
	2787	Students living in apartments
(2 x 714)	1428	Non-student family members will live in the 714 family housing units

Using sustainable water use factors provide by UCR staff, water demand are estimated of 70 gallons per day per person living on campus and 20 gallons per day for all students, faculty staff, and visitors not living on campus. Add 60% of the total demand for landscaping irrigation until the campus development will reaches ultimate build out. Table 3.1- Phase 1 Estimated Water Demand summarizes estimated water demand for the West campus.

Table 3.4.3 Estimated Water Demand with Sustainable Use

Classification	Users x Demand	Daily Demand GPD
Students in Apartments	2,787 @ 70 =	195,090
Students in Family Housing	714 @ 70 =	49,980
Non-Students in Family Student Housing	2 x 714 @ 70 =	99,960
Students, Faculty, Staff, and Visitors	(10,856 - 3,501) @ 20 =	147,100
Total Domestic Demand		492,130
Landscape Irrigation Demand @ 60% of Total	(492,130 / 60%) =	787,408
Total West Campus Demand		**1,274,538**

The UCR West Campus domestic demand utilized in the network model was derived based upon the analysis of a number of sources. The estimated water demands, peak hour factors and maximum daily demand factors used by a number of City's and water districts were reviewed. Studies prepared by the Public Policy Institute of California, Pacific Institute and the California Local Government Commission were reviewed in order to provide a reasonable estimate of domestic demands in addition to anticipated savings that could be applied to the demand estimates due to water conservation programs, demand management measures and resource sustainability.

According to the California Department of Water Resources 2005 update of the California Water Plan, Californians used about 232 gallons per capita per day. The California Water Plan estimates roughly 42 percent of total residential demand was used outdoors. The domestic indoor water use per person would be roughly 135 gpcpd.

The UCR West Campus Development Plan proposes the use of water conservation features and the implementation of a sustainable resource and energy program. The implementation of conservation features will reduce the demands for water by the University. The estimated reductions that may be anticipated through sustainable water use are discussed in Section 3.9.

For purposes of infrastructure planning of the West Campus, 135 gpcpd was used to estimate the domestic water demands. This is a conservative approach that is utilized at the planning level of study detail. See Table 3.6.1 West Campus Summary of Domestic Water Design Criteria.

The distribution of water demand over the West Campus is based upon the land use as depicted in Figure 3.1. The existing usage of water by the University is also included within the model in order to estimate the velocities, pressure and losses within the existing waterlines. This is useful in determining how the existing waterlines that are proposed to be connected to will function with the added demands of the West Campus. The existing demands on the system are estimated as follows:

> According to University metering, approximately 2,500,000 gallons per day is currently consumed by the University. 40 percent of this amount is potable water usage, i.e. 1,000,000 gallons per day. This calculates to an average daily demand of 694.5 gallons per minute for the existing East Campus.

Future peak hour demands for the expansion of the East Campus were prepared by Bechard Long and Associates for the University of California, Riverside, Detailed Project Program. These values are included herein for information and are utilized in storage tank requirements. The summary of domestic water demand is presented in Table 3.4.4.

Table 3.4.4 Summary of Land Use and Domestic Demand

Planning Area	Land Use	Acres	Demand (GPM)	Average Daily Demand (GPM)	Maximum Daily Demand (GPM)	Peak Hour Demand (GPM)
1	Academic	6.6	2.0	13.2	22.4	44.9
2	Academic	3.5	2.0	7.0	11.9	23.8
3	International Village	6.2	5.6	34.7	59.0	118.0
4	Academic	6.7	2.0	13.4	22.8	45.6
5	Support Facilities	4.9	1.5	7.4	12.5	25.0
6	Support Facilities	2.3	1.5	3.5	5.9	11.7
7	Academic	7.3	2.0	14.6	24.8	49.6
8	Academic	4.6	2.0	9.2	15.6	31.3
9	Academic	11.8	2.0	23.6	40.1	80.2
10	Support Facilities	5.6	1.5	8.4	14.3	28.6
11	Academic	9.0	2.0	18.0	30.6	61.2
12	Academic	5.9	2.0	11.8	20.1	40.1
13	Academic	7.5	2.0	15.0	25.5	51.0
14	Apartments	7.9	7.3	57.7	98.0	196.1
15	Apartments	7.7	7.3	56.2	95.6	191.1
16	Apartments	7.2	7.3	52.6	89.4	178.7
17	Support Facilities	4.9	1.5	7.4	12.5	25.0
18	Family Student Housing	2.7	6.2	16.7	28.5	56.9
19	Family Student Housing	8.8	6.2	54.6	92.8	185.5
20	Family Student Housing	8.1	6.2	50.2	85.4	170.7
21	Recreation	1.0	2.0	2.0	3.4	6.8
22	Family Student Housing	8.2	6.2	50.8	86.4	172.9
23	Family Student Housing	7.3	6.2	45.3	76.9	153.9
24	Graduate Housing	3.6	7.3	26.3	44.7	89.4
25	Medical School	12.7	2.0	25.4	43.2	86.4
26	Medical School[2]	16.5	3.8	62.7	71.2	142.5
	Subtotal West Campus	178.5	104.1	687.7	1169.1	2338.1
	Exist. East Campus			694.5	1180.7	2361.3
	Future East Campus			1211.9	2060.2	4120.4
	Subtotal East Campus			1906.4	3240.8	6481.7[1]
	Total UCR			2594.1	4409.9	8819.8

(1) Taken from “Detailed Project Program for University of California, Riverside, prepared by Bechard Long and Associates.

(2) Includes Ambulatory Care facilities.

Table 3.4.5 is included in the study for informational purposes to provide a comparison of the various assumptions that have been considered during the development of the estimated projections of domestic water demand for the West Campus.

Table 3.4.5 Domestic Demand Comparison

Demand Estimate	Daily Demand (gpm)
Land Use Analysis[1]	666.9
Based on GSF/gpm from Historic Demand[2]	697.6
Historical based on 2.5 mgd and 16,000 Students[3]	472.0
Using 27 Percent Conservation Reduction[4]	503.6
Using Sustainable Factors by UCR	342.0

(1) Derived from Table 3.4.4.
(2) Derived from Table 3.4.2 with an assumed peak hour factor of 3.4.
(3) Derived from Table 3.4.1.
(4) See Section 3.9.

3.5 Fire Water Demand

The fire water (FW) demand for buildings proposed in the UCR West Campus expansion was calculated pursuant to the 2007 California Fire Code, Appendix B. For purposes of fire flow, it is assumed the academic buildings constructed in the UCR West Campus will be primarily Type IA and Type IB. The two-story multi-family housing and apartments are assumed to be Type V-B. All campus academic buildings, offices and medical facilities are anticipated to have approved automatic sprinkler systems installed. The fire flows that are case studied in the flow network model are indicted in Table B105.1.

Table 3.5.1 Fire Flow Requirements

Structure	Purpose	Gross Square Feet	Minimum Fire Flow Table B105.1	Require Fire Flow with Reduction for Approved Automatic Sprinkler System[1]
Building W1	Academic	270,000	5,500	1,500
Building W11	Academic	275,000	5,750	1,500
Building M4	Medical School	224,000	5,000	1,500
Building A1	Apartment	30,000	4,750	1,500
Building A42	Apartment	30,000	4,750	1,500
Building F1	Family Student Housing	18,720	3,750	1,500

(1) Adjusted for allowable reduction in fire-flow per Appendix B, Section B105 of the 2007 California Fire Code.

3.6 Criteria for Preliminary Design and Analysis

A water distribution system should reliably provide potable water in sufficient quantity and adequate pressure for domestic and fire protection purposes. To provide adequate domestic service, the pressure in the main service connections usually should not be below 50 psi during peak flow conditions. The recommended pressure range is from 60 to 75 psi. The basis for the development of the preliminary water system design that is developed herein and subsequently analyzed to determine its flow characteristics included the consideration of the following objectives:

1. Meet the physical design criteria as outlined in Table 3.6.1.
2. Develop an economical system to provide domestic water and fire protection service to the family student housing project in Phase 1A.
3. Develop a system that will allow the University to have an independent domestic and fire water supply system at the earliest possible opportunity.
4. Develop a system that will be owned and operated by the University, but could be converted to a City system at some later date.
5. Provide fire protection water in conjunction with the domestic system to avoid the need for redundant waterlines.
6. Provide flexibility in the preliminary design to allow changes and adjustments to the proposed phasing and build out of the West Campus.

Information provided by the City of Riverside indicates that at the corner of Iowa Avenue and Everton Place, water system pressure ranges from 77 to 86 psi. An 8-inch ductile iron pipe waterline exists in Everton Place and Iowa Avenue. The residual pressure at this location with a flow of 1561 gallons per minute was reported at 72 psi. There is also a City of Riverside 12-inch ductile iron pipe in Everton Place, which terminates on the west side of Gage Canal. This pressure reading indicates that the City system appears to have adequate pressure for future service of the West Campus Phase 1A.

Pressure required for fire fighting depends on the technique and equipment used. The method of supplying fire protection which can be used within the West Campus area will be the use of mobile pumps (fire engine pumping apparatus), which take water from a hydrant. This method is used of most large communities that have full time, well trained fire departments. The required residual pressure in the immediate area of the fire hydrant during fire flow conditions is 20 psi.

Distribution systems are usually laid out on a gridiron system with cross connections at various intervals. Dead end pipes should be avoided. If dead ends pipes are used, they should be designed in such a way that no more than two fire hydrants will be taken out of service.

The minimum cover should be to the City of Riverside standard of 42 to 48-inches.

Table 3.6.1
WEST CAMPUS
SUMMARY OF DOMESTIC WATER DESIGN CRITERIA

ITEM	TYPE/SIZE	QUANTITY
Family Student Housing	3.3 Persons/du 135 gpd/person 20 du/ac	445 gpd/du 6.2 gpm/ac
Apartments	2.6 Persons/du 135 gpd/person 30 du/ac	351 gpd/du 7.3 gpm/ac
International Village	2.0 Persons/du 135 gpd/person 30 du/ac	270 gpd/du 5.6 gpm/ac
Academic Buildings	2.0 gpm/ac	2.0 gpm/ac
Medical School (Ambulatory Care)	15.6 gpm/ac	15.6 gpm/ac
Campus Support Facilities	1.5 gpd/ac	1.5 gpm/ac
Recreation Fields	2.0 gpd/ac	2.0 gpd/ac
Demand Cases		
Studied Cases include the following two design scenarios: PHD & MDD+FF		
Maximum Day Demand (MDD)	MDD = 1.7 x Average Day Demand	
Peak Hour Demand (PHD)	PHD = 2.0 x Maximum Day Demand	
Fire Flow (FF)	See Table 4 Residential 1,500 gpm University Facilities 1,500 gpm with a 4 hour duration	
Pipeline Design Parameters		
Minimum Pressure at Peak Hour Demand = 50 psi Minimum Pressure at Maximum Daily Demand + Fire Flow = 20 psi Maximum Pressure in Mains = 150 psi Maximum Velocity at Peak Hour Demand = 6 fps Maximum Velocity During Fire Flow Conditions = 15 fps Maximum Head Loss = 5 ft per 1000 ft of pipe at Peak Hour Minimum Pipe Size = 8 inches Hazen-Williams Coefficient of Flow = 130 New Pipe Hazen-Williams Coefficient of Flow = 120 Existing Pipe		
Storage Parameters		
Total Storage = Operational Storage + Fire Storage + Emergency Storage Operational Storage = 25 Percent of Maximum Day Demand Fire Storage = 4 Hour Duration at Maximum fire Flow Emergency Storage = 100 Percent of Maximum Day		

3.7 DW and FW Points of Connection to UC Riverside and City of Riverside

The proposed domestic water and fire water main distribution system modeled herein for the West Campus Infrastructure Study consist of a combination of 8-inch through 12-inch P.V.C. waterlines. The UCR domestic water and fire water systems are proposed to connect to the existing UCR and City of Riverside in the following locations:

1. UCR Connection-West Campus Drive near Hinderaker Hall

2. UCR Connection-Agricultural Field R18B

3. City Connection-Everton Place and Iowa Street

4. City Connection-Everton Place, west of Gage Canal

5. City Connection-Cranford Avenue, south of Everton Place

6. City Connection-Chicago Avenue and Martin Luther King Jr. Boulevard.

Some of these connections will be temporary and ultimately abandoned, and some will become secondary backup connections for emergency water supply. These connections would be metered and have manual and/or automatic valves installed as necessary to provide the necessary backup water supply. Each of these connections is discussed further in the phasing section of this study.

3.8 Sustainable Water Demand

This section presents a brief discussion of the domestic water demand that may be estimated for the West Campus expansion considering the implementation of a program of water demand management and sustainable development criteria.

A number of studies have been prepared by various agencies and organizations within the State of California for the purpose of analyzing and predicting future water demands in the State based upon sustainable urban water use. As indicated in the proceeding section, the average water use for California's cities and suburbs is approximately 232 gallons per capita per day. The reduction in demand due to existing legislation and possible future legislation and standards, may have a significant impact on urban water demand over the next 25 years.

According to a number of studies prepared by the Pacific Institute, the 1992 National Energy Policy Act's (NEPAct) water efficiency standards have the potential to reduce residential use for toilets, showerheads, and faucets by 62 percent for fixtures installed prior to 1980 and 39 percent for fixtures installed between 1980 and 1992. Results of the Institute's analysis suggest that the NEPAct will reduce per capita indoor water use to 91 gallons per capita per day. There will likewise be a reduction in office and business use of water. Estimates of future conservation potential for the non-residential sector (commercial and industrial) are around 20 percent based upon studies prepared by the East Bay Municipal Utility District in 1994.

An additional scenario was modeled using a reduction in demand per capita. The residential demand was adjusted to represent a residential demand of 91 gallons per day per person. The demand for academic buildings, medical school and other campus uses were reduced by 20 percent.

The UCR West Campus Area Planning Study presents values of estimated water demands for future construction using sustainable water use factors. The sustainable water use factors are 70 gallons per day for students living on campus and 20 gallons per day for all students, faculty, staff, and visitors not living on campus.

The anticipated population for purposes of projecting water and sewer demand is estimated to be 10,856 including students, faculty, and visitors. The population includes:

714 Students living in family student housing
2787 Students living in apartments
(2 x 714) 1428 Non-student family members will live in the 714 family student housing units

The sustainable domestic water use historically comprises 40 percent of the total potable water demand on campus. Therefore add 60% of the total demand for landscaping irrigation until the campus development will reach ultimate build out. Table 3.8.1, summarizes the estimated water requirements utilizing the sustainable water use factors provided by the West Campus Area Planning Study.

Table 3.8.1 Estimated Water Demand

Classification	Users x Demand	Daily Demand GPD
Students in Apartments	2,787 @ 70 =	195,090
Students in Family Student Housing	714 @ 70 =	49,980
Non-Students in Family Student Housing	2 x 714 @ 70 =	99,960
Students, Faculty, Staff, and Visitors	(10,856 - 3,501) @ 20 =	147,100
Total Domestic Demand		492,130
Landscape Irrigation Demand @ 60% of Total	(492,130 / 60%) =	787,408
Total West Campus Demand		**1,274,538**

The total projected average domestic and landscape irrigation water demand the above sustainable water use factors is approximately 1.3 MGD.

3.9 Storage Requirements

The current storage requirements for the University are a 5,000,000 City Reservoir and two reservoirs on campus of 100,000 gallons and 50,000 gallons. The growth and development of West Campus will require additional water storage. The required storage within a pressure zone or service area is the sum of three elements; operating storage, fire storage and emergency storage.

Operating storage is defined as the volume of storage necessary to allow a reservoir's sources of supply to operate at a uniform rate throughout the day while meeting variable water demand and it is equal to 25 percent of maximum day demand. Fire storage is the minimum amount of water required to be stored for firefighting purposes. Minimum fire flows are normally established by the jurisdictional authority and the California Fire Code. Emergency storage is the amount of water that needs to be stored to satisfy demand when any single component of the system (power, pump, supply pipe, etc.) is out of service.

The fire flows are calculated based upon the California Fire Code. As discussed in Section 3.5, maximum fire flows are estimated to be 1,500 gallons per minute and four hour duration. The total storage required by UCR West Campus is calculated as follows:

Total Storage = Operational Storage + Fire Storage + Emergency Storage

Operational Storage: 25 Percent of Max Day Demand
.25 x 1169.1 gpm x 60 x 24 = 420,876 gallons

Fire Storage: 1,500 gpm x 60 x 4 = 360,000 gallons

Emergency Storage: 100 Percent of Max Day Demand for 24 hours
1169.1 gpm x 60 x 24 = 1,683,504 gallons

Total Storage West Campus: 420,876 + 360,000 + 1,683,504 = 2,464,500 gallons

The construction of additional water storage facilities should be coordinated with the requirements and construction of storage facilities that are discussed in the future infrastructure projects outlined in the University of California, Riverside Detailed Project Program, prepared by Bechard Long and Associates, Inc. As indicated in the report, the existing 5,000,000 gallon City reservoir will not be sufficient to support the campus. The addition of 2,464,500 gallons of storage required by the West Campus, will add to this deficiency. Based upon the elevations necessary to provide the required water pressures for West Campus, the new reservoir should be at or near the elevation of the existing reservoirs. The "Detailed Project Program" recommends the construction of a 2,000,000 gallon tank next to the existing 1,000,000 gallon tank. The 2,000,000 gallon tank should be upsized or the location for another tank determined in order to meet the requirements for storage of West Campus

3.10 Conclusions

The results of the modeling prepared for the West Campus Infrastructure Development Study are depicted in Table 3.9.1. A summary of pressures, line losses and velocities can be reviewed in the Table. The results shown in the table include the proposed waterlines for the West Campus. A discussion of the impact to existing campus waterlines will be discussed in detail further in this section.

Table 3.9.1 Modeling Summary

Scenario	Max. Pressure (psi)	Min. Pressure (psi)	Node No.	Max. Line Loss (ft/K ft)	Pipe No.	Max. Velocity (fps)	Pipe No.
Peak Hour	101.7	65.2	J61	10.1	P40	6.0	P40
MDD+FF at J74	109.6	74.6	J61	12.6	P40	6.7	P40
MDD+FF at J40	109.4	74.8	J61	14.7	P52	6.7	P40
MDD+FF at J86	105.9	74.7	J61	12.6	P40	6.7	P40
MDD+FF at J90	111.6	74.4	J61	12.5	P40	6.7	P70
MDD+FF at J36	108.4	74.9	J61	12.6	P40	6.8	P40
MDD+FF (with sustainable use factors at J36)	118.4	82.1	J61	10.0	P40	6.0	P40
MDD+FF (W/O City Water Backup Source at J86)	105.9	74.7	J61	13.8	P110	6.7	P40

The operating pressures, line losses and velocities indicted for the analysis presented in Table 3.9.1 fall within the acceptable ranges as outlined in the design criteria in Table 3.6.1 except as indicated for pipe segment P40. The maximum head loss in feet per thousand feet of pipe length is above the recommended design value at peak hour demand. Pipe segment P40 is the primary transmission main for water supply to the West Campus. The flows occurring in this pipe will typically be consistently high and at or near peak hour for a majority of its designed operational life. This pipe may also be located under the Interstate 215 freeway. It is suggested that the pipe material for this section of water main be concrete mortar lined and coated ductile iron pipe or steel.

Figure 3.2 provides a schematic diagram of the flow network that was used in the water system analysis. The analysis indicates that for the West Campus, the proposed water system and existing pumping facilities will be able to provide sufficient water quantities and pressures during the peak hour demands. The analysis also indicates that during periods of maximum day demand plus fire flow, pressures along various points in the system, particularly on the East Campus drop below normally acceptable levels. Connections points to the City of Riverside system will provide the additional flows necessary to meet the desired system pressures.

The preliminary design proposes two points of connection to the UCR system. One connection point is near Hinderaker Hall in West Campus Drive, and the second to the existing 8-inch waterline in agricultural field R18B. The flow results for the connection to the existing 12-inch waterline indicate the UCR West Campus system maintains desired pressures and velocities. However, the velocities in the existing 12-inch waterline in University Avenue and West Campus Drive from the point of connection to the pump station (pipe segments P15 and P209) are greater than the desired maximum velocities.

The connection to the 8-inch line may be problematic. The analysis indicates significant pressure drops occur along segments of the existing waterlines in the vicinity of South Campus Drive. This would be expected due to the existing line sizes of 6 and 8-inches. The connection to the 8-inch line in agricultural field R18B should probably occur in order to provide a secondary connection for domestic demands in the southerly area particularly near lot 30. A pressure sustaining valve could be placed in the line in order to maintain line pressures in water lines in the southeast campus (South Campus Drive) area during periods of high demands or fire events.

The construction of additional water storage facilities as outlined herein and as discussed in the "Detailed Project Program Report" prepared by Bechard and Long, should alleviate some of these issues.

3.11 Phasing

The phasing development plan for the water infrastructure system for the West Campus is developed to assure that adequate water service is provided to each phase and fire flow requirements, main pressures and hydrant runs will meet the design standards and code requirements. The project phasing requirements include special consideration relating to the 1) the Family Student Housing in Phase 1A is a stand alone project and infrastructure requirements should be kept as minimal as possible, 2) the connections to the City water system are temporary and should be converted to the UCR system as soon as practical, 3) secondary connections will be made to the City system to provide emergency backup flows. The infrastructure anticipated for each development phase to meet these objectives is presented:

3.11.1 Phase 1A

The construction of the Phase 1A Family Student Housing project (buildings F1 through F33) and building W4 will require the installation of the following infrastructure improvements to meet the domestic water and fire flow requirements (Figure 3.4):

- Construct an 8-inch waterline from the intersection of Iowa Avenue and Everton Place, westerly along Everton Place to Cranford Avenue.

- Construct an 8-inch waterline from Everton Place, southerly along Cranford Avenue to the intersection of the entrance street to the family housing project.

- Connect the 8-inch waterline to the existing 16-inch City water main at Everton Place and Iowa Avenue. This will be a temporary connection to the City system.

- Connect to the existing 20-inch City main in Cranford Avenue. This connection will be temporary and will become a future connection to the City system for emergency backup.

- Connect to the existing 12-inch City water main in Everton Place, located west of Gage Canal. This will be a temporary connection.

- Construct a 10-inch water main from the City connection easterly in Everton Place and than southerly as a 12-inch waterline in the proposed street to provide service to building W4.

3.11.2 Phase 1B

Phase 1B consists of the construction of medical school Building M4 (Figure 3.5).

In addition to the waterlines necessary for the Phase 1A Family Student Housing project, the following waterlines will be required.

- Construct an 8-inch waterline in Cranford Avenue from the Family Student Housing connection, southerly to Northwest Mall.

- Continue the 8-inch waterline easterly in Northwest Mall to Building F20.
- Construct a 10-inch waterline southerly in Cranford Avenue to Southwest Mall and Building M4.

Depending upon the status of the water system for the Phase 1A Family Student Housing project, additional waterlines may be necessary to provide adequate supply for fire and meet fire hydrant requirements.

3.11.3 Phase 1

The development of West Campus Phase 1 (Figure 3.6) includes the construction of building W1, W3 and W5. In order to expedite the ability to utilize the UCR water system, the installation of the water transmission main connecting the West Campus to the existing UCR water pumping facilities is to be installed in this phase. The connections that were made to the City system in Phases 1A and 1B can be removed and the emergency backup connection to the City system installed.

- Connect to the existing 12-inch UCR water main in West Campus Drive near Hinderaker Hall.
- Construct a 12-inch transmission main from the West Campus Drive connection westerly to the 12-inch waterline in the proposed street near Building W3.
- Construct a 10-inch line in Everton Place from the end of the 10-inch line westerly of Gage Canal to Iowa Avenue and connect to the 8-inch line.
- Disconnect the temporary City connection near Building W1.
- Disconnect the temporary City connection in Everton Place and Iowa Avenue.
- Re-valve the City connection in Cranford Avenue near Building F2. This connection will be used for a secondary water supply connection and provide emergency backup.

3.11.4 Phase 2

The construction of new academic facilities, medical school and student housing located throughout the West Campus master planning study area, will require a significant amount of infrastructure in order to meet the requirements of peak demands and fire flows. The waterlines installed will complete loops from previous phases and extend looped water systems to meet the requirements of the building in Phase 2 (Figure 3.7). The required improvements are outline below:

- Construct a 12-inch water main in the proposed street from Building W4 to Building W9.
- Construct a 10-inch and 8-inch waterline in Northwest Mall from Building W6 to Building F20.

- Construct a 10-inch waterline in the proposed street from Everton Place near the University Extension Building, southerly to Martin Luther King Jr. Boulevard.

- Construct an 8-inch waterline in Cranford Avenue from Southwest Mall southerly to Martin Luther King Jr. Boulevard.

- Construct a 10-inch waterline in Southwest Mall from Cranford Avenue to Building W14.

- Construct a 10-inch waterline in Martin Luther King Jr. Boulevard from Cranford Avenue to a connection with the 10-inch waterline near Building W17.

3.11.5 Phase 3

Phase 3 (Figure 3.8) development will consist of the construction of eight academic buildings in the academic core, student housing and enlarging the medical school. Infrastructure requirements are:

- Construct a 10-inch waterline in Martin Luther King Jr. Boulevard from Building W17 to Building W22.

- Construct an 8-inch waterline from Southwest Mall near Building W19 to Martin Luther King Jr. Boulevard.

- Construct an 8-inch waterline in Northwest Mall from Cranford Avenue, westerly to the proposed street west of Building H1. Continue the 8-inch waterline southerly in the proposed street to Martin Luther King Jr. Boulevard.

- Construct a 10-inch waterline in Martin Luther King Jr. Boulevard from Cranford Avenue to Chicago Avenue.

- Extend the 12-inch waterline in Southwest Mall from Building W18 to east side of Building W19.

- Connect to the existing 10-inch City waterline in Chicago Avenue. This connection will be used for a secondary water supply connection and provide emergency backup.

- The addition of the 2,464,500 gallons of storage, required by the West Campus, will be required to be constructed. The construction of additional storage facilities should be coordinated with the requirements for storage of the East Campus build-out.

3.11.6 Phase 4

Phase 4 (Figure 3.9) development will consist of the build-out of the West Campus. Buildings will include academic buildings completing the academic core, the remainder of the student housing, and completing the improvements and expansion of the medical school. The Phase 4 infrastructure improvements are:

- Extend an 8-inch waterline in Northwest Mall from Building H1 to Building MOB1.

- Extend the 10-inch waterline in Martin Luther King Jr. Boulevard, easterly from Building W22 to Canyon Crest Drive.

- Construct an 8-inch and 10-inch waterline in Southwest Mall, easterly from Building W19 to Canyon Crest Drive.

- Extend the 12-inch waterline in the proposed street from Building W9 to Southwest Mall.

- Construct an 8-inch waterline in Canyon Crest Drive from Martin Luther King Jr. Boulevard to Southwest Mall.

- Construct an 8-inch waterline from Building W9, easterly to the northeast corner of building W11. This waterline may be required to be installed in an earlier phase depending upon the timing of the plant facilities located between Building W6 and the electrical substation.

- Extend the 8-inch waterline from Building W11, southerly to Southwest Mall.

- Construct a 10-inch waterline in Southwest Mall from Building W13 to Canyon Crest Drive.

- Construct an 8-inch waterline from the existing 8-inch UCR waterline that is under Interstate 215.

3.12 Alternatives

This study includes a number of assumptions that were utilized in the development of the preliminary design concept. First and foremost is the proposed water system will be owned and operated by the University of Riverside. The preliminary design proposes the use of PVC pipe for the water distribution system.

Over the lifetime of the installation of the water system, it may become attractive to have the water system owned by the City of Riverside. The City would assume maintenance and operation of the water system. It may be cost beneficial to the University to have the City own the water system. The City requires the use of ductile iron pipe for its water mains. Should it be anticipated the water lines may be turned over to the City, the University should discuss the use of PVC pipe with the City. If the City will not accept PVC water mains, the University would have to install ductile iron pipe. The initial cost of installation for DIP waterlines would be higher than installing PVC.

The location of the freeway crossing is not absolute and could be adjusted depending upon phasing, construction costs and flow demands of the East Campus. For example, almost all of the water leaving the pump station is via the 12-inch waterline in University Avenue. As can be seen in the tables in Appendix A-10, flow velocities in the pipe segments along University Avenue and West Campus Drive are greater than the maximum desired. These are also older transite pipes. The water demands that will result from the build-out of the East Campus will put added stress on these pipes. It may be advantageous to cross under the freeway at a point northerly of Parking Building P1. This would allow another connection to the pump station that could bypass the existing piping system thus reducing velocities in the existing waterlines in University Avenue and West Campus Drive.

3.13 Demand Management

The University of California Riverside may embark on an aggressive program of water conservation and water recycling. The conservation program will include measures to reduce domestic water use (e.g., retrofit existing residences with low-flow toilets and showerheads) and to reduce use of water for irrigation (e.g., require use of drought-tolerant landscaping). The recycling program should include consideration of recycled water or gray water use for toilet flushing in new buildings. UCR should continue to implement water conservation measures for proposed building to minimize future water use. A partial list of water conservation measures that could be implemented at the University of California Riverside include:

- Ultra Low Flush Toilet Replacement and New Installation
- Showerhead Retrofit and New Installation
- Urinal Replacement and New Installation
- High-Efficiency Washers in Student Housing
- Public Outreach Programs
- Faculty/Staff Housing Water Audits
- Landscape Water Management
- Selective Landscape Retrofit
- New Water Efficient Landscape
- Evapotranspiration Controllers for Landscaped Areas

The largest demands and the primary end uses of water are generally toilet flushing and irrigation. Therefore, these two uses should be specifically targeted for conservation measures. The greatest long-term, permanent indoor water savings will come from installing water efficient fixtures in new construction and replacing conventional fixtures in existing residences, academic buildings and faculty office buildings. As can be seem by the results of the modeling analysis for the reduced demand scenario, there is not a significant difference in the flow characteristics of the piping network. The line sizes are typically dictated by the fire flow requirements. However, as can be seen in Table 3.4.5, there is potential for a significant reduction in overall daily demand by the University. The reduction in daily demand and subsequently the maximum daily demand, would influence the required storage. Once the final building locations and demands are known, and the maintenance of development flexibility is not necessary, a more detailed analysis, including existing metering analysis, may indicate that some pipes could be decreased in size and the required storage volume may be reduced.

The University of California Riverside should consider preparation and implementation of a Water Conservation Master Planning Study as part an aggressive program of water conservation. The plan would provide a menu of potential water conservation measures that would be deemed applicable to UCR. The development of a water conservation plan would include the preparation of a baseline water use projection. The baseline water use projections would be based upon the analysis of metered data of various water usage categories. Typical internal and external domestic water use by category that would be metered are:

- Student Housing
- Faculty/Staff Housing
- Academic
- Athletics
- Construction Projects
- Leased Commercial Spaces
- Medical School
- Central Energy Facility/Plant
- Other

The use of metering data indicates certain trends and areas where internal and/or external water use may be relatively high. Analysis of appropriate metered data can provide information to focus on conservation measures and analyze the effectiveness of implemented conservation measures.

3.14 Domestic Water and Fire Water Distribution System Cost Summary

This study includes conceptual-level cost estimates for Domestic Water and Fire Water Distribution System development. Details of these cost estimates are included in the Appendix to this report. Costs include mark-ups, sales taxes, and contingencies, but do not include soft costs.

- Phase 1A Housing: $ 128,000
- Phase 1A Campus: $ 98,000
- Phase 1B: $ 167,000
- Phase 1: $ 448,000
- Phase 2 Housing: $ 271,000
- Phase 2 Campus: $ 569,000
- Phase 3: $ 2,886,000
- Phase 4: $ 583,000

Estimated Total for the Build-Out of the Domestic Water and Fire Water Distribution System: $ 5,150,000.

3.16 References

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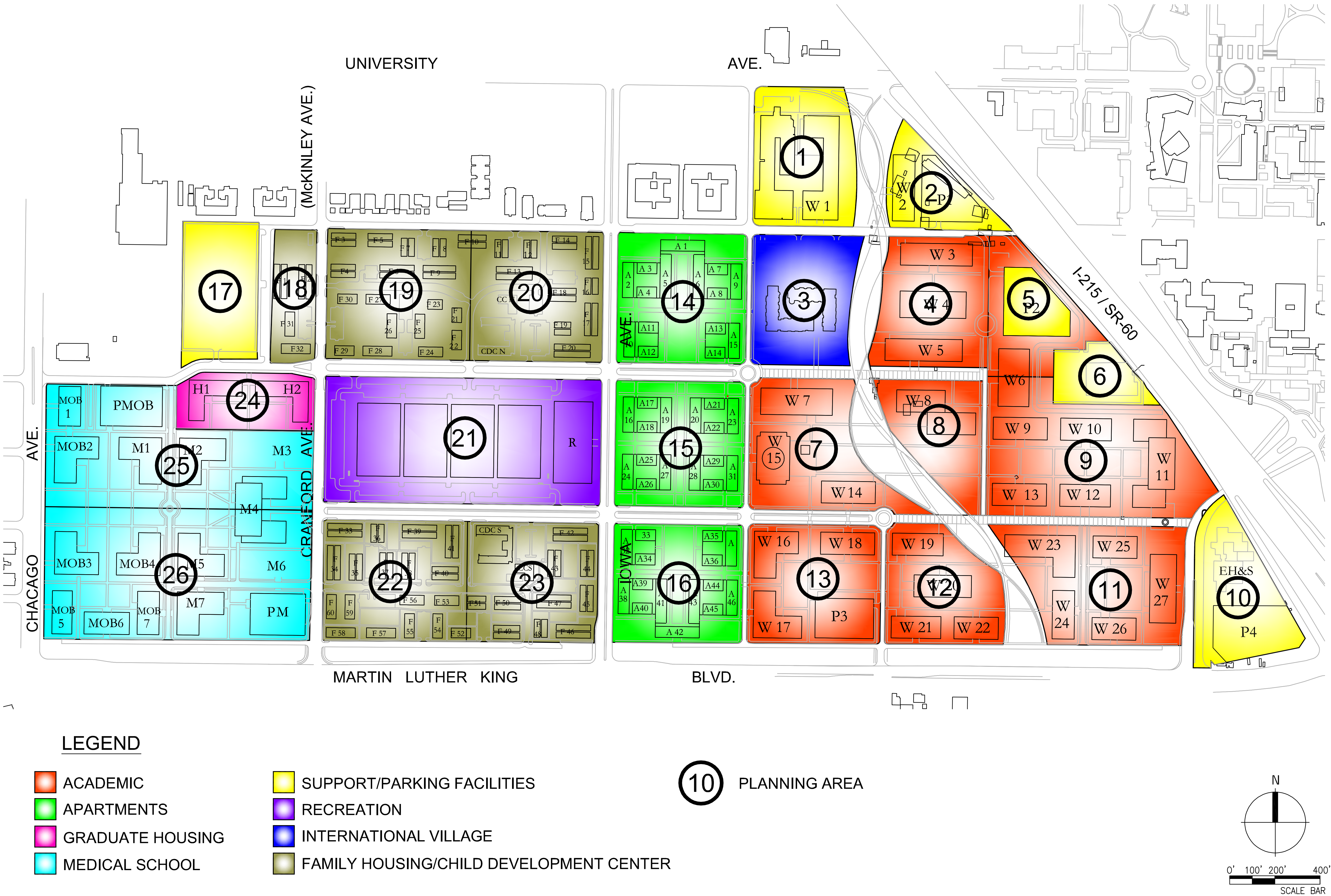

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FIGURE 3.1
LAND USE STUDY

Sheet No.

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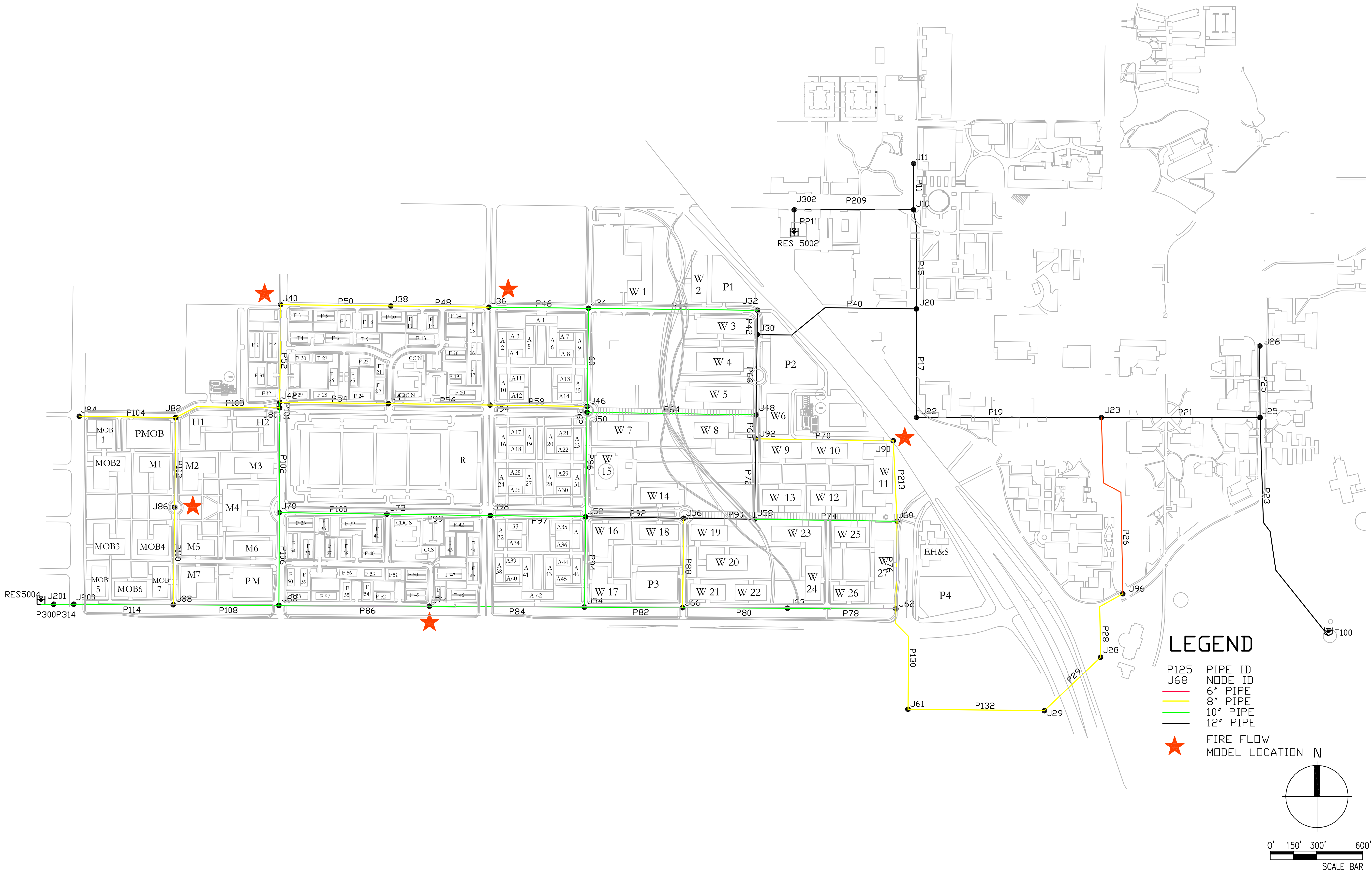

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FIGURE 3.2
UCR WEST CAMPUS DOMESTIC WATER FLOW NETWORK

Sheet No.

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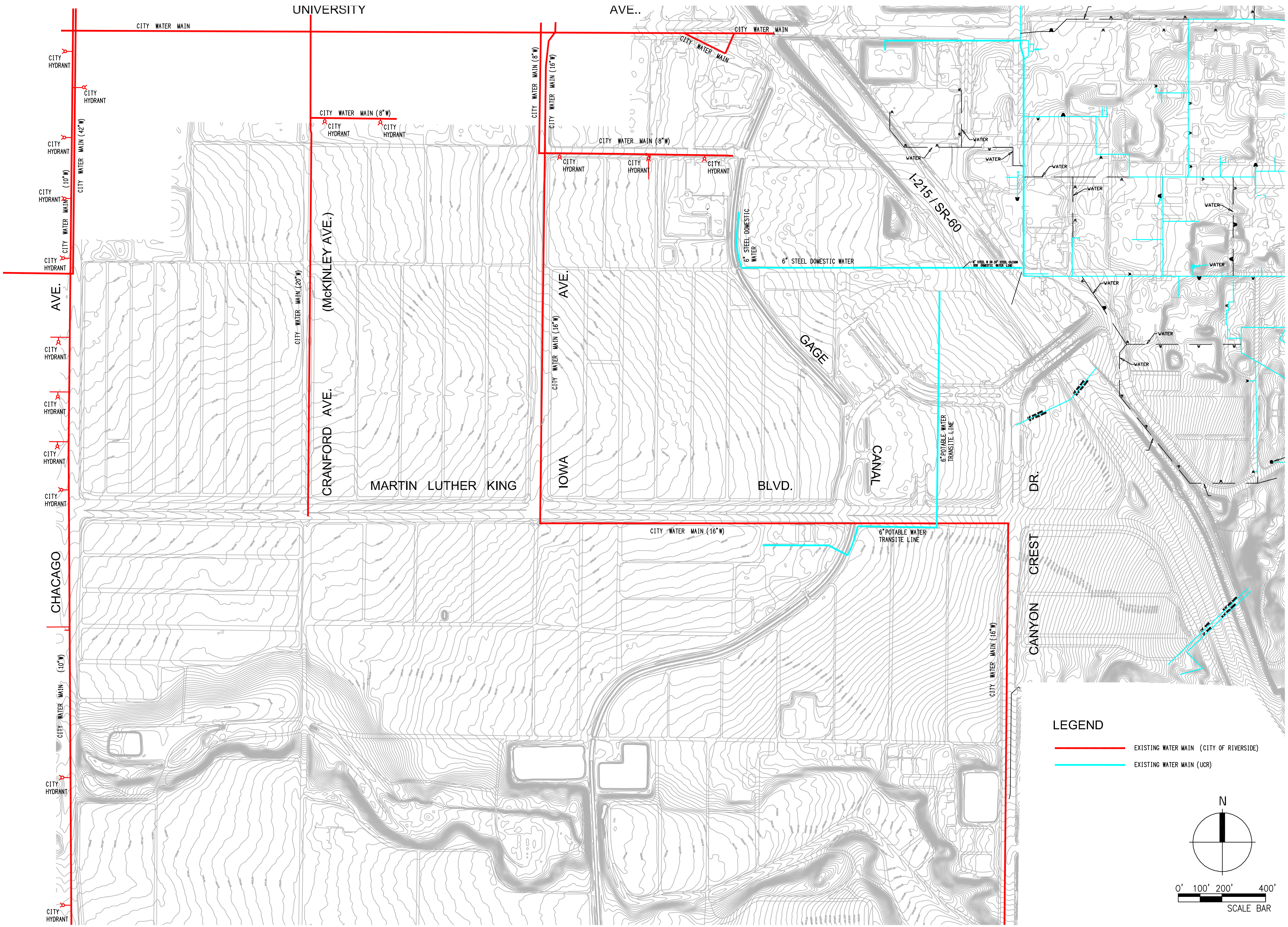

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FIGURE 3.3 WEST CAMPUS EXISTING WATER MAINS

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SHEET 1 OF 1

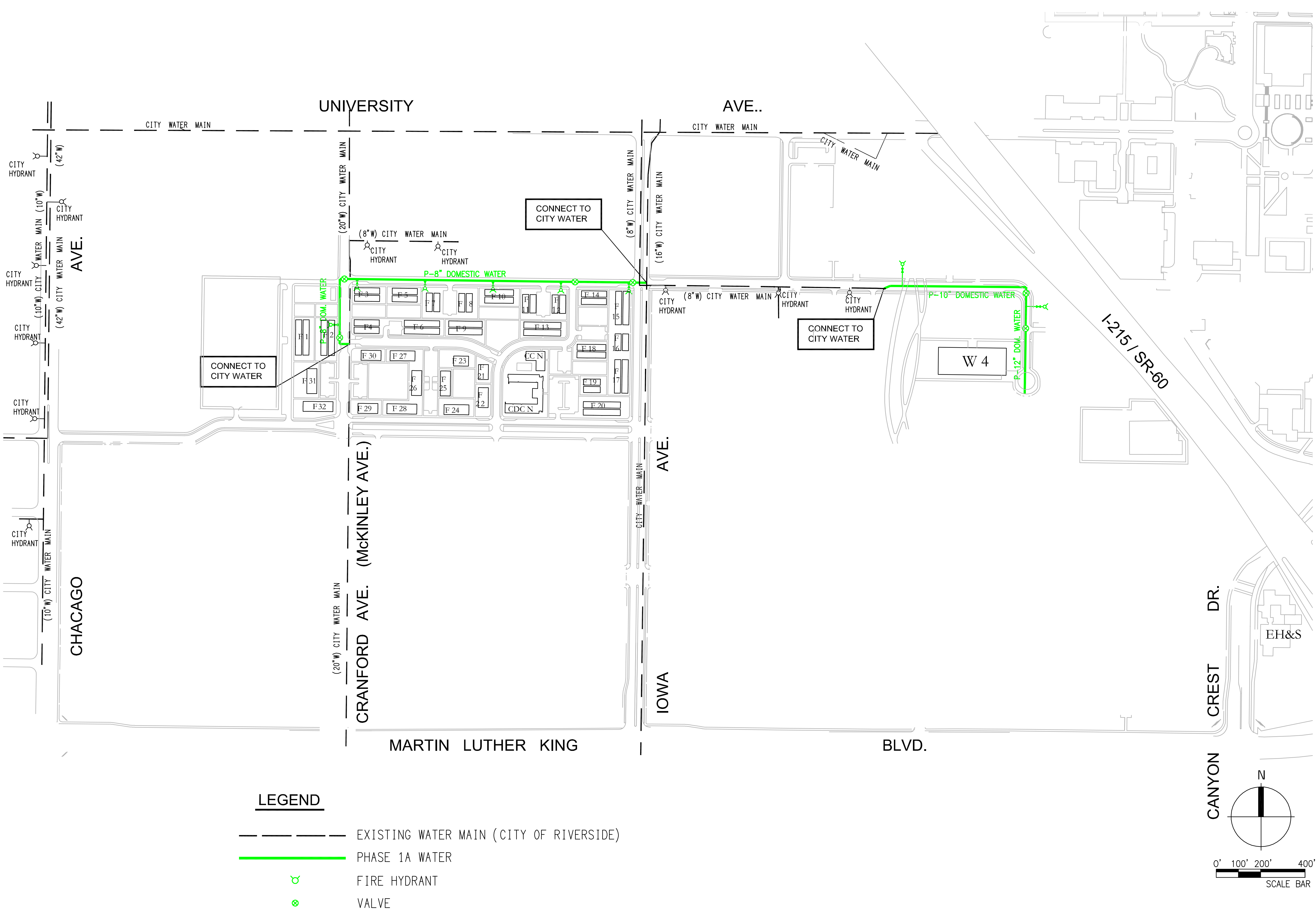

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FIGURE 3.4
WEST CAMPUS DEVELOPMENT PHASE 1A IMPLEMENTATION

Sheet No.

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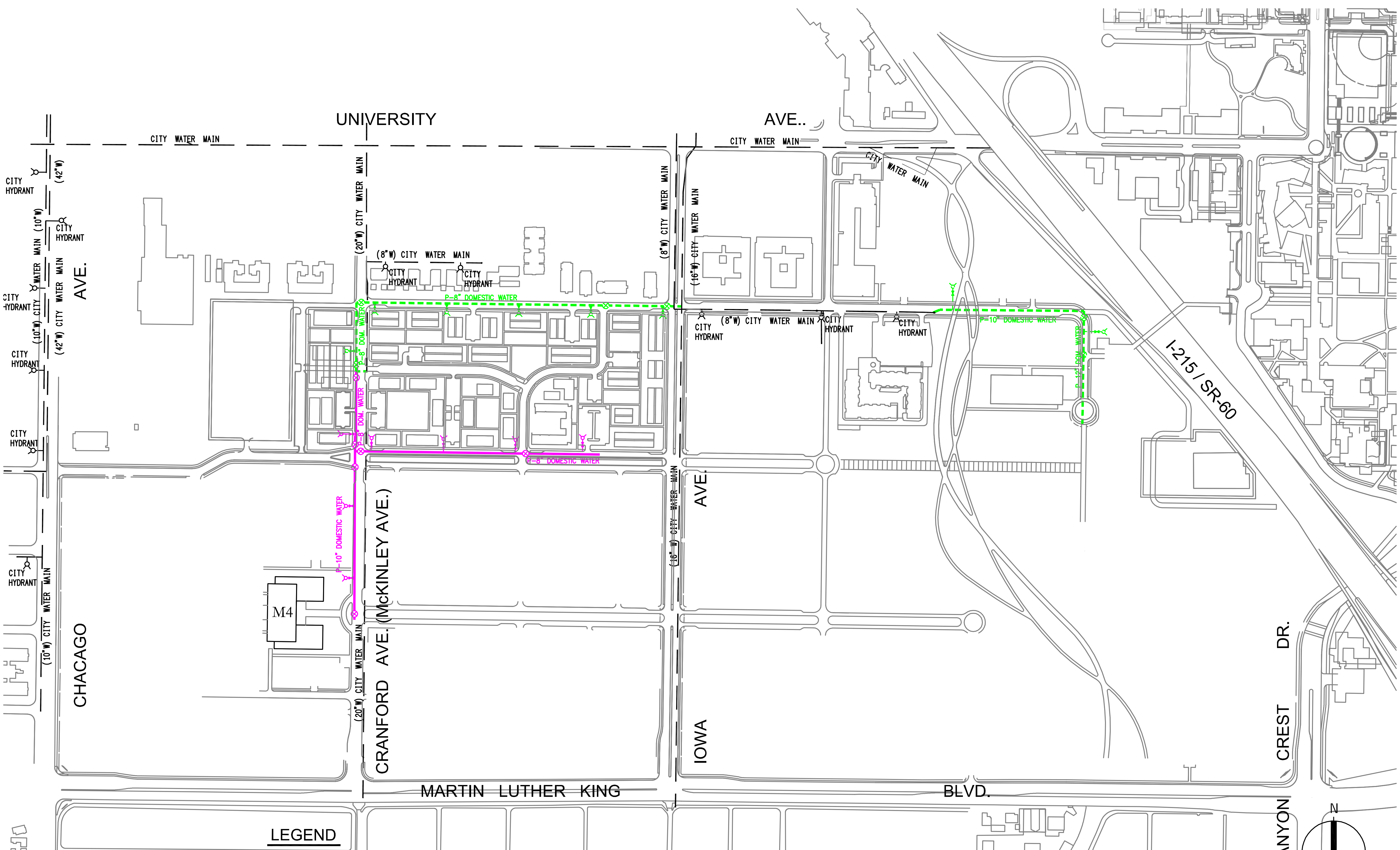

LEGEND

EXISTING WATER MAIN (CITY OF RIVERSIDE)
PHASE 1B WATER
FIRE HYDRANT
VALVE

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FIGURE 3.5 WEST CAMPUS DEVELOPMENT PHASE 1B IMPLEMENTATION

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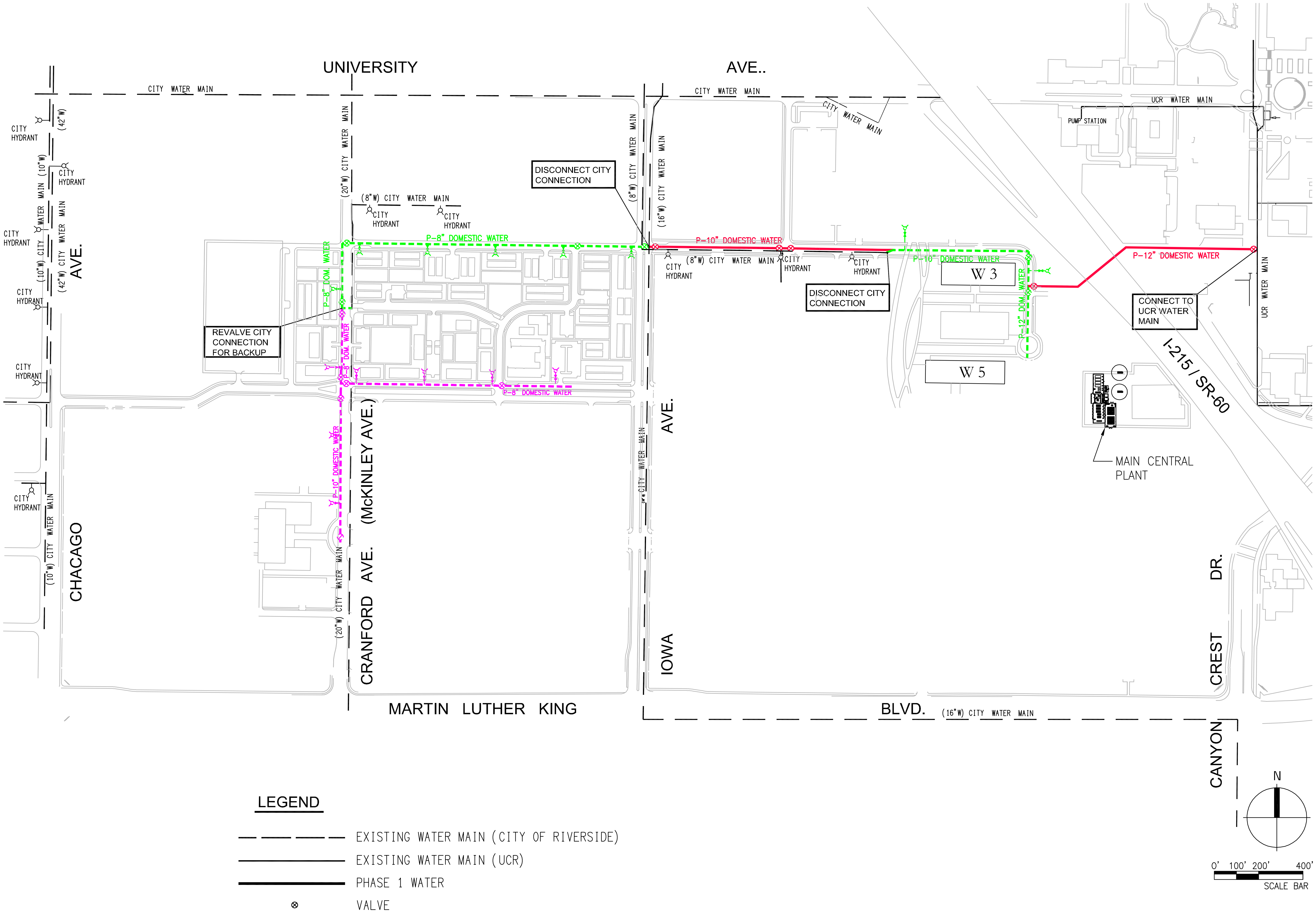

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FIGURE 3.6
WEST CAMPUS DEVELOPMENT PHASE 1 IMPLEMENTATION

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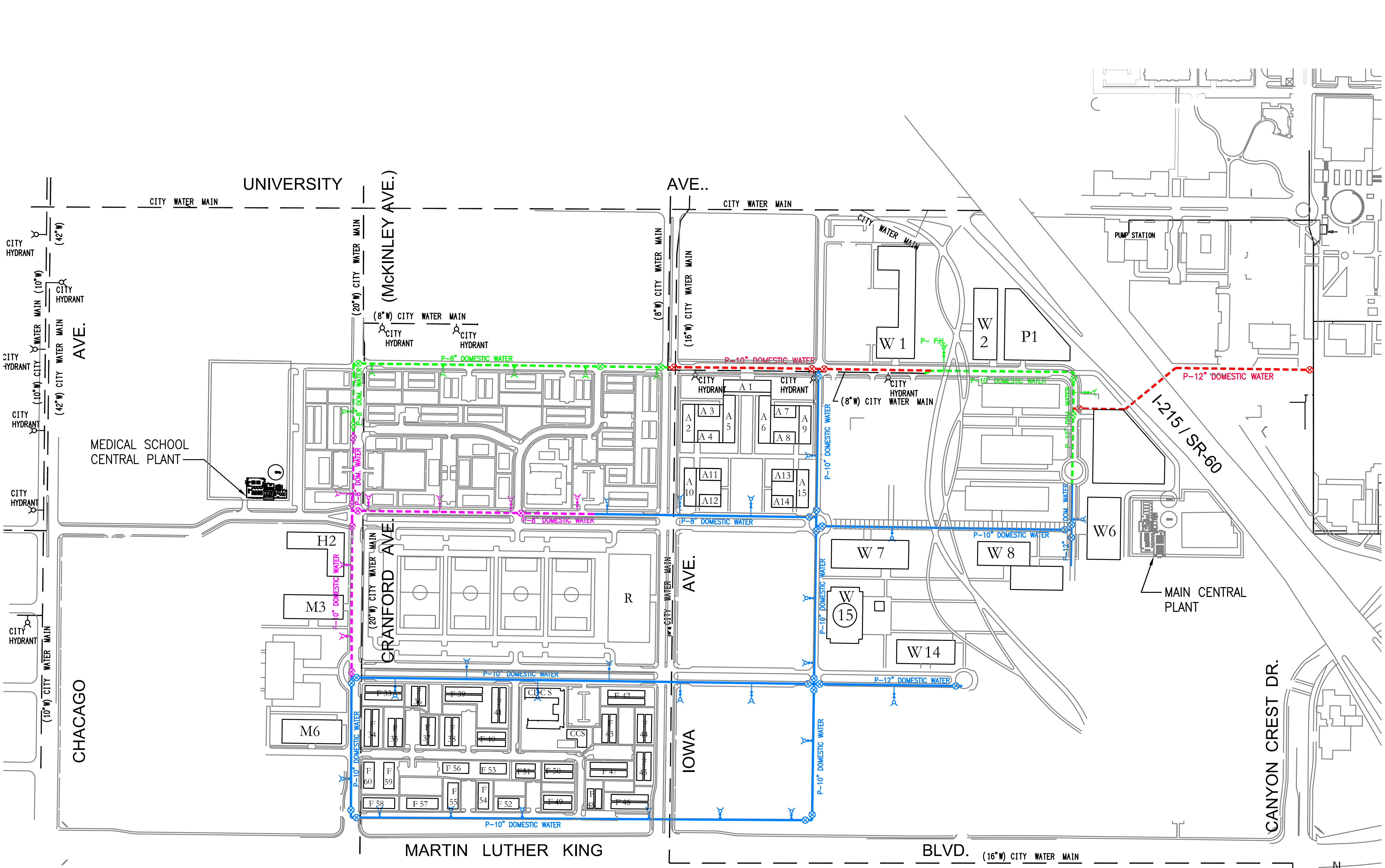

LEGEND

- EXISTING WATER MAIN (CITY OF RIVERSIDE)
- PHASE 2 WATER
- FIRE HYDRANT
- VALVE

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FIGURE 3.7
WEST CAMPUS DEVELOPMENT PHASE 2 IMPLEMENTATION

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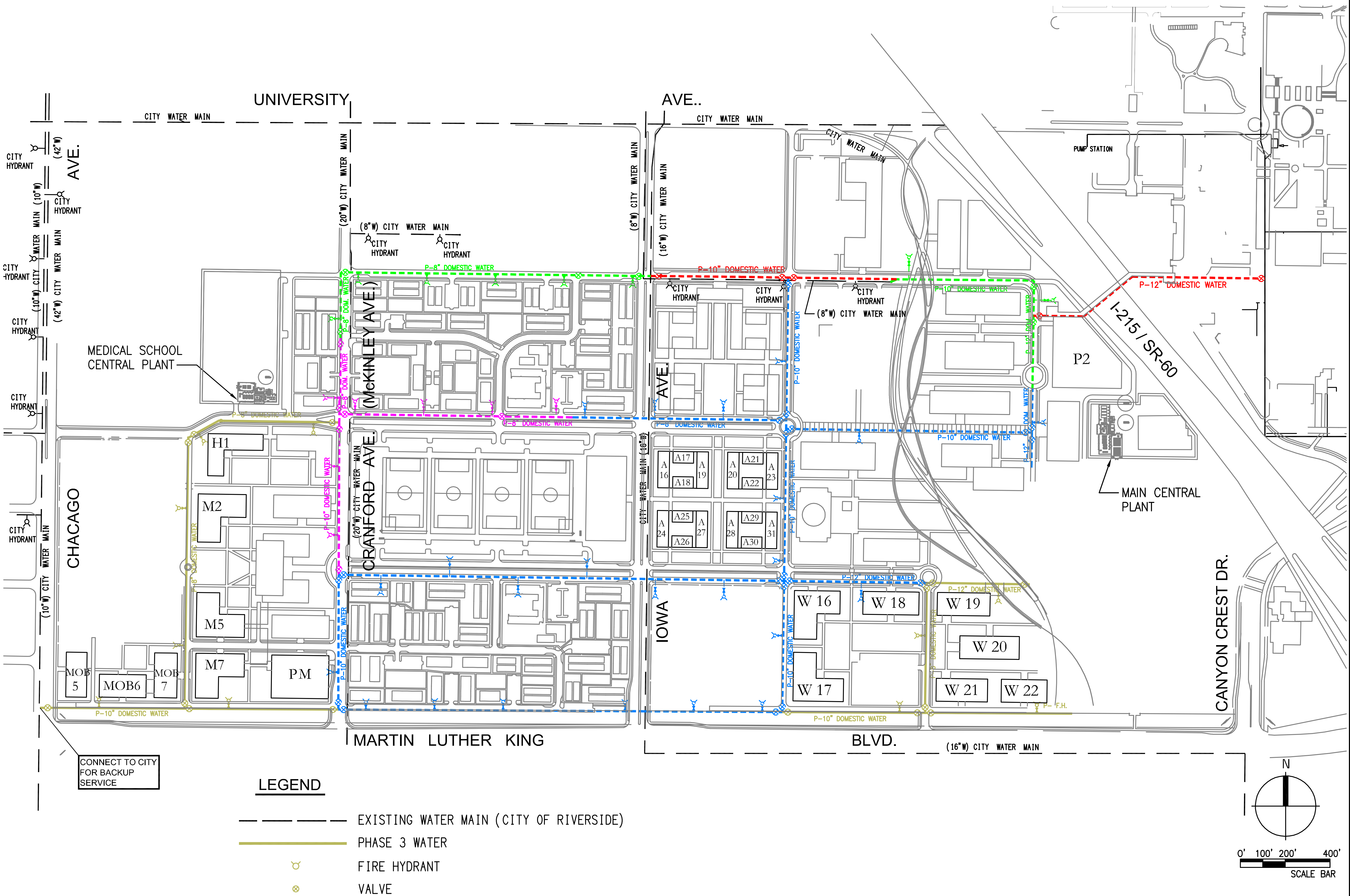

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FIGURE 3.8
WEST CAMPUS DEVELOPMENT PHASE 3 IMPLEMENTATION

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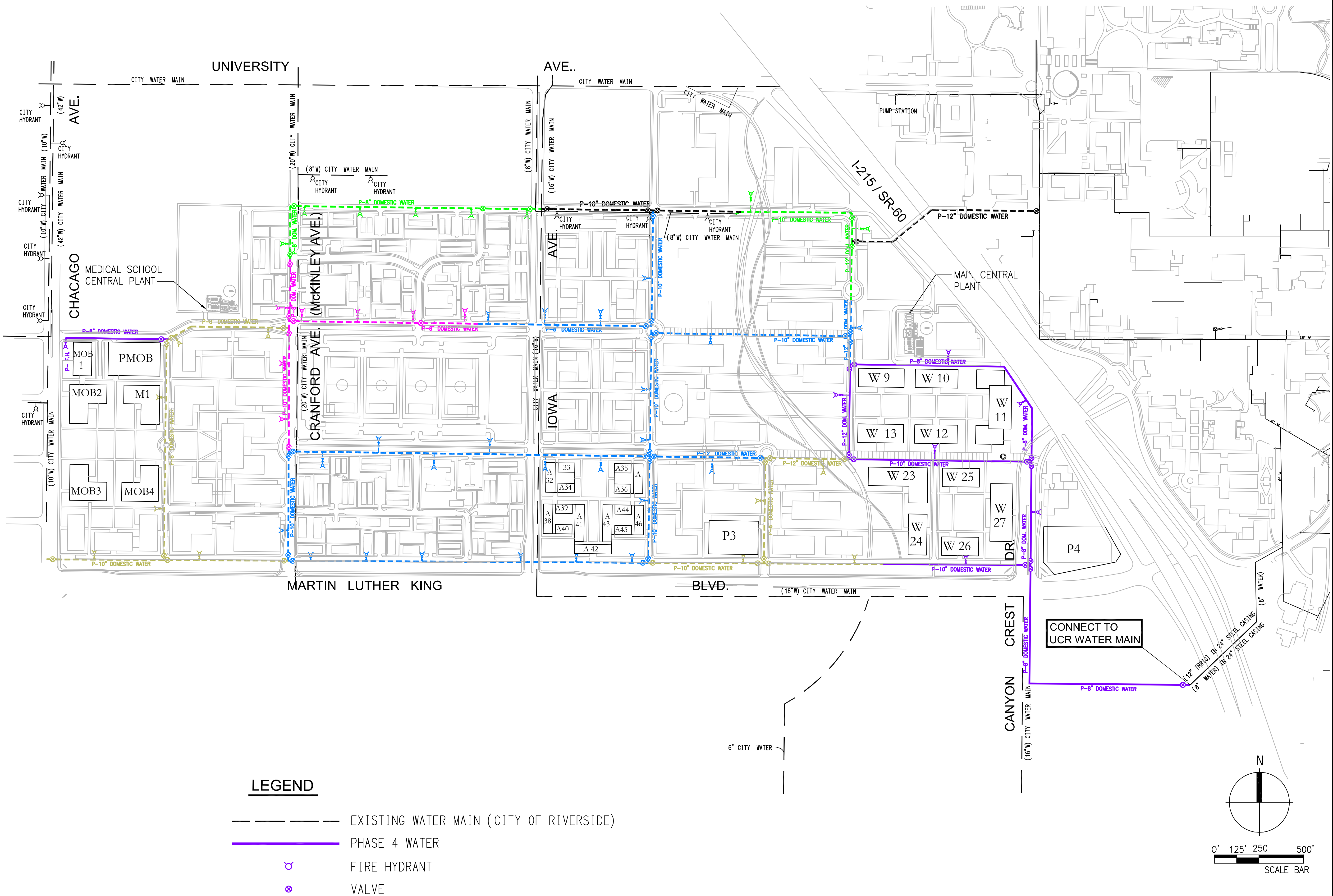

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FIGURE 3.9 WEST CAMPUS DEVELOPMENT PHASE 4 IMPLEMENTATION

Sheet No.

CHAPTER 4

IRRIGATION AND LANDSCAPE WATER DISTRIBUTION SYSTEM

This chapter presents the analyses and recommended plans to serve the development of the West Campus while maintaining the existing agricultural operations irrigation water distribution system and facilitating the irrigation of new landscaping. This chapter will explore the existing irrigation water (IW) distribution system, irrigation water demands, and irrigation of developing campus areas and remaining agricultural areas. Points of connection to existing systems will also be explored. In addition, irrigation water distribution system alternatives will be explored including criteria for analysis, demand and capacities, phasing implications, and cost considerations. The result of these explorations will be the conceptual design of a recommended alternative and a proposed irrigation water distribution system.

4.1 Existing System

The existing agricultural irrigation system that covers West Campus is comprised of 6-inch to 16-inch irrigation lines, reservoirs, and pumps serving the agricultural fields as shown on Figures 4.1.1 to 4.1.6. The existing agricultural operations irrigation source is the Gage Canal.

- There is an existing irrigation return pipe in Chicago Avenue. This line runs southerly to the Martin Luther King Boulevard (MLK) intersection.
- A 12-inch irrigation pipe on the north side of MLK serves Field 9. This field is located at the southeast corner of Chicago Avenue and MLK. This line initiates at Dirt Reservoir #2 and bears north.
- A 14-inch irrigation pipe on the south side of MLK reduces to 12 inches in diameter to the north and serves field S-6. This field is located at the northeast corner of Chicago Avenue and MLK.
- A 12-inch high head irrigation pipe runs east and west and connects Dirt Reservoir No. 2, Reservoir No. 1, and Pump Station No. 3. This line is approximately 1,240 feet south of MLK.
- A 16-inch irrigation pipe initiates at an asphalt reservoir approximately 1,350 feet south of MLK. This line runs westerly and then northerly.
- Field #S-6 consists of a 12-inch main line feeder on the east side of the field and three 10-inch to 12-inch concrete pipes as secondary feeders running from east to west. Eight lines of 8-inch concrete irrigation pipes, with hose bed manifolds, run north to south. Eight lines of 8-inch concrete drain pipes collect extra water via two lines, 12-inch and 24-inch, which run east and west to a pump station. A 12-inch low-head pipe line runs to Reservoir No. 1.

- Field #9 consists of a 12-inch main line feeder running in a north and south direction. Line #3 connects to four 12-inch concrete secondary feeder pipes running east to west. Also, four 8-inch drain pipes running east to west connect to Line #7.

- A 12-inch concrete irrigation pipeline starts from the southeast reservoir and is located at west side of Canyon Crest Drive, running east to west and south to north to the east side of Gage Canal to Pump House No. 1.

- An irrigation pipeline is located on the west side of Gage Canal.

- A 12-inch irrigation water line (steel) that crosses I-215 from East Campus.

- A 10-inch irrigation water line is northeast of Parking Lot 30.

- A 10-inch high-head irrigation pipe runs north to south and east to west.

- A 12-inch to 10-inch high-head irrigation pipe runs north to south and east to west.

- The existing reservoirs, storage tank, and overall water system are shown in Figures 4.1.1 through 4.1.6.

4.2 Irrigation Water Demands

4.2.1 Landscape Irrigation of Developing Campus Areas

The landscape irrigation water system for Phases 1A through 4 of West Campus development will connect to the existing agriculture irrigation water system. The total demand for landscape irrigation water is estimated to be 60% percent of the total West Campus domestic water demand. The domestic water average daily demand is 688 gallons per minute (gpm). So, the total daily water demand for West Campus is 688 gpm divided by 0.4 resulting in 1,719 gpm. The average irrigation water demand is 60 percent of 1,719, resulting in 1,032 gpm.

Based upon the Water Use Classification of Landscape Species (WUCOLS), published by the California Department of Water Resources, the estimated peak demand is 1.6 times the estimated average demand. The irrigation water peak daily demand is 1.6 times the average daily irrigation water demand, resulting in 1,651 gpm. 1,032 gpm multiplied by 60 minutes per hour and 24 hours per day results in a daily average landscape irrigation demand of 1,485,504 gallons per day (gpd).

The West Campus development area north of MLK encompasses approximately 227 acres. Assuming that the landscaped portion of the West Campus' 227 acres can be irrigated in 8 hours, results in a required landscape irrigation system capacity of 3,095 gpm. For the peak irrigation demand, 1,651 gpm multiplied by 60 minutes per hour and 24 hours per day results in a daily peak landscape irrigation demand of 2,376,806 gpd. Assuming that the landscaped portion of the West Campus' 227 acres can be irrigated in 12 hours on a peak day, results in a required landscape irrigation system capacity of 3,301 gpm.

4.2.2 Irrigation of Remaining Agricultural Areas

The West Campus' agriculture irrigation water system is complex and includes reservoirs, pump stations, and field irrigation lines. As Phases 1A through 4 are developed, it is recommended that the agricultural irrigation system in the vicinity be removed, capped, and tapped into in order to supply the required landscape irrigation for the developing areas. As West Campus develops, the integrity of existing agricultural operations irrigation system will be maintained in areas not being developed and systematically dismantled and replaced with the final landscape irrigation water system in the developing areas.

4.3 Use of Agricultural Operations Irrigation Water for Landscape Irrigation Water

Phases 1A through 4 will utilize the existing agricultural operations irrigation system to the extent possible by connecting to the existing system whenever practical. Agricultural Operations irrigation water is obtained from the Gage Canal and may possibly be supplemented by new or existing wells in the future. The use of new or existing wells for irrigation water may provide a more economical source or non-potable water, so this option should be revisited in the future. Irrigation on the West Campus shall be metered for individual buildings and by zones.

4.4 Irrigation Water Points of Connection

The points of connection, node identification, and pipe identification for Phases 1A through 4 are illustrated in Figure 4.2. For reference, the "J" nodes are pipe connection points and the "P" nodes are actual pipes. The following is a qualitative description of the points of connection and piping for Phases 1A through 4.

4.4.1 Phase 1A (Figure 4.3)

The existing agricultural irrigation system has an irrigation line initiating in the asphalt reservoir that runs westerly and then northerly along Iowa Avenue. At node J94, this irrigation line turns westerly once again. For Phase 1A Family Student Housing, the point of connection will be at node J94 with 8-inch polyvinylchloride (PVC) irrigation pipe. Pipe numbers P56, P54, and P52 will be constructed of 8-inch irrigation PVC. Pipe numbers P50 and P48 will be constructed of 6-inch PVC.

For building W4, there is an existing agricultural irrigation water line initiating at the east reservoir that runs northerly along the Gage Canal and then easterly near the North Mall. The second point of connection for Phase 1A will be at node J48 connecting pipe P66 (8-inch irrigation PVC) to the existing agricultural line.

4.4.2 Phase 1B (Figure 4.4)

The Phase 1B point of connection will be at node J42. 8-inch PVC pipe numbers P101 and P102 will connect to the Phase 1A system and be constructed southerly to serve building M4.

4.4.3 Phase 1 (Figure 4.5)

The point of connection for Phase 1 will be at node J30. An 8-inch PVC P42 will run northerly to a 6-inch PVC P44 running westerly.

4.4.4 Phase 2 (Figure 4.6)

Phase 2 has several points of connection. The first Phase 2 point of connection is at node J70 where 8-inch PVC pipes encircle the southerly family student housing development consisting of pipes P100, P99, and 10-inch P106 and P86.

The second point of connection is at node J98 to the existing agricultural irrigation pipe in Iowa Avenue

The third point of connection is at J36 connecting 6-inch P46 and 8-inch P60 and P58. P58 also ties into node J94 and the existing agricultural irrigation pipe in Iowa Avenue. At node J46, Phase 2 piping continues with 8-inch diameter PVC P62, P64, and P96. 10-inch P92 pipe connects at node J52.

4.4.5 Phase 3 (Figure 4.7)

The first of Phase 3's points of connection is at node J80. Here 8-inch PVC pipe numbers P103, P112, and P110 supply the medical buildings.

The second point of connection is at node J68 where 10-inch Phase 2 system connects with 8-inch P108 and 6-inch P114.

Phase 3 also connects 10-inch P94 and 8-inch P97 at node J52.

Node J56 connects an 8-inch P90 and P88, and a 10-inch P80.

4.4.6 Phase 4 (Figure 4.8)

Phase 4's first point of connection is at node J82 where 6-inch PVC pipeline P104 connects to the irrigation system.

Another Phase 4 connection point is at node J74 where 10-inch P84B and P82, and 12-inch P84A, connect to the Phase 2 irrigation line.

The final three points of connection are on the easterly limits of West Campus at nodes J92, J58, and J63. These nodes connect 10-inch P78 and P76, 8-inch P70, P74, P215, P68 and P72.

4.5 Irrigation Water Distribution System Alternatives

4.5.1 Criteria for Analysis

The criteria for analysis depend on the landscape irrigation water demand. Also, the water supply source needs to be large enough to meet the entire landscape water demand. The most desirable landscape irrigation water supplies from a reliability standpoint are as follows:

1. An inexhaustible supply, whether from surface or ground water, which flows by gravity through the distribution system.

2. A gravity source supplemented by storage reservoirs.

3. An exhaustible source that requires pumping.

4. A source that requires both storage and pumping.

For Phases 1A though 4 of the development of UCR's West Campus, the analysis assumes an inexhaustible supply, whether from surface or ground water, which flows through the distribution system under pressure.

While the West Campus is developing, the agricultural fields will systematically be replaced with developed area that will utilize portions of the existing irrigation system as the major source of irrigation water.

4.5.2 Demands and Capacities - Sizing Analysis

The landscape irrigation water system for Phases 1A through 4 of the West Campus development will connect to the existing agriculture irrigation water system. The total demand for landscape irrigation water is estimated to be 60% percent of the total West Campus domestic water demand. The domestic water average daily demand is 688 gallons per minute (gpm). So, the total daily water demand for West Campus is 688 gpm divided by 0.4 resulting in 1,719 gpm. The average irrigation water demand is 60 percent of 1,719, resulting in 1,032 gpm.

Based upon the Water Use Classification of Landscape Species (WUCOLS), published by the California Department of Water Resources, the estimated peak demand is 1.6 times the estimated average demand. The irrigation water peak daily demand is 1.6 times the average daily irrigation water demand, resulting in 1,651 gpm. 1,032 gpm multiplied by 60 minutes per hour and 24 hours per day results in a daily average landscape irrigation demand of 1,485,504 gallons per day (gpd).

The West Campus encompasses approximately 227 acres. Assuming that the landscaped portion of the West Campus' 227 acres can be irrigated in 8 hours, results in a required landscape irrigation system capacity of 3,095 gpm. For the peak irrigation demand, 1,651 gpm multiplied by 60 minutes per hour and 24 hours per day results in a daily peak landscape irrigation demand of 2,376,806 gpd. Assuming that the landscaped portion of the West Campus' 227 acres can be irrigated in 12 hours on a peak day, results in a required landscape irrigation system capacity of 3,301 gpm.

The landscape irrigation water system was sized using H2O Net to model the distributions system. All pipes in the system were modeled with nodes at pipe junctions for 26 planning areas. The Planning Area table shows the 26 planning areas, land uses, acres, demand, average daily demand, maximum daily demand, and peak hour demand. The Land Use Plan (Figure 3.1) illustrates the location and sizes of the 26 planning areas.

The Node and Pipe diagram (Figure 4.2) illustrates the locations of the nodes and pipes in relation to the information contained in the following pipe and node tables. The node table (Table 4.5.2.1) summarizes the Node ID, Demand, Elevation, Head, and Residual Pressure. The pipe table (Table 4.5.2.2) shows Pipe ID, From Node, To Node, Length, Diameter, Roughness, Flow, Velocity, and Head Loss.

Table 4.5.2.1 Nodal Peak Flow Summary

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J200	113.13	972	1186	92.61
J30	198.78	1,030.00	1180	64.9
J32	120	1,031.00	1180	64.39
J34	400.25	1,014.00	1178	71.24
J36	137.17	1,003.00	1177	75.48
J38	144.9	992	1177	80.25
J40	205.65	982	1179	85.2
J42	119.46	980	1180	86.77
J44	237.96	991	1180	81.68
J46	173.99	1,013.00	1181	72.73
J48	198.89	1,032.00	1182	64.85
J50	149.41	1,013.00	1181	72.99
J500	0	1,018.00	1249	99.92
J502	0	1,020.00	1247	98.5
J504	0	1,015.00	1244	99.2
J506	0	1,000.00	1235	101.62
J508	-3,321.75	998	1233	101.97
J52	297.85	1,004.00	1193	82.06
J54	146.51	1,004.00	1209	88.87
J56	215.1	1,015.00	1193	76.97
J58	180	1,022.00	1187	71.43
J60	300	1,037.00	1187	64.91
J62	198.78	1,040.00	1189	64.42
J63	170.23	1,023.00	1192	73.35
J66	131.7	1,011.00	1197	80.63
J68	206.83	985	1195	91.03
J70	408.83	978	1189	91.52
J72	270.27	986	1189	88.03
J74	83.4	994	1223	99.28
J80	154.88	980	1181	86.91
J82	254.59	968.5	1181	91.89
J84	108.84	963	1180	93.95
J86	221.97	973	1182	90.66
J88	113.13	978	1187	90.37
J90	180	1,045.50	1185	60.28
J92	180	1,028.00	1183	67.22
J94	296.24	1,004.00	1180	76.05
J98	324.79	995	1190	84.43

Table 4.5.2.2 Irrigation Pipe Information

ID	From Node	To Node	Length (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	HL/1000 (ft/kft)
P100	J72	J70	684	8	-55.5	0.35	0.09
P101	J80	J42	36	8	686.27	4.38	9.09
P102	J70	J80	666	8	831.69	5.31	12.98
P103	J80	J82	677	8	-9.46	0.06	0
P104	J82	J84	613	6	108.84	1.24	1.22
P106	J70	J68	589	10	-1,296.03	5.29	9.96
P108	J68	J88	672	8	821.12	5.24	12.68
P110	J88	J86	621	8	594.86	3.8	6.98
P112	J86	J82	563	8	372.89	2.38	2.94
P114	J88	J200	631	6	113.13	1.28	1.31
P215	J90	J60	512	8	-457.43	2.92	4.29
P42	J30	J32	154	8	223.2	1.42	1.14
P44	J32	J34	1074	6	103.2	1.17	1.11
P46	J34	J36	633	6	138.33	1.57	1.9
P48	J36	J38	623	6	1.16	0.01	0
P50	J38	J40	700	6	-143.74	1.63	2.04
P500	J500	J502	162	16	3,321.78	5.3	7.86
P501	RES5006	J500	178	16	3,321.78	5.3	7.86
P502	J502	J504	432	16	3,321.78	5.3	7.86
P504	J504	J506	1196	16	3,321.78	5.3	7.86
P506	J506	J508	153	16	3,321.78	5.3	7.86
P52	J40	J42	620	8	-349.39	2.23	2.61
P54	J42	J44	690	8	217.42	1.39	1.08
P56	J44	J94	647	8	-20.54	0.13	0.01
P58	J94	J46	617	8	-316.78	2.02	2.17
P60	J46	J34	624	8	435.38	2.78	3.92
P62	J46	J50	38	8	-926.15	5.91	15.85
P64	J50	J48	1074	8	-85.21	0.54	0.19
P66	J48	J30	511	8	421.98	2.69	3.7
P68	J48	J92	153	8	-706.09	4.51	9.59
P70	J92	J90	873	8	-277.43	1.77	1.7
P72	J92	J58	511	8	-608.66	3.88	7.28
P74	J58	J60	905	8	39.35	0.25	0.05
P76	J60	J62	557	10	-718.07	2.93	3.34
P78	J62	J63	689	10	-916.85	3.75	5.25
P80	J63	J66	667	10	-1,087.08	4.44	7.19

Table 4.5.2.2 Irrigation Pipe Information Continued

ID	From Node	To Node	Length (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	HL/1000 (ft/kft)
P82	J66	J54	624	10	-1,850.52	7.56	19.26
P84A	J54	J508	660	12	-4,236.16	12.02	36.73
P84B	J508	J74	325	10	2,407.37	9.83	31.35
P86	J74	J68	955	10	2,323.97	9.49	29.37
P88	J66	J56	568	8	631.73	4.03	7.8
P90	J56	J58	450	8	828.01	5.29	12.88
P92	J56	J52	624	10	-411.38	1.68	1.19
P94	J52	J54	573	10	-2,239.13	9.15	27.41
P96	J52	J50	665	8	990.35	6.32	17.94
P97	J52	J98	605	8	539.56	3.44	5.83
P99	J98	J72	657	8	214.77	1.37	1.06

4.5.3 Phasing Implications

While the West Campus is developing, the agricultural fields will systematically be replaced with developed area that will utilize portions of the existing irrigation system as the major source of irrigation water. Throughout this process, the existing agricultural system in areas not under development shall be protected in place and the operational functionality maintained. As the initial phases are developed, the existing agricultural irrigation water distribution system should be adequate to supply the required landscape irrigation water. As the West Campus nears a fully developed state, the booster pumps may have to be upgraded to meet the required landscape irrigation demand. The piping for Phases 1A though 4 is illustrated in Figures 4.3 through 4.8.

4.6 Irrigation Water Distribution System Cost Summary

This study includes conceptual-level cost estimates for irrigation water distribution system infrastructure development. Details of these cost estimates are included in the Appendix to this report.

- Phase 1A Housing $ 197,000
- Phase 1A Campus $ 32,000
- Phase 1B $ 80,000
- Phase 1 $ 70,000
- Phase 2 Housing $ 196,000
- Phase 2 Campus $ 236,000
- Phase 3 $ 387,000
- Phase 4 $ 433,000

Estimated Total for the Build-Out of the Irrigation Water Distribution System: $ 1,631,000

4.7 Recommended Irrigation Water Distribution System

The recommended agricultural and landscape irrigation water distribution system implementation schematics for Phases 1A through 4 are illustrated in Figures 4.3 through 4.8.

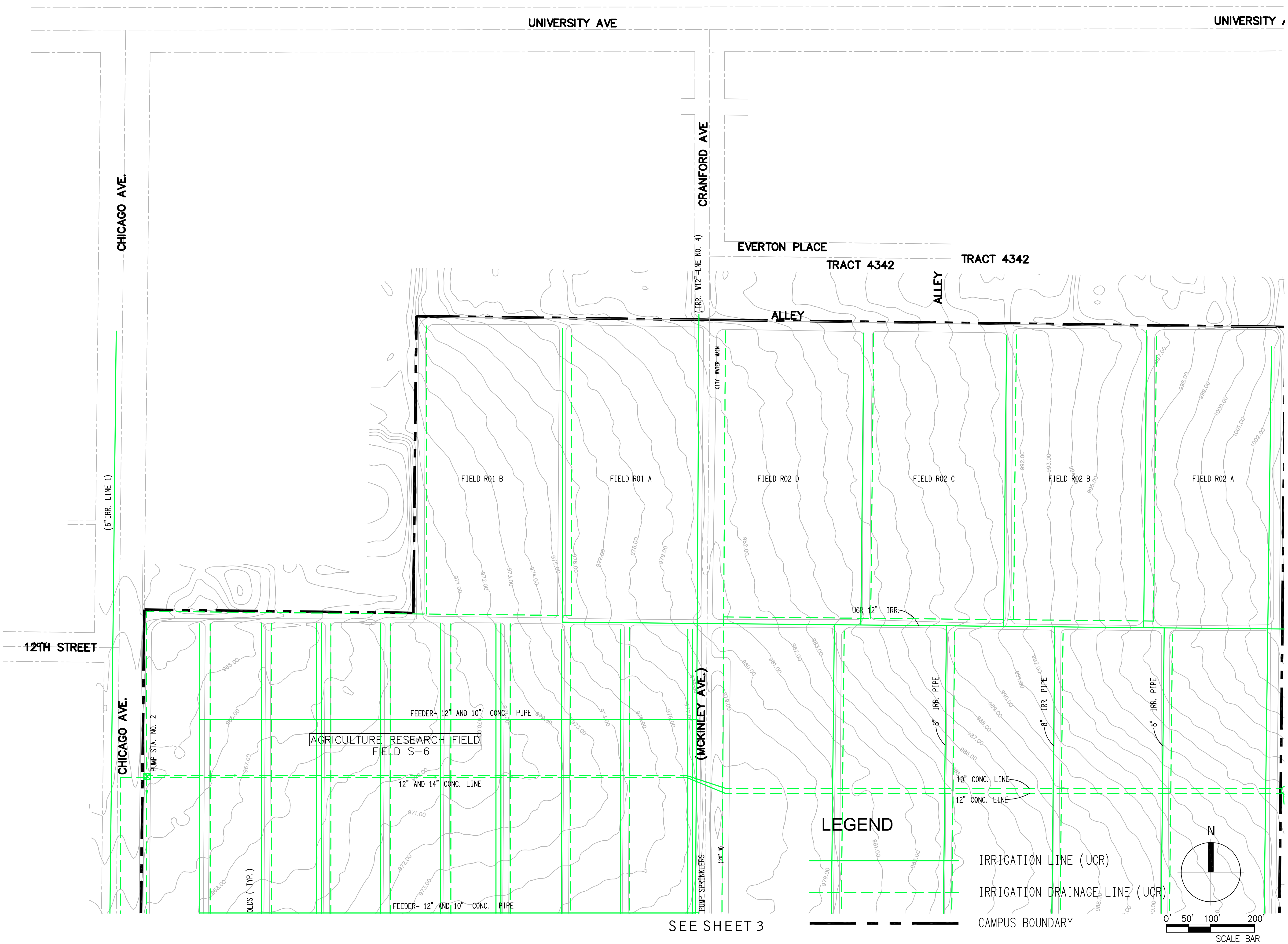

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FIGURE 4.1.1
EXISTING AGRICULTURE IRRIGATION WATER SYSTEM

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FIGURE 4.1.2
EXISTING AGRICULTURE IRRIGATION WATER SYSTEM

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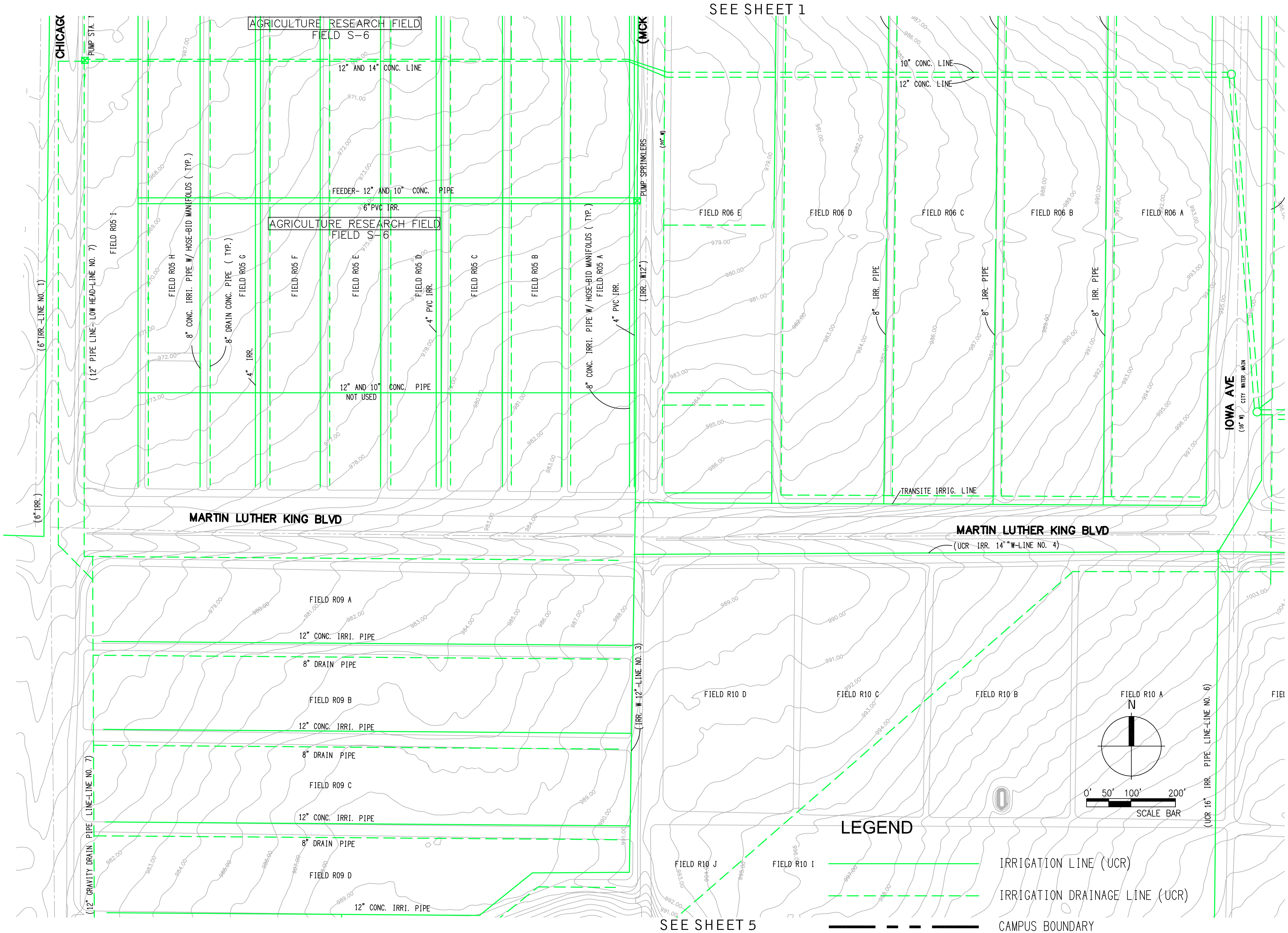

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FIGURE 4.1.3 EXISTING AGRICULTURE IRRIGATION WATER SYSTEM

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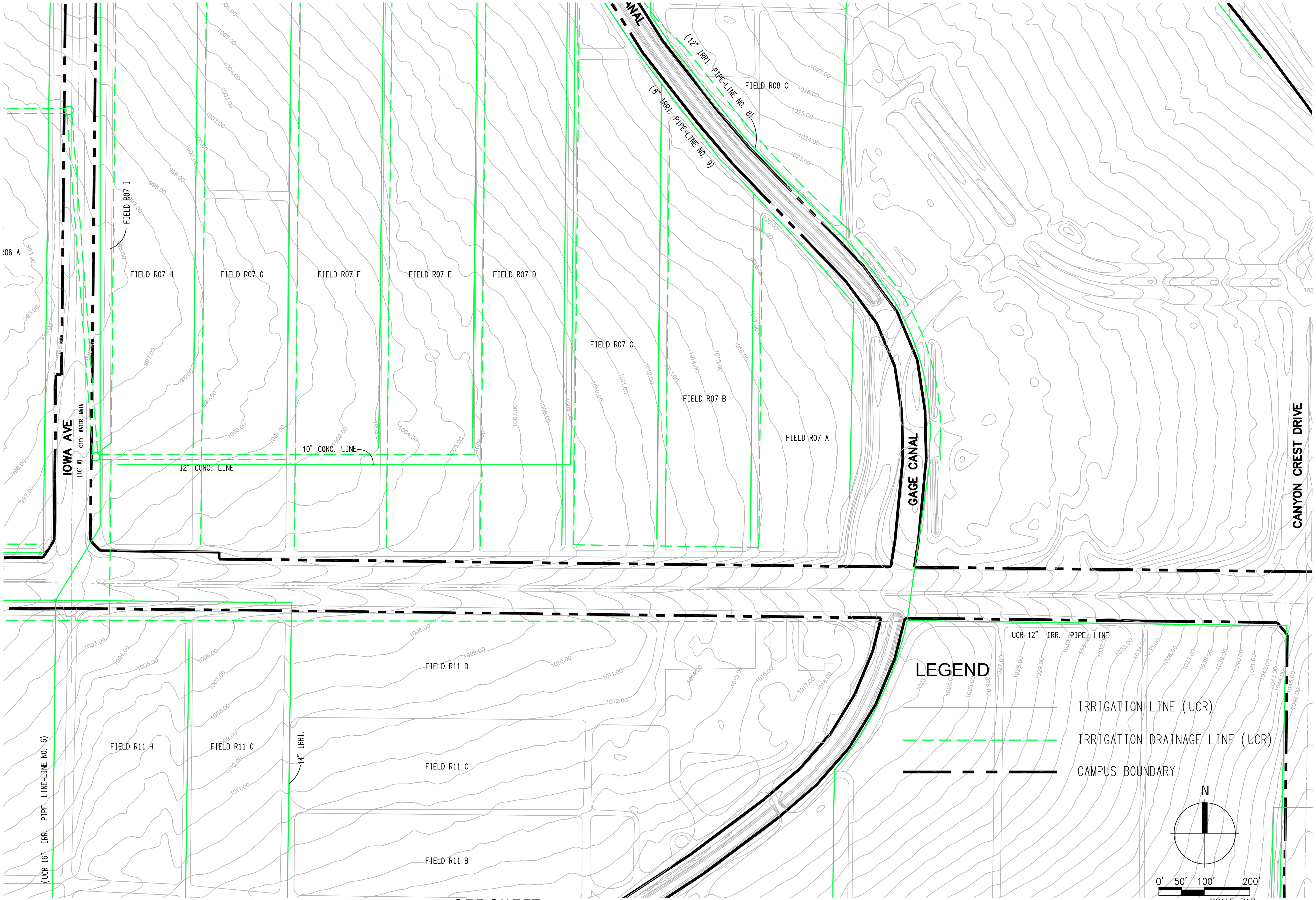

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FIGURE 4.1.4
EXISTING
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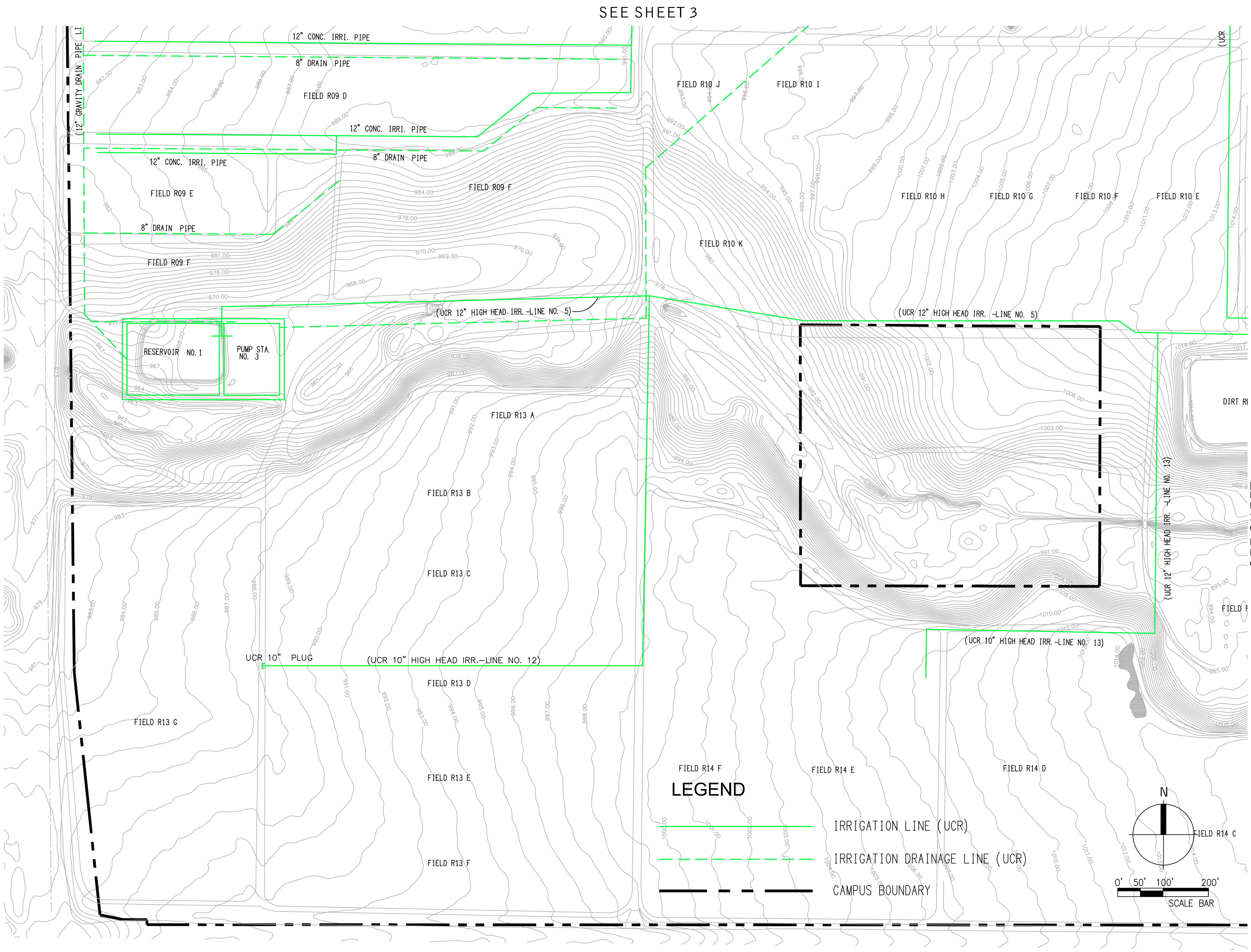

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FIGURE 4.1.5
EXISTING AGRICULTURE IRRIGATION WATER SYSTEM

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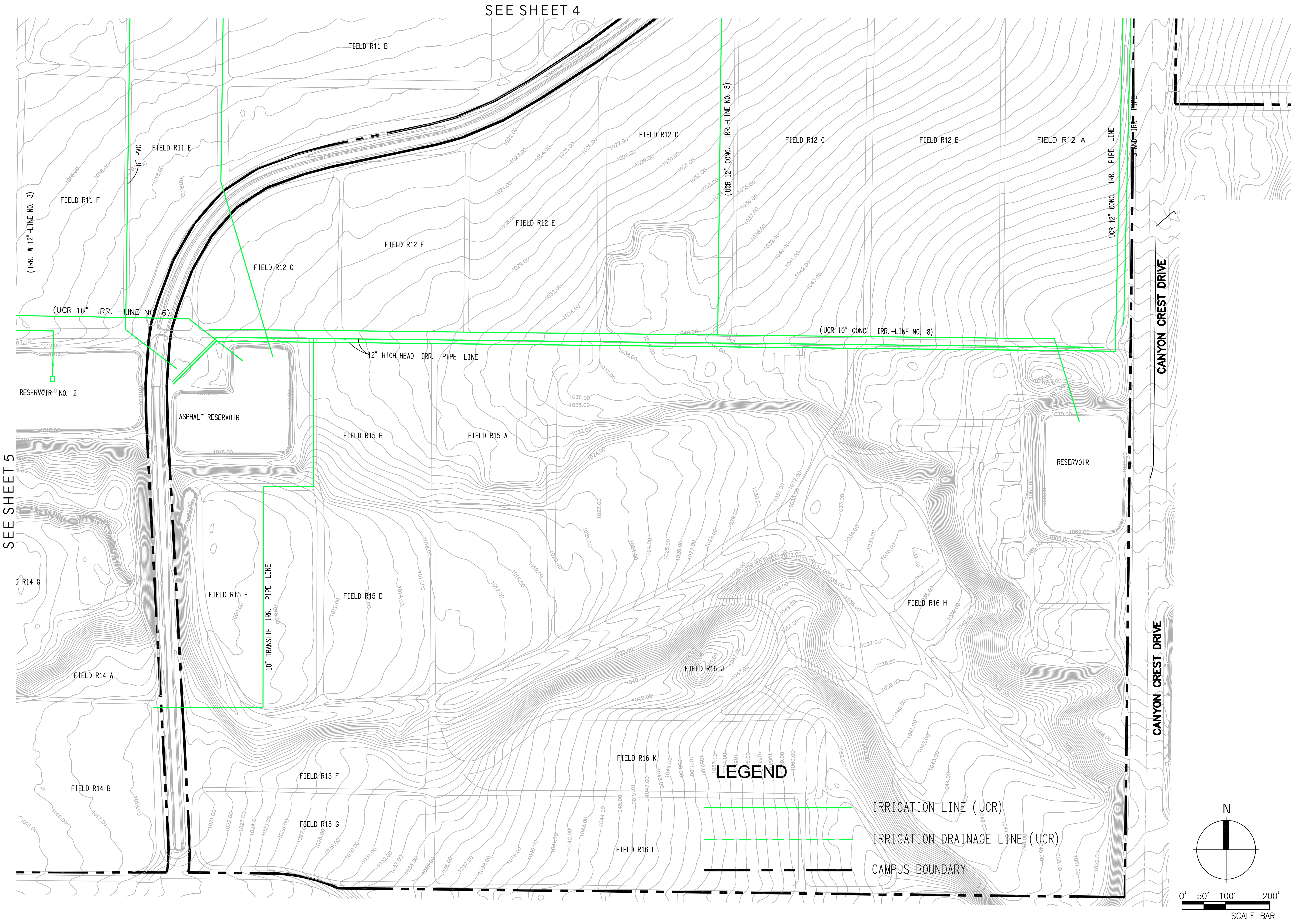

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FIGURE 4.1.6
EXISTING AGRICULTURE IRRIGATION WATER SYSTEM

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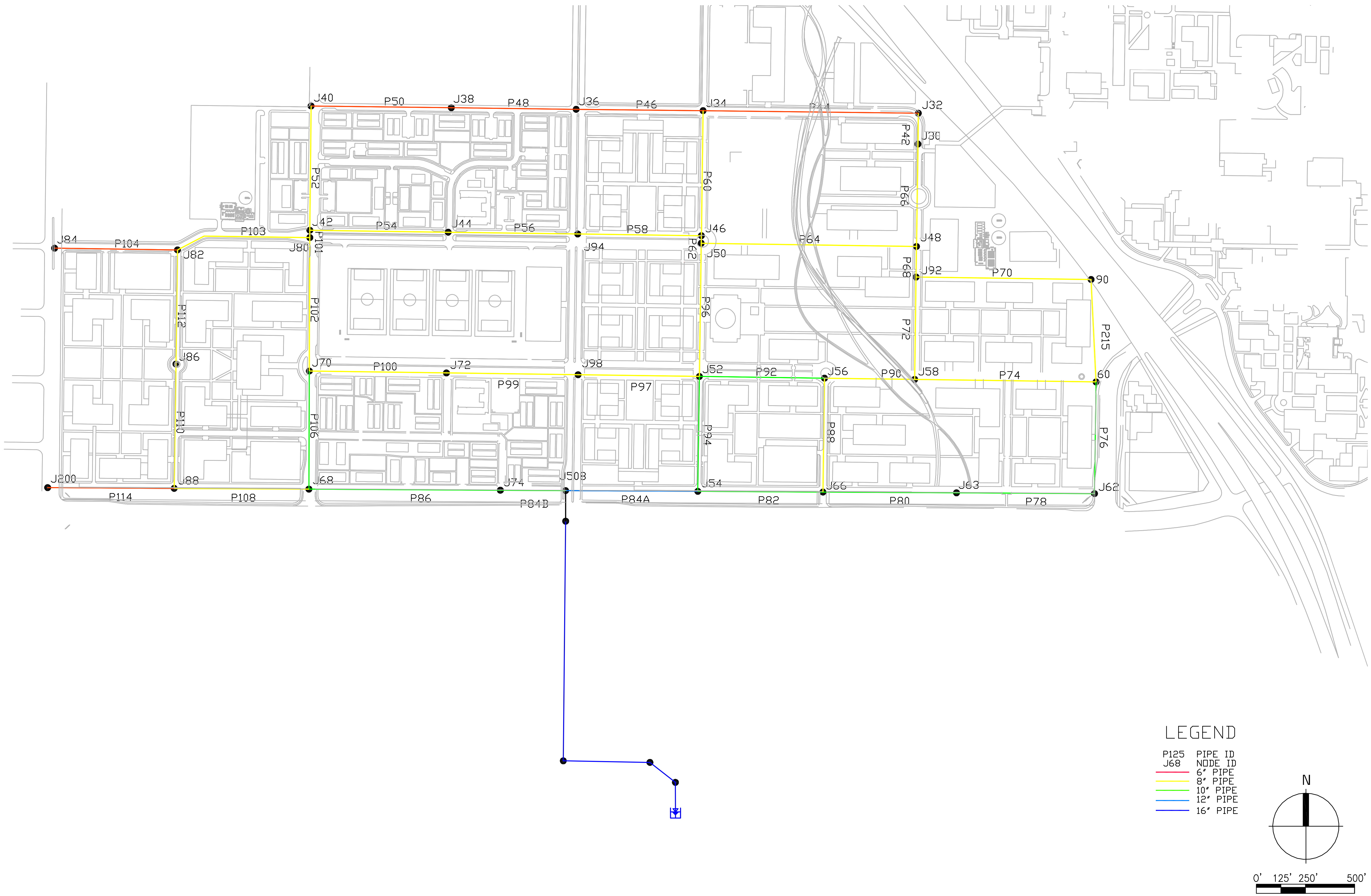

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FIGURE 4.2
UCR WEST CAMPUS IRRIGATION WATER FLOW NETWORK

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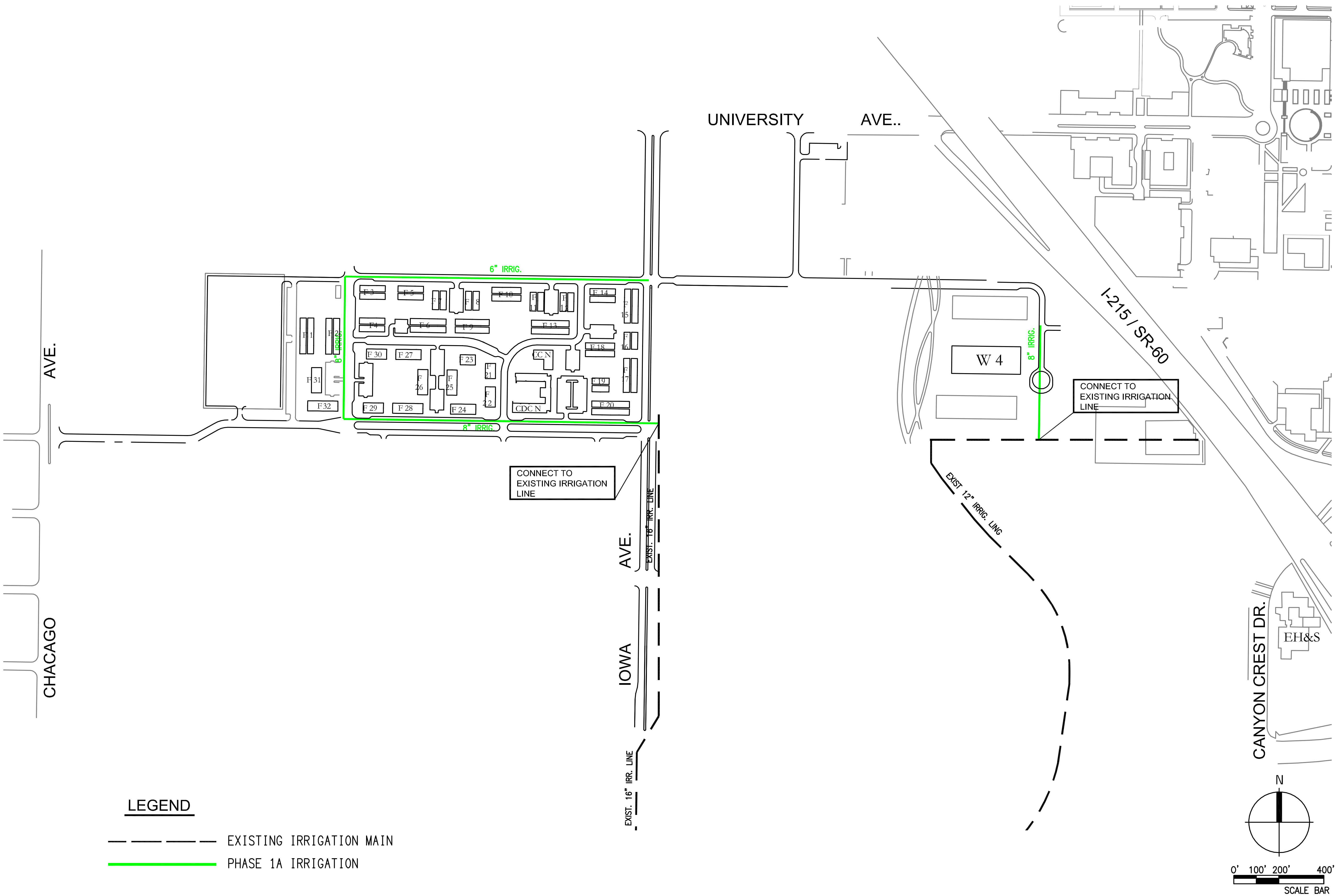

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FIGURE 4.3 WEST CAMPUS DEVELOPMENT PHASE 1A IRRIGATION IMPLEMENTATION

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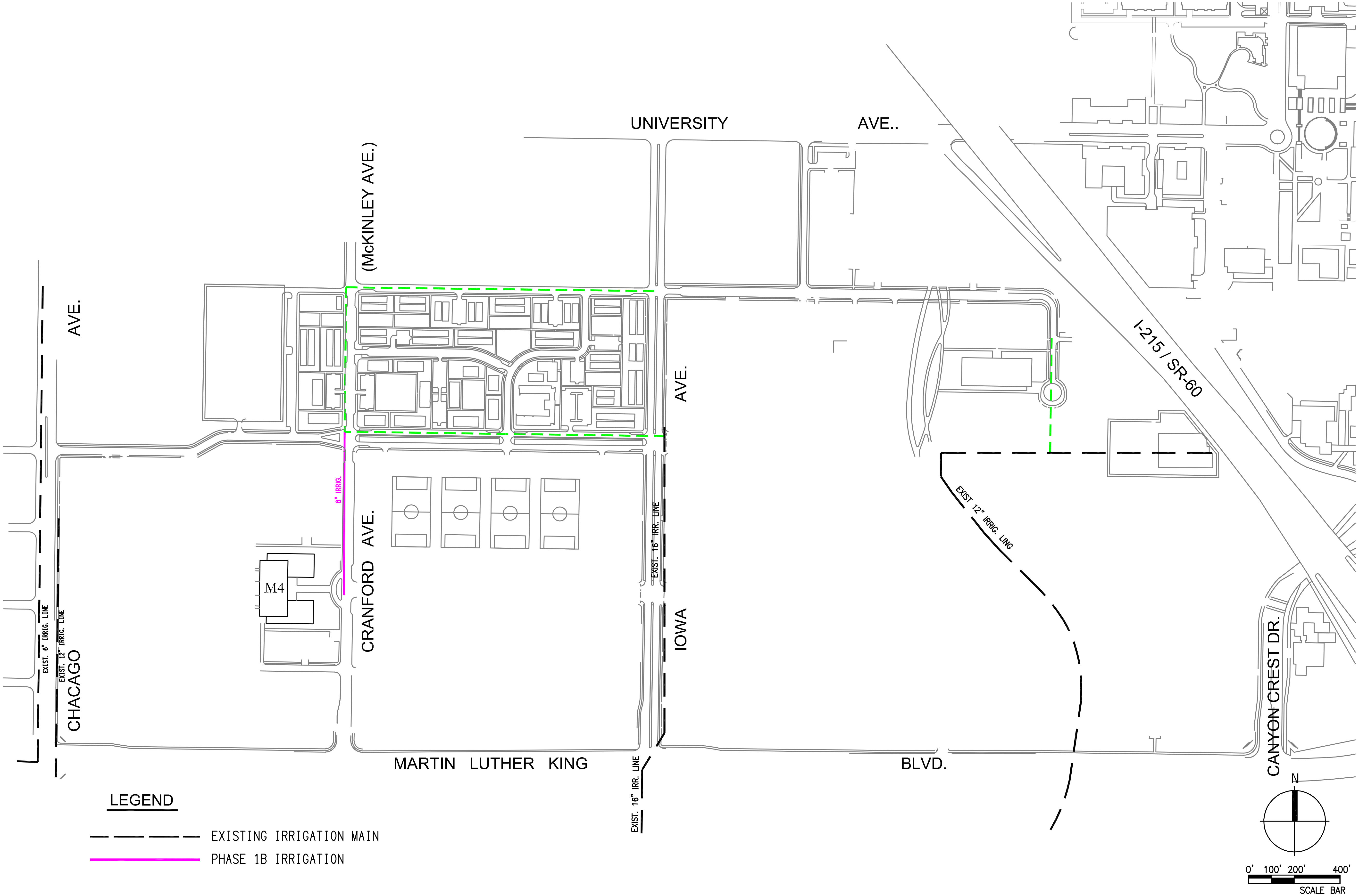

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FIGURE 4.4 WEST CAMPUS DEVELOPMENT PHASE 1B IRRIGATION IMPLEMENTATION

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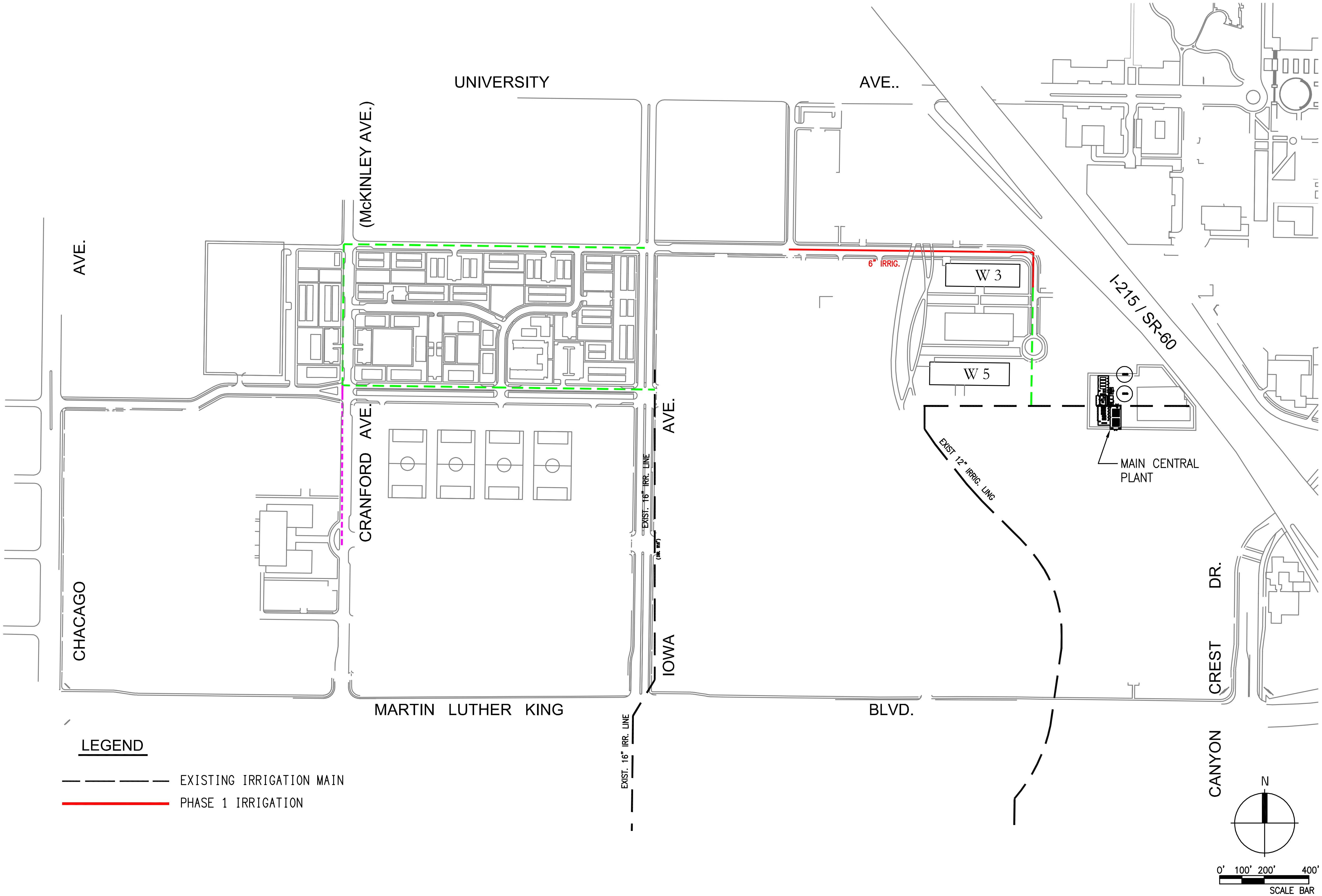

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FIGURE 4.5 WEST CAMPUS DEVELOPMENT PHASE 1 IRRIGATION IMPLEMENTATION

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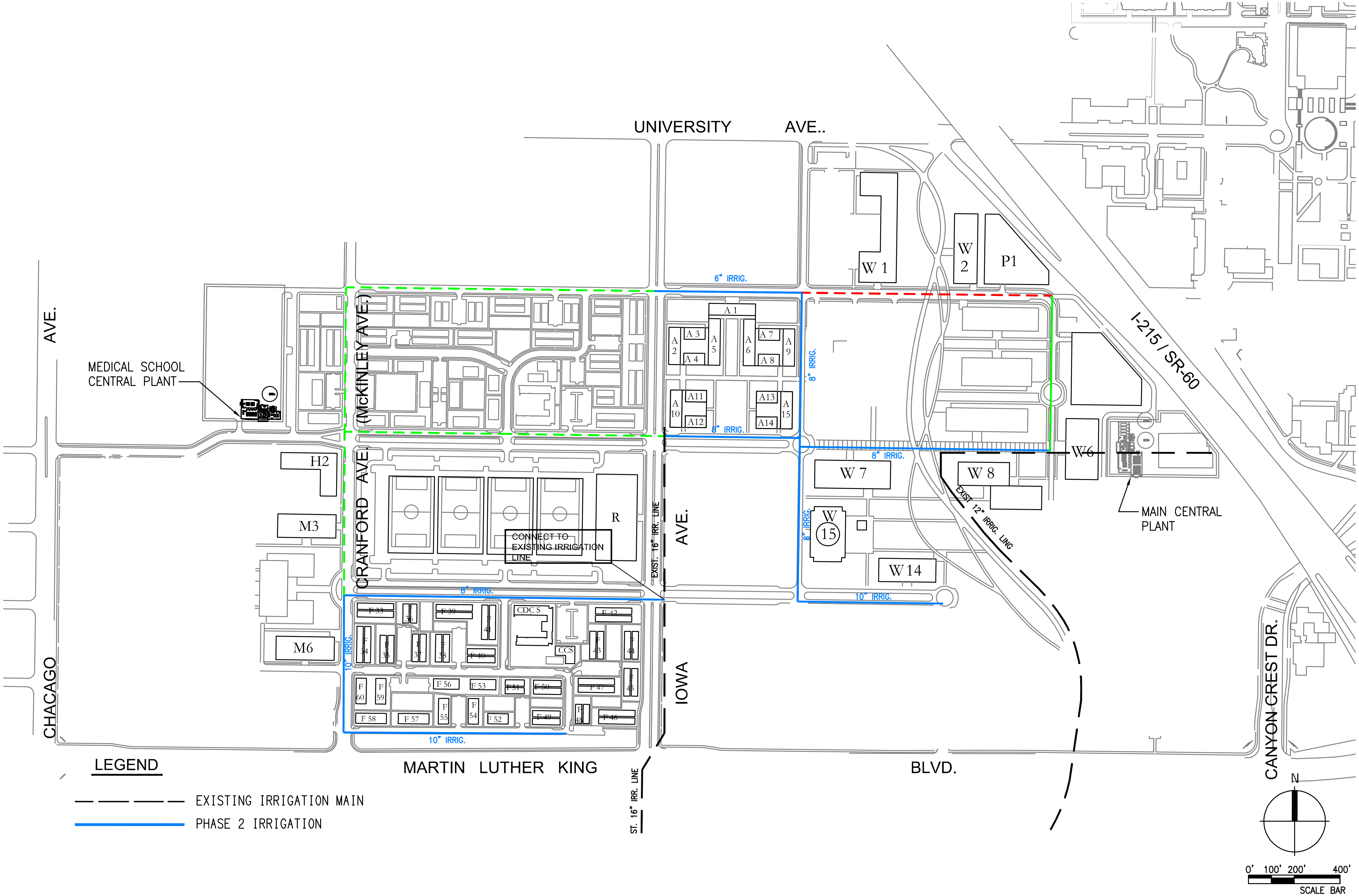

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FIGURE 4.6
WEST CAMPUS DEVELOPMENT PHASE 2 IRRIGATION IMPLEMENTATION

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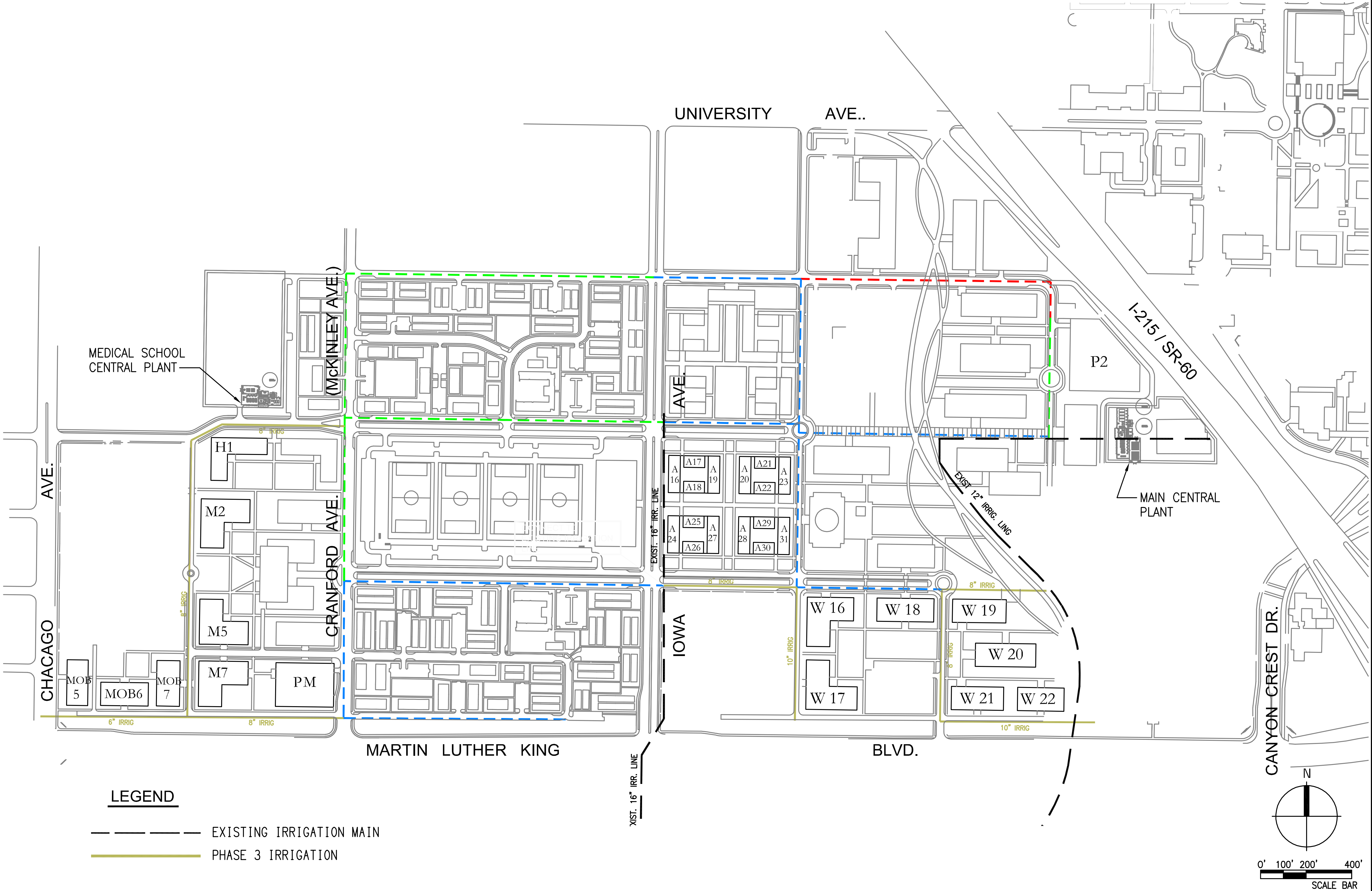

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FIGURE 4.7
WEST CAMPUS DEVELOPMENT PHASE 3 IRRIGATION IMPLEMENTATION

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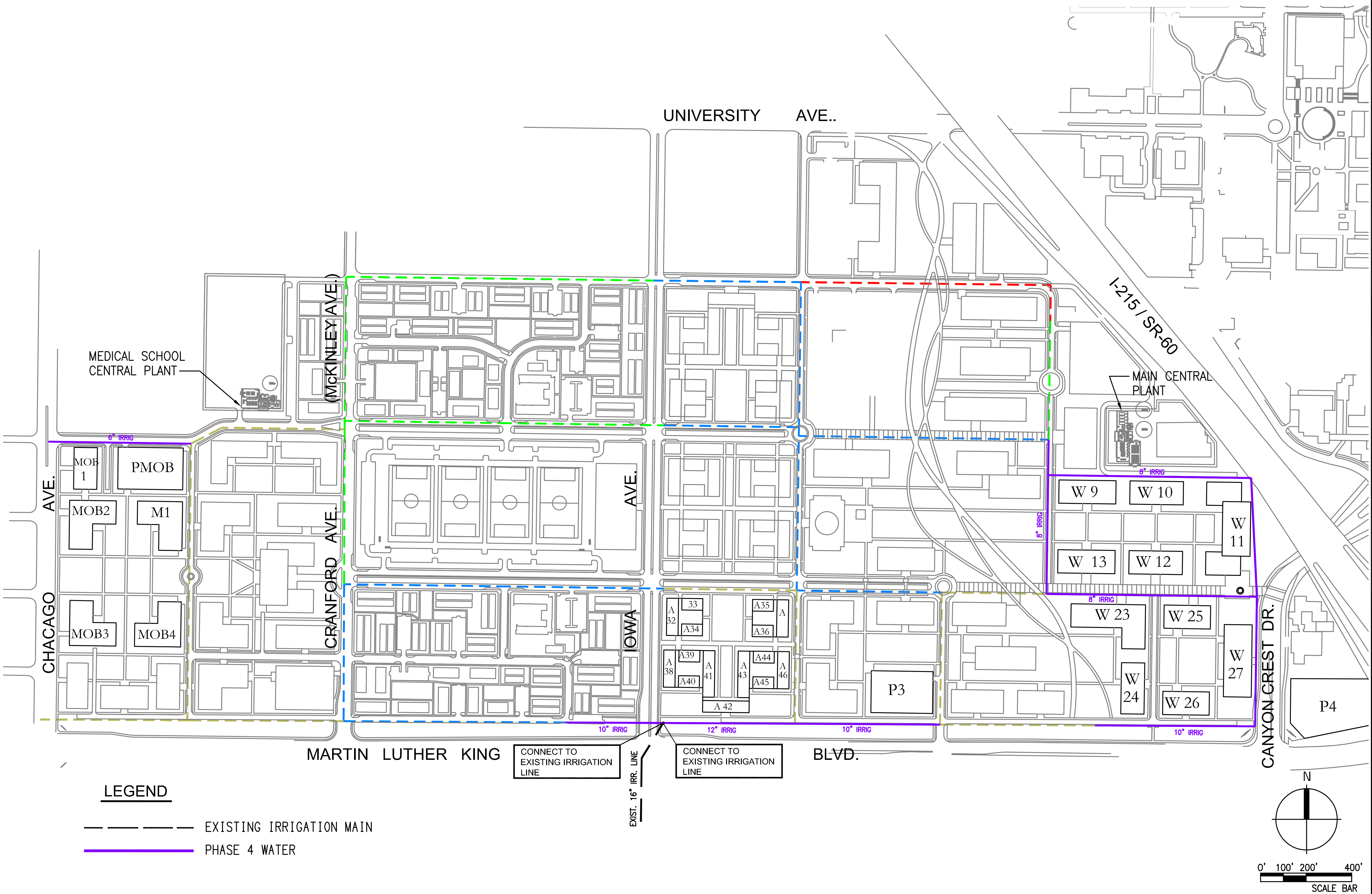

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FIGURE 4.8
WEST CAMPUS DEVELOPMENT PHASE 4 IRRIGATION IMPLEMENTATION

Sheet No.

SHEET 6 OF 6

CHAPTER 5

SANITARY SEWER WASTEWATER COLLECTION SYSTEM

This chapter presents the analyses and recommended conceptual utility plans to serve West Campus buildings with a sanitary sewer wastewater collection system. This chapter will explore the existing sanitary sewer (SS) system, sanitary sewer loads, and sanitary sewer points of connections to the existing sewer system. In addition, sanitary sewer system alternatives will be explored including criteria for analysis, demand and capacities, phasing implications, and cost considerations. The result of these explorations will be the conceptual design of a recommended alternative and sanitary sewer system implementation plan.

5.1 Existing Systems

The existing sanitary sewer wastewater collection system (Figures 5.1.1 through 5.1.6) is comprised of various City of Riverside (City) and University of California Riverside (UCR) sewer mains and laterals ranging from 6 inches to 8 inches in diameter and fabricated of vitrified clay pipe (VCP). At Chicago Avenue, two 8-inch VCP (one City and one UCR) sewer main lines were installed parallel to the centerline flowing in a northerly direction. In Cranford Avenue, an 8-inch VCP City sewer main flows northerly to the main line in University Avenue. In Everton Place West, an 8-inch VCP City sewer main flows in a westerly direction. Iowa Avenue contains an 8-inch VCP City sewer main that flows in a northerly direction. In Everton Place East, an 8-inch VCP sewer main flows westerly, connecting to the sewer main in Iowa Avenue. All of these existing lines are connected to an 8-inch VCP City main line in University Avenue that flows in a westerly direction. Martin Luther King Jr. Boulevard contains an 8-inch UCR owned sewer main on the south side of the roadway that flows in an easterly direction.

5.2 Sanitary Sewer Loads

The sanitary sewer (SS) loads for Phases 1A through 4 are calculated via an equation for design flow that utilizes average flow constants that vary by land use.

Design flow is calculated as:

$$Q_d = 3.6\,(Q_a)^{.85}$$

where Q_d = design flow
Q_a = average flow

Using Q_a = cubic feet per second (cfs) per acre (ac) (varies per land use)

5.3 Sanitary Sewer Lift and Pump Stations

Sanitary sewer lift and pump stations were determined to be unnecessary for conceptual design of West Campus infrastructure because the layout and grades of the proposed development appear to be sufficient for gravity flow systems. This is beneficial in that lift and pump stations are costly and require ongoing maintenance.

5.4 Sanitary Sewer Points of Connection to the Existing Sewer System

The conceptual sanitary sewer wastewater collection system has three points of connection to the existing sewer system.

The first point of connection is to an existing manhole in Cranford Avenue at Everton Place. An 8-inch VCP sewer main line will be connected to the existing manhole and flow in a northerly direction to University Avenue.

The second point of connection will be to an existing City manhole at the east end of Everton Place. This main flows westerly along Everton Avenue and then northerly to University Avenue.

Finally, the third point of connection is in Martin Luther King Jr. Boulevard at Cranford Avenue. This existing 8-inch VCP City sewer main flows in a westerly direction to Chicago Avenue and then northerly to University Avenue.

5.5 Sanitary Sewer System Alternatives

Sanitary sewer system alternatives are selected based on the criteria used for analysis, required loads and capacities, and cost considerations.

5.5.1 Criteria for Analysis

1. Pipe shall be designed to flow at 0.5 D (half diameter) or less at design flow. Minimum pipe slope shall be 0.4%.

2. Desirable sewer main design depth is 8 feet.

3. Recommended depth of laterals at property line is 6 feet (minimum 4 feet).

4. Minimum sewer main pipe diameter shall be 8-inch.

5. Typical manhole spacing shall be 300 to 500 feet, with consideration made for the line size, alignment, and site topography.

6. Preferred locations for sewers are 5 feet north or 5 feet east of centerline.

7. All sewers shall be contained in the street Right of Way or, if necessary, in a dedicated easement (minimum 10-foot width).

8. All recommendations of the State Department of Health Services, relative to crossing and parallel lines with water supply lines, shall be complied with.

5.5.2 Loads and Capacities - Sizing Analysis

Average sewer flow by land use in cubic feet per second per acre (cfs/ac) were obtained from Table A of the current Sewer Policies and Procedures, Department of Public Works, City of San Bernardino.

1. First point of connection at existing manhole in Everton Place at Cranford Avenue:

   Area = 36 Acres — Family Student Houses
   Area = 12 Acres — Academic Building

   Average Flow Qa = 0.00845cfs/Acres for Residential
   Average Flow Qa = 0.00250cfs/Acres for University and College

   Qa (total) = 0.00845 x 36 + 0.00250 x 12 = 0.33 cfs
   $Qd = 3.6\ (0.33)^{0.85} = 1.4$ cfs

   Use 8-inch minimum diameter.

2. Second Point of connection at east end of Everton Place.

   Area = 7 Acres — Academic Building

   Qa (total) = 0.00250 x 7 = 0.02 cfs
   $Qd = 3.6\ (0.02)^{0.85} = 0.13$ cfs

   Use 8-inch minimum diameter.

3. Third point of connection in Martin Luther King Jr. Boulevard at Cranford Avenue.

   Area = 35 Acres — Family Student Housing
   Area = 76 Acres — Academic Building

   Qa (total) = 0.00845 x 35 + 0.00250 x 76 = 0.49 cfs
   $Qd = 3.6\ (0.49)^{0.85} = 2.0$ cfs

   Use 8-inch minimum diameter.

5.5.3 Phasing Implications

Phasing implications for the West Campus Infrastructure Development Study have been addressed via verification of pipe sizes, capacities, and wastewater flows. Phase 1A (Figure 5.2) Family Student Housing sewer infrastructure was originally designed to flow southeasterly and then east to Chicago Avenue. The Phase 1A Family Student Housing design was modified to flow east to Cranford Avenue and then northerly to University Avenue. Also in Phase 1A, the original sewer main layout for building W4 was designed to flow southerly to the Northwest Mall and then easterly connecting to the Phase 1A Family Student Housing sewer main at Iowa Avenue. This would provide a backbone for future development, but at a higher initial cost than constructing the building W4 sewer main northerly and then easterly to the existing City sewer main in Everton Place. The final alternative investigated was to construct the Phase 1A sewer to the west of buildings W3 through W5. This would provide a shorter run for the sewer line in this area and may aid in the avoidance of utility conflicts.

Phase 1B (Figure 5.3) connects a sewer main to the Phase 1A sewer main in Cranford Avenue. This sewer main could also be designed to flow south and connect to the existing sewer main in Martin Luther King Boulevard. By designing the sewer main to flow northerly in Phase 1B, traffic control, street cut, trench repair and additional connection fees are avoided at this stage of development.

Phase 1 (Figure 5.4) includes buildings W1, W3, and W5. Building W1 only requires a lateral to the existing City sewer main in Everton Place. To avoid another City connection fee, the sewer lateral could be constructed to the east and then south to connect to the sewer main constructed during Phase 1A for building W4. This would require additional trenching, pipe, and trench restoration work and may or may not be economically justifiable depending on the negotiated City sewer connection fee. Building W3 only requires a short lateral to the Phase 1A sewer main, while building W5 requires a short sewer main extension, clean out, and lateral. Since sewer will be installed in the vicinity of W5 for Phase 1A, it is recommended that the sewer main for Building W5 be installed during Phase 1A in order to eliminate an additional mobilization cost.

Phase 2 (Figure 5.5) sewer mains connect to Martin Luther King Jr. Boulevard at Cranford Avenue. It appears as though these mains could connect to the Phase 1B sewer mains in Cranford. This alternative was not pursued because of elevation differences in the sewer mains due to the distances covered and minimum slope requirements.

Phase 3 (Figure 5.6) connects to the Phase 1B sewer main in Cranford Avenue on the west side of West Campus. On the west side of West Campus, the Phase 3 building's sewer mains flow northerly then westerly with a final connection to Martin Luther King Jr. Boulevard via the Phase 2 sewer mains.

Phase 4 (Figure 5.7) entails a short easterly sewer main connecting to the Phase 3 system on the westerly potion of West Campus. Another option is to connect to Chicago Avenue accruing possible street cut, street restoration, and traffic control costs. Apartments and academic buildings connect to sewer infrastructure developed in previous phases on the easterly portion of West Campus.

5.5.4 Sanitary Sewer Wastewater Collection System Cost Summary

This study includes conceptual-level cost estimates for sanitary sewer wastewater collection system infrastructure development. Details of these cost estimates are included in the Appendix to this report.

- Phase 1A Housing: $583,000
- Phase 1A Campus: $87,000
- Phase 1B: $57,000
- Phase 1: $5,000
- Phase 2 Housing: $556,000
- Phase 2 Campus: $346,000
- Phase 3: $483,000
- Phase 4: $361,000

Estimated Total for the Build-Out of the Sanitary Sewer System: $ 2,478,000

5.6 Recommended Sanitary Sewer System Implementation Plan

The recommended sanitary sewer system implementation plan is illustrated on the Sewer System Master Planning Study. The sanitary sewer wastewater collection system has three points of connection to the existing sewer system.

The first point of connection is to an existing manhole in Cranford Avenue at Everton Place. An 8-inch VCP sewer main line will be connected to the existing manhole and flow in a northerly direction to University Avenue.

The second point of connection will be to an existing City manhole at the east end of Everton Place. This main flows westerly along Everton Avenue and then northerly to University Avenue.

Finally, the third point of connection is in Martin Luther King Jr. Boulevard at Cranford Avenue. This existing 8-inch VCP City sewer main flows in a westerly direction to Chicago Avenue and then northerly to University Avenue.

The conceptually designed West Campus sanitary sewer waste water collection network is comprised of 8-inch sewer mains, 6-inch sewer laterals, 48” manholes, and cleanouts distributed throughout the West Campus development area.

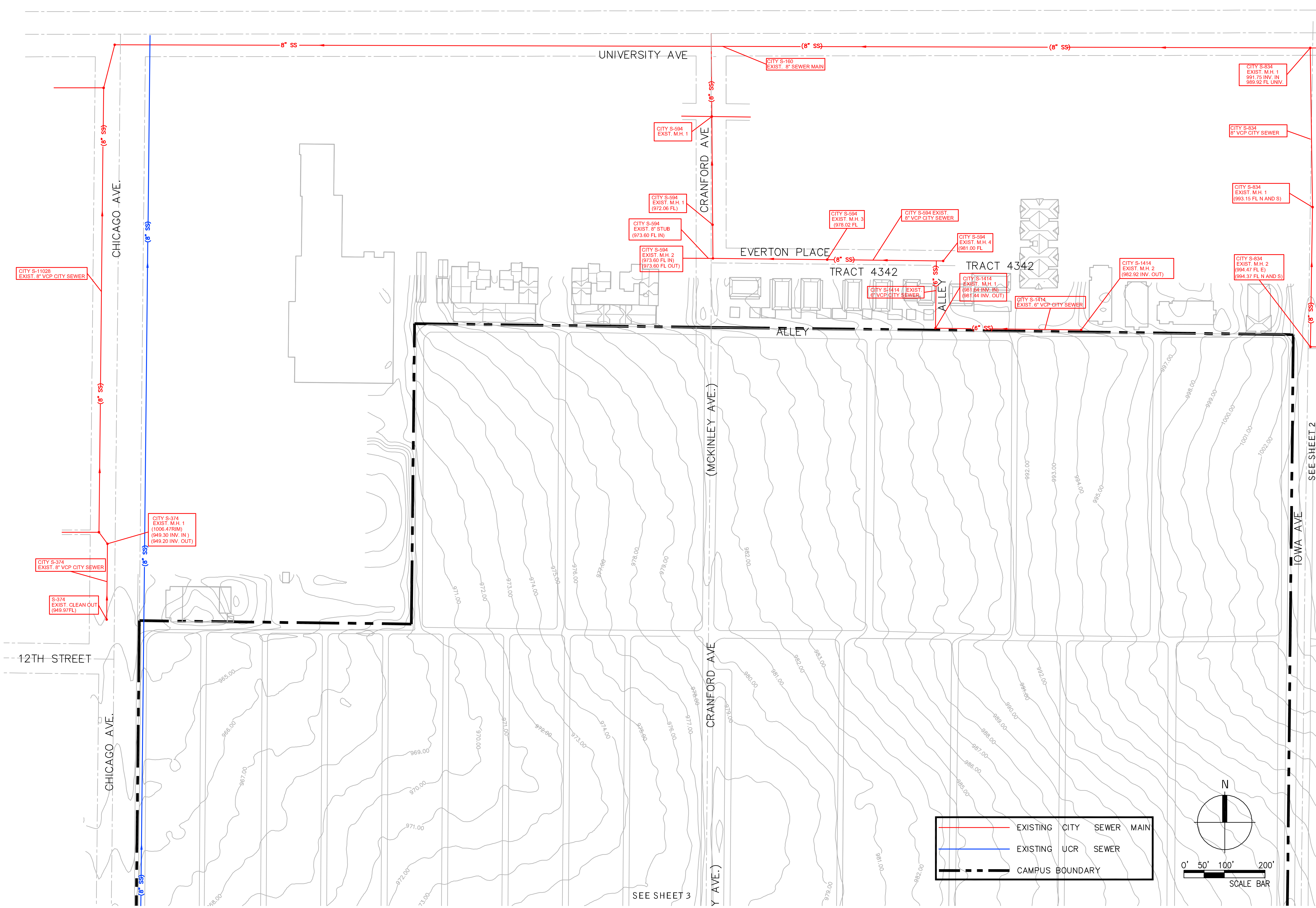

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FIGURE 5.1.1
EXISTING SEWER SYSTEM

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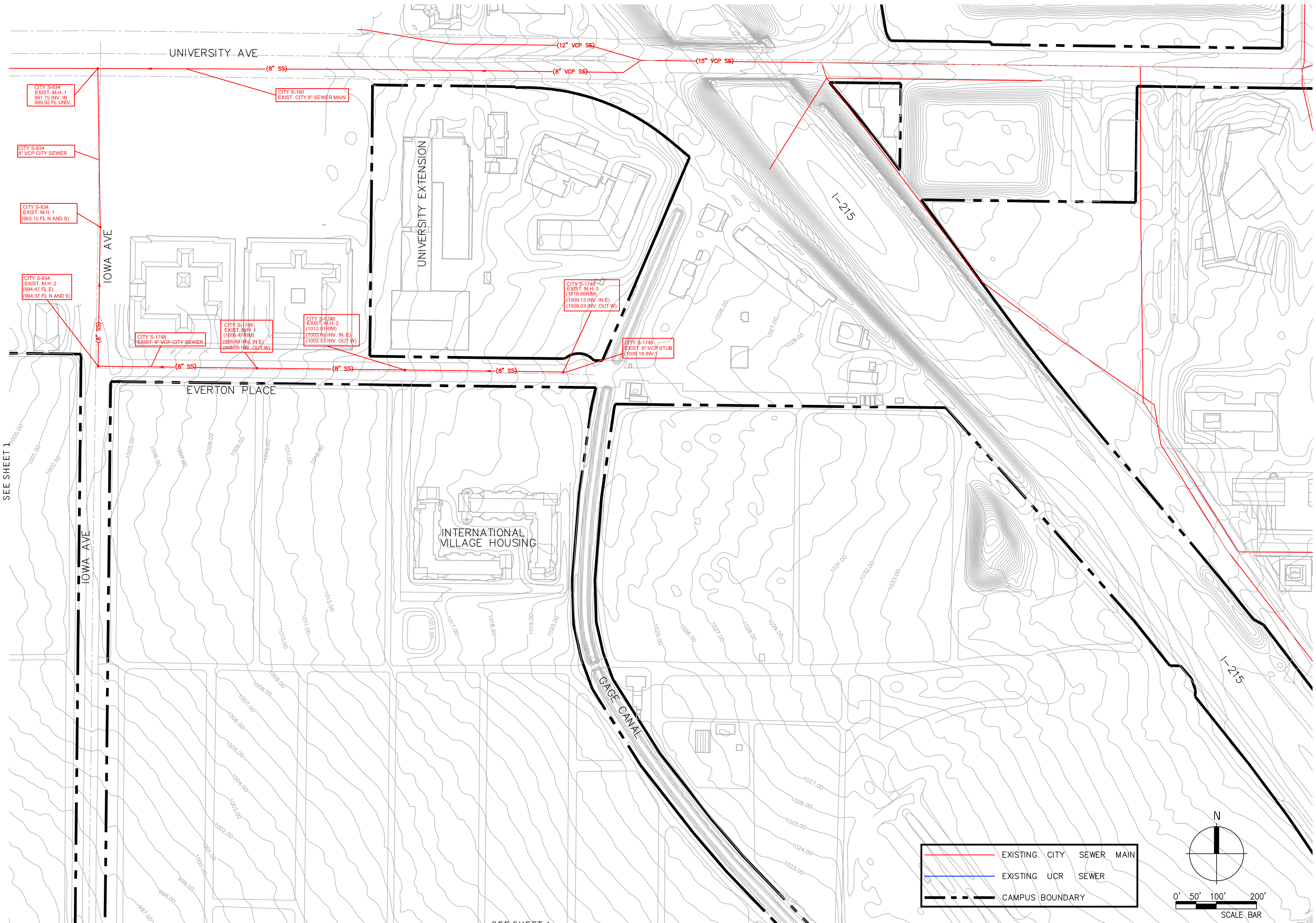

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FIGURE 5.1.2
EXISTING SEWER SYSTEM

Sheet No.

SHEET 2 OF 6

SEE SHEET 1

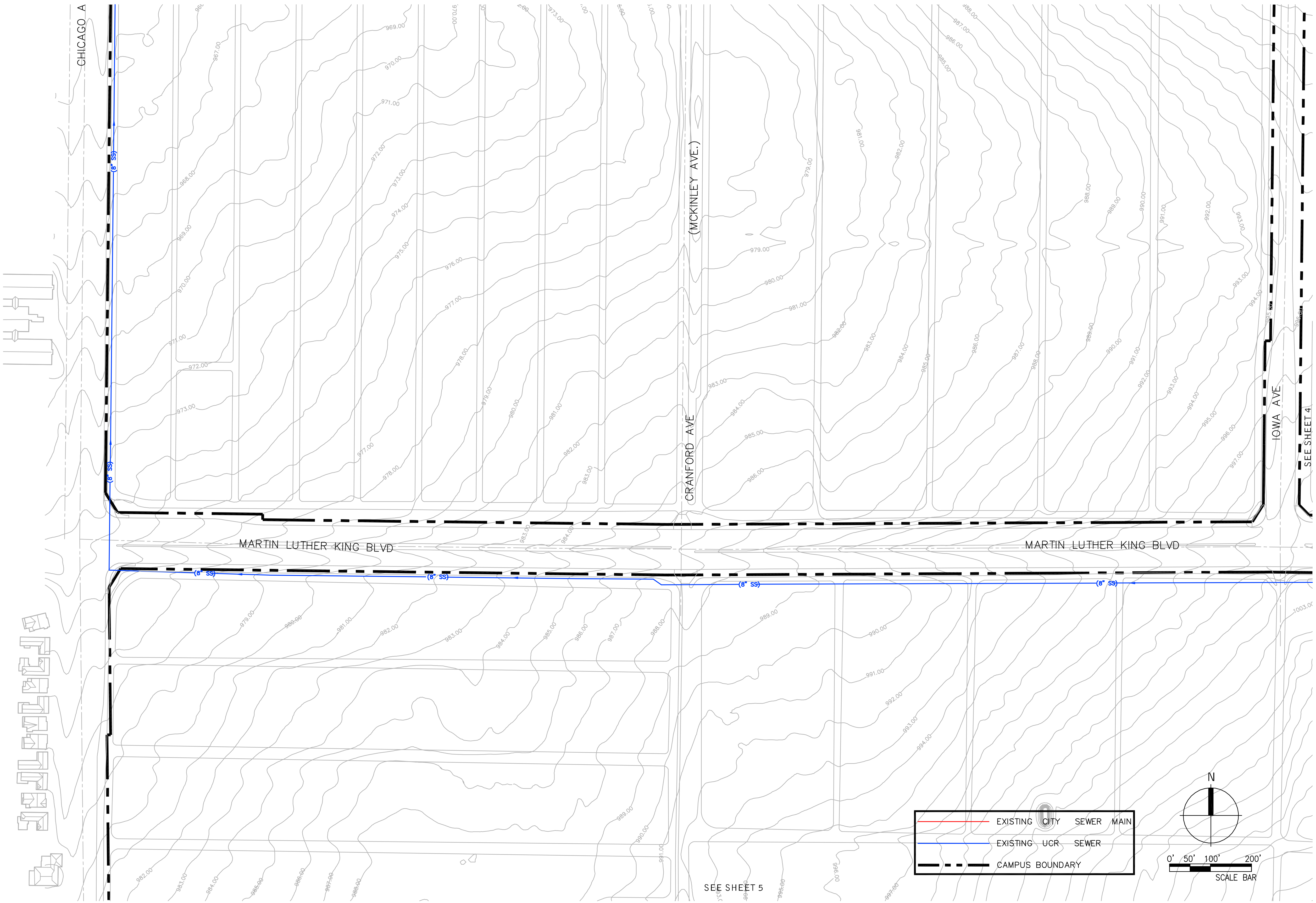

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FIGURE 5.1.3
EXISTING SEWER SYSTEM

Sheet No.

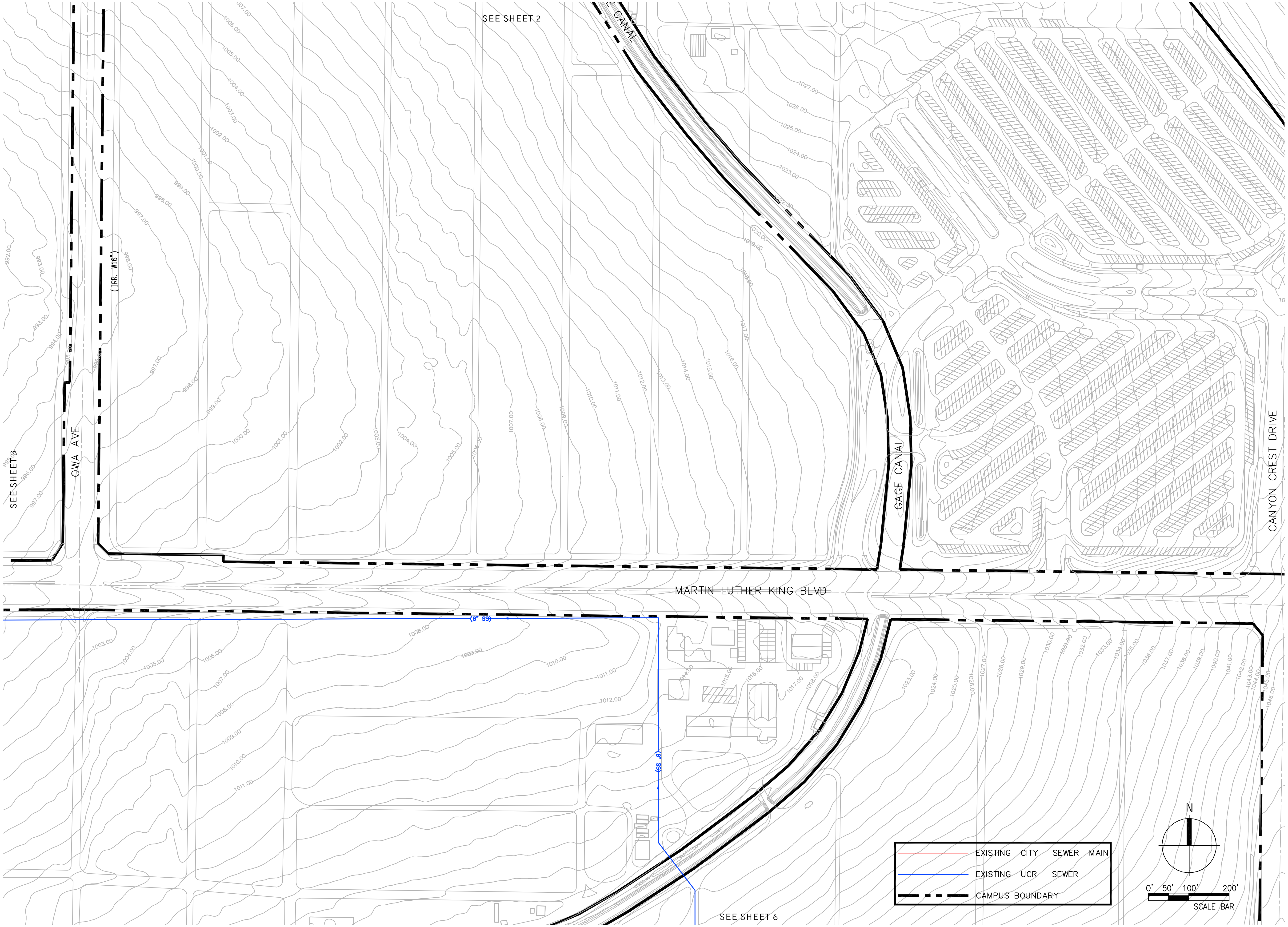

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FIGURE 5.1.4
EXISTING SEWER SYSTEM

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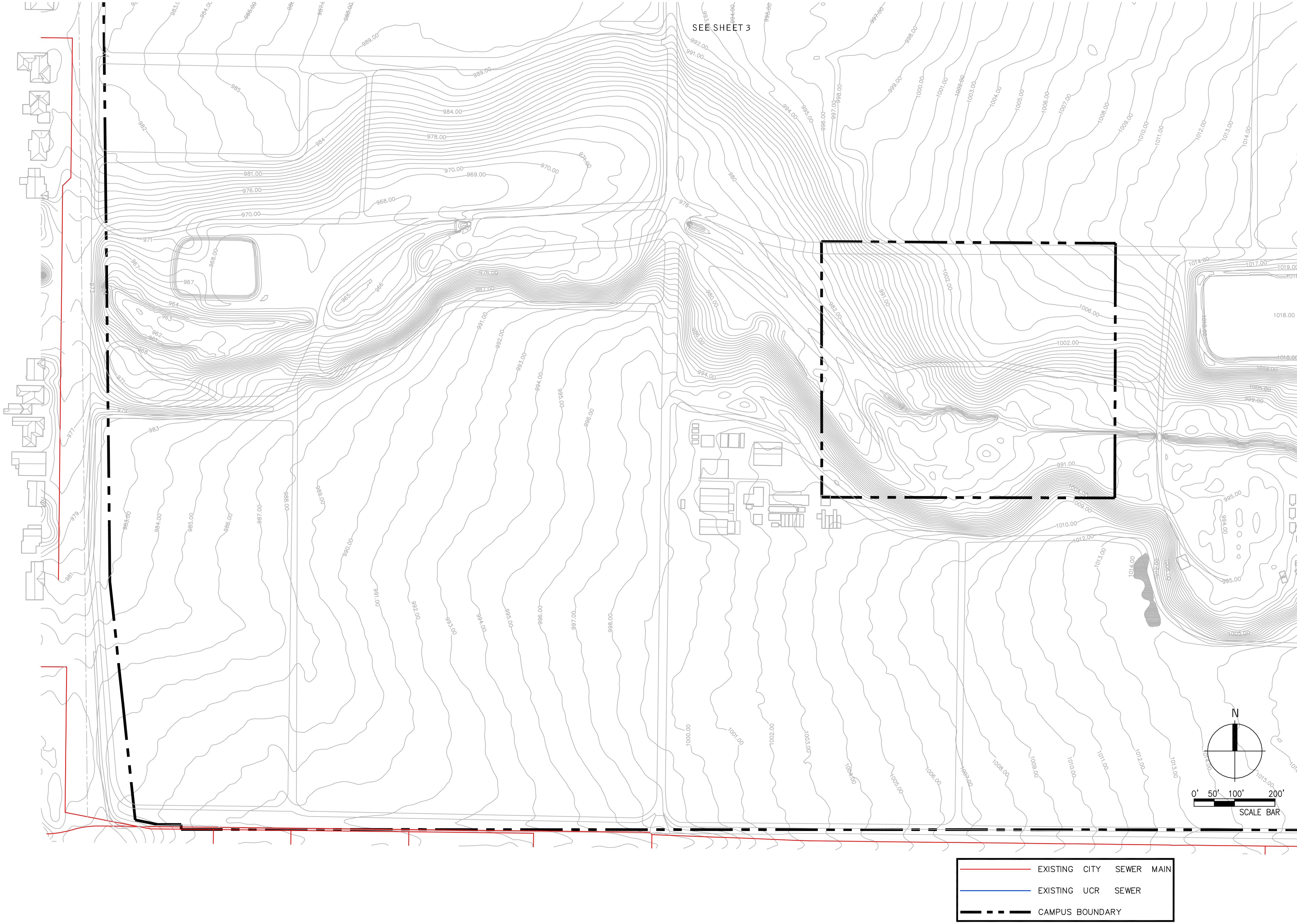

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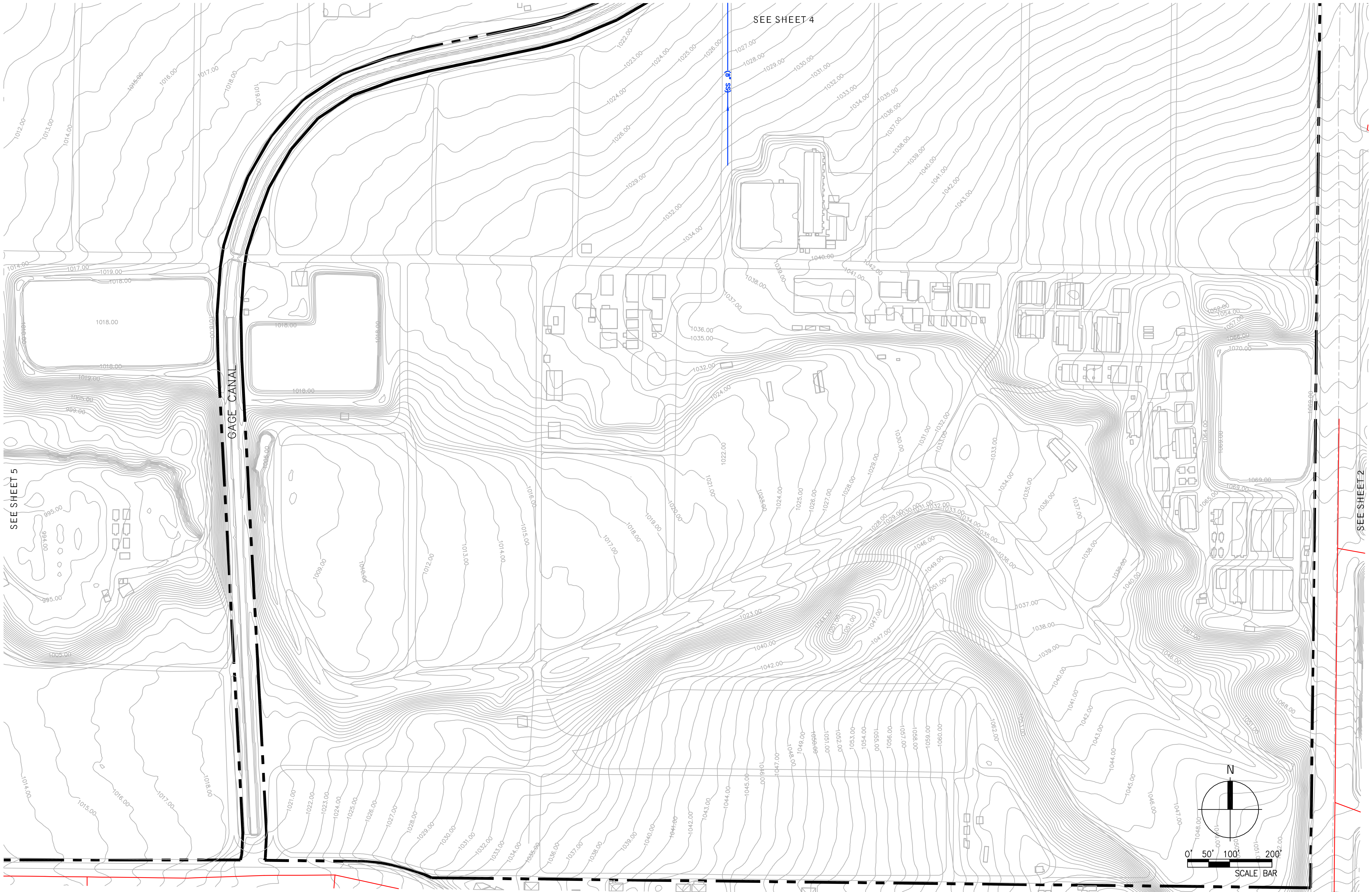
FIGURE 5.1.5
EXISTING SEWER SYSTEM

Sheet No.



——— (red)	EXISTING CITY SEWER MAIN
——— (blue)	EXISTING UCR SEWER
— · — · —	CAMPUS BOUNDARY

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FIGURE 5.1.6
EXISTING SEWER SYSTEM

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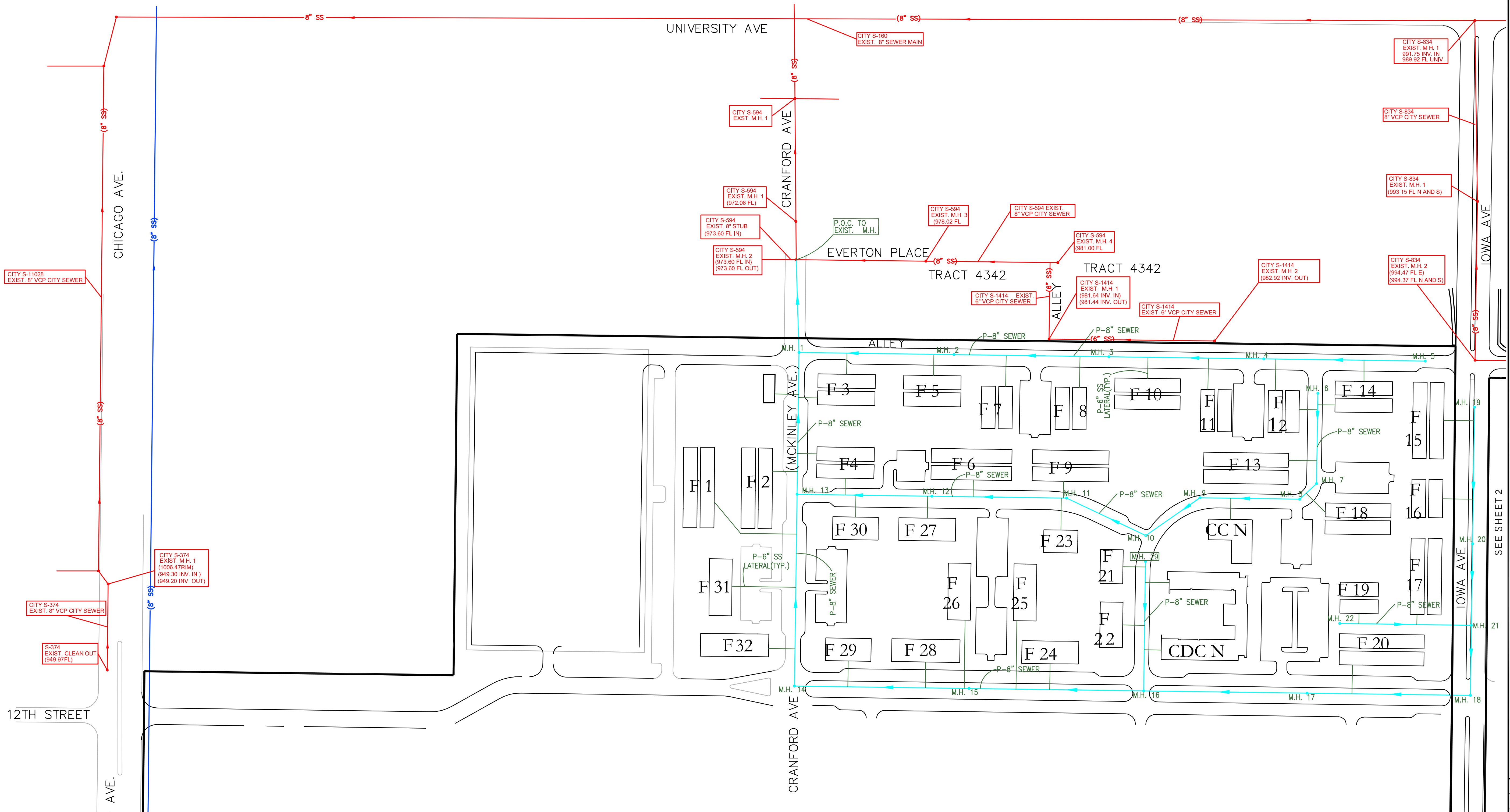

QUANTITIES OF SEWER SYSTEM (PHASE 1A)			
PROPOSED 8" PVC SEWER MAIN	=	3163	L.F.
PROPOSED 6" PVC SEWER LATERAL	=	2193	L.F.
PROPOSED 48" SEWER MANHOLE	=	25	EA
PROPOSED SEWER CLEAN OUT	=	1	EA

- PROPOSED 8" PVC SEWER MAIN
- PROPOSED 6" SEWER LATERAL
- EXISTING CITY SEWER MAIN
- EXISTING UCR SEWER
- CAMPUS BOUNDARY

N

0' 50' 100' 200'
SCALE BAR

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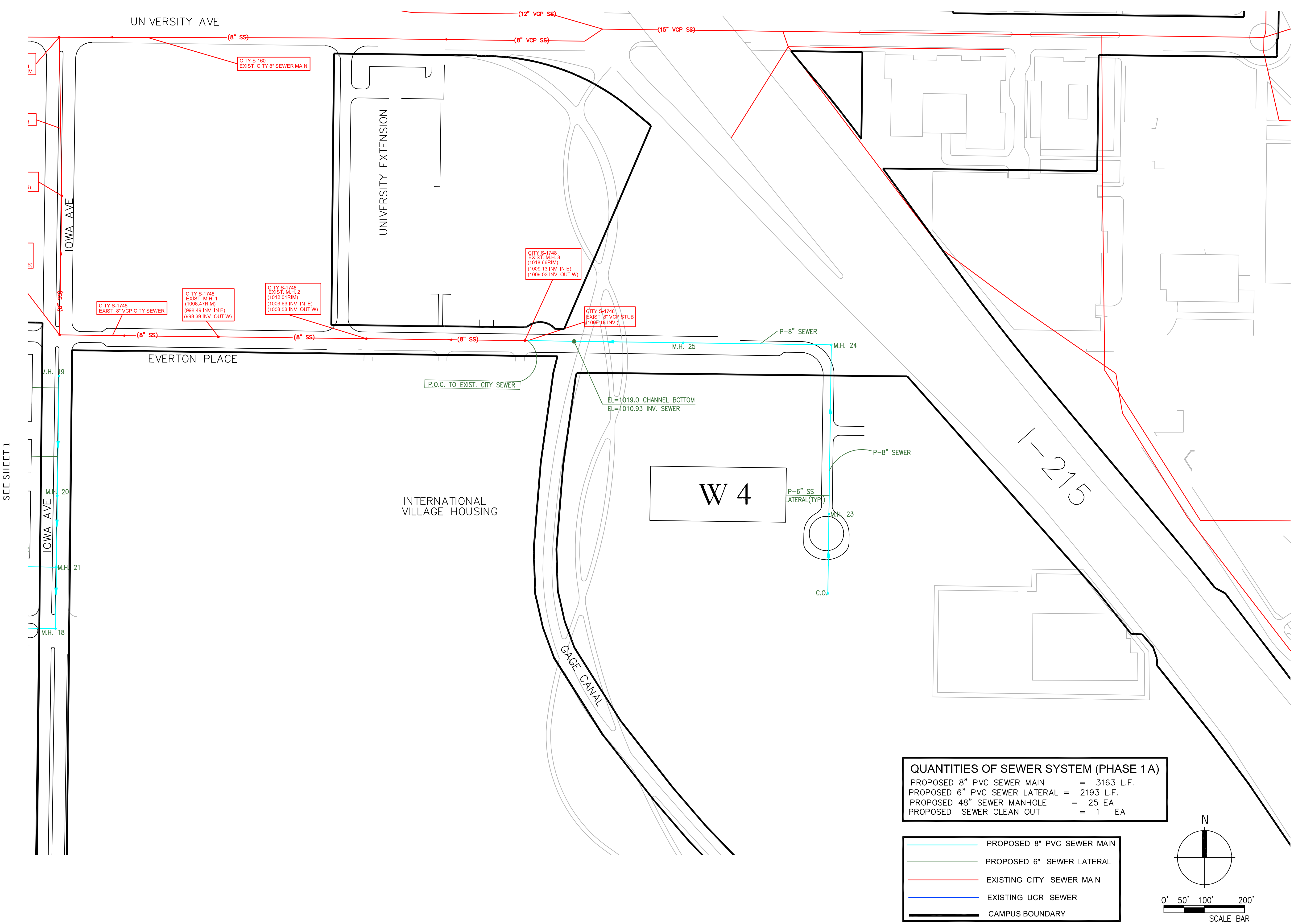
FIGURE 5.2.1
SEWER SYSTEM MASTER STUDY
PHASE 1A

Sheet No.

SHEET 1 OF 2



QUANTITIES OF SEWER SYSTEM (PHASE 1A)

PROPOSED 8" PVC SEWER MAIN	=	3163 L.F.
PROPOSED 6" PVC SEWER LATERAL	=	2193 L.F.
PROPOSED 48" SEWER MANHOLE	=	25 EA
PROPOSED SEWER CLEAN OUT	=	1 EA

PROPOSED 8" PVC SEWER MAIN
PROPOSED 6" SEWER LATERAL
EXISTING CITY SEWER MAIN
EXISTING UCR SEWER
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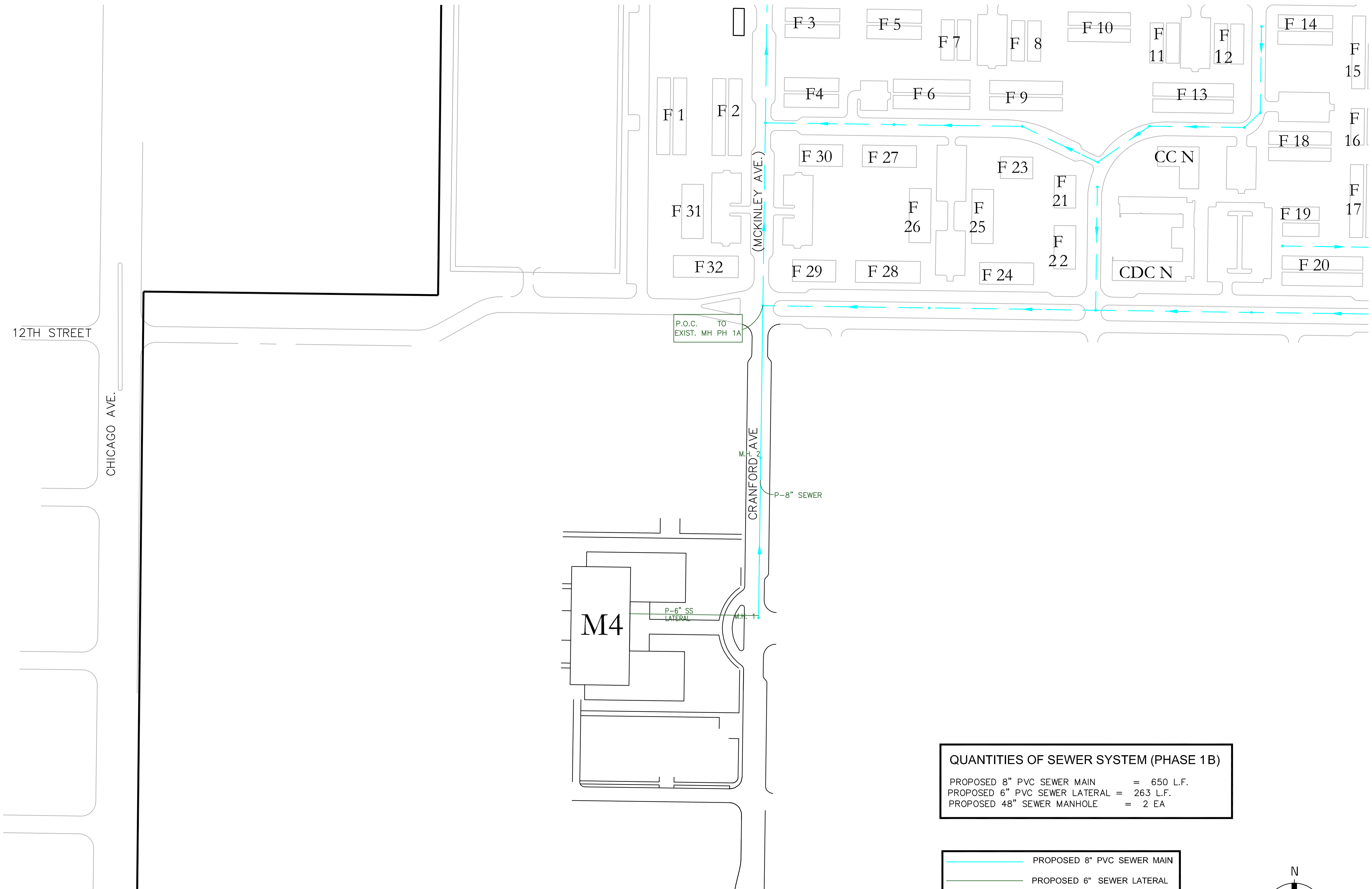
FIGURE 5.2.2
SEWER SYSTEM MASTER STUDY
PHASE 1A

Sheet No.



QUANTITIES OF SEWER SYSTEM (PHASE 1B)

PROPOSED 8" PVC SEWER MAIN	=	650 L.F.
PROPOSED 6" PVC SEWER LATERAL	=	263 L.F.
PROPOSED 48" SEWER MANHOLE	=	2 EA

- PROPOSED 8" PVC SEWER MAIN
- PROPOSED 6" SEWER LATERAL
- EXISTING SEWER MAIN PHASE 1A
- EXISTING CITY SEWER MAIN
- EXISTING UCR SEWER
- CAMPUS BOUNDARY

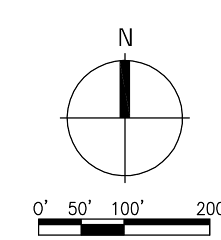


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FIGURE 5.3
SEWER SYSTEM MASTER STUDY
PHASE 1B

Sheet No.

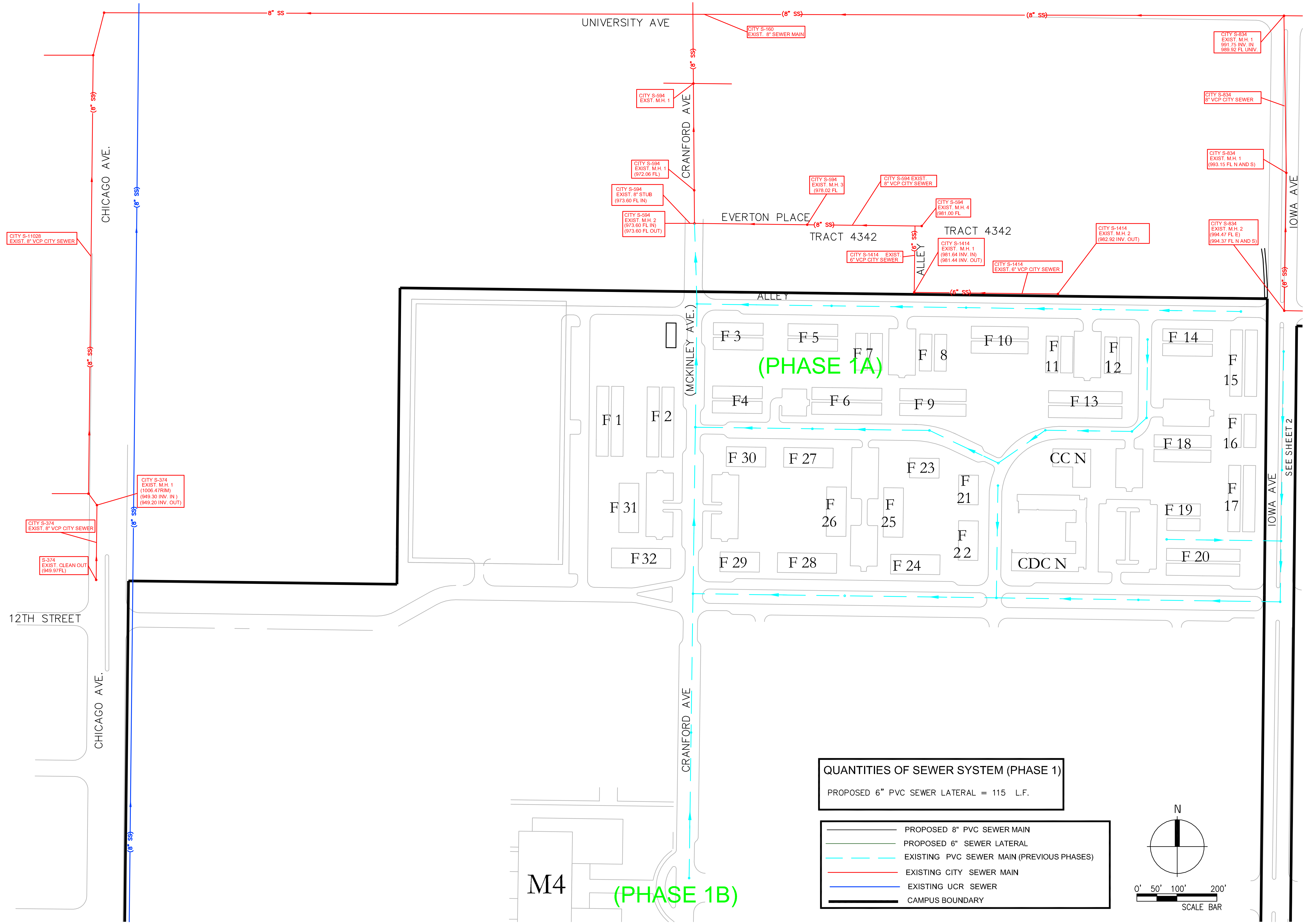

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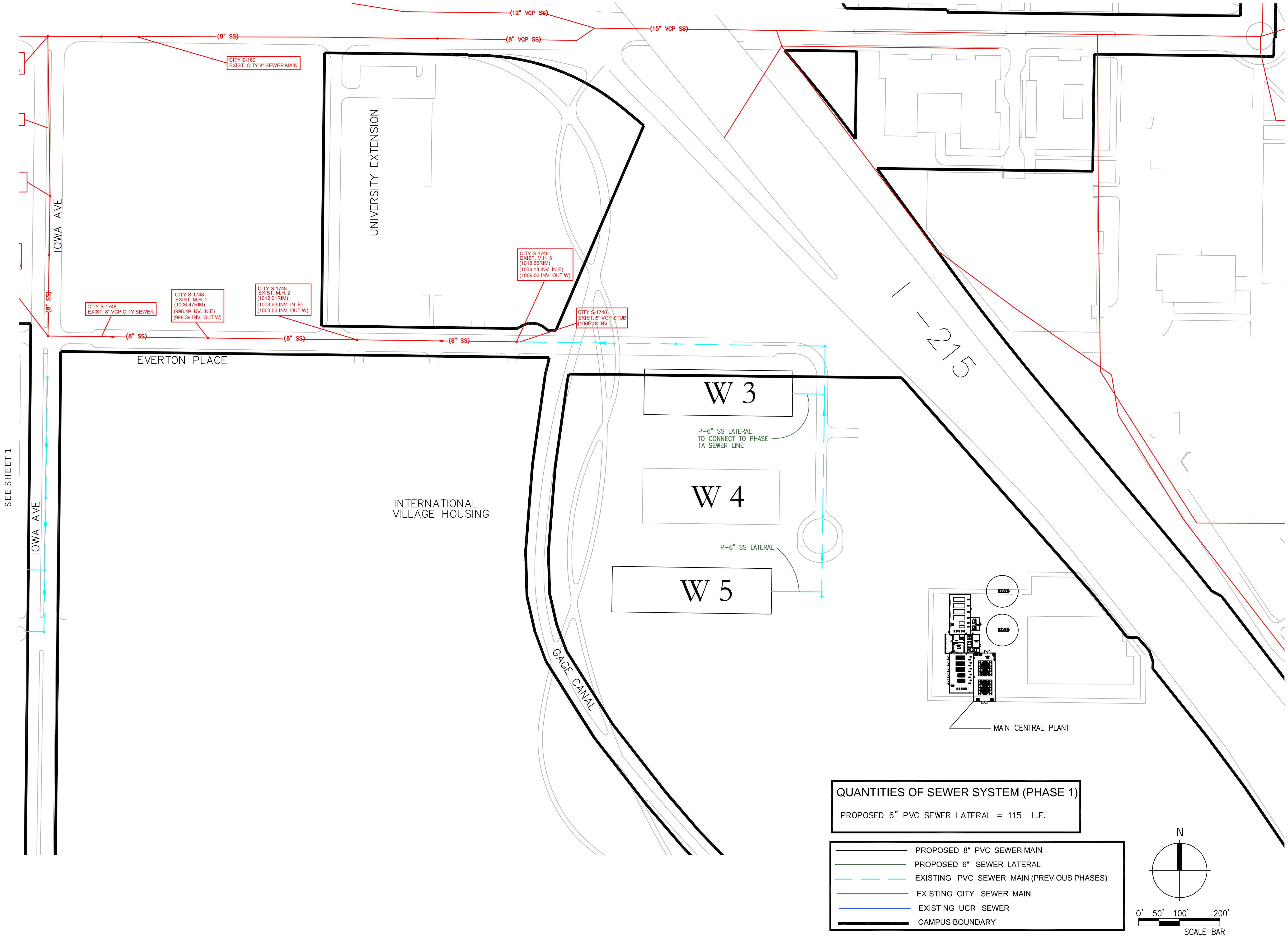
FIGURE 5.4.1
SEWER SYSTEM MASTER STUDY
PHASE 1

Sheet No.

SHEET 1 OF 2



QUANTITIES OF SEWER SYSTEM (PHASE 1)

PROPOSED 6" PVC SEWER LATERAL = 115 L.F.

	PROPOSED 8" PVC SEWER MAIN
	PROPOSED 6" SEWER LATERAL
	EXISTING PVC SEWER MAIN (PREVIOUS PHASES)
	EXISTING CITY SEWER MAIN
	EXISTING UCR SEWER
	CAMPUS BOUNDARY

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FIGURE 5.4.2
SEWER SYSTEM MASTER STUDY
PHASE 1

Sheet No.

SHEET 2 OF 2

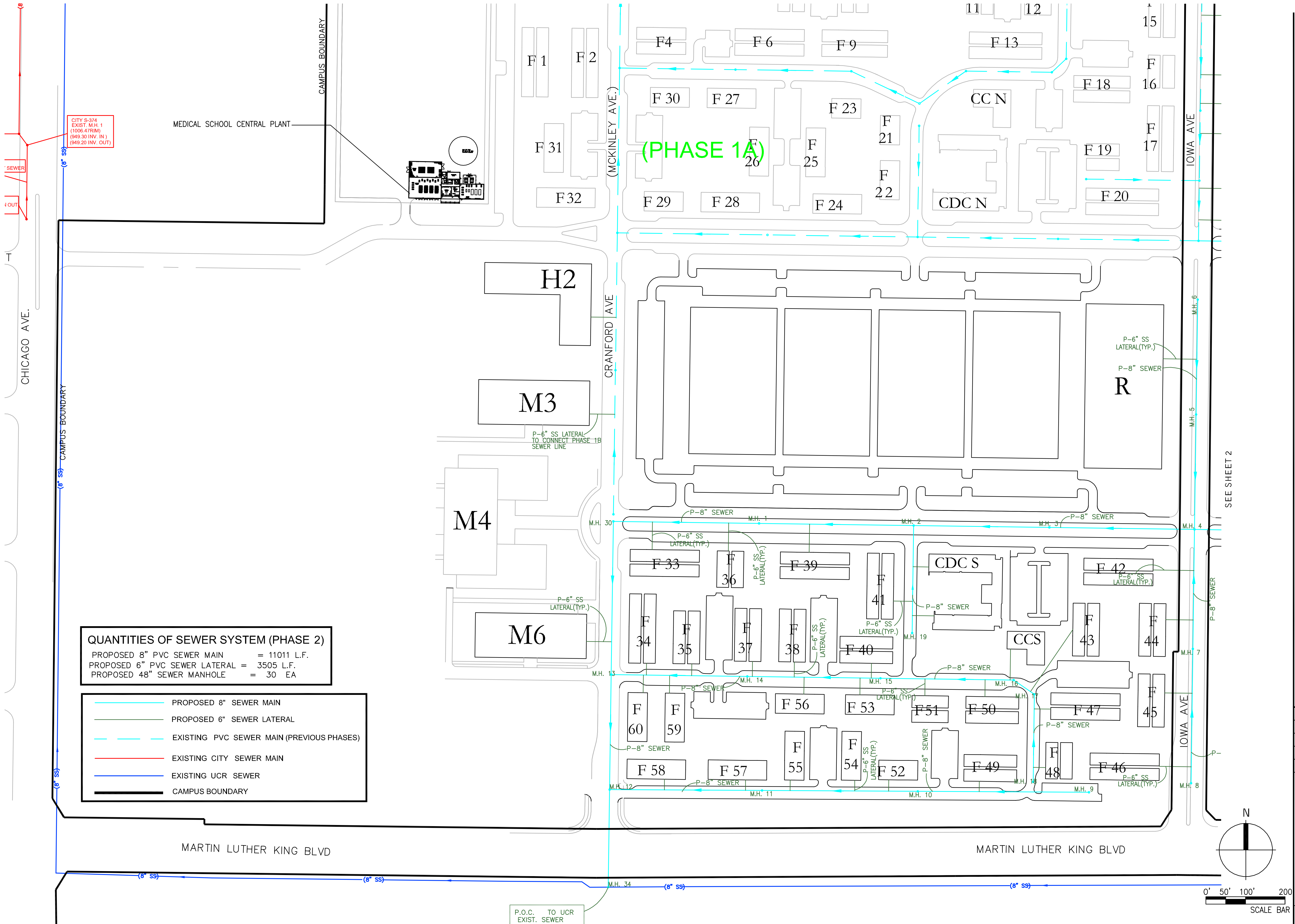

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FIGURE 5.5.1
SEWER SYSTEM MASTER STUDY
PHASE 2

Sheet No.

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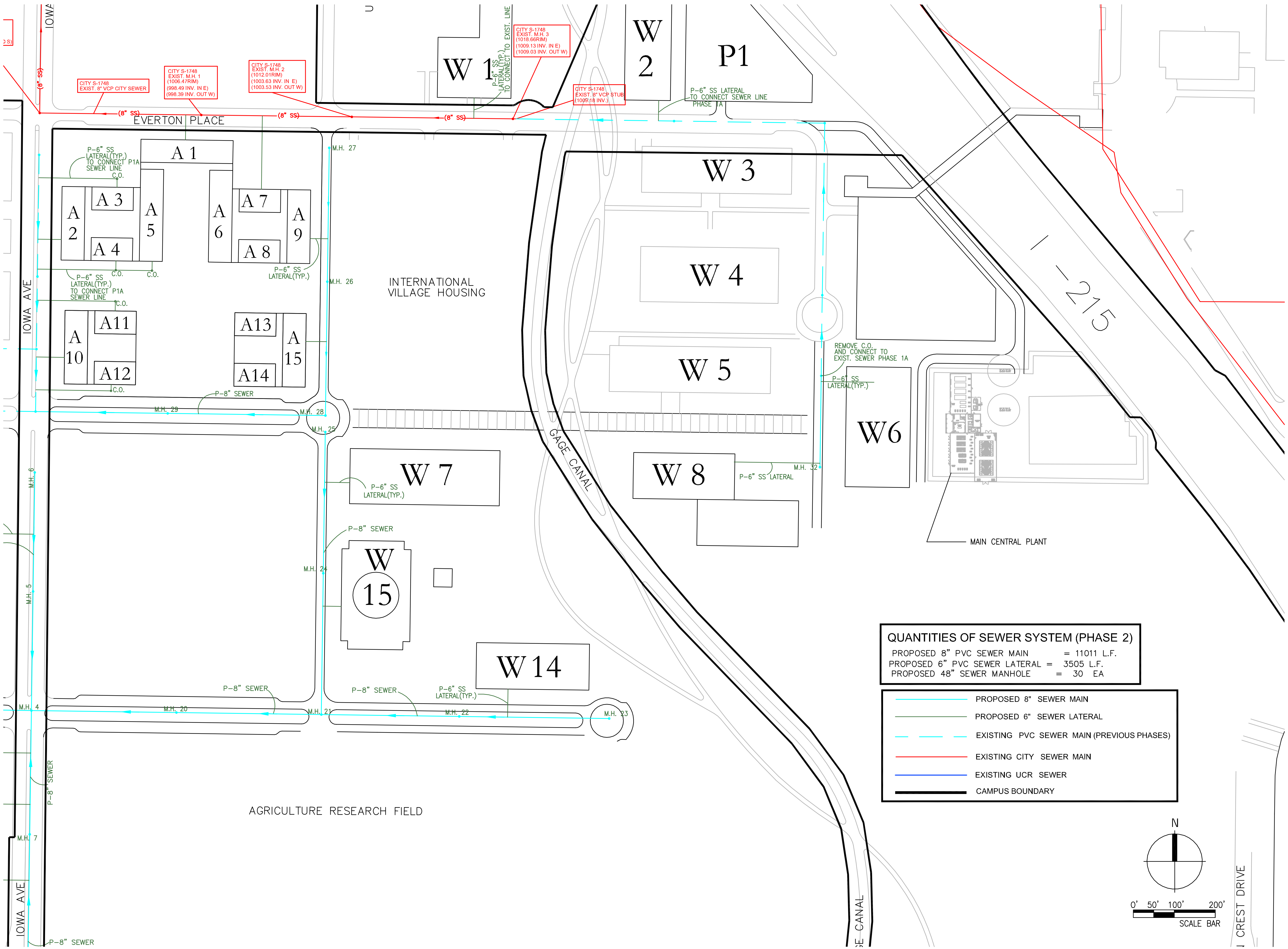

QUANTITIES OF SEWER SYSTEM (PHASE 2)

PROPOSED 8" PVC SEWER MAIN	= 11011	L.F.
PROPOSED 6" PVC SEWER LATERAL	= 3505	L.F.
PROPOSED 48" SEWER MANHOLE	= 30	EA

Legend	
(cyan line)	PROPOSED 8" SEWER MAIN
(green line)	PROPOSED 6" SEWER LATERAL
(cyan dashed line)	EXISTING PVC SEWER MAIN (PREVIOUS PHASES)
(red line)	EXISTING CITY SEWER MAIN
(blue line)	EXISTING UCR SEWER
(thick black line)	CAMPUS BOUNDARY

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FIGURE 5.5.2
SEWER SYSTEM MASTER STUDY
PHASE 2

Sheet No.

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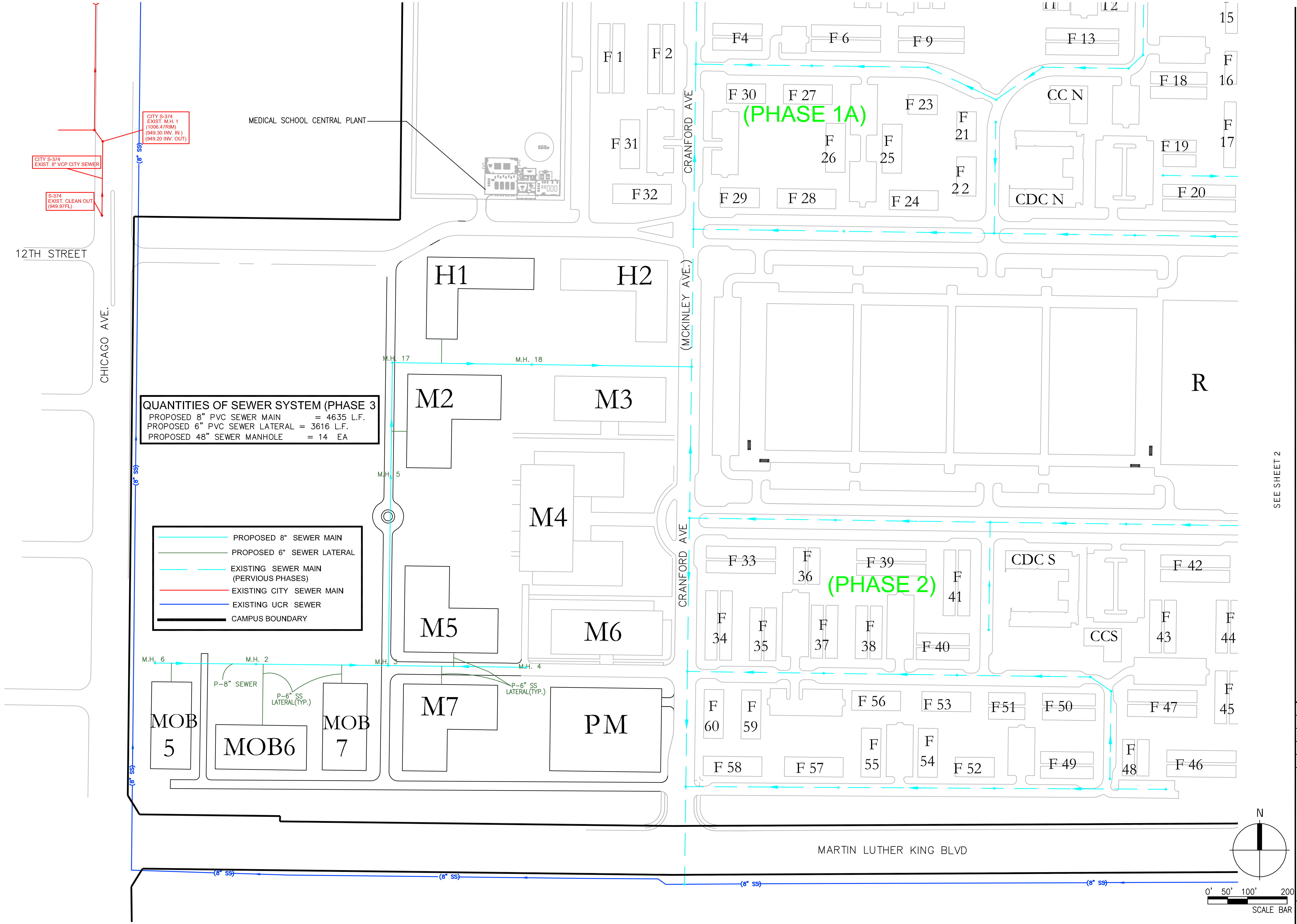

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FIGURE 5.6.1
SEWER SYSTEM MASTER STUDY
PHASE 3

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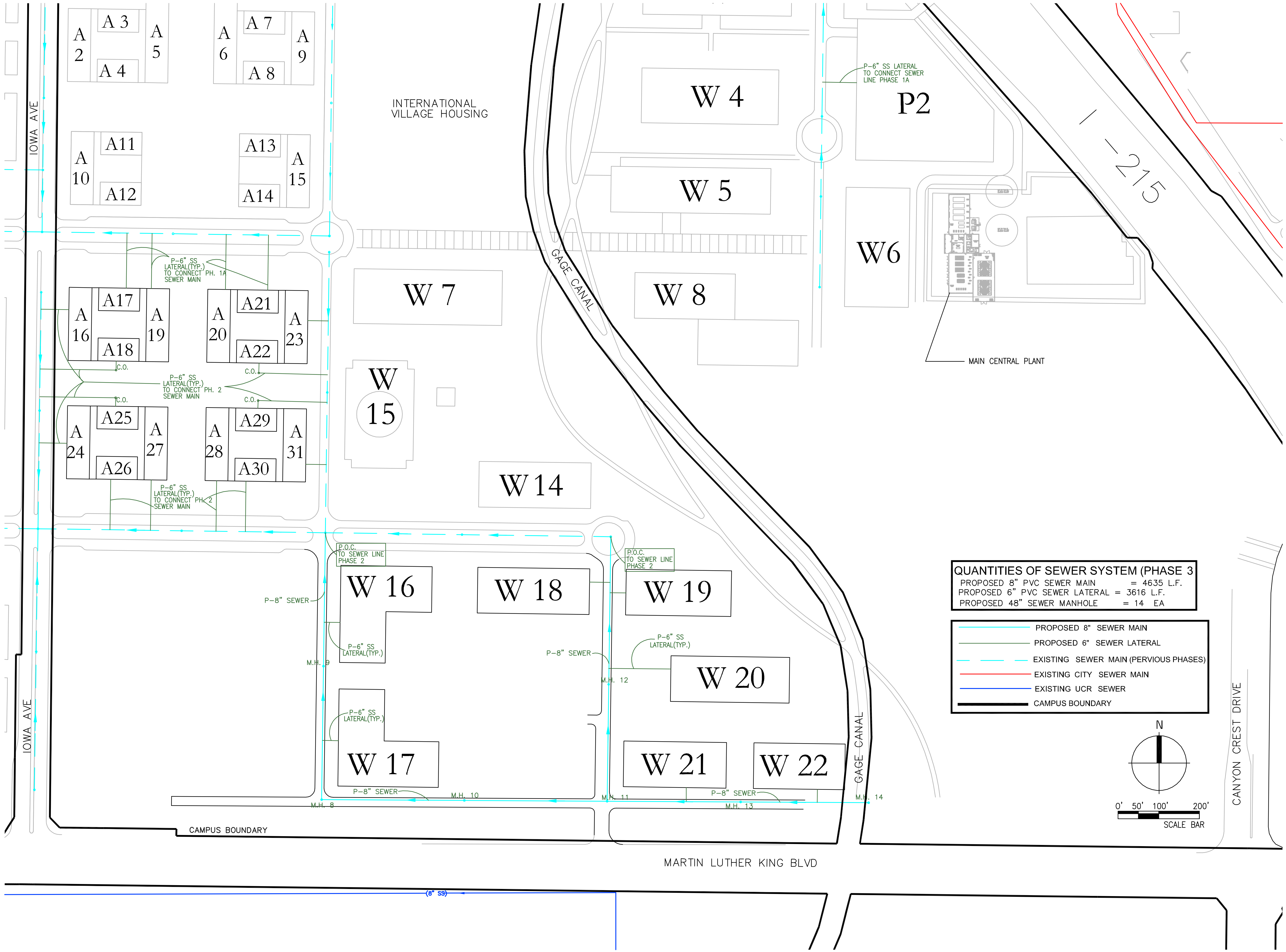

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FIGURE 5.6.2
SEWER SYSTEM MASTER STUDY
PHASE 3

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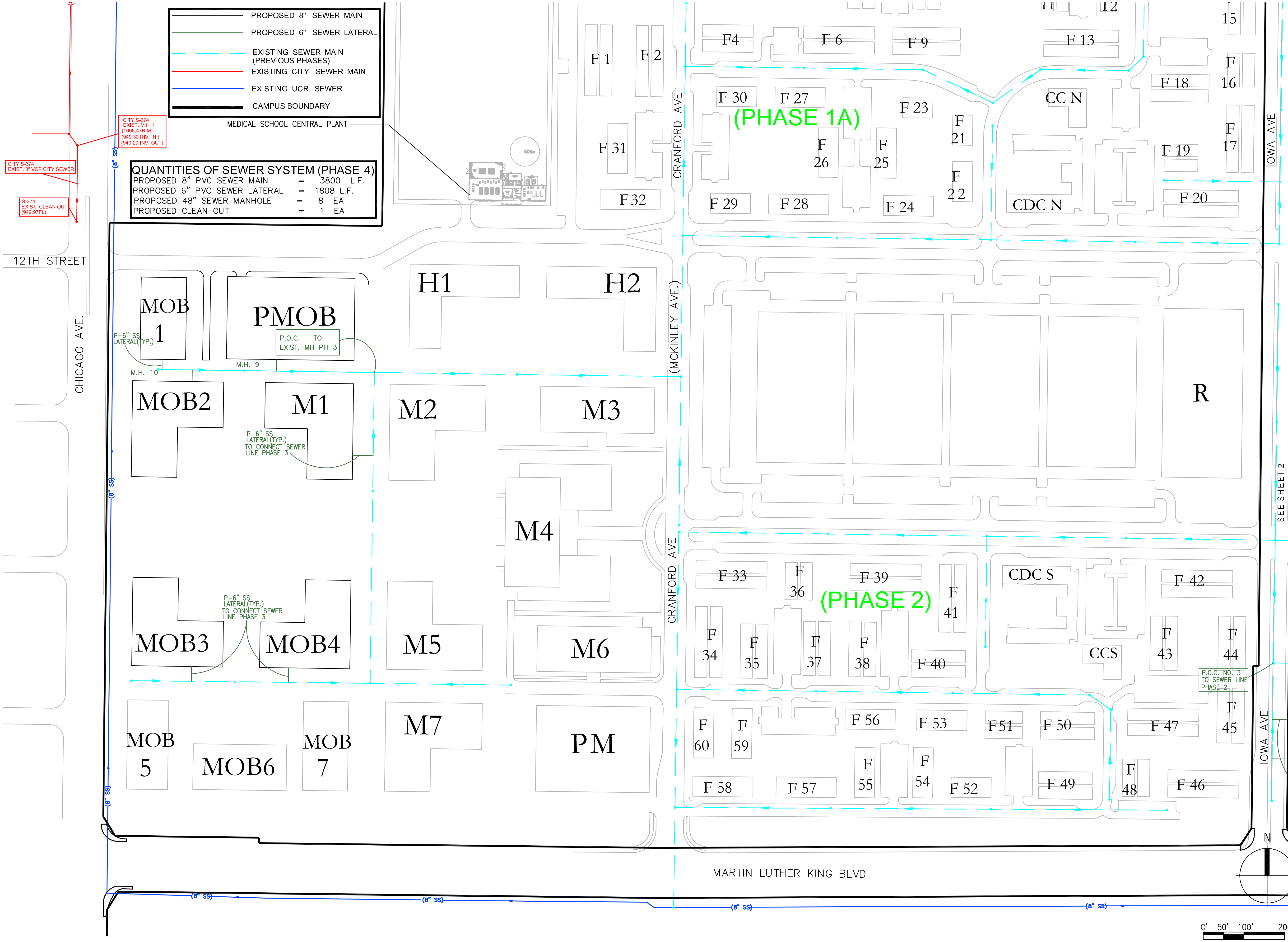

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FIGURE 5.7.1
SEWER SYSTEM MASTER STUDY
PHASE 4

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QUANTITIES OF SEWER SYSTEM (PHASE 4)		
PROPOSED 8" PVC SEWER MAIN	=	3800 L.F.
PROPOSED 6" PVC SEWER LATERAL	=	1808 L.F.
PROPOSED 48" SEWER MANHOLE	=	8 EA
PROPOSED CLEAN OUT	=	1 EA

PROPOSED 8" SEWER MAIN	EXISTING CITY SEWER MAIN
PROPOSED 6" SEWER LATERAL	EXISTING UCR SEWER
EXISTING SEWER MAIN (PREVIOUS PHASES)	CAMPUS BOUNDARY

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FIGURE 5.7.2
SEWER SYSTEM MASTER STUDY
PHASE 4

Sheet No.

SHEET 2 OF 2

CHAPTER 6

STORM DRAIN SYSTEM

This chapter presents the analyses and recommended plans to serve West Campus buildings with a storm drain system. This chapter will explore the existing storm drain (SD) system, storm drain loads, and storm drain points of connections to the existing storm drain system. In addition, storm drain system alternatives will be explored including criteria for analysis, demand and capacities, phasing implications, and cost considerations. The result of these explorations will be the conceptual design of a recommended alternative and storm drain system implementation plan.

6.1 Existing Systems (Figures 6.1.1 through 6.1.6)

The existing storm drain system on the West Campus is comprised of County Flood Control reinforced concrete pipe (RCP) ranging in size from 18 to 75-inches in diameter. These storm drains are located under Cranford Avenue (McKinley Avenue), Martin Luther King Jr. Boulevard, Chicago Avenue, and an alley south of Everton Place. The 18-inch alley storm drain flows in a westerly direction and connects to the storm drain in Cranford Avenue (McKinley Avenue). The storm drain located in Cranford Avenue (McKinley Avenue), ranges in size from 66 to 72 inches in diameter, and flows in a southerly direction. The third storm drain pipe is located in Martin Luther King Jr. Boulevard (MLK), ranges in size from 42 inches to 75 inches, and flows in a westerly direction. The Cranford Avenue storm drain joins the MLK storm drain at the 75-inch portion of RCP located at the intersection of Cranford Avenue and MLK. An 18-inch storm drain in Chicago Avenue also connects to the MLK storm drain and flows in a northerly direction. In MLK, the storm drain flows in a westerly direction past Chicago Avenue and outlets to a retention basin to the west.

6.2 Storm Drain Loads and Proposed Storm Drain Systems

6.2.1 Phase 1A and 1B

1. The proposed storm drain system south of Family Student Housing is comprised of reinforced concrete pipe (RCP) and varies in diameter from 18 to 48 inches, Figure 6.2.1. It flows in a westerly direction and connects to the existing 66-inch RCP located in Cranford Avenue (McKinley Avenue), (first point of connection).

2. The proposed storm drain system for Building W4, Phase 1A, consists of a bioswale. This grassy swale will divert the storm water away from and around the building to the south and then disperse it in sheet flow similar to preconstruction conditions. The roadway to the east of W4 could drain north to Everton Place, where it would follow the current roadway drainage course of Everton Place to Iowa Avenue to University Avenue. The existing ground would be elevated 3 or 4 feet at the cul-de-sac end of the roadway. Another option is drain the north-south portion of the roadway to the south, construct a curb cut in the cul-de-sac, and disperse the water to its natural sheet flow condition. This water would later be conveyed via the proposed storm drain installed in Phase 1.

3. Storm water surrounding Building M4, Phase 1B, will sheet flow away from the building to existing drainage facilities in adjacent roadways.

6.2.2 Phase 1

1. The proposed storm drain system for Phase 1 is comprised of reinforced concrete pipe (RCP) varying in diameter from 18 to 30 inches, flowing in a westerly direction, and connecting to the Phase 1A storm drain system at Iowa Avenue, Figures 6.3.2 and 6.3.3. The storm water then continues to flow in a westerly direction to the first point of connection in Cranford Ave (McKinley Avenue).

2. The maximum discharge for the combined Phase 1A and Phase 1 at the first point of connection is 95.1 cubic feet per second (cfs) with a time of concentration (Tc) equal to 15.2 minutes. The proposed 48-inch RCP is adequate for this volume of flow with a 12.0 feet per second (fps) velocity.

3. The existing southerly volume of flow is 56.8 cfs in Cranford Avenue (McKinley Avenue). The total discharge (existing and proposed) at the first point of connection is 125.5 cfs. The existing 66-inch RCP in Cranford Avenue (McKinley Avenue) is adequate to handle this flow.

6.2.3 Phase 2

1. The proposed storm drain system for Phase 2 is comprised of trapezoidal swales and RCP from 18 to 48 inches in diameter that flows in a westerly direction, in the Southwest Mall, south of the recreation area and connects to an existing 72-inch section of existing RCP located under Cranford Avenue (McKinley Avenue) (second point of connection). The second series of trapezoidal swales are located just north of Martin Luther King Jr. Boulevard, east of Cranford Avenue and west of the Gage Canal. They connect to a 42-inch diameter section of RCP via a P-grate inlet. The 42-inch RCP connects to the existing storm drain in Martin Luther King Jr. Boulevard (third point of connection). See Figures 6.4.1 and 6.4.2.

2. The existing maximum discharge is 147.7 cfs with a Tc of 15.6 minutes at the second point of connection.

3. The total discharge (existing + proposed) at the second point of connection is 259.8 cfs with a Tc of 15.6 minutes. The existing 72 inch RCP in Cranford Avenue (McKinley Avenue) is adequate for this flow under pressure.

6.2.4 Phase 3

1. The proposed Phase 3 storm drain system is comprised of an extension of the Phase 2 trapezoidal swale to the east side of Canyon Crest Drive, just north of Martin Luther King Jr. Boulevard (point of connection four). This swale is being installed prior to Phase 4 development. See Figures 6.5.1 and 6.5.2.

2. The total discharge (proposed + existing) is 242.8 cfs with a Tc of 17.6 minutes.

3. The total flow from West Campus north of Martin Luther King Jr. Boulevard is 397.1 cfs. This flow is routed to a retention basin west of Chicago Avenue. The existing 75-inch RCP storm drain in Martin Luther King Jr. Boulevard is adequate to convey this flow under pressure.

6.3 Storm Drain Points of Connection to the Existing Storm Drain System

6.3.1 Phase 1A

The first point of connection is to the existing 66-inch RCP flowing southerly in Cranford Avenue, Figure 6.2.1, Sheet 1 of 2.

6.3.2 Phase 2

The second point of connection is to the existing 72-inch RCP flowing southerly in Cranford Avenue. The third point of connection is via a 42-inch RCP that connects the trapezoidal swales to the existing storm drain in Martin Luther King Jr. Boulevard. See Figures 6.4.1 and 6.4.2.

6.3.3 Phase 3

The fourth point of connection is an extension of the west end of the Phase 2 trapezoidal swale just north of Martin Luther King Jr. Boulevard. See Figures 6.5.1 and 6.5.2.

6.4 Storm Drain System Alternatives

The proposed storm drain system is selected based on the criteria used for the analyses, loads and capacities, and cost estimates. Unlined trapezoidal drainage channels were selected for the transport of storm water westerly across West Campus.

6.4.1 Criteria for Analysis

1. The rational method was used for calculation of total discharge for each catch basin and applying the hydraulic equations for sizing of the pipe.

2. Pipes were, where practical, designed to flow full.

3. For major drains, full 100-year storms were contained within the street right-of-way.

4. Maximum design velocity was 20 feet per second (fps).

5. Minimum grade on any storm drain is 0.0010.

6. Storm drains shall be constructed of reinforced concrete pipe (RCP).

7. Minimum pipe size shall be 18 inches.

6.4.2 Loads and Capacities - Sizing Analysis

6.4.2.1 Phase 1A (Figure 6.2)

The storm drain system flows westerly (south of Family Student Housing). The storm drain initiates with a 36-inch diameter RCP at the east end and increases to a maximum diameter of 48-inch RCP to the west. All the laterals have minimum diameters of 18 inches and are constructed of RCP with curb inlet catch basins. The following pipe diameters are appropriate for the flow rates in Phase 1A.

Pipe Size	Q (cfs)	V (fps)	Depth of Flow	Slope
36 inch RCP	45.4	10.3	22.8 inch	1%
42 inch RCP	63.0	11.2	25.3 inch	1%
48 inch RCP	79.3	12.0	26.9 inch	1%

6.4.2.2 Phase 1 (Figure 6.3)

The storm drain system flows westerly (south of Campus Buildings). The storm drain initiates with a 24-inch diameter RCP at the east end and increases to a maximum diameter of 30-inch RCP to the west. All the laterals have minimum diameters of 18 inches and are constructed of RCP with curb inlet catch basins. The following pipe diameters are appropriate for the flow rates in Phase 1.

Pipe Size	Q (cfs)	V (fps)	Depth of Flow	Slope
24 inch RCP	14.6	5.8	18 inch	0.5%
30 inch RCP	32.6	9.4	20.8 inch	1%

6.4.2.3 Phase 2 (Figure 6.4)

The Phase 2 storm drain system flows westerly (north of Martin Luther King Jr. Boulevard). The reinforced concrete pipe diameters initiate at 30 inches and increase to 48 inches. The following pipe diameters are appropriate for the flow rates in Phase 2.

Pipe Size	Q (cfs)	V (fps)	Depth of Flow	Slope
30 inch RCP	41.8	10.1	21.4 inch	1%
36 inch RCP	62.2	10.8	29.5 inch	1%
42 inch RCP	94.1	11.9	35.6 inch	1%
48 inch RCP	130.8	13.0	38.3 inch	1%

6.4.2.4 Phase 3 (Figure 6.5)

The Phase 3 storm drain system flows in a westerly direction connecting to the existing 42-inch diameter pipe under Martin Luther King Jr. Blvd. The storm drain pipe diameter initiates at 36 inches and increases to 42 inches. The following pipe diameters are appropriate for the flow rates in Phase 3.

Pipe Size	Q (cfs)	V (fps)	Depth of Flow	Slope
36 inch RCP	39.5	9.8	19.9 inch	1%
42 inch RCP	51.0	10.5	21.2 inch	1%

6.4.3 Phasing Implications

The hydrological and hydraulic calculations have been completed for all four phases. The recommended storm drain system is detailed in the Storm Drain System Master Planning Study.

6.5 Recommended Storm Drain System Implementation Plan

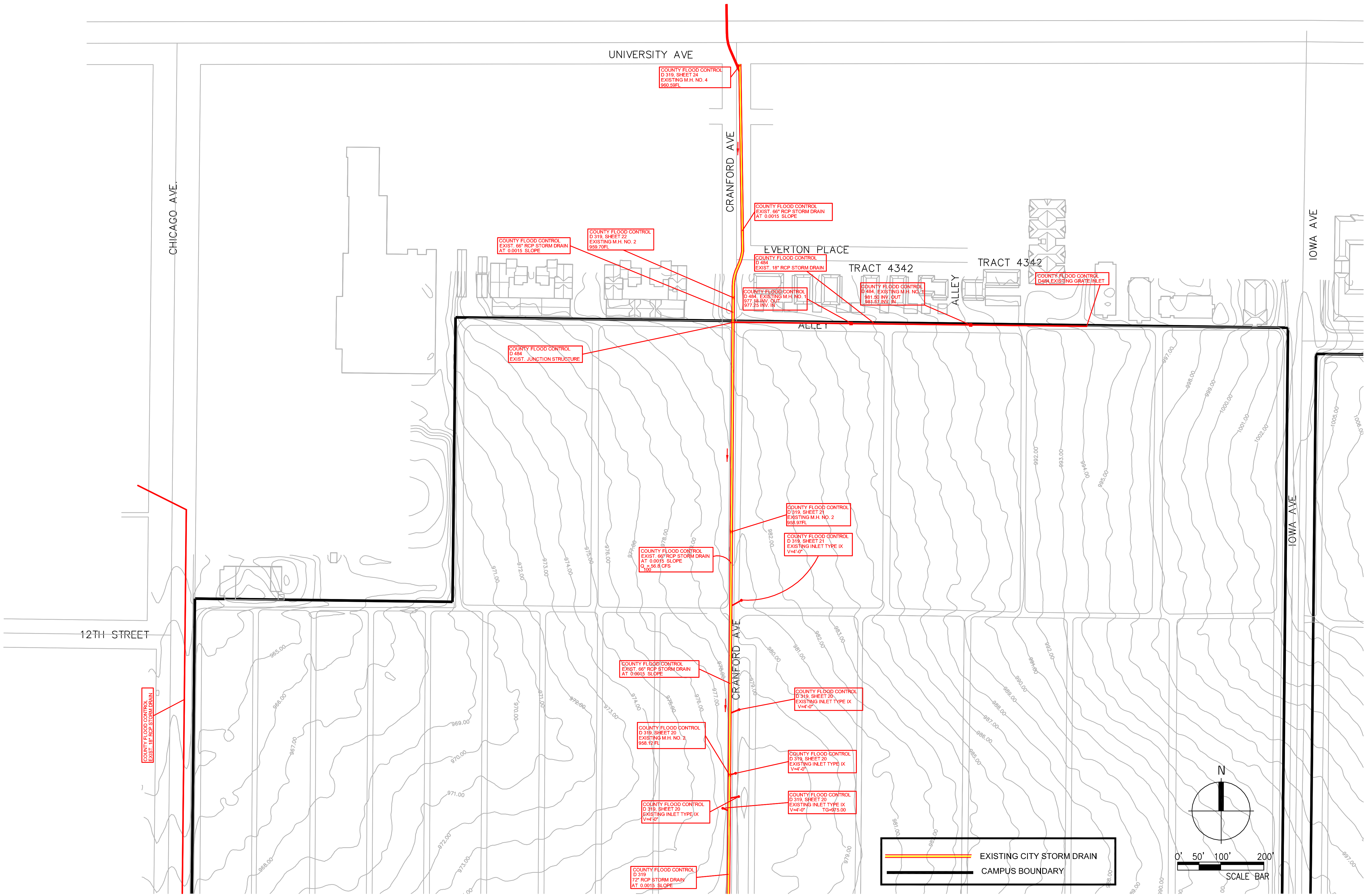
The recommended storm drain system implementation plan is illustrated on the Storm Drain Master Planning Study. This system consists of trapezoidal drainage channels, 18-inch to 42-inch reinforced concrete pipe (RCP), catch basins, manholes, and junction structures.

6.6 Storm Drain System Cost Summary

This study includes conceptual-level cost estimates for the Storm Drain System infrastructure development. Details of these cost estimates are included in the Appendix to this report. Costs include mark-ups, sales taxes, and contingencies, but do not include soft costs. See additional notes on the detailed tables.

- Phase 1A Housing: $253,000
- Phase 1A Campus: $1,000
- Phase 1B: $0
- Phase 1: $169,000
- Phase 2 Housing: $541,000
- Phase 2 Campus: $254,000
- Phase 3: $27,000
- Phase 4: $0

Estimated Total for the Build-Out of the Storm Drain System: $1,245,000



SEE SHEET 2

SEE SHEET 31

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△	Admistrative Draft Report	02/11/08
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FIGURE 6.1.1
EXISTING STORM DRAIN

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FIGURE 6.1.2
EXISTING STORM DRAIN

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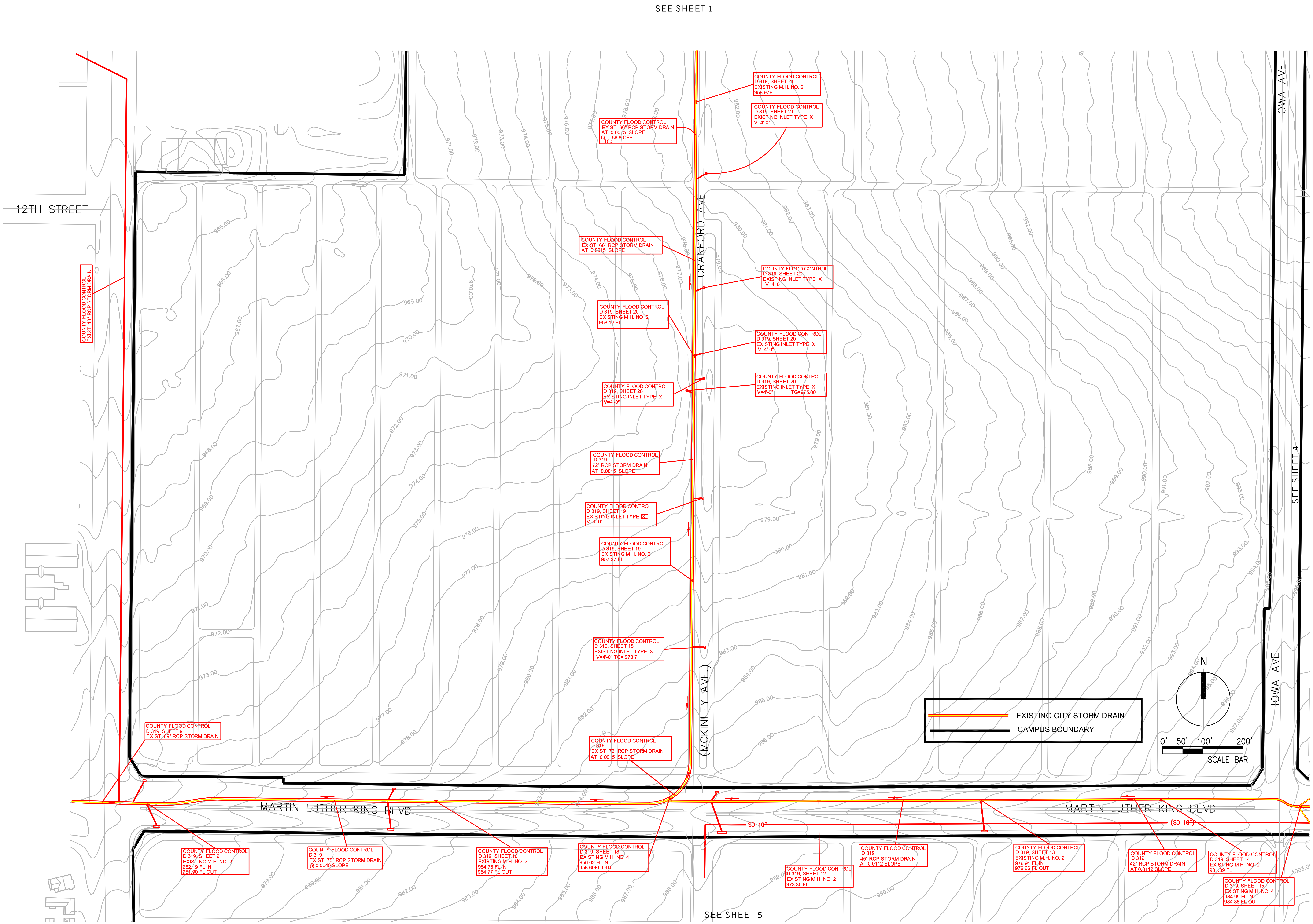

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FIGURE 6.1.3
EXISTING STORM DRAIN

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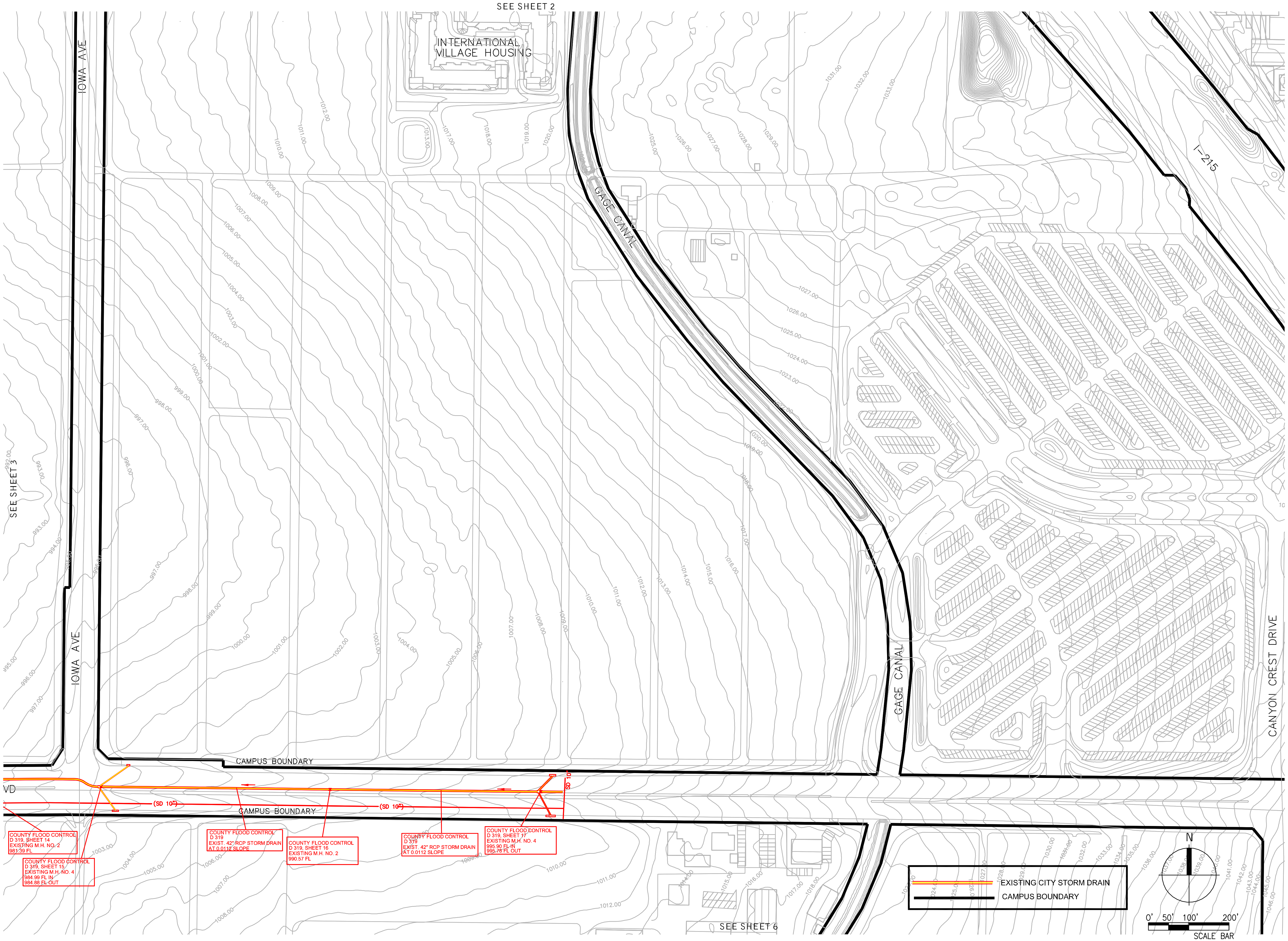

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FIGURE 6.1.4
EXISTING STORM DRAIN

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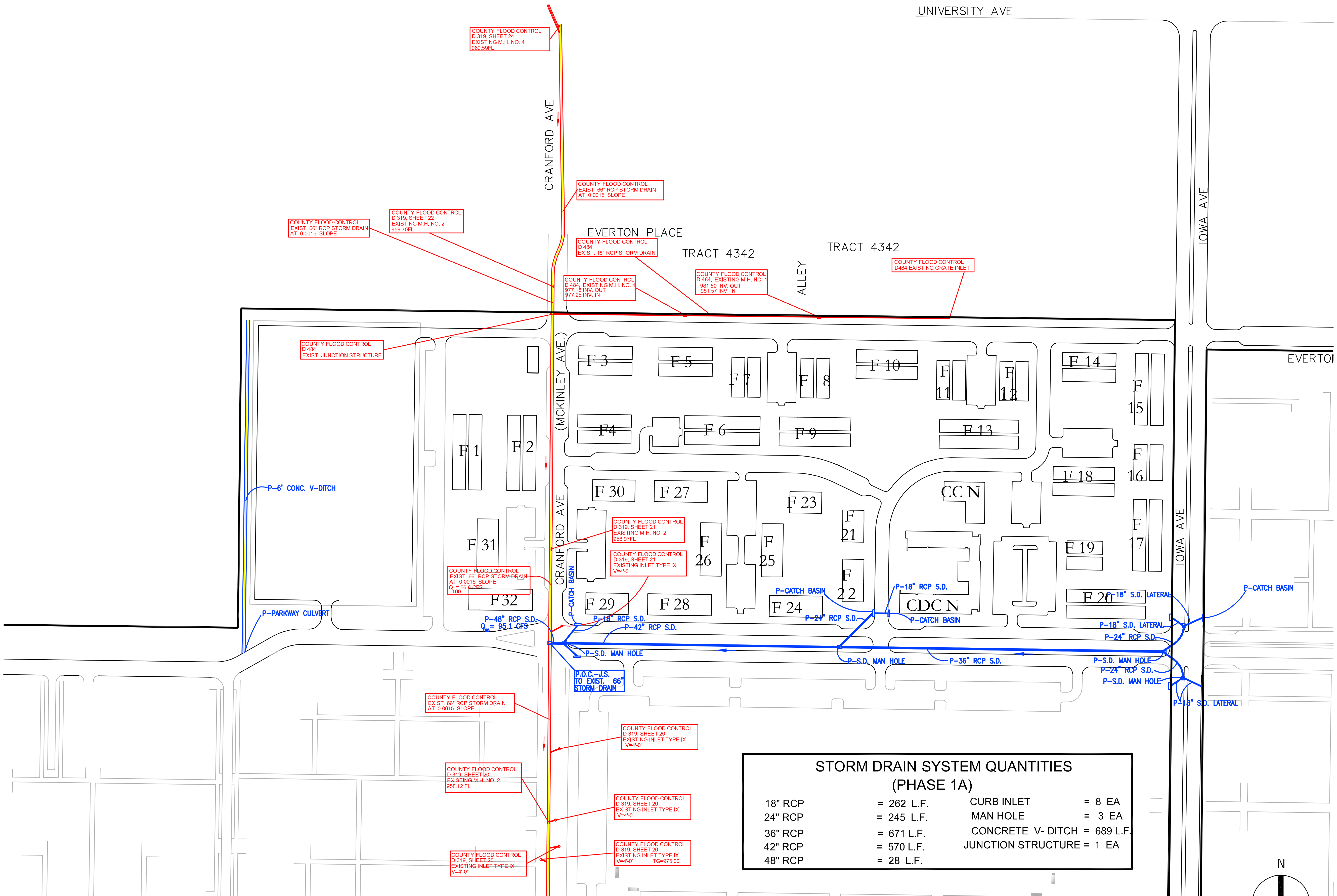

STORM DRAIN SYSTEM QUANTITIES (PHASE 1A)

18" RCP	= 262 L.F.	CURB INLET	= 8 EA
24" RCP	= 245 L.F.	MAN HOLE	= 3 EA
36" RCP	= 671 L.F.	CONCRETE V- DITCH	= 689 L.F.
42" RCP	= 570 L.F.	JUNCTION STRUCTURE	= 1 EA
48" RCP	= 28 L.F.		

BENCH MARK
F.B. 1020/22 C/R F.B. 650/64
ELEV. 993.76 PK NAIL IN N.E.
CURB RETURN LINDEN AND IOWA

PROPOSED RCP STORM DRAIN
EXISTING CITY STORM DRAIN
CAMPUS BOUNDARY

N

0' 50' 100' 200'
SCALE BAR

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FIGURE 6.2.1
STORM DRAIN SYSTEM MASTER STUDY
PHASE 1A

Sheet No.

STORM DRAIN SYSTEM QUANTITIES (PHASE 1A)

18" RCP	= 262 L.F.
24" RCP	= 245 L.F.
36" RCP	= 671 L.F.
42" RCP	= 570 L.F.
48" RCP	= 28 L.F.
CURB INLET	= 8 EA
MAN HOLE	= 3 EA
CONCRETE V- DITCH	= 689 L.F.
JUNCTION STRUCTURE	= 1 EA

BENCH MARK
F.B. 1020/22 C/R F.B. 650/64
ELEV. 993.76 PK NAIL IN N.E.
CURB RETURN LINDEN AND IOWA

PROPOSED RCP STORM DRAIN
EXISTING CITY STORM DRAIN
CAMPUS BOUNDARY
BIOSWALE = 1000 S.F.

N

0' 50' 100' 200'
SCALE BAR

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FIGURE 6.2.2
STORM DRAIN SYSTEM MASTER STUDY
PHASE 1A

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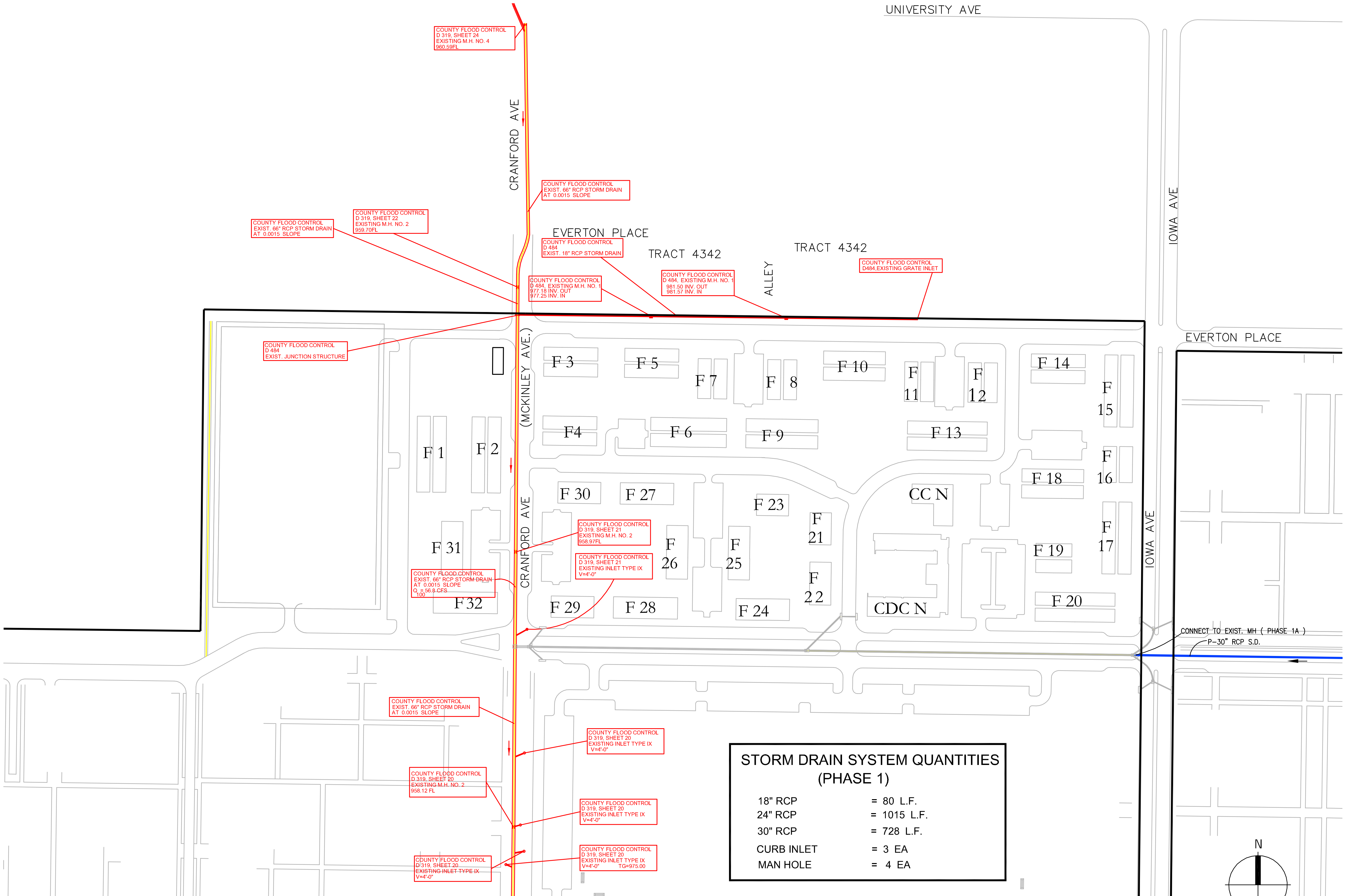

STORM DRAIN SYSTEM QUANTITIES (PHASE 1)

18" RCP	= 80 L.F.
24" RCP	= 1015 L.F.
30" RCP	= 728 L.F.
CURB INLET	= 3 EA
MAN HOLE	= 4 EA

BENCH MARK
F.B. 1020/22 C/R F.B. 650/64
ELEV. 993.76 PK NAIL IN N.E.
CURB RETURN LINDEN AND IOWA

PROPOSED RCP STORM DRAIN
EXIST. STORM DRAIN (PREVIOUS PHASE)
EXISTING CITY STORM DRAIN
CAMPUS BOUNDARY

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FIGURE 6.3.1
STORM DRAIN SYSTEM MASTER STUDY
PHASE 1

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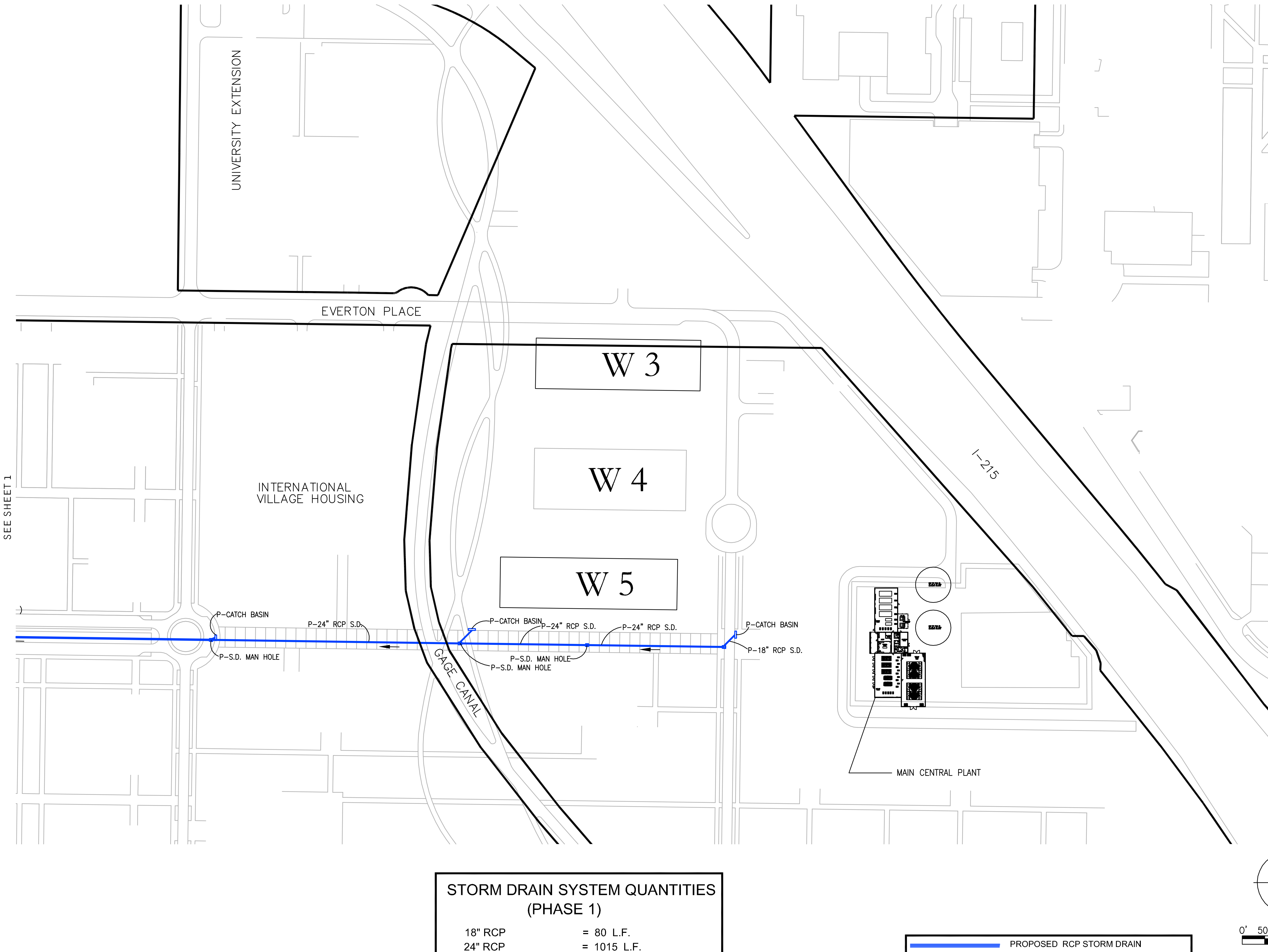

STORM DRAIN SYSTEM QUANTITIES (PHASE 1)

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24" RCP	= 1015 L.F.
30" RCP	= 728 L.F.
CURB INLET	= 3 EA
MAN HOLE	= 4 EA

BENCH MARK
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CURB RETURN LINDEN AND IOWA

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- EXIST. STORM DRAIN (PREVIOUS PHASE)
- EXISTING CITY STORM DRAIN
- CAMPUS BOUNDARY

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FIGURE 6.3.2
STORM DRAIN SYSTEM MASTER STUDY PHASE1

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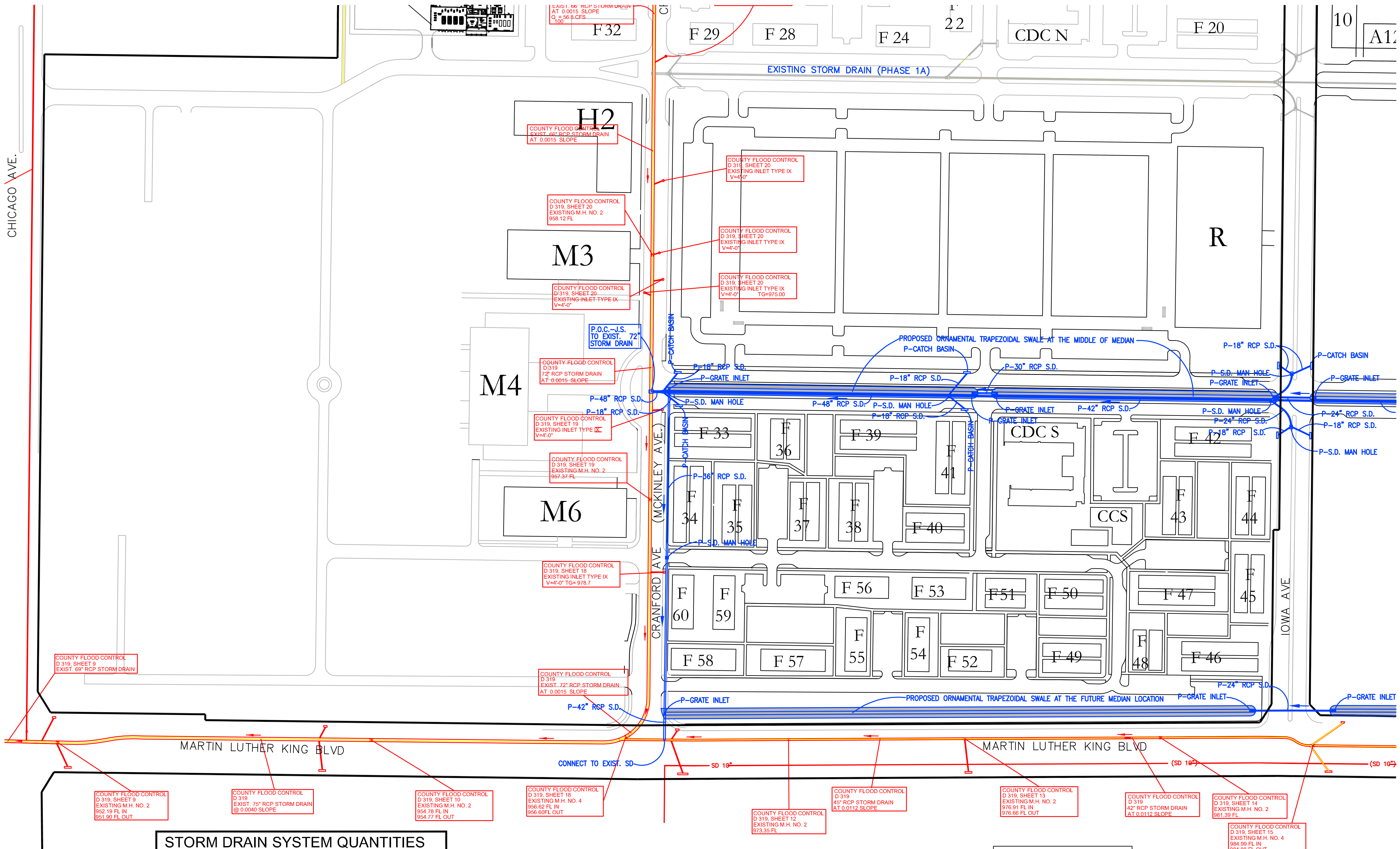

STORM DRAIN SYSTEM QUANTITIES (PHASE 2)

18" RCP	= 568 L.F.
24" RCP	= 398 L.F.
30" RCP	= 1112 L.F.
36" RCP	= 1353 L.F.
42" RCP	= 714 L.F.
48" RCP	= 608 L.F.
CATCH BASIN	= 11 EA
MAN HOLE	= 10 EA
GRATE INLET	= 12 EA
TRAPEZOIDAL SWALE	= 5127 L.F.
JUNCTION STRUCTURE	= 2 EA

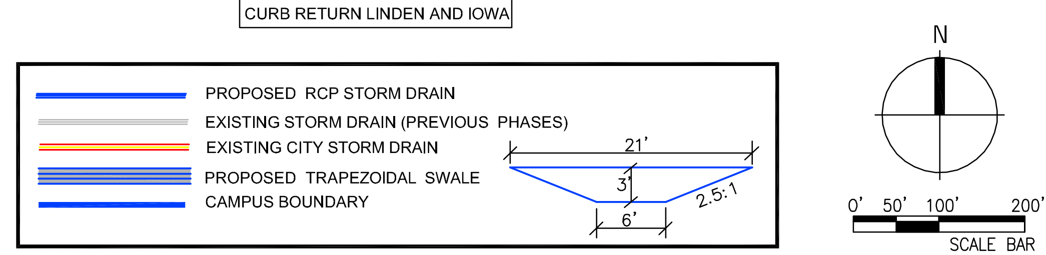

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FIGURE 6.4.1
STORM DRAIN SYSTEM MASTER STUDY PHASE 2

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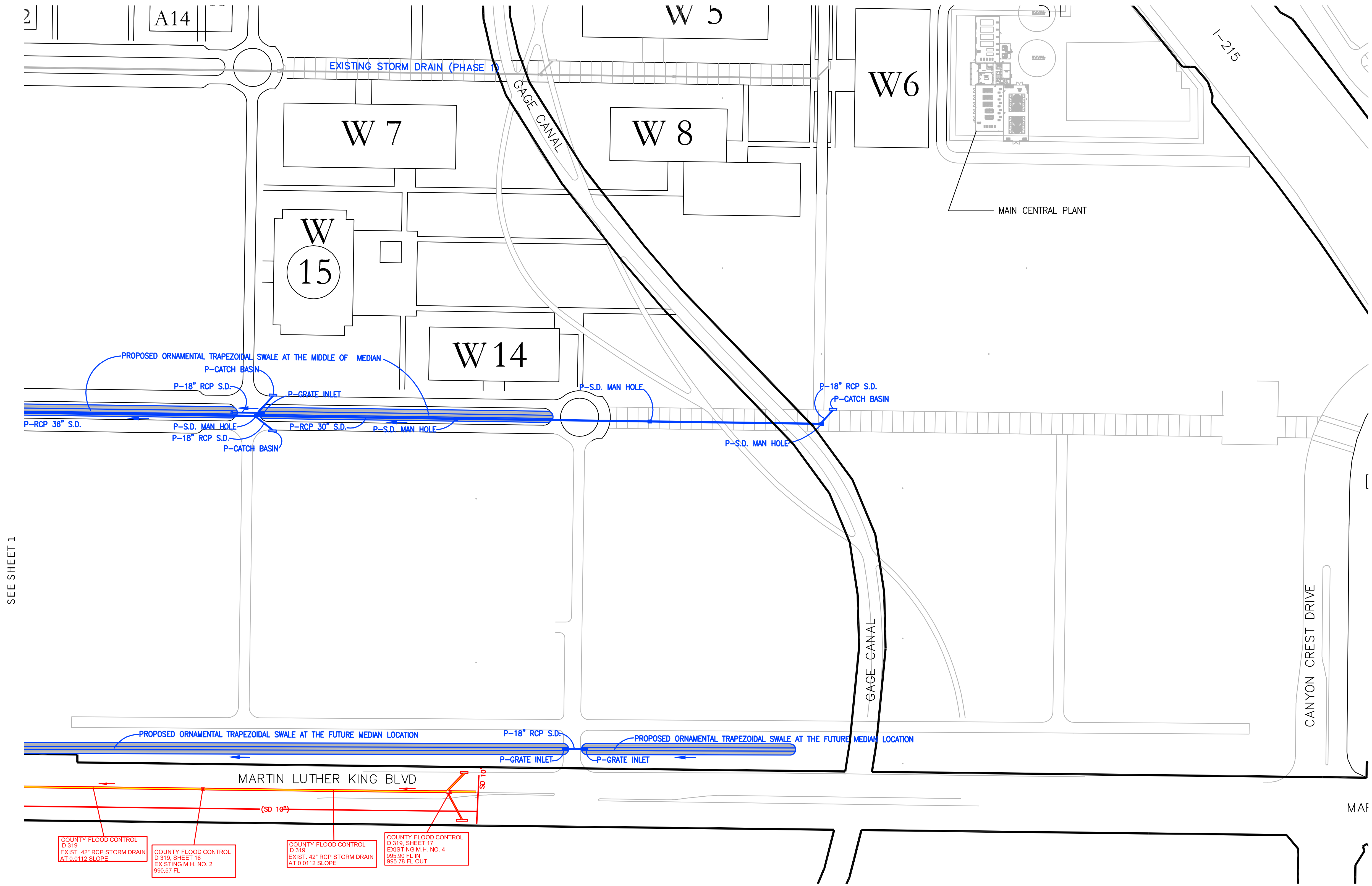
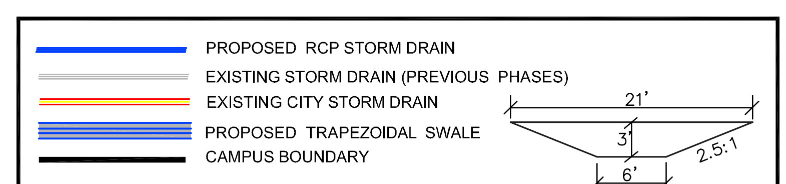
SHEET 1 OF 2

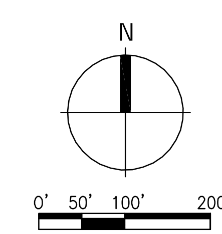


STORM DRAIN SYSTEM QUANTITIES (PHASE 2)

18" RCP	= 568 L.F.
24" RCP	= 398 L.F.
30" RCP	= 1112 L.F.
36" RCP	= 1353 L.F.
42" RCP	= 714 L.F.
48" RCP	= 608 L.F.
CATCH BASIN	= 11 EA
MAN HOLE	= 10 EA
GRATE INLET	= 12 EA
TRAPEZOIDAL SWALE	= 5127 L.F.
JUNCTION STRUCTURE	= 2 EA

BENCH MARK
F.B. 1020/22 C/R F.B. 650/64
ELEV. 993.76 PK NAIL IN N.E.
CURB RETURN LINDEN AND IOWA





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West Campus Infrastructure Development Study

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Revision	Description	Date
△	Phase 1 Implementation Plan Report	10/31/07
△	Administrative Draft Report	02/11/08
△	Final Report	03/14/08
△	Final Report	04/25/08

Job. No.	507.5137.1
Date	04/25/08
Scale	1" = 200'
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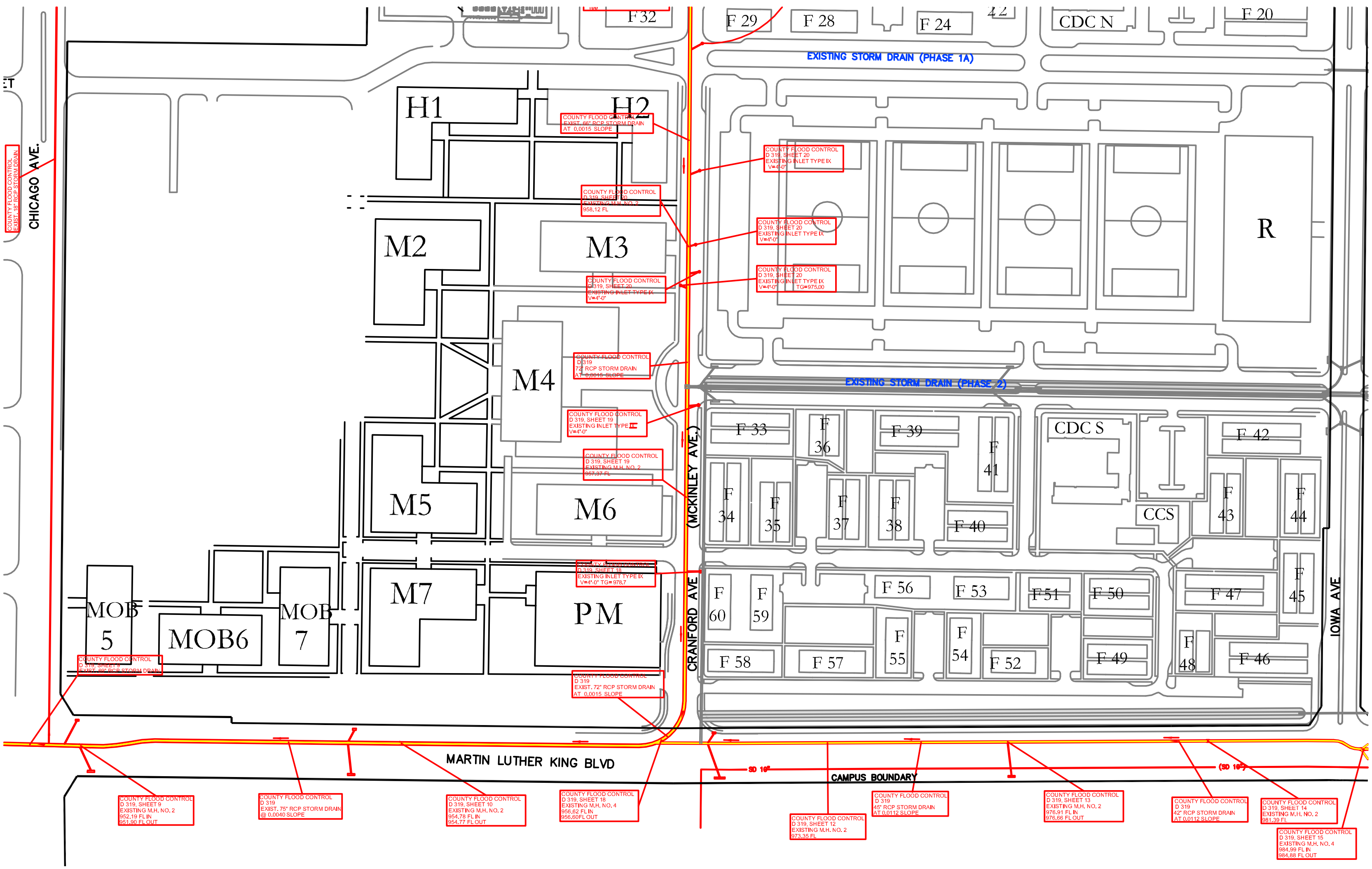
Sheet Title	

FIGURE 6.4.2
STORM DRAIN SYSTEM MASTER STUDY PHASE 2

Sheet No.



STORM DRAIN SYSTEM QUANTITIES (PHASE 3)

TRAPEZOIDAL SWALE = 863 L.F.

BENCH MARK
F.B. 1020/22 C/R F.B. 650/64
ELEV. 993.76 PK NAIL IN N.E.
CURB RETURN LINDEN AND IOWA

PROPOSED TRAPEZOIDAL SWALE
EXISTING STORM DRAIN (PREVIOUS PHASES)
EXISTING CITY STORM DRAIN
EXISTING TRAPEZOIDAL SWALE
CAMPUS BOUNDARY

21' 3' 6' 2.5:1

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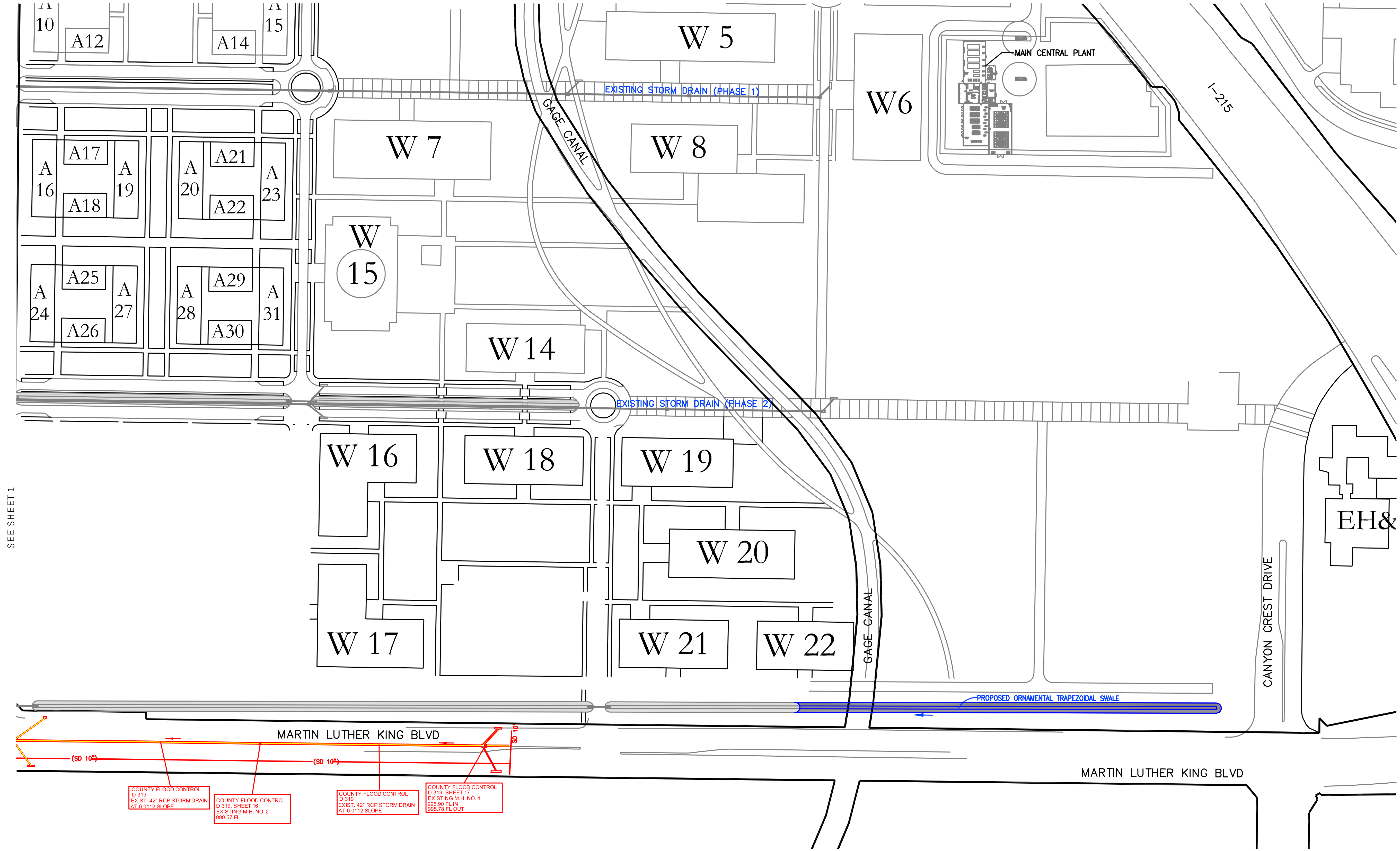
Sheet Title

FIGURE 6.5.1
STORM DRAIN SYSTEM MASTER STUDY
PHASE 3

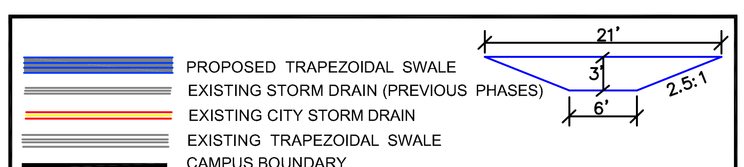
Sheet No.

SHEET 1 OF 2

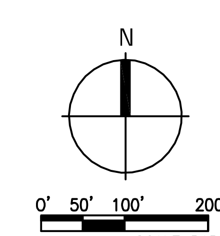


STORM DRAIN SYSTEM QUANTITIES (PHASE 3)

TRAPEZOIDAL SWALE = 863 L.F.



BENCH MARK
F.B. 1020/22 C/R F.B. 650/64
ELEV. 993.76 PK NAIL IN N.E.
CURB RETURN LINDEN AND IOWA



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Job. No.	507.5137.1
Date	04/25/08
Scale	1" = 200'
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Checked by	
Sheet Title	

FIGURE 6.5.2
STORM DRAIN SYSTEM MASTER STUDY
PHASE 3

Sheet No.

SHEET 2 OF 2

TRAFFIC IMPACT ANALYSIS
FOR
WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

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For
West Campus Infrastructure Development Study

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This report was prepared by Jana Robbins, Senior Transportation Analyst, under the direct supervision of Ali Cayir, a registered Professional Engineer.

______________________________ 04-21-08

Jana Robbins, Senior Transportation Analyst

REGISTERED PROFESSIONAL ENGINEER
ALI CAYIR
Exp. 12-31-2009
No. 47128
CIVIL
STATE OF CALIFORNIA

______________________ 04-21-08 ______________________

Ali Cayir, PE date Professional Engineer's Stamp

CHAPTER 7

TRAFFIC IMPACT ANALYSIS

7.1 Traffic Impact Analysis

The UC Riverside (UCR) campus is located three miles east of downtown Riverside and is bisected by the I-215/SR-60 freeway. The 609.7 acres east of the freeway includes the academic core and most of the existing campus facilities. The 511.3 acres west of the freeway currently includes agriculture research fields and support facilities, a large parking lot, administrative facilities (Highlander Hall and Human Resources), the University Extension (UNEX) facility, and International Village student housing. UCR is experiencing a growth cycle with a present enrollment of approximately 17,100 students that is expected to increase to an estimated 31,700 students by the year 2025. With this expected growth in the student population, the University has taken the opportunity to expand its campus to its western portion. The expansion will include graduate professional school programs, additional classrooms, family student housing, conference centers, and a sports facility with playing fields, student apartments, support uses, as well as a proposed School of Medicine and medical office buildings for leasing opportunities. It is a goal of the University that in future years a large portion of all students attending the university will be housed on campus. The 2005 Long Range Development Plan, has a housing goal of 50% of all students will be residents on campus[1] by 2015. With this in mind the overall campus circulation element focuses on providing plenty of walking paths, bikeways and transit for students, placing less emphasis on private automobile travel.

The expansion of the University is expected to occur in several phases. Ultimately, the phases will be guided by student enrollment figures and funding. However, for traffic analysis purposes each phase 1 thru 4 are assumed to occur in increments of 5 years; Phase 1A, 1B, Phase 1 completed by 2010, Phase 2 completed by 2015, Phase 3 completed by 2020, and Phase 4 with full build-out completed by 2025. The project will be formulated to accommodate the full build-out of the West Campus as identified in Campus Aggregate Master Planning Study (CAMPS), which could ultimately support a student body of approximately 31,700 students.

This chapter presents an analysis of the traffic and circulation impacts of the West Campus Development during each of its proposed building phases. As part of this effort, existing and projected traffic volumes, trip generation estimates, distribution of project related traffic and capacity analysis at the studied intersections during peak AM and PM traffic hours will be determined for each phase. This analysis is used as a tool in projecting future impacts to the circulation system with each phased increase in student population, housing and buildings. The traffic impact analysis has been prepared in accordance with City of Riverside, Congestion Management Plan (CMP) and Riverside County guidelines for the preparation of Traffic Impact Analysis (TIA). ***Figure 7-1***, provides a vicinity map of the studied area.

1 LRDP, Traffic Impact Study dated March 18, 2004

FIGURE 7-1: LOCAL VICINITY MAP

7.1.1 Existing Traffic Conditions

The following paragraphs provide a brief description of the characteristics of the existing roadways that comprise the circulation network of the study area. These facilities provide the majority of both regional and local access to the project. Access to the West Campus will be provided by University Avenue, Martin Luther King Jr. Boulevard (MLK), Iowa Avenue, and Chicago Avenue.

University Avenue is an east-west major arterial street, which carries two to three lanes in each direction with left turn channelization and signals at its major intersections. The roadway has a raised landscaped median island with access to commercial driveways. Bike lanes are located on either side of the roadway. University Avenue has a posted speed limit of 35 mph with no parking any time.

University Avenue at Iowa Avenue

Martin Luther King Jr. Boulevard (MLK Jr. Blvd.) is an east-west major arterial street, which carries two lanes in each direction with left turn channelization at major intersections and a raised median island. MLK Jr. Blvd. is posted with a 50 mph speed limit with no parking any time. There are striped bike lanes on both sides of the roadway. Currently MLK Jr. Blvd. carries between 23,000 and 30,000 average daily vehicle trips.

MLK Jr. Blvd. at Canyon Crest

UNIVERSITY OF CALIFORNIA UCRIVERSIDE

Canyon Crest Drive is a north-south arterial with two lanes in each direction. There are bike lanes on both sides of the street with no parking any time. Canyon Crest north of MLK Jr. Blvd. to University Avenue is a campus street and provides direct access into the UCR East Campus. Canyon Crest is used by regional traffic as a route to avoid heavy freeway traffic. This is indicated by the heavy turning movements from MLK Jr. Blvd. traveling south. Canyon Crest north of MLK Jr. Blvd. carries 10,877 average daily vehicles.

Canyon Crest Drive north of MLK Jr. Blvd.

Iowa Avenue currently is a north-south secondary street 66 feet in width. Between MLK and University Avenue, Iowa Avenue carries one to two travel lanes in each direction with left turn channelization at its intersections. Iowa Avenue widens to 110 feet north of University Avenue. On-street parking is allowed north of Everton Place. Iowa Avenue has a posted speed limit of 45 mph. Iowa Avenue carries a significant amount of local and regional traffic. Since Iowa Avenue in the future will essentially divide the West Campus, it will be important to provide traffic calming measures with streetscapes to make the street pedestrian and bicycle friendly with controlled crossings. Iowa Avenue north of MLK Jr. Blvd. carries approximately 16,543 average daily vehicle trips.

Iowa Avenue at Everton Place

Everton Place is an east-west local street 38 feet in width with one travel lane in each direction. Everton Place starts at Iowa Avenue and deadends to the east. In its present configuration parking is allowed on both sides of the street. In the future, Everton Place will provide direct access to surface parking to the east, which will in later phases become parking structures. Everton Place will also serve as direct access to several educational facilities. In the future, Everton Place will extend to the west as a campus street from Iowa Avenue to Cranford Avenue which will provide access to future residential uses. The extension of Cranford Avenue within UCR boundaries will be a campus street.

Chicago Avenue is a north-south major arterial street, which carries two to three lanes in each direction with a two-way left turn lane. Parking is not allowed along Chicago Avenue. Chicago Avenue links MLK Jr. Blvd. to University Avenue for both regional and local traffic. Chicago Avenue has a posted speed limit of 40 mph north of MLK and 45 mph south of MLK. Chicago Avenue carries approximately 20,629 average daily vehicle trips.

Chicago Avenue at MLK

Linden Street is an east-west secondary arterial street, which carries two lanes in each direction. No parking is allowed along Linden Street east of Canyon Crest Drive which is a campus street from Canyon Crest Drive to Pentland Way. There are striped bike lanes on both sides of the roadway. Linden Street has a posted speed limit of 40 mph.

Linden Street west of Iowa Avenue

Blaine Street (3rd Street) is an east-west major arterial street, which carries two lanes in each direction with signals at its major intersections. North and south access is provided to the I-215/SR-60 Freeway. No parking is allowed along Blaine Street. There are striped bike lanes on both sides of the roadway. Blaine Street has a posted speed limit of 40 mph.

7.1.2 Existing Turning Movement Counts at Intersections

For the purpose of evaluating existing as well as future operating conditions with and without the proposed project, the study area was carefully selected in accordance with City's traffic impact study guidelines and County of Riverside Congestion Management Plan (CMP) guidelines. Guidelines state that the geographic area examined in the Traffic Impact Analysis must include, at a minimum, all freeway links with 100 or more peak hour project trips (two-way) and other CMP roadways (intersections) with 50 or more peak-hour project trips (two-way). Existing traffic volume data was based on manual counts of turning movements conducted by Transtech Engineers during the peak hours of 7-9 AM and 4-6 PM on typical weekdays in January 2008, when classes were is session. ***Figures 7-2 and 7-3*** illustrate existing AM and PM peak hour turning movement counts at the studied intersections. ***Figure 7-4*** depicts the existing roadway geometrics at each of the studied intersections. For easier reference all of the Figures, with the exception of Figure 1, are included at the end of the traffic report document.

The following intersections were chosen for evaluation prior to proceeding with the study:

1. Chicago Avenue at 3rd St/Blaine Street
2. I-215/SR-60 SB Ramps at Blaine Street
3. I-215/SR-60 NB Ramps at Blaine Street
4. Iowa Avenue at Blaine Street
5. Chicago Avenue at Linden Street
6. Iowa Avenue at Linden Street
7. Chicago Avenue at University Avenue
8. Iowa Avenue at University Avenue
9. I-215/SR-60 SB Ramps at University Avenue
10. I-215/SR-60 NB Ramps at University Avenue
11. West Campus Drive at University Avenue (University entrance)
12. Iowa Avenue at Everton Place
13. Chicago Avenue at Martin Luther King Jr. Boulevard
14. Iowa Avenue at Martin Luther King Jr. Boulevard
15. Entry to Lot 30 Parking Lot from Martin Luther King Jr. Boulevard
16. Canyon Crest Drive at Martin Luther King Jr. Boulevard
17. I-215/SR-60 SB Ramps at Martin Luther King Jr. Boulevard
18. I-215/SR-60 NB Ramps at Martin Luther King Jr. Boulevard

7.1.3 Existing Level of Service Analysis

Intersections are frequently the controlling factor in providing an adequate circulation system. They are the most constrained portions of almost any roadway segment in terms of capacity, as intersections require a sharing of right-of-way. Additionally, intersections present the area within which a great majority of traffic accidents take place. Peak hour operations of intersections often give the most accurate picture of relative congestion experienced by motorists. As specified in the Congestion Management Program (CMP) for Riverside County and Riverside County guidelines, actual peak hour factors (phf) were used for existing conditions and mid-term future years and a phf of .925 for 2025 conditions to account for 15-minute variations in volume within the hour. The calculation sheets for the calculation of peak hour factors are included in the Appendix.

CMP methodologies require the use of the 2000 Highway Capacity Manual (HCM) operational delay method in conducting intersection Level of Service (LOS) calculations. In this analysis, Transtech Engineers has employed the computer program TRAFFIX, version 7.8, to conduct the required LOS calculations in a format compatible with City, County and CMP requirements.

7.1.4 Level of Service Methodology

Both capacity and level of service were fully considered when evaluating the overall operation of signalized intersections. Level of Service (LOS) is based on the average stopped delay per vehicle for all of the movements within the intersection. For any given LOS, a range of delay values result because the volume to capacity or V/C ratio does not consider signal timing factors. For this reason both the V/C ratio and vehicle delay are carefully examined. ***Table 7-1*** illustrates the level of service criteria. Any V/C ratio greater than 1.0 is an indication of actual or potential breakdown, representing little available capacity in the critical movements to absorb demand increases. Therefore, an intersection must be designated as operating at LOS F when the V/C of the critical movements is equal to or greater than 1.0. The following provides a brief explanation of the Levels of Service from A to F[2]:

LOS A describes operations with very low delay, up to 10 seconds per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green light phase. Most vehicles do not stop at all. Short stop sign cycle lengths may also contribute to low delay.

LOS B describes operations with delay greater than 10 and up to 20 seconds per vehicle for signalized intersections. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.

---

2 2000 Highway Capacity Manual, Chapter 9.

Table 7-1
Level of Service Criteria[3]

Level of Service	Two-Way or All-Way Stop Controlled Intersection Average Delay per Vehicle (sec)	Signalized Intersection Average Delay per Vehicle (sec)
A	0-10	< or = 10
B	> 10 - 15	> 10 – 20
C	> 15 – 25	> 20 - 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F	> 50	> 80 or a V/C ratio equal or greater than 1.0

LOS C describes operations with delay greater than 20 and up to 35 seconds per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

LOS D describes operations with delay greater than 35 and up to 55 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

LOS E describes operations with delay greater than 55 and up to 80 seconds per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.

LOS F describes operations with delay in excess of 80 seconds per vehicle. This level, considered to be unacceptable to most drivers, often occurs with over saturation, when arrival flow rates exceed the capacity of the intersection. It may also occur at high V/C ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

3 Highway Capacity Manual, 2000 update, by the Transportation Research Board, Chapter 9, Signalized Intersections.

7.1.5 Unsignalized Intersection Analysis

For unsignalized intersections, the 2000 HCM methodology for two-way and four-way stop controlled intersections was utilized, also using the computer program TRAFFIX 7.8.

The level of service criteria for stop-controlled, unsignalized intersections is also illustrated in ***Table 7-1.*** As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. The proposed level of service criteria for stop-controlled intersections is somewhat different from the criteria used for signalized intersections. It is considered that the total delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. A total delay of 50 seconds/vehicle is assumed as the break point between LOS E and F.

LOS F exists when there are insufficient gaps of suitable size to allow a side street vehicle to cross safely through a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queuing on the minor approaches. The method, however, is based on a constant critical gap size - that is, the critical gap remains constant, no matter how long the side street motorist waits. LOS F may also appear in the form of side street vehicles selecting smaller-than-usual gaps. In such cases, safety may be a problem and some disruption to the major street traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior.[4] The CMP identifies a minimum level of service threshold of LOS E. The City uses a minimum threshold of LOS D, therefore any intersection operating at LOS E or F is considered to be deficient and will need to be improved to an acceptable LOS D or better.

Per CMP guidelines the following default values were utilized in the analysis[5]:

- 7 second minimum phase time
- 4 second lost time per phase
- 120 maximum cycle length
- 1900 saturation rate
- 1800 saturation rate for dual left turn
- Actual peak hour factor for existing and short term future
- .925 peak hour factor for ultimate conditions
- Exclusive right turn is assumed if pavement is wide enough (at least 19’)
- 2000 HCM method for signalized and unsignalized LOS analysis

---

4 2000 Highway Capacity Manual, Chapter 10, Unsignalized Intersections.

5 2006 Congestion Management Program for Riverside County.

7.1.6 Existing Level of Service at Intersections

Table 7-2 presents an existing conditions intersection level of service analysis summary. The level of service worksheets are provided in the Technical Appendix. As seen in ***Table 7-2***, two intersections are presently operating below LOS D, which is considered to be operating deficiently.

- Iowa Avenue at Everton Place (unsignalized intersection) operates at LOS F during the PM peak period. This can be attributed to the delay that the minor left turn off of Everton Place to southbound Iowa Avenue experiences.

- Canyon Crest Drive at MLK Jr. Blvd operates at LOS E during the PM Peak period. This can be attributed to the heavy movements from Canyon Crest Drive to MLK

It was determined that arterial street segments would not need to be studied since impacts at arterial segments, if any, would be reflected at the adjacent key intersections and mitigated with implementation of mitigation measures at those intersections.

Table 7-2
Existing Conditions 2007 Level of Service Summary

Location	Peak Hour	2007 Existing Conditions	
		LOS	Average Del. Sec/ Veh
1. Chicago Avenue at Blaine St./3rd Street	AM	D	41.8
	PM	D	44.7
2. I-215 SB Ramps at Blaine Street	AM	C	24.0
	PM	C	30.8
3. I-215 NB Ramps at Blaine Street	AM	C	23.6
	PM	B	18.2
4. Iowa Avenue at Blaine Street	AM	D	37.5
	PM	D	35.8
5. Chicago Avenue at Linden Street	AM	C	31.9
	PM	C	24.5
6. Iowa Avenue at Linden Street	AM	C	30.4
	PM	C	25.2
7. Chicago Avenue at University Avenue	AM	C	33.4
	PM	D	42.9
8. Iowa Avenue at University Avenue	AM	D	35.4
	PM	D	40.6
9. I-215 SB Ramp at University Avenue	AM	C	22.9
	PM	B	19.4
10. I-215 NB Ramp at University Avenue	AM	C	24.3
	PM	C	25.2
11. West Campus Dr at University Avenue	AM	C	27.4
	PM	C	24.7
12. Iowa Avenue at Everton Place (unsignalized)	AM	C	17.1
	PM	F	92.2*
13. Chicago Avenue at Martin Luther King Jr. Boulevard (MLK Jr. Blvd.)	AM	C	31.8
	PM	D	52.8
14. Iowa Avenue at MLK Jr. Blvd.	AM	B	19.9
	PM	C	21.5
15. Lot 30 at MLK Jr. Blvd.	AM	C	21.0
	PM	C	33.3
16. Canyon Crest Dr at MLK Jr. Blvd.	AM	C	24.6
	PM	E	65.1*
17. I-215 SB Ramps at MLK Jr. Blvd.	AM	B	17.7
	PM	B	12.5
18. I-215 NB Ramps at MLK Jr. Blvd. (unsignalized)	AM	B	14.6
	PM	B	10.7

7.2 Future Traffic Conditions

7.2.1 Development of Future Year Traffic Volumes

Background traffic volumes at the study intersections for the year 2010 were developed by applying a 1.7 percent annual growth rate to existing 2007 traffic volumes[6].

The annual rate is intended to account for typical growth in regional traffic volumes within the study area, as well as any new developments outside the sphere of the University that adds traffic to the local area. The 2010 base traffic volumes represent traffic conditions before addition of new development on West Campus.

Existing plus ambient traffic conditions were evaluated using the 2000 Highway Capacity Manual method for signalized and unsignalized intersections. LOS and V/C ratios for all study area intersections under 2010 Base Conditions (existing plus ambient growth) are summarized in ***Table 7-3***. ***Figures 7-5 and 7-6*** depict AM and PM peak hour volumes for 2010 base conditions.

As seen on ***Table 7-3***, three intersections are projected to operate at poor levels of service prior to any development on the campus. These intersections are:

12. Iowa Avenue at Everton Place (unsignalized intersection) will continue to operate at LOS F during the PM peak period.
13. Chicago Avenue at MLK Jr. Blvd. will operate at LOS E during the PM Peak period. This can be attributed to the heavy southbound traffic on Chicago Avenue and MLK traffic turning onto Chicago Avenue.
16. Canyon Crest Drive at MLK Jr. Blvd. will continue to operate at LOS E during the PM Peak period. This can be attributed to the heavy amount of traffic traveling eastbound and making a right turn onto Canyon Crest Drive.

(numbers correspond to Table and Figure numbering)

7.2.2 Trip Generation of West Campus Development

The following traffic analysis is based on an incremental increase in student enrollment, new development and roadway improvements. This incremental increase may or may not happen during the specified years or time frames, but for study purposes the traffic report is sectioned into 4 main phases in 5 year increments to "buildout" of the West Campus north of MLK with several sub-phases in the first phase or 2010 analysis. The assumptions used for each phase is detailed in each of the following sections.

The first step in quantifying the potential impacts of the West Campus development is to determine the amount of new traffic each phase will generate and then distribute these "new" vehicle trips throughout the local roadway network. Based on discussion with University staff and standard traffic engineering practices ***Table 7-4*** was formulated. The rates for each type of land use are taken directly from the ITE Trip Generation Manual, 7th Edition. This is a nationally recognized source for the preparation of traffic impact documents. ***Table 7-4*** presents the

6 Source: 2005 LRDP Regional Background Traffic Growth

rates used in calculating the volume of new traffic generated by each new land use. Using the rates from ***Table 7-4*** the amount of "New" volume was calculated for each phase. ***Table 7-5*** shows the amount of new volume the West Campus development will generate. This table will be referenced in each subsequent phase chapter. As seen in **Table 7-5**, when West Campus is projected to be fully developed, the project will generate a total of 41,310 daily trips, with 3,512 AM peak trips and 4,003 trips during the PM peak.

These are considered "New" trips that will use local roads and intersections. A reduction in the amount of trips associated with the development was made. This reduction is referred to as Internal Capture. This principal applies to some developments that can show that internal trips can be made by either walking or by vehicles entirely on internal pathways or roadways without using streets external to the development. It can also be applied to uses that tend to interact and attract a portion of each others trips. In the West Campus Development, this can be applied to all uses since the increase in students living on campus is directly proportional to the amount of housing, classrooms and other facilities built on campus. As ***Table 7-5*** indicates, the amount of internal capture increases with each subsequent phase as the density of buildings and amount of students living on campus increase. Also in later phases a further reduction in vehicle trips of 10% to 20% will be realized with a transit or shuttle program in place. The transit component will provide an attractive alternative to driving and parking and will serve to further link the East Campus and West Campus.

Table 7-3
2010 Conditions Without West Campus Development

Location	Peak Hour	2010 Base Conditions	
		LOS	Average Del. Sec/ Veh
1. Chicago Avenue at Blaine St/3rd Street	AM	D	43.1
	PM	D	47.3
2. I-215 SB Ramps at Blaine Street	AM	C	24.5
	PM	C	32.2
3. I-215 NB Ramps at Blaine Street	AM	C	24.2
	PM	B	18.5
4. Iowa Avenue at Blaine Street	AM	D	39.3
	PM	D	36.9
5. Chicago Avenue at Linden Street	AM	C	33.9
	PM	C	25.0
6. Iowa Avenue at Linden Street	AM	C	30.7
	PM	C	25.7
7. Chicago Avenue at University Avenue	AM	C	33.6
	PM	D	45.2
8. Iowa Avenue at University Avenue	AM	D	35.6
	PM	D	41.9
9. I-215 SB Ramp at University Avenue	AM	C	23.1
	PM	B	19.7
10. I-215 NB Ramp at University Avenue	AM	C	24.6
	PM	C	25.7
11. West Campus Dr at University Avenue	AM	C	28.2
	PM	C	25.1
12. Iowa Avenue at Everton Place (unsignalized)	AM	C	18.1
	PM	F	129.4
13. Chicago Avenue at Martin Luther King Jr. Boulevard (MLK Jr. Blvd.)	AM	C	32.2
	PM	E	60.4
14. Iowa Avenue at MLK Jr. Blvd.	AM	C	20.2
	PM	C	22.2
15. Lot 30 at MLK Jr. Blvd.	AM	C	22.9
	PM	D	41.0
16. Canyon Crest Dr at MLK Jr. Blvd.	AM	C	25.1
	PM	E	75.8
17. I-215 SB Ramps at MLK Jr. Blvd.	AM	B	17.9
	PM	B	12.7
18. I-215 NB Ramps at MLK Jr. Blvd. (unsignalized)	AM	C	15.4
	PM	B	10.9

Table 7-4
Trip Generation Rates

Trip Generation Rates		ITE Trip Generation Manual 7th Edition					
Apartment (220)		Family and Graduate					
Weekday:	6.72	AM Peak:	0.51	AM IN:	0.20	AM OUT:	0.80
		PM Peak:	0.62	PM IN:	0.65	PM OUT:	0.35
Day Care Center (565)		Based on 1,000 sqf					
Weekday:	79.26	AM Peak:	12.79	AM IN:	0.53	AM OUT:	0.47
		PM Peak:	13.18	PM IN:	0.47	PM OUT:	0.53
University/College (550)		Based on Increase in Students					
Weekday:	2.38	AM Peak:	0.21	AM IN:	0.80	AM OUT:	0.20
		PM Peak:	0.21	PM IN:	0.30	PM OUT:	0.70
University/College (550)		Based on staff and faculty assumptions					
Weekday:	9.13	AM Peak:	0.73	AM IN:	0.82	AM OUT:	0.18
		PM Peak:	0.88	PM IN:	0.29	PM OUT:	0.71
Conference Center (710)		Based on 1,000 sqf					
Weekday:	11.01	AM Peak:	1.55	AM IN:	0.88	AM OUT:	0.12
		PM Peak:	1.49	PM IN:	0.17	PM OUT:	0.83
Medical Office (720)		Based on 1,000 sqf					
Weekday:	36.13	AM Peak:	2.48	AM IN:	0.79	AM OUT:	0.21
		PM Peak:	3.72	PM IN:	0.27	PM OUT:	0.73
Clinic (630)		Based on 1,000 sqf					
Weekday:	31.45	AM Peak:	3.14	AM IN:	0.50	AM OUT:	0.50
		PM Peak:	3.14	PM IN:	0.50	PM OUT:	0.50

*Visitor totals are included in the Trip Generation Rates for each type of use

Table 7-5
Trip Generation Volume

Trip Generation Volumes By Phase

Phase 1A:	2010			Peak 1 hour in AM			Peak 1 hour in PM		
Land Use	Code	Units	Weekday	AM Total	AM In	AM Out	PM total	PM In	PM Out
Family Apartments	220	255	1714	130	26	104	158	103	55
Family Townhouses	220	85	571	43	9	35	53	34	18
CDC N	565	14.8	1173	189	100	89	195	92	103
New Students	550	2900	6902	609	487	122	609	183	426
New Staff	550	290	2648	212	174	38	255	74	181
Net Phase 1A			13008	1183	796	388	1270	485	785
Less Internal Capture		0.4	5203	473	318	155	508	194	314
Total Phase 1A New Trips Generated			**7805**	**710**	**477**	**233**	**762**	**291**	**471**
W4 Edu	New students count								

Phase 1B:	2010			Peak 1 hour in AM			Peak 1 hour in PM		
Land Use	Code	Units	Weekday	AM Total	AM In	AM Out	PM total	PM In	PM Out
Building M4 Edu	Trip Gen based on New students for 2010								

Phase 1:	2010			Peak 1 hour in AM			Peak 1 hour in PM		
Land Use	Code	Units	Weekday	AM Total	AM In	AM Out	PM total	PM In	PM Out
Conference Center	710	270	2973	419	368	50	402	68	334
W3 Edu	Trip Gen based on New students								
W5 Edu	for 2010								
Highlander Hall Dem	710		2973	419	368	50	402	68	334
Human Res. Demo	710								
Total Phase 1 Trips Generated			**0**	**0**	**0**	**0**	**0**	**0**	**0**

Phase 2:	2015			Peak 1 hour in AM			Peak 1 hour in PM		
Land Use	Code	Units	Weekday	AM Total	AM In	AM Out	PM total	PM In	PM Out
H2 Grad Housing	220	125	840	64	13	51	78	50	27
Family Apartments	220	256	1720	131	26	104	159	103	56
Family Townhouses	220	72	484	37	7	29	45	29	16
Apartments	220	294	1976	150	30	120	182	118	64
CDC S	565	14.8	1173	189	100	89	195	92	103
New Students	550	5000	11900	1050	840	210	1050	315	735
New Staff	550	500	4565	365	299	66	440	128	312
Conference Center	710	120	1321	186	164	22	179	30	148
Hospital Clinic	630	100	3145	314	157	157	314	157	157
Net Phase 2			27124	2485	1636	849	2641	1023	1618
Less Internal Capture		0.5	13562	1243	818	424	1321	511	809
Less Transit		0.1	1356	124	82	42	132	51	81
Total Phase 2 New Trips Generated			**12206**	**1118**	**736**	**382**	**1188**	**460**	**728**
Educational Bldings and CCS are wrapped in the New Student Volumes									

Phase 3:	2020			Peak 1 hour in AM			Peak 1 hour in PM		
Land Use	Code	Units	Weekday	AM Total	AM In	AM Out	PM total	PM In	PM Out
H1 Grad Housing	220	125	840	64	13	51	78	50	27
Apartments	220	300	2016	153	31	122	186	121	65
New Students	550	3350	7973	704	563	141	704	211	492
New Staff	550	335	3059	245	201	44	295	85	209
Hospital Clinic	630	120	3774	377	188	188	377	188	188
Med Office MOB 5	720	70	2529	174	137	36	260	70	190
Med Office MOB 6	720	82	2963	203	161	43	305	82	223
Med Office MOB 7	720	78	2818	193	153	41	290	78	212
Net Phase 3			25971	2112	1446	666	2494	887	1607
Less Internal Capture		0.5	12986	1056	723	333	1247	444	803
Less Transit		0.15	1948	158	108	50	187	67	121
Total Phase 3 New Trips Generated			**11038**	**898**	**614**	**283**	**1060**	**377**	**683**

Table 7-5 Continued
Trip Generation Volume

Educational Bldings W16-22, M2, M7 are wrapped in the New Student Volumes

Phase 4:	2025			Peak 1 hour in AM			Peak 1 hour in PM		
Land Use	Code	Units	Weekday	AM Total	AM In	AM Out	PM total	PM In	PM Out
Apartments	220	294	1976	150	30	120	182	118	64
New Students	550	3350	7973	704	563	141	704	211	492
New Staff	550	335	3059	245	201	44	295	85	209
Med Office MOB 1	630	120	4336	298	235	62	446	121	326
Med Office MOB 2	720	70	2529	174	137	36	260	70	190
Med Office MOB 3	720	82	2963	203	161	43	305	82	223
Med Office MOB 4	720	78	2818	193	153	41	290	78	212
Net Phase 4			25653	1966	1479	487	2483	767	1716
Less Internal Capture		0.5	12826	983	740	243	1241	383	858
Less Transit		0.2	2565	197	148	49	248	77	172
Total Phase 4 New Trips Generated			**10261**	**786**	**592**	**195**	**993**	**307**	**686**

Educational Bldings W9-13 and W23-27, M1 are wrapped in the New Student Volumes

Assumptions:
Family Apartments: Total Sqf x .80 (liveable) = sqf / 900 sqf per unit = # of units
Family Townhouses: Total Sqf x .80 (liveable) = sqf / 1000 sqf per unit = # of units
Apartments: Total Sqf x .80 (liveable) = sqf/ 800 sqf per unit = # of units

New Students:
Phase 1A: 2900 new students, 30% new students on W Campus - 70% on E Campus
Phase 1B: 2900 new students, 40% new students on W Campus - 60% on E Campus
Phase 1: 2900 new students, 50% new students on W Campus - 50% on E Campus
Phase 2: 5000 new students, 60% new students on W Campus - 40% on E Campus
Phase 3: 3350 new students, 75% new students on W Campus - 25% on E Campus
Phase 4: 3350 new students, 90% new students on W Campus - 10% on E Campus

7.2.3 Trip Distribution of West Campus Development

Trip distribution patterns were developed in the same manner as used in the 2005 LRDP document, traffic from the campus was divided into two separate fields. The first represented resident students and new housing. The second represented commuter students, staff and trips generated by the proposed office and clinics. Arrival and departure distribution patterns and percentages were then derived for each group. The percentages for commuter trips were based on discussions with University staff and from a review of current zip code information generated for students and staff. ***Figure 7-7*** depicts the arrival and departure distribution percentages for resident students, housing and day care**.** ***Figure 7-8*** depicts the arrival and departure distribution percentages for commuting students, staff and office development. These percentages were used throughout the document for each phase. However, the local route for each phase is based on the location of the new development, available housing and parking lots and structures. In each phase it was assumed that the trips generated by the increase in students would be directed toward the closest or most logical parking lot, with most trips placed on larger streets capable of carrying an increase in cars such as Martin Luther King Jr. Boulevard, Iowa Avenue, and later Cranford Avenue (which will be closed between NW Mall and University Avenue).

7.3 Future Conditions with West Campus Development

7.3.1 Phase 1A (2010) Traffic Conditions (20,000 Students)

The potential first development for the West Campus will occur around the year 2010, with an estimated 255 Family Student Apartments, 85 Family Student Townhouses, and a Child Development Center. This phase of buildings will be located south of Everton Place and west of Iowa Avenue. It was assumed that the student body would increase to 20,000 students, which is a total of 2,900 new students. New staff was assumed to be 10% of new students, so in 2010, this would result in an increase of 290 staff members. Educational building W4 will also be built. It was assumed that only 30% of the increase in students would be on West Campus, with the remainder an increase on East Campus.

The following is a list of the assumptions made for the traffic analysis for Phase 1A:

- 30% of student increase on West Campus
- 70% of student increase on East Campus
- Ambient growth from 2007 to 2010 is 1.7/year x 3 = 1.05
- Most of the increase in students from West Campus would use Lot 30 and P2 surface lot.
- Traffic associated from all educational buildings are accounted for in the trip totals for new students and staff.
- New trips associated with the housing and day care would originate from these locations with their own adjacent parking.
- Iowa Avenue and Everton Place will be constructed as a 4 leg intersection. For initial analysis it was assumed that it would remain stop controlled at the minor legs (Everton Place).
- Iowa Avenue and NW Mall will be constructed as a T intersection west of Iowa Avenue. For initial analysis it was assumed that it would remain stop controlled at the minor leg (NW Mall).
- Everton Place would be extended to P2. All access to P2 would be through Everton Place and Iowa Avenue.
- As seen on ***Table 7-5*** it was assumed that 40% of all new trips would be considered as "internally captured". These trips were subtracted from trips generated. These trips are considered to be duplicate trips between housing, day care and the increase in new students.

The new trips generated by project Phase 1A traffic was distributed throughout the roadway network to determine the impacts of these trips. ***Figure 7-9*** shows Project Only AM and PM Peak hour volumes at each studied intersection. Utilizing the above assumptions a level of service analysis was also calculated for each of the studied intersections. As documented in ***Table 7-6***, (Phase 1A level of service summary) the following four intersections are projected to operate at LOS E or F during AM or PM peak hours:

12. Iowa Avenue at Everton Place (unsignalized intersection) will continue to operate at LOS F during both the AM and PM peak period.
13. Chicago Avenue at MLK Jr. Boulevard will operate at LOS E during the PM peak period.
16. Canyon Crest Drive at MLK Jr. Boulevard will continue to operate at LOS E during the PM peak period.
19. NW Mall at Iowa Avenue (unsignalized intersection) will operate at LOS F during the PM peak period.

Figures 7-10 and 7-11 show Phase 1A , AM and PM peak volumes at the studied intersections.

Table 7-6
Phase 1A - 2010 Conditions With West Campus Development
Level of Service Summary

Location	Peak Hour	Phase 1A Conditions	
		LOS	Average Del. Sec/ Veh
1. Chicago Avenue at Blaine St/3rd Street	AM	D	44.1
	PM	D	48.0
2. I-215 SB Ramps at Blaine Street	AM	C	24.8
	PM	C	32.5
3. I-215 NB Ramps at Blaine Street	AM	C	24.1
	PM	B	18.4
4. Iowa Avenue at Blaine Street	AM	D	40.5
	PM	D	38.0
5. Chicago Avenue at Linden Street	AM	C	34.7
	PM	C	25.3
6. Iowa Avenue at Linden Street	AM	C	31.1
	PM	C	26.9
7. Chicago Avenue at University Avenue	AM	C	33.7
	PM	D	45.4
8. Iowa Avenue at University Avenue	AM	D	35.8
	PM	D	44.6
9. I-215 SB Ramp at University Avenue	AM	C	23.5
	PM	C	20.9
10. I-215 NB Ramp at University Avenue	AM	C	24.9
	PM	C	26.2
11. West Campus Dr at University Avenue	AM	C	28.4
	PM	C	25.0
12. Iowa Avenue at Everton Place (unsignalized)	AM	F	79.1
	PM	F	544.6
13. Chicago Avenue at Martin Luther King Jr. Boulevard (MLK Jr. Blvd.)	AM	C	32.5
	PM	E	63.9
14. Iowa Avenue at MLK Jr. Blvd.	AM	C	20.6
	PM	C	23.0
15. Lot 30 at Martin Luther King Blvd	AM	C	23.1
	PM	D	45.0
16. Canyon Crest Dr at MLK Jr. Blvd.	AM	C	28.7
	PM	E	77.1
17. I-215 SB Ramps at MLK Jr. Blvd.	AM	B	18.4
	PM	B	12.6
18. I-215 NB Ramps at MLK Jr. Blvd. (unsignalized)	AM	C	16.7
	PM	B	11.5
19. NW Mall at Iowa Avenue (unsignalized)	AM	C	22.5
	PM	F	59.7

7.3.2 Phase 1B (2010) Traffic Conditions (20,000 Students)

Phase 1B is still planned for the year 2010. However, in this scenario educational building M4 will be built. As in the other phases the traffic generated by the new academic building is contained within the trips generated by new students and staff. However, in this phase it is assumed that more students (40%) will be on West Campus and 60% on East Campus. Another assumption is that parking will be provided around the building in paved surface lot until a parking lot or structure is completed.

- 60% of student increase on East Campus
- 40% of student increase on West Campus
- Ambient growth from 2007 to 2010 is 1.7/year x 3 = 1.05
- Trips associated with the academic building would access a surface lot on Cranford Avenue.
- As seen on ***Table 7-5*** no additional trips would be generated. There would however be a redistribution of trips due to new students and staff.
- It is assumed that Phase 1A is already built and in place.
- Cranford Avenue will need to be constructed to connect to MLK Jr. Blvd.

Table 7-7 summarizes the level of service conditions with the redistribution of new students and the addition of academic building M4. ***Figure 7-12*** depicts AM and PM Project Only volumes through local area intersections. As ***Table 7-7*** indicates the following four intersections are projected to operate at LOS E or F:

12. Iowa Avenue at Everton Place (unsignalized intersection) will continue to operate at LOS F during both the AM and PM peak period.
13. Chicago Avenue at MLK Jr. Boulevard will operate at LOS E during the PM peak period.
16. Canyon Crest Drive at MLK Jr. Boulevard will continue to operate at LOS E during the PM peak period.
19. NW Mall at Iowa Avenue (unsignalized intersection) will operate at LOS F during the PM peak period.

Figures 7-13 and 7-14 illustrates Phase 1B – AM and PM peak hour volumes for 2010 conditions.

Table 7-7
Phase 1B - 2010 Conditions With West Campus Development
Level of Service Summary

Location	Peak Hour	Phase 1B Conditions	
		LOS	Average Del. Sec/ Veh
1. Chicago Avenue at Blaine St/3rd Street	AM	D	43.9
	PM	D	48.0
2. I-215 SB Ramps at Blaine Street	AM	C	24.8
	PM	C	32.5
3. I-215 NB Ramps at Blaine Street	AM	C	24.1
	PM	B	18.5
4. Iowa Avenue at Blaine Street	AM	D	40.4
	PM	D	37.9
5. Chicago Avenue at Linden Street	AM	C	34.7
	PM	C	25.4
6. Iowa Avenue at Linden Street	AM	C	31.1
	PM	C	26.8
7. Chicago Avenue at University Avenue	AM	C	33.7
	PM	D	45.5
8. Iowa Avenue at University Avenue	AM	D	35.8
	PM	D	44.6
9. I-215 SB Ramp at University Avenue	AM	C	23.4
	PM	C	20.7
10. I-215 NB Ramp at University Avenue	AM	C	24.9
	PM	C	26.2
11. West Campus Dr at University Avenue	AM	C	28.3
	PM	C	25.1
12. Iowa Avenue at Everton Place (unsignalized)	AM	F	86.7
	PM	F	569.2
13. Chicago Avenue at Martin Luther King Jr. Boulevard (MLK Jr. Blvd.)	AM	C	32.6
	PM	E	63.8
14. Iowa Avenue at MLK Jr. Blvd.	AM	C	20.7
	PM	C	23.1
15. Lot 30 at MLK Jr. Blvd.	AM	C	23.3
	PM	D	45.8
16. Canyon Crest Dr at MLK Jr. Blvd.	AM	C	28.5
	PM	E	77.3
17. I-215 SB Ramps at MLK Jr. Blvd.	AM	B	18.6
	PM	B	12.8
18. I-215 NB Ramps at MLK Jr. Blvd. (unsignalized)	AM	C	16.8
	PM	B	11.6
19. NW Mall at Iowa Avenue (unsignalized)	AM	C	22.8
	PM	F	60.8

7.3.3 Phase 1 (2010) Traffic Conditions (20,000 Students)

Phase 1 is also planned for the year 2010. However, in this scenario Highlander Hall and the Human Resource Building will be demolished and in their place building W1 will be built. Also academic buildings W3 and W5 may also be built. As in the other phases the traffic generated by the new academic buildings is contained within the trips generated by new students staff and faculty. Also, because of the demolitions it is assumed that no new office trips would be generated. In this phase it is assumed that more students 50% will be on West Campus and 50% on East Campus. Parking will be provided around the academic buildings in paved surface lots until a parking lot or structure is completed. Access to Lot 30 area was also assumed.

- 50% of student increase on East Campus
- 50% of student increase on West Campus
- There would be 2,900 additional students
- Ambient growth from 2007 to 2010 is 1.7/year x 3 = 1.05
- Trips associated with academic buildings W3 and W4 would access a surface lot at the end of Everton Place.
- The conference center would have parking around its perimeter.
- As seen on ***Table 7-5*** no additional trips would be generated. There would however be a redistribution of trips due to new students, staff and faculty.
- It is assumed that Phase 1A and 1B are already built and in place.

Table 7-8 summarizes the level of service conditions with the redistribution of new students and the addition of new academic buildings and conference center. ***Figure 7-15*** depicts AM and PM Project Only volumes through local area intersections. As ***Table 7-8*** indicates the following four intersections are projected to operate at LOS E or F:

12. Iowa Avenue at Everton Place (unsignalized intersection) will continue to operate at LOS F during both the AM and PM peak period.
13. Chicago Avenue at MLK Jr. Boulevard will operate at LOS E during the PM peak period.
16. Canyon Crest Drive at MLK Jr. Boulevard will continue to operate at LOS E during the PM peak period.
19. NW Mall at Iowa Avenue (unsignalized intersection) will operate at LOS F during the PM peak period.

Figures 7-16 and 7-17 illustrates Phase 1 – AM and PM peak hour volumes for 2010 conditions.

Table 7-8
Phase 1 - 2010 Conditions With West Campus Development
Level of Service Summary

Location	Peak Hour	Phase 1 Conditions	
		LOS	Average Del. Sec/ Veh
1. Chicago Avenue at Blaine St/3rd Street	AM	D	43.8
	PM	D	48.0
2. I-215 SB Ramps at Blaine Street	AM	C	24.7
	PM	C	32.5
3. I-215 NB Ramps at Blaine Street	AM	C	24.1
	PM	B	18.4
4. Iowa Avenue at Blaine Street	AM	D	40.3
	PM	D	37.8
5. Chicago Avenue at Linden Street	AM	C	34.6
	PM	C	25.3
6. Iowa Avenue at Linden Street	AM	C	31.1
	PM	C	26.9
7. Chicago Avenue at University Avenue	AM	C	33.8
	PM	D	45.5
8. Iowa Avenue at University Avenue	AM	D	36.2
	PM	D	45.6
9. I-215 SB Ramp at University Avenue	AM	C	23.5
	PM	C	20.5
10. I-215 NB Ramp at University Avenue	AM	C	25.2
	PM	C	26.6
11. West Campus Dr at University Avenue	AM	C	28.1
	PM	C	25.1
12. Iowa Avenue at Everton Place (unsignalized)	AM	F	164.7
	PM	F	798.2
13. Chicago Avenue at Martin Luther King Jr. Boulevard (MLK Jr. Blvd.)	AM	C	32.5
	PM	E	63.8
14. Iowa Avenue at MLK Jr. Blvd.	AM	C	20.9
	PM	C	23.2
15. Lot 30 at MLK Jr. Blvd.	AM	C	23.1
	PM	D	45.7
16. Canyon Crest Dr at MLK Jr. Blvd.	AM	C	27.4
	PM	E	77.9
17. I-215 SB Ramps at MLK Jr. Blvd.	AM	B	18.4
	PM	B	12.8
18. I-215 NB Ramps at MLK Jr. Blvd. (unsignalized)	AM	C	16.3
	PM	B	11.5
19. NW Mall at Iowa Avenue (unsignalized)	AM	C	23.1
	PM	F	63.4

7.3.4 Phase 2 (2015) Traffic Conditions (25,000 Students)

Phase 2 is planned for the year 2015, with an increase of 5,000 new students over the year 2010, with 500 new faculty members. In this scenario, additional family student housing units A1-A16, located east of Iowa Avenue between Everton Place and NW Mall, with more family student housing and apartment units below SW Mall west of Iowa Avenue and medical school housing off of Cranford Avenue. The School of Medicine and research facilities will continue to grow with a parking facility PM in place for these uses. In the core academic area more academic buildings W6, W7, W8, W14, and W15 may also be built. The Recreation Building will also be included. As in the other phases, the traffic generated by the new academic buildings is contained within the trips generated by new students, staff and faculty. In this phase, it is assumed that more students (60%) will be on West Campus and 40% on East Campus. It is assumed that Phases 1A, 1B, and 1 are in place. Phase 2 development will generate 12,206 new daily trips with 1,118 in the AM peak and 1,188 in the PM peak. This is after a 50% reduction in trips has been taken for internal capture and a 10% reduction in vehicle trips for a transit program.

- 40% of student increase on East Campus
- 60% of student increase on West Campus
- There would be 5,000 additional students
- Ambient growth from 2007 to 2015 is 1.7/year x 8 = 1.14
- Students would have access to parking lots, PM, P1 and Lots near 30 and a surface lot around the W3-5 educational buildings
- It is assumed that Phases 1A, 1B, and 1 are already built and in place.
- SW Mall would need to be built between Cranford Avenue and Iowa Avenue
- For initial traffic analysis, it was assumed that Iowa Avenue at SW Mall was unsignalized with stop control at SW Mall legs.
- It was assumed that Cranford Avenue at MLK Jr. Blvd. would be a signalized intersection. This is needed to allow left turns in and out of the intersection onto MLK Jr. Blvd.

Table 7-9 summarizes the level of service conditions with the redistribution of new students and the addition of new development. ***Figure 7-18*** depicts AM and PM Project Only volumes through local area intersections. ***Figures 7-19 and 7-20*** illustrates Phase 2 – AM and PM peak hour volumes for 2015 conditions. As ***Table 7-9*** indicates, the following eight intersections are projected to operate at LOS E or F:

7. Chicago Avenue at University Avenue is expected to operate at LOS E during the PM peak period.
8. Iowa Avenue at University Avenue is anticipated to operate at LOS E during the PM peak period.

12. Iowa Avenue at Everton Place (unsignalized intersection) will continue to operate at LOS F during both the AM and PM peak period.
13. Chicago Avenue at MLK Jr. Boulevard will operate at LOS F during the PM peak period.
15. Lot 30 at MLK Blvd will operate at LOS E during the PM peak period.
16. Canyon Crest Drive at MLK Jr. Blvd. will continue to operate at LOS E during the PM peak period.
19. NW Mall at Iowa Avenue (unsignalized intersection) will operate at LOS F during the PM peak period.
20. SW Mall at Iowa Avenue will operate at LOS E and F during AM and PM peak periods, respectively.

Table 7-9
Phase 2 - 2015 Conditions With West Campus Development Level of Service Summary

Location	Peak Hour	Phase 2 Conditions	
		LOS	Average Del. Sec/ Veh
1. Chicago Avenue at Blaine St/3rd Street	AM	D	48.4
	PM	E	59.3
2. I-215 SB Ramps at Blaine Street	AM	C	25.9
	PM	D	36.8
3. I-215 NB Ramps at Blaine Street	AM	C	25.3
	PM	B	19.1
4. Iowa Avenue at Blaine Street	AM	D	49.1
	PM	D	42.9
5. Chicago Avenue at Linden Street	AM	D	37.5
	PM	C	26.9
6. Iowa Avenue at Linden Street	AM	C	32.4
	PM	C	29.0
7. Chicago Avenue at University Avenue	AM	C	34.6
	PM	E	55.4
8. Iowa Avenue at University Avenue	AM	D	38.5
	PM	E	63.1
9. I-215 SB Ramp at University Avenue	AM	C	24.7
	PM	C	22.0
10. I-215 NB Ramp at University Avenue	AM	C	27.5
	PM	C	29.2
11. West Campus Dr at University Avenue	AM	C	30.0
	PM	C	26.2
12. Iowa Avenue at Everton Place (unsignalized)	AM	F	OVF
	PM	F	OVF
13. Chicago Avenue at Martin Luther King Jr. Boulevard (MLK Jr. Blvd.)	AM	D	35.1
	PM	F	90.0
14. Iowa Avenue at MLK Jr. Blvd.	AM	C	23.1
	PM	C	28.0
15. Lot 30 at MLK Jr. Blvd.	AM	C	30.2
	PM	E	64.2
16. Canyon Crest Dr at MLK Jr. Blvd.	AM	C	31.3
	PM	E	73.4
17. I-215 SB Ramps at MLK Jr. Blvd.	AM	C	20.2
	PM	B	14.5
18. I-215 NB Ramps at MLK Jr. Blvd. (unsignalized)	AM	C	22.9
	PM	B	13.9
19. NW Mall at Iowa Avenue (unsignalized)	AM	F	56.4
	PM	F	276.0
20. SW Mall at Iowa Avenue (unsignalized)	AM	E	36.5
	PM	F	189.6
21. Cranford Avenue at MLK Jr. Blvd.	AM	B	13.0
	PM	B	11.8

7.3.5 Phase 3 (2020) Traffic Conditions (28,350 Students)

Phase 3 is planned for the year 2020, with an increase of 3,350 new students over the year 2015, with 335 new staff and faculty members. In this scenario, West Campus will continue to grow with more family student housing units and grad housing. In addition, the University may build medical offices at the south-west corner of the medical school development area that can be rented for additional revenue. More academic buildings will be constructed below the core academic area (W16 thru W22). Parking will be provided at P3, PM, PMOB, P1, P2 and P4. As in the other phases the traffic generated by new academic buildings is contained within the trips generated by new students and staff. In this phase, it is assumed that more students (75%) will be on West Campus and 25% on East Campus. It is assumed that Phases 1A, 1B, 1, and 2 are in place. Phase 3 development will generate 11,038 new daily trips with 898 in the AM peak and 1,060 in the PM peak. This is after a 50% reduction in trips has been taken for internal capture and a 15% reduction in vehicle trips for a transit program.

- There would be 3,350 additional students
- 25% of student increase on East Campus
- 75% of student increase on West Campus
- Ambient growth from 2007 to 2020 is 1.7/year x 13 = 1.23
- Students would have access to parking lots: P3, PM, PMOB, P1, P2 and P4
- It is assumed that Phases 1A, 1B, 1, and Phase 2 are already built and in place.
- SW Mall would need to be built east of Iowa Avenue
- For initial traffic analysis it was assumed that Iowa Avenue at SW Mall was unsignalized with stop control at SW Mall legs.
- It was assumed that Cranford Avenue at MLK Jr. Blvd. would be a signalized intersection. This is needed to allow left turns in and out of the intersection onto MLK Jr. Blvd.

Table 7-10 summarizes the level of service conditions with the redistribution of new students and the addition of new development. ***Figure 7-21*** depicts AM and PM Project Only volumes through local area intersections. ***Figures 7-22 and 7-23*** illustrates Phase 3 – AM and PM peak hour volumes for 2020 conditions. As ***Table 7-10*** indicates the following twelve intersections are projected to operate at LOS E or F:

1. Chicago Avenue at Blaine Street is expected to operate at LOS E and F during AM and PM peak hours, respectively.
4. Iowa Avenue at Blaine Street is expected to operate at LOS E during the PM peak period.
5. Chicago Avenue at Linden Street is expected to operate at LOS E during the PM peak period.
7. Chicago Avenue at University Avenue is expected to operate at LOS E during the PM peak period.
8. Iowa Avenue at University Avenue is anticipated to operate at LOS F during the PM peak period.

12. Iowa Avenue at Everton Place (unsignalized intersection) will continue to operate at LOS F during both the AM and PM peak period.
13. Chicago Avenue at MLK Jr. Blvd. will operate at LOS F during the PM peak period.
15. Lot 30 at MLK Jr. Blvd. will operate at LOS E and F during AM and PM peak periods, respectively.
16. Canyon Crest Drive at MLK Jr. Blvd. will continue to operate at LOS F during the PM peak period.
18. I-215 NB Ramps at MLK Jr. Blvd. will operate at LOS E during the AM peak period.
19. NW Mall at Iowa Avenue (unsignalized intersection) will operate at LOS F during AM and PM peak periods, respectively.
20. SW Mall at Iowa Avenue (unsignalized intersection) will operate at LOS F during AM and PM peak periods, respectively.

Table 7-10
Phase 3 - 2020 Conditions With West Campus Development Level of Service Summary

Location	Peak Hour	Phase 3 Conditions	
		LOS	Average Del. Sec/ Veh
1. Chicago Avenue at Blaine St/3rd Street	AM	E	57.6
	PM	F	82.6
2. I-215 SB Ramps at Blaine Street	AM	C	27.2
	PM	D	45.8
3. I-215 NB Ramps at Blaine Street	AM	C	27.1
	PM	C	20.2
4. Iowa Avenue at Blaine Street	AM	E	65.1
	PM	D	51.8
5. Chicago Avenue at Linden Street	AM	E	55.3
	PM	C	30.5
6. Iowa Avenue at Linden Street	AM	C	34.6
	PM	C	31.8
7. Chicago Avenue at University Avenue	AM	D	35.4
	PM	E	72.8
8. Iowa Avenue at University Avenue	AM	D	41.2
	PM	F	88.9
9. I-215 SB Ramp at University Avenue	AM	C	25.2
	PM	C	23.3
10. I-215 NB Ramp at University Avenue	AM	C	30.2
	PM	C	32.4
11. West Campus Dr at University Avenue	AM	C	33.1
	PM	C	28.0
12. Iowa Avenue at Everton Place (unsignalized)	AM	F	OVF
	PM	F	OVF
13. Chicago Avenue at Martin Luther King Jr. Boulevard (MLK Jr. Blvd.)	AM	D	39.0
	PM	F	118.3
14. Iowa Avenue at MLK Jr. Blvd.	AM	C	26.1
	PM	D	45.3
15. Lot 30 at MLK Jr. Blvd.	AM	E	63.1
	PM	F	107.5
16. Canyon Crest Dr at MLK Jr. Blvd.	AM	D	39.3
	PM	F	96.5
17. I-215 SB Ramps at MLK Jr. Blvd.	AM	C	22.3
	PM	B	16.4
18. I-215 NB Ramps at MLK Jr. Blvd. (unsignalized)	AM	E	36.8
	PM	C	18.3
19. NW Mall at Iowa Avenue (unsignalized)	AM	F	127.5
	PM	F	873.5
20. SW Mall at Iowa Avenue (unsignalized)	AM	F	119.1
	PM	F	913.3
21. Cranford Avenue at MLK Jr. Blvd.	AM	C	21.5
	PM	C	27.5

7.3.6 Phase 4 (2025) Traffic Conditions (31,700 Students)

The final phase, Phase 4, is the completion of the development planned for West Campus, north of Martin Luther King Jr. Boulevard. With Phase 4, all of the proposed academic buildings are in place, and the family student housing, child care centers, and recreation facilities are built. During Phase 4, the remaining medical office buildings will be constructed along with the balance of the student housing. By Phase 4, most, if not all, of the surface parking lots will be converted to parking structures. It is assumed that there will be an additional increase of 3,350 new students over the year 2020, with 335 new staff and faculty members. In Phase 4, it is assumed that (90%) of the new students will be on West Campus and 10% on East Campus. For traffic analysis purposes, the development of buildings for all other phases is complete, with a total new population at 14,600 students and 1,460 new staff and faculty members. The campus will now have a total of 31,700 students, and the traffic and infrastructure to support these students. It is assumed that 50% of students will also live on campus and that a transit system is in place. Phase 4 development will generate 10,261 new daily trips with 786 in the AM peak and 993 in the PM peak. This is after a 50% reduction in trips has been taken for internal capture and a 20% reduction in vehicle trips for a transit program and pedestrian program. The following are the traffic assumptions made for Phase 4 analysis:

- There would be 3,350 additional students
- 335 new staff members
- 90% of student increase on West Campus
- 10% of student increase on East Campus
- Ambient growth from 2007 to 2025 is 1.7/year x 18 = 1.30
- Students would have access to parking lots: P3, PM, PMOB, P1, P2 and P4
- It is assumed that Phases 1A thru 3 are already built and in place.
- Peak hour factor of .925

Table 7-11 summarizes the level of service conditions with the redistribution of new students and the addition of new development. ***Figure 7-24*** depicts AM and PM Project Only volumes through local area intersections. As a note, Project Only volumes include the "New" traffic from all phases of new development and student enrollment. With each phase of development more of the increase in students will be centered on West Campus. ***Figures 7-25 and 7-26*** illustrates Phase 4 – AM and PM peak hour volumes for 2020 conditions. As seen in ***Table 7-11***, with more development and parking structures built, the distribution of students and traffic changes to reflect new destinations. There are several intersections that may see some relief in the traffic congestion that they will experience in earlier phases as a result of the redistribution of traffic. The following thirteen intersections are projected to operate at LOS E or F under Phase 4 2025 with build-out of the West Campus:

1. Chicago Avenue at Blaine Street is expected to operate at LOS F during AM and PM peak hours, respectively.
2. I-215 SB Ramps at Blaine/3rd Street is expected to operate at LOS E during the PM peak period.

4. Iowa Avenue at Blaine Street is expected to operate at LOS E during AM and PM peak periods, respectively.
7. Chicago Avenue at University Avenue is expected to operate at LOS E during the PM peak period.
8. Iowa Avenue at University Avenue is anticipated to operate at LOS F during the PM peak period.
12. Iowa Avenue at Everton Place (unsignalized intersection) will continue to operate at LOS F during both the AM and PM peak period.
13. Chicago Avenue at MLK Blvd. will operate at LOS F during the PM peak period.
14. Iowa Avenue at MLK Blvd. is expected to operate at LOS E during the PM peak period.
15. Lot 30 at MLK Blvd. is expected to operate at LOS F during the PM peak period.
16. Canyon Crest Drive at MLK Blvd. is expected to operate at LOS F during the PM peak period.
18. I-215 NB Ramps at MLK Blvd. will operate at LOS E during the AM peak period.
19. NW Mall at Iowa Avenue (unsignalized intersection) will operate at LOS F during AM and PM peak periods, respectively.
20. SW Mall at Iowa Avenue (unsignalized intersection) will operate at LOS F during AM and PM peak periods, respectively.

Table 7-11
Phase 4 - 2025 Conditions With West Campus Development Level of Service Summary

Location	Peak Hour	Phase 4 Conditions	
		LOS	Average Del. Sec/ Veh
1. Chicago Avenue at Blaine St/3rd Street	AM	D	46.7
	PM	F	91.1
2. I-215 SB Ramps at Blaine Street	AM	C	27.9
	PM	E	61.6
3. I-215 NB Ramps at Blaine Street	AM	C	27.2
	PM	C	21.3
4. Iowa Avenue at Blaine Street	AM	E	58.9
	PM	E	55.9
5. Chicago Avenue at Linden Street	AM	C	33.6
	PM	C	28.7
6. Iowa Avenue at Linden Street	AM	C	29.4
	PM	C	30.6
7. Chicago Avenue at University Avenue	AM	C	34.7
	PM	E	77.2
8. Iowa Avenue at University Avenue	AM	D	40.9
	PM	F	90.4
9. I-215 SB Ramp at University Avenue	AM	C	23.3
	PM	C	20.7
10. I-215 NB Ramp at University Avenue	AM	C	30.3
	PM	C	27.2
11. West Campus Dr at University Avenue	AM	C	27.2
	PM	C	28.3
12. Iowa Avenue at Everton Place (unsignalized)	AM	F	OVF
	PM	F	OVF
13. Chicago Avenue at Martin Luther King Jr. Boulevard (MLK Jr. Blvd.)	AM	D	39.8
	PM	F	122.5
14. Iowa Avenue at MLK Jr. Blvd.	AM	C	28.9
	PM	E	77.3
15. Lot 30 at MLK Jr. Blvd.	AM	D	41.6
	PM	F	119.5
16. Canyon Crest Dr at MLK Jr. Blvd.	AM	D	41.9
	PM	F	87.1
17. I-215 SB Ramps at MLK Jr. Blvd.	AM	C	22.2
	PM	B	14.8
18. I-215 NB Ramps at MLK Jr. Blvd. (unsignalized)	AM	E	44.7
	PM	C	18.2
19. NW Mall at Iowa Avenue (unsignalized)	AM	F	182.1
	PM	F	OVF
20. SW Mall at Iowa Avenue (unsignalized)	AM	F	221.6
	PM	F	OVF
21. Cranford Avenue at MLK Jr. Blvd.	AM	C	20.4
	PM	D	39.4

7.4 Thresholds for Determining Significant Impacts

The City of Riverside and the County of Riverside have established minimum Level of Service standards for intersections associated with developments. The City of Riverside uses a threshold of LOS D. Any intersection falling below this threshold at LOS E and F will need to be mitigated and then reanalyzed to determine if improvements will bring the impacted intersection back to acceptable levels of LOS D prior to the addition of project traffic volumes.

7.4.1 Mitigation Measures to Reduce Project Impacts

Most mitigation is based on the ultimate build out of the project, which in this case, are the Phase 4 traffic conditions. This section presents the measures needed to improve intersection operations back to acceptable LOS D or better. Most of the impacted intersections are outside the boundaries of the West Campus University and are heavily impacted by regional commuter traffic as well as traffic generated by the University. The suggested mitigation measures are designed to improve the entire intersection back to acceptable LOS A, B, C, or D. These measures may or may not be feasible due to right of way and cost constraints and do not imply that the University is responsible for the implementation of these measures. However, the University may want to implement the mitigation measures for intersections that provide direct access to West Campus, such as Iowa Avenue at Everton Place, NW Mall and SW Mall, as well as Cranford Avenue at MLK Jr. Blvd. The next section, "project contribution", discusses how much "project related" traffic contributes to the deterioration of each of the impacted or deficient intersections.

7.4.2 2025 Mitigation Measures

Figure 7-27 and ***Table 7-12*** shows a comparison of results and measures before and after mitigation.

1. *Chicago Avenue at Blaine Street* is expected to operate at LOS F during AM and PM peak hours, respectively. With the following mitigation measures the intersection will operate at LOS D for both AM and PM peak periods.
    - Add an additional NB right turn lane, add an additional SB right turn lane, and add an additional WB left turn lane.

2. *I-215 SB Ramps at Blaine/3rd Street* is expected to operate at LOS E during the PM peak period. With the following measures this intersection will operate at LOS C for both AM and PM peak periods.
    - Add an additional SB thru lane. There is a heavy volume of traffic that exits the freeway and gets back on in order to either bypass stopped traffic or merge to other lanes.

4. *Iowa Avenue at Blaine Street* is expected to operate at LOS E during AM and PM peak periods, respectively. With the following mitigation measures the intersection will operate at LOS D for both AM and PM peak periods.
    - Add an additional EB left turn lane, add an additional WB right turn lane.

7. *Chicago Avenue at University Avenue* is expected to operate at LOS E during the PM peak period. With the following mitigation measures the intersection will operate at LOS C and D for AM and PM peak periods, respectively.

- Add an additional SB right turn lane.

8. *Iowa Avenue at University Avenue* is anticipated to operate at LOS F during the PM peak period. With the following mitigation measures the intersection will operate at LOS D for both AM and PM peak periods.

    - Add an additional SB right turn lane

12. *Iowa Avenue at Everton Place* (unsignalized intersection) will continue to operate at LOS F during both the AM and PM peak period. With the following measures the intersection will operate at LOS A and B for AM and PM peak periods, respectively.

    - Signalize the intersection with 1 NB left, 1 NB thru, 1 NB right turn lane; 1 SB left, 2 SB thru, 1 SB right turn lanes; 1 EB left turn lane with a shared thru and right lane; 1 WB left turn lane with a shared thru and right turn lane.

13. *Chicago Avenue at MLK Jr. Blvd.* will operate at LOS F during the PM peak period. With the following mitigation measure the intersection will operate at LOS D for both AM and PM peak periods.

    - Add an additional EB thru lane and 1 additional EB right turn lane; add an additional WB right turn lane and WB thru lane.

14. *Iowa at MLK Jr. Blvd.* is expected to operate at LOS E during the PM peak period. With the following mitigation measures the intersection will operate at LOS C during both AM and PM peak periods.

    - Add an additional EB and WB thru lane.

15. *Lot 30 at MLK Jr. Blvd.* is expected to operate at LOS F during the PM peak period. With the following mitigation measures the intersection will operate at B during both AM and PM peak periods.

    - Add an additional EB right turn lane and an additional EB left turn lane.

16. *Canyon Crest Drive at MLK Jr. Blvd.* is expected to operate at LOS F during the PM peak period. With the following mitigation measures the intersection will operate at LOS D during both AM and PM peak periods.

    - Add an additional EB thru lane and an EB right turn lane.

18. *I-215 NB Ramps at MLK Jr. Blvd.* will operate at LOS E during the AM peak period. With the following mitigation measures the intersection will operate at LOS B during both AM and PM peak hours.

    - Signalize the intersection

19. *NW Mall at Iowa Avenue* (unsignalized intersection) will operate at LOS F during AM and PM peak periods, respectively. With the following mitigation measures the intersection will operate at LOS A and D during AM and PM peak hours, respectively.

    - Signalize the intersection and provide 1 NB left and 1 NB shared thru and right turn lane; 1 SB left with 1 shared thru and right turn lane and 1 shared EB and WB lane.

20. *SW Mall at Iowa Avenue* (unsignalized intersection) will operate at LOS F during AM and PM peak periods, respectively. With the following mitigation measures the intersection will operate at LOS A and D during AM and PM peak hours, respectively.

- Signalize the intersection and provide 1 NB left and 1 NB shared thru and right turn lane; 1 SB left with 1 shared thru and right turn lane and 1 shared EB and WB lane.

Table 7-12
LOS Summary of Phase 4 2025 Conditions Before and After Improvements

Location	Peak Hour	Before Mitigation		After Mitigation	
		LOS	Average Del. Sec/Veh	LOS	Average Del. Sec/Veh
1. Chicago Avenue at Blaine St/3rd Street	AM	D	46.7	D	41.5
	PM	F	91.1	D	51.1
2. I-215 SB Ramp at Blaine Street	AM	C	27.9	C	27.5
	PM	E	61.6	C	32.5
4. Iowa Avenue at Blaine Street	AM	E	58.9	D	36.5
	PM	E	55.9	D	44.5
7. Chicago Avenue at University Avenue	AM	C	34.7	C	33.8
	PM	E	77.2	D	43.8
8. Iowa Avenue at University Avenue	AM	D	40.9	D	37.7
	PM	F	90.4	D	54.4
12. Iowa Avenue at Everton Place (unsignalized)	AM	F	OVF	A	8.7
	PM	F	OVF	B	16.3
13. Chicago Avenue at Martin Luther King Jr. Boulevard (MLK Jr. Blvd.)	AM	D	39.8	D	36.4
	PM	F	122.5	D	45.8
14. Iowa Avenue at MLK Jr. Blvd.	AM	C	28.9	C	25.0
	PM	E	77.3	C	31.4
15. Lot 30 at MLK Jr. Blvd.	AM	D	41.6	B	19.3
	PM	F	119.5	B	17.7
16. Canyon Crest Dr at MLK Jr. Blvd.	AM	D	41.9	D	41.9
	PM	F	87.1	D	37.0
18. I-215 NB Ramps at MLK Jr. Blvd. (unsignalized)	AM	E	44.7	B	18.6
	PM	C	18.2	B	16.2
19. NW Mall at Iowa Avenue (unsignalized)	AM	F	182.1	A	5.4
	PM	F	OVF	D	44.5
20. SW Mall at Iowa Avenue (unsignalized)	AM	F	221.6	A	6.0
	PM	F	OVF	C	24.0

7.4.3 Project Contribution to Total New Volumes

As part of traffic impact analysis requirements, the contribution of project traffic to total new traffic was determined for the identified impacted intersections for future Phase 4 2025 conditions. ***Table 7-13*** presents the results of this analysis.

The total existing and total future year peak hour traffic is the sum of all turning movements for each intersection approach before peak hour factor and other adjustments were made. The total new traffic is the difference between the future year 2025 and the existing peak hour traffic volumes. Total project traffic is the sum of the project increment peak hour traffic volume through the study area key intersections. The project contribution to total new traffic is calculated by dividing the project increment by the total new traffic.

Table 7-13
Project Percent Shares at Impacted Intersections

Intersection	Peak Period	Existing Volume	2025 Total Traffic	New Volume	Project Volume	% Project
1. Chicago Avenue at Blaine St/3rd Street	AM	2809	4039	1230	387	31%
	PM	3523	5047	1524	467	31%
2. I-215 SB Ramps at Blaine St/3rd Street	AM	1929	2752	823	244	30%
	PM	2554	3591	1037	270	26%
4. Iowa Avenue at Blaine Street	AM	3237	4692	1455	485	33%
	PM	3518	5120	1602	548	34%
7. Chicago Avenue at University Avenue	AM	2698	4137	1439	629	44%
	PM	4130	6136	2006	764	38%
8. Iowa Avenue at University Avenue	AM	2308	3980	1672	977	58%
	PM	3715	5910	2195	1080	49%
12. Iowa Avenue at Everton Place	AM	1111	2565	1454	1121	77%
	PM	1692	3421	1729	1221	71%
13. Chicago Avenue at MLK Jr. Blvd.	AM	3838	5924	2086	936	45%
	PM	5225	7898	2673	1105	41%
14. Iowa Avenue at MLK Jr. Blvd.	AM	2340	4302	1962	1260	64%
	PM	3754	6329	2575	1449	56%
15. Lot 30 at MLK Jr. Blvd.	AM	2304	4020	1716	1025	60%
	PM	3391	5590	2199	1182	54%
16. Canyon Crest Dr at MLK Jr. Blvd.	AM	3344	5597	2253	1248	55%
	PM	4181	6855	2674	1417	53%
18. I-215 NB Ramps at MLK Jr. Blvd.	AM	877	2545	1668	460	28%
	PM	522	1110	588	432	73%

Project percents may decrease with the identification of other new development besides the University.

The intersections of NW Mall and SW Mall along Iowa Avenue and Cranford Avenue at MLK Boulevard were not included because it is assumed that these intersections are a direct result of development on West Campus.

7.5 Cost Summary of Signalization and Improvements

This study includes conceptual-level cost estimates for the cost of signalization for the four intersections bordering West Campus. These intersections include:

- Iowa Avenue at NW Mall (in Phase 1A)
- Iowa Avenue at Everton Place (in Phase 1A)
- Cranford Avenue at MLK Jr. Blvd. (in Phase 1B)
- Iowa Avenue at SW Mall (in Phase 2)

Details of these cost estimates are included in the Appendix to this report. Costs include mark-ups, sales taxes, and contingencies, but do not include soft costs.

- Phase 1A: $ 416,501 (Iowa Avenue at NW Mall)
- Phase 1A: $ 416,501 (Iowa Avenue at Everton Place)
- Phase 1B: $ 345,130 (Cranford Avenue at MLK Jr. Blvd.)
- Phase 1: $ 0
- Phase 2: $ 416,501 (Iowa Avenue at SW Mall)
- Phase 3: $ 0
- Phase 4: $ 0

Estimated Total for the Build-Out of Intersection Signalization: $ 1,260,587.

7.6 Glossary of Typically Used Traffic Terms

Actuated Control -	All approaches to a signalized intersection have vehicle detectors with each phase subject to a minimum and maximum green time which some phases skipped if no vehicle is detected.
All Way Stop Control -	An intersection with stop signs at all approaches.
Approach Delay -	The sum of stopped-time delay and the time lost in decelerating to a stop and accelerating to a steady speed.
Average Daily Traffic -	The total traffic volume during a given time period (more than a day and less than a year) divided by the number of days in that time period.
Base Saturation Flow Rate -	The maximum steady flow rate, expressed in passenger cars per hour per lane, at which passenger cars can cross a point on interrupted flow roadways.

Capacity -	The maximum number of vehicles that can pass a point on a roadway during a specified time period (usually 1 hour) under prevailing roadway, traffic and control conditions.
Clearance Time -	The portion of time between traffic signal phases during which an intersection is not used by any traffic movement in seconds.
Control -	A variable or characteristic associated with a stop sign, yield sign, flashing device or other similar measure.
Corridor -	A set of parallel transportation facilities for moving people and goods between two points.
Critical Signalized Intersection -	The signalized intersection with the lowest volume to capacity ratio (v/c), typically the one with the lowest effective green ratio (g/c) for the through movement.
Cycle Length -	The time it takes for a traffic signal to go through one complete sequence of signal indications.
Deficient Intersection -	Intersection operating below acceptable levels of service as determined by the governing agency.
Delay -	The amount of travel time experienced by a traveler in seconds.
Demand -	The number of vehicles using a given roadway.
Density -	The number of vehicles, averaged over time, occupying a given length of lane or roadway; usually expressed as vehicles per mile (vpm) or vehicles per mile per lane (vpmpl).
Directional Distribution Factor -	The proportion of an hour's total volume occurring in the higher volume direction.
Dual Left Turn Lanes -	Two lanes designated exclusively for left turn movement at intersections.
Effective Green Time -	The time allocated for the through movement to proceed through an intersection (Thru green plus yellow plus all-red less the lost time).
Exclusive Right Turn Lanes -	Lane designated for right turn only movement. Usually posted with signage and arrow pavement legends.
Functional Classification -	The assignment of roads according to the character is service they provide in relation to the total roadway network. This typically includes; local, collector, arterials and highways.
Heavy Vehicle -	A vehicle with more than 4 wheels touching the pavement during normal operation.

Highway Capacity Manual (HCM) - The Transportation Research Board document on highway capacity and quality of service.

Interchange - Is associated with an off-ramp, overpass/underpass or on-ramp to a freeway.

Interrupted Flow - Roadways characterized by signals, stop signs or other causes of interruption in traffic flow.

Level of Service (LOS) - A quantitative indication of the quality of service at an intersection or roadway segment divided into 6 letter grades (A thru F) with F being the poorest operation.

Lost Time - Time during which a signalized intersection is not used by any movement.

Maximum Acceptable Value - The highest value of LOS that an agency will accept in reviewing traffic studies.

Median - Areas that are restrictive or non-restrictive that separates opposing traffic lanes. This includes raised medians, striped medians and two-way left turn lanes.

Movement - A flow of vehicles in a given direction

Multilane - Having more than one through lane in one direction

Multimodal - A method of travel which may include; vehicles, bicycles, bus, train, plane or pedestrian.

One-Way - A type of roadway in which vehicles are allowed to move in one direction only.

Operational Analysis - A detailed analysis of a roadway's present or future level of service.

Outside Lane - A roadway's vehicle through lane closest to the edge of pavement.

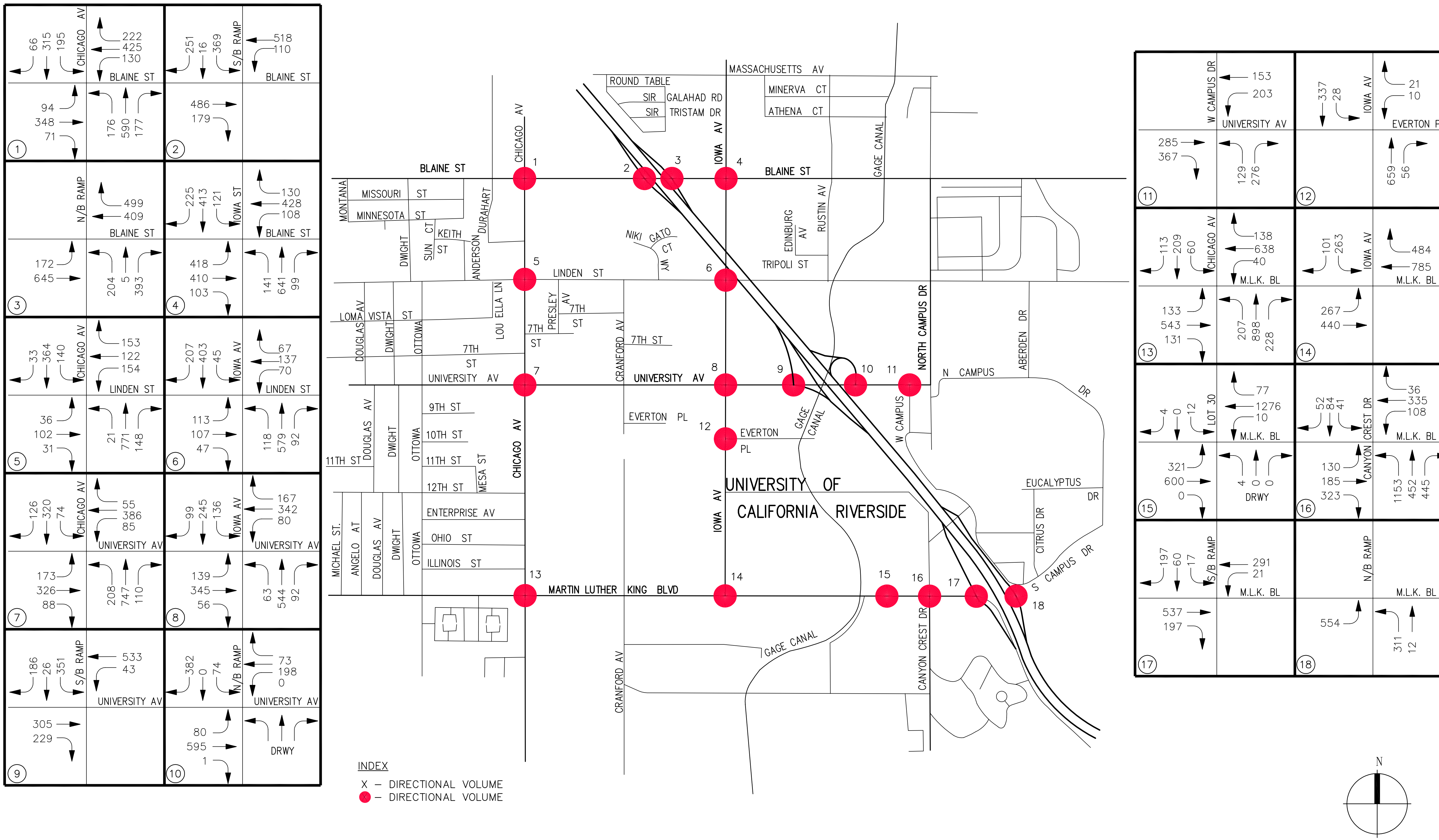
Passenger Car Equivalency (PCE) - Vehicles of different sizes and weights have different operating characteristics as opposed to passenger cars. Trucks are generally slower and occupy more roadway space. Consequently, trucks have a greater individual effect of roadway operation than passenger cars. The number of equivalent passenger cars equaling the effect of one truck is dependent of the roadway grade, number of lanes. Typically a PCE factor of 1.5 to 2.5 is used to account for heavy vehicles in the traffic stream.

Paved Shoulder - At least 3 feet in width separated by a solid pavement marking from the outside through lane to the edge of pavement.

Peak Hour - A 1 hour time period with high volume.

Peak Hour Factor (PHF) -	The ratio of hourly volume to the peak 15-minute flow rate for that hour; hourly volume/(4 x peak 15 minute volume).
Pedestrian Refuge -	At least 5 feet but less than 10 feet in width that separates opposing mid-block traffic lanes and allows pedestrians to cross a roadway.
Phase -	The part of a traffic signals cycle allocated to any combination of traffic movements receiving the right-of-way during one or more intervals.
Platoon -	A group of vehicles traveling together as a group, either voluntarily or involuntarily because of signal control, geometrics or other factors.
Posted Speed -	The maximum speed at which vehicles are legally allowed to travel over a roadway segment.
Pretimed Control -	Traffic signal control in which the cycle length, phase plan, and phase times are preset and repeated continuously.
Roadway Class -	Categories of arterials, freeways and two-lane highways.
Seasonal Factor -	A factor used to adjust for the variation in traffic over the course of a year.
Semiactuated -	Signal control of an intersection in which the through movement on the main roadway gets the unused green time from side movements because of no side street movements.
Shared Lane -	A roadway lane shared by 2 or more movements, usually thru and right turns, or left and thru movements.
Signal Types -	The kind of traffic signals; actuated, pretimed or semiactuated. Relates to a signals cycle length, phase plan and timing.
Study Period -	A length in time including a future year of analysis. Usually includes existing, opening year and build-out.
Study Times -	The amount of time vehicle counts are taken; typical peak hours are considered to be 7:00 to 9:00 am and 4:00 to 6:00 pm. Traffic studies are based on the largest 1 hour during the study time.
Thresholds -	The breakpoints between level of service letter grades.
Travel Time -	The average time spent by vehicles traversing a roadway.
Two-Way Left Turn Lane -	A lane that simultaneously serves left turning vehicles in both directions.

Two-Way Stop Control -	The type of traffic control at an intersection where drivers on the minor street or a driver turning left from the major street must wait for a gap in major street traffic to complete a maneuver.
Uninterrupted Flow -	A category of roadway that does not have signals, stop signs or other fixed causes of delay to the traffic stream.
V/C -	The ratio of demand flow rate (volume) to capacity of a signalized intersection, segment or facility.



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Sheet Title Figure 7-2

West Campus Development

Existing AM Peak Hour Volumes

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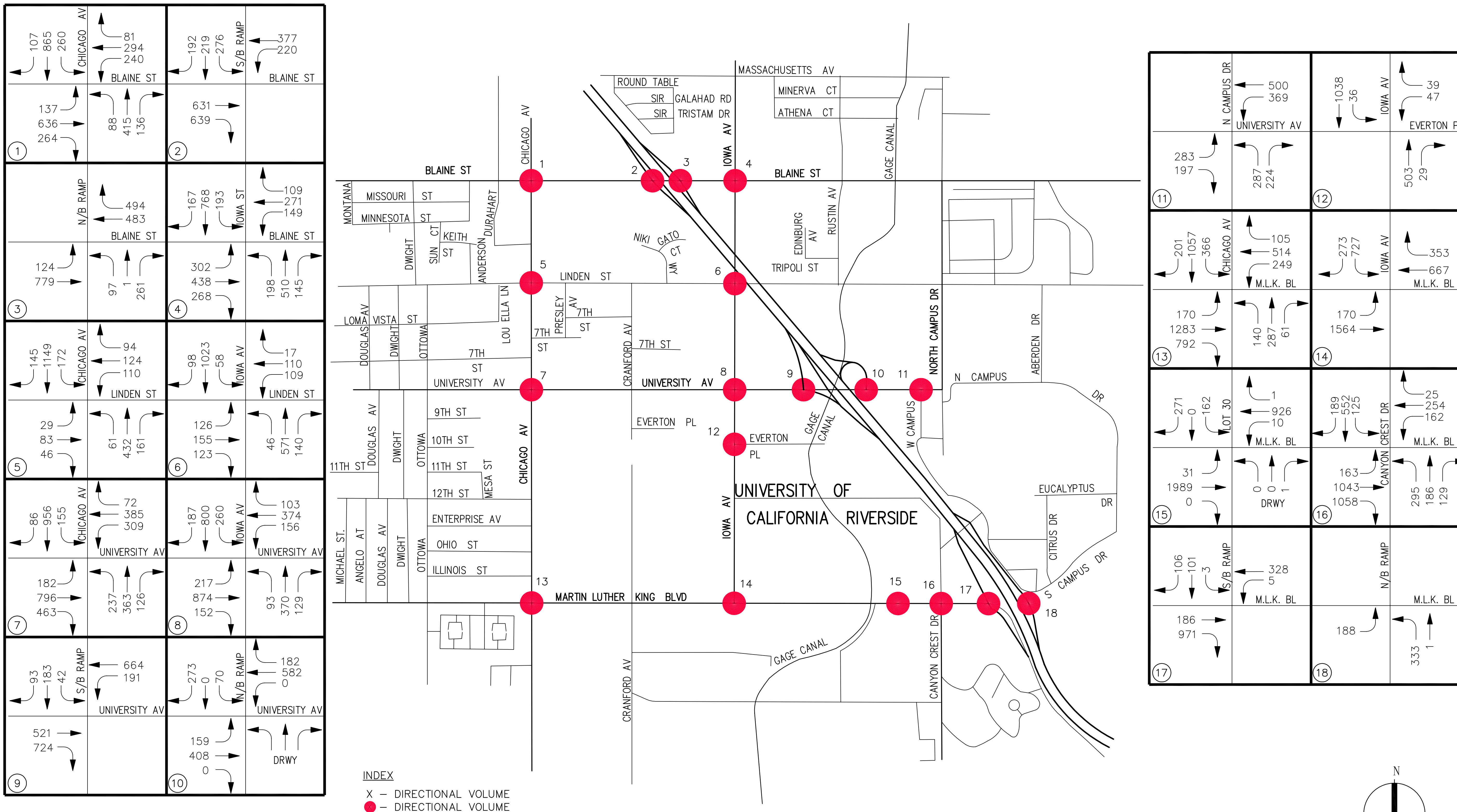

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West Campus Development

Existing PM Peak Hour Volumes

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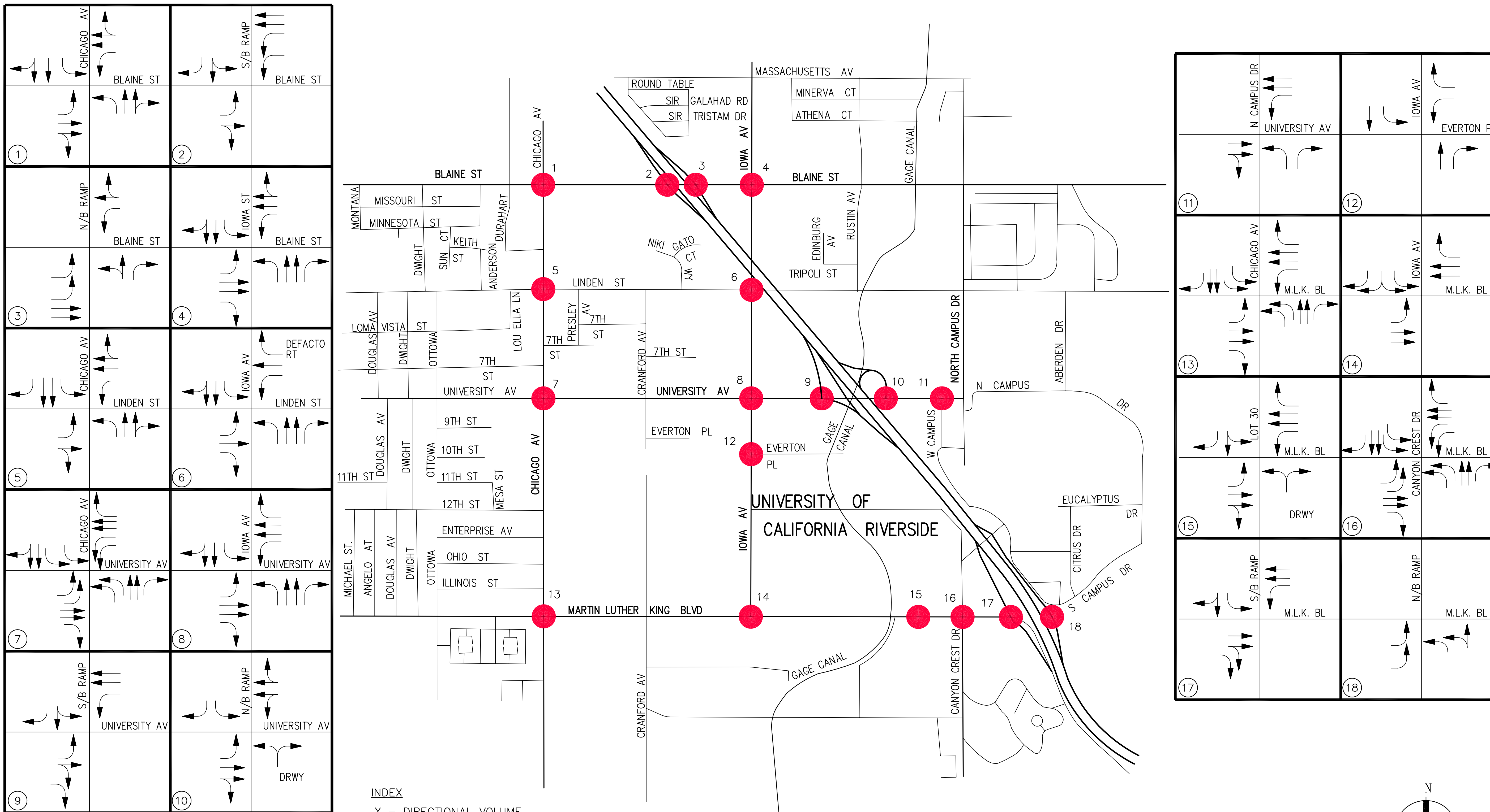

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– DEFACTOR RT – WHERE THE LANE WIDTH IS WIDE ENOUGH TO ACCOMODATE A RT EVEN THOUGH NOT STRIPED

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Existing Roadway Geometrics

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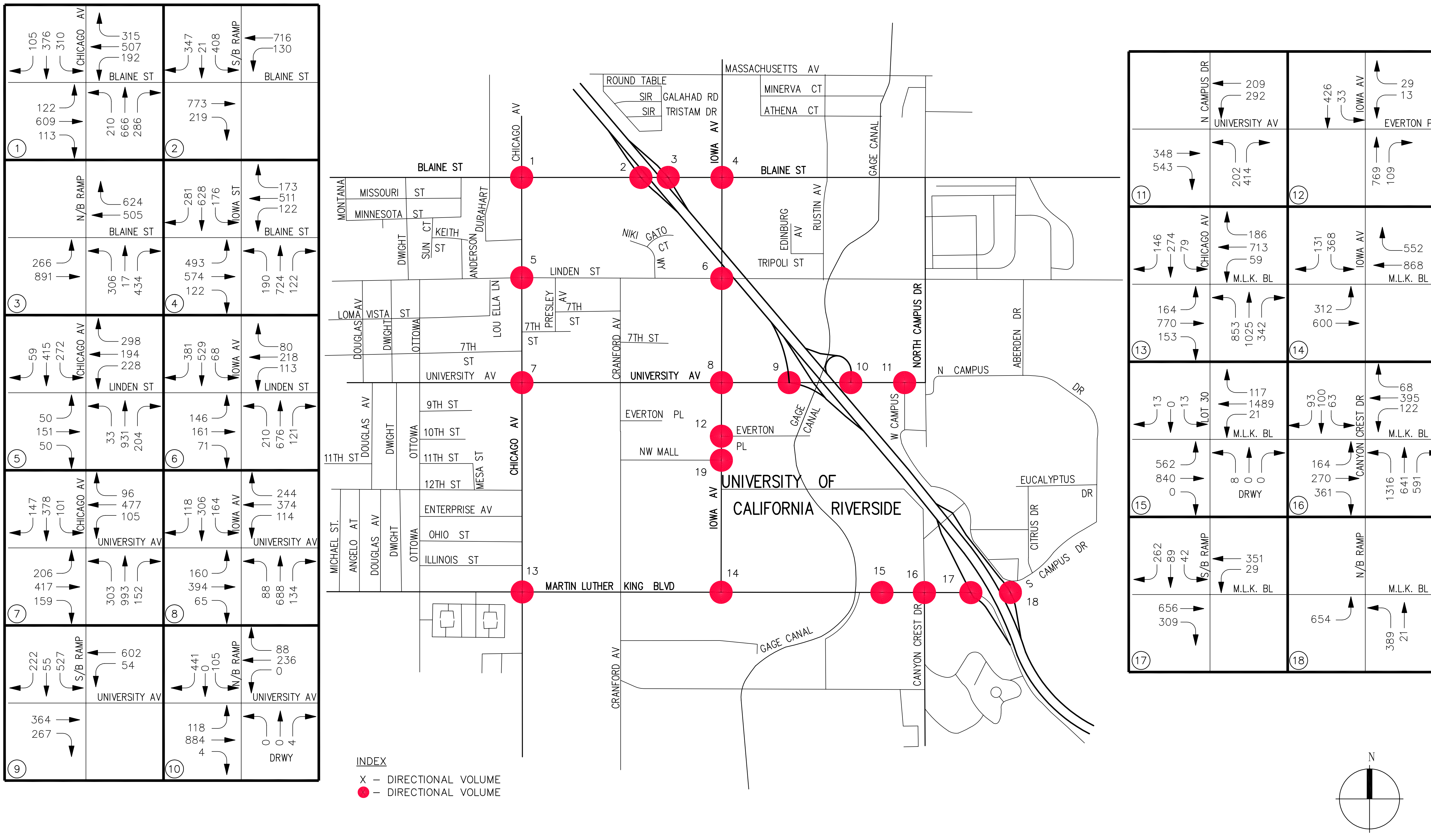

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West Campus Development
2010 Base Volumes AM Peak

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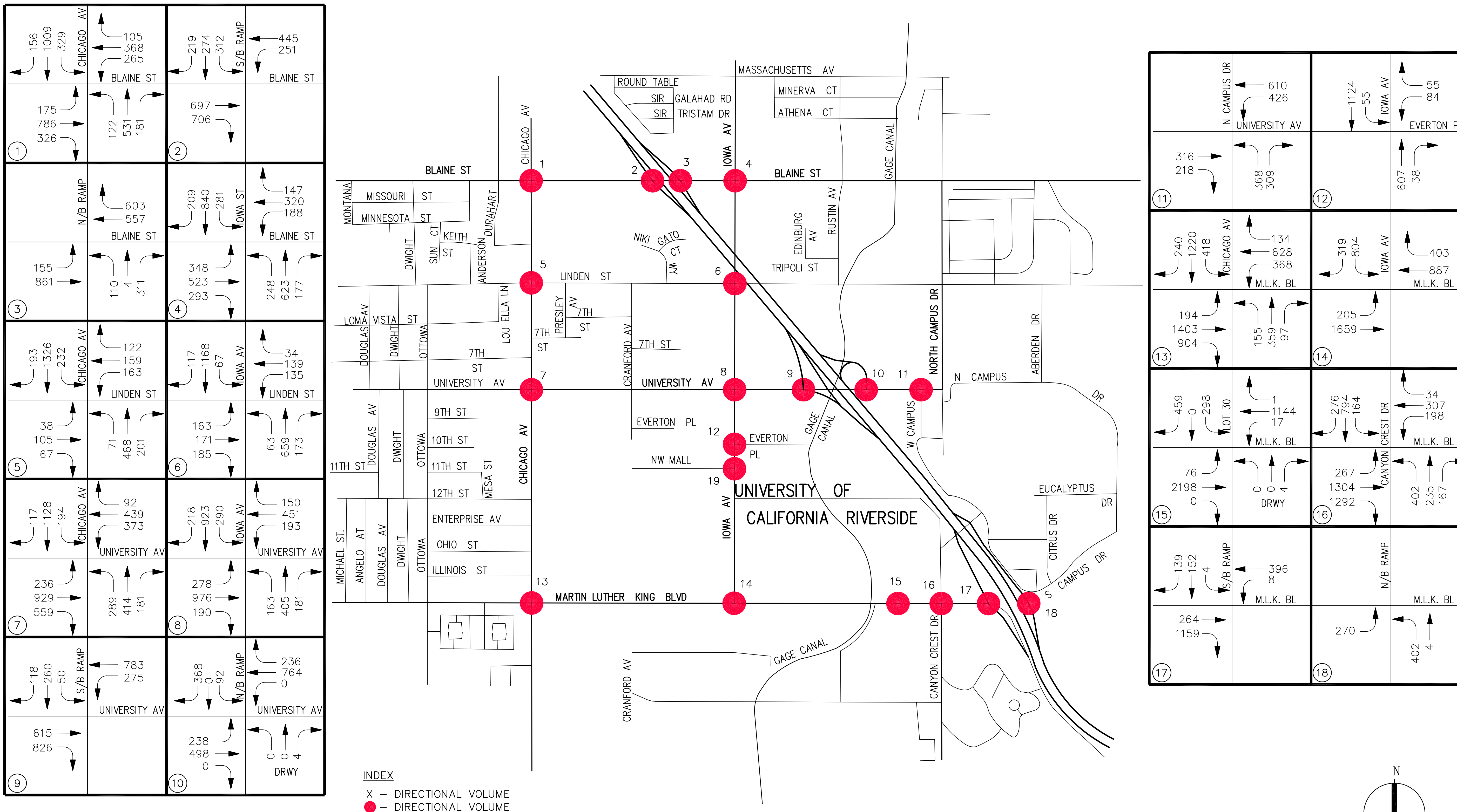

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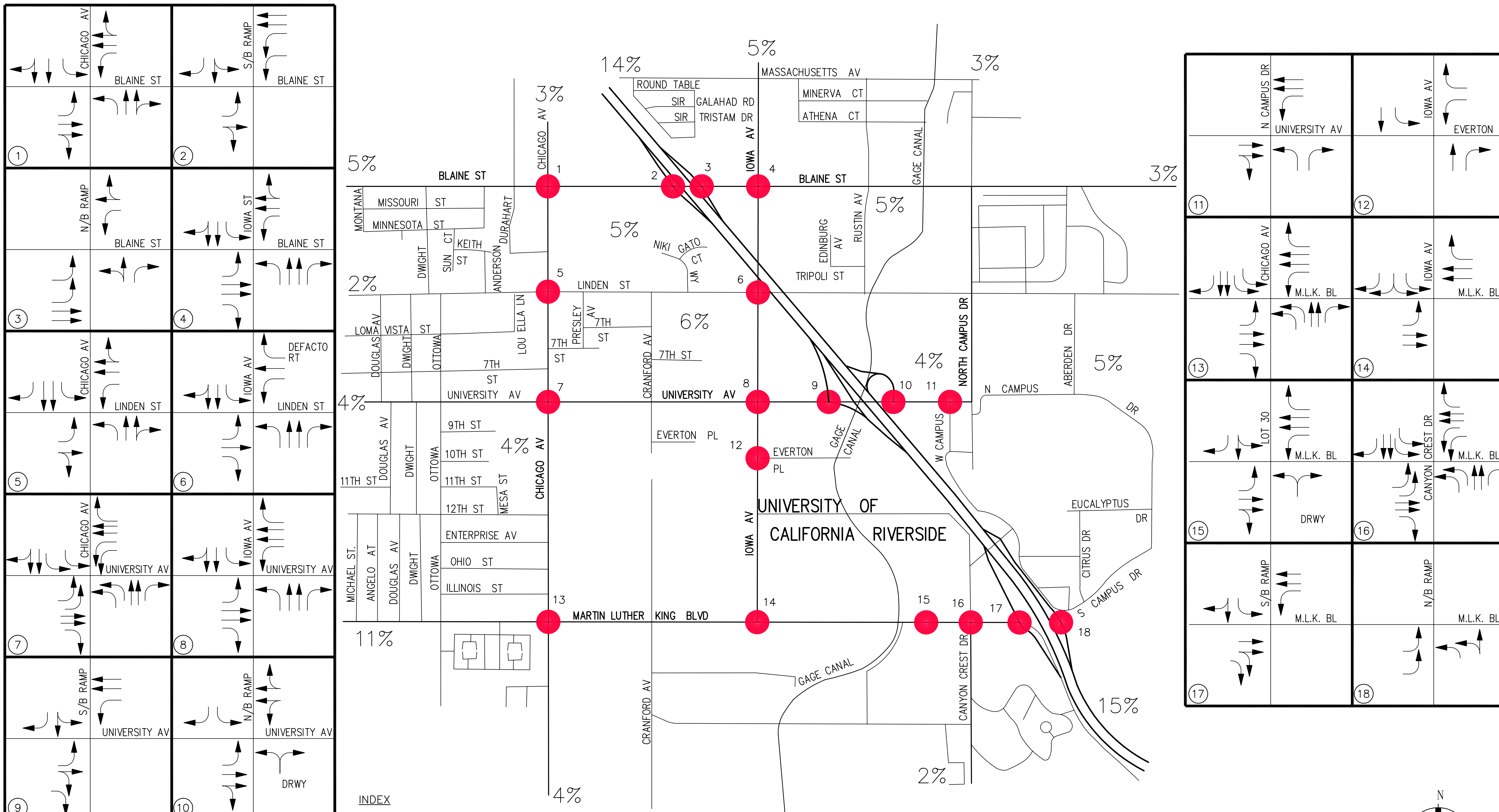

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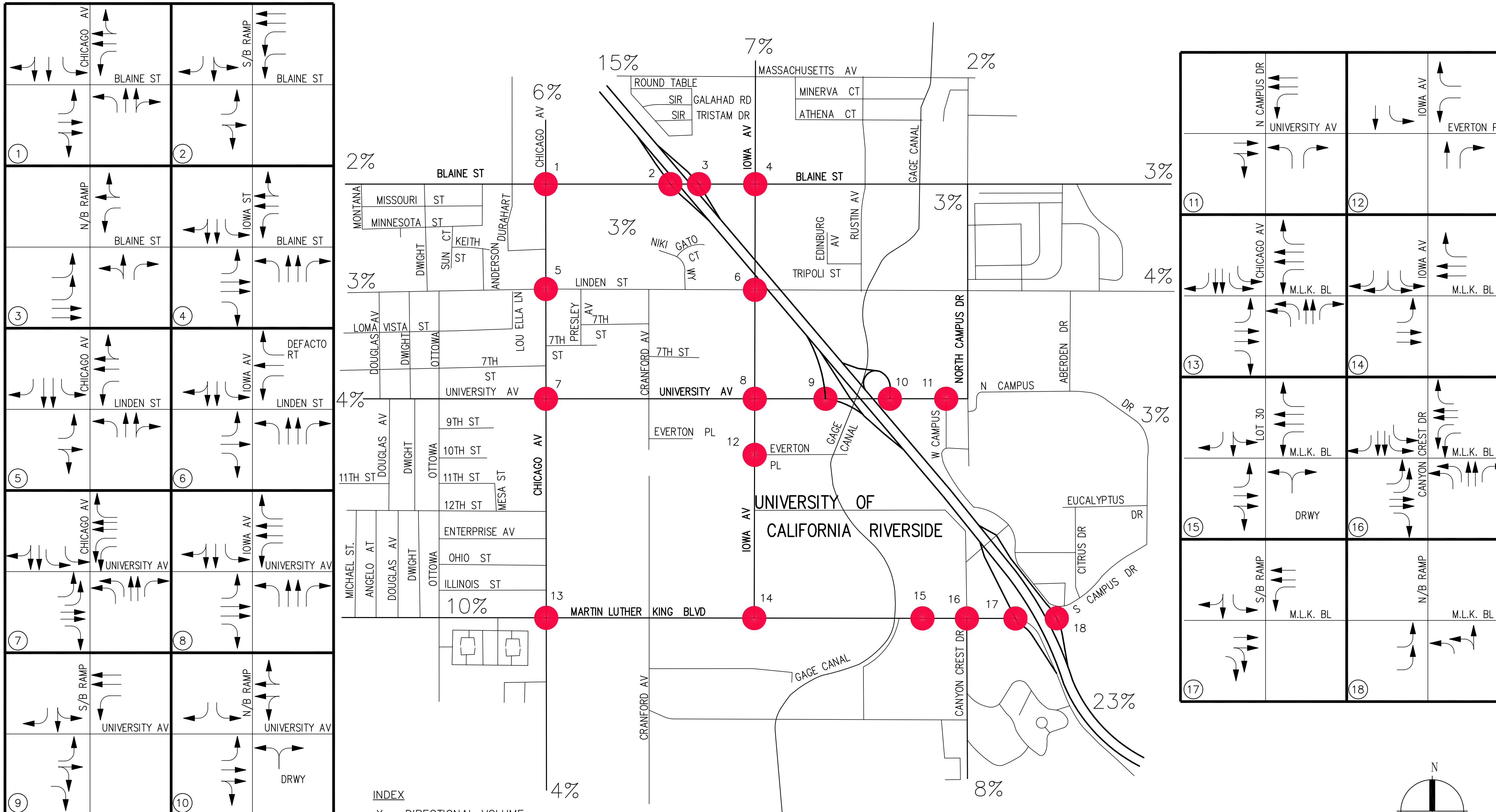

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Project Distribution Commuters and Office use

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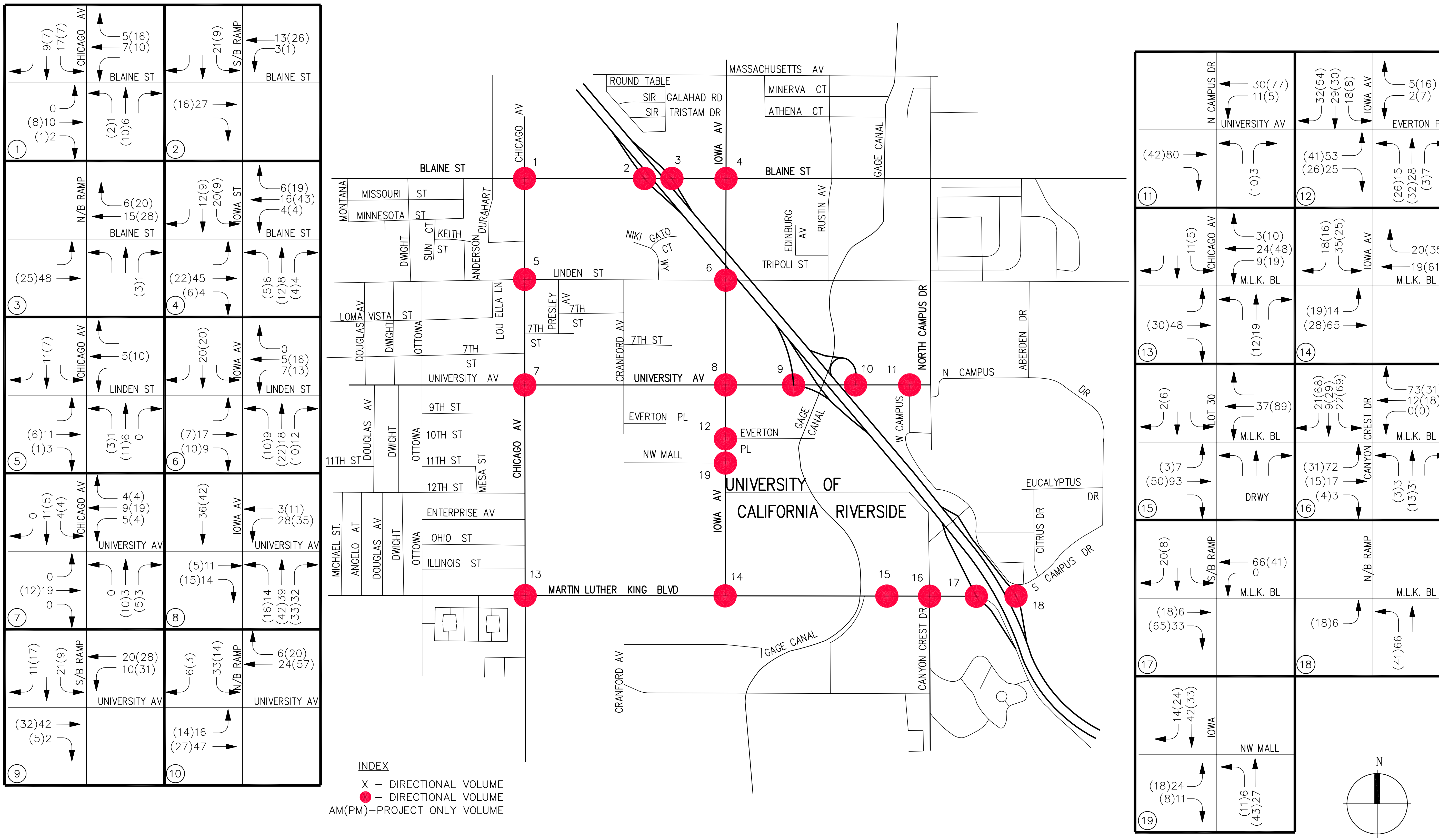

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West Campus Development
Phase 1A (2010) Project Only Volumes AM and PM Peak

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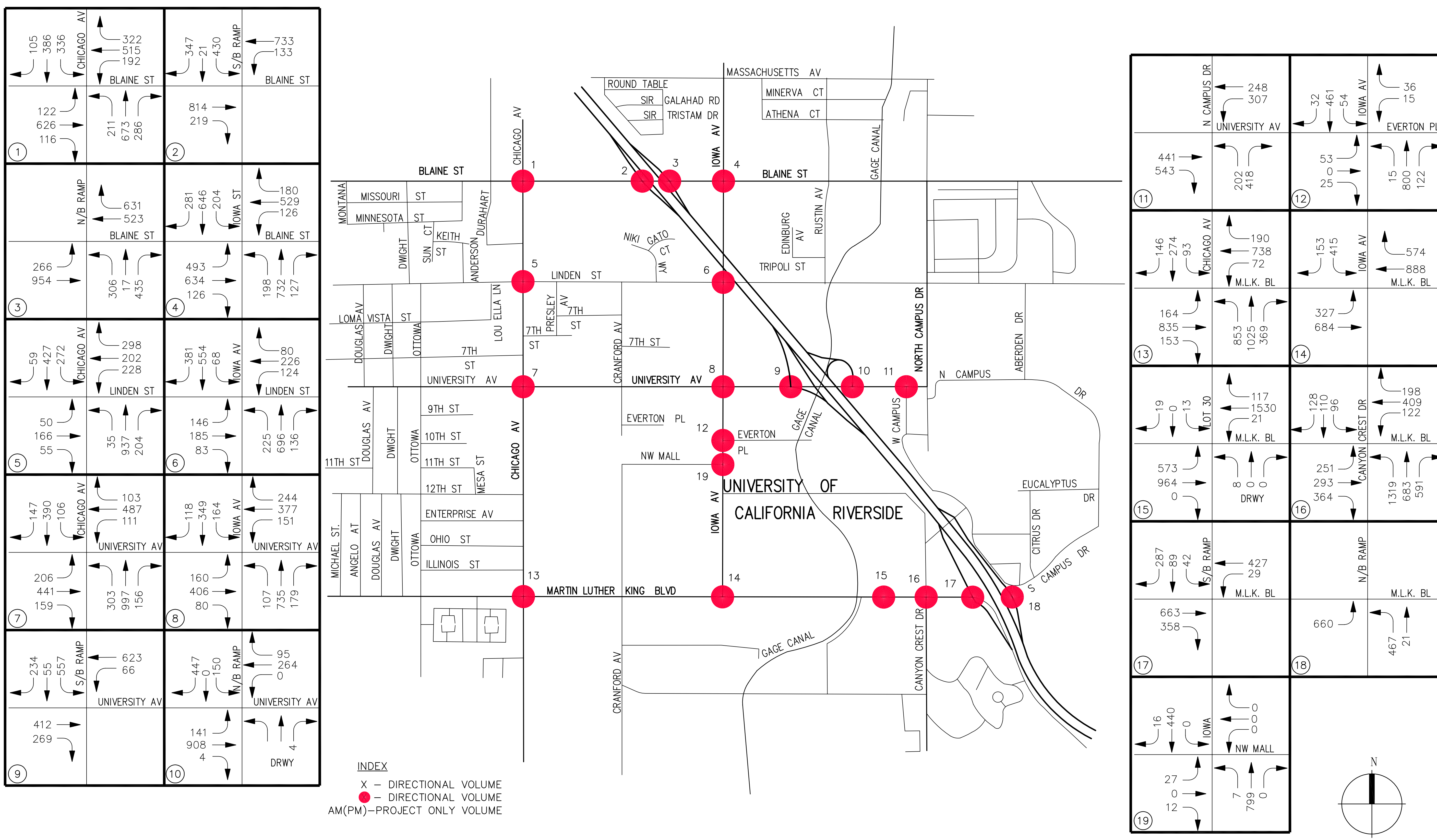

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Phase 1A (2010) Volumes AM Peak

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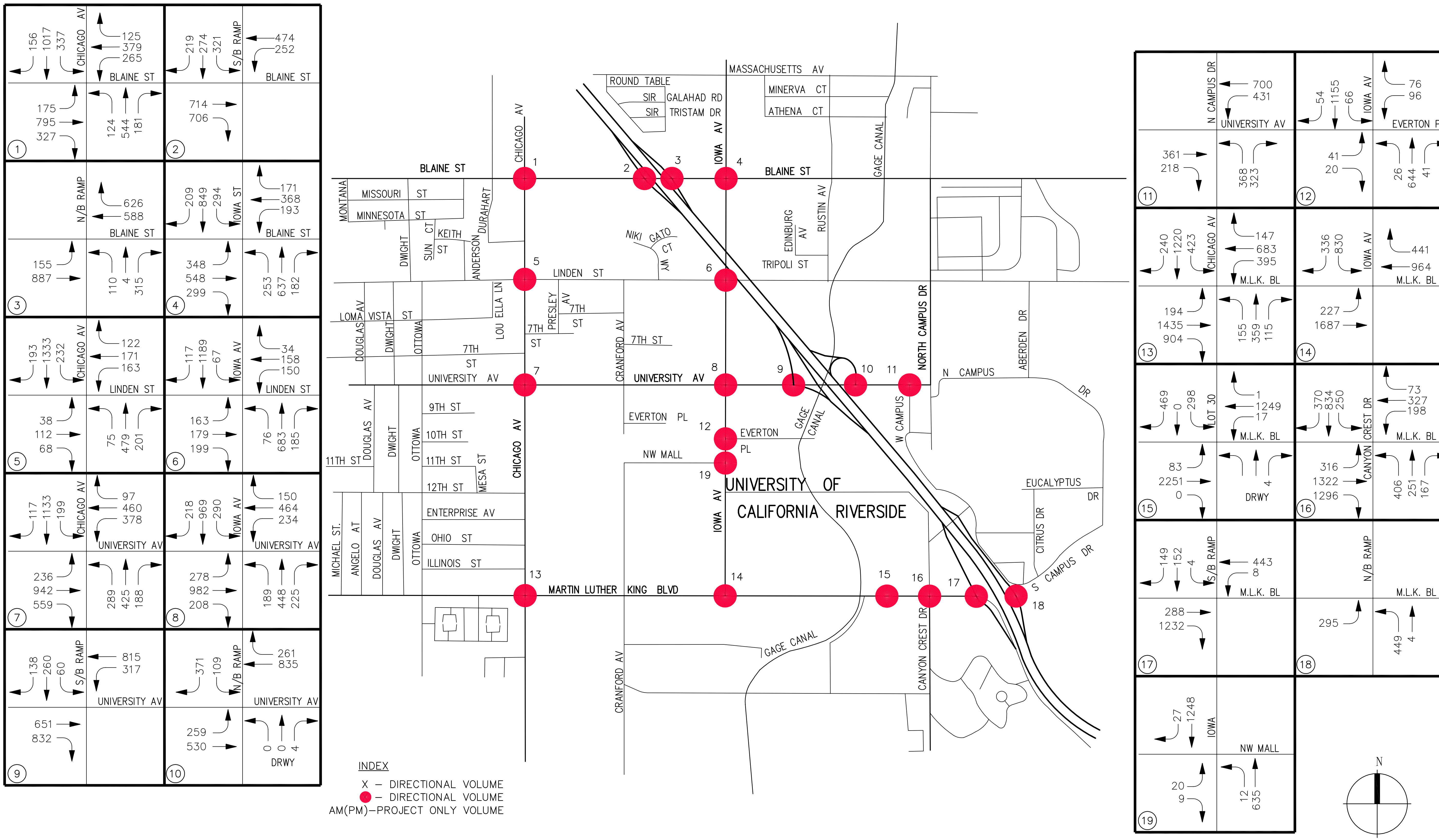

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West Campus Development

Phase 1A (2010) Volumes PM Peak

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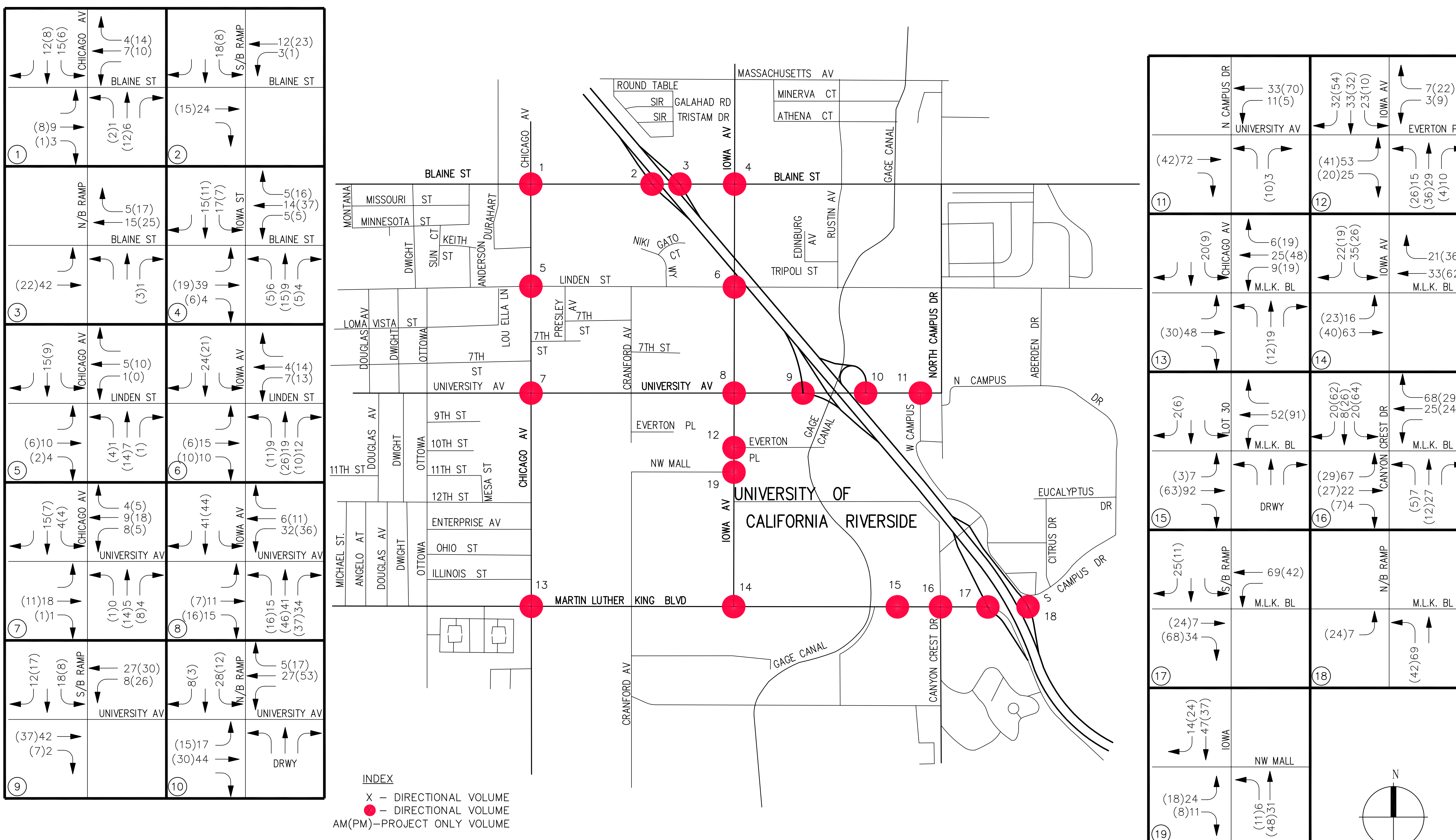

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West Campus Development

Phase 1B (2010) Project Only Volumes AM and PM Peak

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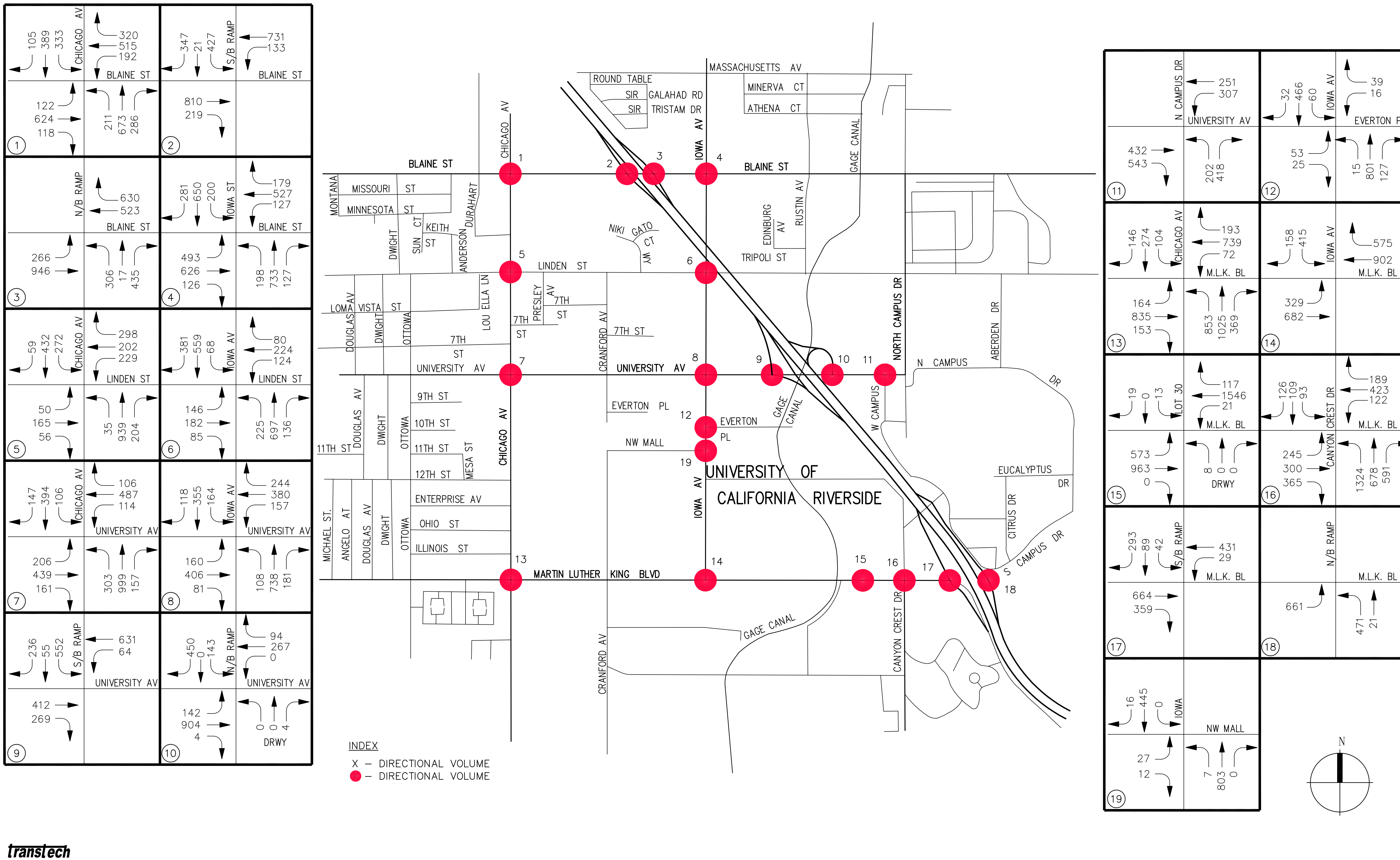

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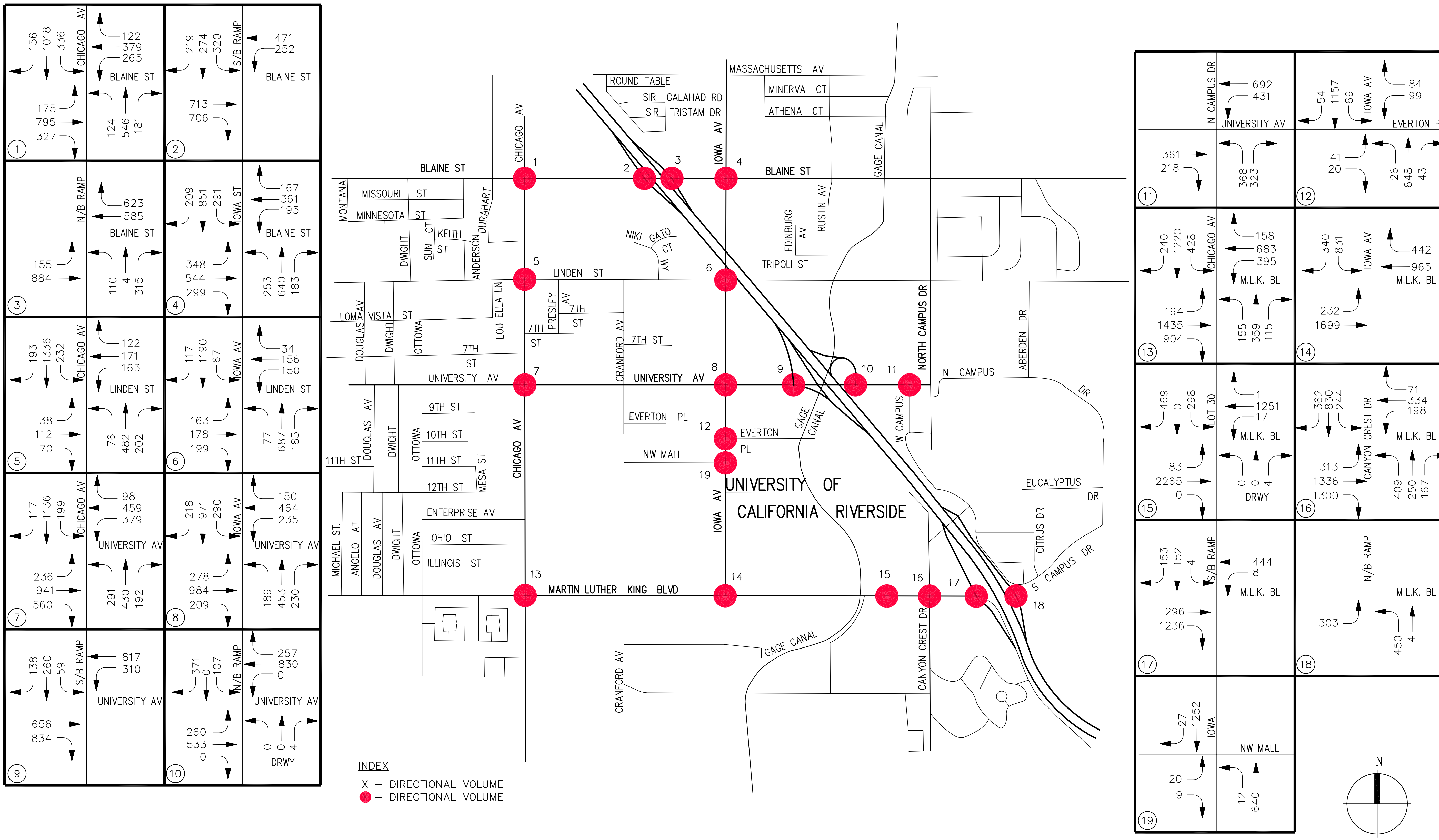

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Phase 1B (2010) Volumes PM Peak

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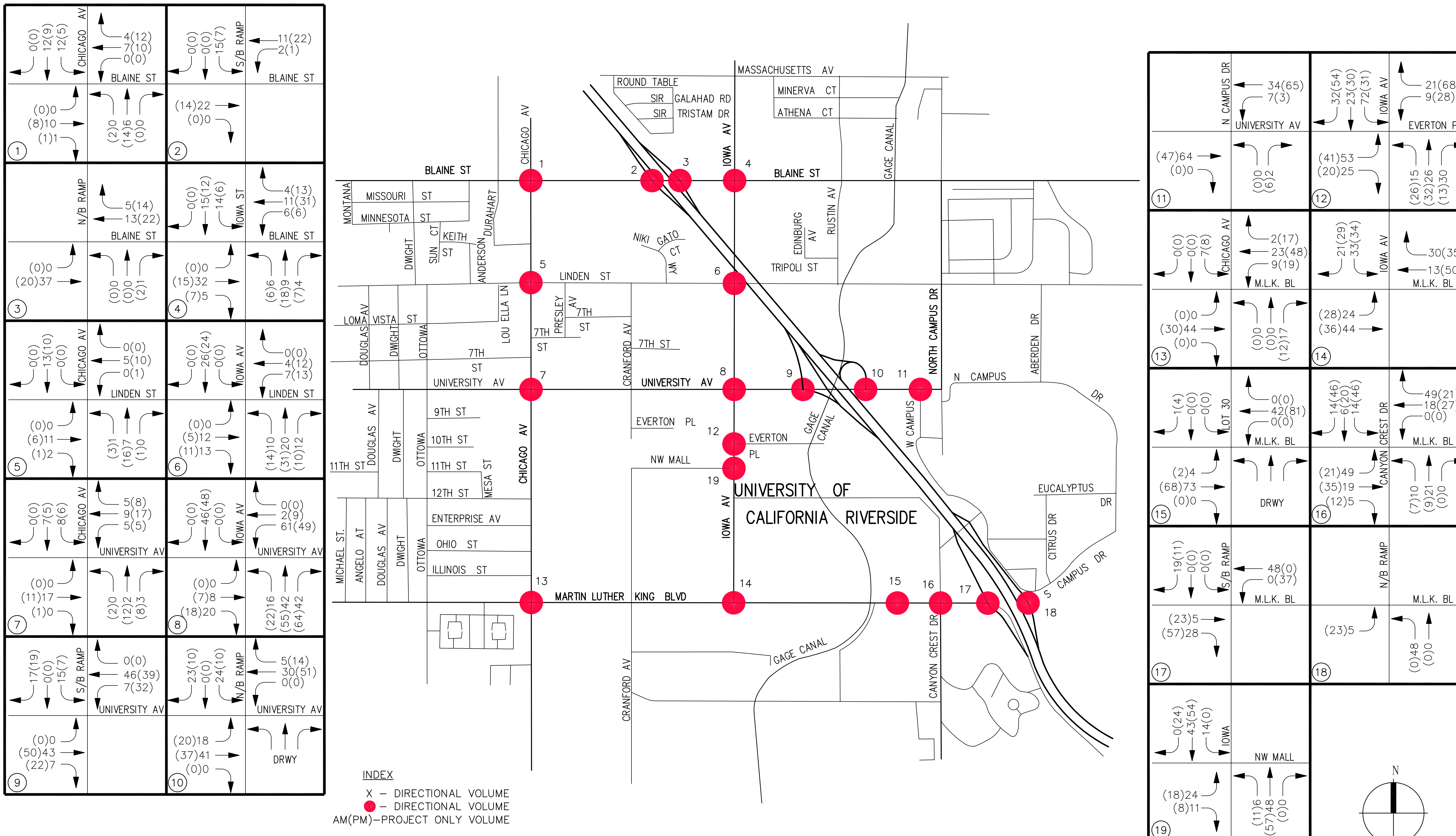

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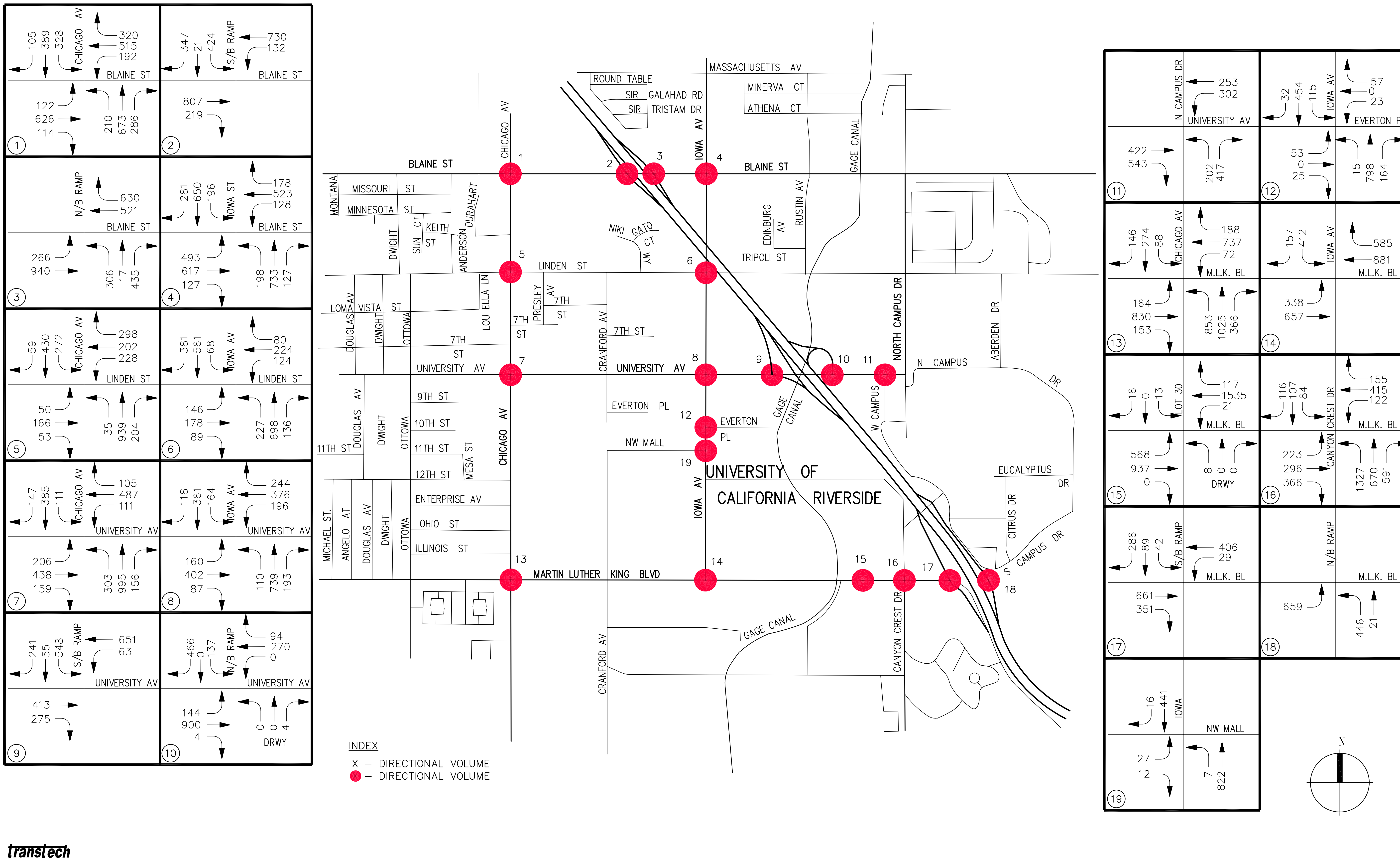

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Phase 1 (2010) Volumes AM Peak

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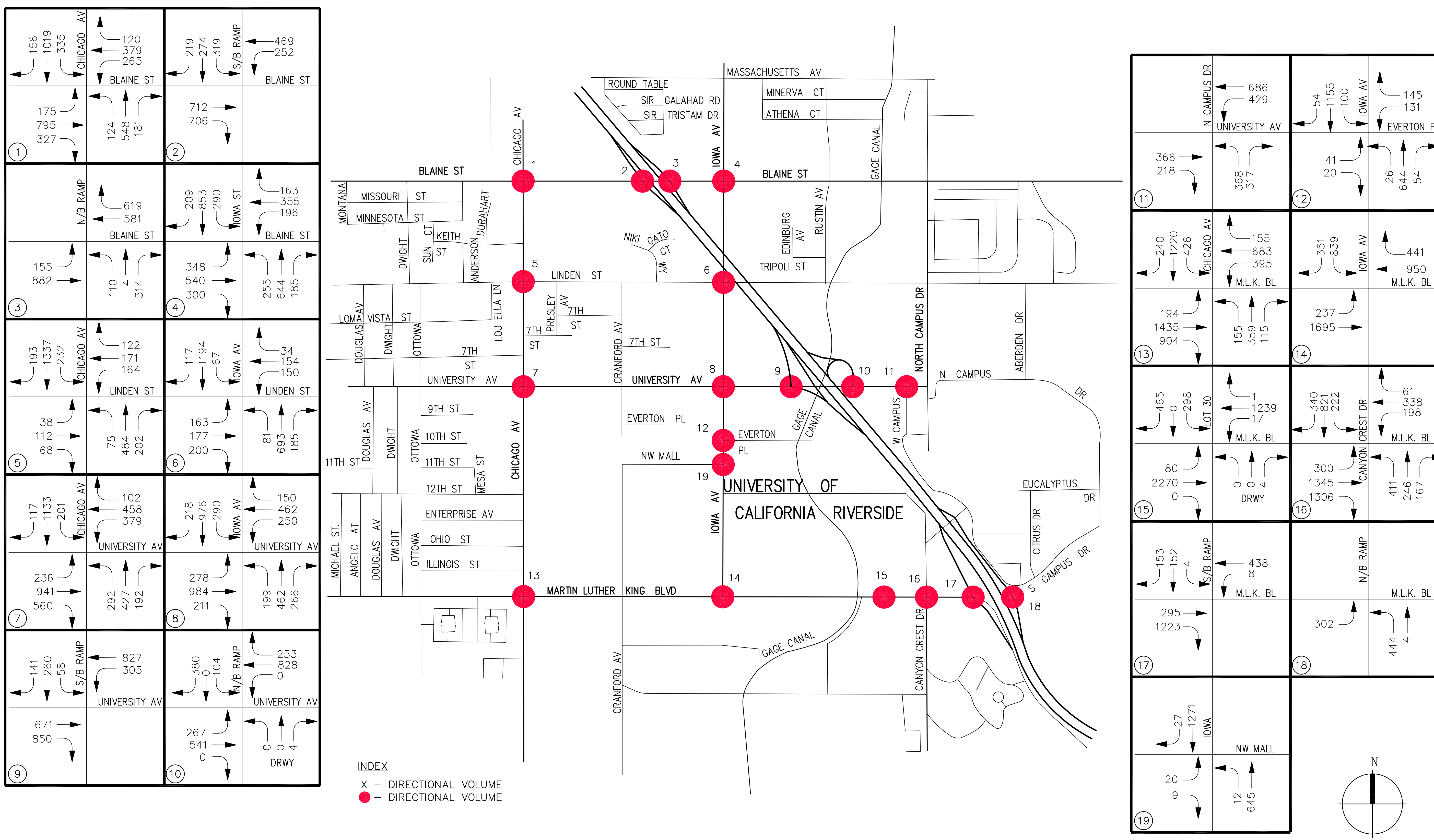

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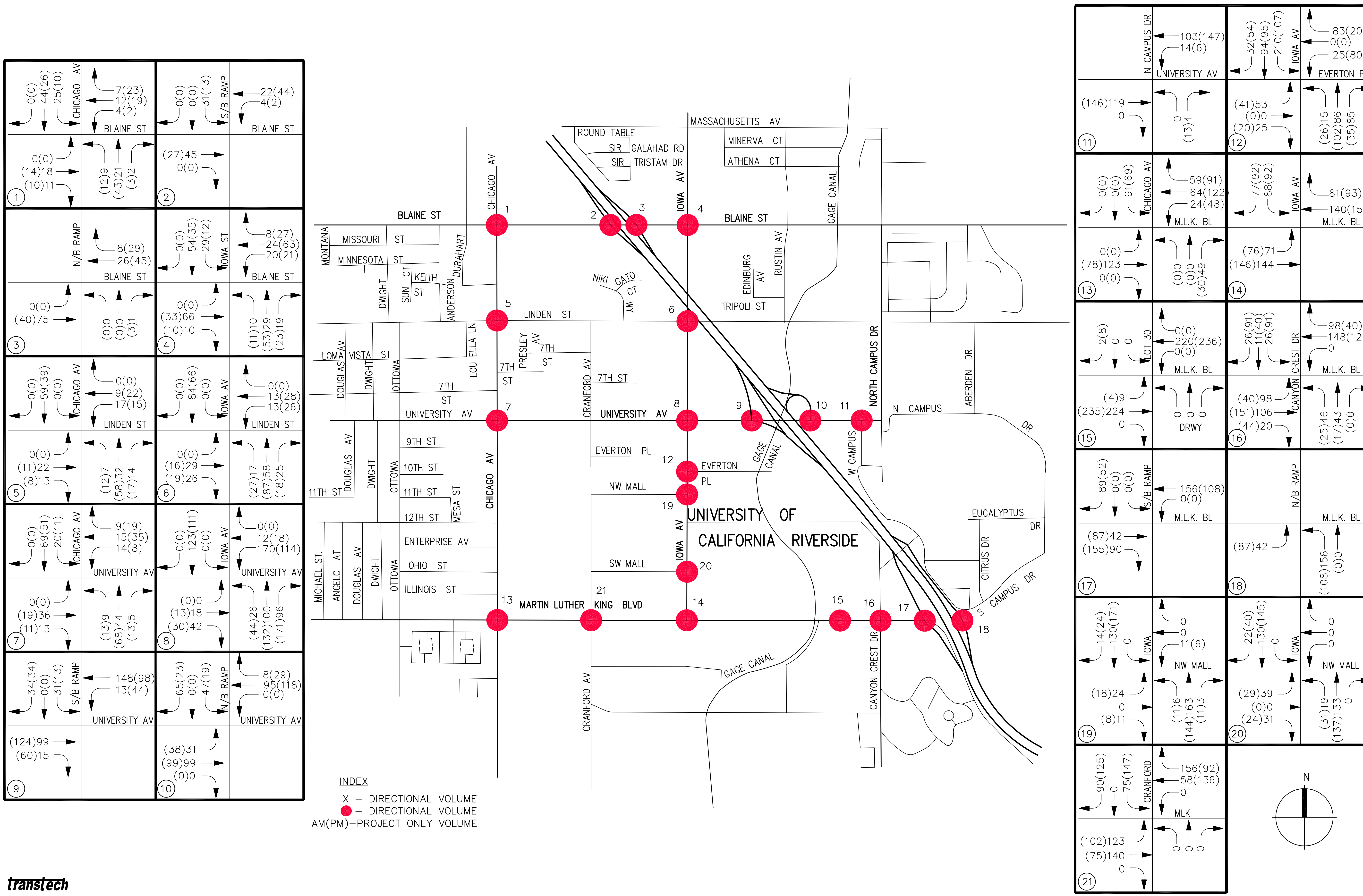

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Phase 2 (2015) Project Only Volumes AM and PM Peak

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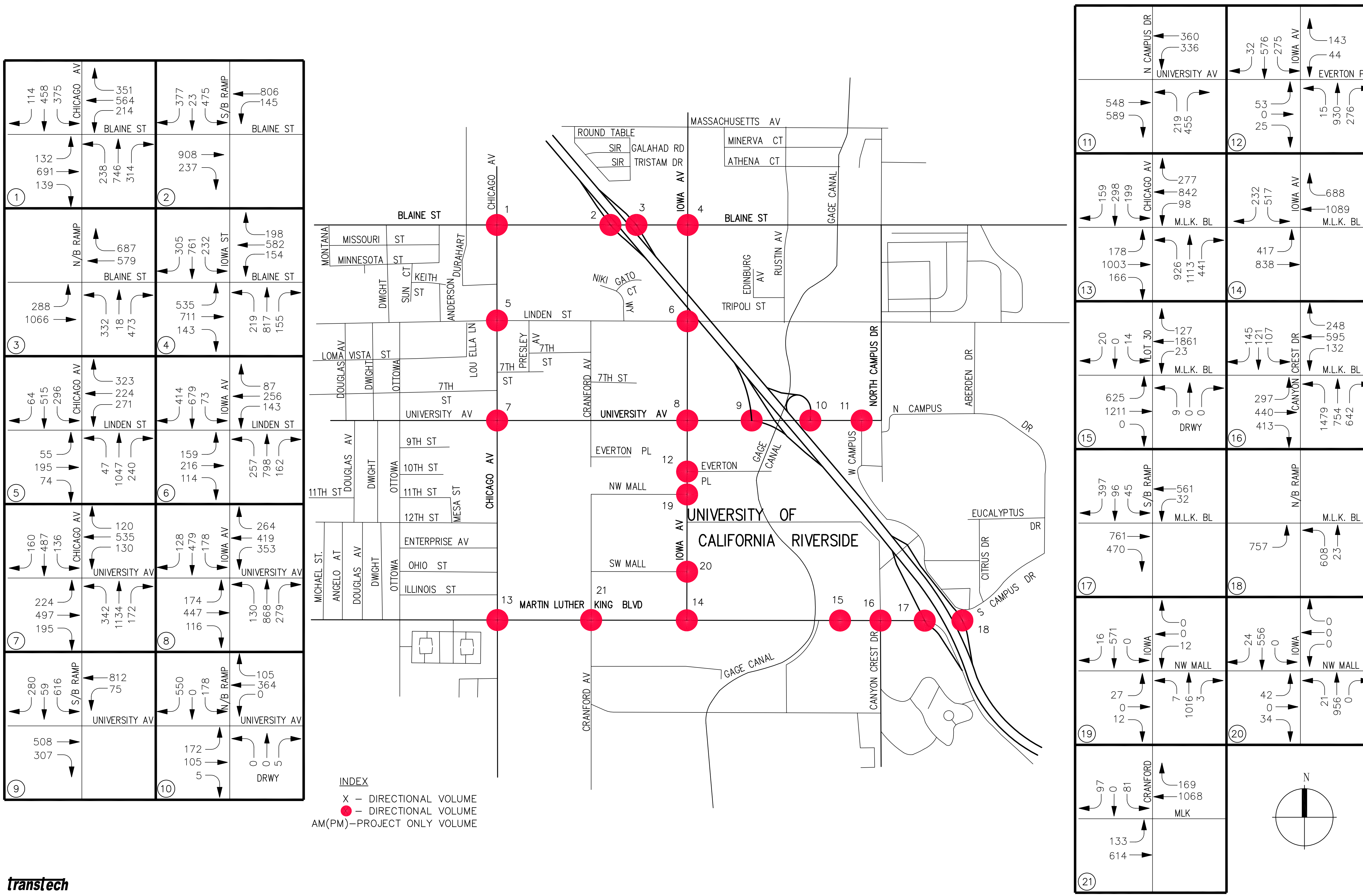

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Phase 2 (2015) Volumes AM Peak

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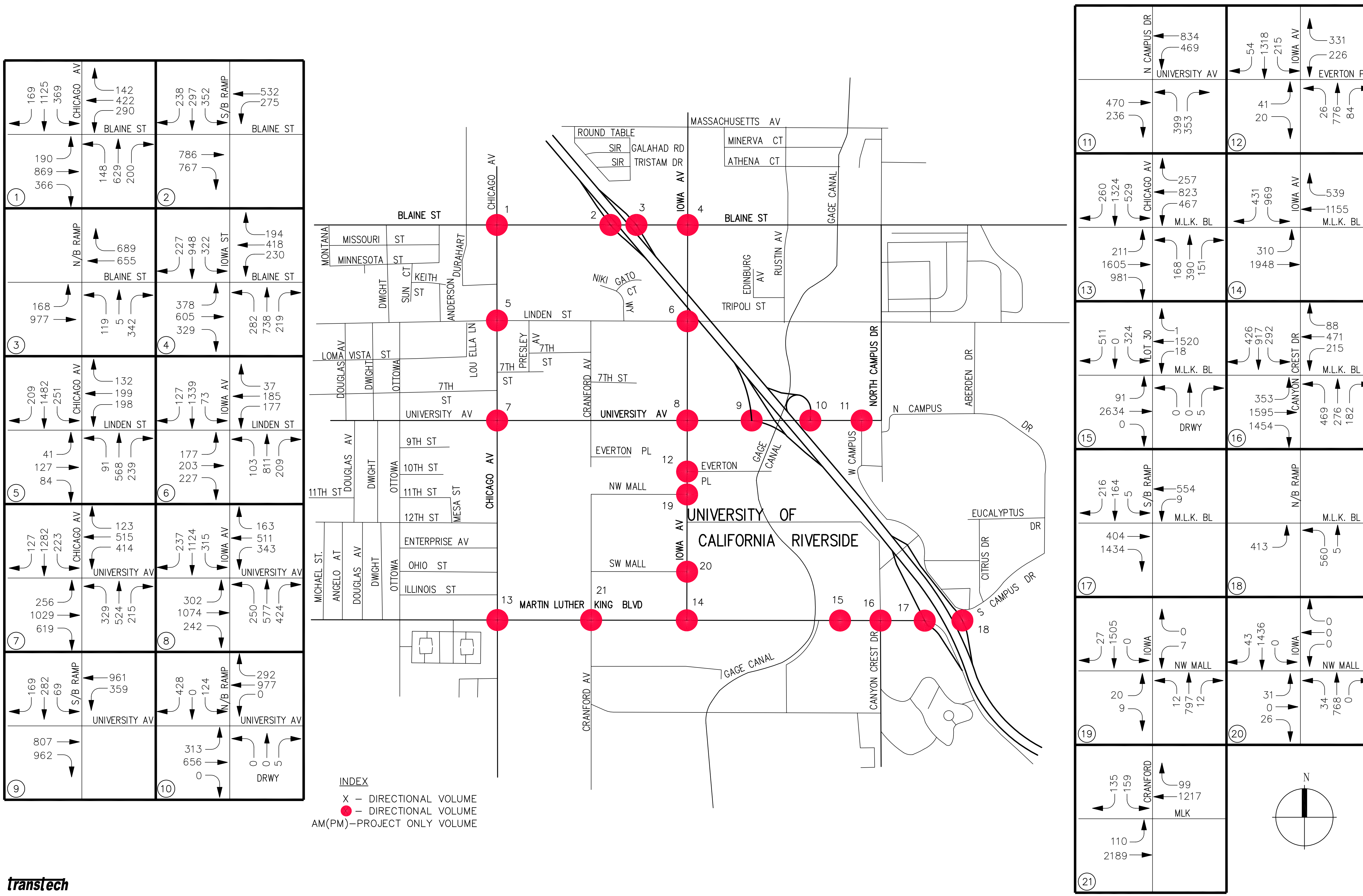

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Sheet Title Figure 7-20

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Phase 2 (2015) Volumes PM Peak

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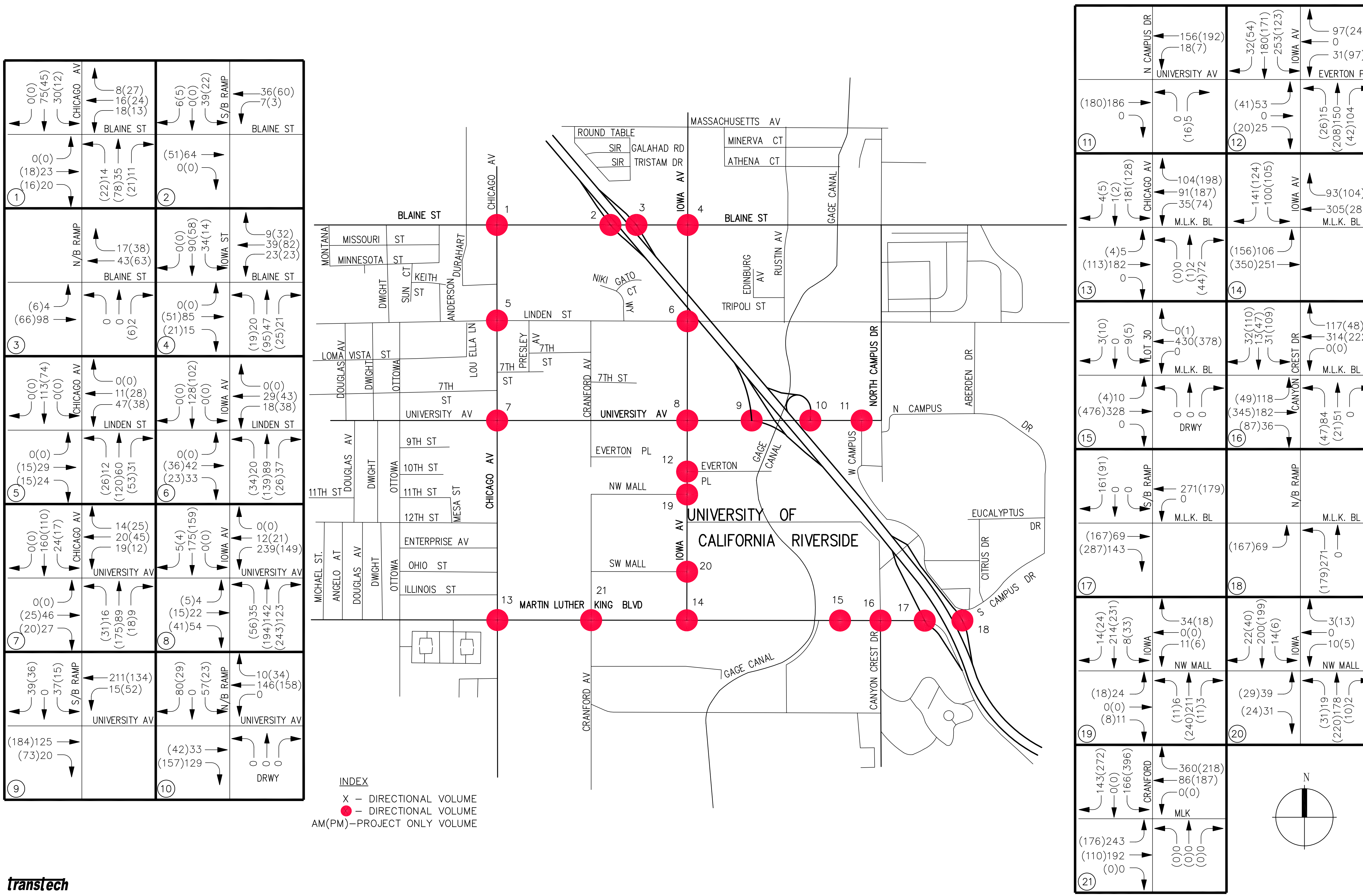

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Phase 3 (2020) Project Only Volumes AM and PM Peak

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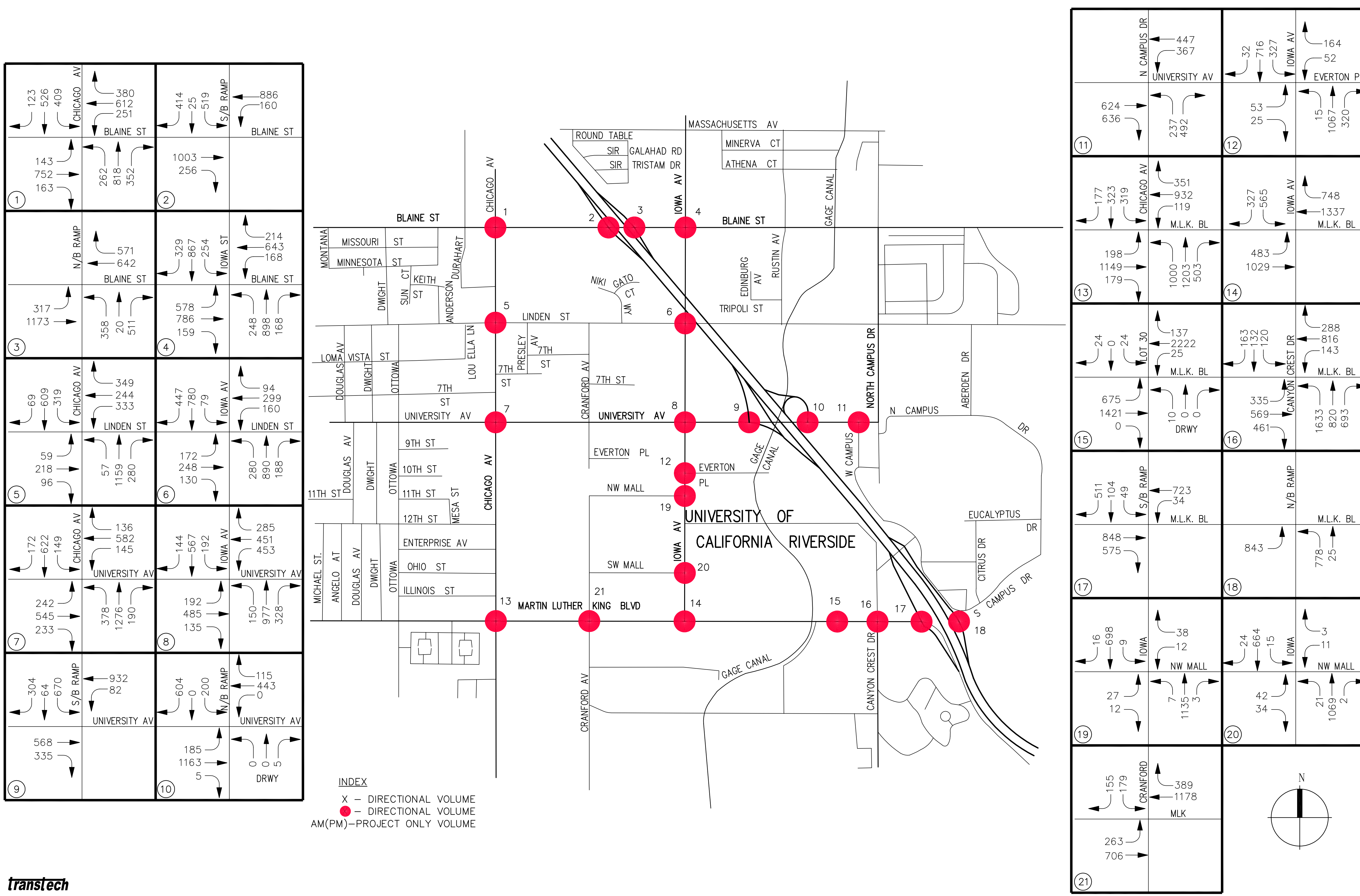

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West Campus Development

Phase 3 (2020) Volumes AM Peak

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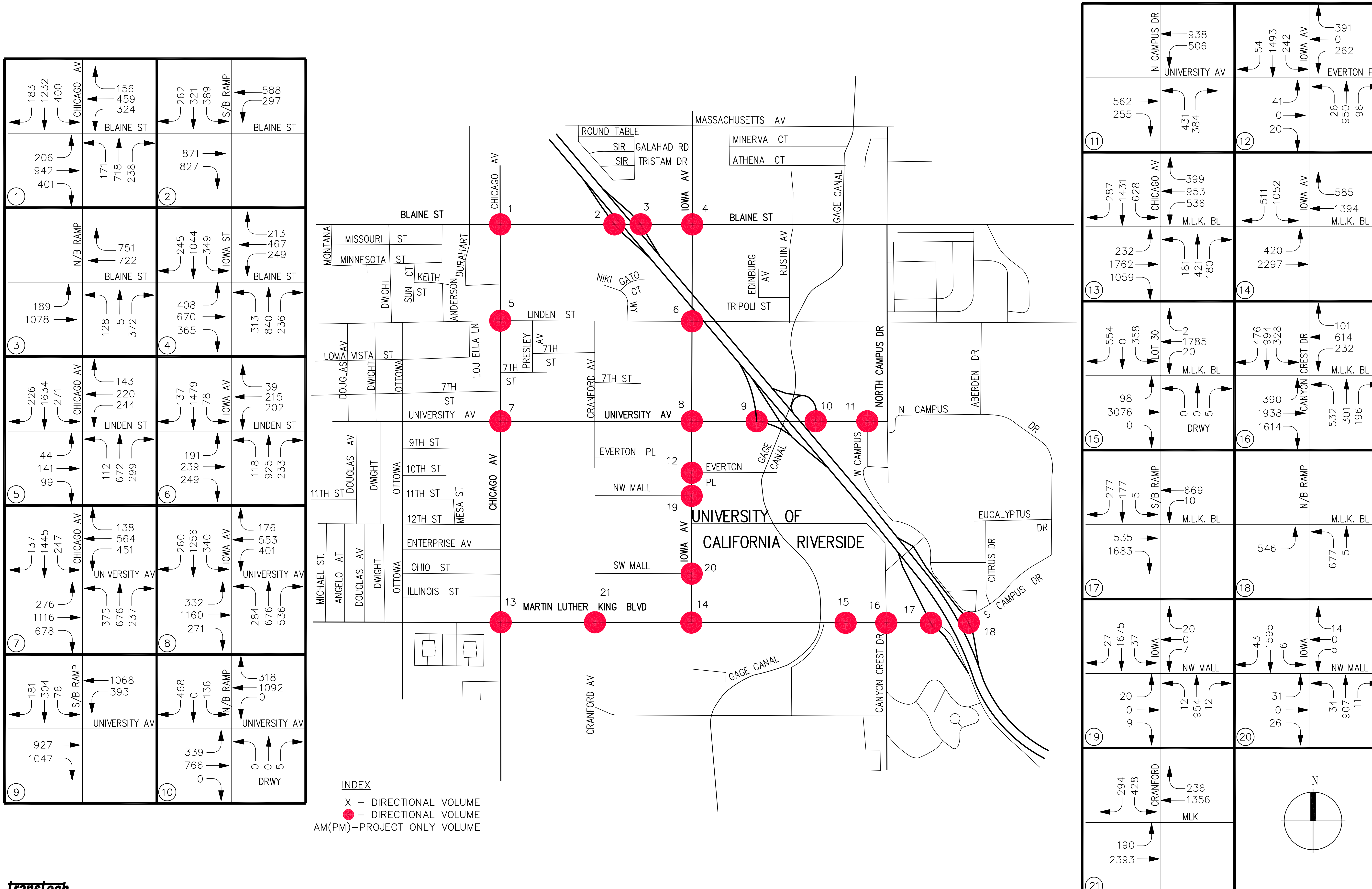

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West Campus Development
Phase 3 (2020) Volumes PM Peak

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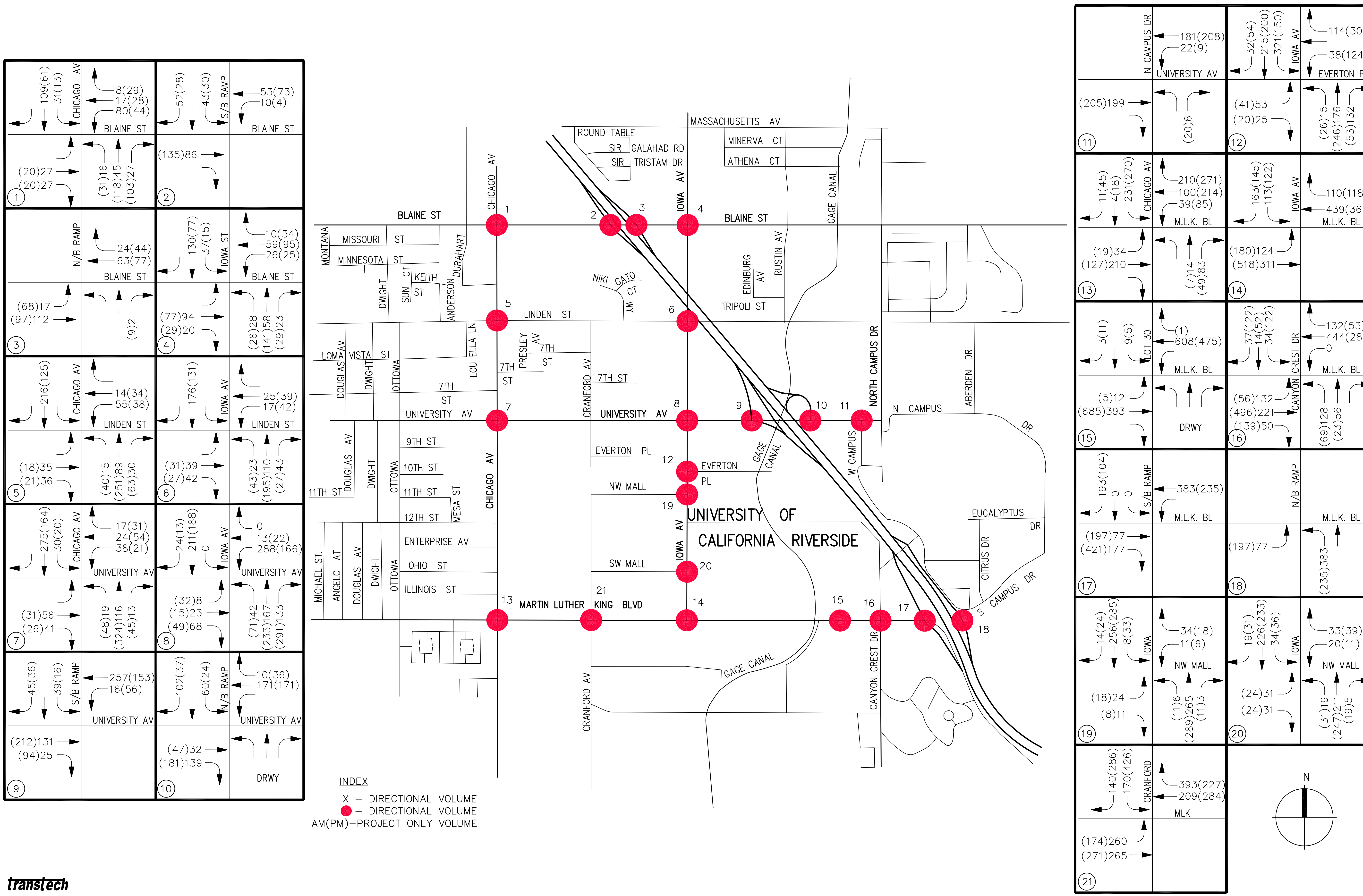

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Phase 4 (2025) Project Only Volumes AM and PM Peak

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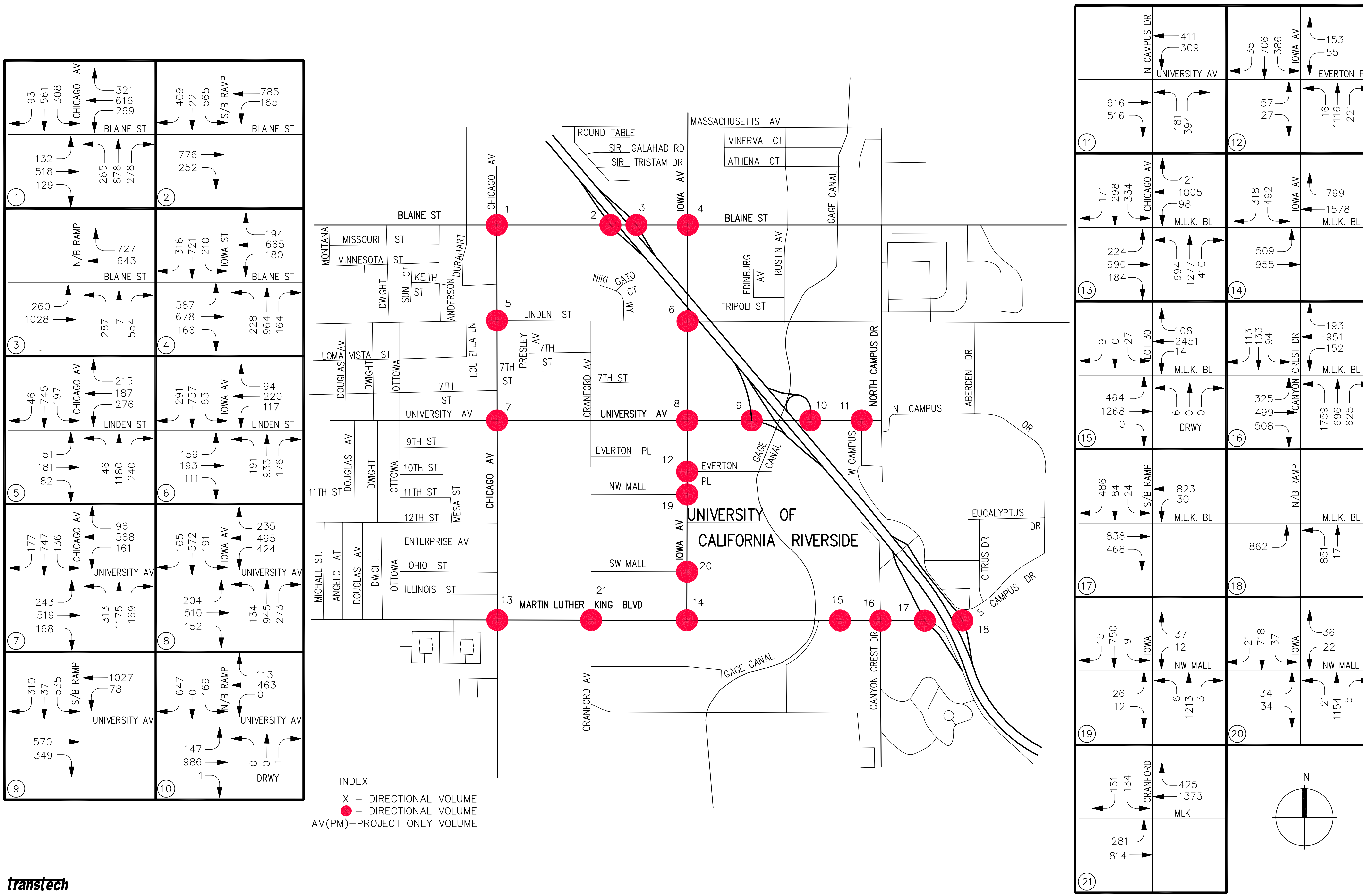

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West Campus Development

Phase 4 (2025) Volumes AM Peak

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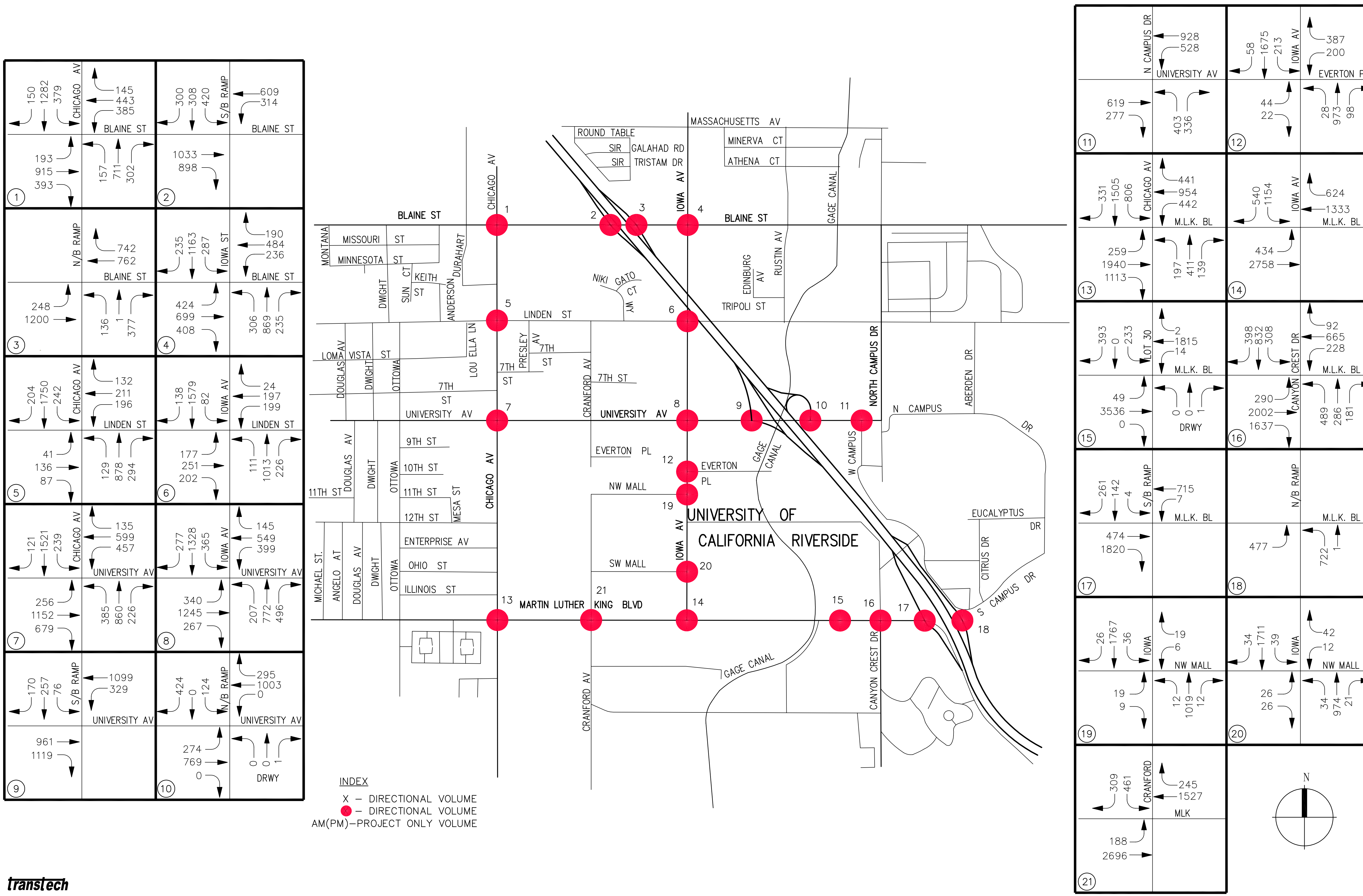

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West Campus Development

Phase 4 (2025) Volumes PM Peak

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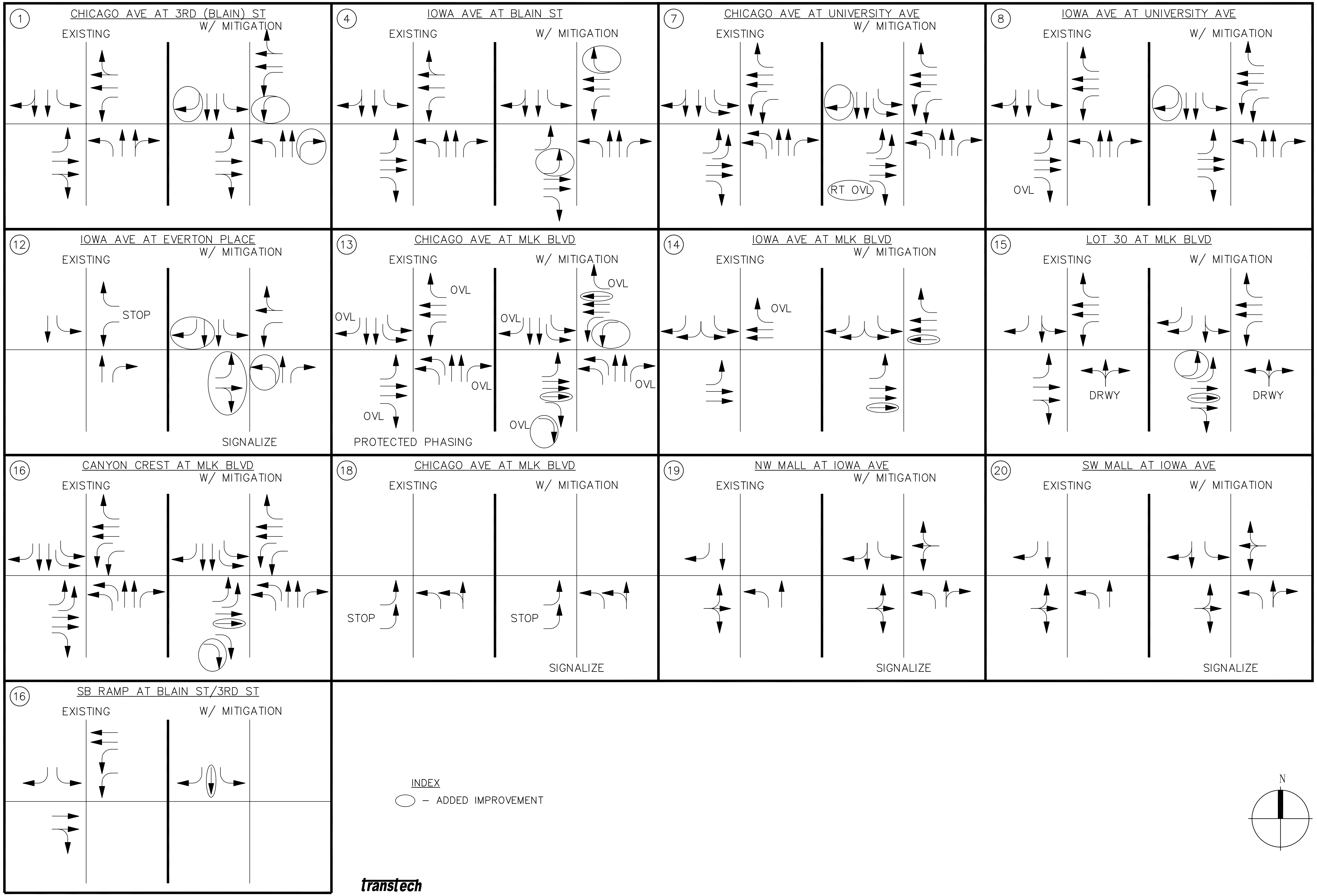

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West Campus Development

Needed Mitigation Measures

Sheet No.

CHAPTER 8

COOLING AND HEATING SYSTEMS

This chapter presents the analyses and recommended plans to serve West Campus buildings with the cooling and heating necessary for proper space conditioning within the buildings. There are many considerations that go into this, such as the number, size, and types of buildings; implementation phasing; code considerations; sustainability issues; and the means in which to provide the cooling and heating.

8.1 Cooling Loads

The first step is to determine the size and phasing of the cooling loads associated with West Campus development. Table 8-1 (in the appendix) shows all the future buildings and their associated projected peak cooling loads for all six phases (1A, 1B, 1, 2, 3, and 4) through to Build-Out. However, it should be noted that cooling loads will be experienced in a variety of different ways, dependent on how cooling is provided. Tables 8-2 and 8-3 (in the appendix) show building cooling loads associated with two central plant development alternatives. These are further described and summarized below.

The building peak cooling loads are based on the assumptions and criteria listed below, which are typical of these types of buildings, designed at least 20% better than Title 24 per UC Riverside's policy, in the Inland Empire region of southern California.

- Classroom and office buildings 350 sf/ton
- Child development center 350 sf/ton
- Community center 350 sf/ton
- Wet lab buildings 300 sf/ton
- Residential 450 sf/ton
- Conference 350 sf/ton
- Hospital 300 sf/ton
- Research 300 sf/ton
- Student center 300 sf/ton
- Medical office building 300 sf/ton

8.1.1 Cooling Alternatives

For the purpose of cooling loads calculations, three general alternatives are considered for providing cooling to West Campus buildings. These are more fully developed and analyzed later in this section. The three general cooling alternatives are:

- Alternative 1: Building-Local Cooling: Cooling provided locally at all buildings with unitary type HVAC equipment.

- Alternative 2: Single Campus Central Plant: Cooling provided by a single campus central plant, except for Family Housing, which has building-local cooling.

- Alternative 3: Two Campus Central Plants: Cooling provided by two central plants; one to serve the east side of West Campus, including the Academic Core and Apartments; and the other to serve the Medical School section of West Campus.

8.1.2 Cooling Load Diversity Factor

Cooling load diversity factor comes into play when buildings' cooling demands are served by a central cooling plant. For cooling provided locally at a building, the building cooling generation equipment must provide for peak cooling load. However, for cooling provided from a campus central plant, a diversity factor can be taken into account. Although the building will experience peak cooling load, all the buildings will not peak at the same time. Therefore, a campus central plant will experience a diversified peak cooling load of about 70% of the sum of the buildings' peak cooling loads. The 70% figure is derived from historical experience at southern California campuses with central cooling and heating plants.

8.1.3 Buildings Served by Central Plant(s)

Another key factor that comes into play is just what campus buildings should be connected to a central cooling plant. In the case of West Campus development, all future buildings are candidates for central plant connection with the exception of the Family Student Housing section and the Recreation Building.

Family Student Housing and its associated facilities (Child Development Center North (CDC N), Community Center North (CC N), Child Development Center South (CDC S), and Community Center South (CC S) would be best served by local unitary type HVAC equipment, since there is a desire for the occupants of those housing units to be separately-metered.

The Recreation Building and adjacent telecommunications node facility would be best served local unitary type HVAC equipment, since they are located in the Family Student Housing area of campus and across Iowa Avenue from the likely location of the Main Central Plant. Also, the telecommunications node facility needs an independent, stand-alone HVAC system. The first cost would be high to extend chilled water (CHW) piping to the Recreation Building across Iowa Avenue. However, if it is decided to interconnect a Main Central Plant and a Medical School Central Plant with CHW piping, for the purpose of back-up, then serving the Recreation Building with central plant CHW is indeed an option. This will be investigated further later in this report.

8.1.4 Number of Campus Central Plants

Yet another key factor that must be considered is whether one or two central plants are most appropriate for West Campus considering the other factors involved. One alternative is for a single heating and cooling central plant to serve the entire West Campus, except for Family Student Housing. Another alternative is for there to be two central plants, one to serve the east side of West Campus, including the Academic Core and Apartments. The Medical School section of West Campus would be served by a second heating and cooling central plant, which would also include utilities specific to it, such as medical gases, compressed air, and vacuum. See Section 8.3.5 for more discussion on these two alternatives.

8.1.5 Summary of Cooling Loads

Given the factors described above, Table 8-4 summarizes the cooling loads analysis.

Table 8-4. Cooling Loads Summary

Scenario and Phase	Cumulative Peak Cooling Load, tons	Cumulative Diversified Peak Cooling Load, tons
Alternative 1: Building-Local Cooling		
Phase 1A	1,410	987
Phase 1B	2,050	1,435
Phase 1	3,664	2,565
Phase 2	9,439	6,608
Phase 3	14,947	10,463
Phase 4 (Build-Out)	21,557	15,090
Alternative 2: Single Campus Central Plant [a]		
Phase 1A	480 [b]	336 [b]
Phase 1B	1,120 [b]	784 [b]
Phase 1	2,734	1,914
Phase 2	7,615	5,330
Phase 3	13,122	9,186
Phase 4 (Build-Out)	19,733	13,813
Alternative 3: Two Campus Central Plants: Main Central Plant [a]		
Phase 1A	480 [b]	336 [b]
Phase 1B	480 [b]	336 [b]
Phase 1	2,094	1,466
Phase 2	5,954	4,168
Phase 3	9,177	6,424
Phase 4 (Build-Out)	13,834	9,684
Alternative 3: Two Campus Central Plants: Medical School Central Plant [a]		
Phase 1A	-	-
Phase 1B	640 [b]	448 [b]
Phase 1	640 [b]	448 [b]
Phase 2	1,661	1,163
Phase 3	3,946	2,762
Phase 4 (Build-Out)	5,899	4,129

[a] without cooling loads from Family Student Housing facilities

[b] these cooling loads are covered by building-local cooling until the Main Central Plant comes on line in Phase 1 and the Medical School Central Plant comes on line in Phase 2.

8.2 Heating Loads

The first step is to determine the size and phasing of the heating loads associated with West Campus development. Table 8-5 (in the appendix) shows all the future buildings and their associated projected peak heating loads for all six phases (1A, 1B, 1, 2, 3, and 4) through to Build-Out. However, it should be noted that heating loads will be experienced in a variety of different ways, dependent on how heating is provided. Tables 8-6 and 8-7 (in the appendix) show building heating loads associated with two central plant development alternatives. These are further described and summarized below.

The building peak heating loads are based on the following assumptions and criteria, which are typical of these types of buildings, designed at least 20% better than Title 24, in the Inland Empire region of southern California:

- Classroom and office buildings 14 Btuh/sf
- Child development center 14 Btuh/sf
- Community center 14 Btuh/sf
- Wet lab buildings 16 Btuh/sf
- Residential 19 Btuh/sf
- Conference 14 Btuh/sf
- Hospital 16 Btuh/sf
- Research 16 Btuh/sf
- Student center 16 Btuh/sf
- Medical office building 16 Btuh/sf

8.2.1 Heating Alternatives

For the purpose of heating loads calculations, three general alternatives are considered for providing heating to West Campus buildings. These are more fully developed and analyzed later in this section. The three general heating alternatives are:

- Alternative 1: Building-Local Heating: Heating provided locally at all buildings with unitary type HVAC equipment.

- Alternative 2: Single Campus Central Plant: Heating provided by a single campus central plant, except for Family Student Housing which has building-local heating.

- Alternative 3: Two Campus Central Plants: Heating provided by two central plants; one to serve the east side of West Campus, including the Academic Core and Apartments; and the other to serve the Medical School section of West Campus.

8.2.2 Heating Load Diversity Factor

Heating load diversity factor comes into play when buildings' heating demands are served by a central heating plant. For heating provided locally at a building, the building heating generation equipment must provide for peak heating load. However, for heating provided from a campus central plant, a diversity factor can be taken into account. Although the building will experience peak heating load, all the buildings will not peak at the same time. Therefore, a campus central plant will experience a diversified peak heating load of about 85% of the sum of the buildings' peak heating loads.

8.2.3 Buildings Served by Central Plant(s)

Another key factor that comes into play is just what campus buildings should be connected to a central heating plant. In the case of West Campus development, all future buildings are candidates for central plant connection with the exception of the Family Student Housing section and the Recreation Building.

Family Student Housing and its associated facilities (Child Development Center North (CDC N), Community Center North (CC N), Child Development Center South (CDC S), and Community Center South (CC S) would be best served by local unitary type HVAC equipment, since there is a desire for the occupants of those housing units to be separately-metered.

The Recreation Building and adjacent telecommunications node facility would be best served local unitary type HVAC equipment, since they are located in the Family Student Housing area of campus and across Iowa Avenue from the likely location of the Main Central Plant. The first cost would be high to extend heating hot water (HHW) piping to the Recreation Building across Iowa Avenue. However, if it is decided to interconnect a Main Central Plant and a Medical School Central Plant with HHW piping, for the purpose of back-up, then serving the Recreation Building with central plant HHW is indeed an option. This will be investigated further later in this report.

8.2.4 Number of Campus Central Plants

Yet another key factor that must be considered is whether one or two central plants are most appropriate for West Campus considering the other factors involved. One alternative is for a single heating and cooling central plant to serve the entire West Campus, except for Family Student Housing. Another alternative is for there to be two central plants, one to serve the east side of West Campus, including the Academic Core and Apartments. The Medical School section of West Campus would be served by a second heating and cooling central plant, which would also include utilities specific to it, such as such as medical gases, compressed air, and vacuum. See Section 8.3.5 for more discussion on these two alternatives.

8.2.5 Summary of Heating Loads

Given the factors described above, Table 8-8 summarizes the heating loads analysis.

Table 8-8. Heating Loads Summary

Scenario and Phase	Cumulative Peak Heating Load, MMBtuh	Cumulative Diversified Peak Heating Load, MMBtuh
Alternative 1: Building-Local Heating		
Phase 1A	12.95	11.01
Phase 1B	16.98	14.44
Phase 1	27.15	23.08
Phase 2	71.90	61.11
Phase 3	111.71	94.96
Phase 4 (Build-Out)	157.39	133.78
Alternative 2: Single Campus Central Plant [a]		
Phase 1A	3.17 [b]	2.69 [b]
Phase 1B	7.20 [b]	6.12 [b]
Phase 1	17.37	14.76
Phase 2	52.70	44.80
Phase 3	92.52	78.64
Phase 4 (Build-Out)	138.20	117.47
Alternative 3: Two Campus Central Plants: Main Central Plant [a]		
Phase 1A	3.17 [b]	2.69 [b]
Phase 1B	3.17 [b]	2.69 [b]
Phase 1	13.34	11.34
Phase 2	40.76	34.65
Phase 3	64.34	54.69
Phase 4 (Build-Out)	97.12	82.56
Alternative 3: Two Campus Central Plants: Medical School Central Plant [a]		
Phase 1A	-	-
Phase 1B	4.03 [b]	3.43 [b]
Phase 1	4.03 [b]	3.43 [b]
Phase 2	11.94	10.15
Phase 3	28.18	23.96
Phase 4 (Build-Out)	41.07	34.91

[a] without heating loads from Family Student Housing facilities
[b] these heating loads are covered by building-local heating until the Main Central Plant comes on line in Phase 1 and the Medical School Central Plant comes on line in Phase 2.

8.3 Criteria for Cooling and Heating Alternatives

In paragraphs 8.1.1 and 8.1.2, three broad alternatives were presented for the purposes of identifying cooling and heating loads. In this section, those broad alternatives are more comprehensively developed to provide for a more detailed analysis that will ultimately yield a comprehensive recommended approach for heating and cooling the West Campus.

8.3.1 Criteria for Analysis

The criteria for developing and analyzing West Campus cooling and heating alternatives include the following:

- Building-local cooling and heating vs. central plant-provided cooling and heating
- Occupancies requiring individual metering vs. occupancies not requiring individual metering
- Central plant locations and number of central plants
- Phasing implications
- Cogeneration
- Central plant chillers: centrifugal vs. absorption
- Thermal energy storage (TES) vs. no TES
- Ice TES vs. chilled water TES
- Chilled water ΔT
- Heating hot water (190°F) vs. steam vs. high temperature hot water (350°F)
- Heating hot water ΔT
- Direct-buried pipes vs. utilidors vs. utility tunnels
- Cost implications

Many of the criteria can be evaluated qualitatively (i.e. site, regulatory, and ownership constraints); other criteria must be analyzed quantitatively (i.e. life cycle cost comparisons). The qualitative evaluations are addressed in the paragraphs immediately below for the purpose of winnowing down the list of alternatives to only those that warrant more detailed analysis. The quantitative analyses are presented further on in this chapter.

8.3.2 Building-Local Cooling and Heating vs. Central Plant-Provided Cooling and Heating

In a campus environment, such as the UC Riverside West Campus, it is a given that, unless there are other compelling reasons, central plant-provided cooling and heating is more energy-efficient, O&M-friendly, and cost-effective than building-local cooling and heating. UC Riverside's East Campus is served by a central plant, and as such, the campus personnel are fully familiar with the operation and maintenance (O&M) of central plant systems.

For this criterion then, it is generally given that central plant-provided cooling and heating will be used instead of building-local cooling and heating, except for the special cases described below.

The Recreation Building and adjacent telecommunications node facility would be best served local unitary type HVAC equipment, since they are located in the Family Student Housing area of campus and across Iowa Avenue from the likely location of the Main Campus Central Plant. The first cost would be high to extend CHW and HHW piping to the Recreation Building. Consequently, the Recreation Building does not have campus cooling and heating infrastructure implications. However, if it is decided to interconnect a Main Campus Central Plant and a Medical School Central Plant with CHW and HHW piping, for the purpose of back-up, then serving the Recreation Building with central plant CHW and HHW is indeed an option. This will be investigated further later in this report.

8.3.3 Occupancies Requiring Individual Metering vs. Occupancies Not Requiring Individual Metering

The Family Student Housing (Family Apartments and Family Townhouses) are to be constructed in Phases 1A and 2 as residential buildings. The numerous residential units need to be individually-metered for electricity and gas. Family Student Housing will receive electricity and gas from off-site utilities. Their cooling and heating will be powered by electricity and/or fueled by gas.

All other buildings, planned for the West Campus, will be connected to the central plants, and will be individually metered for chilled water and heating hot water for energy tracking.

For this criterion then, it is given that Family Student Housing will use building-local cooling and heating (i.e. will use local unitary type HVAC equipment), and will not be connected to the central plant. Consequently, Family Housing does not have any further campus cooling and heating infrastructure implications.

8.3.4 Central Plant Locations and Number of Central Plants

Central plants are ideally located near the loads they serve. However, as “industrial” processes, they are most appropriately located away from the more aesthetic facilities and buildings that are more directly-involved in the educational mission of the campus. These seemingly contradictory criteria must be reconciled to arrive at the optimal locations for campus cooling and heating plants. Furthermore, the central plant location(s) should be consistent with the phased development pattern of the campus.

Considering the build-out master plan of West Campus, it is clear that a central plant cannot be located within the Academic core on the east side of West Campus. It cannot be located within the Apartments section; Family Student Housing section; Medical School section; nor within the designated open space areas of the quads, Gage Canal, Northwest Mall, Southwest Mall, or the fields between the two Family Student Housing developments. The only two logical locations are as follows:

1. Site between the existing electrical substation and building W6 on the east side of West Campus. This location has several advantages:

    - It is part of and adjacent to an “industrial” area (i.e. does not intrude upon the aesthetic Academic core).

    - It is on the perimeter of the campus (i.e. does not intrude upon the aesthetic Academic core).

    - It is adjacent to the electrical substation, which will be convenient for servicing the central plant’s large electrical load.

    - Its location near the freeway is not problematical from a noise perspective.

- It is relatively close to the cooling and heating loads it will serve (i.e. the east side of West Campus). Because of this, then length and cost of piping distribution systems can be minimized.

2. Site in the "Service Area" north of the Medical School section (specifically north of building H1). This location has three advantages:

   - It is part of a designated "service area" (i.e. does not intrude upon the aesthetic Medical School area).

   - It is on the perimeter of the campus (i.e. does not intrude upon the aesthetic Medical School area).

   - It is relatively close to the cooling and heating loads it will serve (i.e. the Medical School area on the west side of West Campus). Because of this, then length and cost of piping distribution systems can be minimized.

Given the only two logical locations of the central plant(s), as described above, the issue then becomes is it best to site two central plants (i.e. one at each of the two locations) or just one central plant at one of those two locations. It is evident that the two central plants alternative is most desirable for the following reasons:

- Under the single central plant alternative, the cost of long lengths of piping and utilities tunnel through the Family Housing and Recreation Fields area would be prohibitive relative to the benefit of that approach. There are essentially no cooling and heating loads to be served in that area, which means very little benefit would be gained by piping and tunneling such a long distance through that area. The two central plants alternative avoids this cost problem.

- Under the single central plant alternative the high first cost of piping and tunnels through the Family Housing and Recreation Fields area is exacerbated by the West Campus Phasing plan. Basically, the full cost of those pipes and tunnels would be borne early on in Phase 2, sized to serve the built-out Medical School. But most of the Medical School buildings will come on line much later in Phases 3 and 4. This means the single central plant alternative requires a large investment in infrastructure early on, which will remain substantially under capacity for many years. The two central plants alternative avoids this large up-front investment problem.

- Under the single central plant alternative, the on-going energy cost of pumping chilled water and heating hot water over such long distances is a significant disadvantage. The two central plants alternative avoids this high pumping energy cost problem.

- Under the single central plant alternative, there is an added complication and cost of piping and tunneling under Iowa Avenue. The two central plants alternative avoids this complication and cost problem.

8.3.5 Phasing Implications

8.3.5.1 Phase 1A

Phase 1A is the very first implementation stage. It consists of the north phase of Family Student Housing (F1 through F32), Child Development Center North (CDC N), and Community Center North (CC N). None of these facilities will be served by the Main Central Plant so they don't figure any further into this analysis. One academic building (W4) will also be implemented under Phase 1A. Initially, this building will not be served by the Main Central Plant since Main Central Plant is not to be implemented until Phase 1. However, the HVAC systems for W4 will be designed so that they can be later connected to central plant service.

No central plant or CHW/HHW distribution piping will be implemented under Phase 1A.

8.3.5.2 Phase 1B

Under Phase 1B, the first building (M4) of the Medical School will be constructed. Initially, this building will not be served by the Medical School Central Plant since Medical School Central Plant is not to be implemented until Phase 2. However, the HVAC systems for M4 will be designed so that they can be later connected to central plant service.

No central plant or CHW/HHW distribution piping will be implemented under Phase 1B.

8.3.5.3 Phase 1

West Campus will generally be developed from east to west, and north to south. Under Phase 1, three academic buildings (W1, W3, and W5) will be located in the northeast area of the campus. These will all need to be served by the central plant, hereinafter referred to as the Main Central Plant. See Figure 8-1 for Phase 1 buildings and cooling and heating infrastructure development.

Given the location of these first Phase 1 developments, it would follow that the Main Central Plant (or at least one of them) must be located next to the existing electrical substation on the east side of West Campus. Main chilled water supply (CHWS), chilled water return (CHWR), heating hot water supply (HHWS), and heating hot water return (HHWR) piping would be installed from the Main Central Plant, west towards building W5, north along the east side of buildings W3/W4/W5, west along the north side of building W3, and west along the south side of buildings W1 and UNEX, terminating just southeast of UNEX. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR would extend to the individual buildings. Building W4, constructed under Phase 1A, would be connected to central plant service under Phase 1, and its building chiller and boiler plant would be retained in standby.

8.3.5.4 Phase 2

Under Phase 2, six academic buildings (W2, W6, W7, W8, W14, and W15) will be constructed generally in the central part of the Academic core (east end of West Campus). Also, Apartments, A1 through A15, will be located in the north central area of the campus. Finally, the Recreation Building (R) will be constructed. These will all need to be served by the already existing, but expanding, Main Central Plant, located next to the existing electrical substation on the east side of West Campus. (Family Student Housing (F33 through F60), Child Development Center South (CDC S), Community Center South (CC S), and the Recreation Building (R) will also be implemented under Phase 2, but will not be served by the Main Central Plant so they don't figure into this analysis.) See Figure 8-2 for Phase 2 buildings and cooling and heating infrastructure development.

Main CHWS, CHWR, HHWS, and HHWR piping would need to be extended from the Phase 1 terminus just southeast of UNEX south along the west side of International Village and buildings W7 and W15, east along the south side of buildings W15 and W14, terminating just southeast of building W14. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR would extend to the buildings.

Also under Phase 2, three buildings (H2, M3, and M6) of the Medical School at the west end of West Campus will be constructed. These are a long distance from the Main Central Plant at the very east end of West Campus. Main CHWS, CHWR, HHWS, and HHWR piping from the Main Central Plant would need to be piped this long distance, including the distance through the non-central-plant-served, Family Student Housing Section. Furthermore, the main CHWS, CHWR, HHWS, and HHWR piping in the academic core and all the way to the Medical School would need to be upsized to accommodate the CHW and HHW flows associated with full build-out of the Medical School. Finally, CHW and HHW pumping costs would be increased to distribute CHW and HHW this much longer distance.

Considering this, it would be more appropriate for the Medical School section of West Campus to be served by a second central plant, located in the "Service Area" north of the Medical School (specifically north of building H1). This second central plant, hereinafter referred to as the Medical School Central Plant, would also include utilities specific to the Medical School, such as medical gases, vacuum, and possibly steam.

Main CHWS, CHWR, HHWS, and HHWR piping (and other utilities piping) would be installed from the Medical School Central Plant, south along the west side of buildings H2, M3, M4, and M6, terminating just southwest of building M6. Building M4, constructed under Phase 1B, would be connected to central plant service under Phase 2, and its building chiller and boiler plant would be retained in standby.

8.3.5.5 Phase 3

Under Phase 3, seven academic buildings (W16, W17, W18, W19, W20, W21, and W22) will be constructed generally in the south part of the Academic core (east end of West Campus). Also, Apartments, A16 through A31, will be located in the central area of the campus. These will all need to be served by the already existing, but expanding, Main Central Plant, located next to the existing electrical substation on the east side of West Campus. See Figure 8-3 for Phase 3 buildings and cooling and heating infrastructure development.

Main CHWS, CHWR, HHWS, and HHWR piping would not need to be extended from the Phase 2 terminus just southeast of building W14 under Phase 3 project. Only smaller branch piping for CHWS, CHWR, HHWS, and HHWR would extend to the individual buildings.

Also under Phase 3, more Medical School buildings (H1, M2, M5, M7, MOB5, MOB6, and MOB7) at the west end of West Campus will be constructed. These will all need to be served by the already existing, but expanding, Medical School Central Plant, located in the "Service Area" north of the Medical School (specifically north of building H1).

Main CHWS, CHWR, HHWS, and HHWR piping (and other utilities piping) would need to be extended from the Phase 2 terminus just southwest of building M6, west along the north side of buildings M7/MOB7/MOB6, terminating just north of building MOB6. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR (and other utilities piping) would extend to the individual buildings.

8.3.5.6 Phase 4

Under Phase 4, ten academic buildings (W9, W10, W11, W12, W13, W23, W24, W25, W26, and W27) will be constructed generally in the southeast part of the Academic core (east end of West Campus). These will all need to be served by the already existing, but expanding, Main Central Plant, located next to the existing electrical substation on the east side of West Campus. See Figure 8-4 for Phase 4 buildings and cooling and heating infrastructure development.

Main CHWS, CHWR, HHWS, and HHWR piping would need to be extended from the Phase 2 terminus just southeast of building W14, west along the north side of building W19 and south side of building W13, north between buildings W13 and W12 and north between buildings W9 and W10, and back to the Main Central Plant, thus completing the loop. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR would extend to the individual buildings.

Also under Phase 4, more Medical School buildings (M1, MOB1, MOB2, MOB3, and MOB4) at the west end of West Campus will be constructed. These will all need to be served by the already existing, but expanding, Medical School Central Plant, located in the "Service Area" north of the Medical School (specifically north of building H1).

Main CHWS, CHWR, HHWS, and HHWR piping (and other utilities piping) would need to be extended from the Phase 3 terminus just north of building MOB6, north between buildings MOB3 and MOB4 and north between buildings MOB2 and M1, north along the east side of building MOB1, east along the north side of PMOB (parking structure), and back to the Medical School Central Plant, thus completing the loop. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR (and other utilities piping) would extend to the individual buildings.

8.3.6 Cogeneration

Numerous studies have been conducted on cogeneration for college campuses. For the most part, cogeneration has been found to be marginally economical at best. Generally, it has been found to be economically infeasible in the current economic climate of energy rates. Cogeneration is mostly pursued where there are other compelling reasons, such as a desire for energy independence to secure against rolling blackouts.

At UC Riverside, there are additional economic reasons to not pursue cogeneration as part of a West Campus central plant. Cogeneration is especially problematic because UC Riverside enjoys low electricity rates from the City of Riverside, largely due to its use of thermal energy storage (TES), and its non-use of cogeneration. If cogeneration were implemented on West Campus, this could jeopardize UC Riverside's favorable electricity rates.

Because of this evident economic downside associated with cogeneration, it is recommended not to pursue cogeneration as part of the West Campus infrastructure development.

8.4 Central Chiller Plants

Alternatives 2 and 3 entail use of central plants to provide campus cooling. These are described as follows:

- Alternative 2: Single Campus Central Plant: Cooling provided by a single campus central plant, except for Family Housing which has building-local cooling.

- Alternative 3: Two Campus Central Plants: Cooling provided by two central plants; one to serve the east side of West Campus, including the Academic Core and Apartments; and the other to serve the Medical School section of West Campus.

Sustainability measures are included in the central cooling plants as described in the various paragraphs below, and as described in more detail in the paragraphs of section 16.4.1 in Chapter 16 – Sustainability Considerations.

8.4.1 Central Chiller Plant Capacities

Under Alternatives 2 and 3, central chiller plants must have certain capacities to keep up with campus development. Table 8-9 shows cumulative diversified peak cooling loads for each of the six phases (1A, 1B, 1, 2, 3, and 4), as well as the corresponding required chiller plant capacities and chiller modules that will make up those capacities. These capacities assume no use of thermal energy storage (TES).

Table 8-9. Cooling Loads and Required Central Plant Chiller Capacities (without TES)

Alternative and Phase	Cumulative Diversified Peak Cooling Loads, tons	Required Chiller Capacities, tons	Chiller Modules
Alternative 2: Single Campus Central Plant [a]			
Phase 1A	336	0	(Building W4 has a 500-ton building chiller)
Phase 1B	784	0	(Building M4 has a 650-ton building chiller)
Phase 1	1,466	2,400	(2) 1,200-ton
Phase 2	5,330	7,200	(3) 1,600-ton + (2) 1,200-ton
Phase 3	9,186	12,000	(6) 1,600-ton + (2) 1,200-ton
Phase 4 (Build-Out)	13,813	15,200	(8) 1,600-ton + (2) 1,200-ton
Alternative 3: Two Campus Central Plants: Main Central Plant [a]			
Phase 1A	336	0	(Building W4 has a 500-ton building chiller)
Phase 1B	336	0	(Building W4 has a 500-ton building chiller)
Phase 1	1,466	2,400	(2) 1,200-ton
Phase 2	4,168	5,600	(2) 1,600-ton + (2) 1,200-ton
Phase 3	6,424	8,800	(4) 1,600-ton + (2) 1,200-ton
Phase 4 (Build-Out)	9,684	12,000	(6) 1,600-ton + (2) 1,200-ton
Alternative 3: Two Campus Central Plants: Medical School Central Plant [a]			
Phase 1A	-	0	-
Phase 1B	448	0	(Building M4 has a 650-ton building chiller)
Phase 1	448	0	(Building M4 has a 650-ton building chiller)
Phase 2	1,163	2,400	(1) 1,200-ton + (2) 600-ton
Phase 3	2,762	5,200	(3) 1,200-ton + (2) 600-ton
Phase 4 (Build-Out)	4,129	6,000	(4) 1,200-ton + (2) 600-ton

[a] without cooling loads from Family Student Housing facilities

8.4.2 Central Chiller Plants Type and Configuration

The central chiller plants will consist of electrical centrifugal chillers. The chiller plants will be designed to achieve a very high 30°F CHW ΔT, meaning chilled water supply (CHWS) at 38°F (adjustable) and chilled water return (CHWR) at 68°F. This high CHW ΔT translates into a substantial first cost savings in that CHW pumps, CHW pipes, and any CHW TES tank can be downsized proportionately while providing the same capacity. In addition, CHW pumping costs and motor horsepower energy are substantially reduced since less CHW is pumped for the same cooling capacity delivered. The implications of this are more fully described in the sustainability section.

To achieve the 30°F CHW ΔT, individual chillers will be paired up in series, with each chiller in the pair nominally achieving a 15°F CHW ΔT. The chiller pairs will be arranged in parallel. To preserve this high 30°F CHW ΔT, the design criteria for all new cooling coils on West Campus shall be designed for 40°F CHWS and 70°F CHWR.

A chiller/cooling tower plant optimization program should be included in the central plant design. This is software that considers all the energy consuming components of the chiller/cooling tower systems, and optimizes the operational level of those components to meet cooling load with minimum energy consumption.

8.4.3 Central Chiller Plant Capacities with Back-up Capacity

Table 8-9 shows cumulative diversified peak cooling loads for each of the six phases (1A, 1B, 1, 2, 3, and 4), as well as the corresponding required chiller plant capacities and chiller modules that will make up those capacities. The required chiller plant cooling capacities are based on the need to satisfy the cumulative diversified peak cooling load plus a measure a back-up capacity.

The amount of back-up capacity needed is essentially a risk analysis. A conservative approach would be to be able to satisfy the cumulative diversified peak cooling load in the event one piece of equipment went out of service, or put another way, having a spare chiller to bring on line in case an operating chiller goes out of service; or put yet another way, having a standby chiller available at all times.

In the early years, when the chiller plant is smaller with fewer pieces of equipment, a single equipment failure would have a proportionately greater adverse impact on cooling capacity deficiency. A single machine failure would mean experiencing cooling deficiency over a wider range of climate conditions, such as those with moderate to peak cooling loads. In this case, a higher percentage of back-up capacity is warranted. Furthermore, the additional capacity is not merely sunk cost, but represents chiller capacity that will be needed in the near future anyway as the campus expands.

In the later years, when the chiller plant is larger with many pieces of equipment, a single equipment failure would have a proportionately smaller adverse impact on cooling capacity deficiency. In this case, a lower percentage of back-up capacity is warranted.

Also, it is important to note that building W4 will be constructed during Phase 1A and will have a 500-ton building chiller since Main Central Plant will not be implemented at that time. That building chiller will be retained as 500 tons of standby chiller capacity, which figures into the back-up cooling capacity analysis.

Similarly, building M4 will be constructed during Phase 1B and will have a 650-ton building chiller since Medical School Central Plant will not be implemented at that time. That building chiller will be retained as 650 tons of standby chiller capacity, which figures into the back-up cooling capacity analysis.

So, considering Table 8-9 above, in each phase, there is generally sufficient back-up cooling capacity to allow the central chiller plant to satisfy most of the cumulative diversified peak cooling load with the largest single piece of equipment out of service.

8.4.4 Chiller Modules

Table 8-9 shows the chiller modules recommended to make up the required cooling capacities. Up to two chiller module sizes are used within each chiller plant. One is a large size; the other is smaller. The large size is needed in recognition that the central chiller plant will significantly expand over time. Large modules are preferred so that there is not a proliferation of many pieces of small equipment as the plant expands. However, a smaller chiller size is needed to handle periods of the year when there are low cooling load conditions, particularly during the early years of the plant. So, for simplicity sake, a maximum of two chiller module sizes is considered in each plant; a large size for convenient expansion, and a small size to efficiently handle low cooling load conditions.

8.4.5 Electrical Centrifugal Chillers

Individual chillers will be paired up series, with each chiller in the pair nominally achieving a 15°F CHW ΔT. As such, the chiller plants will achieve a very high 30°F CHW ΔT, meaning chilled water supply (CHWS) at 38°F (adjustable) and chilled water return (CHWR) at 68°F. The chiller pairs will be arranged in parallel.

These chillers could be supplied by a number of chiller manufacturers, including Carrier, York, and Trane. For the purpose of this utilities infrastructure master plan, a selection was based around the Carrier Evergreen model 19XRV centrifugal chiller. Each chiller in this application would have the following features:

- Type — Electrical centrifugal
- Refrigerant — R-134a (HFC-134a) (non-ozone-depleting refrigerant)
- Chiller pair efficiency — 0.53 kW/ton or less
- Chiller pair NPLV — 0.39 kW/ton or less
- Compressor motor — with variable frequency drive (VFD)
- CHW EWT (CHWR) — Chiller #1: 68°F Chiller #2: 51°F
- CHW LWT (CHWS) — Chiller #1: 51°F Chiller #2: 38°F
- Evaporator tubes — Super E2 (SUPE2), 0.035 inch thick copper
- CDW EWT (CDWS) — 80°F

- CDW LWT (CDWR) 90°F
- Condenser tubes Spike Fin III (SPK3), 0.035 inch thick copper

It is recommended that R-134a be used as the refrigerant for the new chillers. This refrigerant has a zero ozone depletion factor (ODF). A chiller using refrigerant R-123 could be considered in this application. R-123 has an extremely low ODF. However, an R-134a chiller is recommended because it is believed that being able to claim zero ODF is important for sustainability considerations.

Marine waterboxes are recommended for the chiller CDW pipe connections. However, flanged connections are sufficient for the chiller CHW pipe connections.

8.5 Chilled Water Distribution Systems

Each CHW distribution system consists of the central plant cooling generation equipment and ancillary equipment such as the CHW pumps, the campus CHW distribution piping, and the building CHW components.

8.5.1 CHW Distribution Systems in the Central Cooling Plants

The central cooling plants CHW distribution systems will each use a constant flow primary loop/variable flow secondary loop configuration. Chilled water will be pumped as constant flow through the chiller evaporators using constant flow primary CHW pumps, each dedicated to their chiller. The chilled water distribution around campus will be in a variable flow secondary loop using variable flow secondary CHW pumps with variable frequency drives (VFDs). One secondary CHW pump will be standby. Although the central chiller plants will operate at a design condition of 30°F CHW ΔT, the campus chilled water distribution piping will be sized based on a 25°F CHW ΔT to be conservative.

Components in each central cooling plant CHW system will be:

- Constant flow primary CHW pumps, one pump for each chiller pair, but manifolded together for cross service capability.

- Variable flow secondary CHW pumps with variable frequency drives (VFDs).

- One compression tank for the CHW piping system.

- One air separator for the CHW piping system.

- Insulated, standard weight, Schedule 40, ASTM A53, Grade B, ERW welded, carbon steel, chilled water supply (CHWS) and chilled water return (CHWR) piping.

- CHW pot feeder and chemical treatment system.

- CHW make-up water system.

8.5.2 CHW Distribution Systems Around Campus

The CHW distribution around West Campus will be piping distribution systems designed for variable CHW flow. The pipes may be direct-buried, in utilidors, and/or in utility tunnels. A more detailed description of the overall campus CHW distribution system is presented in Chapter 9.

8.5.3 CHW Distribution Systems in the Buildings

Chilled water for space cooling will be used directly in campus buildings in various cooling coils. There will be no active booster pumps or tertiary pumps at the buildings. CHW will be directly pumped from the central cooling plants, around the campus, through building cooling coils, and back to the plants, using variable flow secondary CHW pumps with variable frequency drives (VFDs).

However, there will be standby CHW booster pumps in each building that can be manually called into service in the event that additional chilled water flow and/or pressure are required in the building.

8.6 Cooling Towers and Condenser Water Systems

Cooling towers and their associated condenser water systems are companion components to the chillers and the chilled water distribution systems.

8.6.1 Condenser Water Loads and Cooling Tower Capacities

Cooling towers must reject chiller condenser heat to atmosphere. As such they must be sized to handle the chiller condenser heat loads. Table 8-10 presents the cumulative condenser heat loads for each of the six phases (1A, 1B, 1, 2, 3, and 4), as well as the corresponding required cooling tower capacities and cooling tower modules that will make up those capacities. These capacities assume no use of thermal energy storage (TES).

Table 8-10. Condenser Heat Loads and Required Cooling Tower Capacities (without TES)

Alternative and Phase	Cumulative Condenser Heat Loads, tons [a]	Required Cooling Tower Capacities, tons	Cooling Tower Modules
Alternative 2: Single Campus Central Plant [b]			
Phase 1A	0	0	(Building W4 has a 600-ton cooling tower)
Phase 1B	0	0	(Building M4 has a 760-ton cooling tower)
Phase 1	2,801	4,800	(2) 2,400-ton
Phase 2	8,402	9,600	(4) 2,400-ton
Phase 3	14,004	14,400	(6) 2,400-ton
Phase 4 (Build-Out)	17,738	19,200	(8) 2,400-ton
Alternative 3: Two Campus Central Plants: Main Central Plant [b]			
Phase 1A	0	0	(Building W4 has a 600-ton cooling tower)
Phase 1B	0	0	(Building W4 has a 600-ton cooling tower)
Phase 1	2,801	4,800	(2) 2,400-ton
Phase 2	6,535	9,600	(4) 2,400-ton
Phase 3	10,270	14,400	(6) 2,400-ton
Phase 4 (Build-Out)	14,004	14,400	(6) 2,400-ton
Alternative 3: Two Campus Central Plants: Medical School Central Plant [b]			
Phase 1A	0	0	-
Phase 1B	0	0	(Building M4 has a 760-ton cooling tower)
Phase 1	0	0	(Building M4 has a 760-ton cooling tower)
Phase 2	2,801	3,200	(2) 1,600-ton
Phase 3	6,068	6,400	(4) 1,600-ton
Phase 4 (Build-Out)	7,002	8,000	(5) 1,600-ton

[a] based on installed chiller condenser heat rejection
[b] without cooling loads from Family Student Housing facilities

8.6.2 Cooling Towers Type and Capacity

Cooling towers will be arranged in parallel with respect to their CDW piping. Although the basins will be individual to allow for taking individual cooling tower cells off line for servicing, the standard mode of operation will be to use all three cooling tower cells at all times with basin dividers opened up for common operation. This operational strategy allows the full use of the cooling tower media at all times, thereby minimizing the use of the cooling tower fans.

Cooling tower fans will have VFDs for fan speed control based on maintaining a set condenser water supply temperature.

The cooling towers could be provided by a number of manufacturers, including Baltimore Air Coil (BAC) and Marley. Each cooling tower in this application would have the following features:

- Type Crossflow
- CDW EWT (CDWR) 90°F
- CDW LWT (CDWS) 80°F
- Ambient wet bulb 72°F

8.6.3 Condenser Water System

Condenser water will be pumped as constant flow through the chiller condensers, to the cooling towers, and back to the chiller condensers using constant flow CDW pumps, each dedicated to their chiller.

Components in the condenser water (CDW) system will be:

- Constant flow CDW pumps.
- Non-insulated, standard weight, Schedule 40, ASTM A53, Grade B, ERW welded, carbon steel, condenser water supply (CDWS) piping from the cooling towers to the chillers and condenser water return (CDWR) piping from the chillers to the cooling towers.
- CDW chemical treatment system.
- CDW make-up water system.
- A cooling tower sand filtration unit for each cooling tower cell for cleaning of the CDW. Each unit will include sweeper piping in the cooling tower basins, which will circulate CDW from the basin, through the sand filter, and back to the basins. The unit will have a backwash cycle for the cleansing of the sand bed. The cooling tower sand filtration unit will be as manufactured by Puroflux, PEP, or equal.
- A cooling tower chemical treatment system.

As an additional sustainable design measure, the condenser water system could use reclaimed water. A condenser water system is an open system from which substantial amounts of water are evaporated through the cooling towers. Use of reclaimed water in that system would be a significant benefit in terms of potable water consumption savings and potable water cost savings.

The challenge is to get the cooling tower manufacturer to warrant their cooling tower for use with reclaimed water. Similarly, there is a challenge in getting the chiller manufacturer to warrant their chiller for use of reclaimed water in the chiller condenser. However, since condenser water is typically extensively treated at the central plant with algaecide, biocide, and corrosion inhibitors, and since reclaimed water is highly treated anyway prior to arrival at the site, cooling tower manufacturers and chiller manufacturers are generally open to reclaimed water in this application. However, this must be clearly spelled out in the project specifications to avoid any ambiguity on this point.

Use of reclaimed water on West Campus is discussed more extensively in Chapter 4.

8.7 Thermal Energy Storage

Thermal energy storage (TES) involves the generation of cooling during less expensive non-peak cooling hours, and storing that cooling for use during peak cooling hours. UC Riverside has two thermal energy storage tanks on their main campus, one for their main central plant and one for their satellite central plant. As such, UC Riverside personnel are very familiar with the operation of TES as part of CHW systems.

8.7.1 TES Advantages

TES has a number of implications for the central chiller plants:

- It saves on-going energy costs by reducing expensive on-peak electrical demand. (If UC Riverside did not employ TES, then it would be subject to a rate schedule that has high on-peak electrical rates, lower mid-peak electrical rates, and very low off-peak electrical rates. See the fourth bullet point below.)

- It saves on-going energy costs by reducing electrical energy consumption. By generating and storing cooling during cooler off-peak hours, the cooling generation process uses significantly less energy. Also, by having the chillers operate at full load whenever they are operating, the chillers run more efficiently than when they are tracking demand at part loads.

- It allows the chiller plant capacity to be reduced substantially because the peak cooling load is shaved off with storage. A properly sized TES tank and its piping system, integrated with the chiller plant, may mean the elimination of two or three electrical centrifugal chillers, and their ancillary equipment, such as cooling towers and primary CHW pumps. The additional secondary chilled water pumps would still be needed. So, the additional first cost of the TES tank would be substantially offset by eliminating the first cost of chillers, cooling towers, and primary chilled water pumps.

- It saves substantial electricity costs due to a likely highly favorable rate schedule. Because UC Riverside's main campus uses TES, the City of Riverside Public Utilities Commission provides a flat $0.06/kwh electricity rate schedule for the entire main campus. This is for all electrical rate periods, without any demand charges, and is for all the electricity consumed by the campus, not just for the central plant. If UC Riverside did not have TES, then they would fall under the Large Industrial Usage rate category, for which a flat $0.0727/kwh charge is incurred for all electrical rate periods plus demand charges. Those demand charges are $6.50/kw/month on-peak, $2.59/kw/month mid-peak, and $1.24/kw/month off-peak. Presumably, the same, highly favorable, flat $0.06/kwh electricity rate schedule would be extended to UC Riverside's West Campus as well if TES is implemented.

8.7.2 Ice TES

Ice TES stores cooling energy in the form of ice, meaning it incorporates the energy of freezing into the storage as well as the sensible energy. CHW TES stores only the sensible energy of chilled water. As a result, ice TES uses less volume for storage than CHW TES. University of Arizona has a 22,000 ton-hour Calmac ice TES system. Most UC and CSU universities that have TES, use CHW TES systems.

The University of Arizona (U of A) ice TES system illustrates a typical configuration of an ice TES system. U of A has regular CHW chillers and then special dual purpose chillers for use in the ice TES system. The dual purpose chillers are Trane chillers designed to generate 17°F glycol. They can also generate 42°F CHW if used directly in the campus CHW system. The 17°F glycol is circulated through a total of 14,000 feet of coiled poly pipe in a number of manifolded 8' high, 8' in diameter tanks. During cooling energy storage, the cold glycol circulates through the poly pipe to turn water in those tanks into solid blocks of ice. During cooling energy withdrawal, the cold glycol transfers the ice cold energy (i.e. thaws the ice) to the campus CHW in plate-and-frame heat exchangers.

U of A cited the following reasons for selecting an ice TES system over a CHW TES system:

- U of A was concerned that a CHW TES tank at atmospheric pressure and exposed to atmosphere through the tank vent would be susceptible to bacterial contamination. This would in turn cause fouling problems in the CHW system and cooling coils.

- U of A was concerned that a CHW TES system, with a reference pressure of atmospheric pressure, would incur additional pumping costs associated with having to use backpressure control regulators in the higher buildings.

8.7.3 CHW TES

The CHW TES system would be a thermally-stratified system, in which the CHW is charged into, and discharged from, the TES tank in a laminar fashion. This allows the warmer CHWR (68°F) to lie above the colder CHWS (38°F) inside the tank, separated by a relatively narrow thermocline. The TES tank would be at atmospheric pressure and is vented.

In terms of its configuration within the CHW system, the TES tank would be situated within the constant flow primary CHW loop and the variable flow secondary CHW loop. The flow of CHW would be self-balancing, depending on the speed (flow) of the variable speed secondary CHW pumps. When secondary CHW pumps are at high speed (high flow) and/or the primary CHW pumps are off, the TES tank is discharging CHW to campus. When secondary CHW pumps are at low speed (low flow) and the primary CHW pumps are on, the TES tank is primarily being charged with CHW. This sequence is more specifically described as follows:

- During on-peak electrical rate periods (late-spring, summer, and early autumn afternoons), when CHW is withdrawn from the TES tank for campus cooling, the variable speed secondary CHW pumps would circulate CHWS from bottom of the TES tank, around campus, and back to the top of the TES tank as CHWR. The primary CHW loop (chillers, cooling towers, and primary CHW pumps) would be shut down.

- During mid-peak and off-peak electrical rate periods, when the TES tank is to be charged with CHW, the constant speed primary CHW pumps would circulate CHWS from the chillers to the bottom of the TES tank, withdraw CHWR from the top of the TES tank, and back to the chillers. Any CHWS needed by the campus during these periods would be drawn from the primary CHW loop by the secondary CHW pumps.

8.7.4 Comparison: Ice TES vs. CHW TES

- Ice TES uses less volume than CHW TES. However, the area used by the two TES systems is roughly equivalent. This is because the multiple cylindrical ice TES tanks occupy as much area as a single cylindrical CHW TES tank.

- In an atmospherically-vented CHW TES system, backpressure control regulators are required in CHW return piping for any cooling coils located physically higher than the water level in the CHW TES tank. This is so that, when the secondary loop CHW pumps are turned off, the CHW does not drain from the high coils out through the atmospheric vent in the CHW TES tank. Since a CHW TES tank may be about 70 feet high, only cooling coils located on building floors 6 and above would need backpressure control regulators. This is a very small number of the total cooling coils expected on campus, and consequently, the parasitic pumping costs associated with this is considered to be very small relative to total pumping costs.

- As far as is known, neither the UC Riverside or other UC and CSU campuses with CHW TES have encountered bacterial contamination of their CHW systems due to an atmospherically-vented CHW TES tank. Proper CHW water treatment is routine for all CHW systems – those with and without TES.

- An ice TES system has more complicated components than a CHW TES system. The ice TES system requires special, dual purpose chillers in addition to the regular CHW chillers. The CHW TES system uses only regular CHW chillers. Also, the ice TES system has many additional components, such as a glycol loop, extra pumps, plate-and-frame heat exchangers, long lengths of poly piping, and special tanks. A CHW TES system only has a CHW tank (i.e. a “fat place in the pipe”) without additional pumps or other components.

- An ice TES system is more complicated to operate than a CHW TES system. A deliberate choice needs to be made each time the ice TES system/campus CHW system switches between storage operation and withdrawal operation. A CHW TES system is self-regulating, automatically allocating CHW to and from storage based on the relative speeds of the primary and secondary CHW pumps.

- A CHW TES system entails less first cost than an ice TES system.

- CHW TES is much more energy efficient than ice TES. Ice TES chillers operate at about 0.72 kw/ton (even when operating in CHW mode). CHW TES chillers operate at about 0.53 kw/ton. This is a significant difference. Ongoing energy costs will be much lower with a CHW TES system.

- UC Riverside already has two CHW systems on the East Campus. As such, operating personnel are already familiar with CHW TES operation, whereas ice TES would be a new type of system on campus for which O&M knowledge and spare parts would need to be added anew.

Because of the clear economic advantages (both first cost and energy costs) and institutional advantages associated with the CHW TES system relative to the ice TES system, the CHW TES system is recommended for UC Riverside's West Campus.

8.7.5 Comparison: Above-Ground, Insulated, Welded Steel TES Tank vs. Buried Concrete TES Tank

It is recommended that a single, above-ground, insulated, welded steel, chilled water TES tank be installed with the mechanical infrastructure as part of Phase 1. UC Riverside's West Campus is flat, unlike the hilly nature of UC Riverside's main campus. As such, the possibility of constructing a TES tank into a hillside does not exist. Although an above-ground TES tank is more visible, it has the following advantages:

- An above-ground, insulated, welded steel, chilled water TES tank is about one-half the first cost of a buried concrete TES tank

- Its reference water level (the TES tank water level exposed to atmospheric pressure) is much higher than that of a buried concrete TES tank; perhaps as much as 70 feet higher. This means that most, if not all, of the parasitic energy loss of backflow prevention devices can be avoided. Backflow prevention devices are needed for all buildings that have cooling coils located physically higher than the reference water level in the TES tank, otherwise when the secondary CHW pumps are shut off, water in cooling coils that are physically higher than the TES tank reference water level will drain out the top of the TES tank.

There are no apparent hurdles to using an above-ground, insulated, welded steel, chilled water TES tank on the West Campus next to the central plants. As such, it is the recommended TES tank choice for UC Riverside's West Campus because of its much lower first cost and operational advantages.

8.7.6 TES Sizing

Typically, the most economic TES tank sizing criteria would be to sufficiently size the TES tank so as avoid all electrical centrifugal chiller use in the electrical on-peak period. Although the central chiller plants will operate at a design condition of 30°F CHW ΔT (38°F CHWS and 68°F CHWR), the TES tank will be sized based on a 25°F CHW ΔT to be conservative.

A TES tank sized to provide the equivalent of 5,000 tons of additional cooling capacity each hour over a 6-hour on-peak period would be about 1,750,000 gallons or 30,000 ton-hours of cooling capacity.

A TES tank sized to provide the equivalent of 4,000 tons of additional cooling capacity each hour over a 6-hour on-peak period would be about 1,400,000 gallons or 24,000 ton-hours of cooling capacity.

A TES tank sized to provide the equivalent of 3,000 tons of additional cooling capacity each hour over a 6-hour on-peak period would be about 1,050,000 gallons or 18,000 ton-hours of cooling capacity.

A TES tank sized to provide the equivalent of 2,000 tons of additional cooling capacity each hour over a 6-hour on-peak period would be about 700,000 gallons or 12,000 ton-hours of cooling capacity.

8.7.7 Recommended Chiller/TES Plants

Table 8-11 shows cumulative diversified peak cooling loads for each of the six phases (1A, 1B, 1, 2, 3, and 4), as well as the corresponding required chiller plant capacities and chiller/TES modules that will make up those capacities, given the implementation of TES.

Table 8-11. Cooling Loads and Required Central Plant Chiller/TES Capacities

Alternative and Phase	Cumulative Diversified Peak Cooling Loads, tons	Required Chiller Capacities, tons	Chiller/TES Modules
Alternative 2: Single Campus Central Plant [a]			
Phase 1A	336	0	(Building W4 has a 500-ton building chiller)
Phase 1B	784	0	(Building M4 has a 650-ton building chiller)
Phase 1	1,466	1,600	(2) 800-ton chillers + (1) 30,000 ton-hour TES
Phase 2	5,330	3,200	(1) 1,600-ton chiller + (2) 800-ton chillers + (1) 30,000 ton-hour TES
Phase 3	9,186	6,400	(3) 1,600-ton chillers + (2) 800-ton chillers + (2) 30,000 ton-hour TES
Phase 4 (Build-Out)	13,813	8,000	(4) 1,600-ton chillers + (2) 800-ton chillers + (2) 30,000 ton-hour TES
Alternative 3: Two Campus Central Plants: Main Central Plant [a]			
Phase 1A	336	0	(Building W4 has a 500-ton building chiller)
Phase 1B	336	0	(Building W4 has a 500-ton building chiller)
Phase 1	1,466	1,600	(2) 800-ton chillers + (1) 30,000 ton-hour TES
Phase 2	4,168	3,200	(1) 1,600-ton chiller + (2) 800-ton chillers + (1) 30,000 ton-hour TES
Phase 3	6,424	4,800	(2) 1,600-ton chillers + (2) 800-ton chillers + (2) 30,000 ton-hour TES
Phase 4 (Build-Out)	9,684	6,400	(3) 1,600-ton chillers + (2) 800-ton chillers + (2) 30,000 ton-hour TES
Alternative 3: Two Campus Central Plants: Medical School Central Plant [a]			
Phase 1A	0	0	-
Phase 1B	448	0	(Building M4 has a 650-ton building chiller)
Phase 1	448	0	(Building M4 has a 650-ton building chiller)
Phase 2	1,163	1,600	(2) 800-ton chillers
Phase 3	2,762	2,400	(3) 800-ton chillers + (1) 24,000 ton-hour TES
Phase 4 (Build-Out)	4,129	3,200	(4) 800-ton chillers + (1) 24,000 ton-hour TES

[a] without cooling loads from Family Student Housing facilities

Table 8-12 shows cumulative condenser heat loads for each of the six phases (1A, 1B, 1, 2, 3, and 4), as well as the corresponding required cooling tower capacities and cooling tower modules that will make up those capacities, given the implementation of TES.

Table 8-12. Condenser Heat Loads and Required Cooling Tower Capacities (with TES)

Alternative and Phase	Cumulative Condenser Heat Loads, tons [a]	Required Cooling Tower Capacities, tons	Cooling Tower Modules
Alternative 2: Single Campus Central Plant [b]			
Phase 1A	0	0	(Building W4 has a 600-ton cooling tower)
Phase 1B	0	0	(Building M4 has a 760-ton cooling tower)
Phase 1	1,867	2,000	(2) 1,000-ton
Phase 2	3,734	4,000	(1) 2,000-ton + (2) 1,000-ton
Phase 3	7,468	8,000	(3) 2,000-ton + (2) 1,000-ton
Phase 4 (Build-Out)	9,336	10,000	(4) 2,000-ton + (2) 1,000-ton
Alternative 3: Two Campus Central Plants: Main Central Plant [b]			
Phase 1A	0	0	(Building W4 has a 600-ton cooling tower)
Phase 1B	0	0	(Building W4 has a 600-ton cooling tower)
Phase 1	1,867	3,800	(2) 1,900-ton
Phase 2	3,734	5,700	(3) 1,900-ton
Phase 3	5,602	7,600	(4) 1,900-ton
Phase 4 (Build-Out)	7,469	7,600	(4) 1,900-ton
Alternative 3: Two Campus Central Plants: Medical School Central Plant [b]			
Phase 1A	0	0	-
Phase 1B	0	0	(Building M4 has a 760-ton cooling tower)
Phase 1	0	0	(Building M4 has a 760-ton cooling tower)
Phase 2	1,867	2,000	(2) 1,000-ton
Phase 3	2,801	4,000	(4) 1,000-ton
Phase 4 (Build-Out)	3,734	4,000	(4) 1,000-ton

[a] based on installed chiller condenser heat rejection
[b] without cooling loads from Family Student Housing facilities

8.8 Central Heating Plants

Alternatives 2 and 3 entail use of central plants to provide campus heating. These are described as follows:

- Alternative 2: Single Campus Central Plant: Heating provided by a single campus central plant, except for Family Student Housing which has building-local heating.

- Alternative 3: Two Campus Central Plants: Heating provided by two central plants; one to serve the east side of West Campus, including the Academic Core and Apartments; and the other to serve the Medical School section of West Campus.

Sustainability measures are included in the central heating plants as described in the various paragraphs below, and as described in more detail in the paragraphs of section 16.4.1 in Chapter 16 – Sustainability Considerations.

8.8.1 Central Heating Plant Capacities

Under Alternatives 2 and 3, central heating plants must have certain capacities to keep up with campus development. Table 8-13 shows cumulative diversified peak heating loads for each of the six phases (1A, 1B, 1, 2, 3, and 4), as well as the corresponding required heating plant capacities and boiler modules that will make up those capacities.

Table 8-13. Heating Loads and Required Central Plant Boiler Capacities

Alternative and Phase	Cumulative Diversified Peak Heating Loads, MMBtuh	Required Boiler Capacities, MMBtuh	Boiler Modules
Alternative 2: Single Campus Central Plant [a]			
Phase 1A	2.69	0	(Building W4 has two 1.6 MMBtuh building boilers)
Phase 1B	6.12	0	(Building M4 has three 1.4 MMBtuh building boilers)
Phase 1	14.76	20	(2) 10 MMBtuh
Phase 2	44.80	60	(1) 30 MMBtuh + (3) 10 MMBtuh
Phase 3	78.64	90	(2) 30 MMBtuh + (3) 10 MMBtuh
Phase 4 (Build-Out)	117.47	150	(4) 30 MMBtuh + (3) 10 MMBtuh
Alternative 3: Two Campus Central Plants: Main Central Plant [a]			
Phase 1A	2.69	0	(Building W4 has two 1.6 MMBtuh building boilers)
Phase 1B	2.69	0	(Building W4 has two 1.6 MMBtuh building boilers)
Phase 1	11.34	20	(2) 10 MMBtuh
Phase 2	34.65	60	(2) 20 MMBtuh + (2) 10 MMBtuh
Phase 3	54.69	80	(3) 20 MMBtuh + (2) 10 MMBtuh
Phase 4 (Build-Out)	82.56	100	(4) 20 MMBtuh + (2) 10 MMBtuh
Alternative 3: Two Campus Central Plants: Medical School Central Plant [a]			
Phase 1A	0	0	-
Phase 1B	3.43	0	(Building M4 has three 1.4 MMBtuh building boilers)
Phase 1	3.43	0	(Building M4 has three 1.4 MMBtuh building boilers)
Phase 2	10.15	20	(1) 10 MMBtuh + (2) 5 MMBtuh
Phase 3	23.96	30	(2) 10 MMBtuh + (2) 5 MMBtuh
Phase 4 (Build-Out)	34.91	40	(3) 10 MMBtuh + (2) 5 MMBtuh

[a] without heating loads from Family Student Housing facilities

8.8.2 Central Heating Plants Type and Configuration

The heating medium could be generated in boilers as high temperature hot water (HTW), steam, or medium temperature heating hot water (HHW).

8.8.2.1 High Temperature Hot Water

HTW is considered water under high temperature and high pressure. Typically this might mean 350°F HTWS at 300 psig. The advantage of this is that a high ΔT can be used, such as 100°F ΔT (350°F HHWS/250°F HHWR). This translates to first cost savings from reduced HTW piping sizes and decreased energy costs from reduced HTW pumping. The disadvantages of HTW are as follows:

- Individual campus buildings each need heat exchangers and pumped hydronic HHW systems. HTW is distributed around campus to the heat exchanger in each building. HHW is distributed from the heat exchanger to heating coils within the building. This complexity results in added first cost and added ongoing operation and maintenance (O&M) costs.

- HTW piping is heavier grade and its insulation is more complex to reduce heat loss from such a high temperature heating medium. This results in added first cost, which will probably more than offset the first cost savings from being able to use smaller pipes.

- A high temperature/high pressure HTW generation system will require a full time boiler operator, as required by code. This operator requirement is a substantial on-going O&M cost. HHW boilers generating medium temperature HHW do not need code-required full-time boiler operators.

These disadvantages are a significant drawback to use of HTW for campus heating, and as a result, very few new facilities use HTW for campus heating. HTW is not recommended for use on UC Riverside's West Campus.

8.8.2.2 Steam

Steam is boiled water above 212°F. The advantage of steam as a heating medium is that it contains a high heat density, both in terms of sensible heat, and particularly, latent heat. This translates to first cost savings from reduced steam and condensate return piping sizes, and decreased energy costs from negligible associated pumping. The disadvantages of steam as a heating medium are as follows:

- Individual campus buildings each need heat exchangers and pumped hydronic HHW systems. Steam is distributed around campus to the heat exchanger in each building. HHW is distributed from the heat exchanger to heating coils within the building. This complexity results in added first cost and added ongoing operation and maintenance (O&M) costs.

- Steam and condensate return piping are heavier grade and their insulation is more complex to reduce heat loss from such a high temperature heating medium. In addition steam traps, pumped condensate return systems, and other ancillary steam appurtenances are involved in a steam/condensate return distribution system. This all results in added first cost, which will probably more than offset the first cost savings from being able to use smaller pipes.

- A steam generation system (>15 psig) will require a full time boiler operator, as required by code. This operator requirement is a substantial on-going O&M cost. HHW boilers generating medium temperature HHW do not need code-required full-time boiler operators.

These disadvantages are a significant drawback to use of steam for campus heating, and as a result, very few new facilities use steam exclusively for campus heating. Steam is not recommended as a heating medium for use on UC Riverside's West Campus.

8.8.2.3 Heating Hot Water

Heating hot water (HHW) is considered hot water below 212°F (i.e. the water boiling point at atmospheric pressure). In this regard, it is a simpler heating medium to use. Full-time boiler operators are not needed. Also, HHW will be pumped directly from the campus central plants to building heating coils and back. There will be no intervening heat exchangers or tertiary building pumps.

The most significant drawback is that often HHW is used with a low ΔT such as 20°F ΔT (180°F HHWS/160°F HHWR). This means much more hot water must be pumped to deliver a given heating capacity as compared to HTW or steam. HHW pipes must be larger as well. However, this drawback need not be the case if the HHW distribution system is designed properly. This utilities infrastructure master plan proposes an HHW distribution system with a 60°F ΔT (190°F HHWS/130°F HHWR). This high ΔT significantly overcomes this drawback.

The central heating plants will consist of gas-fired, heating hot water boilers, arranged in parallel. The boiler plants will be designed to achieve a very high 60°F HHW ΔT, meaning heating hot water supply (HHWS) at 190°F (adjustable) and heating hot water return (HHWR) at 130°F. This high HHW ΔT translates into a substantial first cost savings in that HHW pumps and HHW pipes can be downsized proportionately while providing the same capacity. In addition, HHW pumping costs and motor horsepower energy are substantially reduced since less HHW is pumped for the same heating capacity delivered. The implications of this are more fully described in the sustainability section.

To achieve this high 60°F HHW ΔT, the design criteria for all new heating coils on West Campus shall be designed for 180°F HHWS and 120°F HHWR. In some cases, such as VAV reheat coils, achieving such a high HHW ΔT may not be possible. In those cases, at least a 40°F HHW ΔT (180°F HHWS, 140°F HHWR) shall be the design criterion.

8.8.3 Central Boiler Plant Capacities with Back-up Capacity

Table 8-13 shows cumulative diversified peak heating loads for each of the six phases (1A, 1B, 1, 2, 3, and 4) as well as the corresponding required boiler plant capacities and boiler modules that will make up those capacities. The required heating plant heating capacities are based on the need to satisfy the cumulative diversified peak heating load plus a measure a back-up capacity.

The amount of back-up capacity needed is essentially a risk analysis. A conservative approach would be to be able to satisfy the cumulative diversified peak heating load in the event one piece of equipment went out of service, or put another way, having a spare boiler to bring on line in case an operating boiler goes out of service; or put yet another way, having a standby boiler available at all times. However, back-up capacity is not as essential in the case of heating as it is in cooling, since peaking space heating load tends to occur during times when campus academic buildings are not occupied and are in night setback. As such, smaller margins of back-up capacity are recommended.

In the early years, when the boiler plant is smaller with fewer pieces of equipment, a single equipment failure would have a proportionately greater adverse impact on heating capacity deficiency. A single machine failure would mean experiencing heating deficiency over a wider range of climate conditions, such as those with moderate to peak heating loads. In this case, a higher percentage of back-up capacity is warranted. Furthermore, the additional capacity is not merely sunk cost, but represents boiler capacity that will be needed in the near future anyway as the campus expands.

In the later years, when the boiler plant is larger with many pieces of equipment, a single equipment failure would have a proportionately smaller adverse impact on heating capacity deficiency. In this case, a lower percentage of back-up capacity is warranted.

Also, it is important to note that building W4 will be constructed during Phase 1A and will have two 1.6 MMBtuh boilers since Main Central Plant will not be implemented at that time. Those building boilers will be retained as 3.2 MMBtuh of standby boiler capacity, which figures into the back-up heating capacity analysis.

Similarly, building W4 will be constructed during Phase 1B and will have three 1.4 MMBtuh boilers since Medical School Central Plant will not be implemented at that time. Those building boilers will be retained as 4.2 MMBtuh of standby boiler capacity, which figures into the back-up heating capacity analysis.

So, considering Table 8-13 above, in each phase, there is generally sufficient back-up heating capacity to allow the central boiler plant to satisfy the majority of the cumulative diversified peak heating load with the largest single piece of equipment out of service.

8.8.4 Boiler Modules

Table 8-13 shows the boiler modules recommended to make up the required heating capacities. Up to two boiler module sizes are used within each heating plant. One is a large size; the other is smaller. The large size is needed in recognition that the central heating plant will significantly expand over time. Large modules are preferred so that there is not a proliferation of many pieces of small equipment as the plant expands. However, a smaller boiler size is needed to handle periods of the year when there are low heating load conditions, particularly during the early years of the plant. So, for simplicity sake, a maximum of two boiler module sizes are considered in each plant; a large size for convenient expansion, and a small size to efficiently handle low heating load conditions.

8.8.5 Gas-Fired, Heating Hot Water (HHW) Boilers

The gas-fired, HHW boilers could be provided by a number of boiler manufacturers. For the purpose of this utilities infrastructure master plan, a selection was based around the Bryan model RW boiler. Each boiler in this application would have the following features:

- Type — Gas-fired, water tube, water heating boiler with low NO_x package
- Efficiency — 84%
- HHW EWT (HHWS) — 130 °F
- HHW LWT (HHWR) — 190 °F

The boilers should have flue gas-to-combustion air heat recovery as an energy efficiency measure. This feature recovers flue gas heat for the purpose of pre-heating combustion air used by the boilers.

8.9 Heating Hot Water Distribution Systems

Each HHW distribution system consists of the central plant heating generation equipment and ancillary equipment such as the HHW pumps, the campus HHW distribution piping, and the building HHW components.

8.9.1 HHW Distribution Systems in the Central Heating Plants

The central heating plants HHW distribution systems will each use a constant flow primary loop/variable flow secondary loop configuration. Heating hot water will be pumped as constant flow through the boilers using constant flow primary HHW pumps, each dedicated to their boiler and furnished as part of the boiler package. The HHW distribution system from the heating plants, around campus, and back to the plants will be in variable flow secondary loops using variable flow secondary HHW pumps with variable frequency drives (VFDs). One secondary HHW pump will be standby. Although the central heating plants will operate at a design condition of 60°F CHW ΔT, the campus heating hot water distribution piping will be sized based on a 40°F HHW ΔT to be conservative.

Components in each central heating plant HHW system will be:

- Constant flow primary HHW pumps, each dedicated to their boiler.
- Variable flow secondary HHW pumps with variable frequency drives (VFDs).
- One expansion tank for the HHW piping system.
- One air separator for the HHW piping system.
- Insulated, standard weight, Schedule 40, ASTM A53, Grade B, ERW welded, carbon steel, heating hot water supply (HHWS) and heating hot water return (HHWR) piping.
- HHW pot feeder and chemical treatment system.
- HHW make-up water system.

8.9.2 HHW Distribution Systems Around Campus

The HHW distribution around West Campus will be piping distribution systems designed for variable HHW flow. The pipes may be direct-buried, in utilidors, and/or in utility tunnels. A more comprehensive description of the overall campus heating hot water distribution system is presented in Chapter 9.

8.9.3 HHW Distribution Systems in the Buildings

Heating hot water for space heating will be used directly in campus buildings in various heating coils. There will be no booster pumps or tertiary pumps at the buildings. HHW will be directly pumped from the central heating plants, around the campus, through building heating coils, and back to the plants, using variable flow secondary HHW pumps with variable frequency drives (VFDs).

However, there will be standby HHW booster pumps in each building that can be manually called into service in the event that additional heating hot water flow and/or pressure are required in the building.

HHW will also be used to provide domestic hot water (DHW) heating in the Apartments and in buildings with significant DHW loads such as the Recreation building, Student Center, medical buildings, and lab buildings. In most Academic buildings however, DHW demand will be non-existent or very low. What DHW load there is would be most cost-effectively served with point-of-use, instantaneous, electric hot water heaters.

In the buildings with significant DHW load, double-wall, shell-and-tube heat exchangers will be used between the HHW and DHW in those buildings. The annular space between each heat exchanger's two walls will be vented, thereby allowing any leak to be easily identified. This is a code requirement to minimize cross contamination between the HHW and DHW.

8.10 Special Central Plant Services for the Medical School

The Medical School Central Plant will serve research facilities, wet labs, a vivarium, and medical office buildings. These facilities will require some special services. Medical gases (oxygen, nitrogen, etc.), natural gas, compressed air, and vacuum are among these special services. These services could be located in the buildings for which they are needed, or, alternatively, they could be centralized in the Medical School Central Plant and piped to their points of use alongside the CHW and HHW piping to those buildings. A decision on this can be postponed until more details are known on the actual loads and locations of these special services.

8.11 Recommended Central Cooling and Heating Plants for West Campus

Considering the analysis of various alternatives in this chapter, the comprehensive recommendations are presented below for cooling and heating UC Riverside's West Campus facilities.

8.11.1 General Recommendations

- **Family Student Housing.** Family Student Housing (Family Apartments and Family Townhouses), and its associated facilities (Child Development Center North (CDC N), Community Center North (CC N), Child Development Center South (CDC S), and Community Center South (CC S), will use building-local cooling and heating (i.e. will use local unitary type HVAC equipment).

- **Recreation Building.** The Recreation Building and adjacent telecommunications node facility would be best served local unitary type HVAC equipment, since they are located in the Family Student Housing area of campus and across Iowa Avenue from the likely location of the Main Central Plant. The first cost would be high to extend CHW and HHW piping across Iowa Avenue to the Recreation Building. However, if it is decided to interconnect a Main Central Plant and a Medical School Central Plant with CHW and HHW piping, for the purpose of back-up, then serving the Recreation Building with central plant CHW and HHW is indeed an option.

- **Main Central Plant.** The east side of West Campus (Academic core and Apartments) will be served by a central cooling and heating plant, which will be located in an "industrial" area, just west of the existing electrical substation and just east of future building W6. The Main Central Plant building will be built in Phase 1, large enough to house all equipment through Phase 4 (Build-out). Building W4, constructed in Phase 1A, will be connected to the Main Central Plant CHW and HHW systems during Phase 1. Building W4's chiller and boilers will be retained as back-up capacity.

- **Medical School Central Plant.** The west side of West Campus (Medical School) will be served by a central cooling and heating plant, which will be located in a "service" area, just north of the future Medical School. The Medical School Central Plant building will be built in Phase 2, large enough to house all equipment through Phase 4 (Build-out).

- **CHW and HHW Distribution Systems.** Chilled water (CHW) and heating hot water (HHW) will be circulated to campus buildings in underground piping (in a utilities tunnel or direct-buried). Please see Chapter 9 for details on the CHW and HHW distribution systems. CHW and HHW will be used directly in campus buildings in various coils. There will be no booster pumps or tertiary pumps at the buildings. CHW and HHW will be directly pumped from the central plants, around the campus, through building coils, and back to the plants, using variable flow secondary pumps with variable frequency drives (VFDs). However, there will be standby CHW and HHW booster pumps in each building that can be manually called into service in the event that additional CHW or HHW flow and/or pressure are required in the building.

- **Chillers.** Central plant chillers will consist of high efficiency, electrical centrifugal chillers with VFDs on their compressors. Individual chillers will be paired up series, with each chiller in the pair nominally achieving a 15°F CHW ΔT. As such, the chiller plants will achieve a very high 30°F CHW ΔT, meaning chilled water supply (CHWS) at 38°F (adjustable) and chilled water return (CHWR) at 68°F. The chiller pairs will be arranged in parallel.

- **Cooling Towers.** Cooling towers will be used to reject chiller condenser heat. They will be arranged in parallel with respect to their CDW piping. Cooling tower fans will have VFDs for fan speed control based on maintaining a set condenser water supply temperature. Cooling towers will be sized to cool 90°F CDWR to 80°F CDWS in a 72°F wet bulb ambient condition.

- **Thermal Energy Storage Systems.** Each central plant will include an above-ground, insulated, welded steel, thermally-stratified, chilled water, thermal energy storage (TES) tank. In terms of its configuration within the CHW system, the TES tank would be situated within the constant flow primary CHW loop and the variable flow secondary CHW loop. The flow of CHW would be self-balancing, depending on the speed (flow) of the variable speed secondary CHW pumps. When secondary CHW pumps are at high speed (high flow) and/or the primary CHW pumps are off, the TES tank is discharging CHW to campus. When secondary CHW pumps are at low speed (low flow) and the primary CHW pumps are on, the TES tank is primarily being charged with CHW.

- **Boilers.** Central plant boilers will consist of gas-fired, heating hot water boilers, arranged in parallel. The boiler plants will be designed to achieve a very high 60°F HHW ΔT, meaning heating hot water supply (HHWS) at 190°F (adjustable) and heating hot water return (HHWR) at 130°F.

8.11.2 Recommended Central Plants Implementation Plan

Tables 8-14, 8-15, 8-16, and 8-17 present the recommended central plants implementation plan.

Table 8-14. Recommended Main Central Plant Cooling System Implementation Plan

Phase	Cumulative Chiller Modules	Cumulative Cooling Tower Modules	Cumulative TES Tank Modules	Cumulative Primary CHW Pump Modules	Cumulative Secondary CHW Pump Modules	Cumulative Condenser Water Pump Modules
Phase 1A	0	0	0	0	0	0
Phase 1B	0	0	0	0	0	0
Phase 1	(2) 800-ton	(2) 1,900-ton	(1) 30,000 ton-hour TES tank	(2) 1,280-gpm	(2) 2,000-gpm	(2) 2,240-gpm
Phase 2	(1) 1,600-ton + (2) 800-ton	(3) 1,900-ton	(1) 30,000 ton-hour TES tank	(1) 2,560-gpm + (2) 1,280-gpm	(3) 2,000-gpm	(1) 4,480-gpm + (2) 2,240-gpm
Phase 3	(2) 1,600-ton + (2) 800-ton	(4) 1,900-ton	(2) 30,000 ton-hour TES tank	(2) 2,560-gpm + (2) 1,280-gpm	(4) 2,000-gpm	(2) 4,480-gpm + (2) 2,240-gpm
Phase 4 (Build-Out)	(3) 1,600-ton + (2) 800-ton	(4) 1,900-ton	(2) 30,000 ton-hour TES tank	(3) 2,560-gpm + (2) 1,280-gpm	(6) 2,000-gpm	(3) 4,480-gpm + (2) 2,240-gpm

Table 8-15. Recommended Main Central Plant Heating System Implementation Plan

Phase	Cumulative Boiler Modules	Cumulative Primary HHW Pump Modules	Cumulative Secondary HHW Pump Modules
Phase 1A	0	0	0
Phase 1B	0	0	0
Phase 1	(2) 10-MMBtuh	(2) 340-gpm	(2) 1,000-gpm
Phase 2	(2) 20-MMBtuh + (2) 10-MMBtuh	(2) 670-gpm + (2) 340-gpm	(3) 1,000-gpm
Phase 3	(3) 20-MMBtuh + (2) 10-MMBtuh	(3) 670-gpm + (2) 340-gpm	(4) 1,000-gpm
Phase 4 (Build-Out)	(4) 20-MMBtuh + (2) 10-MMBtuh	(4) 670-gpm + (2) 340-gpm	(5) 1,000-gpm

Table 8-16. Recommended Medical School Central Plant Cooling System Implementation Plan

Phase	Cumulative Chiller Modules	Cumulative Cooling Tower Modules	Cumulative TES Tank Modules	Cumulative Primary CHW Pump Modules	Cumulative Secondary CHW Pump Modules	Cumulative Condenser Water Pump Modules
Phase 1A	0	0	0	0	0	0
Phase 1B	0	0	0	0	0	0
Phase 1	0	0	0	0	0	0
Phase 2	(2) 800-ton	(2) 1,000-ton	0	(2) 1,280-gpm	(2) 1,300-gpm	(2) 2,240-gpm
Phase 3	(3) 800-ton	(4) 1,000-ton	(1) 24,000 ton-hour TES tank	(3) 1,280-gpm	(3) 1,300-gpm	(3) 2,240-gpm
Phase 4 (Build-Out)	(4) 800-ton	(4) 1,000-ton	(1) 24,000 ton-hour TES tank	(4) 1,280-gpm	(4) 1,300-gpm	(4) 2,240-gpm

Table 8-17. Recommended Medical School Central Plant Heating System Implementation Plan

Phase	Cumulative Boiler Modules	Cumulative Primary HHW Pump Modules	Cumulative Secondary HHW Pump Modules
Phase 1A	0	0	0
Phase 1B	0	0	0
Phase 1	0	0	0
Phase 2	(1) 10-MMBtuh + (2) 5-MMBtuh	(1) 340-gpm + (2) 170-gpm	(2) 500-gpm
Phase 3	(2) 10-MMBtuh + (2) 5-MMBtuh	(2) 340-gpm + (2) 170-gpm	(4) 500-gpm
Phase 4 (Build-Out)	(3) 10-MMBtuh + (2) 5-MMBtuh	(3) 340-gpm + (2) 170-gpm	(5) 500-gpm

8.11.3 Layout of the Central Cooling and Heating Plants for West Campus

Given the recommended components of the central cooling and heating plants for UC Riverside's West Campus, it is possible to consider some rough layouts to determine the site areas required to support the central plants.

8.11.3.1 Layout and Footprint of the Main Central Plant

Figure 8-5 shows a layout and footprint of the Main Central Plant at Build-Out in the preferred location between the existing electrical substation and building W6 on the east side of West Campus. As can be seen, there is ample space at this location to support the siting of the fully built-out Main Central Plant.

8.11.3.2 Layout and Footprint of the Medical School Central Plant

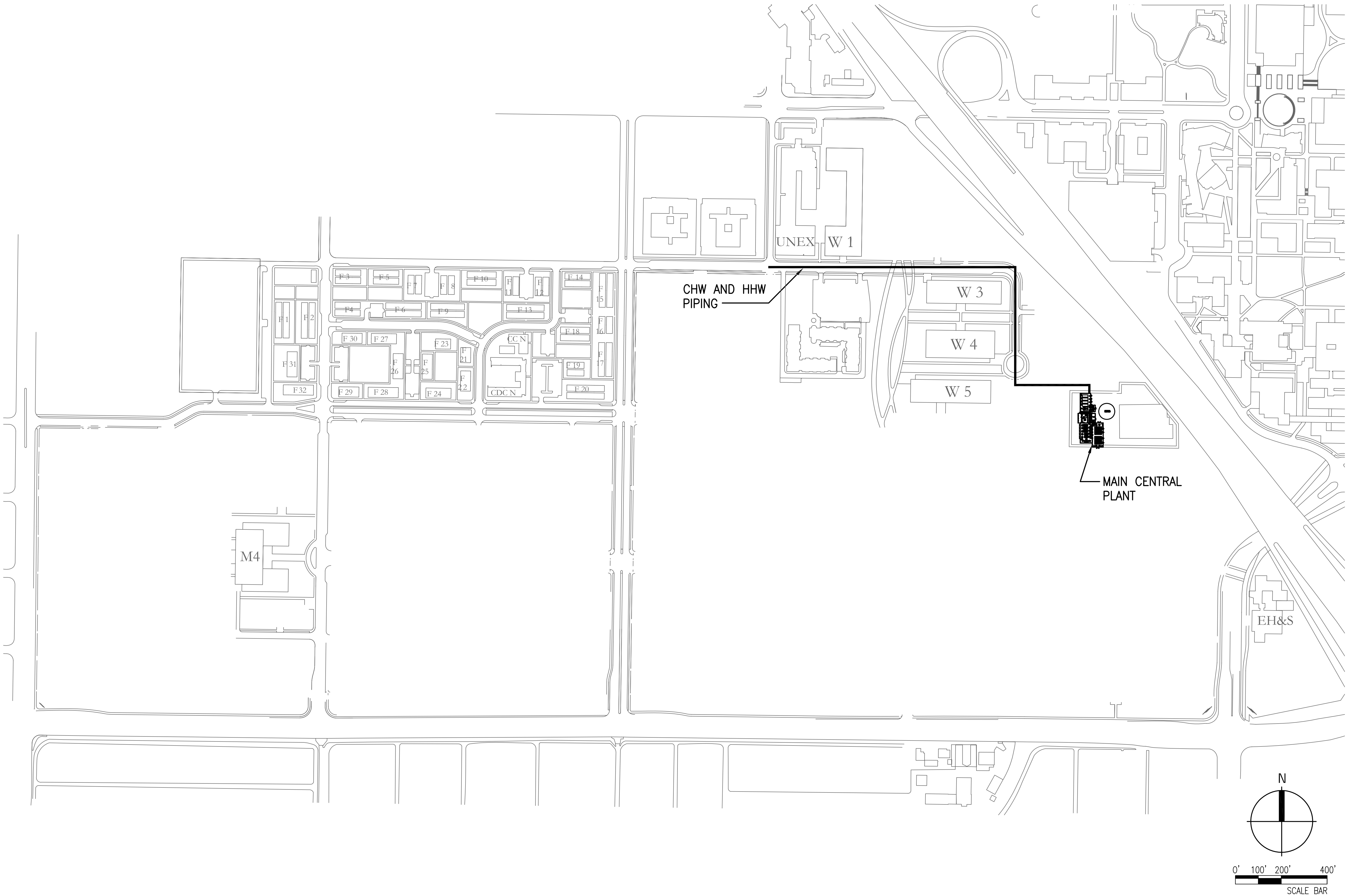
Figure 8-6 shows a layout and footprint of the Medical School Central Plant at Build-Out in the preferred location in the "Service Area" north of the Medical School (specifically north of building H1). As can be seen, there is ample space at this location to support the siting of the fully built-out Medical School Central Plant.

8.12 Central Plants Cost Summary

This study includes conceptual-level cost estimates for central plants development. Details of these cost estimates are included in the Appendix to this report. Costs include mark-ups, sales taxes, and contingencies, but do not include soft costs. See additional notes on the detailed tables.

- Phase 1A Housing: $ 0
- Phase 1A Campus: $ 0
- Phase 1B: $ 0
- Phase 1: $12,122,000
- Phase 2 Housing: $ 0
- Phase 2 Campus: $10,443,000
- Phase 3: $ 8,026,000
- Phase 4: $ 3,037,000

Estimated Total for the Build-Out of the Central Plants: $33,628,000



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△	Final Report	04/25/08

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Figure 8-1
West Campus Development Phase 1 Mechanical Infrastructure

Sheet No.

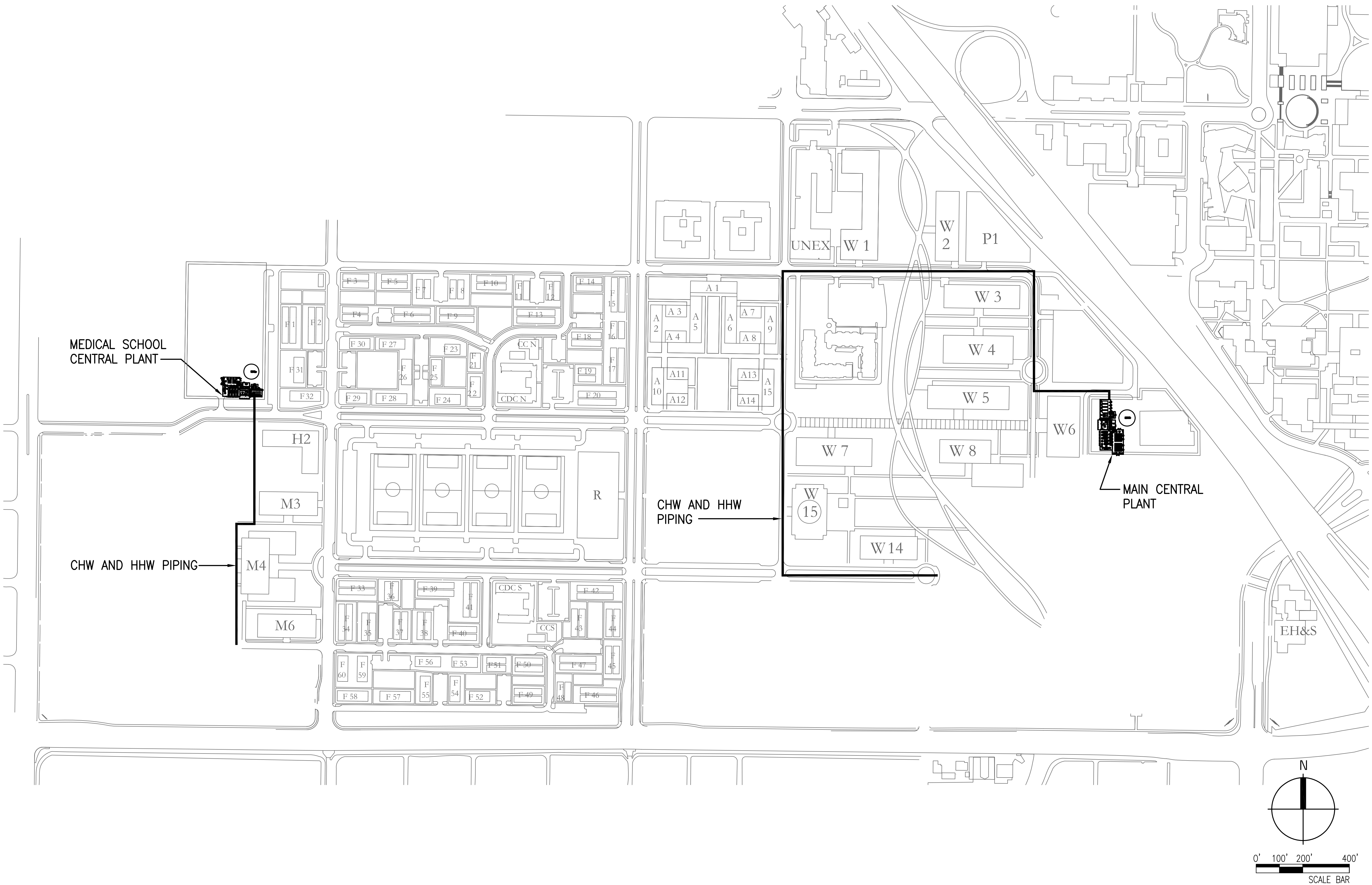

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Figure 8-2
West Campus Development Phase 2 Mechanical Infrastructure

Sheet No.

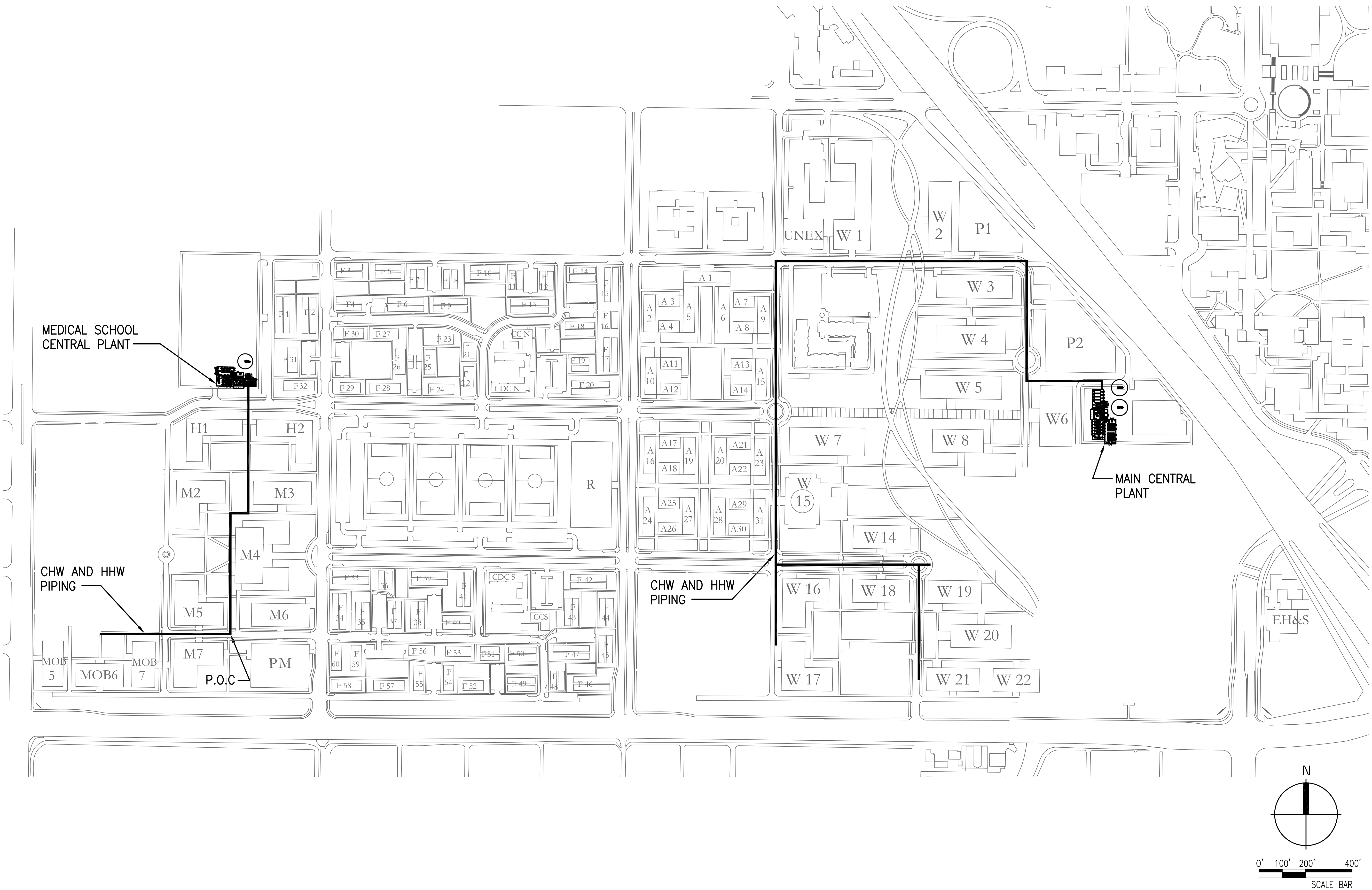

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Figure 8-3
West Campus Development Phase 3 Mechanical Infrastructure

Sheet No.

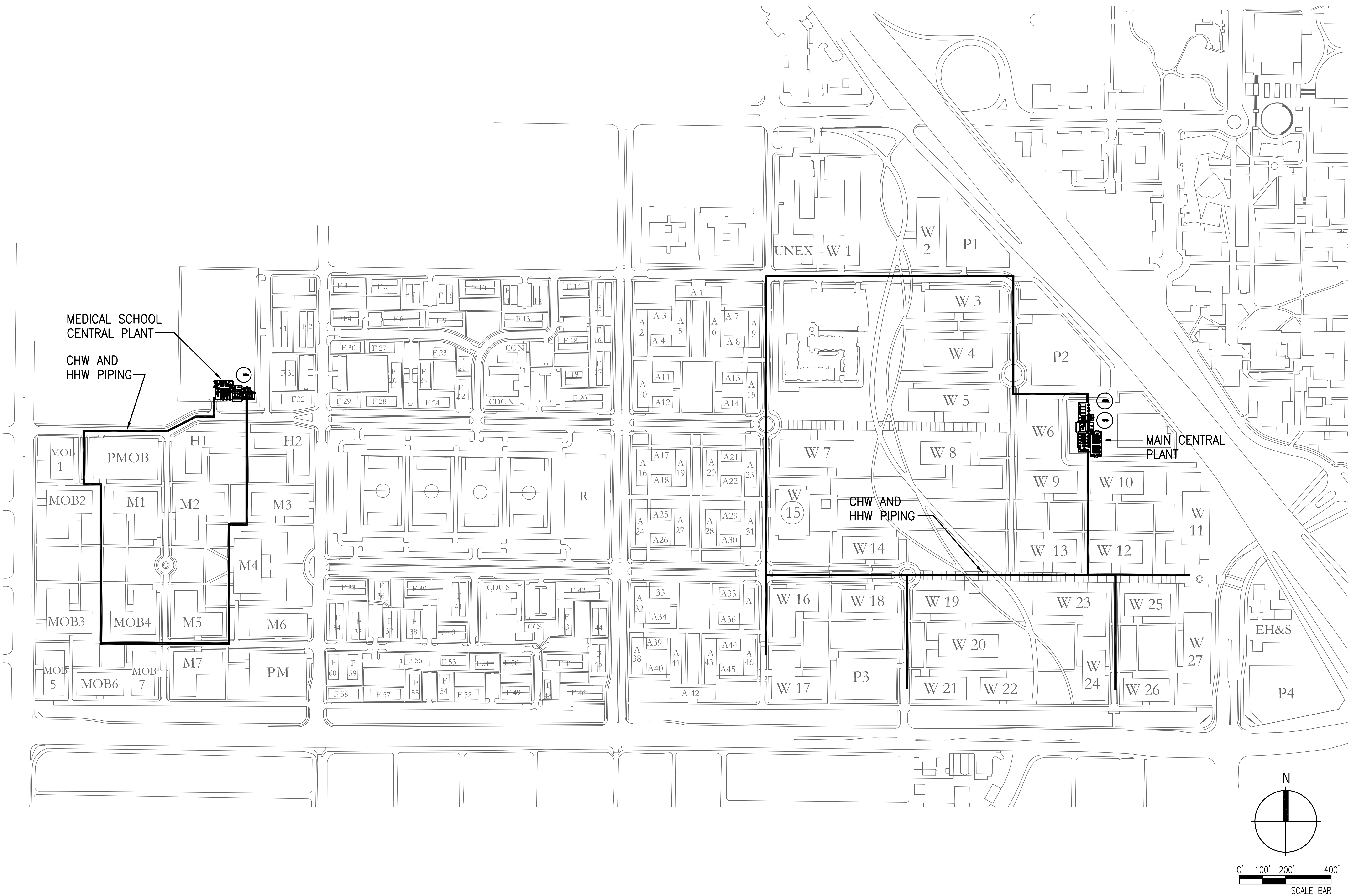

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Figure 8-4
West Campus Development Phase 4 Mechanical Infrastructure

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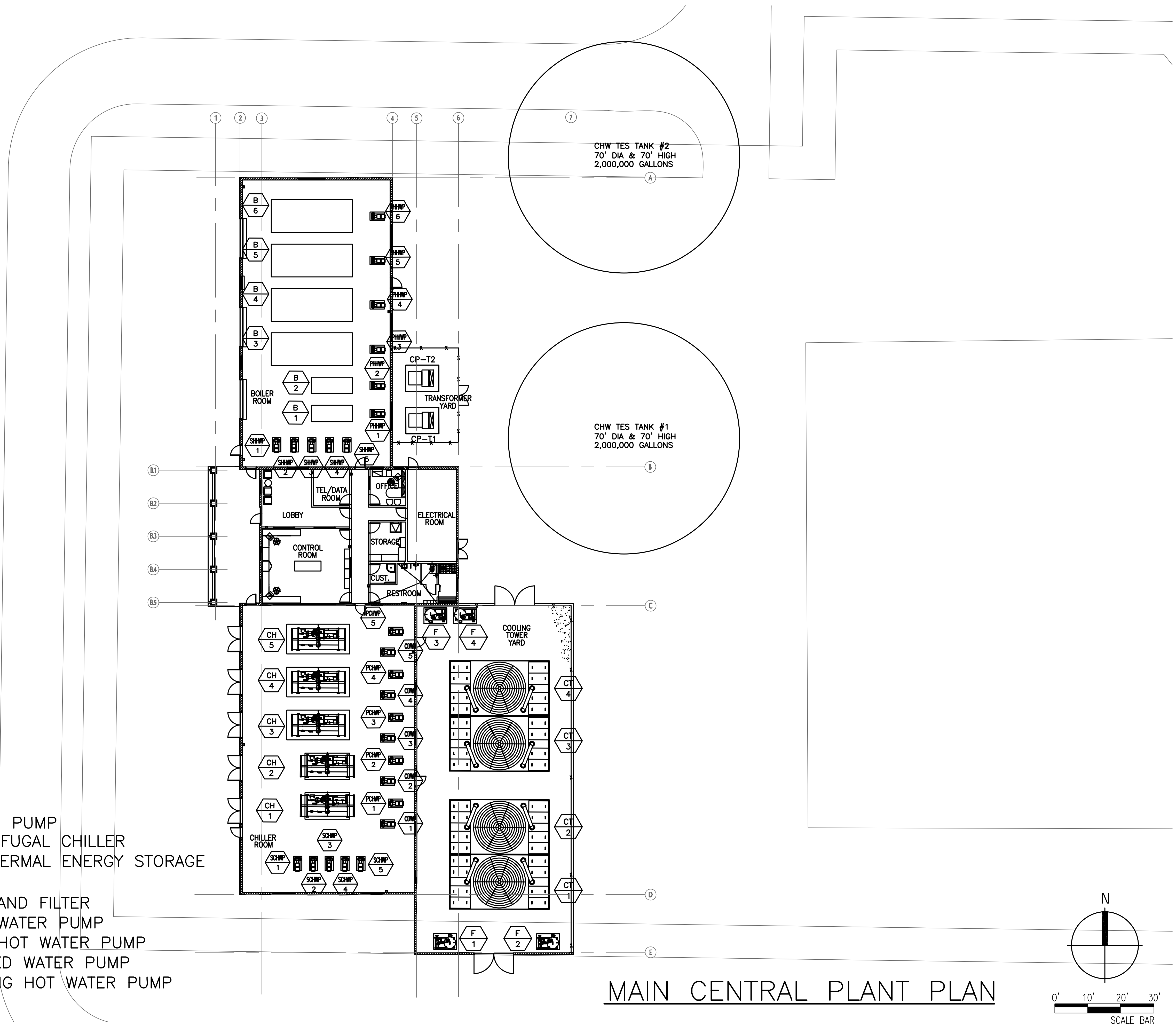

MAIN CENTRAL PLANT PLAN

LEGEND

B = GAS FIRED BOILER
CDWP = CONDENSER WATER PUMP
CH = ELECTRICAL CENTRIFUGAL CHILLER
CHW TES = CHILLED WATER THERMAL ENERGY STORAGE
CT = COOLING TOWER
F = COOLING TOWER SAND FILTER
PCHWP = PRIMARY CHILLED WATER PUMP
PHHWP = PRIMARY HEATING HOT WATER PUMP
SCHWP = SECONDARY CHILLED WATER PUMP
SHHWP = SECONDARY HEATING HOT WATER PUMP

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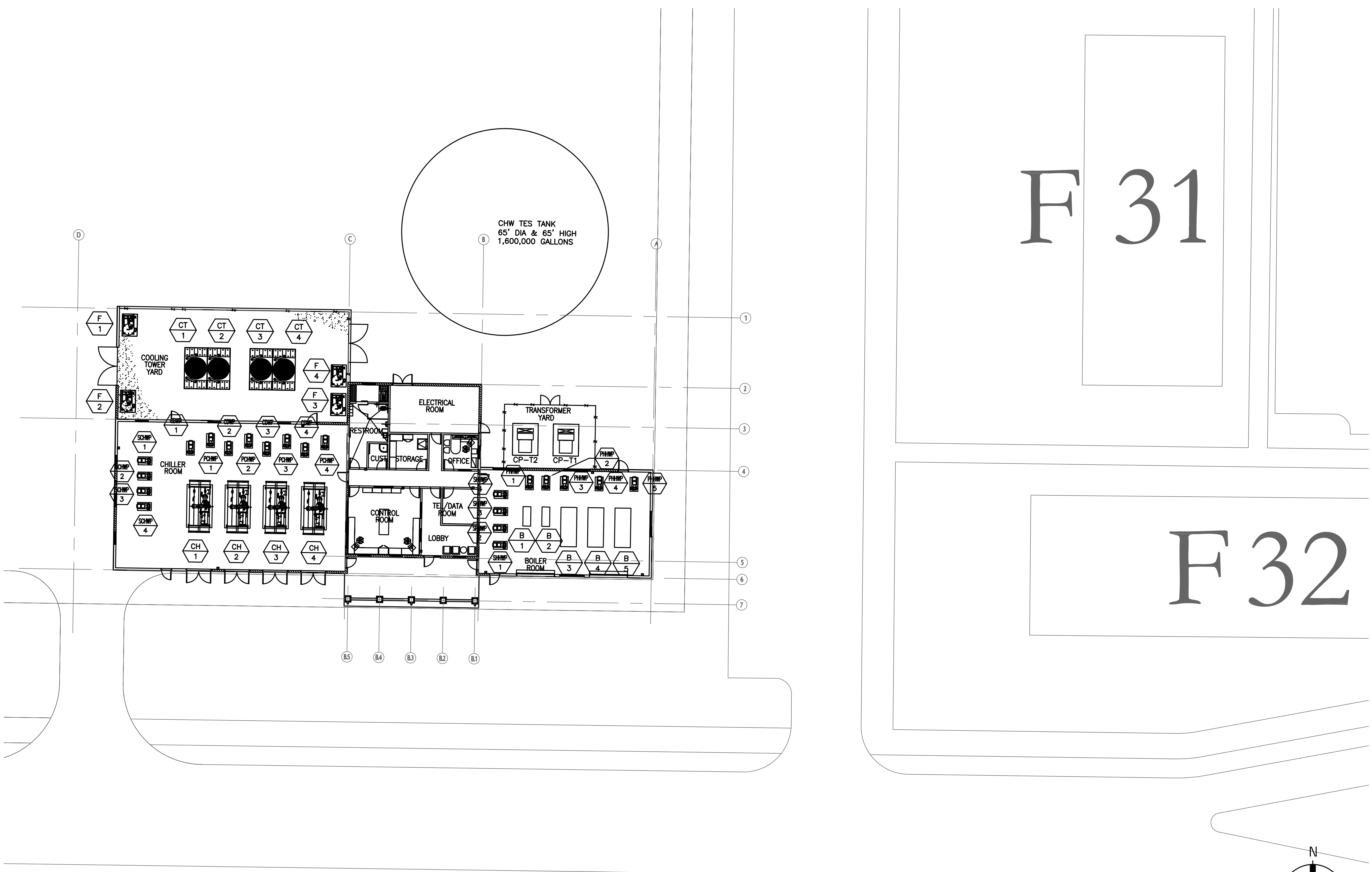
Figure 8-5
Main Central Plant
Site Layout

Sheet No.



MEDICAL SCHOOL CENTRAL PLANT PLAN

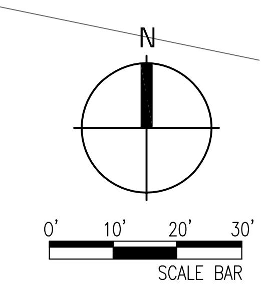


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Figure 8-6 Medical School Central Plant Site Layout

Sheet No.

CHAPTER 8A

COOLING AND HEATING SYSTEMS WITH AGGRESSIVE SUSTAINABILITY

8A.0 Cooling and Heating Systems with Sustainability

UC Riverside is dedicated to aggressively implementing sustainable design features in West Campus development so that it truly can claim the mantle of being a campus of the future. The actual sustainable design considerations are detailed in Chapter 16 – Sustainability Considerations. If UC Riverside consistently pursues this policy, then substantially lower energy consumption will be realized as compared to a business-as-usual building implementation approach. Buildings designed with aggressive implementation of sustainable design features are estimated to experience peak diversified cooling and heating loads of 20% to 25% below buildings that are typically designed for 20% better than Title 24 energy efficiency.

It is a given that sustainable design features require additional first cost investment, but that they yield an on-going return in energy savings, durable materials, materials recycling, and quality of life. However, what is less recognized is that there are also **first cost savings** from properly planned implementation of sustainable design features. These first cost savings are realized because sustainable design features reduce energy loads (cooling, heating, and electricity), which in turn, reduces the size and first cost of the infrastructure needed to support those loads.

It is important to recognize however, that if UC Riverside pursues an aggressive sustainable design implementation policy, it must be consistent in its enforcement over time. This is because certain portions of the mechanical infrastructure, such as underground piping and central plant building space, will be difficult and expensive to retrofit later if additional capacity is required due to higher than planned peak diversified cooling and heating loads from energy-inefficient buildings.

Chapter 8A presents the analyses and recommended plans to serve West Campus buildings with the cooling and heating necessary for proper space conditioning within the buildings. However, it differs from Chapter 8 in that it sizes the cooling and heating infrastructure (central plants and piping systems) based on aggressive implementation of building and infrastructure sustainable design features. This chapter has the same format and much of the same content as Chapter 8, and is intended as a full stand-alone replacement of Chapter 8, if desired.

8A.1 Cooling Loads

The first step is to determine the size and phasing of the cooling loads associated with West Campus development. Table 8A-1 (in the appendix) shows all the future buildings and their associated projected peak cooling loads for all six phases (1A, 1B, 1, 2, 3, and 4) through to Build-Out. However, it should be noted that cooling loads will be experienced in a variety of different ways, dependent on how cooling is provided. Tables 8A-2 and 8A-3 (in the appendix) show building cooling loads associated with two central plant development alternatives. These are further described and summarized below.

The building peak cooling loads are based on the following assumptions and criteria, which are typical of these types of buildings, designed with aggressive sustainability measures (roughly 40%-45% better than Title 24), in the Inland Empire region of southern California:

- Classroom and office buildings 475 sf/ton
- Child development center 475 sf/ton
- Community center 475 sf/ton
- Wet lab buildings 400 sf/ton
- Residential 550 sf/ton
- Conference 475 sf/ton
- Hospital 400 sf/ton
- Research 400 sf/ton
- Student center 400 sf/ton
- Medical office building 400 sf/ton

8A.1.1 Cooling Alternatives

For the purpose of cooling loads calculations, three general alternatives are considered for providing cooling to West Campus buildings. These are more fully developed and analyzed later in this section. The three general cooling alternatives are:

- Alternative 1: Building-Local Cooling: Cooling provided locally at all buildings with unitary type HVAC equipment.

- Alternative 2: Single Campus Central Plant: Cooling provided by a single campus central plant, except for Family Housing, which has building-local cooling.

- Alternative 3: Two Campus Central Plants: Cooling provided by two central plants; one to serve the east side of West Campus, including the Academic Core and Apartments; and the other to serve the Medical School section of West Campus.

8A.1.2 Cooling Load Diversity Factor

Cooling load diversity factor comes into play when buildings' cooling demands are served by a central cooling plant. For cooling provided locally at a building, the building cooling generation equipment must provide for peak cooling load. However, for cooling provided from a campus central plant, a diversity factor can be taken into account. Although the building will experience peak cooling load, all the buildings will not peak at the same time. Therefore, a campus central plant will experience a diversified peak cooling load of about 70% of the sum of the buildings' peak cooling loads. The 70% figure is derived from historical experience at southern California campuses with central cooling and heating plants.

8A.1.3 Buildings Served by Central Plant(s)

Another key factor that comes into play is just what campus buildings should be connected to a central cooling plant. In the case of West Campus development, all future buildings are candidates for central plant connection with the exception of the Family Student Housing section and the Recreation Building.

Family Student Housing and its associated facilities (Child Development Center North (CDC N), Community Center North (CC N), Child Development Center South (CDC S), and Community Center South (CC S) would be best served by local unitary type HVAC equipment, since there is a desire for the occupants of those housing units to be separately-metered.

The Recreation Building and adjacent telecommunications node facility would be best served local unitary type HVAC equipment, since they are located in the Family Student Housing area of campus and across Iowa Avenue from the likely location of the Main Central Plant. The first cost would be high to extend chilled water (CHW) piping to the Recreation Building across Iowa Avenue. However, if it is decided to interconnect a Main Central Plant and a Medical School Central Plant with CHW piping, for the purpose of back-up, then serving the Recreation Building with central plant CHW is indeed an option. This will be investigated further later in this report.

8A.1.4 Number of Campus Central Plants

Yet another key factor that must be considered is whether one or two central plants are most appropriate for West Campus considering the other factors involved. One alternative is for a single heating and cooling central plant to serve the entire West Campus, except for Family Student Housing. Another alternative is for there to be two central plants, one to serve the east side of West Campus, including the Academic Core and Apartments. The Medical School section of West Campus would be served by a second heating and cooling central plant, which would also include utilities specific to it, such as medical gases, compressed air, and vacuum. See Section 8A.3.5 for more discussion on these two alternatives.

8A.1.5 Summary of Cooling Loads

Given the factors described above, Table 8A-4 summarizes the cooling loads analysis.

Table 8A-4. Cooling Loads Summary

Scenario and Phase	Cumulative Peak Cooling Load, tons	Cumulative Diversified Peak Cooling Load, tons
Alternative 1: Building-Local Cooling		
Phase 1A	1,116	781
Phase 1B	1,588	1,111
Phase 1	2,777	1,944
Phase 2	7,205	5,044
Phase 3	11,378	7,965
Phase 4 (Build-Out)	16,350	11,445
Alternative 2: Single Campus Central Plant [a]		
Phase 1A	360 [b]	252 [b]
Phase 1B	832 [b]	582 [b]
Phase 1	2,021	1,415
Phase 2	5,722	4,005
Phase 3	9,895	6,926
Phase 4 (Build-Out)	14,867	10,407
Alternative 3: Two Campus Central Plants: Main Central Plant [a]		
Phase 1A	360 [b]	252 [b]
Phase 1B	360 [b]	252 [b]
Phase 1	1,549	1,085
Phase 2	4,465	3,126
Phase 3	6,906	4,834
Phase 4 (Build-Out)	10,413	7,289
Alternative 3: Two Campus Central Plants: Medical School Central Plant [a]		
Phase 1A	-	-
Phase 1B	472 [b]	330 [b]
Phase 1	472 [b]	330 [b]
Phase 2	1,256	879
Phase 3	2,989	2,092
Phase 4 (Build-Out)	4,454	3,118

[a] without cooling loads from Family Student Housing facilities

[b] these cooling loads are covered by building-local cooling until the Main Central Plant comes on line in Phase 1 and the Medical School Central Plant comes on line in Phase 2.

8A.2 Heating Loads

The first step is to determine the size and phasing of the heating loads associated with West Campus development. Table 8A-5 (in the appendix) shows all the future buildings and their associated projected peak heating loads for all six phases (1A, 1B, 1, 2, 3, and 4) through to Build-Out. However, it should be noted that heating loads will be experienced in a variety of different ways, dependent on how heating is provided. Tables 8A-6 and 8A-7 (in the appendix) show building heating loads associated with two central plant development alternatives. These are further described and summarized below.

The building peak heating loads are based on the following assumptions and criteria, which are typical of these types of buildings, designed with aggressive sustainability measures (roughly 40%-45% better than Title 24), in the Inland Empire region of southern California:

- Classroom and office buildings 14 Btuh/sf
- Child development center 14 Btuh/sf
- Community center 14 Btuh/sf
- Wet lab buildings 16 Btuh/sf
- Residential 19 Btuh/sf
- Conference 14 Btuh/sf
- Hospital 16 Btuh/sf
- Research 16 Btuh/sf
- Student center 16 Btuh/sf
- Medical office building 16 Btuh/sf

8A.2.1 Heating Alternatives

For the purpose of heating loads calculations, three general alternatives are considered for providing heating to West Campus buildings. These are more fully developed and analyzed later in this section. The three general heating alternatives are:

- Alternative 1: Building-Local Heating: Heating provided locally at all buildings with unitary type HVAC equipment.

- Alternative 2: Single Campus Central Plant: Heating provided by a single campus central plant, except for Family Student Housing, which has building-local heating.

- Alternative 3: Two Campus Central Plants: Heating provided by two central plants; one to serve the east side of West Campus, including the Academic Core and Apartments; and the other to serve the Medical School section of West Campus.

8A.2.2 Heating Load Diversity Factor

Heating load diversity factor comes into play when buildings' heating demands are served by a central heating plant. For heating provided locally at a building, the building heating generation equipment must provide for peak heating load. However, for heating provided from a campus central plant, a diversity factor can be taken into account. Although the building will experience peak heating load, all the buildings will not peak at the same time. Therefore, a campus central plant will experience a diversified peak heating load of about 85% of the sum of the buildings' peak heating loads.

8A.2.3 Buildings Served by Central Plant(s)

Another key factor that comes into play is just what campus buildings should be connected to a central heating plant. In the case of West Campus development, all future buildings are candidates for central plant connection with the exception of the Family Student Housing section and the Recreation Building.

Family Student Housing and its associated facilities (Child Development Center North (CDC N), Community Center North (CC N), Child Development Center South (CDC S), and Community Center South (CC S) would be best served by local unitary type HVAC equipment, since there is a desire for the occupants of those housing units to be separately-metered.

The Recreation Building and adjacent telecommunications node facility would be best served local unitary type HVAC equipment, since they are located in the Family Student Housing area of campus and across Iowa Avenue from the likely location of the Main Central Plant. The first cost would be high to extend heating hot water (HHW) piping to the Recreation Building across Iowa Avenue. However, if it is decided to interconnect a Main Central Plant and a Medical School Central Plant with HHW piping, for the purpose of back-up, then serving the Recreation Building with central plant HHW is indeed an option. This will be investigated further later in this report.

8A.2.4 Number of Campus Central Plants

Yet another key factor that must be considered is whether one or two central plants are most appropriate for West Campus considering the other factors involved. One alternative is for a single heating and cooling central plant to serve the entire West Campus, except for Family Student Housing. Another alternative is for there to be two central plants, one to serve the east side of West Campus, including the Academic Core and Apartments. The Medical School section of West Campus would be served by a second heating and cooling central plant, which would also include utilities specific to it, such as such as medical gases, compressed air, and vacuum. See Section 8A.3.5 for more discussion on these two alternatives.

8A.2.5 Summary of Heating Loads

Given the factors described above, Table 8A-8 summarizes the heating loads analysis.

Table 8A-8. Heating Loads Summary

Scenario and Phase	Cumulative Peak Heating Load, MMBtuh	Cumulative Diversified Peak Heating Load, MMBtuh
Alternative 1: Building-Local Heating		
Phase 1A	10.04	8.54
Phase 1B	13.18	11.20
Phase 1	21.09	17.93
Phase 2	55.50	47.18
Phase 3	85.65	72.80
Phase 4 (Build-Out)	120.05	102.05
Alternative 2: Single Campus Central Plant [a]		
Phase 1A	2.30 [b]	1.96 [b]
Phase 1B	5.44 [b]	4.62 [b]
Phase 1	13.35	11.38
Phase 2	40.32	34.27
Phase 3	70.46	59.89
Phase 4 (Build-Out)	104.87	89.14
Alternative 3: Two Campus Central Plants: Main Central Plant [a]		
Phase 1A	2.30 [b]	1.96 [b]
Phase 1B	2.30 [b]	1.96 [b]
Phase 1	10.21	8.68
Phase 2	31.24	26.55
Phase 3	49.37	41.97
Phase 4 (Build-Out)	74.41	62.25
Alternative 3: Two Campus Central Plants: Medical School Central Plant [a]		
Phase 1A	-	-
Phase 1B	3.14 [b]	2.67 [b]
Phase 1	3.14 [b]	2.67 [b]
Phase 2	9.08	7.72
Phase 3	21.09	17.92
Phase 4 (Build-Out)	30.46	25.89

[a] without heating loads from Family Student Housing facilities

[b] these heating loads are covered by building-local heating until the Main Central Plant comes on line in Phase 1 and the Medical School Central Plant comes on line in Phase 2.

8A.3 Criteria for Cooling and Heating Alternatives

In paragraphs 8A.1.1 and 8A.1.2, three broad alternatives were presented for the purposes of identifying cooling and heating loads. In this section, those broad alternatives are more comprehensively developed to provide for a more detailed analysis that will ultimately yield a comprehensive recommended approach for heating and cooling the West Campus.

8A.3.1 Criteria for Analysis

The criteria for developing and analyzing West Campus cooling and heating alternatives include the following:

- Building-local cooling and heating vs. central plant-provided cooling and heating
- Occupancies requiring individual metering vs. occupancies not requiring individual metering
- Central plant locations and number of central plants
- Phasing implications
- Cogeneration
- Central plant chillers: centrifugal vs. absorption
- Thermal energy storage (TES) vs. no TES
- Ice TES vs. chilled water TES
- Chilled water ΔT
- Heating hot water (190°F) vs. steam vs. high temperature hot water (350°F)
- Heating hot water ΔT
- Direct-buried pipes vs. utilidors vs. utility tunnels
- Cost implications

Many of the criteria can be evaluated qualitatively (i.e. site, regulatory, and ownership constraints); other criteria must be analyzed quantitatively (i.e. life cycle cost comparisons). The qualitative evaluations are addressed in the paragraphs immediately below for the purpose of winnowing down the list of alternatives to only those that warrant more detailed analysis. The quantitative analyses are presented further on in this chapter.

8A.3.2 Building-Local Cooling and Heating vs. Central Plant-Provided Cooling and Heating

In a campus environment, such as the UC Riverside West Campus, it is a given that, unless there are other compelling reasons, central plant-provided cooling and heating is more energy-efficient, O&M-friendly, and cost-effective than building-local cooling and heating. UC Riverside's East Campus is served by a central plant, and as such, the campus personnel are fully familiar with the operation and maintenance (O&M) of central plant systems.

For this criterion then, it is generally given that central plant-provided cooling and heating will be used instead of building-local cooling and heating, except for the special cases described below.

The Recreation Building and adjacent telecommunications node facility would be best served local unitary type HVAC equipment, since they are located in the Family Student Housing area of campus and across Iowa Avenue from the likely location of the Main Campus Central Plant. The first cost would be high to extend CHW and HHW piping to the Recreation Building. Consequently, the Recreation Building does not have campus cooling and heating infrastructure implications. However, if it is decided to interconnect a Main Campus Central Plant and a Medical School Central Plant with CHW and HHW piping, for the purpose of back-up, then serving the Recreation Building with central plant CHW and HHW is indeed an option. This will be investigated further later in this report.

8A.3.3 Occupancies Requiring Individual Metering vs. Occupancies Not Requiring Individual Metering

The Family Student Housing (Family Apartments and Family Townhouses) are to be constructed in Phases 1A and 2 as residential buildings. The numerous residential units need to be individually-metered for electricity and gas. Family Student Housing will receive electricity and gas from off-site utilities. Their cooling and heating will be powered by electricity and/or fueled by gas.

All other buildings, planned for the West Campus, will be connected to the central plants, and will be individually metered for chilled water and heating hot water for energy tracking.

For this criterion then, it is given that Family Student Housing will use building-local cooling and heating (i.e. will use local unitary type HVAC equipment), and will not be connected to the central plant. Consequently, Family Housing does not have any further campus cooling and heating infrastructure implications.

8A.3.4 Central Plant Locations and Number of Central Plants

Central plants are ideally located near the loads they serve. However, as “industrial” processes, they are most appropriately located away from the more aesthetic facilities and buildings that are more directly-involved in the educational mission of the campus. These seemingly contradictory criteria must be reconciled to arrive at the optimal locations for campus cooling and heating plants. Furthermore, the central plant location(s) should be consistent with the phased development pattern of the campus.

Considering the build-out master plan of West Campus, it is clear that a central plant cannot be located within the Academic core on the east side of West Campus. It cannot be located within the Apartments section; Family Student Housing section; Medical School section; nor within the designated open space areas of the quads, Gage Canal, Northwest Mall, Southwest Mall, or the fields between the two Family Student Housing developments. The only two logical locations are as follows:

1. Site between the existing electrical substation and building W6 on the east side of West Campus. This location has several advantages:

    - It is part of and adjacent to an “industrial” area (i.e. does not intrude upon the aesthetic Academic core).

    - It is on the perimeter of the campus (i.e. does not intrude upon the aesthetic Academic core).

    - It is adjacent to the electrical substation, which will be convenient for servicing the central plant’s large electrical load.

    - Its location near the freeway is not problematical from a noise perspective.

- It is relatively close to the cooling and heating loads it will serve (i.e. the east side of West Campus). Because of this, then length and cost of piping distribution systems can be minimized.

2. Site in the "Service Area" north of the Medical School section (specifically north of building H1). This location has three advantages:

   - It is part of a designated "service area" (i.e. does not intrude upon the aesthetic Medical School area).

   - It is on the perimeter of the campus (i.e. does not intrude upon the aesthetic Medical School area).

   - It is relatively close to the cooling and heating loads it will serve (i.e. the Medical School area on the west side of West Campus). Because of this, then length and cost of piping distribution systems can be minimized.

Given the only two logical locations of the central plant(s), as described above, the issue then becomes is it best to site two central plants (i.e. one at each of the two locations) or just one central plant at one of those two locations. It is evident that the two central plants alternative is most desirable for the following reasons:

- Under the single central plant alternative, the cost of long lengths of piping and utilities tunnel through the Family Housing and Recreation Fields area would be prohibitive relative to the benefit of that approach. There are essentially no cooling and heating loads to be served in that area, which means very little benefit would be gained by piping and tunneling such a long distance through that area. The two central plants alternative avoids this cost problem.

- Under the single central plant alternative the high first cost of piping and tunnels through the Family Housing and Recreation Fields area is exacerbated by the West Campus Phasing plan. Basically, the full cost of those pipes and tunnels would be borne early on in Phase 2, sized to serve the built-out Medical School. But most of the Medical School buildings will come on line much later in Phases 3 and 4. This means the single central plant alternative requires a large investment in infrastructure early on, which will remain substantially under capacity for many years. The two central plants alternative avoids this large up-front investment problem.

- Under the single central plant alternative, the on-going energy cost of pumping chilled water and heating hot water over such long distances is a significant disadvantage. The two central plants alternative avoids this high pumping energy cost problem.

- Under the single central plant alternative, there is an added complication and cost of piping and tunneling under Iowa Avenue. The two central plants alternative avoids this complication and cost problem.

8A.3.5 Phasing Implications

8A.3.5.1 Phase 1A

Phase 1A is the very first implementation stage. It consists of the north phase of Family Student Housing (F1 through F32), Child Development Center North (CDC N), and Community Center North (CC N). None of these facilities will be served by the Main Central Plant so they don't figure any further into this analysis. One academic building (W4) will also be implemented under Phase 1A. Initially, this building will not be served by the Main Central Plant since Main Central Plant is not to be implemented until Phase 1. However, the HVAC systems for W4 will be designed so that they can be later connected to central plant service.

No central plant or CHW/HHW distribution piping will be implemented under Phase 1A.

8A.3.5.2 Phase 1B

Under Phase 1B, the first building (M4) of the Medical School will be constructed. Initially, this building will not be served by the Medical School Central Plant since Medical School Central Plant is not to be implemented until Phase 2. However, the HVAC systems for M4 will be designed so that they can be later connected to central plant service.

No central plant or CHW/HHW distribution piping will be implemented under Phase 1B.

8A.3.5.3 Phase 1

West Campus will generally be developed from east to west, and north to south. Under Phase 1, three academic buildings (W1, W3, and W5) will be located in the northeast area of the campus. These will all need to be served by the central plant, hereinafter referred to as the Main Central Plant. See Figure 8A-1 for Phase 1 buildings and cooling and heating infrastructure development.

Given the location of these first Phase 1 developments, it would follow that the Main Central Plant (or at least one of them) must be located next to the existing electrical substation on the east side of West Campus. Main chilled water supply (CHWS), chilled water return (CHWR), heating hot water supply (HHWS), and heating hot water return (HHWR) piping would be installed from the Main Central Plant, west towards building W5, north along the east side of buildings W3/W4/W5, west along the north side of building W3, and west along the south side of buildings W1 and UNEX, terminating just southeast of UNEX. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR would extend to the individual buildings. Building W4, constructed under Phase 1A, would be connected to central plant service under Phase 1, and its building chiller and boiler plant would be retained in standby.

8A.3.5.4 Phase 2

Under Phase 2, six academic buildings (W2, W6, W7, W8, W14, and W15) will be constructed generally in the central part of the Academic core (east end of West Campus). Also, Apartments, A1 through A15, will be located in the north central area of the campus. Finally, the Recreation Building (R) will be constructed. These will all need to be served by the already existing, but expanding, Main Central Plant, located next to the existing electrical substation on the east side of West Campus. (Family Student Housing (F33 through F60), Child Development Center South (CDC S), Community Center South (CC S), and the Recreation Building (R) will also be implemented under Phase 2, but will not be served by the Main Central Plant so they don't figure into this analysis.) See Figure 8A-2 for Phase 2 buildings and cooling and heating infrastructure development.

Main CHWS, CHWR, HHWS, and HHWR piping would need to be extended from the Phase 1 terminus just southeast of UNEX, south along the west side of International Village and buildings W7 and W15, east along the south side of buildings W15 and W14, terminating just southeast of building W14. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR would extend to the buildings.

Also under Phase 2, three buildings (H2, M3, and M6) of the Medical School at the west end of West Campus will be constructed. These are a long distance from the Main Central Plant at the very east end of West Campus. Main CHWS, CHWR, HHWS, and HHWR piping from the Main Central Plant would need to be piped this long distance, including the distance through the non-central-plant-served Family Housing Section. Furthermore, the main CHWS, CHWR, HHWS, and HHWR piping in the academic core and all the way to the Medical School would need to be upsized to accommodate the CHW and HHW flows associated with full build-out of the Medical School. Finally, CHW and HHW pumping costs would be increased to distribute CHW and HHW this much longer distance.

Considering this, it would be more appropriate for the Medical School section of West Campus to be served by a second central plant, located in the "Service Area" north of the Medical School (specifically north of building H1). This second central plant, hereinafter referred to as the Medical School Central Plant, would also include utilities specific to the Medical School, such as medical gases, vacuum, and possibly steam.

Main CHWS, CHWR, HHWS, and HHWR piping (and other utilities piping) would be installed from the Medical School Central Plant, south along the west side of buildings H2, M3, M4, and M6, terminating just southwest of building M6. Building M4, constructed under Phase 1B, would be connected to central plant service under Phase 2, and its building chiller and boiler plant would be retained in standby.

8A.3.5.5 Phase 3

Under Phase 3, seven academic buildings (W16, W17, W18, W19, W20, W21, and W22) will be constructed generally in the south part of the Academic core (east end of West Campus). Also, Apartments, A16 through A31, will be located in the central area of the campus. These will all need to be served by the already existing, but expanding, Main Central Plant, located next to the existing electrical substation on the east side of West Campus. See Figure 8A-3 for Phase 3 buildings and cooling and heating infrastructure development.

Main CHWS, CHWR, HHWS, and HHWR piping would not need to be extended from the Phase 2 terminus just southeast of building W14 under Phase 3 project. Only smaller branch piping for CHWS, CHWR, HHWS, and HHWR would extend to the individual buildings.

Also under Phase 3, more Medical School buildings (H1, M2, M5, M7, MOB5, MOB6, and MOB7) at the west end of West Campus will be constructed. These will all need to be served by the already existing, but expanding, Medical School Central Plant, located in the "Service Area" north of the Medical School (specifically north of building H1).

Main CHWS, CHWR, HHWS, and HHWR piping (and other utilities piping) would need to be extended from the Phase 2 terminus just southwest of building M6, west along the north side of buildings M7/MOB7/MOB6, terminating just north of building MOB6. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR (and other utilities piping) would extend to the individual buildings.

8A.3.5.6 Phase 4

Under Phase 4, ten academic buildings (W9, W10, W11, W12, W13, W23, W24, W25, W26, and W27) will be constructed generally in the southeast part of the Academic core (east end of West Campus). These will all need to be served by the already existing, but expanding, Main Central Plant, located next to the existing electrical substation on the east side of West Campus. See Figure 8A-4 for Phase 4 buildings and cooling and heating infrastructure development.

Main CHWS, CHWR, HHWS, and HHWR piping would need to be extended from the Phase 2 terminus just southeast of building W14, west along the north side of building W19 and south side of building W13, north between buildings W13 and W12 and north between buildings W9 and W10, and back to the Main Central Plant, thus completing the loop. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR would extend to the individual buildings.

Also under Phase 4, more Medical School buildings (M1, MOB1, MOB2, MOB3, and MOB4) at the west end of West Campus will be constructed. These will all need to be served by the already existing, but expanding, Medical School Central Plant, located in the "Service Area" north of the Medical School (specifically north of building H1).

Main CHWS, CHWR, HHWS, and HHWR piping (and other utilities piping) would need to be extended from the Phase 3 terminus just north of building MOB6, north between buildings MOB3 and MOB4 and north between buildings MOB2 and M1, north along the east side of building MOB1, east along the north side of PMOB (parking structure), and back to the Medical School Central Plant, thus completing the loop. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR (and other utilities piping) would extend to the individual buildings.

8A.3.6 Cogeneration

Numerous studies have been conducted on cogeneration for college campuses. For the most part, cogeneration has been found to be marginally economical at best. Generally, it has been found to be economically infeasible in the current economic climate of energy rates. Cogeneration is mostly pursued where there are other compelling reasons, such as a desire for energy independence to secure against rolling blackouts.

At UC Riverside, there are additional economic reasons to not pursue cogeneration as part of a West Campus central plant. Cogeneration is especially problematic because UC Riverside enjoys low electricity rates from the City of Riverside, largely due to its use of thermal energy storage (TES), and its non-use of cogeneration. If cogeneration were implemented on West Campus, this could jeopardize UC Riverside's favorable electricity rates.

Because of this evident economic downside associated with cogeneration, it is recommended not to pursue cogeneration as part of the West Campus infrastructure development.

8A.4 Central Chiller Plants

Alternatives 2 and 3 entail use of central plants to provide campus cooling. These are described as follows:

- Alternative 2: Single Campus Central Plant: Cooling provided by a single campus central plant, except for Family Housing which has building-local cooling.

- Alternative 3: Two Campus Central Plants: Cooling provided by two central plants; one to serve the east side of West Campus, including the Academic Core and Apartments; and the other to serve the Medical School section of West Campus.

Sustainability measures are included in the central cooling plants as described in the various paragraphs below, and as described in more detail in the paragraphs of section 16.4.1 in Chapter 16 – Sustainability Considerations.

8A.4.1 Central Chiller Plant Capacities

Under Alternatives 2 and 3, central chiller plants must have certain capacities to keep up with campus development. Table 8A-9 shows cumulative diversified peak cooling loads for each of the six phases (1A, 1B, 1, 2, 3, and 4), as well as the corresponding required chiller plant capacities and chiller modules that will make up those capacities. These capacities assume no use of thermal energy storage (TES).

Table 8A-9. Cooling Loads and Required Central Plant Chiller Capacities (without TES)

Alternative and Phase	Cumulative Diversified Peak Cooling Loads, tons	Required Chiller Capacities, tons	Chiller Modules
Alternative 2: Single Campus Central Plant [a]			
Phase 1A	252	0	(Building W4 has a 400-ton building chiller)
Phase 1B	582	0	(Building M4 has a 480-ton building chiller)
Phase 1	1,085	2,400	(2) 1,200-ton
Phase 2	4,005	5,600	(2) 1,600-ton + (2) 1,200-ton
Phase 3	6,926	8,800	(4) 1,600-ton + (2) 1,200-ton
Phase 4 (Build-Out)	10,407	12,000	(6) 1,600-ton + (2) 1,200-ton
Alternative 3: Two Campus Central Plants: Main Central Plant [a]			
Phase 1A	252	0	(Building W4 has a 400-ton building chiller)
Phase 1B	252	0	(Building W4 has a 400-ton building chiller)
Phase 1	1,085	2,400	(2) 1,200-ton
Phase 2	3,126	5,600	(2) 1,600-ton + (2) 1,200-ton
Phase 3	4,834	7,200	(3) 1,600-ton + (2) 1,200-ton
Phase 4 (Build-Out)	7,289	8,800	(4) 1,600-ton + (3) 1,200-ton
Alternative 3: Two Campus Central Plants: Medical School Central Plant [a]			
Phase 1A	-	0	-
Phase 1B	330	0	(Building M4 has a 480-ton building chiller)
Phase 1	330	0	(Building M4 has a 480-ton building chiller)
Phase 2	879	2,400	(1) 1,200-ton + (2) 600-ton
Phase 3	2,092	3,600	(2) 1,200-ton + (2) 600-ton
Phase 4 (Build-Out)	3,118	4,800	(3) 1,200-ton + (2) 600-ton

[a] without cooling loads from Family Student Housing facilities

8A.4.2 Central Chiller Plants Type and Configuration

The central chiller plants will consist of electrical centrifugal chillers. The chiller plants will be designed to achieve a very high 30°F CHW ΔT, meaning chilled water supply (CHWS) at 38°F (adjustable) and chilled water return (CHWR) at 68°F. This high CHW ΔT translates into a substantial first cost savings in that CHW pumps, CHW pipes, and any CHW TES tank can be downsized proportionately while providing the same capacity. In addition, CHW pumping costs and motor horsepower energy are substantially reduced since less CHW is pumped for the same cooling capacity delivered. The implications of this are more fully described in the sustainability section.

To achieve the 30°F CHW ΔT, individual chillers will be paired up in series, with each chiller in the pair nominally achieving a 15°F CHW ΔT. The chiller pairs will be arranged in parallel. To preserve this high 30°F CHW ΔT, the design criteria for all new cooling coils on West Campus shall be designed for 40°F CHWS and 70°F CHWR.

A chiller/cooling tower plant optimization program should be included in the central plant design. This is software that considers all the energy consuming components of the chiller/cooling tower systems, and optimizes the operational level of those components to meet cooling load with minimum energy consumption.

8A.4.3 Central Chiller Plant Capacities with Back-up Capacity

Table 8A-9 shows cumulative diversified peak cooling loads for each of the six phases (1A, 1B, 1, 2, 3, and 4), as well as the corresponding required chiller plant capacities and chiller modules that will make up those capacities. The required chiller plant cooling capacities are based on the need to satisfy the cumulative diversified peak cooling load plus a measure a back-up capacity.

The amount of back-up capacity needed is essentially a risk analysis. A conservative approach would be to be able to satisfy the cumulative diversified peak cooling load in the event one piece of equipment went out of service, or put another way, having a spare chiller to bring on line in case an operating chiller goes out of service; or put yet another way, having a standby chiller available at all times.

In the early years, when the chiller plant is smaller with fewer pieces of equipment, a single equipment failure would have a proportionately greater adverse impact on cooling capacity deficiency. A single machine failure would mean experiencing cooling deficiency over a wider range of climate conditions, such as those with moderate to peak cooling loads. In this case, a higher percentage of back-up capacity is warranted. Furthermore, the additional capacity is not merely sunk cost, but represents chiller capacity that will be needed in the near future anyway as the campus expands.

In the later years, when the chiller plant is larger with many pieces of equipment, a single equipment failure would have a proportionately smaller adverse impact on cooling capacity deficiency. In this case, a lower percentage of back-up capacity is warranted.

Also, it is important to note that building W4 will be constructed during Phase 1A and will have a 400-ton building chiller since Main Central Plant will not be implemented at that time. That building chiller will be retained as 400 tons of standby chiller capacity, which figures into the back-up cooling capacity analysis.

Similarly, building M4 will be constructed during Phase 1B and will have a 480-ton building chiller since Medical School Central Plant will not be implemented at that time. That building chiller will be retained as 480 tons of standby chiller capacity, which figures into the back-up cooling capacity analysis.

So, considering Table 8A-9 above, in each phase, there is generally sufficient back-up cooling capacity to allow the central chiller plant to satisfy most of the cumulative diversified peak cooling load with the largest single piece of equipment out of service.

8A.4.4 Chiller Modules

Table 8A-9 shows the chiller modules recommended to make up the required cooling capacities. Up to two chiller module sizes are used within each chiller plant. One is a large size; the other is smaller. The large size is needed in recognition that the central chiller plant will significantly expand over time. Large modules are preferred so that there is not a proliferation of many pieces of small equipment as the plant expands. However, a smaller chiller size is needed to handle periods of the year when there are low cooling load conditions, particularly during the early years of the plant. So, for simplicity sake, a maximum of two chiller module sizes is considered in each plant; a large size for convenient expansion, and a small size to efficiently handle low cooling load conditions.

8A.4.5 Electrical Centrifugal Chillers

Individual chillers will be paired up series, with each chiller in the pair nominally achieving a 15°F CHW ΔT. As such, the chiller plants will achieve a very high 30°F CHW ΔT, meaning chilled water supply (CHWS) at 38°F (adjustable) and chilled water return (CHWR) at 68°F. The chiller pairs will be arranged in parallel.

These chillers could be supplied by a number of chiller manufacturers, including Carrier, York, and Trane. For the purpose of this utilities infrastructure master plan, a selection was based around the Carrier Evergreen model 19XRV centrifugal chiller. Each chiller in this application would have the following features:

- Type — Electrical centrifugal
- Refrigerant — R-134a (HFC-134a) (non-ozone-depleting refrigerant)
- Chiller pair efficiency — 0.53 kW/ton or less
- Chiller pair NPLV — 0.39 kW/ton or less
- Compressor motor — with variable frequency drive (VFD)
- CHW EWT (CHWR) — Chiller #1: 68°F Chiller #2: 51°F
- CHW LWT (CHWS) — Chiller #1: 51°F Chiller #2: 38°F
- Evaporator tubes — Super E2 (SUPE2), 0.035 inch thick copper
- CDW EWT (CDWS) — 80°F

- CDW LWT (CDWR) 90°F
- Condenser tubes Spike Fin III (SPK3), 0.035 inch thick copper

It is recommended that R-134a be used as the refrigerant for the new chillers. This refrigerant has a zero ozone depletion factor (ODF). A chiller using refrigerant R-123 could be considered in this application. R-123 has an extremely low ODF. However, an R-134a chiller is recommended because it is believed that being able to claim zero ODF is important for sustainability considerations.

Marine waterboxes are recommended for the chiller CDW pipe connections. However, flanged connections are sufficient for the chiller CHW pipe connections.

8A.5 Chilled Water Distribution Systems

Each CHW distribution system consists of the central plant cooling generation equipment and ancillary equipment such as the CHW pumps, the campus CHW distribution piping, and the building CHW components.

8A.5.1 CHW Distribution Systems in the Central Cooling Plants

The central cooling plants CHW distribution systems will each use a constant flow primary loop/variable flow secondary loop configuration. Chilled water will be pumped as constant flow through the chiller evaporators using constant flow primary CHW pumps, each dedicated to their chiller. The chilled water distribution around campus will be in a variable flow secondary loop using variable flow secondary CHW pumps with variable frequency drives (VFDs). One secondary CHW pump will be standby. Although the central chiller plants will operate at a design condition of 30°F CHW ΔT, the campus chilled water distribution piping will be sized based on a 25°F CHW ΔT to be conservative.

Components in each central cooling plant CHW system will be:

- Constant flow primary CHW pumps, one pump for each chiller pair, but manifolded together for cross service capability.

- Variable flow secondary CHW pumps with variable frequency drives (VFDs).

- One compression tank for the CHW piping system.

- One air separator for the CHW piping system.

- Insulated, standard weight, Schedule 40, ASTM A53, Grade B, ERW welded, carbon steel, chilled water supply (CHWS) and chilled water return (CHWR) piping.

- CHW pot feeder and chemical treatment system.

- CHW make-up water system.

8A.5.2 CHW Distribution Systems Around Campus

The CHW distribution around West Campus will be piping distribution systems designed for variable CHW flow. The pipes may be direct-buried, in utilidors, and/or in utility tunnels. A more detailed description of the overall campus CHW distribution system is presented in Chapter 9A.

8A.5.3 CHW Distribution Systems in the Buildings

Chilled water for space cooling will be used directly in campus buildings in various cooling coils. There will be no active booster pumps or tertiary pumps at the buildings. CHW will be directly pumped from the central cooling plants, around the campus, through building cooling coils, and back to the plants, using variable flow secondary CHW pumps with variable frequency drives (VFDs).

However, there will be standby CHW booster pumps in each building that can be manually called into service in the event that additional chilled water flow and/or pressure are required in the building.

8A.6 Cooling Towers and Condenser Water Systems

Cooling towers and their associated condenser water systems are companion components to the chillers and the chilled water distribution systems.

8A.6.1 Condenser Water Loads and Cooling Tower Capacities

Cooling towers must reject chiller condenser heat to atmosphere. As such they must be sized to handle the chiller condenser heat loads. Table 8A-10 presents the cumulative condenser heat loads for each of the six phases (1A, 1B, 1, 2, 3, and 4), as well as the corresponding required cooling tower capacities and cooling tower modules that will make up those capacities. These capacities assume no use of thermal energy storage (TES).

Table 8A-10. Condenser Heat Loads and Required Cooling Tower Capacities (without TES)

Alternative and Phase	Cumulative Condenser Heat Loads, tons [a]	Required Cooling Tower Capacities, tons	Cooling Tower Modules
Alternative 2: Single Campus Central Plant [b]			
Phase 1A	0	0	(Building W4 has a 470-ton building cooling tower)
Phase 1B	0	0	(Building M4 has a 560-ton building cooling tower)
Phase 1	2,801	4,800	(2) 2,400-ton
Phase 2	6,353	7,200	(3) 2,400-ton
Phase 3	10,270	12,000	(5) 2,400-ton
Phase 4 (Build-Out)	14,004	14,400	(6) 2,400-ton
Alternative 3: Two Campus Central Plants: Main Central Plant [b]			
Phase 1A	0	0	(Building W4 has a 470-ton building cooling tower)
Phase 1B	0	0	(Building W4 has a 470-ton building cooling tower)
Phase 1	2,801	4,800	(2) 2,400-ton
Phase 2	6,353	7,200	(3) 2,400-ton
Phase 3	8,402	9,600	(4) 2,400-ton
Phase 4 (Build-Out)	10,270	12,000	(5) 2,400-ton
Alternative 3: Two Campus Central Plants: Medical School Central Plant [b]			
Phase 1A	0	0	-
Phase 1B	0	0	(Building M4 has a 560-ton building cooling tower)
Phase 1	0	0	(Building M4 has a 560-ton building cooling tower)
Phase 2	2,801	3,200	(2) 1,600-ton
Phase 3	4,201	4,800	(3) 1,600-ton
Phase 4 (Build-Out)	5,602	6,400	(4) 1,600-ton

[a] based on installed chiller condenser heat rejection
[b] without cooling loads from Family Student Housing facilities

8A.6.2 Cooling Towers Type and Capacity

Cooling towers will be arranged in parallel with respect to their CDW piping. Although the basins will be individual to allow for taking individual cooling tower cells off line for servicing, the standard mode of operation will be to use all three cooling tower cells at all times with basin dividers opened up for common operation. This operational strategy allows the full use of the cooling tower media at all times, thereby minimizing the use of the cooling tower fans.

Cooling tower fans will have VFDs for fan speed control based on maintaining a set condenser water supply temperature.

The cooling towers could be provided by a number of manufacturers, including Baltimore Air Coil (BAC) and Marley. Each cooling tower in this application would have the following features:

- Type Crossflow
- CDW EWT (CDWR) 90°F
- CDW LWT (CDWS) 80°F
- Ambient wet bulb 72°F

8A.6.3 Condenser Water System

Condenser water will be pumped as constant flow through the chiller condensers, to the cooling towers, and back to the chiller condensers using constant flow CDW pumps, each dedicated to their chiller.

Components in the condenser water (CDW) system will be:

- Constant flow CDW pumps.

- Non-insulated, standard weight, Schedule 40, ASTM A53, Grade B, ERW welded, carbon steel, condenser water supply (CDWS) piping from the cooling towers to the chillers and condenser water return (CDWR) piping from the chillers to the cooling towers.

- CDW chemical treatment system.

- CDW make-up water system.

- A cooling tower sand filtration unit for each cooling tower cell for cleaning of the CDW. Each unit will include sweeper piping in the cooling tower basins, which will circulate CDW from the basin, through the sand filter, and back to the basins. The unit will have a backwash cycle for the cleansing of the sand bed. The cooling tower sand filtration unit will be as manufactured by Puroflux, PEP, or equal.

- A cooling tower chemical treatment system.

As an additional sustainable design measure, the condenser water system could use reclaimed water. A condenser water system is an open system from which substantial amounts of water are evaporated through the cooling towers. Use of reclaimed water in that system would be a significant benefit in terms of potable water consumption savings and potable water cost savings.

The challenge is to get the cooling tower manufacturer to warrant their cooling tower for use with reclaimed water. Similarly, there is a challenge in getting the chiller manufacturer to warrant their chiller for use of reclaimed water in the chiller condenser. However, since condenser water is typically extensively treated at the central plant with algaecide, biocide, and corrosion inhibitors, and since reclaimed water is highly treated anyway prior to arrival at the site, cooling tower manufacturers and chiller manufacturers are generally open to reclaimed water in this application. However, this must be clearly spelled out in the project specifications to avoid any ambiguity on this point.

Use of reclaimed water on West Campus is discussed more extensively in Chapter 4.

8A.7 Thermal Energy Storage

Thermal energy storage (TES) involves the generation of cooling during less expensive non-peak cooling hours, and storing that cooling for use during peak cooling hours. UC Riverside has two thermal energy storage tanks on their main campus, one for their main central plant and one for their satellite central plant. As such, UC Riverside personnel are very familiar with the operation of TES as part of CHW systems.

8A.7.1 TES Advantages

TES has a number of implications for the central chiller plants:

- It saves on-going energy costs by reducing expensive on-peak electrical demand. (If UC Riverside did not employ TES, then it would be subject to a rate schedule that has high on-peak electrical rates, lower mid-peak electrical rates, and very low off-peak electrical rates. See the fourth bullet point below.)

- It saves on-going energy costs by reducing electrical energy consumption. By generating and storing cooling during cooler off-peak hours, the cooling generation process uses significantly less energy. Also, by having the chillers operate at full load whenever they are operating, the chillers run more efficiently than when they are tracking demand at part loads.

- It allows the chiller plant capacity to be reduced substantially because the peak cooling load is shaved off with storage. A properly sized TES tank and its piping system, integrated with the chiller plant, may mean the elimination of two or three electrical centrifugal chillers, and their ancillary equipment, such as cooling towers and primary CHW pumps. The additional secondary chilled water pumps would still be needed. So, the additional first cost of the TES tank would be substantially offset by eliminating the first cost of chillers, cooling towers, and primary chilled water pumps.

- It saves substantial electricity costs due to a likely highly favorable rate schedule. Because UC Riverside's main campus uses TES, the City of Riverside Public Utilities Commission provides a flat $0.06/kwh electricity rate schedule for the entire main campus. This is for all electrical rate periods, without any demand charges, and is for all the electricity consumed by the campus, not just for the central plant. If UC Riverside did not have TES, then they would fall under the Large Industrial Usage rate category, for which a flat $0.0727/kwh charge is incurred for all electrical rate periods plus demand charges. Those demand charges are $6.50/kw/month on-peak, $2.59/kw/month mid-peak, and $1.24/kw/month off-peak. Presumably, the same, highly favorable, flat $0.06/kwh electricity rate schedule would be extended to UC Riverside's West Campus as well if TES is implemented.

8A.7.2 Ice TES

Ice TES stores cooling energy in the form of ice, meaning it incorporates the energy of freezing into the storage as well as the sensible energy. CHW TES stores only the sensible energy of chilled water. As a result, ice TES uses less volume for storage than CHW TES. University of Arizona has a 22,000 ton-hour Calmac ice TES system. Most UC and CSU universities that have TES, use CHW TES systems.

The University of Arizona (U of A) ice TES system illustrates a typical configuration of an ice TES system. U of A has regular CHW chillers and then special dual purpose chillers for use in the ice TES system. The dual purpose chillers are Trane chillers designed to generate 17°F glycol. They can also generate 42°F CHW if used directly in the campus CHW system. The 17°F glycol is circulated through a total of 14,000 feet of coiled poly pipe in a number of manifolded 8' high, 8' in diameter tanks. During cooling energy storage, the cold glycol circulates through the poly pipe to turn water in those tanks into solid blocks of ice. During cooling energy withdrawal, the cold glycol transfers the ice cold energy (i.e. thaws the ice) to the campus CHW in plate-and-frame heat exchangers.

U of A cited the following reasons for selecting an ice TES system over a CHW TES system:

- U of A was concerned that a CHW TES tank at atmospheric pressure and exposed to atmosphere through the tank vent would be susceptible to bacterial contamination. This would in turn cause fouling problems in the CHW system and cooling coils.

- U of A was concerned that a CHW TES system, with a reference pressure of atmospheric pressure, would incur additional pumping costs associated with having to use backpressure control regulators in the higher buildings.

8A.7.3 CHW TES

The CHW TES system would be a thermally-stratified system, in which the CHW is charged into, and discharged from, the TES tank in a laminar fashion. This allows the warmer CHWR (68°F) to lie above the colder CHWS (38°F) inside the tank, separated by a relatively narrow thermocline. The TES tank would be at atmospheric pressure and is vented.

In terms of its configuration within the CHW system, the TES tank would be situated within the constant flow primary CHW loop and the variable flow secondary CHW loop. The flow of CHW would be self-balancing, depending on the speed (flow) of the variable speed secondary CHW pumps. When secondary CHW pumps are at high speed (high flow) and/or the primary CHW pumps are off, the TES tank is discharging CHW to campus. When secondary CHW pumps are at low speed (low flow) and the primary CHW pumps are on, the TES tank is primarily being charged with CHW. This sequence is more specifically described as follows:

- During on-peak electrical rate periods (late-spring, summer, and early autumn afternoons), when CHW is withdrawn from the TES tank for campus cooling, the variable speed secondary CHW pumps would circulate CHWS from bottom of the TES tank, around campus, and back to the top of the TES tank as CHWR. The primary CHW loop (chillers, cooling towers, and primary CHW pumps) would be shut down.

- During mid-peak and off-peak electrical rate periods, when the TES tank is to be charged with CHW, the constant speed primary CHW pumps would circulate CHWS from the chillers to the bottom of the TES tank, withdraw CHWR from the top of the TES tank, and back to the chillers. Any CHWS needed by the campus during these periods would be drawn from the primary CHW loop by the secondary CHW pumps.

8A.7.4 Comparison: Ice TES vs. CHW TES

- Ice TES uses less volume than CHW TES. However, the area used by the two TES systems is roughly equivalent. This is because the multiple cylindrical ice TES tanks occupy as much area as a single cylindrical CHW TES tank.

- In an atmospherically-vented CHW TES system, backpressure control regulators are required in CHW return piping for any cooling coils located physically higher than the water level in the CHW TES tank. This is so that, when the secondary loop CHW pumps are turned off, the CHW does not drain from the high coils out through the atmospheric vent in the CHW TES tank. Since a CHW TES tank may be about 70 feet high, only cooling coils located on building floors 6 and above would need backpressure control regulators. This is a very small number of the total cooling coils expected on campus, and consequently, the parasitic pumping costs associated with this is considered to be very small relative to total pumping costs.

- As far as is known, neither the UC Riverside or other UC and CSU campuses with CHW TES have encountered bacterial contamination of their CHW systems due to an atmospherically-vented CHW TES tank. Proper CHW water treatment is routine for all CHW systems – those with and without TES.

- An ice TES system has more complicated components than a CHW TES system. The ice TES system requires special, dual purpose chillers in addition to the regular CHW chillers. The CHW TES system uses only regular CHW chillers. Also, the ice TES system has many additional components, such as a glycol loop, extra pumps, plate-and-frame heat exchangers, long lengths of poly piping, and special tanks. A CHW TES system only has a CHW tank (i.e. a “fat place in the pipe”) without additional pumps or other components.

- An ice TES system is more complicated to operate than a CHW TES system. A deliberate choice needs to be made each time the ice TES system/campus CHW system switches between storage operation and withdrawal operation. A CHW TES system is self-regulating, automatically allocating CHW to and from storage based on the relative speeds of the primary and secondary CHW pumps.

- A CHW TES system entails less first cost than an ice TES system.

- CHW TES is much more energy efficient than ice TES. Ice TES chillers operate at about 0.72 kw/ton (even when operating in CHW mode). CHW TES chillers operate at about 0.53 kw/ton. This is a significant difference. Ongoing energy costs will be much lower with a CHW TES system.

- UC Riverside already has two CHW systems on the East Campus. As such, operating personnel are already familiar with CHW TES operation, whereas ice TES would be a new type of system on campus for which O&M knowledge and spare parts would need to be added anew.

Because of the clear economic advantages (both first cost and energy costs) and institutional advantages associated with the CHW TES system relative to the ice TES system, the CHW TES system is recommended for UC Riverside's West Campus.

8A.7.5 Comparison: Above-Ground, Insulated, Welded Steel TES Tank vs. Buried Concrete TES Tank

It is recommended that a single, above-ground, insulated, welded steel, chilled water TES tank be installed with the mechanical infrastructure as part of Phase 1. UC Riverside's West Campus is flat, unlike the hilly nature of UC Riverside's main campus. As such, the possibility of constructing a TES tank into a hillside does not exist. Although an above-ground TES tank is more visible, it has the following advantages:

- An above-ground, insulated, welded steel, chilled water TES tank is about one-half the first cost of a buried concrete TES tank

- Its reference water level (the TES tank water level exposed to atmospheric pressure) is much higher than that of a buried concrete TES tank; perhaps as much as 70 feet higher. This means that most, if not all, of the parasitic energy loss of backflow prevention devices can be avoided. Backflow prevention devices are needed for all buildings that have cooling coils located physically higher than the reference water level in the TES tank, otherwise when the secondary CHW pumps are shut off, water in cooling coils that are physically higher than the TES tank reference water level will drain out the top of the TES tank.

There are no apparent hurdles to using an above-ground, insulated, welded steel, chilled water TES tank on the West Campus next to the central plants. As such, it is the recommended TES tank choice for UC Riverside's West Campus because of its much lower first cost and operational advantages.

8A.7.6 TES Sizing

Typically, the most economic TES tank sizing criteria would be to sufficiently size the TES tank so as avoid all electrical centrifugal chiller use in the electrical on-peak period. Although the central chiller plants will operate at a design condition of 30°F CHW ΔT (38°F CHWS and 68°F CHWR), the TES tank will be sized based on a 25°F CHW ΔT to be conservative.

A TES tank sized to provide the equivalent of 5,000 tons of additional cooling capacity each hour over a 6-hour on-peak period would be about 1,750,000 gallons or 30,000 ton-hours of cooling capacity.

A TES tank sized to provide the equivalent of 4,000 tons of additional cooling capacity each hour over a 6-hour on-peak period would be about 1,400,000 gallons or 24,000 ton-hours of cooling capacity.

A TES tank sized to provide the equivalent of 3,000 tons of additional cooling capacity each hour over a 6-hour on-peak period would be about 1,050,000 gallons or 18,000 ton-hours of cooling capacity.

A TES tank sized to provide the equivalent of 2,000 tons of additional cooling capacity each hour over a 6-hour on-peak period would be about 700,000 gallons or 12,000 ton-hours of cooling capacity.

8A.7.7 Recommended Chiller/TES Plants

Table 8A-11 shows cumulative diversified peak cooling loads for each of the six phases (1A, 1B, 1, 2, 3, and 4), as well as the corresponding required chiller plant capacities and chiller/TES modules that will make up those capacities, given the implementation of TES.

Table 8A-11. Cooling Loads and Required Central Plant Chiller/TES Capacities

Alternative and Phase	Cumulative Diversified Peak Cooling Loads, tons	Required Chiller Capacities, tons	Chiller/TES Modules
Alternative 2: Single Campus Central Plant [a]			
Phase 1A	252	0	(Building W4 has a 400-ton building chiller)
Phase 1B	582	0	(Building M4 has a 480-ton building chiller)
Phase 1	1,085	1,600	(2) 800-ton chillers + (1) 24,000 ton-hour TES
Phase 2	4,005	3,200	(1) 1,600-ton chiller + (2) 800-ton chillers + (1) 24,000 ton-hour TES
Phase 3	6,926	4,800	(2) 1,600-ton chillers + (2) 800-ton chillers + (2) 24,000 ton-hour TES
Phase 4 (Build-Out)	10,407	6,400	(3) 1,600-ton chillers + (2) 800-ton chillers + (2) 24,000 ton-hour TES
Alternative 3: Two Campus Central Plants: Main Central Plant [a]			
Phase 1A	252	0	(Building W4 has a 400-ton building chiller)
Phase 1B	252	0	(Building W4 has a 400-ton building chiller)
Phase 1	1,085	1,600	(2) 800-ton chillers + (1) 21,000 ton-hour TES
Phase 2	3,126	3,200	(1) 1,600-ton chiller + (2) 800-ton chillers + (1) 21,000 ton-hour TES
Phase 3	4,834	4,800	(2) 1,600-ton chillers + (2) 800-ton chillers + (2) 21,000 ton-hour TES
Phase 4 (Build-Out)	7,289	4,800	(2) 1,600-ton chillers + (2) 800-ton chillers + (2) 21,000 ton-hour TES
Alternative 3: Two Campus Central Plants: Medical School Central Plant [a]			
Phase 1A	0	0	-
Phase 1B	330	0	(Building M4 has a 480-ton building chiller)
Phase 1	330	0	(Building M4 has a 480-ton building chiller)
Phase 2	879	1,600	(2) 800-ton chillers
Phase 3	2,092	2,400	(3) 800-ton chillers + (1) 18,000 ton-hour TES
Phase 4 (Build-Out)	3,118	2,400	(3) 800-ton chillers + (1) 18,000 ton-hour TES

[a] without cooling loads from Family Student Housing facilities

Table 8A-12 shows cumulative condenser heat loads for each of the six phases (1A, 1B, 1, 2, 3, and 4), as well as the corresponding required cooling tower capacities and cooling tower modules that will make up those capacities, given the implementation of TES.

Table 8A-12. Condenser Heat Loads and Required Cooling Tower Capacities (with TES)

Alternative and Phase	Cumulative Condenser Heat Loads, tons [a]	Required Cooling Tower Capacities, tons	Cooling Tower Modules
Alternative 2: Single Campus Central Plant [b]			
Phase 1A	0	0	(Building W4 has a 470-ton building cooling tower)
Phase 1B	0	0	(Building M4 has a 560-ton building cooling tower)
Phase 1	1,867	3,000	(2) 1,500-ton
Phase 2	3,734	4,500	(3) 1,500-ton
Phase 3	5,602	6,000	(4) 1,500-ton
Phase 4 (Build-Out)	7,469	7,500	(5) 1,500-ton
Alternative 3: Two Campus Central Plants: Main Central Plant [b]			
Phase 1A	0	0	(Building W4 has a 470-ton building cooling tower)
Phase 1B	0	0	(Building W4 has a 470-ton building cooling tower)
Phase 1	1,867	3,000	(2) 1,500-ton
Phase 2	3,734	4,500	(3) 1,500-ton
Phase 3	5,602	6,000	(4) 1,500-ton
Phase 4 (Build-Out)	5,602	6,000	(4) 1,500-ton
Alternative 3: Two Campus Central Plants: Medical School Central Plant [b]			
Phase 1A	0	0	-
Phase 1B	0	0	(Building M4 has a 560-ton building cooling tower)
Phase 1	0	0	(Building M4 has a 560-ton building cooling tower)
Phase 2	1,867	2,000	(2) 1,000-ton
Phase 3	2,801	3,000	(3) 1,000-ton
Phase 4 (Build-Out)	2,801	3,000	(3) 1,000-ton

[a] based on installed chiller condenser heat rejection
[b] without cooling loads from Family Student Housing facilities

8A.8 Central Heating Plants

Alternatives 2 and 3 entail use of central plants to provide campus heating. These are described as follows:

- Alternative 2: Single Campus Central Plant: Heating provided by a single campus central plant, except for Family Student Housing, which has building-local heating.

- Alternative 3: Two Campus Central Plants: Heating provided by two central plants; one to serve the east side of West Campus, including the Academic Core and Apartments; and the other to serve the Medical School section of West Campus.

Sustainability measures are included in the central heating plants as described in the various paragraphs below, and as described in more detail in the paragraphs of section 16.4.1 in Chapter 16 – Sustainability Considerations.

8A.8.1 Central Heating Plant Capacities

Under Alternatives 2 and 3, central heating plants must have certain capacities to keep up with campus development. Table 8A-13 shows cumulative diversified peak heating loads for each of the six phases (1A, 1B, 1, 2, 3, and 4), as well as the corresponding required heating plant capacities and boiler modules that will make up those capacities.

Table 8A-13. Heating Loads and Required Central Plant Boiler Capacities

Alternative and Phase	Cumulative Diversified Peak Heating Loads, MMBtuh	Required Boiler Capacities, MMBtuh	Boiler Modules
Alternative 2: Single Campus Central Plant [a]			
Phase 1A	1.96	0	(Building W4 has two 1.0 MMBtuh building boilers)
Phase 1B	4.62	0	(Building M4 has two 1.6 MMBtuh building boilers)
Phase 1	11.38	16	(2) 8 MMBtuh
Phase 2	34.27	54	(1) 30 MMBtuh + (3) 8 MMBtuh
Phase 3	59.89	84	(2) 30 MMBtuh + (3) 8 MMBtuh
Phase 4 (Build-Out)	89.14	114	(3) 30 MMBtuh + (3) 8 MMBtuh
Alternative 3: Two Campus Central Plants: Main Central Plant [a]			
Phase 1A	1.96	0	(Building W4 has two 1.0 MMBtuh building boilers)
Phase 1B	1.96	0	(Building W4 has two 1.0 MMBtuh building boilers)
Phase 1	8.68	16	(2) 8 MMBtuh
Phase 2	26.55	48	(2) 16 MMBtuh + (2) 8 MMBtuh
Phase 3	41.97	64	(3) 16 MMBtuh + (2) 8 MMBtuh
Phase 4 (Build-Out)	62.25	80	(4) 16 MMBtuh + (2) 8 MMBtuh
Alternative 3: Two Campus Central Plants: Medical School Central Plant [a]			
Phase 1A	0	0	-
Phase 1B	2.67	0	(Building M4 has two 1.6 MMBtuh building boilers)
Phase 1	2.67	0	(Building M4 has two 1.6 MMBtuh building boilers)
Phase 2	7.72	16	(2) 8 MMBtuh
Phase 3	17.92	24	(3) 8 MMBtuh
Phase 4 (Build-Out)	25.89	32	(4) 8 MMBtuh

[a] without heating loads from Family Student Housing facilities

8A.8.2 Central Heating Plants Type and Configuration

The heating medium could be generated in boilers as high temperature hot water (HTW), steam, or medium temperature heating hot water (HHW).

8A.8.2.1 High Temperature Hot Water

HTW is considered water under high temperature and high pressure. Typically this might mean 350°F HTWS at 300 psig. The advantage of this is that a high ΔT can be used, such as 100°F ΔT (350°F HHWS/250°F HHWR). This translates to first cost savings from reduced HTW piping sizes and decreased energy costs from reduced HTW pumping. The disadvantages of HTW are as follows:

- Individual campus buildings each need heat exchangers and pumped hydronic HHW systems. HTW is distributed around campus to the heat exchanger in each building. HHW is distributed from the heat exchanger to heating coils within the building. This complexity results in added first cost and added ongoing operation and maintenance (O&M) costs.

- HTW piping is heavier grade and its insulation is more complex to reduce heat loss from such a high temperature heating medium. This results in added first cost, which will probably more than offset the first cost savings from being able to use smaller pipes.

- A high temperature/high pressure HTW generation system will require a full time boiler operator, as required by code. This operator requirement is a substantial on-going O&M cost. HHW boilers generating medium temperature HHW do not need code-required full-time boiler operators.

These disadvantages are a significant drawback to use of HTW for campus heating, and as a result, very few new facilities use HTW for campus heating. HTW is not recommended for use on UC Riverside's West Campus.

8A.8.2.2 Steam

Steam is boiled water above 212°F. The advantage of steam as a heating medium is that it contains a high heat density, both in terms of sensible heat, and particularly, latent heat. This translates to first cost savings from reduced steam and condensate return piping sizes, and decreased energy costs from negligible associated pumping. The disadvantages of steam as a heating medium are as follows:

- Individual campus buildings each need heat exchangers and pumped hydronic HHW systems. Steam is distributed around campus to the heat exchanger in each building. HHW is distributed from the heat exchanger to heating coils within the building. This complexity results in added first cost and added ongoing operation and maintenance (O&M) costs.

- Steam and condensate return piping are heavier grade and their insulation is more complex to reduce heat loss from such a high temperature heating medium. In addition steam traps, pumped condensate return systems, and other ancillary steam appurtenances are involved in a steam/condensate return distribution system. This all results in added first cost, which will probably more than offset the first cost savings from being able to use smaller pipes.

- A steam generation system (>15 psig) will require a full time boiler operator, as required by code. This operator requirement is a substantial on-going O&M cost. HHW boilers generating medium temperature HHW do not need code-required full-time boiler operators.

These disadvantages are a significant drawback to use of steam for campus heating, and as a result, very few new facilities use steam exclusively for campus heating. Steam is not recommended as a heating medium for use on UC Riverside's West Campus.

8A.8.2.3 Heating Hot Water

Heating hot water (HHW) is considered hot water below 212°F (i.e. the water boiling point at atmospheric pressure). In this regard, it is a simpler heating medium to use. Full-time boiler operators are not needed. Also, HHW will be pumped directly from the campus central plants to building heating coils and back. There will be no intervening heat exchangers or tertiary building pumps.

The most significant drawback is that often HHW is used with a low ΔT such as 20°F ΔT (180°F HHWS/160°F HHWR). This means much more hot water must be pumped to deliver a given heating capacity as compared to HTW or steam. HHW pipes must be larger as well. However, this drawback need not be the case if the HHW distribution system is designed properly. This utilities infrastructure master plan proposes an HHW distribution system with a 60°F ΔT (190°F HHWS/130°F HHWR). This high ΔT significantly overcomes this drawback.

The central heating plants will consist of gas-fired, heating hot water boilers, arranged in parallel. The boiler plants will be designed to achieve a very high 60°F HHW ΔT, meaning heating hot water supply (HHWS) at 190°F (adjustable) and heating hot water return (HHWR) at 130°F. This high HHW ΔT translates into a substantial first cost savings in that HHW pumps and HHW pipes can be downsized proportionately while providing the same capacity. In addition, HHW pumping costs and motor horsepower energy are substantially reduced since less HHW is pumped for the same heating capacity delivered. The implications of this are more fully described in the sustainability section.

To achieve this high 60°F HHW ΔT, the design criteria for all new heating coils on West Campus shall be designed for 180°F HHWS and 120°F HHWR. In some cases, such as VAV reheat coils, achieving such a high HHW ΔT may not be possible. In those cases, at least a 40°F HHW ΔT (180°F HHWS, 140°F HHWR) shall be the design criterion.

8A.8.3 Central Boiler Plant Capacities with Back-up Capacity

Table 8A-13 shows cumulative diversified peak heating loads for each of the six phases (1A, 1B, 1, 2, 3, and 4) as well as the corresponding required boiler plant capacities and boiler modules that will make up those capacities. The required heating plant heating capacities are based on the need to satisfy the cumulative diversified peak heating load plus a measure a back-up capacity.

The amount of back-up capacity needed is essentially a risk analysis. A conservative approach would be to be able to satisfy the cumulative diversified peak heating load in the event one piece of equipment went out of service, or put another way, having a spare boiler to bring on line in case an operating boiler goes out of service; or put yet another way, having a standby boiler available at all times. However, back-up capacity is not as essential in the case of heating as it is in cooling, since peaking space heating load tends to occur during times when campus academic buildings are not occupied and are in night setback. As such, smaller margins of back-up capacity are recommended.

In the early years, when the boiler plant is smaller with fewer pieces of equipment, a single equipment failure would have a proportionately greater adverse impact on heating capacity deficiency. A single machine failure would mean experiencing heating deficiency over a wider range of climate conditions, such as those with moderate to peak heating loads. In this case, a higher percentage of back-up capacity is warranted. Furthermore, the additional capacity is not merely sunk cost, but represents boiler capacity that will be needed in the near future anyway as the campus expands.

In the later years, when the boiler plant is larger with many pieces of equipment, a single equipment failure would have a proportionately smaller adverse impact on heating capacity deficiency. In this case, a lower percentage of back-up capacity is warranted.

Also, it is important to note that building W4 will be constructed during Phase 1A and will have two 1.0 MMBtuh boilers since Main Central Plant will not be implemented at that time. Those building boilers will be retained as 2.0 MMBtuh of standby boiler capacity, which figures into the back-up heating capacity analysis.

Similarly, building W4 will be constructed during Phase 1B and will have two 1.6 MMBtuh boilers since Medical School Central Plant will not be implemented at that time. Those building boilers will be retained as 3.2 MMBtuh of standby boiler capacity, which figures into the back-up heating capacity analysis.

So, considering Table 8A-13 above, in each phase, there is generally sufficient back-up heating capacity to allow the central boiler plant to satisfy the majority of the cumulative diversified peak heating load with the largest single piece of equipment out of service.

8A.8.4 Boiler Modules

Table 8A-13 shows the boiler modules recommended to make up the required heating capacities. Up to two boiler module sizes are used within each heating plant. One is a large size; the other is smaller. The large size is needed in recognition that the central heating plant will significantly expand over time. Large modules are preferred so that there is not a proliferation of many pieces of small equipment as the plant expands. However, a smaller boiler size is needed to handle periods of the year when there are low heating load conditions, particularly during the early years of the plant. So, for simplicity sake, a maximum of two boiler module sizes are considered in each plant; a large size for convenient expansion, and a small size to efficiently handle low heating load conditions.

8A.8.5 Gas-Fired, Heating Hot Water (HHW) Boilers

The gas-fired, HHW boilers could be provided by a number of boiler manufacturers. For the purpose of this utilities infrastructure master plan, a selection was based around the Bryan model RW boiler. Each boiler in this application would have the following features:

- Type — Gas-fired, water tube, water heating boiler with low NO_x package
- Efficiency — 84%
- HHW EWT (HHWS) — 130 °F
- HHW LWT (HHWR) — 190 °F

The boilers should have flue gas-to-combustion air heat recovery as an energy efficiency measure. This feature recovers flue gas heat for the purpose of pre-heating combustion air used by the boilers.

8A.9 Heating Hot Water Distribution Systems

Each HHW distribution system consists of the central plant heating generation equipment and ancillary equipment such as the HHW pumps, the campus HHW distribution piping, and the building HHW components.

8A.9.1 HHW Distribution Systems in the Central Heating Plants

The central heating plants HHW distribution systems will each use a constant flow primary loop/variable flow secondary loop configuration. Heating hot water will be pumped as constant flow through the boilers using constant flow primary HHW pumps, each dedicated to their boiler and furnished as part of the boiler package. The HHW distribution system from the heating plants, around campus, and back to the plants will be in variable flow secondary loops using variable flow secondary HHW pumps with variable frequency drives (VFDs). One secondary HHW pump will be standby. Although the central heating plants will operate at a design condition of 60°F CHW ΔT, the campus heating hot water distribution piping will be sized based on a 40°F HHW ΔT to be conservative.

Components in each central heating plant HHW system will be:

- Constant flow primary HHW pumps, each dedicated to their boiler.
- Variable flow secondary HHW pumps with variable frequency drives (VFDs).
- One expansion tank for the HHW piping system.
- One air separator for the HHW piping system.
- Insulated, standard weight, Schedule 40, ASTM A53, Grade B, ERW welded, carbon steel, heating hot water supply (HHWS) and heating hot water return (HHWR) piping.
- HHW pot feeder and chemical treatment system.
- HHW make-up water system.

8A.9.2 HHW Distribution Systems Around Campus

The HHW distribution around West Campus will be piping distribution systems designed for variable HHW flow. The pipes may be direct-buried, in utilidors, and/or in utility tunnels. A more comprehensive description of the overall campus heating hot water distribution system is presented in Chapter 9A.

8A.9.3 HHW Distribution Systems in the Buildings

Heating hot water for space heating will be used directly in campus buildings in various heating coils. There will be no booster pumps or tertiary pumps at the buildings. HHW will be directly pumped from the central heating plants, around the campus, through building heating coils, and back to the plants, using variable flow secondary HHW pumps with variable frequency drives (VFDs).

However, there will be standby HHW booster pumps in each building that can be manually called into service in the event that additional heating hot water flow and/or pressure are required in the building.

HHW will also be used to provide domestic hot water (DHW) heating in the Apartments and in buildings with significant DHW loads such as the Recreation building, Student Center, medical buildings, and lab buildings. In most Academic buildings however, DHW demand will be non-existent or very low. What DHW load there is would be most cost-effectively served with point-of-use, instantaneous, electric hot water heaters.

In the buildings with significant DHW load, double-wall, shell-and-tube heat exchangers will be used between the HHW and DHW in those buildings. The annular space between each heat exchanger's two walls will be vented, thereby allowing any leak to be easily identified. This is a code requirement to minimize cross contamination between the HHW and DHW.

8A.10 Special Central Plant Services for the Medical School

The Medical School Central Plant will serve research facilities, wet labs, a vivarium, and medical office buildings. These facilities will require some special services. Medical gases (oxygen, nitrogen, etc.), natural gas, compressed air, and vacuum are among these special services. These services could be located in the buildings for which they are needed, or, alternatively, they could be centralized in the Medical School Central Plant and piped to their points of use alongside the CHW and HHW piping to those buildings. A decision on this can be postponed until more details are known on the actual loads and locations of these special services.

8A.11 Recommended Central Cooling and Heating Plants for West Campus

Considering the analysis of various alternatives in this chapter, the comprehensive recommendations are presented below for cooling and heating UC Riverside's West Campus facilities.

8A.11.1 General Recommendations

- **Family Student Housing.** Family Student Housing (Family Apartments and Family Townhouses), and its associated facilities (Child Development Center North (CDC N), Community Center North (CC N), Child Development Center South (CDC S), and Community Center South (CC S), will use building-local cooling and heating (i.e. will use local unitary type HVAC equipment).

- **Recreation Building.** The Recreation Building and adjacent telecommunications node facility would be best served local unitary type HVAC equipment, since they are located in the Family Student Housing area of campus and across Iowa Avenue from the likely location of the Main Central Plant. The first cost would be high to extend CHW and HHW piping across Iowa Avenue to the Recreation Building. However, if it is decided to interconnect a Main Central Plant and a Medical School Central Plant with CHW and HHW piping, for the purpose of back-up, then serving the Recreation Building with central plant CHW and HHW is indeed an option.

- **Main Central Plant.** The east side of West Campus (Academic core and Apartments) will be served by a central cooling and heating plant, which will be located in an "industrial" area, just west of the existing electrical substation and just east of future building W6. The Main Central Plant building will be built in Phase 1, large enough to house all equipment through Phase 4 (Build-out). Building W4, constructed in Phase 1A, will be connected to the Main Central Plant CHW and HHW systems during Phase 1. Building W4's chiller and boilers will be retained as back-up capacity.

- **Medical School Central Plant.** The west side of West Campus (Medical School) will be served by a central cooling and heating plant, which will be located in a "service" area, just north of the future Medical School. The Medical School Central Plant building will be built in Phase 2, large enough to house all equipment through Phase 4 (Build-out).

- **CHW and HHW Distribution Systems.** Chilled water (CHW) and heating hot water (HHW) will be circulated to campus buildings in underground piping (in a utilities tunnel or direct-buried). Please see Chapter 9 for details on the CHW and HHW distribution systems. CHW and HHW will be used directly in campus buildings in various coils. There will be no booster pumps or tertiary pumps at the buildings. CHW and HHW will be directly pumped from the central plants, around the campus, through building coils, and back to the plants, using variable flow secondary pumps with variable frequency drives (VFDs). However, there will be standby CHW and HHW booster pumps in each building that can be manually called into service in the event that additional CHW or HHW flow and/or pressure are required in the building.

- **Chillers.** Central plant chillers will consist of high efficiency, electrical centrifugal chillers with VFDs on their compressors. Individual chillers will be paired up series, with each chiller in the pair nominally achieving a 15°F CHW ΔT. As such, the chiller plants will achieve a very high 30°F CHW ΔT, meaning chilled water supply (CHWS) at 38°F (adjustable) and chilled water return (CHWR) at 68°F. The chiller pairs will be arranged in parallel.

- **Cooling Towers.** Cooling towers will be used to reject chiller condenser heat. They will be arranged in parallel with respect to their CDW piping. Cooling tower fans will have VFDs for fan speed control based on maintaining a set condenser water supply temperature. Cooling towers will be sized to cool 90°F CDWR to 80°F CDWS in a 72°F wet bulb ambient condition.

- **Thermal Energy Storage Systems.** Each central plant will include an above-ground, insulated, welded steel, thermally-stratified, chilled water, thermal energy storage (TES) tank. In terms of its configuration within the CHW system, the TES tank would be situated within the constant flow primary CHW loop and the variable flow secondary CHW loop. The flow of CHW would be self-balancing, depending on the speed (flow) of the variable speed secondary CHW pumps. When secondary CHW pumps are at high speed (high flow) and/or the primary CHW pumps are off, the TES tank is discharging CHW to campus. When secondary CHW pumps are at low speed (low flow) and the primary CHW pumps are on, the TES tank is primarily being charged with CHW.

- **Boilers.** Central plant boilers will consist of gas-fired, heating hot water boilers, arranged in parallel. The boiler plants will be designed to achieve a very high 60°F HHW ΔT, meaning heating hot water supply (HHWS) at 190°F (adjustable) and heating hot water return (HHWR) at 130°F.

8A.11.2 Recommended Central Plants Implementation Plan

Tables 8A-14, 8A-15, 8A-16, and 8A-17 present the recommended central plants implementation plan.

Table 8A-14. Recommended Main Central Plant Cooling System Implementation Plan

Phase	Cumulative Chiller Modules	Cumulative Cooling Tower Modules	Cumulative TES Tank Modules	Cumulative Primary CHW Pump Modules	Cumulative Secondary CHW Pump Modules	Cumulative Condenser Water Pump Modules
Phase 1A	0	0	0	0	0	0
Phase 1B	0	0	0	0	0	0
Phase 1	(2) 800-ton	(2) 1,500-ton	(1) 21,000 ton-hour TES tank	(2) 1,280-gpm	(2) 1,500-gpm	(2) 2,240-gpm
Phase 2	(1) 1,600-ton + (2) 800-ton	(3) 1,500-ton	(1) 21,000 ton-hour TES tank	(1) 2,560-gpm + (2) 1,280-gpm	(3) 1,500-gpm	(1) 4,480-gpm + (2) 2,240-gpm
Phase 3	(2) 1,600-ton + (2) 800-ton	(4) 1,500-ton	(2) 21,000 ton-hour TES tank	(2) 2,560-gpm + (2) 1,280-gpm	(4) 1,500-gpm	(2) 4,480-gpm + (2) 2,240-gpm
Phase 4 (Build-Out)	(2) 1,600-ton + (2) 800-ton	(4) 1,500-ton	(2) 21,000 ton-hour TES tank	(2) 2,560-gpm + (2) 1,280-gpm	(6) 1,500-gpm	(2) 4,480-gpm + (2) 2,240-gpm

Table 8A-15. Recommended Main Central Plant Heating System Implementation Plan

Phase	Cumulative Boiler Modules	Cumulative Primary HHW Pump Modules	Cumulative Secondary HHW Pump Modules
Phase 1A	0	0	0
Phase 1B	0	0	0
Phase 1	(2) 8 MMBtuh	(2) 280-gpm	(2) 800-gpm
Phase 2	(2) 16 MMBtuh + (2) 8 MMBtuh	(2) 560-gpm + (2) 280-gpm	(3) 800-gpm
Phase 3	(3) 16 MMBtuh + (2) 8 MMBtuh	(3) 560-gpm + (2) 280-gpm	(4) 800-gpm
Phase 4 (Build-Out)	(4) 16 MMBtuh + (2) 8 MMBtuh	(4) 560-gpm + (2) 280-gpm	(5) 800-gpm

Table 8A-16. Recommended Medical School Central Plant Cooling System Implementation Plan

Phase	Cumulative Chiller Modules	Cumulative Cooling Tower Modules	Cumulative TES Tank Modules	Cumulative Primary CHW Pump Modules	Cumulative Secondary CHW Pump Modules	Cumulative Condenser Water Pump Modules
Phase 1A	0	0	0	0	0	0
Phase 1B	0	0	0	0	0	0
Phase 1	0	0	0	0	0	0
Phase 2	(2) 800-ton	(2) 1,000-ton	0	(2) 1,280-gpm	(2) 1,100-gpm	(2) 2,240-gpm
Phase 3	(3) 800-ton	(3) 1,000-ton	(1) 18,000 ton-hour TES tank	(3) 1,280-gpm	(3) 1,100-gpm	(3) 2,240-gpm
Phase 4 (Build-Out)	(3) 800-ton	(3) 1,000-ton	(1) 18,000 ton-hour TES tank	(3) 1,280-gpm	(4) 1,100-gpm	(3) 2,240-gpm

Table 8A-17. Recommended Medical School Central Plant Heating System Implementation Plan

Phase	Cumulative Boiler Modules	Cumulative Primary HHW Pump Modules	Cumulative Secondary HHW Pump Modules
Phase 1A	0	0	0
Phase 1B	0	0	0
Phase 1	0	0	0
Phase 2	(2) 8-MMBtuh	(2) 280-gpm	(2) 450-gpm
Phase 3	(3) 8-MMBtuh	(3) 280-gpm	(3) 450-gpm
Phase 4 (Build-Out)	(4) 8-MMBtuh	(4) 280-gpm	(4) 450-gpm

8A.11.3 Layout of the Central Cooling and Heating Plants for West Campus

Given the recommended components of the central cooling and heating plants for UC Riverside's West Campus, it is possible to consider some rough layouts to determine the site areas required to support the central plants.

8A.11.3.1 Layout and Footprint of the Main Central Plant

Figure 8A-5 shows a layout and footprint of the Main Central Plant at Build-Out in the preferred location between the existing electrical substation and building W6 on the east side of West Campus. As can be seen, there is ample space at this location to support the siting of the fully built-out Main Central Plant.

8A.11.3.2 Layout and Footprint of the Medical School Central Plant

Figure 8A-6 shows a layout and footprint of the Medical School Central Plant at Build-Out in the preferred location in the "Service Area" north of the Medical School (specifically north of building H1). As can be seen, there is ample space at this location to support the siting of the fully built-out Medical School Central Plant.

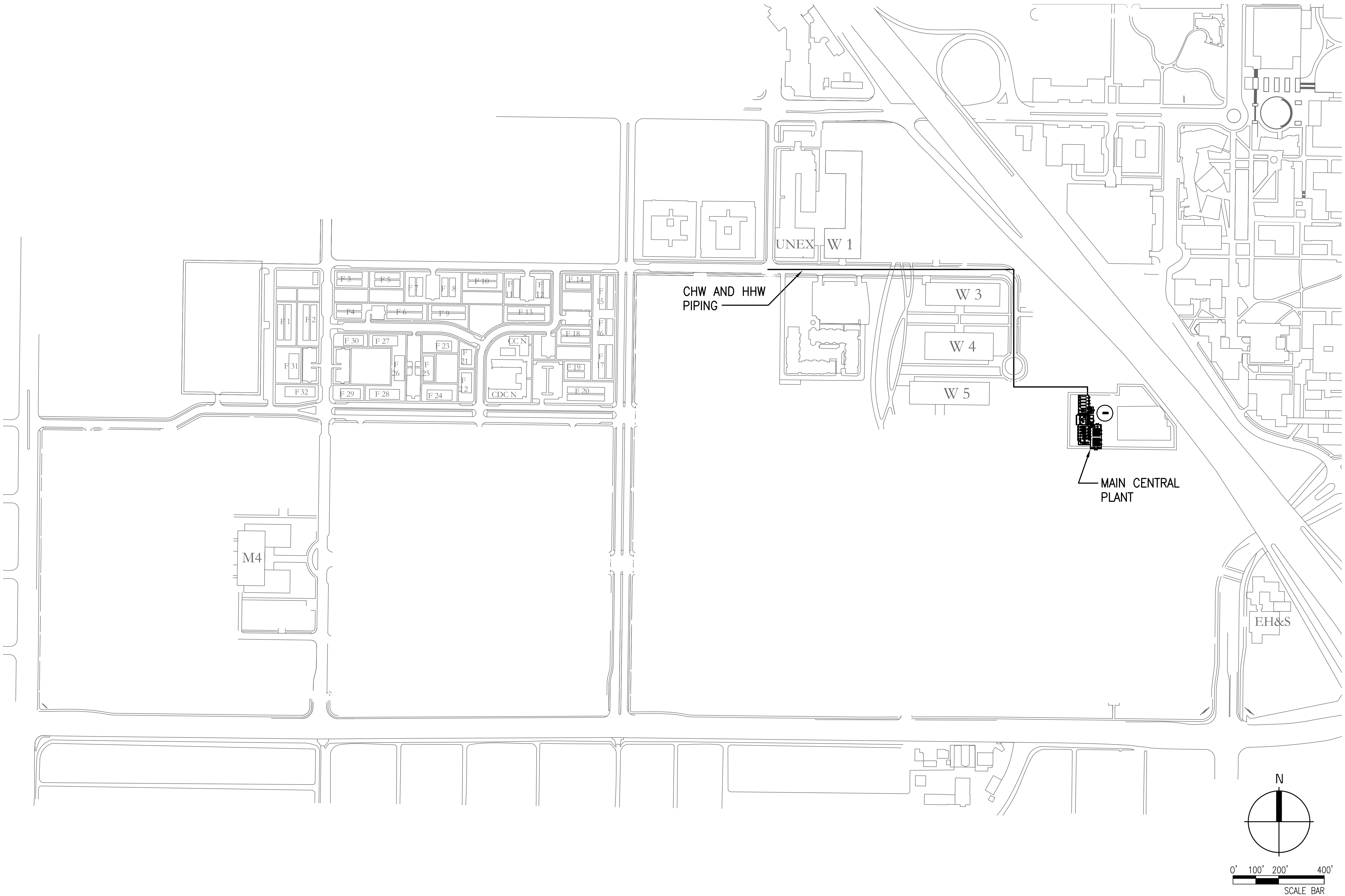
8A.12 Central Plants Cost Summary

This study includes conceptual-level cost estimates for central plants development considering aggressive sustainability implementation. Details of these cost estimates are included in the Appendix to this report. Costs include mark-ups, sales taxes, and contingencies, but do not include soft costs. See additional notes on the detailed tables.

- Phase 1A Housing: $ 0
- Phase 1A Campus: $ 0
- Phase 1B: $ 0
- Phase 1: $10,319,000
- Phase 2 Housing: $ 0
- Phase 2 Campus: $ 9,340,000
- Phase 3: $ 6,320,000
- Phase 4: $ 2,281,000

Estimated Total for the Build-Out of the Central Plants with aggressive sustainability implementation: $ 28,260,000

The estimated total for the build-out of the central plants without aggressive sustainability implementation is $ 33,628,000. As such, it can be seen that an aggressive sustainability implementation strategy for all West Campus buildings will have an estimated first cost savings of about $5,368,000 in central plant development.



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△	Admistrative Draft Report	02/11/08
△	Final Report	03/14/08
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Figure 8A-1 West Campus Development Phase 1 Mechanical Infrastructure

Sheet No.

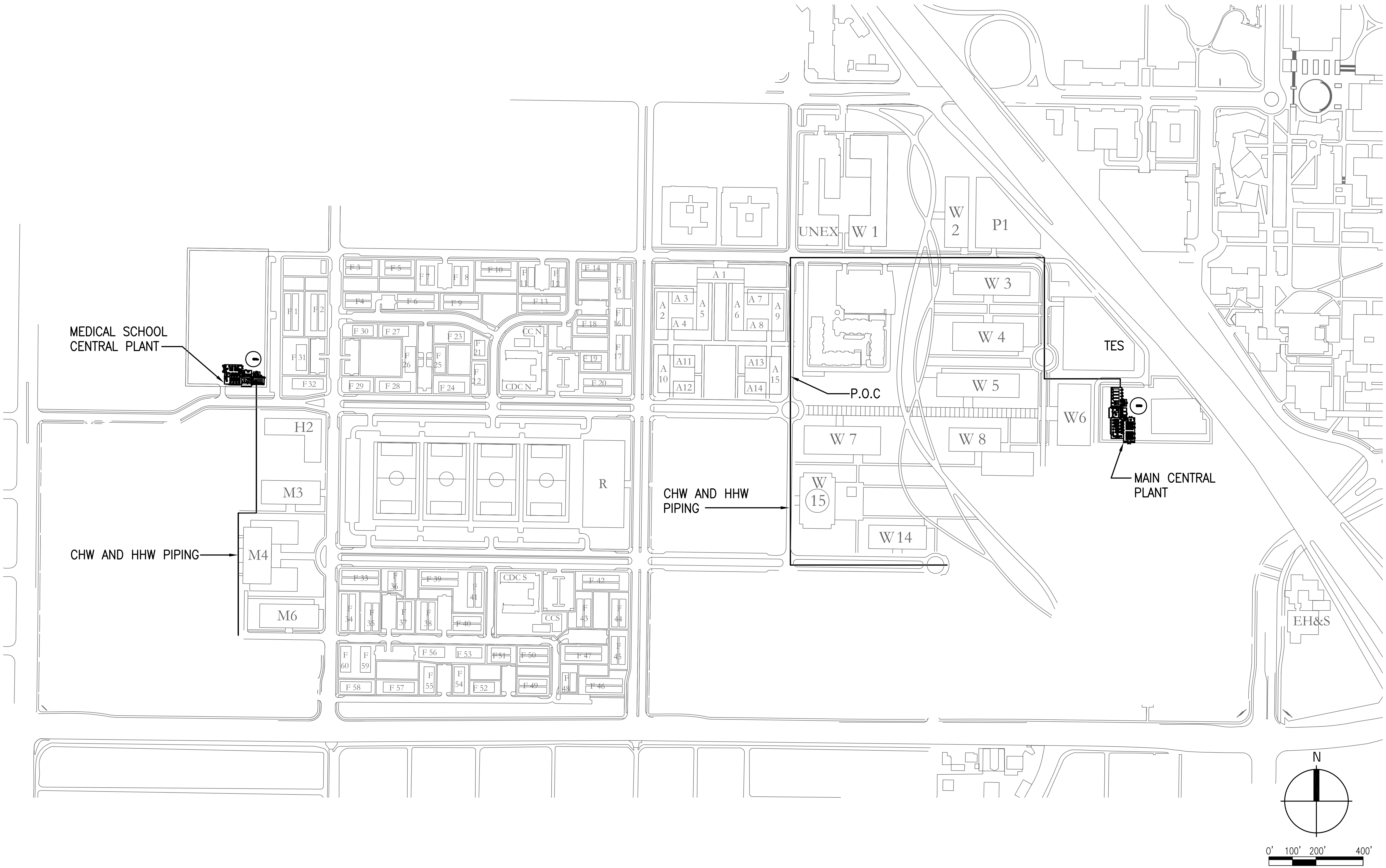

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Figure 8A-2
West Campus
Development
Phase 2
Mechanical
Infrastructure

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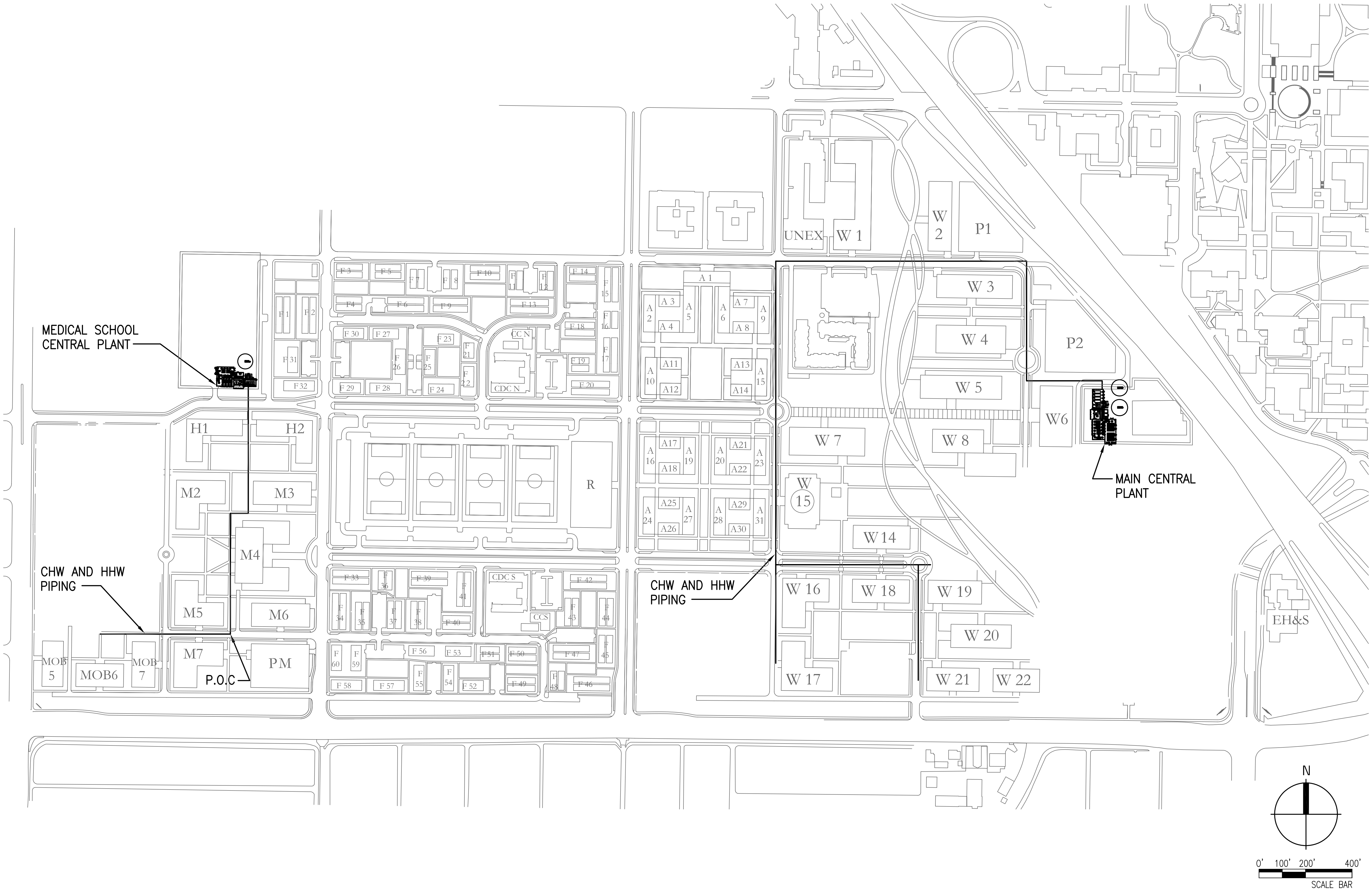

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Figure 8A-3 West Campus Development Phase 3 Mechanical Infrastructure

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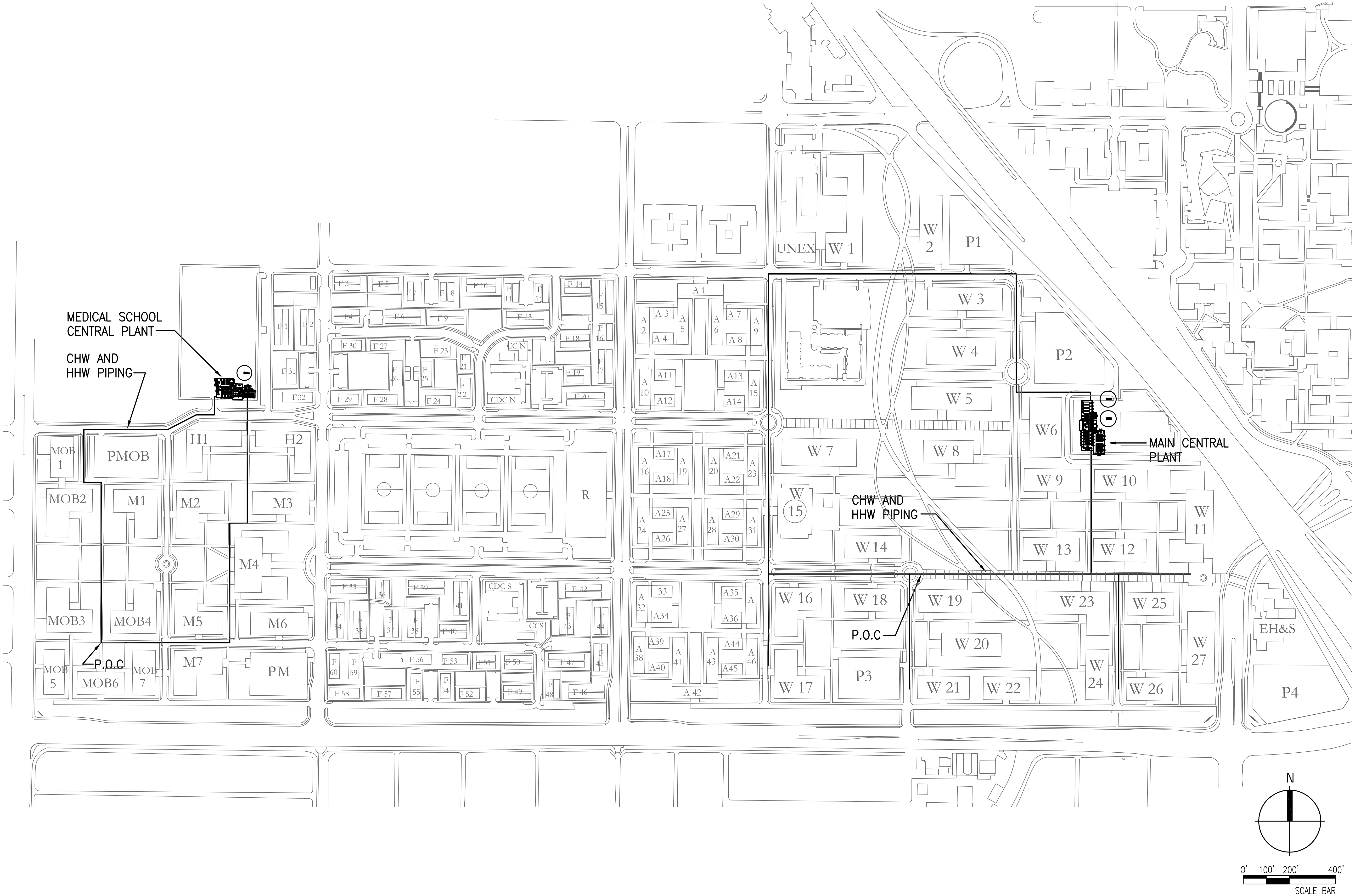

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Figure 8A-4 West Campus Development Phase 4 Mechanical Infrastructure

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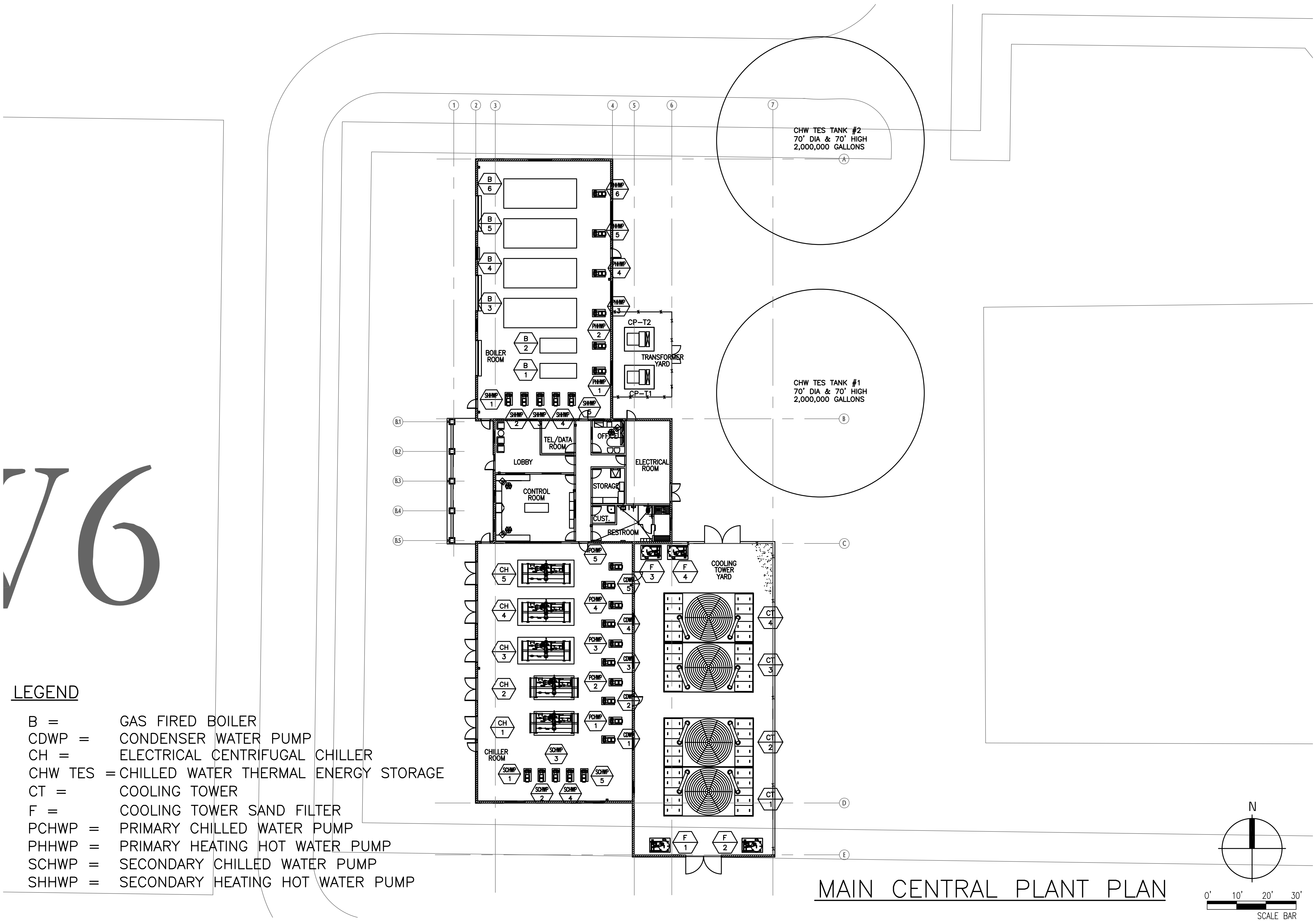

LEGEND

B = GAS FIRED BOILER
CDWP = CONDENSER WATER PUMP
CH = ELECTRICAL CENTRIFUGAL CHILLER
CHW TES = CHILLED WATER THERMAL ENERGY STORAGE
CT = COOLING TOWER
F = COOLING TOWER SAND FILTER
PCHWP = PRIMARY CHILLED WATER PUMP
PHHWP = PRIMARY HEATING HOT WATER PUMP
SCHWP = SECONDARY CHILLED WATER PUMP
SHHWP = SECONDARY HEATING HOT WATER PUMP

MAIN CENTRAL PLANT PLAN

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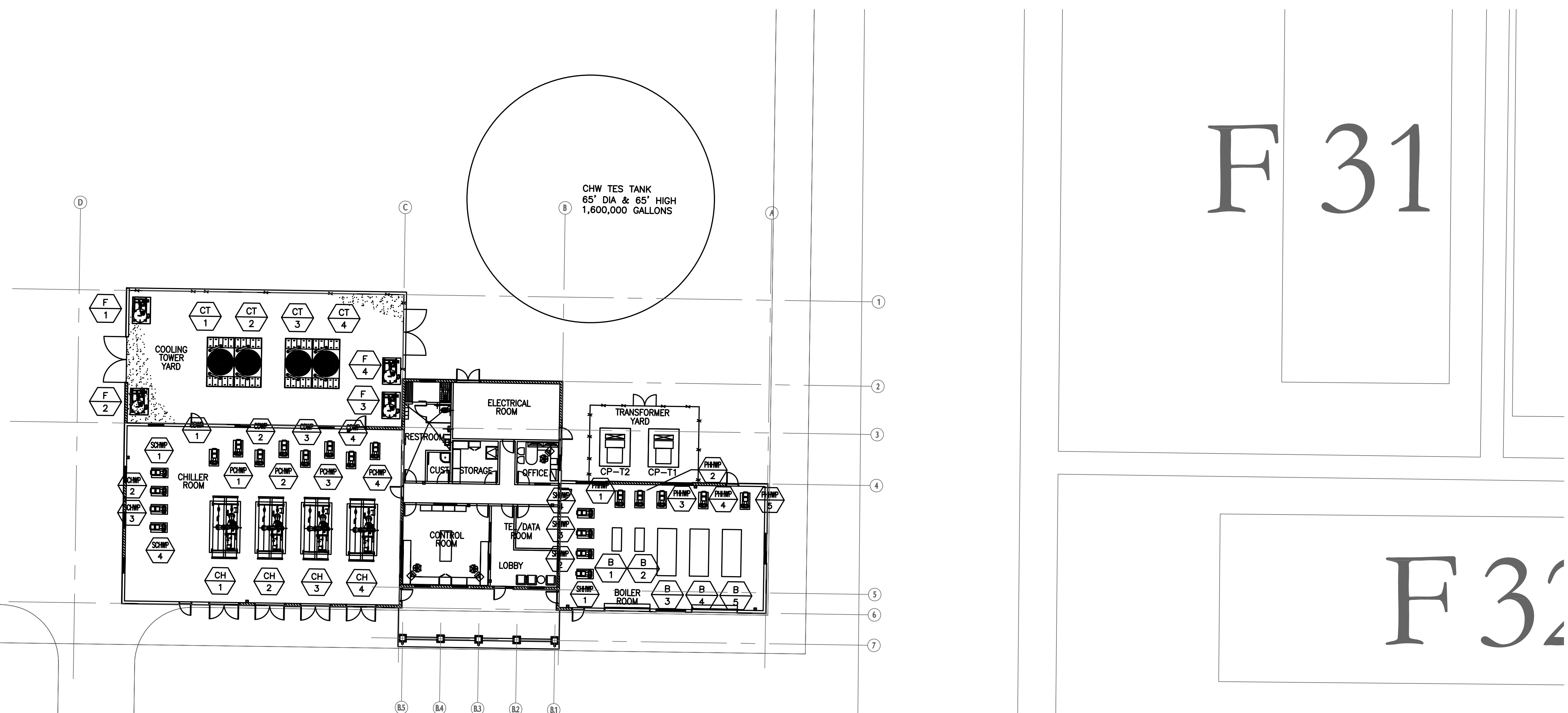
Figure 8A-5
Main Central Plant
Site Layout

Sheet No.



LEGEND

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PHHWP = PRIMARY HEATING HOT WATER PUMP
SCHWP = SECONDARY CHILLED WATER PUMP
SHHWP = SECONDARY HEATING HOT WATER PUMP

MEDICAL SCHOOL CENTRAL PLANT PLAN

N

0' 10' 20' 30'
SCALE BAR

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Figure 8A-6
Medical School
Central Plant
Site Layout

Sheet No.

CHAPTER 9

CHILLED WATER AND HEATING HOT WATER PIPING DISTRIBUTION SYSTEMS

Chapter 8 established the cooling and heating loads, as well as the means, strategies, and phasing under which cooling and heating systems will be implemented.

Essentially, two central plants will be used. The Main Campus Central Plant will provide chilled water (CHW) for space cooling and heating hot water (HHW) for space heating and domestic hot water heating to the Academic core and Apartments on the east side of West Campus. The Medical School Central Plant will provide CHW and HHW to the Medical School on the west side of West Campus.

This chapter, Chapter 9, presents the analyses and recommended plans to distribute CHW and HHW to West Campus buildings, including the pipes types and sizes.

9.1 CHW and HHW Piping Routing and Sizing

The main loops of chilled water supply (CHWS), chilled water return (CHWR), heating hot water supply (HHWS), and heating hot water return (HHWR) piping will be installed in accordance with the West Campus phasing plan. These will be provided under various utilities infrastructure projects that are the subject of the West Campus Infrastructure Development Study (WCIDS). The pipe routes are selected so as to minimize the length and first cost of the piping, and in so doing minimize pumping costs.

Any CHWS, CHWR, HHWS, and HHWR main branches, serving multiple buildings will be considered utilities infrastructure project pipes. Pipe branches to individual buildings will be covered under building projects.

An analysis of the required flows and pipe sizing was developed in Tables 9-1, 9-2, 9-3, and 9-4.

9.1.1 Phase 1A

Phase 1A is the very first implementation stage. It consists of the north phase of Family Family Student Housing Housing (F1 through F32), Child Development Center North (CDC N), and Community Center North (CC N). None of these facilities will be served by the Main Central Plant so they don't figure any further into this analysis. One academic building (W4) will also be implemented under Phase 1A. Initially, this building will not be served by the Main Central Plant since Main Central Plant is not to be implemented until Phase 1. However, the HVAC systems for W4 will be designed so that they can be later connected to central plant service.

No central plant or CHW/HHW distribution piping will be implemented under Phase 1A.

9.1.2 Phase 1B

Under Phase 1B, the first building (M4) of the Medical School will be constructed. Initially, this building will not be served by the Medical School Central Plant since Medical School Central Plant is not to be implemented until Phase 2. However, the HVAC systems for M4 will be designed so that they can be later connected to central plant service.

No central plant or CHW/HHW distribution piping will be implemented under Phase 1B.

9.1.3 Phase 1

West Campus will generally be developed from east to west, and north to south. Under Phase 1, three academic buildings (W1, W3, and W5) will be located in the northeast area of the campus. These will all need to be served by the central plant, hereinafter referred to as the Main Central Plant.

See Figure 9-1 for Phase 1 CHW piping. See Figure 9-5 for Phase 1 HHW piping. These figures, and their companion figures 9-2, 9-3, 9-4, 9-6, 9-7, and 9-8, show piping loop nodes (in circled numbers) and required sizes for pipe mains that are sized for build-out conditions. Tables 9-1, 9-2, 9-3, and 9-4 also show sizes for pipe branches to individual buildings.

Main CHWS, CHWR, HHWS, and HHWR piping will be installed from the Main Central Plant, west towards building W5, north along the east side of buildings W3/W4/W5, west along the north side of building W3, and west along the south side of buildings W1 and UNEX, terminating just southeast of UNEX. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR will extend to the individual buildings as shown. Building W4, constructed under Phase 1A, would be connected to central plant service under Phase 1, and its building chiller and boiler plant would be retained in standby.

9.1.4 Phase 2

Under Phase 2, six academic buildings (W2, W6, W7, W8, W14, and W15) will be constructed generally in the central part of the Academic core (east end of West Campus). Also, Apartments, A1 through A15, will be located in the north central area of the campus. Finally, the Recreation Building (R) will be constructed. These will all be served by the already existing, but expanding, Main Central Plant, located next to the existing electrical substation on the east side of West Campus. (Family Student Housing (F33 through F60), Child Development Center South (CDC S), Community Center South (CC S), and the Recreation Building (R) are also implemented under Phase 2, but will not be served by the Main Central Plant so they don't figure into this analysis.)

See Figure 9-2 for Phase 2 CHW piping, and Figure 9-6 for Phase 2 HHW piping.

Main CHWS, CHWR, HHWS, and HHWR piping will be extended from the Phase 1 terminus just southeast of UNEX, south along the west side of International Village and buildings W7 and W15, east along the south side of buildings W15 and W14, terminating just southeast of building W14. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR would extend to the buildings.

Also under Phase 2, three buildings (H2, M3, and M6) of the Medical School at the west end of West Campus will be constructed. Main CHWS, CHWR, HHWS, and HHWR piping (and other utilities piping) will be installed from the Medical School Central Plant, south along the west side of buildings H2, M3, M4, and M6, terminating just southwest of building M6. Building M4, constructed under Phase 1B, would be connected to central plant service under Phase 2, and its building chiller and boiler plant would be retained in standby.

9.1.5 Phase 3

Under Phase 3, seven academic buildings (W16, W17, W18, W19, W20, W21, and W22) will be constructed generally in the south part of the Academic core (east end of West Campus). Also, Apartments, A16 through A31, will be located in the central area of the campus. These will all be served by the already existing, but expanding, Main Central Plant, located next to the existing electrical substation on the east side of West Campus.

See Figure 9-3 for Phase 3 CHW piping, and Figure 9-7 for Phase 3 HHW piping.

Main CHWS, CHWR, HHWS, and HHWR piping will extend south in a spur along the west side of Buildings W16 and W17 for service to those buildings. Also, main CHWS, CHWR, HHWS, and HHWR piping will extend south in a spur along the west side of Buildings W19 and W21 for service to Buildings W18, W19, W20, W21, and W22. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR will extend to the individual buildings.

Also under Phase 3, more Medical School buildings (H1, M2, M5, M7, MOB5, MOB6, and MOB7) at the west end of West Campus will be constructed. These will all be served by the already existing, but expanding, Medical School Central Plant, located in the “Service Area” north of the Medical School (specifically north of building H1).

Main CHWS, CHWR, HHWS, and HHWR piping (and other utilities piping) will be extended from the Phase 2 terminus just southwest of building M6, west along the north side of buildings M7/MOB7/MOB6, terminating just north of building MOB6. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR (and other utilities piping) would extend to the individual buildings.

9.1.6 Phase 4

Under Phase 4, ten academic buildings (W9, W10, W11, W12, W13, W23, W24, W25, W26, and W27) will be constructed generally in the southeast part of the Academic core (east end of West Campus). These will all be served by the already existing, but expanding, Main Central Plant, located next to the existing electrical substation on the east side of West Campus.

See Figure 9-4 for Phase 4 CHW piping, and Figure 9-8 for Phase 4 HHW piping.

Main CHWS, CHWR, HHWS, and HHWR piping will need to be extended from the Phase 2 terminus just southeast of building W14, east along the north side of building W19 and south side of building W13, north between buildings W13 and W12 and north between buildings W9 and W10, and back to the Main Central Plant, thus completing the loop. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR will extend to the individual buildings.

Also, main CHWS, CHWR, HHWS, and HHWR piping will extend east in a spur between Buildings W12 and W25 for service to Buildings W11 and W27. Another main CHWS, CHWR, HHWS, and HHWR piping spur will extend south between Buildings W23 and W24 and between W24 and W26, to serve those buildings. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR will extend to the individual buildings.

Also under Phase 4, more Medical School buildings (M1, MOB1, MOB2, MOB3, and MOB4) at the west end of West Campus will be constructed. These will all be served by the already existing, but expanding, Medical School Central Plant, located in the "Service Area" north of the Medical School (specifically north of building H1).

Main CHWS, CHWR, HHWS, and HHWR piping (and other utilities piping) will be extended from the Phase 3 terminus just north of building MOB6, north between buildings MOB3 and MOB4 and north between buildings MOB2 and M1, north along the east side of building MOB1, east along the north side of PMOB (parking structure), and back to the Medical School Central Plant, thus completing the loop. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR (and other utilities piping) will extend to the individual buildings.

9.2 CHW Pipe Sizing Criteria

Within practical limits, it is desirable to design for as high a CHW ΔT as possible. This can help to minimize pipe and pump size (reduced first cost) and to minimize pumping horsepower (reduced energy consumption and cost).

CHWS will be generated at the central plants at 38°F (adjustable). Chiller pairs will be designed for entering CHWR at 68°F. This is a 30°F CHW ΔT. The primary determinant of CHW ΔT is cooling coil performance. Under all building projects, cooling coils shall be designed for 40°F CHWS and 70°F CHWR. This includes a safety factor for some pipe losses and some campus cooling coils which may not have as high a CHW ΔT performance. ***It is imperative that mechanical engineering consultants on all UC Riverside West Campus building projects use a cooling coil design criteria of 40°F CHWS and 70°F CHWR.***

The CHW campus distribution pipes are sized using the following design criteria:

- Pipe mains are sized for CHW flows to serve West Campus peak diversified cooling loads to Build-Out.

- Pipe mains are sized for CHW flows using cooling diversity factors of between 0.7 and 1.0, depending on the number of buildings on any particular pipe segment. CHW mains closer to the central plant (i.e. those pipe segments carrying CHW flow for many buildings), have a cooling diversity factor closer to 0.7. CHW mains farther away from the central plant and building CHW pipe branches (i.e. those pipe segments carrying CHW flow for one or just a couple buildings), have a cooling diversity factor closer to 1.0.

- Pipe mains are sized based on a 25°F CHW ΔT, instead of 30°F CHW ΔT, to include a safety factor.

- Pipe mains are sized using a maximum water velocity of 9 fps or a maximum friction loss of 3 feet per 100 feet of equivalent length.

- No central plant cooling service will be provided for Family Student Housing (Family Apartments, Family Townhouses, Recreation Building, Child Development Center North (CDC N), Community Center North (CC N), Child Development Center South (CDC S), and Community Center South (CC S).

The recommended CHW piping loop is divided into pipe segments. Each segment carries a certain amount of peak diversified cooling load flow from which pipe sizing can be developed, using the pipe sizing criteria above. Tables 9-1 and 9-2 (in the appendix) show the sizing calculations for each CHW pipe segment for the Main Central Plant and the Medical School Central Plant respectively.

9.3 HHW Pipe Sizing Criteria

Within practical limits, it is desirable to design for as high a HHW ΔT as possible. This can help to minimize pipe and pump size (reduced first cost) and to minimize pumping horsepower (reduced energy consumption and cost).

HHWS will be generated at the central plants at 190°F (adjustable). Gas-fired boilers will be designed for entering HHWR at 130°F. This is a 60°F HHW ΔT. The primary determinant of HHW ΔT is heating coil performance. Under all building projects where practical, heating coils shall be designed for 180°F HHWS and 120°F HHWR. This includes a safety factor for some pipe losses and some campus heating coils which may not have as high a HHW ΔT performance. ***It is imperative that mechanical engineering consultants on all UC Riverside West Campus building projects use a heating coil design criteria of 180°F HHWS and 120°F HHWR.***

The HHW campus distribution pipes are designed using the following design criteria:

- Pipe mains are sized for HHW flows to serve West Campus peak diversified heating loads to Build-Out.

- Pipe mains are sized for HHW flows using heating diversity factors of between 0.85 and 1.0, depending on the number of buildings on any particular pipe segment. HHW mains closer to the central plant (i.e. those pipe segments carrying HHW flow for many buildings), will have a heating diversity factor closer to 0.85. HHW mains farther away from the central plant and building HHW pipe branches (i.e. those pipe segments carrying HHW flow for one or just a couple buildings), will have a cooling diversity factor closer to 1.0.

- Pipe mains will be sized based on a 40°F HHW ΔT. This is a prudent pipe sizing criterion since not all reheat coils can achieve a 60°F HHW ΔT.

- Pipe mains will be sized using a maximum water velocity of 9 fps or a maximum friction loss of 3 feet per 100 feet of equivalent length.

- No central plant heating service will be provided for Family Housing (Family Apartments, Family Townhouses, Recreation Building, Child Development Center North (CDC N), Community Center North (CC N), Child Development Center South (CDC S), and Community Center South (CC S).

The recommended HHW piping loop is divided into pipe segments. Each segment carries a certain amount of peak diversified heating load flow from which pipe sizing can be developed, using the pipe sizing criteria above. Tables 9-3 and 9-4 (in the appendix) show the sizing calculations for each HHW pipe segment for the Main Central Plant and the Medical School Central Plant respectively.

9.4 Utility Tunnels vs. Utilidors vs. Direct-Buried Piping

The above sections address the recommended routing and sizing of the CHW and HHW distribution systems. This section addresses the means to distribute CHW and HHW from the campus central plants to the buildings and back to the campus central plants. Certainly piping will be used. The question is whether that piping will be installed in utility tunnels, in utilidors, and/or be direct-buried.

9.4.1 Utility Tunnels

Utility tunnels would be either an underground concrete conduit or a pre-fab circular pipe type of conduit. They are walk-though conduits in which the pipes and their isolation valves can be directly accessed for operation and maintenance. See Figure 9-9 for a typical utilities tunnel cross-section.

The main advantage of utility tunnels is that they facilitate the location and repair of leaks since the piping is readily observable along its route in the utility tunnels. Another advantage is that other utilities, such as electrical, data/telecommunications, and other piping can also be routed in the utility tunnel.

The main disadvantage is high relative cost. Also, utility tunnels need a fire sprinkler piping system, which further adds to the high cost. However, the CHW and HHW piping is less expensive in that exposed insulated piping can be used instead of the more expensive pre-fabricated, pre-insulated piping that is used in direct-buried piping installations. This offsets the high cost disadvantage somewhat.

Many California State University (CSU) and University of California (UC) campuses have utility tunnel system. California State University, Fullerton, has a very extensive utility tunnel system, which was installed in the 1960s. The new UC Merced campus has some recently-implemented utility tunnels. Currently, it has about 150 feet of tunnel out from its central plant into the main building core. This main tunnel can be extended. Branch piping to buildings is direct-buried.

9.4.2 Utilidors

A utilidor would be a concrete trench with a removable top that is flush with the ground surface. They are smaller conduits than utility tunnels and are not the walk-through type. The pipes and their isolation valves in a utilidor can be directly accessed for operation and maintenance.

The main advantage of utilidors is that they facilitate the location and repair of leaks since the piping is readily observable along its route in the utility tunnels. Another advantage is that other utilities, such as electrical, data/telecommunications, and other piping can also be routed in utilidors.

Utilidors are expensive relative to direct-buried piping, but are less expensive than walk-through utility tunnels. Utilidors do not need a fire sprinkler piping system, which helps to keep the first cost down. Also, the CHW and HHW piping is the exposed insulated piping type instead the more expensive pre-fabricated, pre-insulated piping that is used in direct-buried piping installations. This helps to offset the high cost disadvantage of utilidors compared to direct-buried piping.

California Polytechnic State University, San Luis Obispo has an extensive utilidor system for its main piping and electrical. The utilidor was installed in the mid-1990s. Branch piping to buildings is direct-buried.

9.4.3 Direct-Buried Piping

Direct-buried CHW and HHW piping would be the pre-fabricated, pre-insulated type. This is the least expensive, and most common, approach to distributing CHW and HHW piping around campuses. However, it has the main drawback of masking leaks, which are often inevitable over the lifetime of the extensive distribution systems. This leads to loss of treated water and energy. The difficulty of locating leaks is the main reason leaks go unrepaired for long periods of time.

9.4.4 Recommendations for CHW and HHW Piping Distribution Strategy

Utility tunnels and utilidors become increasingly advantageous when large and numerous utility systems can be routed together. Because of this, it is recommended that utility tunnels be used for the main piping loops around the academic core and the Medical School. This is similar to the model being used for the new UC Merced campus. Alternatively, if the cost of utility tunnels proves to be too untenable, utilidors could be used for the main piping loops. Branch piping to buildings from these main loops could be the direct-buried type or could be installed in branch tunnels. Please see Figures 9-4 and 9-8 for the full extent of the main CHW and HHW piping in utilities tunnels, and the branch CHW and HHW piping to the buildings.

If a utilities tunnel can be incorporated into a building (i.e. the tunnel becomes the building basement/mechanical room), then tunnel first costs can be reduced. However, because of the difficulties coordinating separate utilities infrastructure projects and building projects, as well as the different timing of them, all utilities tunnel projects are shown as utilities infrastructure projects. As utilities infrastructure projects and building projects become more imminent and scheduled in more detail, the combined building basement/utilities tunnel approach could be considered by UC Riverside as a cost savings measure.

9.5 Direct-Buried CHW Pipe Type

Direct-buried CHW piping will be the pre-fabricated, pre-insulated type. The carrier pipe will be standard weight, Schedule 40, ASTM A53, Grade B, ERW welded, carbon steel. It will have polyurethane foam insulation of a required thickness based on pipe size. The outside will be covered by a seamless high density polyethylene (HDPE) outer protective insulation jacket.

Alternatively, the direct-buried CHW piping could be a different type of pre-fabricated, pre-insulated pipe. In this case, the carrier pipe would be C900/C905 gasketed PVC piping with push-on joints. It would have polyurethane foam insulation of a required thickness based on pipe size. The outside would be covered by a seamless high density polyethylene (HDPE) outer protective insulation jacket. Thrust blocks would be used at changes in direction and at pipe junctions.

9.6 Direct-Buried HHW Pipe Type

Direct-buried HHW piping will be the pre-fabricated, pre-insulated type. The carrier pipe will be standard weight, Schedule 40, ASTM A53, Grade B, ERW welded, carbon steel. It will have polyurethane foam insulation of a required thickness based on pipe size. The outside will be covered by a seamless high density polyethylene (HDPE) outer protective insulation jacket.

9.7 Exposed CHW Pipe Type

Exposed CHW piping will be insulated Type L copper piping or insulated Schedule 40 black steel piping. Exposed CHW piping will have fiberglass insulation of a required thickness based on pipe size. Color coded labeling will be provided on all CHW piping that will show direction of flow, fluid in pipe, and system(s) served. All isolation valves will be fully accessible for maintenance and safety.

9.8 Exposed HHW Pipe Type

Exposed HHW piping will be insulated Type L copper piping or insulated Schedule 40 black steel piping. Exposed HHW piping will have fiberglass insulation of a required thickness based on pipe size. Color coded labeling will be provided on all HHW piping that will show direction of flow, fluid in pipe and system(s) served. All isolation valves will be fully accessible for maintenance and safety.

9.9 Isolation Valves

All piping junctions will have isolation valves on all three legs such that any single main piping segment or any pipe branch to a building can be isolated in such a way that only one building is affected by such isolation.

If the junction is in a utility tunnel or a utilidor, then the isolation valves will be exposed and readily accessible. If the junction is at a significant location within a direct-buried piping network, then the isolation valves will be in a vault at the piping junction. In that case as well, the isolation valves will be exposed and readily accessible. If the piping junction is direct-buried, then the isolation valve stems will be in valve cans, in which the valves are direct-buried, but they can be operated from the surface by accessing and turning the valve stem.

9.10 Building Metering of CHW and HHW

All buildings, connected to central plants, will be individually metered for chilled water and heating hot water. The buildings will be individually metered for energy tracking (i.e. CHW and HHW flow, CHWS and HHWS temperature, CHWR and HHWR temperature, cooling and heating consumption instantaneous and totalized). The meters will be connected to the energy management system (EMS) so that the energy tracking data can be remotely and automatically gathered and processed.

9.11 CHW and HHW Distribution Systems in the Buildings

The CHW and HHW distribution around West Campus will be piping distribution systems designed for variable CHW and HHW flow. The pipes may be direct-buried, in utilidors, and/or in utility tunnels. CHW for space cooling and HHW for space heating and domestic hot water heating will be used directly in campus buildings in various coils. There will be no booster pumps or tertiary pumps at the buildings. CHW and HHW will be directly pumped from the central plants, around the campus, through building coils, and back to the central plants, using variable flow secondary pumps with variable frequency drives (VFDs).

However, there will be standby CHW and HHW booster pumps in each building that can be manually called into service in the event that additional CHW or HHW flow and/or pressure are required in the building.

As mentioned above, HHW will be used to provide domestic hot water (DHW) heating in the Apartments and in buildings with significant DHW loads such as the Student Center, medical buildings, and lab buildings. In most Academic buildings however, DHW demand will be non-existent or very low. What DHW load there is would be most cost-effectively served with point-of-use, instantaneous, electric hot water heaters.

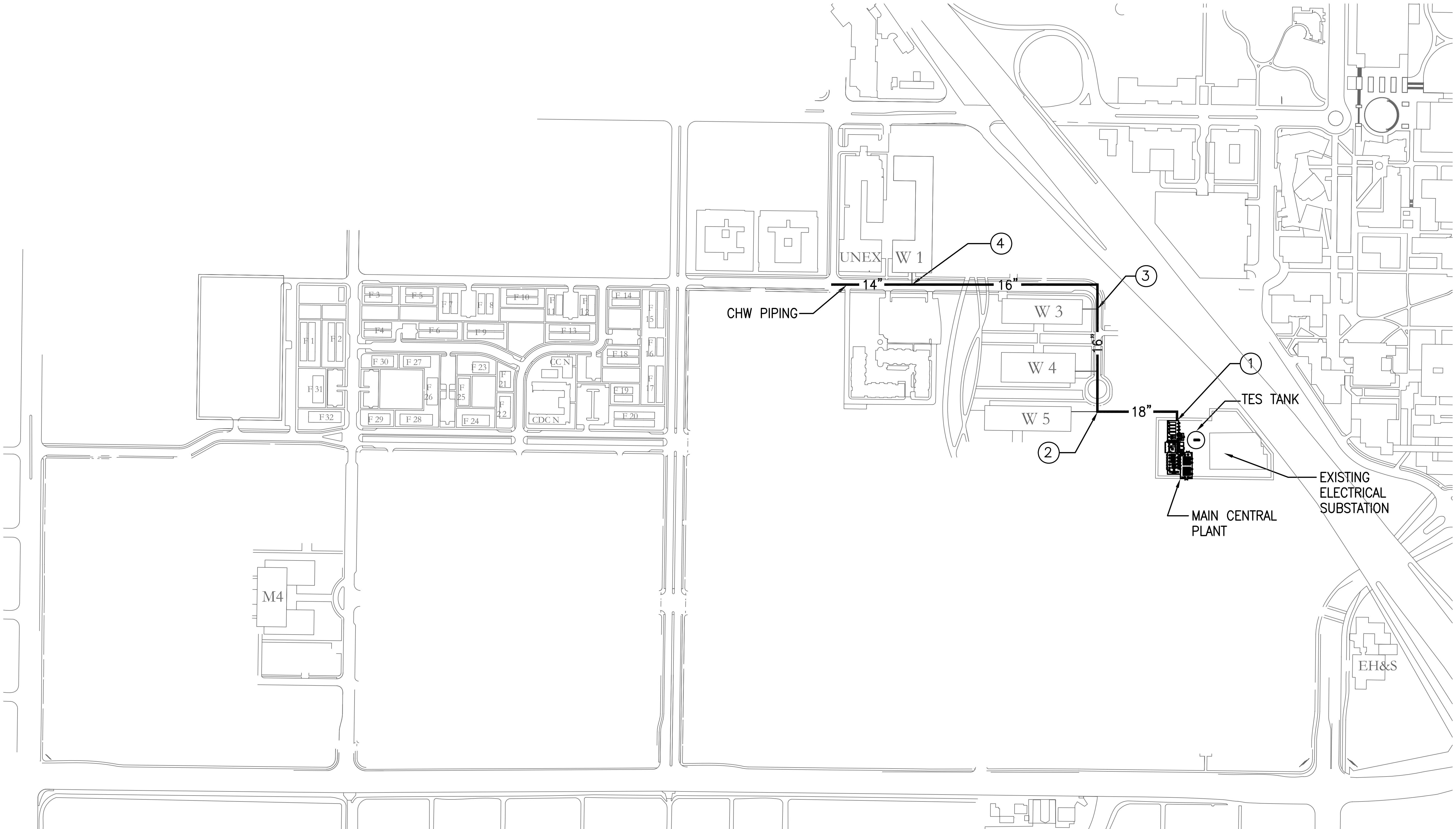
In the buildings with significant DHW load, double-wall, shell-and-tube heat exchangers will be used between the HHW and DHW in those buildings. The annular space between each heat exchanger's two walls will be vented, thereby allowing any leak to be easily identified. This is a code requirement to minimize cross contamination between the HHW and DHW.

9.12 CHW and HHW Distribution Systems Cost Summary

This study includes conceptual-level cost estimates for CHW and HHW Distribution Systems infrastructure development. Details of these cost estimates are included in the Appendix to this report. Costs include mark-ups, sales taxes, and contingencies, but do not include soft costs. See additional notes on the detailed tables. It should also be noted that it is assumed that excavation occurs in undeveloped areas of the campus, meaning there are no utilities or other route conflicts. Also, no surface restoration is included since that is assumed to be covered under landscape and hardscape costs (Chapter 2).

- Phase 1A Housing: $ 0
- Phase 1A Campus: $ 0
- Phase 1B: $ 0
- Phase 1: $ 3,006,000
- Phase 2 Housing: $ 0
- Phase 2 Campus: $ 4,521,000
- Phase 3: $ 1,908,000
- Phase 4: $ 5,489,000

Estimated Total for the Build-Out of the CHW and HHW Distribution Systems: $14,924,000



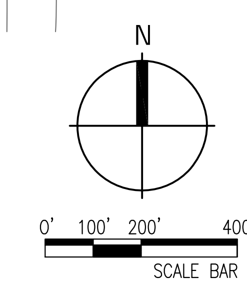
LEGEND

PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)

BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)

POINT OF CONNECTION

(1) DESIGNATES A PIPING NODE (USED IN TABLE 9-1 CHW FLOW ANALYSIS IN APPENDIX A-4)



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△	Admistrative Draft Report	02/11/08
△	Final Report	03/14/08
△	Final Report	04/25/08

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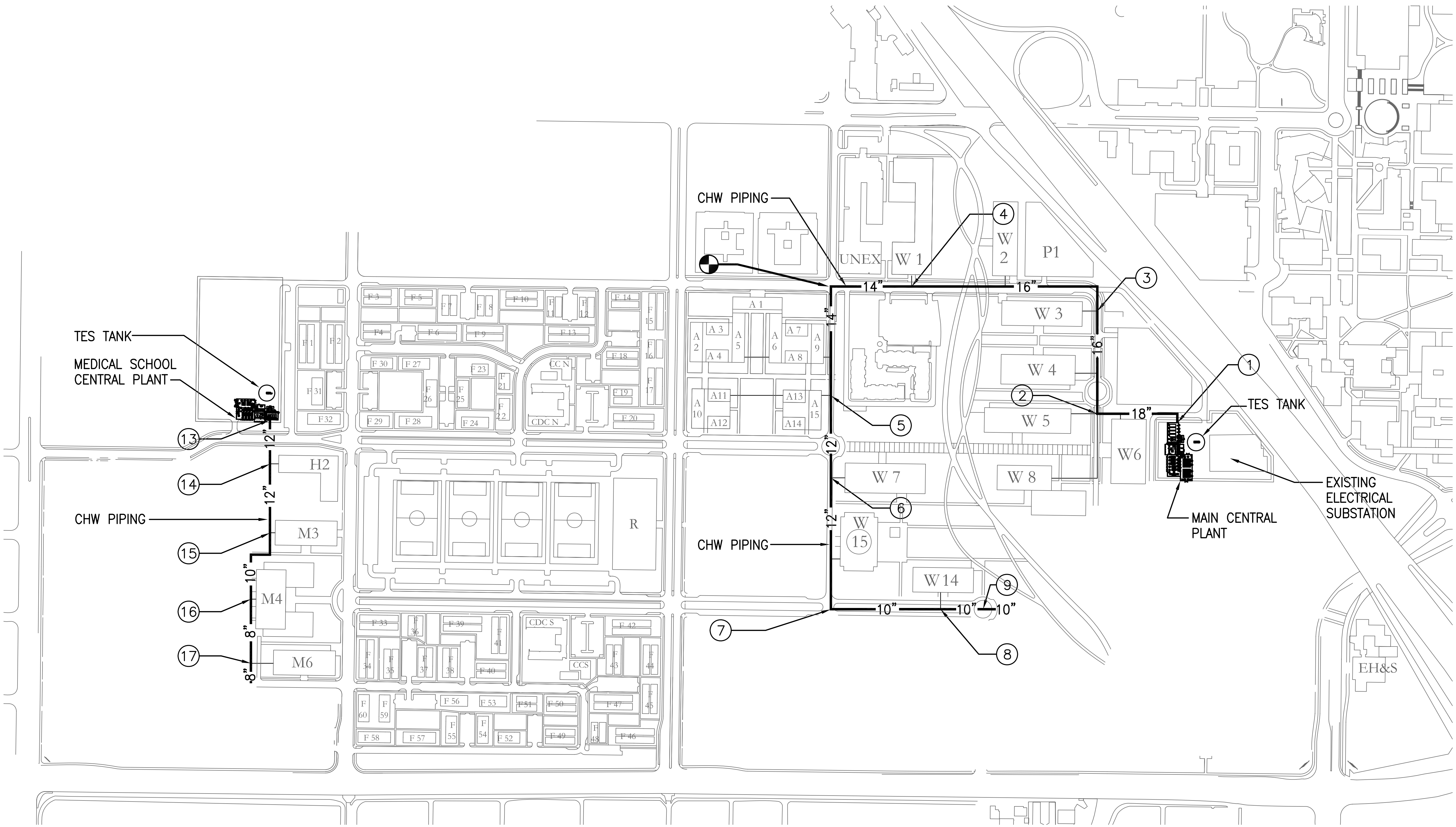
Sheet Title

Figure 9-1
West Campus Development Phase 1 CHW Piping

Sheet No.



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PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)

BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)

POINT OF CONNECTION

① DESIGNATES A PIPING NODE (USED IN TABLE 9-1 CHW FLOW ANALYSIS IN APPENDIX A-4)

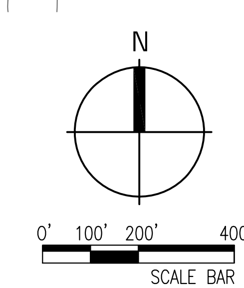

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Figure 9-2 West Campus Development Phase 2 CHW Piping

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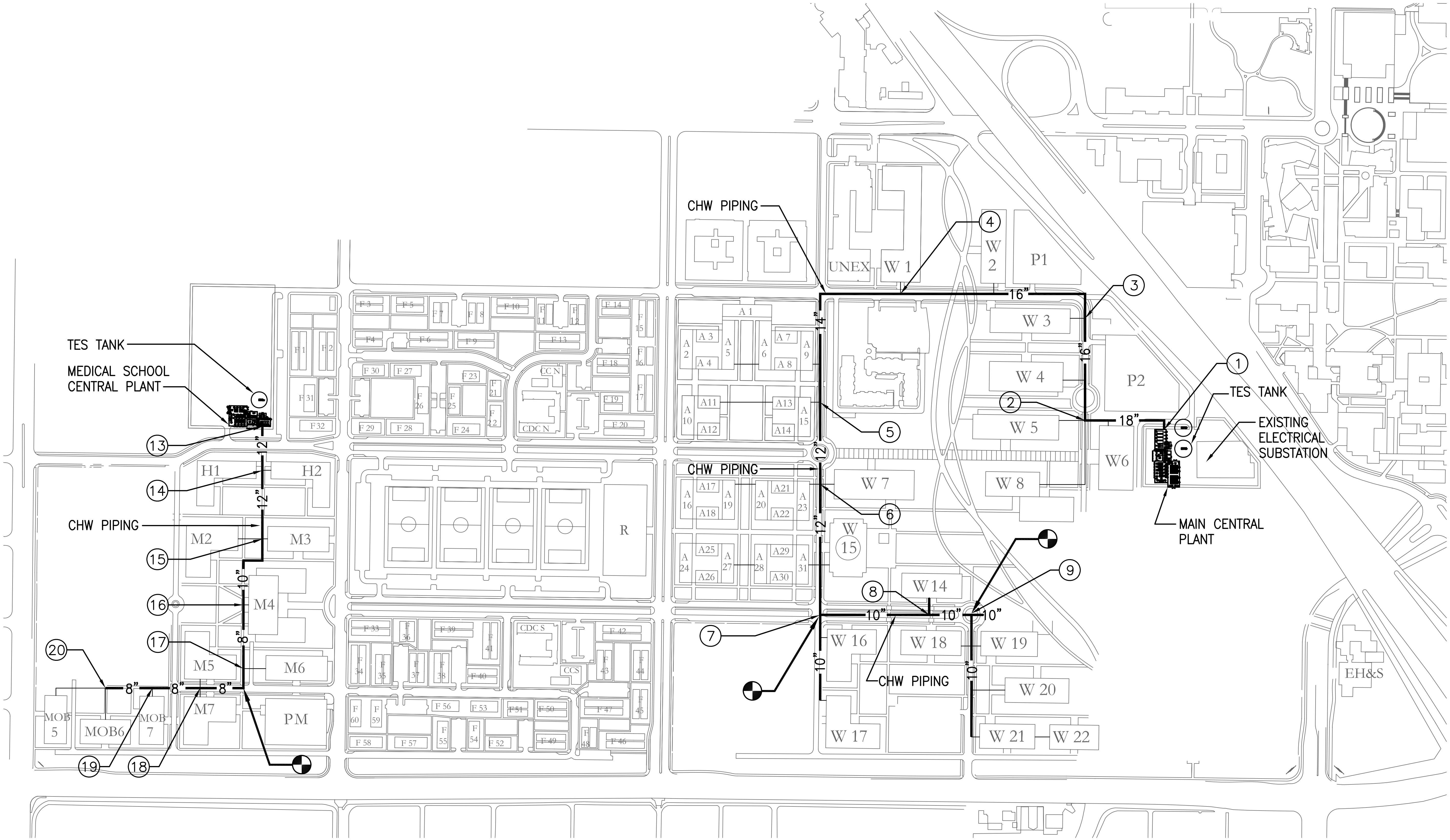

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(light line)	BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)
(symbol)	POINT OF CONNECTION
(1)	DESIGNATES A PIPING NODE (USED IN TABLE 9–1 CHW FLOW ANALYSIS IN APPENDIX A–4)

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Figure 9-3
West Campus
Development
Phase 3
CHW Piping

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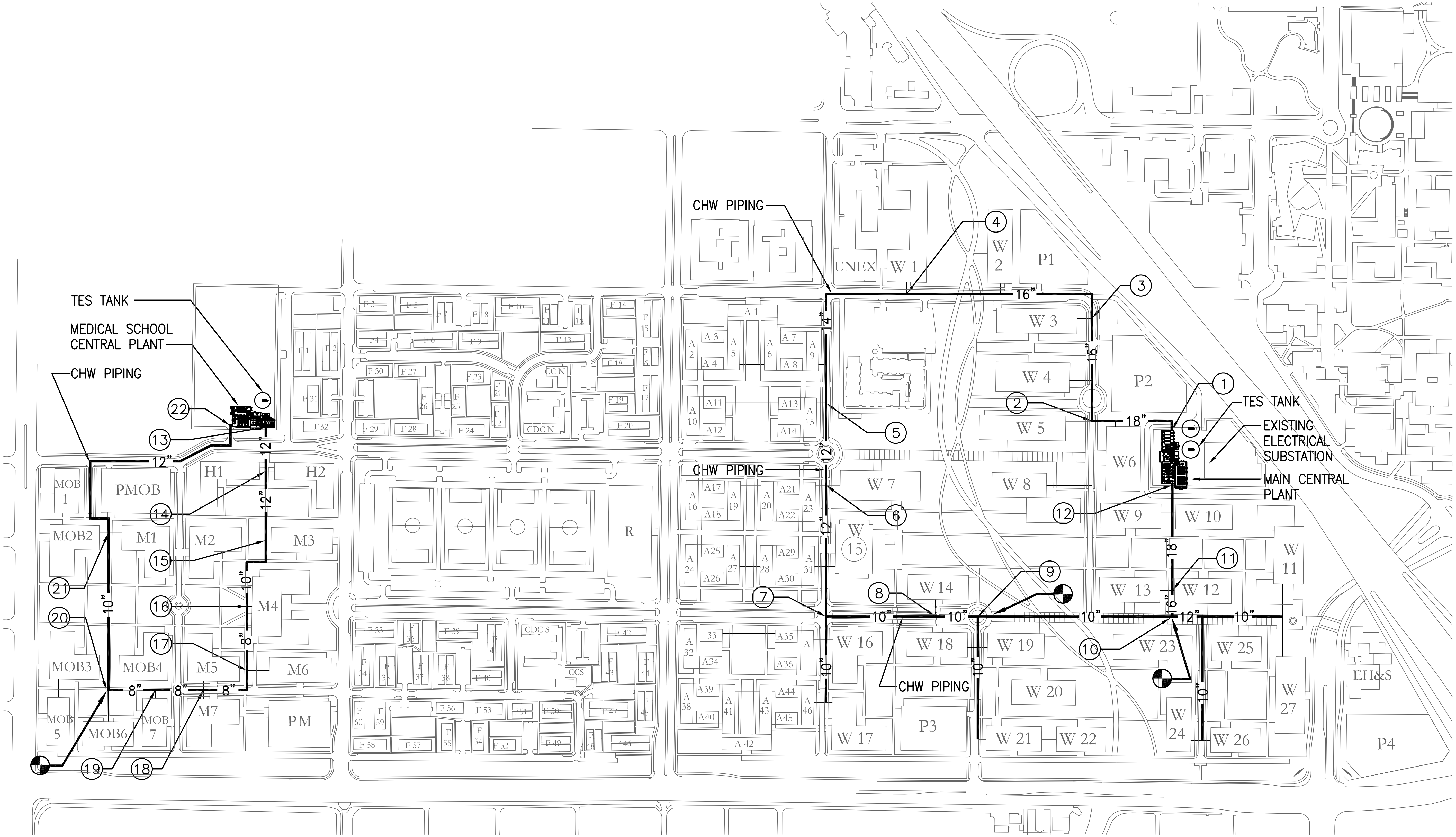

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(light line)	BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)
(symbol)	POINT OF CONNECTION
1	DESIGNATES A PIPING NODE (USED IN TABLE 9–1 CHW FLOW ANALYSIS IN APPENDIX A–4)

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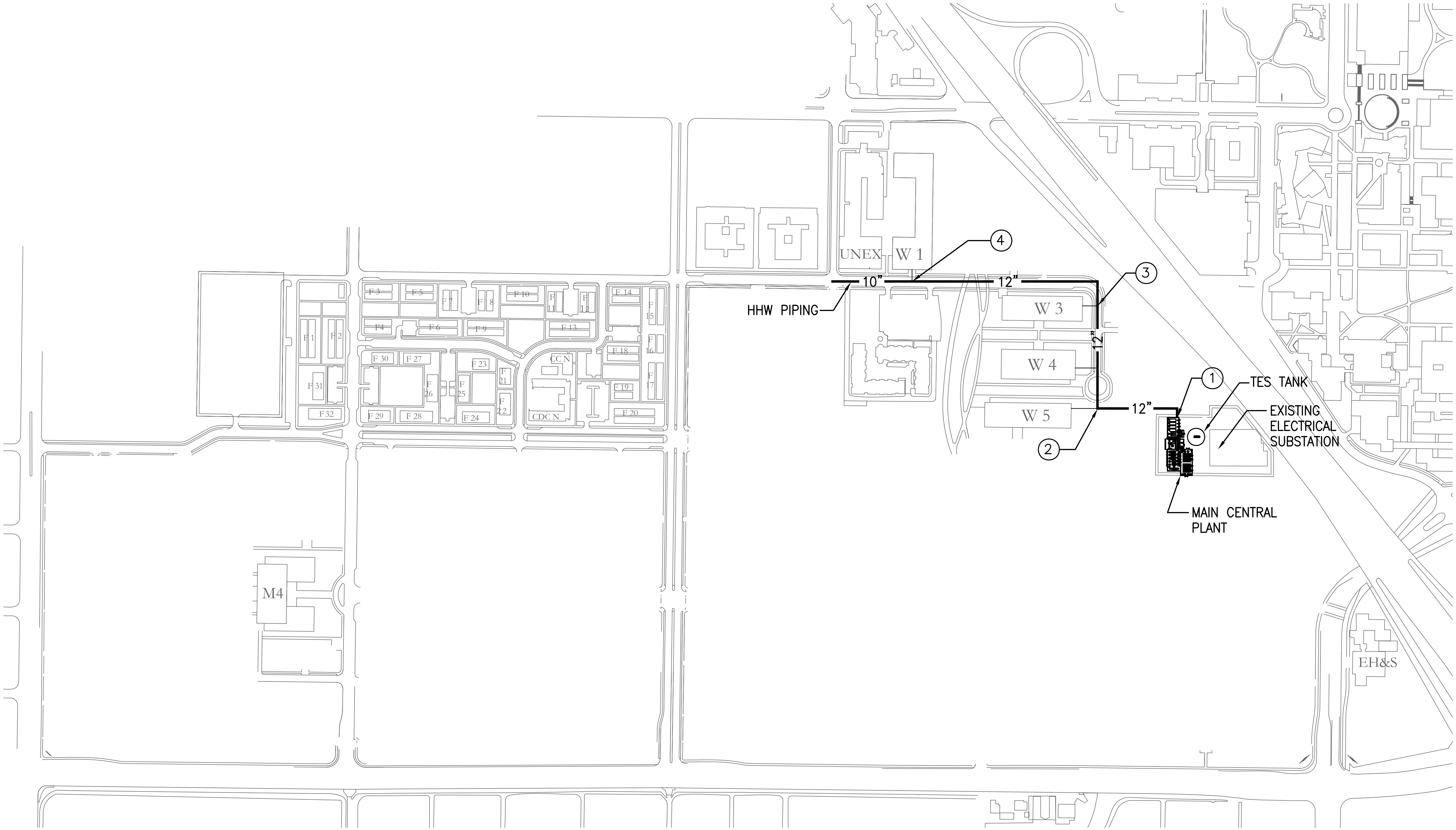
Figure 9-4
West Campus
Development
Phase 4
CHW Piping

Sheet No.



LEGEND

PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)

BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)

POINT OF CONNECTION

(1) DESIGNATES A PIPING NODE (USED IN TABLE 9–3 HHW FLOW ANALYSIS IN APPENDIX A–5)

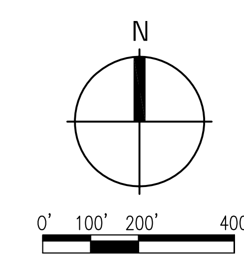


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Figure 9-5
West Campus Development Phase 1 HHW Piping

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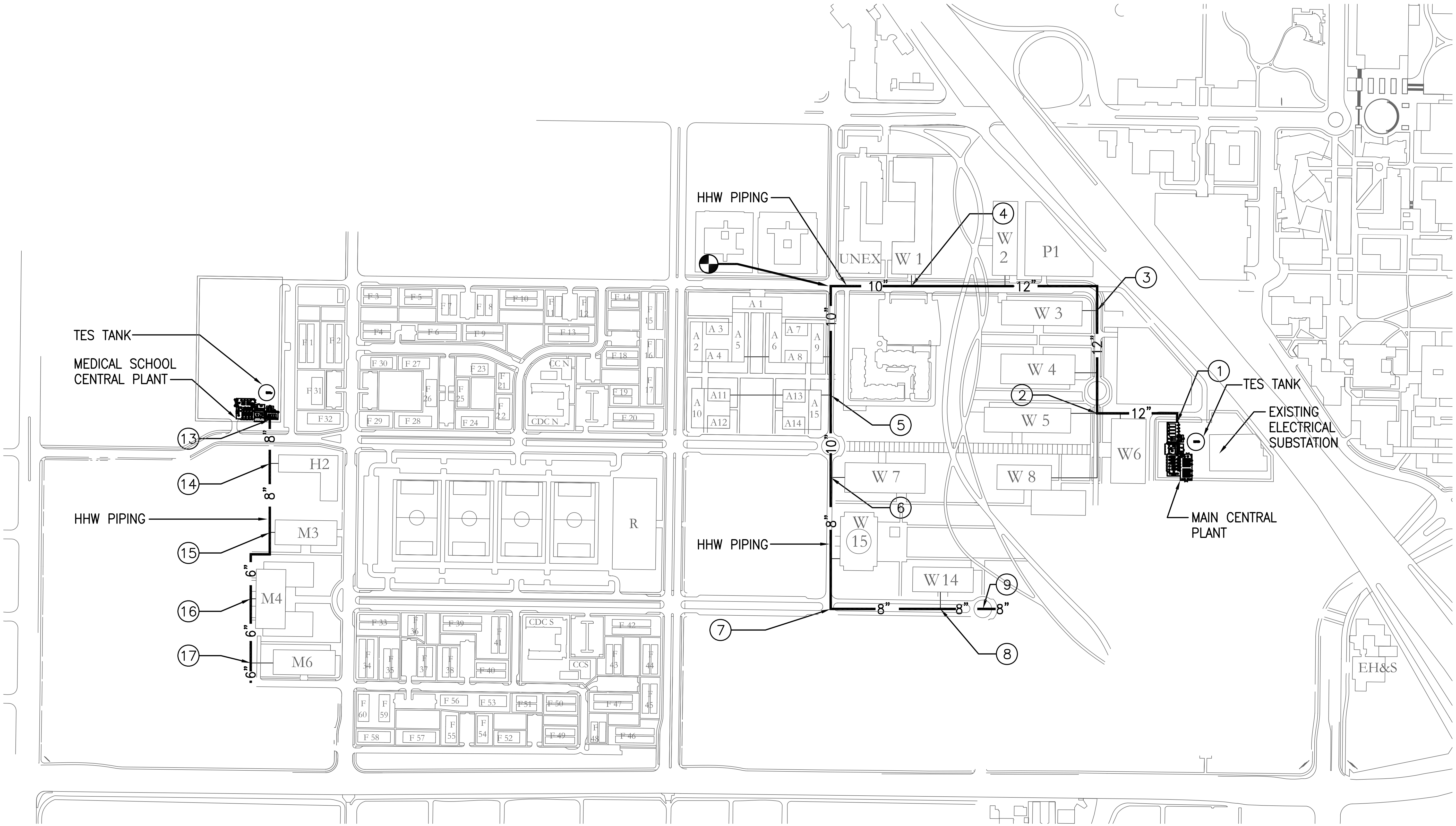

LEGEND

PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)

BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)

POINT OF CONNECTION

① DESIGNATES A PIPING NODE (USED IN TABLE 9–3 HHW FLOW ANALYSIS IN APPENDIX A–5)

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Revision	Description	Date
△	Phase 1 Implementation Plan Report	10/31/07
△	Admistrative Draft Report	02/11/08
△	Final Report	03/14/08
△	Final Report	04/25/08

Job. No.	507.5137.1
Date	04/25/08
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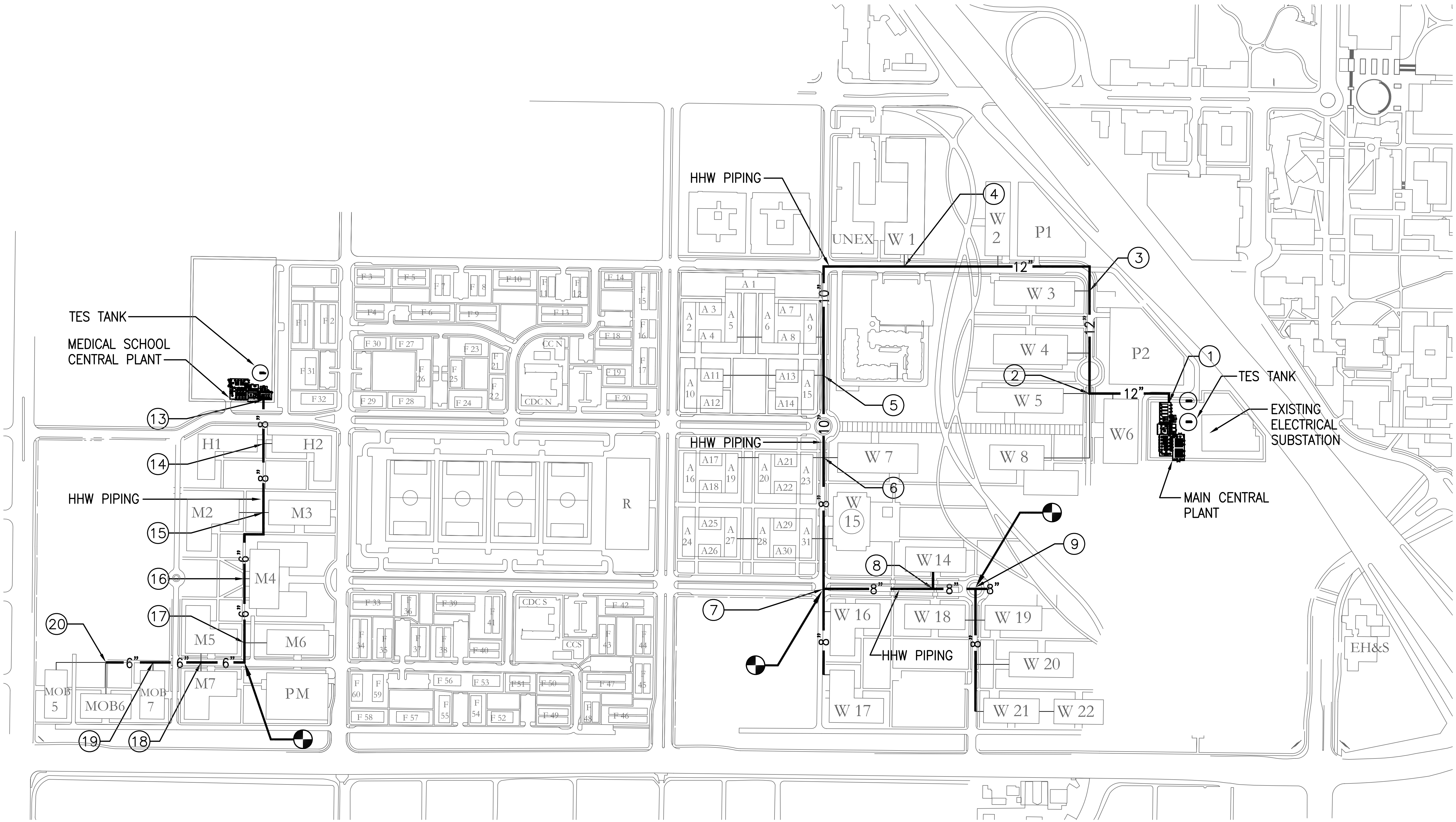
Sheet Title	

Figure 9-6
West Campus Development Phase 2
HHW Piping

Sheet No.



LEGEND

PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)

BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)

POINT OF CONNECTION

(1) DESIGNATES A PIPING NODE (USED IN TABLE 9–3 HHW FLOW ANALYSIS IN APPENDIX A–5)

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Figure 9-7
West Campus
Development
Phase 3
HHW Piping

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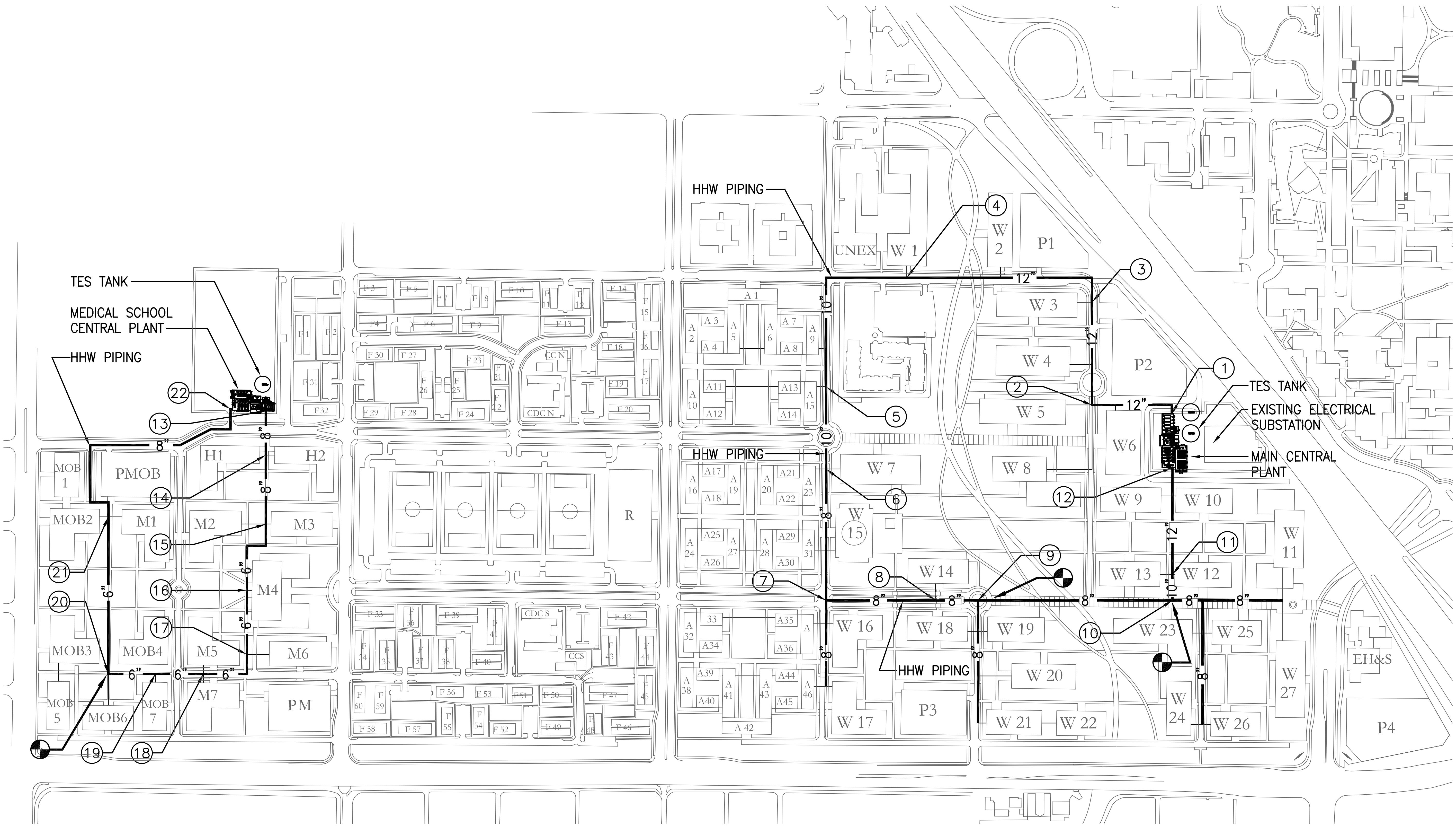

LEGEND

(thick line)	PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)
(thin line)	BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)
(symbol)	POINT OF CONNECTION
(1)	DESIGNATES A PIPING NODE (USED IN TABLE 9–3 HHW FLOW ANALYSIS IN APPENDIX A–5)

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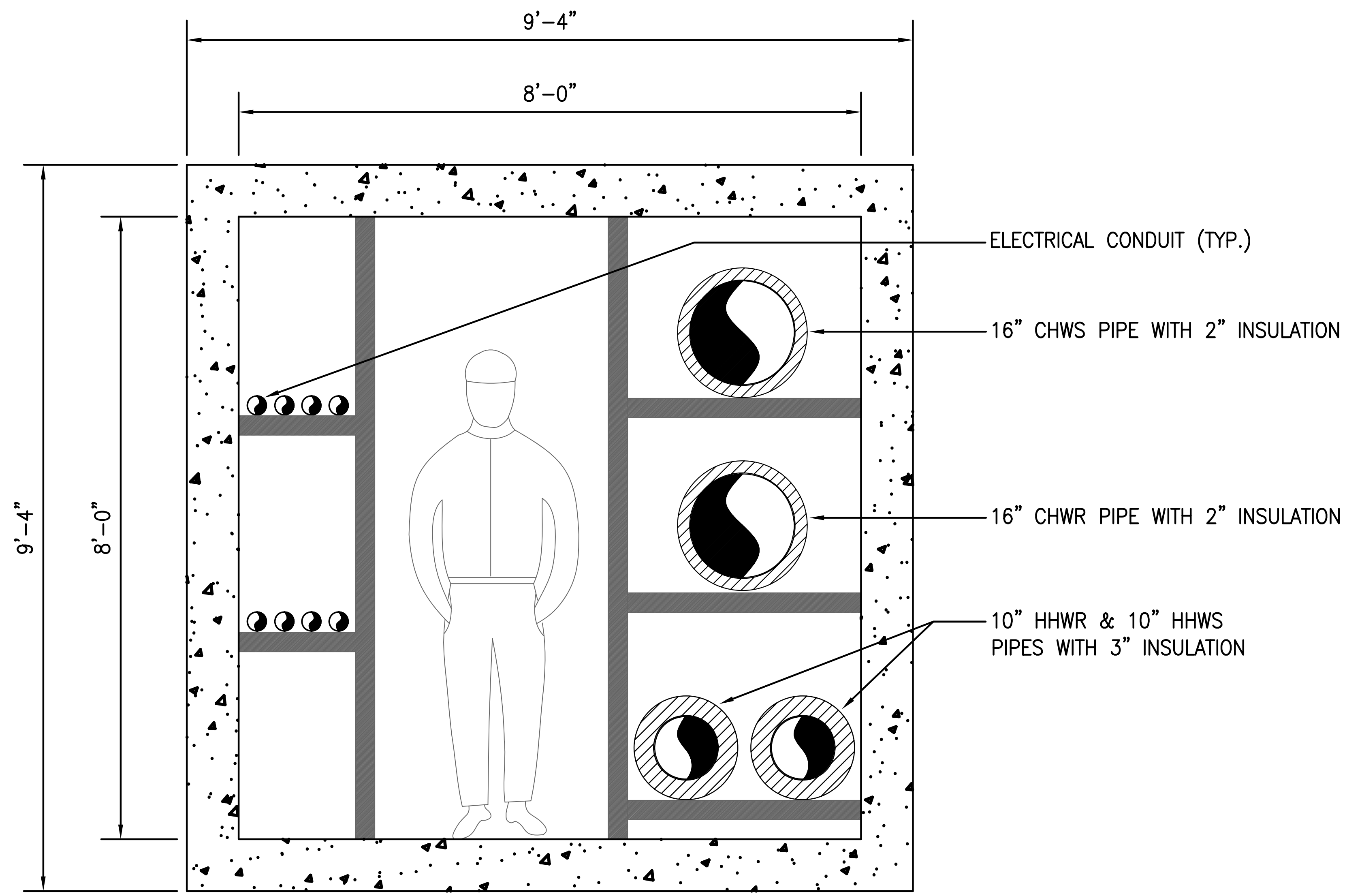
Figure 9-8
West Campus Development Phase 4 HHW Piping

Sheet No.



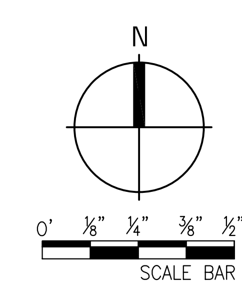


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Figure 9-9
Typical Utilities Tunnel Cross-Section

Sheet No.

CHAPTER 9A

CHILLED WATER AND HEATING HOT WATER PIPING DISTRIBUTION SYSTEMS WITH AGGRESSIVE SUSTAINABILITY

Chapter 8A established the cooling and heating loads based on the aggressive implementation of building sustainability measures, as well as the means, strategies, and phasing under which cooling and heating systems will be implemented.

Essentially, two central plants will be used. The Main Campus Central Plant will provide chilled water (CHW) for space cooling and heating hot water (HHW) for space heating and domestic hot water heating to the Academic core and Apartments on the east side of West Campus. The Medical School Central Plant will provide CHW and HHW to the Medical School on the west side of West Campus.

This chapter, Chapter 9A, presents the analyses and recommended plans to distribute CHW and HHW to West Campus buildings, including the pipes types and sizes. However, it differs from Chapter 9 in that it sizes the cooling and heating piping distribution infrastructure based on aggressive implementation of building and infrastructure sustainable design measures. This chapter has the same format and much of the same content as Chapter 9, and is intended as a full stand-alone replacement of Chapter 9, if desired.

9A.1 CHW and HHW Piping Routing and Sizing

The main loops of chilled water supply (CHWS), chilled water return (CHWR), heating hot water supply (HHWS), and heating hot water return (HHWR) piping will be installed in accordance with the West Campus phasing plan. These will be provided under various utilities infrastructure projects that are the subject of the West Campus Infrastructure Development Study (WCIDS). The pipe routes are selected so as to minimize the length and first cost of the piping, and in so doing minimize pumping costs.

Any CHWS, CHWR, HHWS, and HHWR main branches, serving multiple buildings will be considered utilities infrastructure project pipes. Pipe branches to individual buildings will be covered under building projects.

An analysis of the required flows and pipe sizing was developed in Tables 9A-1, 9A-2, 9A-3, and 9A-4.

9A.1.1 Phase 1A

Phase 1A is the very first implementation stage. It consists of the north phase of Family Family Student Housing Housing (F1 through F32), Child Development Center North (CDC N), and Community Center North (CC N). None of these facilities will be served by the Main Central Plant so they don't figure any further into this analysis. One academic building (W4) will also be implemented under Phase 1A. Initially, this building will not be served by the Main Central Plant since Main Central Plant is not to be implemented until Phase 1. However, the HVAC systems for W4 will be designed so that they can be later connected to central plant service.

No central plant or CHW/HHW distribution piping will be implemented under Phase 1A.

9A.1.2 Phase 1B

Under Phase 1B, the first building (M4) of the Medical School will be constructed. Initially, this building will not be served by the Medical School Central Plant since Medical School Central Plant is not to be implemented until Phase 2. However, the HVAC systems for M4 will be designed so that they can be later connected to central plant service.

No central plant or CHW/HHW distribution piping will be implemented under Phase 1B.

9A.1.3 Phase 1

West Campus will generally be developed from east to west, and north to south. Under Phase 1, three academic buildings (W1, W3, and W5) will be located in the northeast area of the campus. These will all need to be served by the central plant, hereinafter referred to as the Main Central Plant.

See Figure 9A-1 for Phase 1 CHW piping. See Figure 9A-5 for Phase 1 HHW piping. These figures, and their companion figures 9A-2, 9A-3, 9A-4, 9A-6, 9A-7, and 9A-8, show piping loop nodes (in circled numbers) and required sizes for pipe mains that are sized for build-out conditions. Tables 9A-1, 9A-2, 9A-3, and 9A-4 also show sizes for pipe branches to individual buildings.

Main CHWS, CHWR, HHWS, and HHWR piping will be installed from the Main Central Plant, west towards building W5, north along the east side of buildings W3/W4/W5, west along the north side of building W3, and west along the south side of buildings W1 and UNEX, terminating just southeast of UNEX. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR will extend to the individual buildings as shown. Building W4, constructed under Phase 1A, would be connected to central plant service under Phase 1, and its building chiller and boiler plant would be retained in standby.

9A.1.4 Phase 2

Under Phase 2, six academic buildings (W2, W6, W7, W8, W14, and W15) will be constructed generally in the central part of the Academic core (east end of West Campus). Also, Apartments, A1 through A15, will be located in the north central area of the campus. Finally, the Recreation Building (R) will be constructed. These will all be served by the already existing, but expanding, Main Central Plant, located next to the existing electrical substation on the east side of West Campus. (Family Student Housing (F33 through F60), Child Development Center South (CDC S), Community Center South (CC S), and the Recreation Building (R) are also implemented under Phase 2, but will not be served by the Main Central Plant so they don't figure into this analysis.)

See Figure 9A-2 for Phase 2 CHW piping, and Figure 9A-6 for Phase 2 HHW piping.

Main CHWS, CHWR, HHWS, and HHWR piping will be extended from the Phase 1 terminus just southeast of UNEX, south along the west side of International Village and buildings W7 and W15, east along the south side of buildings W15 and W14, terminating just southeast of building W14. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR would extend to the buildings.

Also under Phase 2, three buildings (H2, M3, and M6) of the Medical School at the west end of West Campus will be constructed. Main CHWS, CHWR, HHWS, and HHWR piping (and other utilities piping) will be installed from the Medical School Central Plant, south along the west side of buildings H2, M3, M4, and M6, terminating just southwest of building M6. Building M4, constructed under Phase 1B, would be connected to central plant service under Phase 2, and its building chiller and boiler plant would be retained in standby.

9A.1.5 Phase 3

Under Phase 3, seven academic buildings (W16, W17, W18, W19, W20, W21, and W22) will be constructed generally in the south part of the Academic core (east end of West Campus). These will all be served by the already existing, but expanding, Main Central Plant, located next to the existing electrical substation on the east side of West Campus.

See Figure 9A-3 for Phase 3 CHW piping, and Figure 9A-7 for Phase 3 HHW piping.

Main CHWS, CHWR, HHWS, and HHWR piping will not need to be extended from the Phase 2 terminus just southeast of building W14 under Phase 3 project. Only smaller branch piping for CHWS, CHWR, HHWS, and HHWR will extend to the individual buildings.

Also under Phase 3, more Medical School buildings (H1, M2, M5, M7, MOB5, MOB6, and MOB7) at the west end of West Campus will be constructed. These will all be served by the already existing, but expanding, Medical School Central Plant, located in the “Service Area” north of the Medical School (specifically north of building H1).

Main CHWS, CHWR, HHWS, and HHWR piping (and other utilities piping) will be extended from the Phase 2 terminus just southwest of building M6, west along the north side of buildings M7/MOB7/MOB6, terminating just north of building MOB6. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR (and other utilities piping) would extend to the individual buildings.

9A.1.6 Phase 4

Under Phase 4, ten academic buildings (W9, W10, W11, W12, W13, W23, W24, W25, W26, and W27) will be constructed generally in the southeast part of the Academic core (east end of West Campus). These will all be served by the already existing, but expanding, Main Central Plant, located next to the existing electrical substation on the east side of West Campus.

See Figure 9A-4 for Phase 4 CHW piping, and Figure 9A-8 for Phase 4 HHW piping.

Main CHWS, CHWR, HHWS, and HHWR piping will need to be extended from the Phase 2 terminus just southeast of building W14, west along the north side of building W19 and south side of building W13, north between buildings W13 and W12 and north between buildings W9 and W10, and back to the Main Central Plant, thus completing the loop. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR will extend to the individual buildings.

Also under Phase 4, more Medical School buildings (M1, MOB1, MOB2, MOB3, and MOB4) at the west end of West Campus will be constructed. These will all be served by the already existing, but expanding, Medical School Central Plant, located in the "Service Area" north of the Medical School (specifically north of building H1).

Main CHWS, CHWR, HHWS, and HHWR piping (and other utilities piping) will be extended from the Phase 3 terminus just north of building MOB6, north between buildings MOB3 and MOB4 and north between buildings MOB2 and M1, north along the east side of building MOB1, east along the north side of PMOB (parking structure), and back to the Medical School Central Plant, thus completing the loop. Smaller branch piping for CHWS, CHWR, HHWS, and HHWR (and other utilities piping) will extend to the individual buildings.

9A.2 CHW Pipe Sizing Criteria

Within practical limits, it is desirable to design for as high a CHW ΔT as possible. This can help to minimize pipe and pump size (reduced first cost) and to minimize pumping horsepower (reduced energy consumption and cost).

CHWS will be generated at the central plants at 38°F (adjustable). Chiller pairs will be designed for entering CHWR at 68°F. This is a 30°F CHW ΔT. The primary determinant of CHW ΔT is cooling coil performance. Under all building projects, cooling coils shall be designed for 40°F CHWS and 70°F CHWR. This includes a safety factor for some pipe losses and some campus cooling coils which may not have as high a CHW ΔT performance. ***It is imperative that mechanical engineering consultants on all UC Riverside West Campus building projects use a cooling coil design criteria of 40°F CHWS and 70°F CHWR.***

The CHW campus distribution pipes are sized using the following design criteria:

- Pipe mains are sized for CHW flows to serve West Campus peak diversified cooling loads to Build-Out.

- Pipe mains are sized for CHW flows using cooling diversity factors of between 0.7 and 1.0, depending on the number of buildings on any particular pipe segment. CHW mains closer to the central plant (i.e. those pipe segments carrying CHW flow for many buildings), have a cooling diversity factor closer to 0.7. CHW mains farther away from the central plant and building CHW pipe branches (i.e. those pipe segments carrying CHW flow for one or just a couple buildings), have a cooling diversity factor closer to 1.0.

- Pipe mains are sized based on a 25°F CHW ΔT, instead of 30°F CHW ΔT, to include a safety factor.

- Pipe mains are sized using a maximum water velocity of 9 fps or a maximum friction loss of 3 feet per 100 feet of equivalent length.

- No central plant cooling service will be provided for Family Student Housing (Family Apartments, Family Townhouses, Recreation Building, Child Development Center North (CDC N), Community Center North (CC N), Child Development Center South (CDC S), and Community Center South (CC S).

The recommended CHW piping loop is divided into pipe segments. Each segment carries a certain amount of peak diversified cooling load flow from which pipe sizing can be developed, using the pipe sizing criteria above. Tables 9A-1 and 9A-2 (in the appendix) show the sizing calculations for each CHW pipe segment for the Main Central Plant and the Medical School Central Plant respectively. The resultant pipe sizes are based on diversified peak cooling loads under aggressive implementation of sustainable design measures.

9A.3 HHW Pipe Sizing Criteria

Within practical limits, it is desirable to design for as high a HHW ΔT as possible. This can help to minimize pipe and pump size (reduced first cost) and to minimize pumping horsepower (reduced energy consumption and cost).

HHWS will be generated at the central plants at 190°F (adjustable). Gas-fired boilers will be designed for entering HHWR at 130°F. This is a 60°F HHW ΔT. The primary determinant of HHW ΔT is heating coil performance. Under all building projects where practical, heating coils shall be designed for 180°F HHWS and 120°F HHWR. This includes a safety factor for some pipe losses and some campus heating coils which may not have as high a HHW ΔT performance. ***It is imperative that mechanical engineering consultants on all UC Riverside West Campus building projects use a heating coil design criteria of 180°F HHWS and 120°F HHWR.***

The HHW campus distribution pipes are designed using the following design criteria:

- Pipe mains are sized for HHW flows to serve West Campus peak diversified heating loads to Build-Out.

- Pipe mains are sized for HHW flows using heating diversity factors of between 0.85 and 1.0, depending on the number of buildings on any particular pipe segment. HHW mains closer to the central plant (i.e. those pipe segments carrying HHW flow for many buildings), will have a heating diversity factor closer to 0.85. HHW mains farther away from the central plant and building HHW pipe branches (i.e. those pipe segments carrying HHW flow for one or just a couple buildings), will have a cooling diversity factor closer to 1.0.

- Pipe mains will be sized based on a 40°F HHW ΔT. This is a prudent pipe sizing criterion since not all reheat coils can achieve a 60°F HHW ΔT.

- Pipe mains will be sized using a maximum water velocity of 9 fps or a maximum friction loss of 3 feet per 100 feet of equivalent length.

- No central plant heating service will be provided for Family Housing (Family Apartments, Family Townhouses, Recreation Building, Child Development Center North (CDC N), Community Center North (CC N), Child Development Center South (CDC S), and Community Center South (CC S).

The recommended HHW piping loop is divided into pipe segments. Each segment carries a certain amount of peak diversified heating load flow from which pipe sizing can be developed, using the pipe sizing criteria above. Tables 9A-3 and 9A-4 (in the appendix) show the sizing calculations for each HHW pipe segment for the Main Central Plant and the Medical School Central Plant respectively. The resultant pipe sizes are based on diversified peak heating loads under aggressive implementation of sustainable design measures.

9A.4 Utility Tunnels vs. Utilidors vs. Direct-Buried Piping

The above sections address the recommended routing and sizing of the CHW and HHW distribution systems. This section addresses the means to distribute CHW and HHW from the campus central plants to the buildings and back to the campus central plants. Certainly piping will be used. The question is whether that piping will be installed in utility tunnels, in utilidors, and/or be direct-buried.

9A.4.1 Utility Tunnels

Utility tunnels would be either an underground concrete conduit or a pre-fab circular pipe type of conduit. They are walk-though conduits in which the pipes and their isolation valves can be directly accessed for operation and maintenance. See Figure 9A-9 for a typical utilities tunnel cross-section.

The main advantage of utility tunnels is that they facilitate the location and repair of leaks since the piping is readily observable along its route in the utility tunnels. Another advantage is that other utilities, such as electrical, data/telecommunications, and other piping can also be routed in the utility tunnel.

The main disadvantage is high relative cost. Also, utility tunnels need a fire sprinkler piping system, which further adds to the high cost. However, the CHW and HHW piping is less expensive in that exposed insulated piping can be used instead of the more expensive pre-fabricated, pre-insulated piping that is used in direct-buried piping installations. This offsets the high cost disadvantage somewhat.

Many California State University (CSU) and University of California (UC) campuses have utility tunnel system. California State University, Fullerton, has a very extensive utility tunnel system, which was installed in the 1960s. The new UC Merced campus has some recently-implemented utility tunnels. Currently, it has about 150 feet of tunnel out from its central plant into the main building core. This main tunnel can be extended. Branch piping to buildings is direct-buried.

9A.4.2 Utilidors

A utilidor would be a concrete trench with a removable top that is flush with the ground surface. They are smaller conduits than utility tunnels and are not the walk-through type. The pipes and their isolation valves in a utilidor can be directly accessed for operation and maintenance. The main advantage of utilidors is that they facilitate the location and repair of leaks since the piping is readily observable along its route in the utility tunnels. Another advantage is that other utilities, such as electrical, data/telecommunications, and other piping can also be routed in utilidors.

Utilidors are expensive relative to direct-buried piping, but are less expensive than walk-through utility tunnels. Utilidors do not need a fire sprinkler piping system, which helps to keep the first cost down. Also, the CHW and HHW piping is the exposed insulated piping type instead the more expensive pre-fabricated, pre-insulated piping that is used in direct-buried piping installations. This helps to offset the high cost disadvantage of utilidors compared to direct-buried piping.

California Polytechnic State University, San Luis Obispo has an extensive utilidor system for its main piping and electrical. The utilidor was installed in the mid-1990s. Branch piping to buildings is direct-buried.

9A.4.3 Direct-Buried Piping

Direct-buried CHW and HHW piping would be the pre-fabricated, pre-insulated type. This is the least expensive, and most common, approach to distributing CHW and HHW piping around campuses. However, it has the main drawback of masking leaks, which are often inevitable over the lifetime of the extensive distribution systems. This leads to loss of treated water and energy. The difficulty of locating leaks is the main reason leaks go unrepaired for long periods of time.

9A.4.4 Recommendations for CHW and HHW Piping Distribution Strategy

Utility tunnels and utilidors become increasingly advantageous when large and numerous utility systems can be routed together. Because of this, it is recommended that utility tunnels be used for the main piping loops around the academic core and the Medical School. This is similar to the model being used for the new UC Merced campus. Alternatively, if the cost of utility tunnels proves to be too untenable, utilidors could be used for the main piping loops. Branch piping to buildings from these main loops would be the direct-buried type. Please see Figures 9A-4 and 9A-8 for the full extent of the main loops and the branch piping to the buildings.

9A.5 Direct-Buried CHW Pipe Type

Direct-buried CHW piping will be the pre-fabricated, pre-insulated type. The carrier pipe will be standard weight, Schedule 40, ASTM A53, Grade B, ERW welded, carbon steel. It will have polyurethane foam insulation of a required thickness based on pipe size. The outside will be covered by a seamless high density polyethylene (HDPE) outer protective insulation jacket.

Alternatively, the direct-buried CHW piping could be a different type of pre-fabricated, pre-insulated pipe. In this case, the carrier pipe would be C900/C905 gasketed PVC piping with push-on joints. It would have polyurethane foam insulation of a required thickness based on pipe size. The outside would be covered by a seamless high density polyethylene (HDPE) outer protective insulation jacket. Thrust blocks would be used at changes in direction and at pipe junctions.

9A.6 Direct-Buried HHW Pipe Type

Direct-buried HHW piping will be the pre-fabricated, pre-insulated type. The carrier pipe will be standard weight, Schedule 40, ASTM A53, Grade B, ERW welded, carbon steel. It will have polyurethane foam insulation of a required thickness based on pipe size. The outside will be covered by a seamless high density polyethylene (HDPE) outer protective insulation jacket.

9A.7 Exposed CHW Pipe Type

Exposed CHW piping will be insulated Type L copper piping or insulated Schedule 40 black steel piping. Exposed CHW piping will have fiberglass insulation of a required thickness based on pipe size. Color coded labeling will be provided on all CHW piping that will show direction of flow, fluid in pipe, and system(s) served. All isolation valves will be fully accessible for maintenance and safety.

9A.8 Exposed HHW Pipe Type

Exposed HHW piping will be insulated Type L copper piping or insulated Schedule 40 black steel piping. Exposed HHW piping will have fiberglass insulation of a required thickness based on pipe size. Color coded labeling will be provided on all HHW piping that will show direction of flow, fluid in pipe and system(s) served. All isolation valves will be fully accessible for maintenance and safety.

9A.9 Isolation Valves

All piping junctions will have isolation valves on all three legs such that any single main piping segment or any pipe branch to a building can be isolated in such a way that only one building is affected by such isolation.

If the junction is in a utility tunnel or a utilidor, then the isolation valves will be exposed and readily accessible. If the junction is at a significant location within a direct-buried piping network, then the isolation valves will be in a vault at the piping junction. In that case as well, the isolation valves will be exposed and readily accessible. If the piping junction is direct-buried, then the isolation valve stems will be in valve cans, in which the valves are direct-buried, but they can be operated from the surface by accessing and turning the valve stem.

9A.10 Building Metering of CHW and HHW

All buildings, connected to central plants, will be individually metered for chilled water and heating hot water. The buildings will be individually metered for energy tracking (i.e. CHW and HHW flow, CHWS and HHWS temperature, CHWR and HHWR temperature, cooling and heating consumption instantaneous and totalized). The meters will be connected to the energy management system (EMS) so that the energy tracking data can be remotely and automatically gathered and processed.

9A.11 CHW and HHW Distribution Systems in the Buildings

The CHW and HHW distribution around West Campus will be piping distribution systems designed for variable CHW and HHW flow. The pipes may be direct-buried, in utilidors, and/or in utility tunnels. CHW for space cooling and HHW for space heating and domestic hot water heating will be used directly in campus buildings in various coils. There will be no booster pumps or tertiary pumps at the buildings. CHW and HHW will be directly pumped from the central plants, around the campus, through building coils, and back to the central plants, using variable flow secondary pumps with variable frequency drives (VFDs).

However, there will be standby CHW and HHW booster pumps in each building that can be manually called into service in the event that additional CHW or HHW flow and/or pressure are required in the building.

As mentioned above, HHW will be used to provide domestic hot water (DHW) heating in the Apartments and in buildings with significant DHW loads such as the Student Center, medical buildings, and lab buildings. In most Academic buildings however, DHW demand will be non-existent or very low. What DHW load there is would be most cost-effectively served with point-of-use, instantaneous, electric hot water heaters.

In the buildings with significant DHW load, double-wall, shell-and-tube heat exchangers will be used between the HHW and DHW in those buildings. The annular space between each heat exchanger's two walls will be vented, thereby allowing any leak to be easily identified. This is a code requirement to minimize cross contamination between the HHW and DHW.

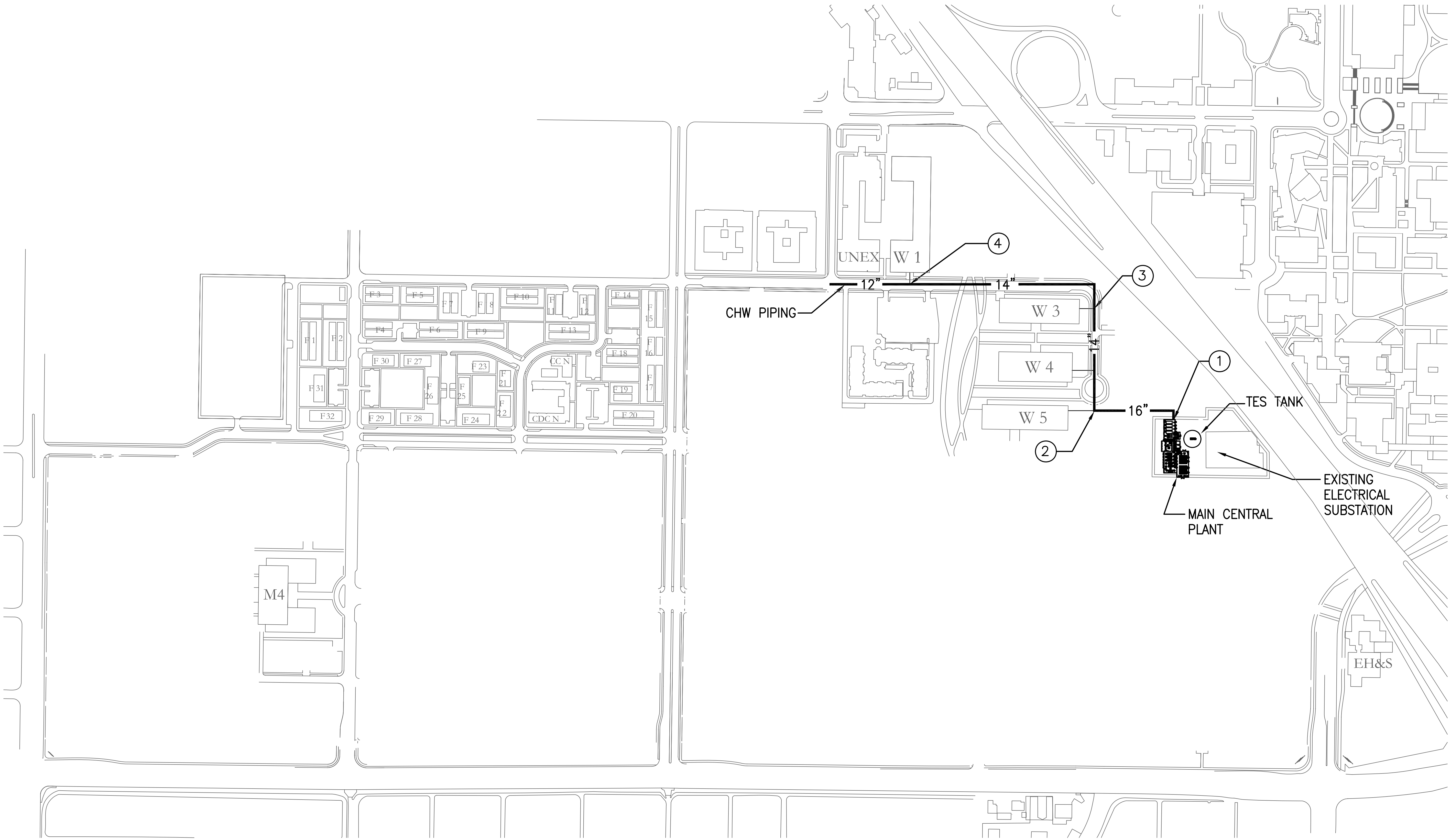
9A.12 CHW and HHW Distribution Systems Cost Summary

This study includes conceptual-level cost estimates for CHW and HHW Distribution Systems infrastructure development considering aggressive sustainability implementation. Details of these cost estimates are included in the Appendix to this report. Costs include mark-ups, sales taxes, and contingencies, but do not include soft costs. See additional notes on the detailed tables. It should also be noted that it is assumed that excavation occurs in undeveloped areas of the campus, meaning there are no utilities or other route conflicts. Also, no surface restoration is included since that is assumed to be covered under landscape and hardscape costs (Chapter 2).

- Phase 1A Housing: $ 0
- Phase 1A Campus: $ 0
- Phase 1B: $ 0
- Phase 1: $ 2,924,000
- Phase 2 Housing: $ 0

- Phase 2 Campus: $ 4,452,000
- Phase 3: $ 1,859,000
- Phase 4: $ 5,346,000

Estimated Total for the Build-Out of the CHW and HHW Distribution Systems: $ 14,581,000



LEGEND

PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)

BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)

POINT OF CONNECTION

(1) DESIGNATES A PIPING NODE (USED IN TABLE 9-1 CHW FLOW ANALYSIS IN APPENDIX A-4)

N

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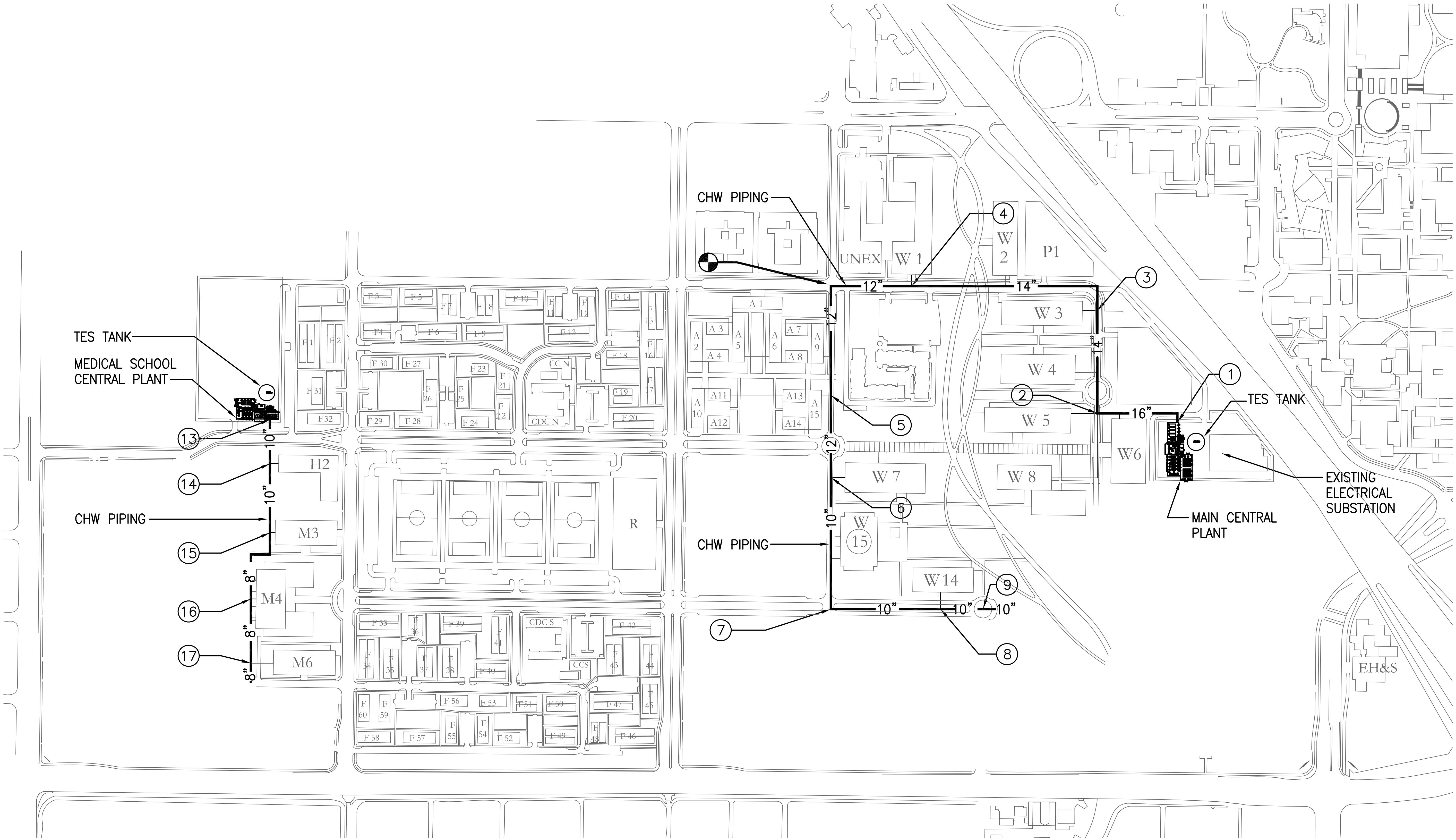
Figure 9A-1
West Campus Development Phase 1 CHW Piping

Sheet No.



LEGEND

PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)

BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)

POINT OF CONNECTION

(1) DESIGNATES A PIPING NODE (USED IN TABLE 9–1 CHW FLOW ANALYSIS IN APPENDIX A–4)

N

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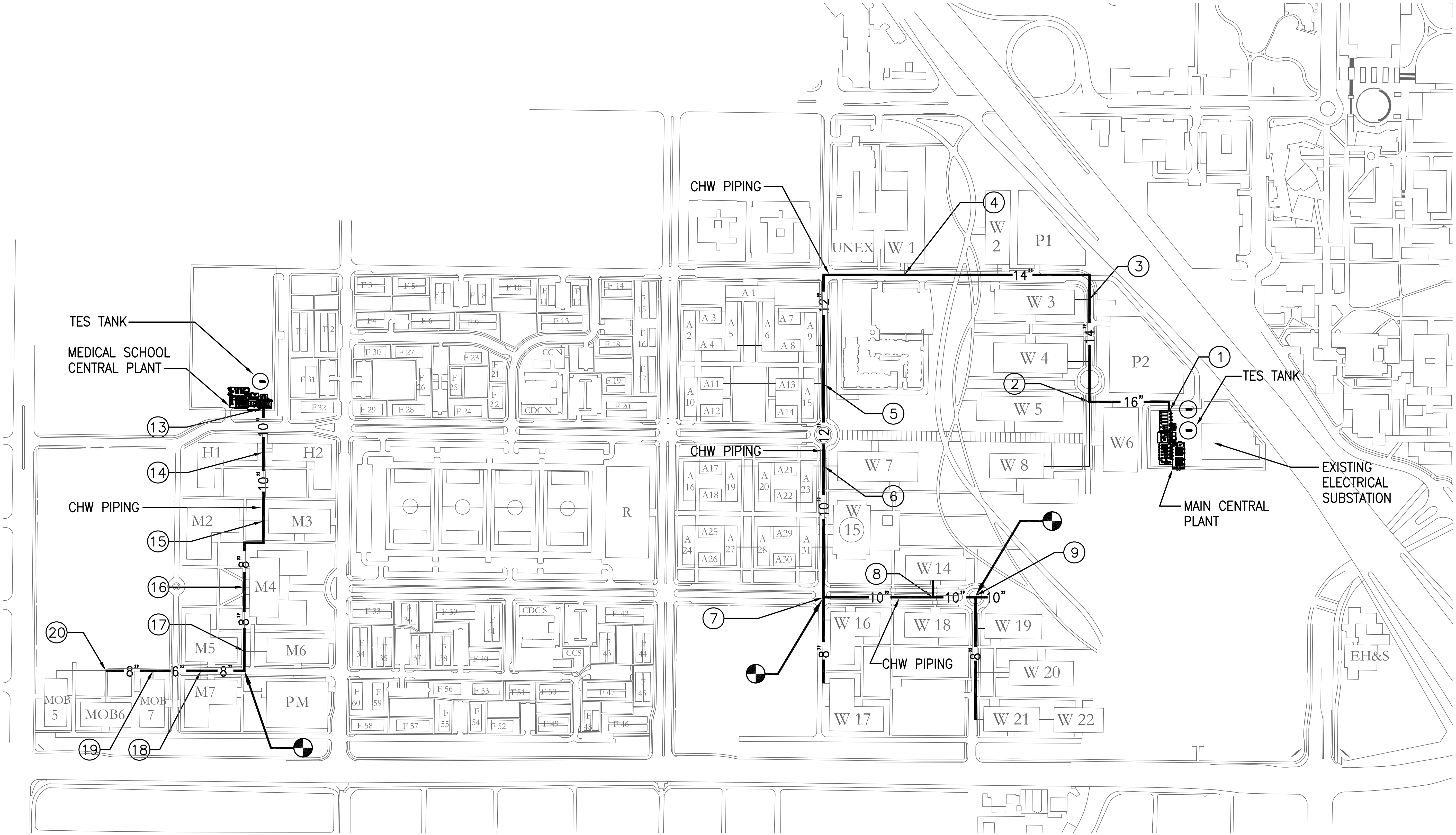
Figure 9A-2
West Campus
Development
Phase 2
CHW Piping

Sheet No.



LEGEND

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(light line)	BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)
(symbol)	POINT OF CONNECTION
(1)	DESIGNATES A PIPING NODE (USED IN TABLE 9–1 CHW FLOW ANALYSIS IN APPENDIX A–4)

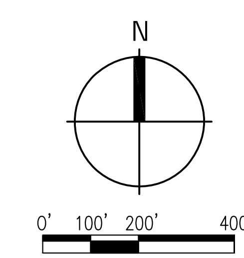

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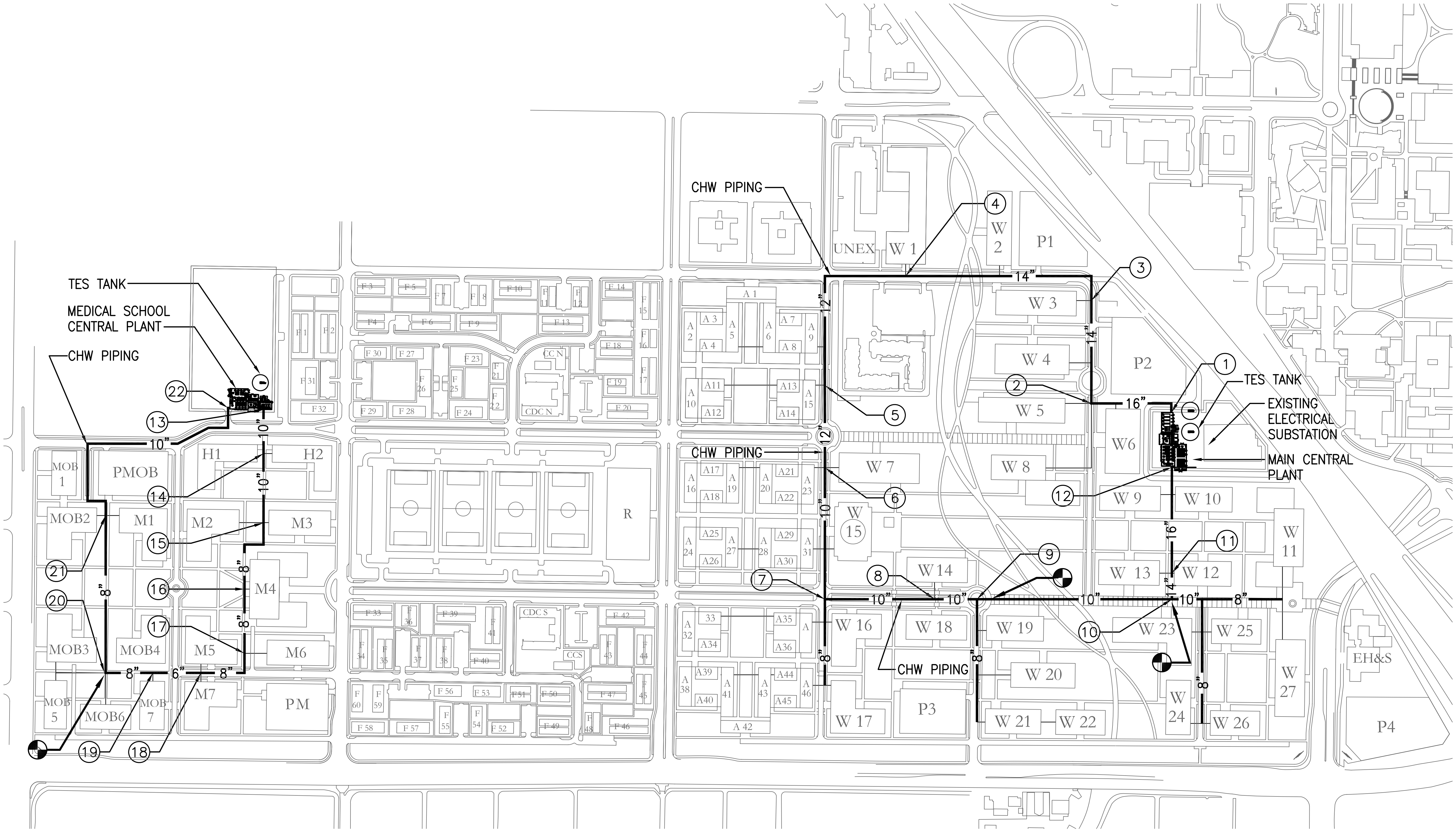
Figure 9A-3
West Campus
Development
Phase 3
CHW Piping

Sheet No.



LEGEND

PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)

BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)

POINT OF CONNECTION

(1) DESIGNATES A PIPING NODE (USED IN TABLE 9-1 CHW FLOW ANALYSIS IN APPENDIX A-4)

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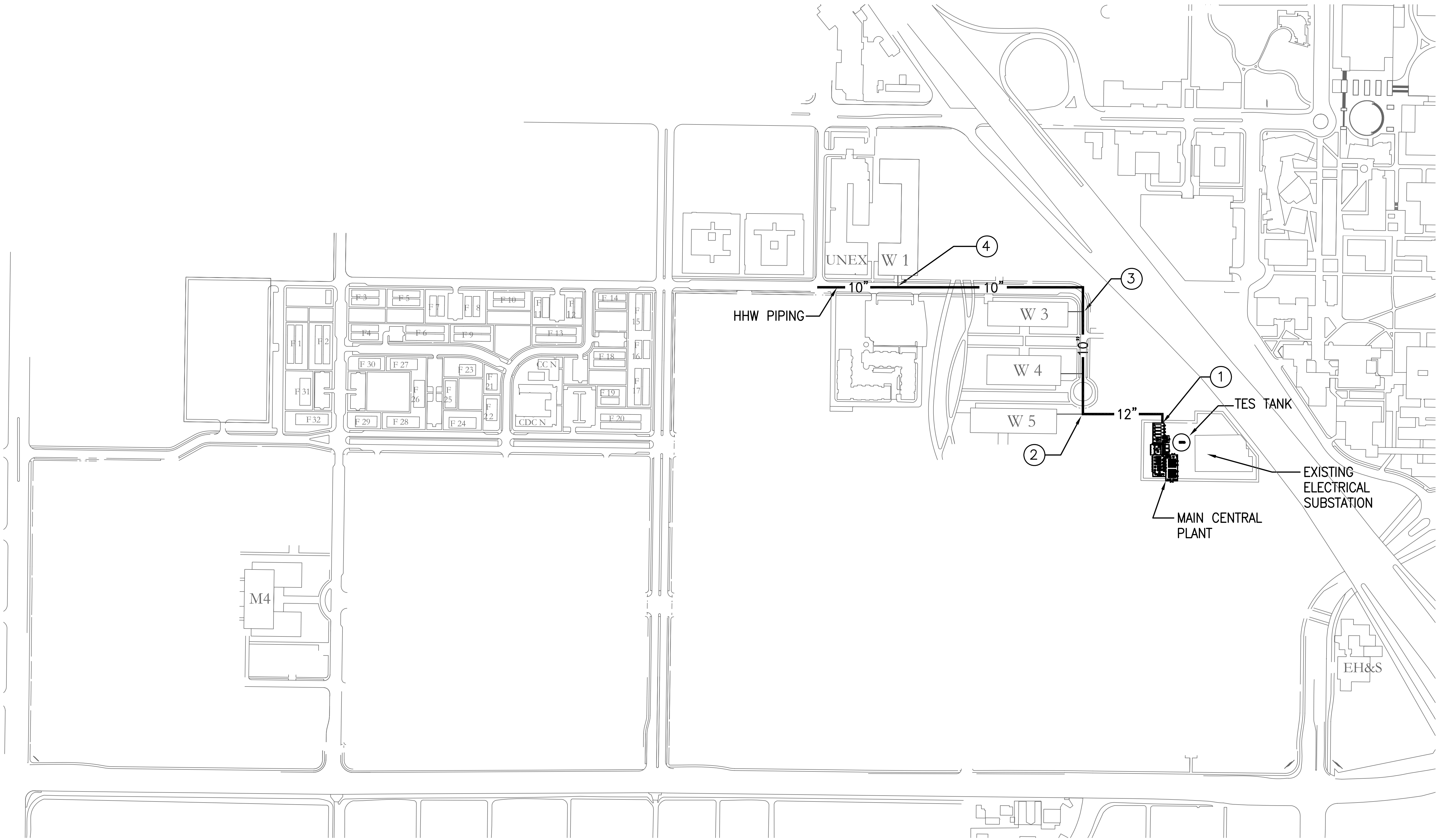
Figure 9A-4
West Campus
Development
Phase 4
CHW Piping

Sheet No.



LEGEND

- PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)
- BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)
- POINT OF CONNECTION
- (1) DESIGNATES A PIPING NODE (USED IN TABLE 9-3 HHW FLOW ANALYSIS IN APPENDIX A-5)

N

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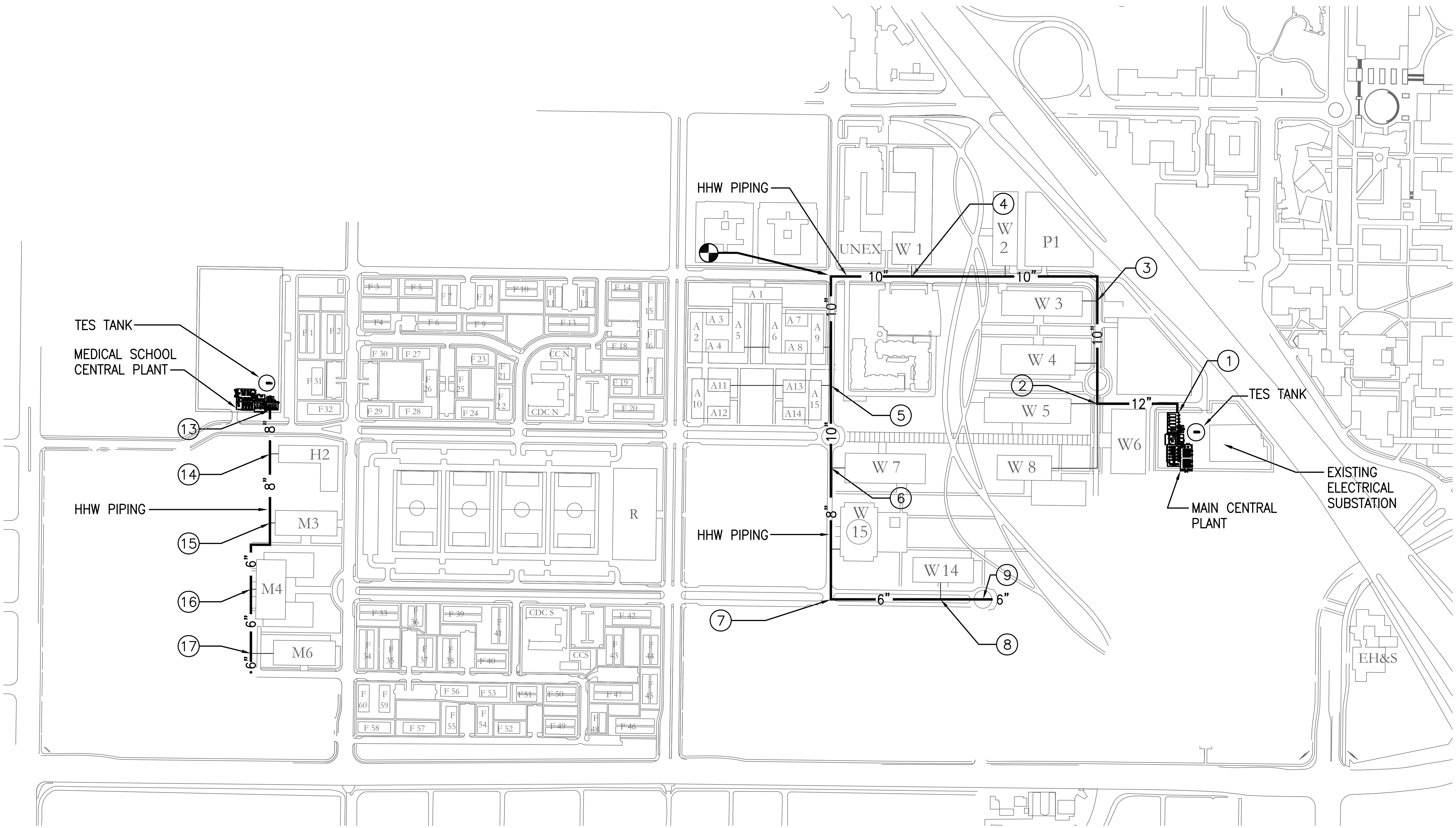
Figure 9A-5
West Campus Development Phase 1 HHW Piping

Sheet No.



LEGEND

(heavy line)	PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)
(light line)	BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)
(symbol)	POINT OF CONNECTION
(1)	DESIGNATES A PIPING NODE (USED IN TABLE 9-3 HHW FLOW ANALYSIS IN APPENDIX A-5)

N

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SCALE BAR

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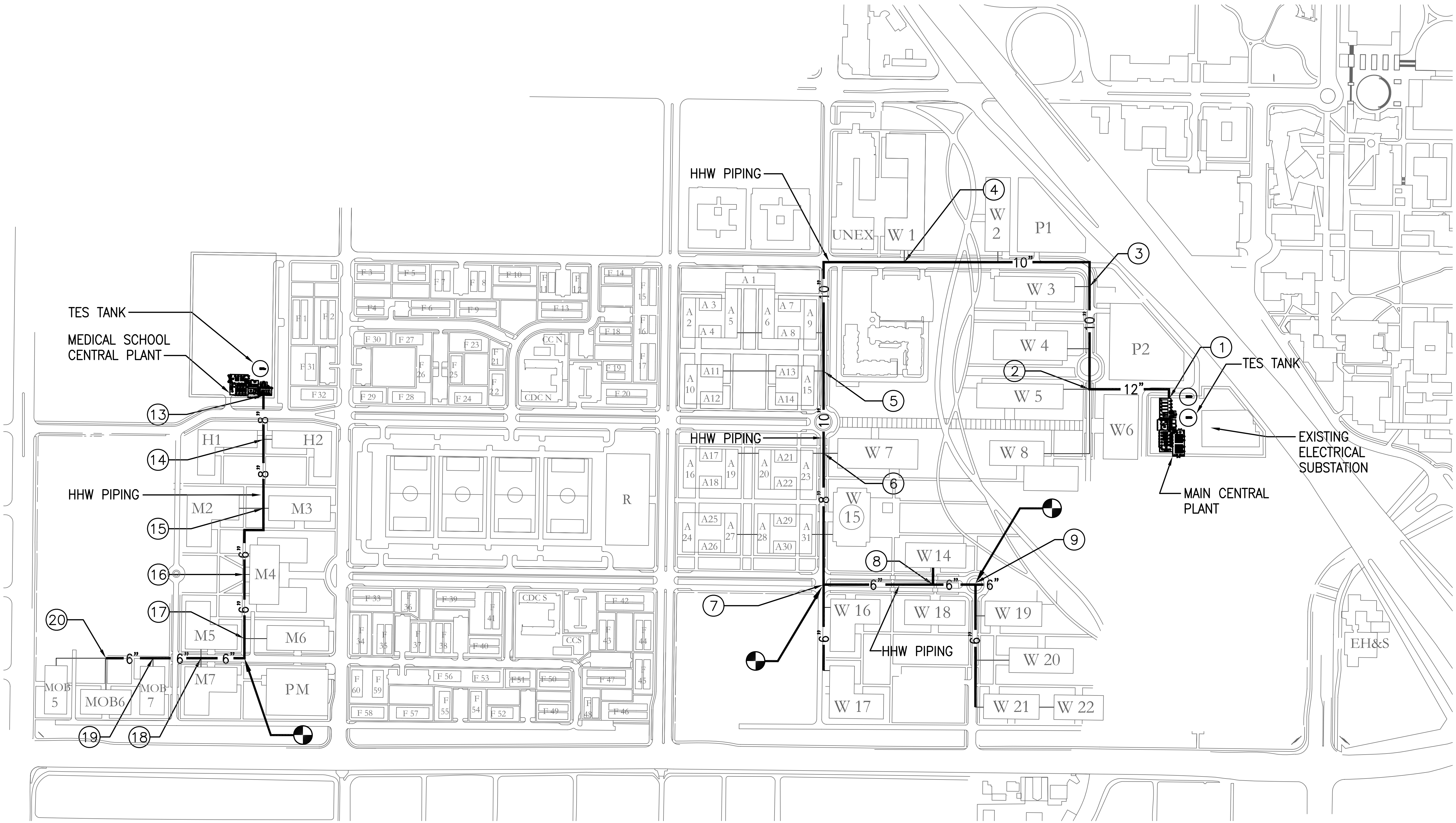
Sheet Title	

Figure 9A-6
West Campus Development Phase 2
HHW Piping

Sheet No.



LEGEND

PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)

BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)

POINT OF CONNECTION

DESIGNATES A PIPING NODE (USED IN TABLE 9–3 HHW FLOW ANALYSIS IN APPENDIX A–5)

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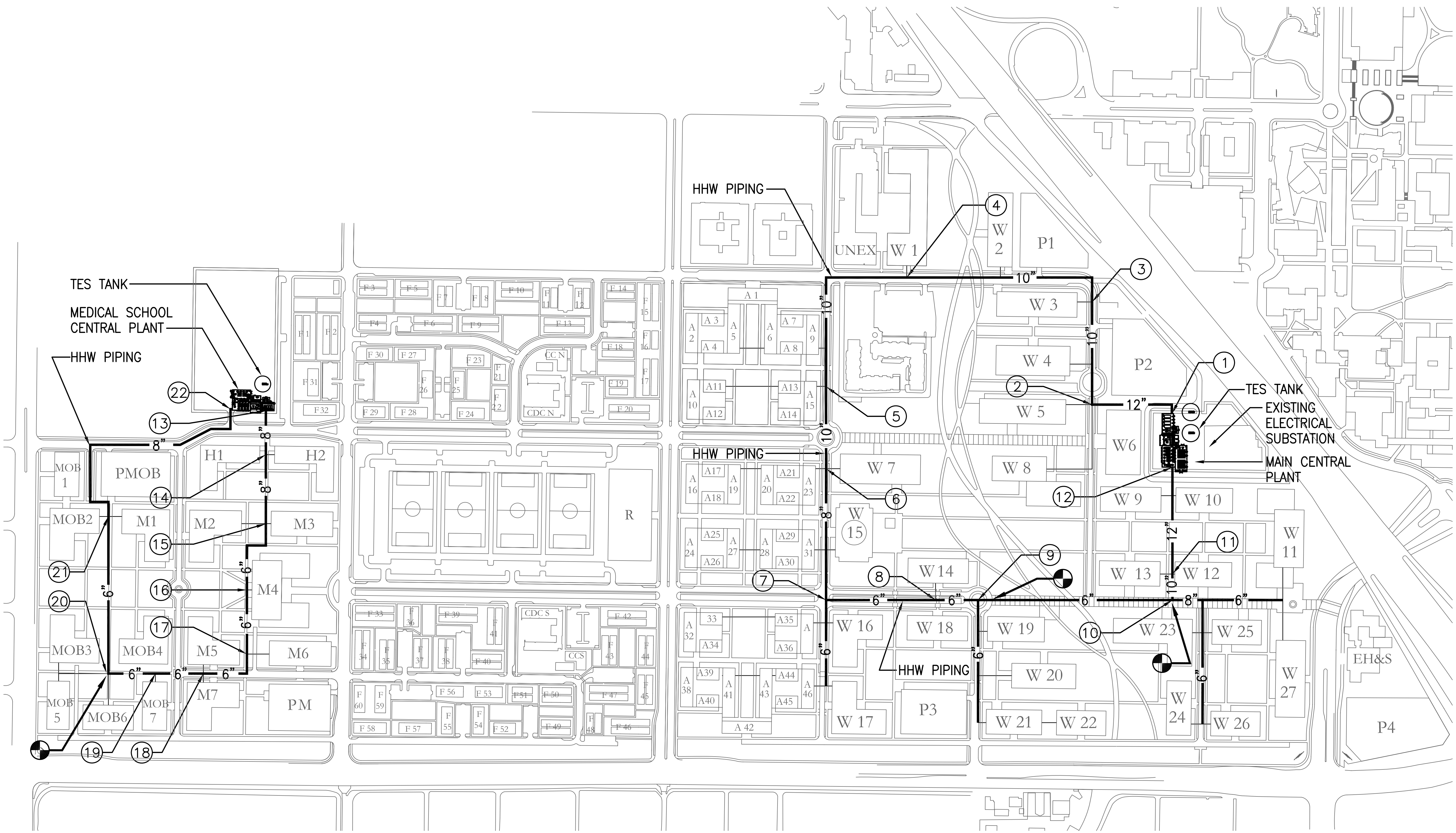
Figure 9A-7
West Campus
Development
Phase 3
HHW Piping

Sheet No.



LEGEND

PIPING IN TUNNEL (UNDER INFRASTRUCTURE PROJECTS)

BRANCH PIPING TO INDIVIDUAL BUILDINGS (UNDER BUILDING PROJECTS)

POINT OF CONNECTION

(1) DESIGNATES A PIPING NODE (USED IN TABLE 9-3 HHW FLOW ANALYSIS IN APPENDIX A-5)

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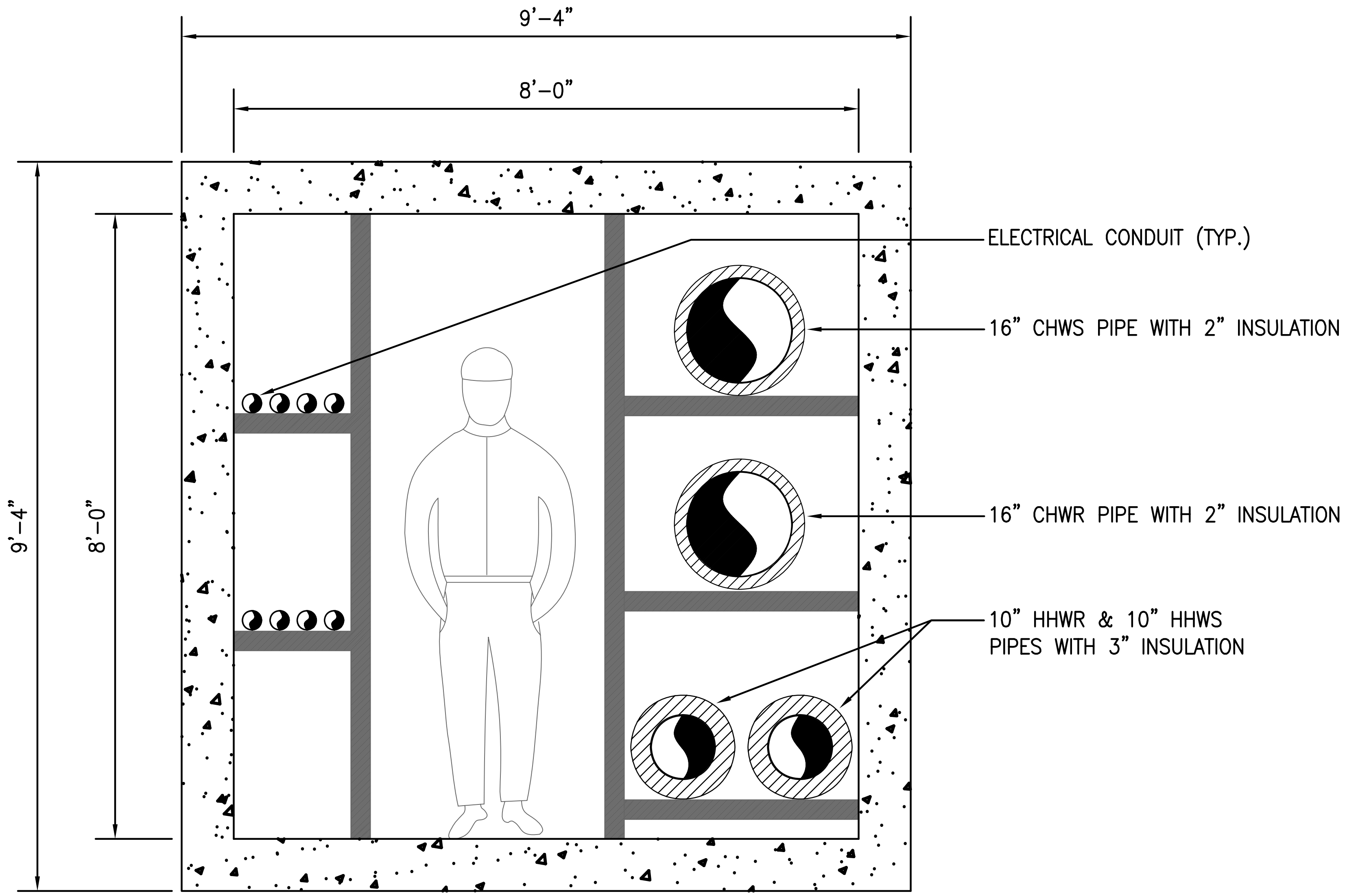
Figure 9A-8
West Campus
Development
Phase 4
HHW Piping

Sheet No.



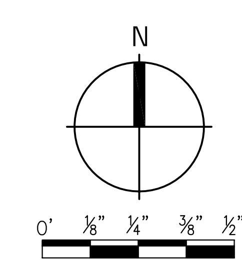


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Figure 9A-9 Typical Utilities Tunnel Cross-Section

Sheet No.

CHAPTER 10

ENERGY MANAGEMENT SYSTEM

This chapter, Chapter 10, presents the recommended features of the energy management system (EMS) for West Campus. References are made to component types and designations that are the current state of the art as of this writing. However, it should be noted that EMS technology can change rapidly with new products and advancement reaching commercialization. With that in mind, the component types and designations mentioned should be taken as a current EMS guideline, but should not be considered necessarily as the specific guidelines for the future. This chapter (as all the chapters) should be periodically updated to reflect then current technology.

10.1 Existing Energy Management Systems

The UC Riverside East Campus has an EMS made up of three manufacturers' systems, although it is mostly a Johnson Controls Metasys EMS. UC Riverside is not insistent on limiting the EMS for West Campus solely to Johnson Controls Metasys. Other appropriate EMS manufacturers' systems could be considered for West Campus.

Some reputable EMS manufacturers and their models that could be considered are:

- Siemens Apogee
- Johnson Controls

10.2 EMS Overview and Architecture

All new West Campus buildings, except Family Housing (Family Apartments and Family Townhouses), will be connected to a new campus-wide EMS. EMS implementation will start with the Phase 1 utilities infrastructure project. It is intended to provide centralized and automatic monitoring and control of HVAC systems campus-wide. It will also be used for lighting control and other facilities management functions.

The EMS will consist of PC-based workstations and microcomputer controllers of modular design providing distributed processing capability, and allowing future expansion of both input/output points and processing/control functions.

The EMS shall consist of a high-speed, peer-to-peer network of direct digital controls (DDC) controllers and a web-based operator interface. Each mechanical system and building floor plan shall be depicted by a point-and-click thermalgraphic. A web server with a network interface card shall gather data from the EMS and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.

The EMS shall directly control HVAC equipment in campus buildings based on the established sequences of operation. Each zone controller shall provide occupied and unoccupied modes of operation by individual zone. Energy conservation features shall be included as well, such as optimal start/stop, night setback, request-based logic, and demand level adjustment of setpoints.

The EMS shall be designed for future system expansion to include monitoring of occupant card access, fire alarm, and lighting control systems.

The EMS shall use the BACnet protocol for communication to the operator workstation or web server and for communication between control modules. Schedules, setpoints, trends, and alarms shall be BACnet objects.

10.3 EMS Components

The EMS will consist of the following components:

10.3.1 Central Operator Workstation

The EMS central operator workstation will be located in the Control Room of the new Main Campus Central Plant building, located adjacent to the existing electric substation at the east end of West Campus. It will consist of a workstation computer/monitor/keyboard, a computer/database management/web access server, a back-up server, and a printer. It will have a latest version of Microsoft XP Professional operating system and other SNMP-compliant software, including the EMS manufacturer's EMS software. For database management, new SQL 2000 database management software will be used. This new EMS will have a web-based interface for password-enabled accessing from any internet-connected PC in the world.

10.3.2 Portable Operator's Terminal

The Portable Operator's Terminal will be an IBM-compatible laptop computer configured with all necessary software. Operators will be able to connect the configured Portable Operator's Terminal to the EMS network or directly to each controller for programming, setting up, and troubleshooting.

10.3.3 Ethernet-based Network Controllers (NC)

Ethernet-based network controllers (NC) will connect directly to the Central Operator Workstation over an Ethernet, provide ARC156 communication to Advanced Application Controllers (AACs), Application Specific Controllers (ASCs) and/or other Input/Output Modules and serve as a gateway to equipment furnished by others.

10.3.4 Building Controllers (BC)

The Building Controllers (BC) will communicate with the Network Controllers, Advanced Application Controllers (AACs), Application Specific Controllers (ASCs) and/or other Input/Output Modules over ARC156 cables. Each BC will have the capability to operate completely standalone.

10.3.5 Advanced Application Controllers (AACs) and Application Specific Controllers (ASCs)

Numerous AACs and ASCs will be networked together throughout the campus to monitor and control mechanical equipment, including air handling units, chillers, cooling towers, boilers, pumps, central plant control, terminal unit control and various lighting circuits. Each AAC and ASC will have the capability to operate completely standalone, containing all of the input/output (I/O) and programs to control its associated equipment.

10.3.6 Smart Actuators (SA), and Smart Sensors (SS)

These are BACnet capable input/output control devices, similar to those below, that can be networked together.

10.3.7 Other Control Devices

These are non-BACnet input/output devices, such as damper and valve actuators; temperature, pressure, pressure differential, flow, and carbon dioxide sensors, etc.

10.3.8 Cable

Cat 5E cable will be used at the Central Operator Workstation to the Ethernet-based Network Controller (NC).

ARC156 cable or fiber optic cables will be used to communicate between AACs and ASCs. Fiber optic cables shall be duplex 900 mm tight-buffer construction designed for intra-building environments. Sheath will be UL listed OFNP in accordance with NEC Article 770. Optical fiber will meet the requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125mm.

10.4 EMS Capabilities

The EMS operator interface will allow each authorized operator to execute the following functions:

10.4.1 Log In and Log Out

The EMS will require user name and password to log in to operator interface.

10.4.2 Navigate by Point-and-Click

Operator interface will be graphically based and will allow operators to access graphics for equipment and geographic areas using point-and-click navigation.

10.4.3 View and Adjust Equipment Properties

Operators will be able to view controlled equipment status and to adjust operating parameters such as setpoints, PID gains, on and off controls, and sensor calibration.

10.4.4 View and Adjust Operating Schedules

Operators will be able to view scheduled operating hours of each schedulable piece of equipment on a weekly or monthly calendar-based graphical schedule display, to select and adjust each schedule and time period, and to simultaneously schedule related equipment. The system will clearly show exception schedules and holidays on the schedule display.

10.4.5 View and Respond to Alarms

Operators will be able to view a list of currently active system alarms, to acknowledge each alarm, and to clear (delete) unneeded alarms.

10.4.6 Generate Graphics

Operators will be able to use graphically-based tools and documentation to allow editing of system graphics, to create graphics, and to integrate graphics into the EMS. Operators will be able to add analog and binary values, dynamic text, static text, and animation files to a background graphic using a mouse. This will be facilitated by the Graphics Library, which is a complete library of standard HVAC equipment graphics, including equipment such as chillers, cooling towers, heat exchangers, boilers, air handling units, air terminal units, fan coils, and unit ventilators. The Graphics Library will include standard symbols for other equipment including fans, pumps, coils, valves, piping, dampers, and ductwork. The Graphics Library graphic file format will be compatible with graphics generation tools.

10.4.7 View and Configure Trends

Operators will be able to view a trend graph of each trended point and to edit graph configuration to display a specific time period or data range. Operators will be able to create custom trend graphs to display on the same page data from multiple trended points.

10.4.8 View and Configure Reports

Operators will be able to run preconfigured reports, to view report results, and to customize report configuration to show data of interest.

10.4.9 Manage Control System Hardware

Operators will be able to view controller status, to restart (reboot) each controller, and to download new control software to each controller.

10.4.10 Manage Operator Access

Typically, only a few operators are authorized to manage operator access. Authorized operators will be able to view a list of operators with system access and of functions they can perform while logged in. Operators will be able to add operators, to delete operators, and to edit operator function authorization. Operators will be able to authorize each operator function separately.

10.4.11 Program Custom Applications

Operators will be able to create, edit, debug, and download custom programs. The EMS will be fully operable while custom programs are edited, compiled, and downloaded.

10.5 Energy Management System Points Count

10.5.1 EMS Points Guidelines for EMS Scope and Cost

The number of points needed to properly cover a building needs to be known to understand the full scope and cost of an EMS. There are a few guidelines to clarify this:

- HVAC EMS points will be implemented down to the individual thermostat or space temperature sensor level.
- Variable air volume (VAV) boxes have 7 possible points
- Roughly speaking, air handling units have about 24 points
- A moderate- to large-sized building will have about 100 other miscellaneous points, such as exhaust fans, miscellaneous equipment, lighting, etc.

10.5.2 University Building Example for EMS Scope and Cost

California State University, Fullerton recently completed their 192,000 square foot College of Business and Economics (CBE) building. An analysis was conducted to determine the EMS scope and cost, which is useful in determining EMS scope and cost of UC Riverside West Campus buildings. CBE had the same guidelines as those presented above. The following are the salient points:

- The CBE building had 1,850 EMS points.
- The controls subcontractor's bid was $750,000.
- Cost per point was $405. This includes the controls subcontractor's mark-up but not the general contractor's mark-up; and, being a bid, is after consideration of design and construction contingency.
- The EMS cost per VAV box, installed and programmed, was $1,500.
- There are approximately 9.6 points per 1,000 square feet.

10.6 Energy Management System Cost Summary

This study includes conceptual-level cost estimates for Energy Management System development, both in the buildings and in the utilities infrastructure. Details of these cost estimates are included in the Appendix to this report. Costs include mark-ups, sales taxes, and design contingency, but do not include soft costs. See additional notes on the detailed tables.

EMS Development Costs in the Buildings

Building EMS costs are EMS points, panels, and wiring costs inside the buildings (i.e. attributable to individual building projects, not utilities infrastructure projects).

- Phase 1A Housing: $ 0
- Phase 1A Campus: $ 680,000
- Phase 1B: $ 1,055,000
- Phase 1: $ 2,644,000
- Phase 2 Housing: $ 0
- Phase 2 Campus: $ 7,922,000
- Phase 3: $ 8,785,000
- Phase 4: $10,281,000

Estimated Total for the Build-Out of the EMS in the Buildings: $ 31,367,000

EMS Development Costs Attributable to Utilities Infrastructure Projects

Utilities infrastructure EMS costs involve the front-ends of the EMS system in the Main Campus Central Plant and Medical School Central Plant, the central plants' EMS points, and the EMS backbone cabling in the Academic Core and Medical School utilities tunnels.

- Phase 1A Housing: $ 0
- Phase 1A Campus: $ 0
- Phase 1B: $ 0
- Phase 1: $ 150,000
- Phase 2 Housing: $ 0
- Phase 2 Campus: $ 175,000
- Phase 3: $ 90,000
- Phase 4: $ 125,000

Estimated Total for the Utilities Infrastructure Portion of the EMS: $ 540,000

CHAPTER 11

NATURAL GAS DISTRIBUTION SYSTEM

11.1 Natural Gas Uses

Natural gas (gas) must be piped from the off-site Southern California Gas Company (SCG) system, through new gas meter assemblies, and then throughout West Campus where it is needed.

Chapter 8 established the heating loads. The Academic core, Apartments, and Medical School West Campus buildings will be provided with space heating and domestic hot water (DHW) heating from centrally distributed heating hot water (HHW) that is heated in gas-fired boilers at the two central plants.

Gas will be used directly for space heating and DHW heating in non-central plant connected buildings. These are the Family Student Housing, Community Centers, and Child Development Centers buildings. In addition, the Recreation building will use gas directly for space heating and DHW heating, because its location is not amenable to central plant service.

There will be other gas use will be used in certain buildings on campus. This includes gas range and gas dryer use in the Apartments, and gas used in laboratories, medical facilities, and other science facilities.

Gas will not be used for DHW heating, except in the Family Student Housing, Community Centers, Child Development Centers, and Recreation buildings. Heating hot water (HHW) will be used to provide DHW heating in the Apartments and in buildings with significant DHW loads such as the Student Center, medical buildings, and lab buildings. In most Academic buildings however, DHW demand will be non-existent or very low. What DHW load there is would be most cost-effectively served with point-of-use, instantaneous, electric hot water heaters.

11.2 Gas Loads Assumptions

The gas loads were estimated based on the following assumptions:

- Central plant boiler gas loads are based on the conservative planning scenario in Chapter 8. These are in turn developed from the heating assumptions developed in Chapter 8. Central plant boiler gas loads are expressed in cubic feet per hour (cfh), and are figured as follows: cfh = (MMBtuh output x 1,000,000 Btu/MMBtu x 1 cf/1,000 Btu)/0.8 efficiency).

- Individual Family Apartment gas loads are assumed to be 140 cfh each, considering diversity and load factor. Total connected gas load in each apartment includes gas-based space heating forced air unit (FAU) (40 cfh), a gas range (65 cfh), a gas water heater (40 cfh), and a gas dryer (35 cfh).

- Individual Family Townhouse gas loads are assumed to be 200 cfh each, considering diversity and load factor. Total connected gas load in each apartment includes gas-based space heating forced air unit (FAU) (60 cfh), a gas range (65 cfh), a gas water heater (50 cfh), and a gas dryer (35 cfh).

- Gas Load of Phase 1A Family Apartments is figured as 286,200 sf/800 sf/unit x 140 cfh = 50,085 cfh.

- Gas Load of Phase 2 Family Apartments is figured as 288,372 sf/800 sf/unit x 140 cfh = 50,465 cfh.

- Gas Load of Phase 1A Family Townhouses is figured as 106,458 sf/1,400 sf/unit x 200 cfh = 15,208 cfh.

- Gas Load of Phase 2 Family Townhouses is figured as 89,052 sf/1,400 sf/unit x 200 cfh = 12,722 cfh.

- Gas Load of Recreation Building is figured as: Space heating: 16 Btuh/sf x 65,000 sf x 1 cf/1,000 Btu)/0.8 efficiency = 1,300 cfh; DHW heating = 2,000 cfh

- Gas Load of Community Centers and Child Development Center is figured as: 14 Btuh/sf x 39,600 sf x 1 cf/1,000 Btu)/0.8 efficiency = 700 cfh; DHW heating = 500 cfh

- Individual Apartment (Apartments and Graduate Housing) gas loads are assumed to be 70 cfh each, considering diversity and load factor. Total connected gas load in each apartment includes a gas range (65 cfh) and a gas dryer (35 cfh). Space heating and DHW heating are accomplished by central plant-based heating hot water.

- Gas Load of Phase 2 Apartments is figured as 294,000 sf/800 sf/unit x 70 cfh = 25,725 cfh.

- Gas Load of Phase 2 Graduate Housing is figured as 125,000 sf/800 sf/unit x 70 cfh = 10,938 cfh.

- Gas Load of Phase 3 Apartments is figured as 300,000 sf/800 sf/unit x 70 cfh = 26,250 cfh.

- Gas Load of Phase 3 Graduate Housing is figured as 125,000 sf/800 sf/unit x 70 cfh = 10,938 cfh.

- Gas Load of Phase 4 Apartments is figured as 294,000 sf/800 sf/unit x 70 cfh = 25,725 cfh.

- Gas Load of other campus buildings is assumed to be and average of 1,000 cfh per building. Space heating and DHW heating are accomplished by central plant-based heating hot water.

11.3 Gas Loads Summary

Gas loads by phase attributed to the central plant gas-fired boilers; non-central plant-connected, Family Student Housing buildings; Apartments and Graduate Housing; and other campus buildings are presented in Table 11-1 below.

Table 11-1. Gas Loads Summary

Phase	Main Central Plant Cumulative Gas Loads, cfh	Medical School Central Plant Cumulative Gas Loads, cfh	Family Housing Buildings Cumulative Gas Loads, cfh	Apartments and Graduate Housing Cumulative Gas Loads, cfh	Other Campus Buildings Cumulative Gas Loads, cfh
Phase 1A	0	0	66,000	0	2,000
Phase 1B	0	0	66,000	0	4,000
Phase 1	25,000	0	66,000	0	7,000
Phase 2	75,000	25,000	130,000	37,000	16,000
Phase 3	100,000	38,000	130,000	74,000	29,000
Phase 4 (Build-Out)	125,000	50,000	130,000	100,000	42,000

11.4 Existing Gas Distribution by the Southern California Gas Company

There are existing SCG gas lines around and through the West Campus site that carry gas at 60 to 80 psig pressure. These are as follows:

- 2-inch gas pipe along the length of University Avenue.
- 2-inch gas pipe along the length of, and along the east side, of Iowa Avenue.
- 4-inch gas pipe along the length of Martin Luther King Jr. Boulevard (MLK Jr. Blvd.).
- 4-inch gas pipe along the length of Canyon Crest.

11.5 Points of Connection to SCG and Phased Routing of Campus Gas Pipes

Natural gas will be piped from the 60 to 80 psig pressure, Southern California Gas Company (SCG) system, through new gas meter assemblies, and then throughout West Campus where it is needed.

The main loops of gas piping will be installed in accordance with the West Campus phasing plan. These will be provided under various utilities infrastructure projects that are the subject of the West Campus Infrastructure Development Study (WCIDS). The pipe routes are selected so as to minimize the length and cost of the piping. Where possible, main gas pipes will take the same route as the CHW and HHW piping mains so that they can be installed in the utilities tunnels. Where they do not parallel the path of the CHW and HHW piping mains, the main gas pipes will be direct-buried. Gas pipe branches to individual buildings, except for central plant buildings, will be installed under the various building projects, not the utilities infrastructure projects.

11.5.1 Phase 1A

Phase 1A is the very first implementation stage. It consists of the north phase of Family Student Housing North (F1 through F32), Child Development Center North (CDC N), and Community Center North (CC N). One academic building (W4) will also be implemented under Phase 1A. Initially, this building will not be served by the Main Central Plant, since the Main Central Plant will not to be implemented until Phase 1. However, the HVAC systems for W4 will be designed so that they can be later connected to central plant service.

In Phase 1A, a 2-inch gas pipe and meter for Building W4 will be tapped off the Everton Place 2-inch SCG gas line, northeast of International Village. Building W4 will need gas for its building boiler plant, as well as various building needs. Family Student Housing North will be served directly by SCG, and the housing units will be individually-metered by SCG. See Figure 11-1A for Phase 1A campus gas piping.

11.5.2 Phase 1B

Under Phase 1B, the first building (M4) of the Medical School will be constructed. It will need gas for its building boiler plant, as well as various building needs. Initially, this building will not be served by the Medical School Central Plant since the Medical School Central Plant is not to be implemented until Phase 2. However, the HVAC systems for M4 will be designed so that they can be later connected to central plant service.

In Phase 1B, a 6-inch gas pipe and meter for Building M4 at the Medical School will be tapped off the MLK Jr. Blvd. 4-inch SCG gas line, halfway between Chicago Avenue and Iowa Avenue. The gas pipe branch directly to Building M4 will be 1-inch, but the 6-inch gas pipe is sized for the Medical School Central Plant, which will be first implemented in Phase 2.

See Figure 11-1B for Phase 1B campus gas piping.

11.5.3 Phase 1

West Campus will generally be developed from east to west, and north to south. Under Phase 1, three academic buildings (W1, W3, and W5) will be located in the northeast area of the campus.

In Phase 1, a 6-inch gas pipe and meter for the Main Campus Central Plant will be tapped off the Canyon Crest 4-inch SCG gas line, just southwest of I-215. In addition, a second 6-inch gas pipe will be tapped off the Everton Place 2-inch SCG gas line, northeast of International Village. This second tap is for various Phase 1 Main Campus buildings along that route and for additional central plant gas reliability. This second line will be installed in the utilities tunnel.

See Figure 11-1 for Phase 1 campus gas piping.

11.5.4 Phase 2

Under Phase 2, six academic buildings (W2, W6, W7, W8, W14, and W15) will be constructed generally in the central part of the Academic core (east end of West Campus). Also, Apartments, A1 through A15, will be located in the north central area of the campus. Finally, the Recreation Building (R) will be constructed. Family Student Housing South (F33 through F60), Child Development Center South (CDC S), Community Center South (CC S), and the Recreation Building (R) are also implemented under Phase 2.

Also under Phase 2, three buildings (H2, M3, and M6) of the Medical School will be constructed at the west end of West Campus.

In Phase 2, a 2-inch gas pipe will be tapped off the Everton Place 2-inch SCG gas line, northeast of International Village. This pipe will extend throughout the utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 2 Main Campus buildings along that route. Also, a 6-inch gas pipe on the Medical School Campus will extend north in the utilities tunnel from the terminus in Phase 1B southwest of Building M6 to the Medical School Central Plant.

See Figure 11-2 for Phase 2 campus gas piping.

11.5.5 Phase 3

Under Phase 3, seven academic buildings (W16, W17, W18, W19, W20, W21, and W22) will be constructed generally in the south part of the Academic core (east end of West Campus). Also, Apartments, A16 through A31, will be located in the central area of the campus.

Also under Phase 3, more Medical School buildings (H1, M2, M5, M7, MOB5, MOB6, and MOB7) at the west end of West Campus will be constructed.

In Phase 3, 2-inch gas pipe will be extended in the utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 3 Main Campus buildings along that route. Also, 2-inch gas pipe will be extended in the utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 3 Medical School buildings along that route.

See Figure 11-3 for Phase 3 campus gas piping.

11.5.6 Phase 4

Under Phase 4, ten academic buildings (W9, W10, W11, W12, W13, W23, W24, W25, W26, and W27) will be constructed generally in the southeast part of the Academic core (east end of West Campus).

Also under Phase 4, more Medical School buildings (M1, MOB1, MOB2, MOB3, and MOB4) at the west end of West Campus will be constructed.

In Phase 4, 2-inch gas pipe will be extended in the utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 4 Main Campus buildings along that route. In so doing, it will loop back to the gas pipe in the Main Campus Central Plant. Also, 2-inch gas pipe will be extended in the utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 4 Medical School buildings along that route. In so doing, it will loop back to the gas pipe in the Medical School Central Plant.

See Figure 11-4 for Phase 4 campus gas piping.

11.6 Gas Pipe Sizing Criteria

The campus gas distribution pipes are sized using the following design criteria:

- Gas pipe mains are sized for gas flows to serve West Campus peak gas loads to Build-Out.
- Gas pipe sizing is based on 20 psig available immediately downstream of the SCG gas meter, with no more than 10 psig pressure loss through the gas mains to the buildings.

11.7 Utility Tunnels and Direct-Buried Piping

The main gas piping that parallels the CHW and HHW piping mains will be installed in utilities tunnels that loop around the academic core and the Medical School. This piping will be the exposed gas pipe type. See 11.9 below.

Gas pipe branches and gas piping mains that do not parallel the CHW and HHW mains, will be the direct-buried type. See 11.8 below.

A discussion of the relative advantages and disadvantages of utility tunnels vs. utilidors vs. direct-buried piping is presented in Section 9.4 in Chapter 9.

11.8 Direct-Buried Gas Pipe Type

Direct-buried gas piping will be the following type:

Polyethylene plastic pipe, ASTM D1248 and D2513:

- 3 inches and smaller pipe: standard dimension ratio (SDR) 11, rated at 80 psi working pressure at 73°F

- 4 inches and larger pipe: SDR 11.5, rated at 76 psi working pressure at 73°F.

Use polyethylene plastic fittings, ASTM D 3261 and D 2683, butt or socket type, joined by heat fusion, color orange or yellow, Plexco PE 2406, Phillips, or equal. Transition to anodeless steel riser at meter, regulator, or building wall.

11.9 Exposed Gas Pipe Type

Exposed gas piping will be the following type:

Black steel, Schedule 40, ASTM A53A, Type E, ERW by US Steel, Laclede, or equal.

Fittings shall be malleable iron, Class 125, ANSI B 16.3, threaded or welded, by Stockham, Grinnell, or equal:

- 2 inches and smaller pipe: Schedule 40 black steel

- 2-1/2 inches and larger pipe: Welded.

11.10 Isolation Valves

All piping junctions will have isolation valves on all three legs such that any single main piping segment or any pipe branch to a building can be isolated in such a way that only one building is affected by such isolation.

If the junction is in a utility tunnel or a utilidor, then the isolation valves will be exposed and readily accessible. If the junction is at a significant location within a direct-buried piping network, then the isolation valves will be in a vault at the piping junction. In that case as well, the isolation valves will be exposed and readily accessible. If the piping junction is direct-buried, then the isolation valve stems will be in valve cans, in which the valves are direct-buried, but they can be operated from the surface by accessing and turning the valve stem.

11.11 Building Metering of Gas

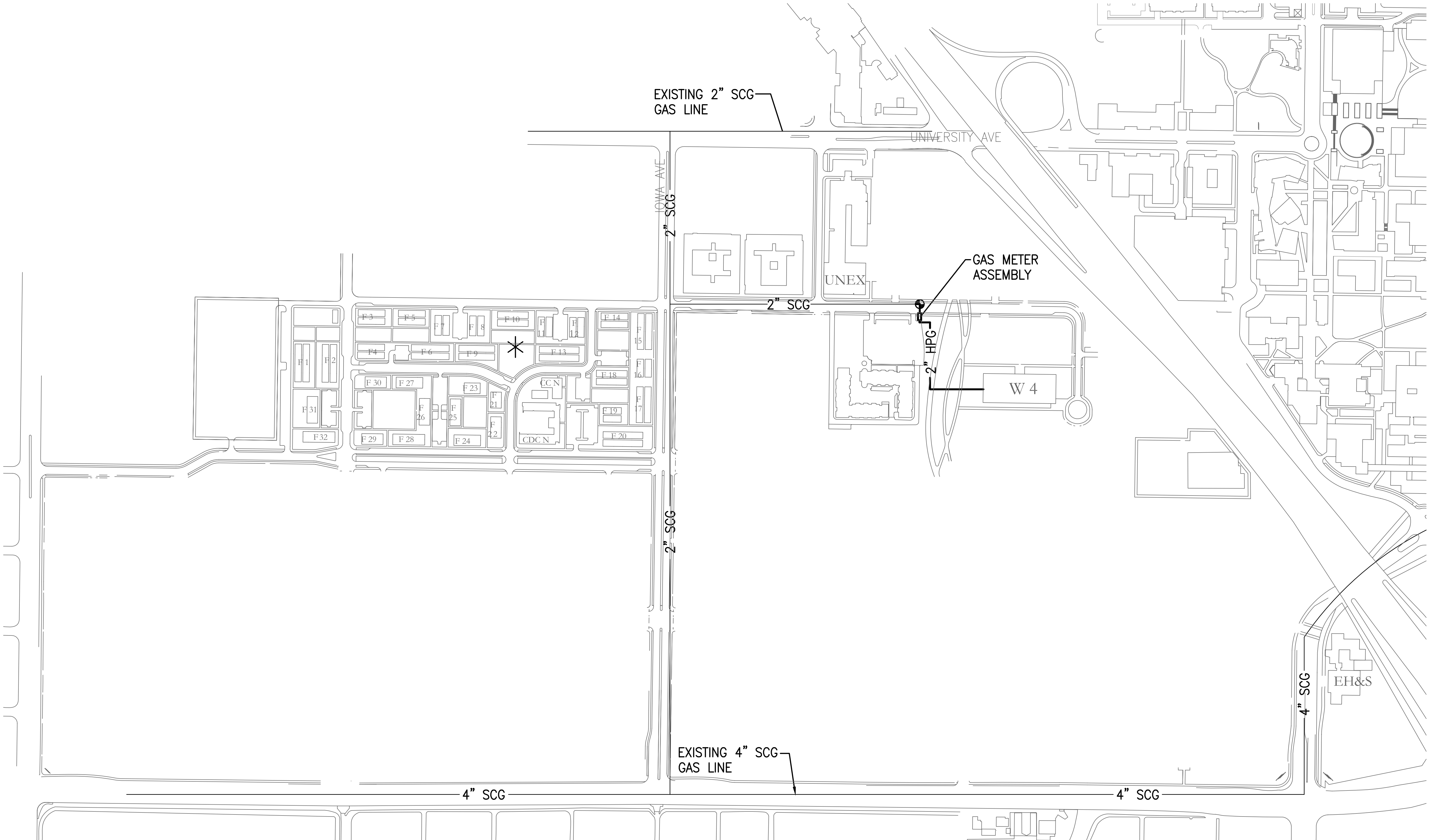
All buildings connected to the gas system, with the exception of Family Student Housing, will be individually gas-metered for energy tracking. The meters will be connected to the energy management system (EMS) so that the energy tracking data can be remotely and automatically gathered and processed. Individual Family Student Housing units will be individually gas-metered by Southern California Gas Company for the purpose of individual gas billing.

11.12 Natural Gas Distribution System Cost Summary

This study includes conceptual-level cost estimates for natural gas distribution system infrastructure development. Details of these cost estimates are included in the Appendix to this report. Costs include mark-ups, sales taxes, and contingencies, but do not include soft costs. See additional notes on the detailed tables.

- Phase 1A Housing: $ 0
- Phase 1A Campus: $ 11,000
- Phase 1B: $ 109,000
- Phase 1: $ 367,000
- Phase 2 Housing: $ 0
- Phase 2 Campus: $ 298,000
- Phase 3: $ 82,000
- Phase 4: $ 401,000

Estimated Total for the Build-Out of the Natural Gas Distribution System: $ 1,268,000



* FAMILY HOUSING SHALL BE PROVIDED WITH GAS BY SOUTHERN CALIFORNIA GAS COMPANY. GAS WILL BE METERED AT INDIVIDUAL HOUSING UNITS.

ABBREVIATIONS:

HPG	NEW UCR HIGH PRESSURE GAS (20 PSI)
SCG	EXISTING SOUTHERN CALIFORNIA GAS (70 PSIG)
⊕	POINT OF CONNECTION

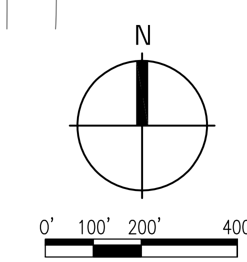


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Figure 11-1A
West Campus
Development
Phase 1A
Gas Distribution

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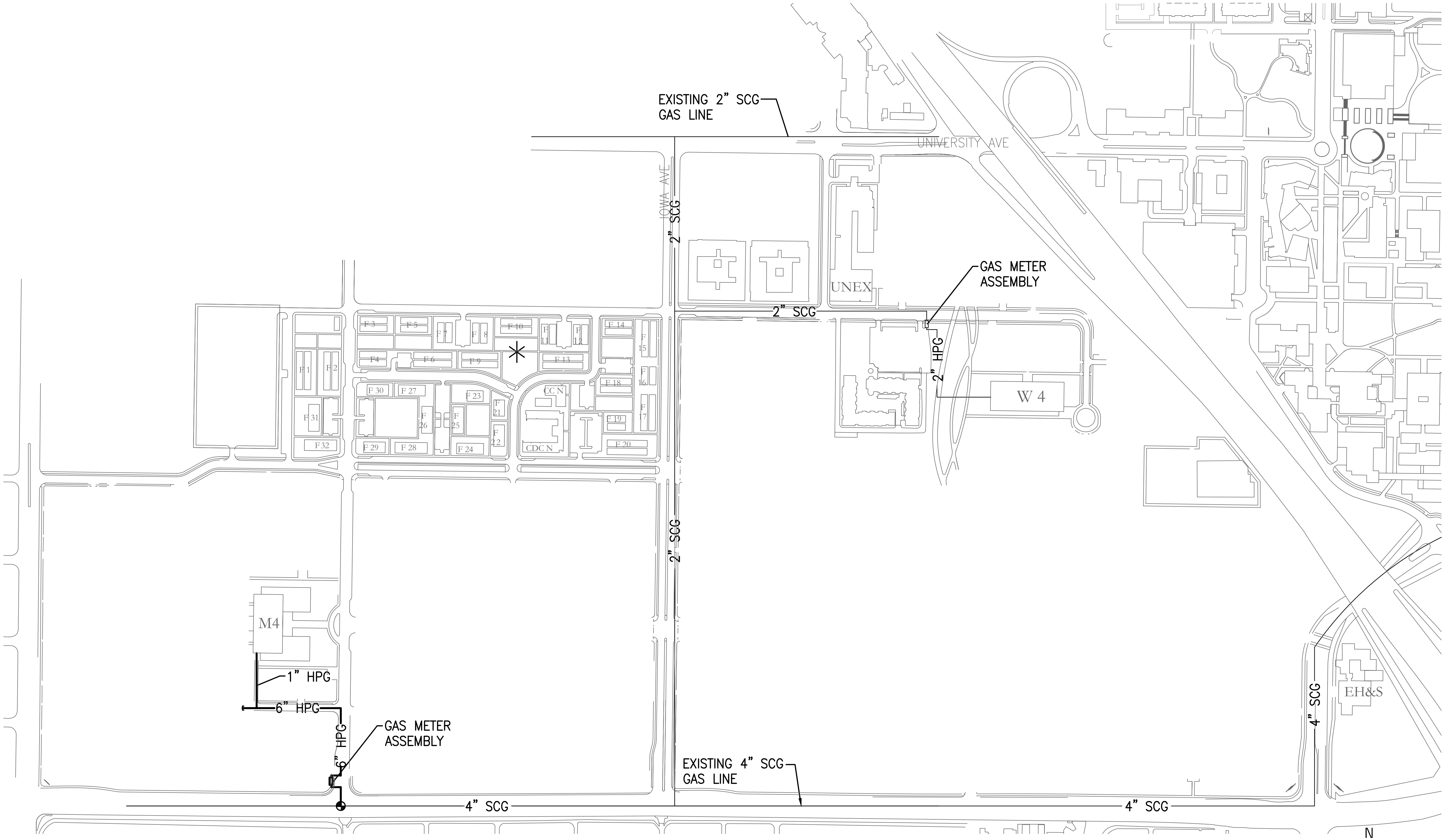

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Figure 11-1B
West Campus
Development
Phase 1B
Gas Distribution

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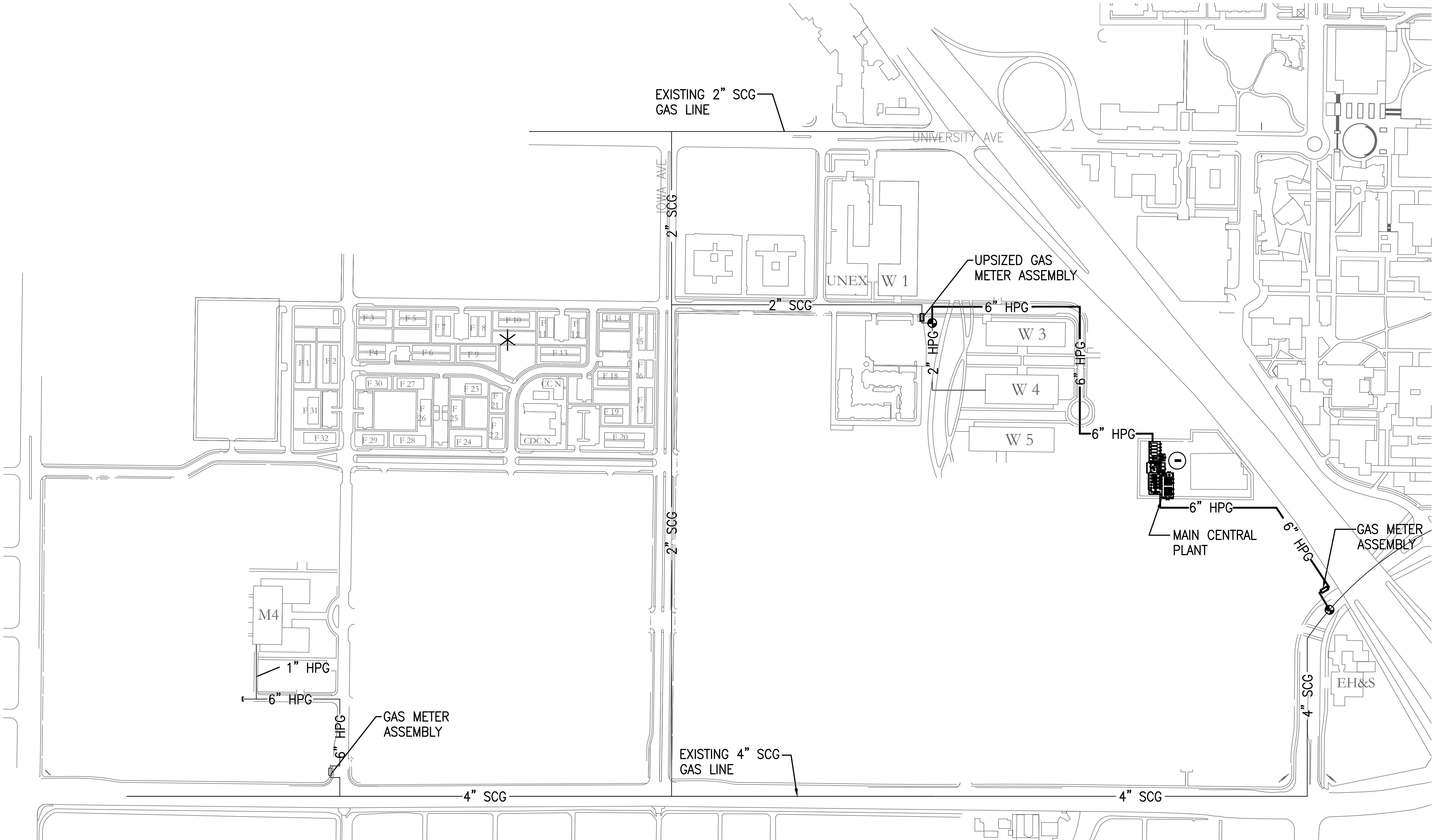

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Figure 11-1
West Campus Development Phase 1 Gas Distribution

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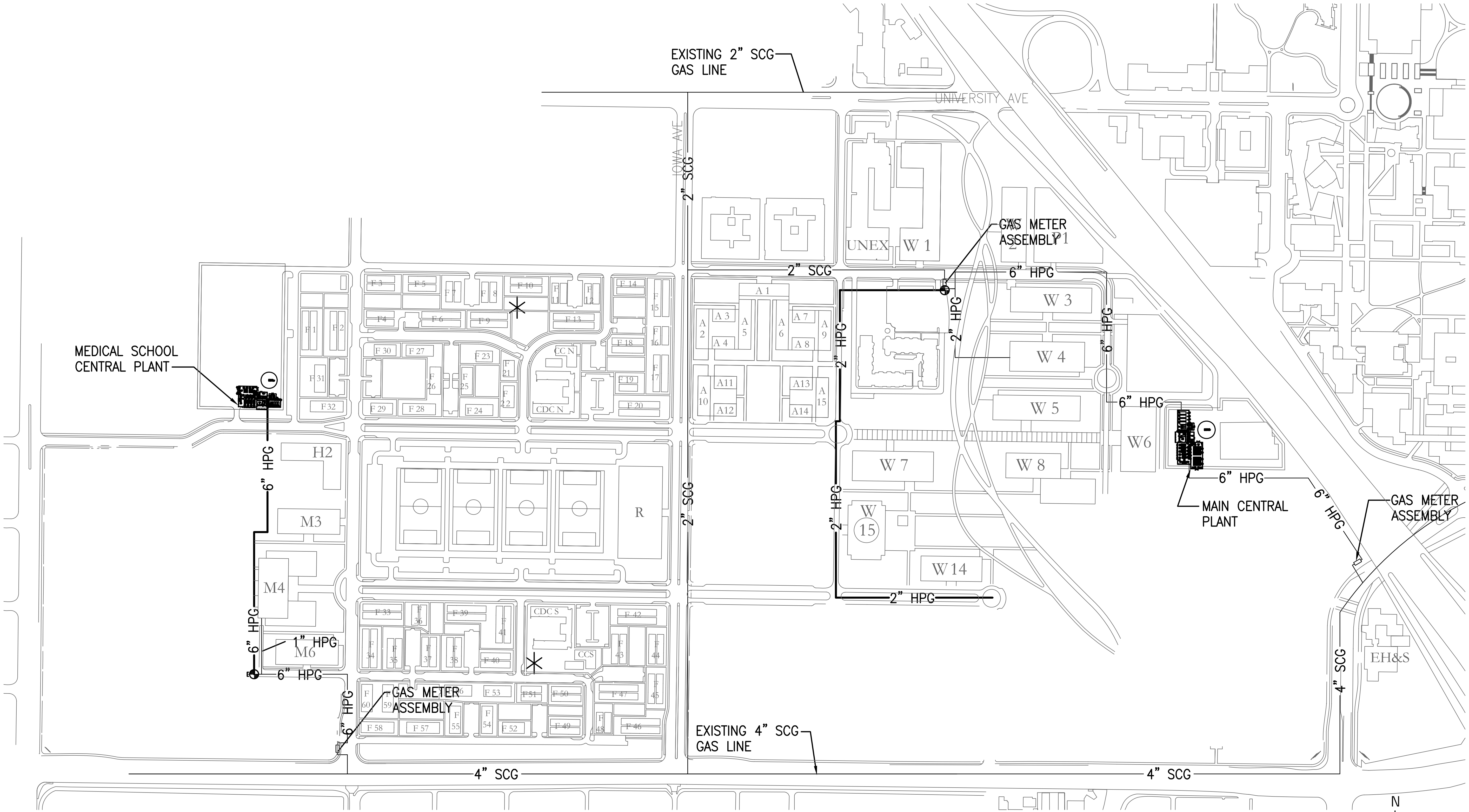

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Figure 11-2
West Campus
Development
Phase 2
Gas Distribution

Sheet No.

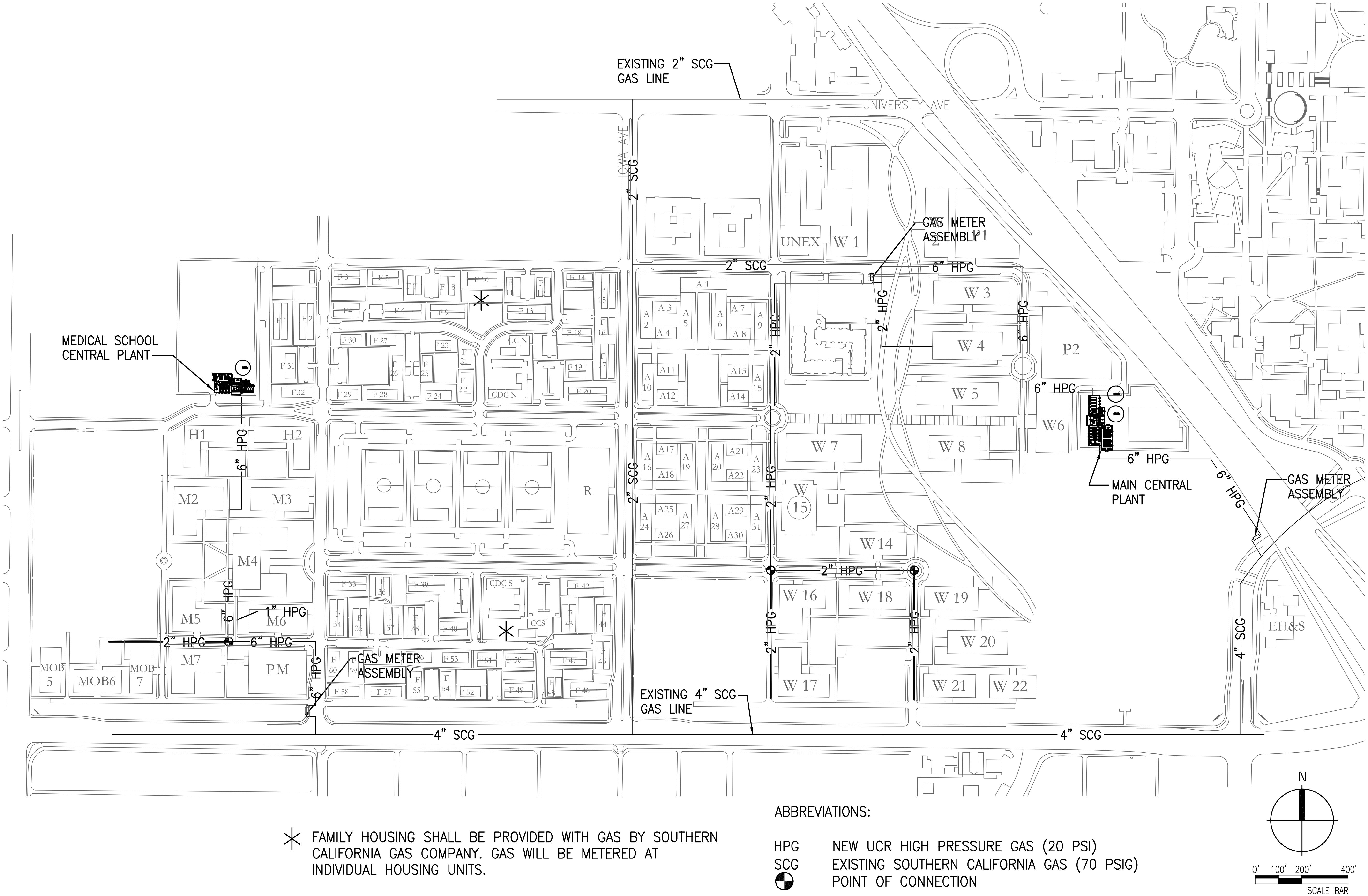

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Figure 11-3
West Campus Development Phase 3 Gas Distribution

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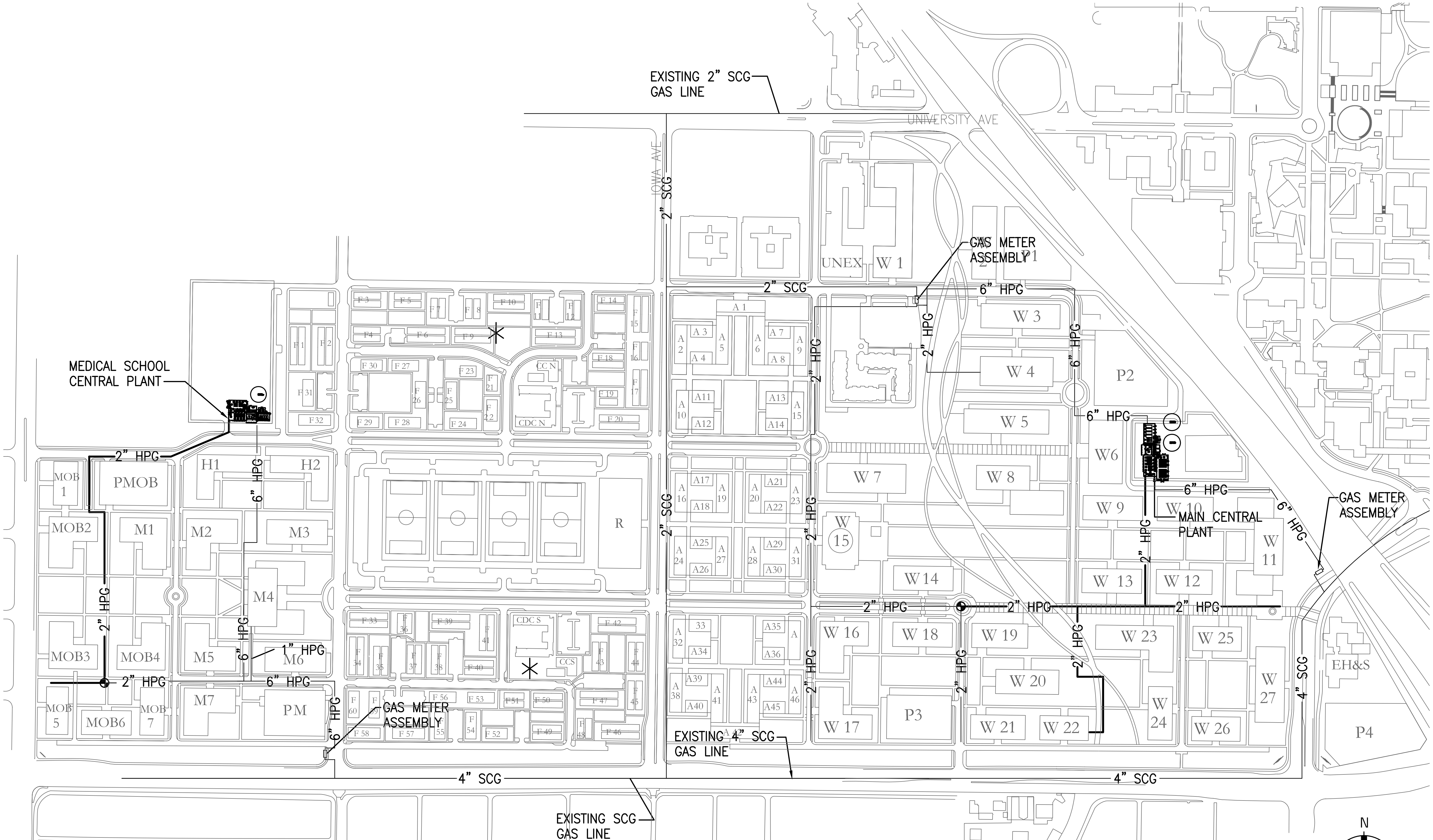

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Figure 11-4
West Campus Development Phase 4 Gas Distribution

Sheet No.

CHAPTER 12

ELECTRICAL POWER DISTRIBUTION SYSTEM

With today's dynamic technological evolution, the dependant on electricity in a University environment is a vital reality. This chapter presents the analyses and recommended plans for electrical system to serve West Campus buildings with emphasis on functions, reliability, redundancy, flexibility and maintainability.

12.1 Existing Electrical System

There are two 69kV feeders provided by City of Riverside to the University's main substation located next to the north end of parking lot 30, south-east of the I-215 freeway. The substation has two 27 MVA primary substation providing power to the East Campus at 12.47 kV. There is no electrical infrastructure for the West Campus other than those supporting the International Village along University Avenue and Parking Lot 30.

There are existing City-owned 69 kV overhead transmission lines crossing the West Campus site. Arrangements need to be made with the City to have all these lines relocated.

12.2 Electrical Loads Analysis

Initial demand load calculations are based on anticipated power requirements for supporting all buildings and campus functions, including lighting, general power, data-communication equipment, office equipment, appliances, laboratory apparatus, and HVAC equipment.

The demand loads analysis is based on typical building-type connected loads and applicable demand factors.

12.2.1 Power Density

The following Power density values will be used for the electrical load analysis:

Lighting	1.1 – 3.0 watt/sf
HVAC	6.0 – 10.0 watt/sf
Lighting	1.1 – 3.0 watt/sf
Receptacle	2.0 – 2.0 watt/sf
Appliance	1.0 – 3.0 watt/sf
Computer	1.0 – 2.0 watt/sf
Lab Equipment	2.0 – 6.0 watt/sf

Power density for different building types are defined on Table 12-1 and 12-1A.

12.2.2 Summary of Electrical Loads

The table below summarizes the electrical loads.
(See Table 12-2 for detailed analysis.)

Phase	Electrical Demand Load on Utility Grid	Electrical Demand Load on Campus Grid	Cumulative Electrical Demand Load on Utility Grid	Cumulative Electrical Demand Load on Campus Grid
Phase 1A	1.36 MVA	0.85 MVA	1.36 MVA	0.85 MVA
Phase 1B	0 MVA	1.00 MVA	1.36 MVA	1.84 MVA
Phase 1	0 MVA	2.64 MVA	1.36 MVA	4.48 MVA
Phase 2	0 MVA	9.18 MVA	1.36 MVA	13.66 MVA
Phase 3	0 MVA	9.40 MVA	1.36 MVA	23.06 MVA
Phase 4 (Build-Out)	0 MVA	10.64 MVA	1.36 MVA	33.70 MVA

The table below summarizes the electrical loads with aggressive sustainability implementation.
(See Table 12-2A for detailed analysis.)

Phase	Electrical Demand Load on Utility Grid	Electrical Demand Load on Campus Grid	Cumulative Electrical Demand Load on Utility Grid	Cumulative Electrical Demand Load on Campus Grid
Phase 1A	1.18 MVA	0.67 MVA	1.18 MVA	0.67 MVA
Phase 1B	0 MVA	0.76 MVA	1.18 MVA	1.44 MVA
Phase 1	0 MVA	2.02 MVA	1.18 MVA	3.46 MVA
Phase 2	0 MVA	7.49 MVA	1.18 MVA	10.95 MVA
Phase 3	0 MVA	7.56 MVA	1.18 MVA	18.51 MVA
Phase 4 (Build-Out)	0 MVA	8.44 MVA	1.18 MVA	26.94 MVA

12.3 Electrical Service Requirements

Based on the preliminary loads analysis, the build-out demand load of West Campus is approximately 34 MVA. This amount can be reduced considerably with the application of sustainable energy features.

Sustainable energy features include:

- Solar photovoltaic systems
- Natural gas powered fuel cells
- Thermal energy storage

With an aggressive sustainable energy approach, the build-out demand can be reduced to less than 27 MVA.

For electrical service requirements, two primary service transformers will be added (by the City) to the power substation facility. Alternatively, the two existing 69kV-12kV transformers can be upgraded to serve both the East and West Campus.

12.4 Electrical Point of Connection

The existing 69 kV point of connection will be utilized with existing and new primary substations serving both the East and West Campuses. New, University-owned, 12 kV secondary medium voltage switchgear will be located adjacent to the City Substation Yard at the new central plant.

The Family Housing north of the Recreation Fields will be served directly from the local utility company and will not be tied to the Campus power grid. The second Family Housing development south of the Recreation Fields will be connected to the Campus power grid.

12.5 Power Distribution System Equipment Alternatives

The power distribution system will include medium voltage switchgear, secondary unit substations, isolation/selector switches, cable, and raceway system.

12.5.1 Switchgear Alternatives

- Load interrupter fusible switchgear
- Metal-clad switchgear with air circuit breaker
- Metal-clad switchgear with SF6 circuit breaker

Load interrupter fusible switchgear is an integrated assembly of switches, bus, and fuses, which are coordinated electrically and mechanically for high voltage circuit protection. Metal-clad switchgear consist of vertical sections, housing various combinations of circuit breakers and sections for auxiliary control equipment, bolted together to form a rigid switchgear assembly.

Because of its lower initial cost, load interrupter fusible switchgear is popular for small campus applications. Configuration and control capability is limited and is not suitable for selective network systems. The major restriction on the fusible switch is the current capacity, typically at 1200 amperes maximum.

Metal-clad switchgear provides high interrupting and ampacity ratings. It also offers a total integrated design concept of cellular breakers and auxiliary equipment, which can be assembled in various combinations to satisfy complex application requirements. Options for overcurrent protection hardware include air circuit breakers and SF6 circuit breakers.

SF6 (sulfur hexafluoride) is a non-toxic, non-flammable gaseous dielectric medium. Pressurized SF6 gas is used as an insulator in gas-insulated circuit breakers because it has a much higher dielectric strength. This property makes it possible to significantly reduce the size of the equipment. SF6 switchgear is also more resistant to the effects of pollution and climate, as well as being more reliable in long-term operation because of its controlled operating environment.

12.5.2 Secondary Unit Substation Transformer Alternatives

- Oil-filled transformer
- General-duty dry-type transformer
- Cast-coil transformer

The transformer at the unit substation is a vital part of the electrical system.

Primary 69 kV transformers will be provided by the City of Riverside and will not be included in this analysis.

Typically, residential type projects, such as Family Housing and Apartments, do not have significantly-sized electrical rooms. So, for these applications, an indoor-type transformer is not practical. As such, only outdoor, pad-mounted, oil-filled transformers are considered for the Family Housing and Apartments developments of West Campus.

For the Academic, Medical School, and other substantial buildings, the alternatives are as follows:

- **Ventilated, Dry-type Transformers.** Ventilated, dry-type transformers can have their windings insulated various ways. A basic method is to preheat the conductor coils and then, when heated, dip them in varnish at an elevated temperature. The coils are then baked to cure the varnish. This process is an open-wound method and helps ensure penetration of the varnish. Cooling ducts in the windings provide an efficient and economical way to remove the heat produced by the electrical losses of the transformer by allowing air to flow through the duct openings. This dry-type insulation system operates satisfactorily in normal ambient conditions with low impact load. Ventilated, dry-type transformers are less expensive than cast-coil transformers, but they are less efficient, have a shorter life expectancy, and are not suitable for extreme conditions.

- **Cast-Coil Transformers.** Cast-coil transformers have higher basic impulse insulation levels (BIL) levels; superior short circuit strength; and superior protection against high moisture, metallic dust-laden and harsh chemical-environments. Cast-coil transformers may be located indoors or outdoors. This transformer type is explosion-resistant, fire-resistant, non-polluting to the environment, and ideally suitable for use in a coordinated-unit substation. Cast-coil transformers consist of separately-wound and cast high- and low-voltage coils. During manufacture, the high voltage coil winding wires are placed in a certain pattern, using pre-insulated wire. The completely-wound coil is then placed in a mold designed to form a heavy coating of epoxy around the coil. After vacuum filling of the epoxy, the mold is placed in an oven for a number of hours to allow the epoxy to cure and achieve full hardness and strength. Because of the additional materials and procedures associated with manufacturing cast-coil transformers, they are more expensive. However, cast-coil transformers are designed to operate with lower losses, require less maintenance than regular-type transformers, and effectively operate in environments that may cause early failure with other transformer types. Also, cast-coil transformers, if operated properly, will normally have a longer life expectancy than other types of transformers.

Cast-coil transformers are the recommended transformer types for laboratory buildings, Medical School buildings, computer facilities, and telecommunication hubs. This recommendation is based on the superior performance and reliability characteristics and long term cost value. Unit substations with dry-type transformers will be considered only for non-critical facilities that have extreme constraints on construction cost.

12.5.3 High Voltage Cable Alternatives

Power cables are a vital part of the electrical distribution system, comparable to the arteries in humans. There are many types of power cable characteristics, including the following:

- Conductors - copper vs. aluminum
- Insulation - EPR vs. XLP vs. TR-XLP
- Insulation level – 100% vs. 133%

12.5.3.1 Conductors - Copper vs. Aluminum

Electrical conductivity for copper is higher than that of aluminum. As such, aluminum conductors are larger than copper conductors with the same ampacity rating. However, aluminum conductors provide a lower weight to current-carrying ratio compared to that of copper conductors. For underground applications, the advantage of the smaller copper conductors will always supersede the lighter aluminum cables.

Aluminum has a higher coefficient of expansion, and expands nearly one third more than copper under the same degree of temperature increase. This expansion, along with the ductile nature of aluminum, has caused significant problems. Connections at equipment can overheat and fail due to the increase of resistance at junction points.

For the West Campus power distribution conductors, copper is recommended over aluminum.

12.5.3.2 Insulation - EPR vs. XLP vs. TR-XLP

Most high voltage cables must sustain a lifespan of 20 to 40 years in operation. The insulation is a critical factor for the durability of the cable. The two most commonly used materials for high voltage cable insulation are cross-link-polyethylene (XLP) and ethylene propylene rubber (EPR). The conventional XLP and EPR insulation have a very similar performance profile. The new generation of TR-XLP insulation shows better impulse breakdown strength, lower dielectric loss, and lower material cost compare to ERP insulation.

For the West Campus power distribution conductors, TR-XLP insulation is recommended over either conventional XLP or EPR insulation.

12.5.3.3 Insulation level – 100% vs. 133%

Cables with 133% insulation have much better protection under extreme conditions. Because of advances in material science, the cost difference between 100% and 133% insulated cable is small.

For the West Campus power distribution conductors, 133% insulation is recommended over 100% insulation.

12.6 Power Distribution System Configuration Alternatives

The power distribution system configuration alternatives considered for West Campus include:

- Simple radial distribution system
- Primary selective distribution system

12.6.1 Simple Radial Distribution System

The simple radial distribution system consists of a single primary feeder that supplies a single transformer, protected by an overcurrent device, which supplies all of the loads. Most electrical services are of the simple radial distribution design, including residential services. These systems can be of high ampacity, ranging from a high of 5,000 amperes, down to a low of 100 amperes. The loss of the primary feeder or transformer causes an outage to the entire facility. In some cases, a fault downstream of the main protective device can also shut off power to the whole facility. See Figure 12-6 for a Simple Radial Distribution System.

12.6.2 Primary Selective Distribution System

The primary selective distribution system, considered for West Campus:

- employs two primary 69 kV transformers,
- creating two 12.47 kV main circuits,
- which feed the metal-clad switchgear,
- that utilize two primary main breakers and a primary tie breaker.

The two primary main breakers and primary tie breaker are either manually or electrically interlocked to prevent closing of all three at the same time and paralleling the sources. Upon loss of voltage on one source, a manual or automatic transfer to the secondary circuit may be utilized to re-establish power to all connected loads. The primary selective distribution system is configured so that when one primary circuit is out of service, the remaining feeder has sufficient capacity to carry the total load. When a primary feeder fault occurs, the associated feeder breaker opens, and the transformer normally supplied from the faulted feeder is out of service. Then manually, each primary switch connected to the faulted line, must be opened and then the alternate line primary switch can be closed, thereby connecting the transformer to the secondary feeder and restoring service to all loads.

Secondary unit substations (each with a single transformer and dual-circuit selector switch) or double-ended dual-feed unit substations can be supplied to each individual facility, depending on the degree of reliability intended. This configuration allows quick restoration of service to all loads when a primary feeder or transformer fault occurs. Each primary feeder conductor must be sized to carry the load on both sides of all the secondary buses that it serves under secondary emergency transfer. If the loss of voltage was due to a failure of one of the transformers in the double-ended unit substation, then the secondary loads normally served by the faulted transformer would have to be transferred to the opposite transformer. Each transformer of a double-ended unit substation would have to have the capability of serving the loads on both sides of the tie breaker. Because of this spare transformer capacity, the voltage regulation provided by the double-ended unit substation system under normal conditions is better than that of the systems with single transformer. See Figure 12-7 for a Primary Selective Distribution System.

12.6.3 Analysis of Power Distribution System Configuration Alternatives

The criteria for analyzing and recommending the West Campus power distribution system configuration include the following:

- System requirements
- Reliability
- Efficiency
- Cost
- Maintenance

The simple radial distribution system would perform reasonably well for small campus academic and residential buildings. However, more “mission critical” facilities, such as data centers, laboratories, and medical buildings, need a more reliable power distribution system.

Since the entire electrical load is served from a single source in a simple radial distribution system, full advantage can be taken of the diversity among the loads. This makes it possible to minimize the installed transformer capacity. However, the voltage regulation and efficiency of this system may be less than desirable because of the single source connection. This approach will significantly reduce the first cost, but will also decrease the level of conductor and equipment protection. Thus, should a fault or overload condition occur, downtime could increase significantly. Also, higher costs may be incurred from equipment damage and replacement. Although this system would result in less initial equipment cost, system reliability would be reduced drastically since a single fault in any part of the primary conductor would cause an outage to all loads within the facility. Most major maintenance on the simple radial distribution system requires complete shut down of the facility, resulting in downtime and incurred costs.

The primary selective distribution system would perform well for most large university environments, including “mission critical facilities” such as data centers, laboratories, and medical buildings. Reliability of this configuration is far more superior to that of the simple radial distribution system. The primary selective distribution system is configured so that when one primary circuit or transformer is out of service, the remaining load will transfer to the alternate line to maintain service to all loads in the facility. The cost of the primary selective distribution system is greater than that of the simple radial distribution system, because of the additional primary main breakers, tie breaker, two sources, increased number of feeder breakers, the use of primary-duplex or selector switches, and the greater amount of primary feeder cable required. The benefits derived from the reduction in the amount of load dropped when a primary feeder is faulted, plus the quick restoration of service to all or most of the loads, will likely more than offset the greater first cost. Maintenance for the primary selective distribution system can be conducted with most or part of the facility remaining in operation.

12.6.4 Recommendation Power Distribution System Configuration

For the West Campus power distribution configuration, the primary selective distribution system is recommended. This is shown in Figure 12-7. Underground vault-mounted high voltage switches will be used in place of above ground pad-mounted devices for the West Campus.

12.7 Phasing Implications

The development of the electrical and data/communication conduit pathway shown on phasing plans Figure 12-1 through 12-4 are based on the building development strategy for the West Campus expansion. Considerations are emphasized on functions, reliability, redundancy, flexibility and maintainability. Conduit duct bank will be located in area which has the lowest possibility for being disturbed due to future building constructions. Loop feed configuration is recommended in such, each major area is being fed from two different directions to guarantee the reliability and redundancy of the raceway infrastructure. Evaluation will be conducted for opportunity to install electrical conduit along the same pathway for other utility piping to minimize trenching. However, due to the large amount of conduit and piping involved, the cost advantage for sharing a common trench will diminish.

12.7.1 Phase 1A

Phase 1A is the very first implementation stage. It consists of the north phase of Family Housing (F1 through F32), Child Development Center North (CDC N), and Community Center North (CC N). One academic building (W4) will also be implemented under Phase 1A. The Family Housing will connect directly to the utility electrical grid with individual meters for each unit. The rest of the buildings will be supported by the campus electrical grid. Dedicated circuits at 12.47 kV will be assigned from the campus main switchgear to support Phase 1A construction. Conduit duct bank with concrete encasement will be used to feed Building W4 before the utility tunnel is constructed. Buildings involve during Phase 1A development and their corresponding electrical loads are list on Table 12.2. See Figure 12-1A for Phase 1A buildings electrical infrastructure development.

12.7.2 Phase 1B

Under Phase 1B, the first building (M4) of the Medical School will be constructed. The electrical loads for this building are list on Table 12.2. See Figure 12-1B for Phase 1B buildings electrical infrastructure development.

12.7.3 Phase 1

Under Phase 1, three academic buildings (W1, W3, and W5) will be located in the northeast area of the campus. Buildings involved in Phase 1 development and their corresponding electrical loads are listed in Table 12.2.

Dedicated 12.47 kV circuits will be provided to support the Main Central Plant.

See Figure 12-1 for Phase 1 buildings electrical infrastructure development.

12.7.4 Phase 2

Under Phase 2, six academic buildings (W2, W6, W7, W8, W14, and W15) will be constructed generally in the central part of the Academic core (east end of West Campus). Apartments, A1 through A15, will be located in the north central area of the campus. Family Housing (F33 through F60), Child Development Center South (CDC S), Community Center South (CC S), the Recreation Building (R) and the main communication hub will also be implemented under Phase 2. In addition, three buildings (H2, M3, and M6) of the Medical School at the west end of West Campus will also be constructed. Buildings involved in Phase 2 development and their corresponding electrical loads are listed in Table 12.2.

Dedicated 12.47 kV circuits will be assigned to support the second central plant at the medical school.

See Figure 12-2 for Phase 2 buildings electrical infrastructure development.

12.7.5 Phase 3

Under Phase 3, seven academic buildings (W16, W17, W18, W19, W20, W21, and W22) will be constructed generally in the south part of the Academic core (east end of West Campus). Also, Apartments, A16 through A31, will be located in the central area of the campus and Medical School buildings (H1, M2, M5, M7, MOB5, MOB6, and MOB7) at the west end of West Campus will be added. Buildings involved in Phase 3 development and their corresponding electrical loads are listed in Table 12.2.

See Figure 12-3 for Phase 3 buildings electrical infrastructure development.

12.7.6 Phase 4

Under Phase 4, ten academic buildings (W9, W10, W11, W12, W13, W23, W24, W25, W26, and W27) will be constructed generally in the southeast part of the Academic core (east end of West Campus). Medical School buildings (M1, MOB1, MOB2, MOB3, and MOB4) will be added to the west end of West Campus. Buildings involved in Phase 4 development and their corresponding electrical loads are listed in Table 12.2.

See Figure 12-4 for Phase 4 buildings electrical infrastructure development.

12.7.7 Electrical Load Implications Based on Phasing Development

The following tables project the electrical load progression for different building types under each development phase:

Load Distribution Based on Building Type

	Housing Load on Utility Grid	Housing Load on Campus Grid	Academic Building Load	Medical Facilities	Community & Recreation Facility
Phase 1A Load	1,355 kVA	0	766 kVA	0	82 KVA
Phase 1B Load	0	0	0	996 kVA	0
Phase 1 Load	0	0	2,635 kVA	0	0
Phase 2 Load	0	2,776 kVA	4,531 kVA	1,541 kVA	335 kVA
Phase 3 Load	0	1,466 kVA	4,013 kVA	3,922 kVA	0
Phase 4 Load	0	1,014 kVA	6,297 kVA	3,330 kVA	0
Phase Total - kVA	1,355 kVA	5,257 kVA	18,242 kVA	9,787 kVA	417 kVA

Total Campus Grid Load	**33.70 MVA**
Total Utility Grid Load	**1.36 MVA**

Load Distribution Based on Building Type with Aggressive Sustainability Implementation

	Housing Load on Utility Grid	Housing Load on Campus Grid	Academic Building Load	Medical Facilities	Community & Reccreation Facility
Phase 1A Load	1,178 kVA	0	604 kVA	0	62 kVA
Phase 1B Load	0	0	0	767 kVA	0
Phase 1 Load	0	0	2,016 kVA	0	0
Phase 2 Load	0	2,474 kVA	3,503 kVA	1,258 kVA	252 kVA
Phase 3 Load	0	1,275 kVA	3,117 kVA	3,167 kVA	0
Phase 4	0	882 kVA	4,898 kVA	2,665 kVA	0
Phase Total - kVA	1,178 kVA	4,631 kVA	14,137 kVA	7,857 kVA	314 kVA

Total Campus Grid Load	**26.94 MVA**
Total Utility Grid Load	**1.18 MVA**

12.8 Emergency and Standby Power

Emergency power systems are required based on CEC, CBC, and NFPA to provide emergency egress illumination and life safety systems including fire alarm and smoke control equipment.

Emergency power systems will have enough capacity to support essential equipment including:

- Data network hardware
- Telecommunications equipment
- Security system

- Energy management system
- Critical laboratory equipment

Alternatives for emergency/standby power include:

- Individual diesel generator or solid-state inverter integral to each future building.
- Small distributed plants using diesel generators adjacent to clusters of buildings
- One or two larger consolidated plants with diesel generators operating in parallel configuration.

For a central consolidated plant, the ultimate requirement will be determined by the nature of future building development and phasing.

Space for a consolidated central emergency power plant can be planned adjacent to the primary electrical substation or central plant location.

Adequate site space also exists within the academic zone for smaller distributed facilities if warranted.

The initial cost of a larger consolidated emergency plant is extremely high because the system has to be sized based on the ultimate build-out loads. Current electrical code requires the emergency power system components to be kept entirely independent of all other wiring and equipment. A complete separate campus-wide emergency power distribution system including panels, switchboard, pull-boxes, cable, and raceway systems must be established to cover the entire campus.

For the West Campus emergency power systems, dedicated generators for individual buildings or small distribution plants serving selected clusters of buildings will be considered.

12.9 Site Lighting

12.9.1 Site Lighting Codes, Regulations, and Guidelines

West Campus lighting will conform to California Energy Commission Energy Efficiency Standards for nonresidential buildings.

Lighting design will comply with guidelines and follow recommendations and procedures of the Illuminating Engineering Society of North America (IESNA) and "Recommended Practice on Lighting for Educational Facilities, ANSI/IESNA RP-3-00."

Alternative design approaches recommended by U.S. Green Building Council (USGBC) will be considered.

12.9.2 Light Levels

The table below presents the recommended maintained illuminance levels.

Application	Minimum Horizontal Illuminance at Pavement Level - lux (fc)	Average Vertical Illuminance 1.8 m (6') Above Walkway - lux (fc)
Roadside Walkways and Type A Bikeways		
Campus Areas	12 (1.2)	15 (1.5)
Housing Areas	10(1)	10 (1)
Walkways Away from Roadside and Type B Bikeways		
Walkways & Bikeways	10(1)	10 (1)
Pedestrian Tunnels	50 (5)	50 (5)
Parking Lot	10 (1)	10 (1)

12.9.3 Site Lighting Analysis and Design

Site lighting will be analyzed and designed to maintain safe light levels.

A computerized photometric model will be used to analyze the site lighting, thereby achieving safe lighting levels, while at the same time absolutely minimizing light trespass off-site, night sky pollution, nighttime glare, and adverse impacts to nocturnal environments.

Site lighting fixtures will be designed with full cutoff luminaries, integrated internal shielding, and precision controlled optics.

12.9.4 Lighting Controls

Site lighting control and interior lighting control will be performed through the campus energy management system (EMS). Photo sensors will be connected to the EMS as analog input points to create specific parameters for programming. Digital outputs from the EMS in conjunction with lighting contactors will facilitate control functions tailored to individual areas. Interior areas with skylights can be controlled in the same manner.

12.10 Electrical Metering at Buildings

The purpose of effective use of metering is to combine meter implementation with data collection, electronic communication and analytical capability. This allows for the gathering of useful data and information, which in turn leads to improve energy management practices.

The utility metering will be implemented at the main switchgear at 12.47 kV. All service switchgear equipment will be SCADA compatible.

A University-owned sub-metering system, using electronic meters, will be provided in all future buildings, including the central plants.

Current/potential transformers, along with pulse initiators and kW transducers, will be provided at each meter location with an Ethernet connection to facilitate connection to the EMS.

12.11 Recommended Electrical Power System Implementation Plan

12.11.1 Electrical Service

The electric power system will be designed to accommodate the electrical equipment load growth through the Year 2025 with a margin of spare capacity.

For electrical service requirements, two additional primary service transformers will be added (by the City). Alternatively, the two existing 69kV-12kV transformers can be upgraded to serve both the East and West Campus.

12.11.2 Electrical Distribution

New 12.47V metal-clad SF6-insulated switchgear will be provided with two main circuit breakers and a main tie circuit breaker in a doubled-ended configuration. Four feeder breakers will be included in the initial construction to support the central plant and Phase 1 construction. Additional feeder breakers will be added subsequently to the switchgear line-up to support the electrical infrastructure addressed under the phasing plan. See Figure 12-5.

The primary selective power distribution system recommended in section 12.6 will be implemented. The build-out configuration will consist of a total of 16 feeder circuit breakers. Each future building or facility will be supported by two 12.47 kV circuits. A secondary unit substation (with a single transformer and dual-circuit selector switch) or a double-ended dual-feed unit substation will be supplied to each individual building depending on the degree of reliability intended. This configuration allows quick restoration of service to all loads when a primary feeder or transformer fault occurs. See Figure 12-7.

The duct-bank backbone will utilize a multiple-loop configuration, working along with dual-circuit feed protocol. When a section of the conduit pathway is interrupted (due to required maintenance or a systemic breakdown), the affected buildings will switch to the alternate feeder to maintain full operation.

Dedicated feeder circuits and a secondary unit substation will be provided for the central plants. Equipment loads, such as chillers, pumps, and motors, will be served from motor control centers that house solid-state reduced-current starters and variable frequency drives (VFDs). VFDs for larger motors will be individual, self-contained assemblies.

The 12.47 kV distribution feeders will be 500kcmil copper, 15kV, TR-XLP 133% insulation level, shielded with one conductor per phase. The circuits will be 3-phase, 3-wire, solidly grounded to supply three phase loads. Single phase line-to-line loads will be avoided and line-to-neutral loads will be prohibited. The primary factor of feeder size is the requirement for a feeder to have the capacity to accept 100% of the load with spare capacity to handle program deviation if necessary. The larger conductor size also provides improved voltage regulation (lower voltage drop) and results in lower load losses.

Underground vault-mounted SF6 sectionalizing switches will be installed at strategic locations between building substations and points of connection to campus distribution loops to facilitate ease of maintenance and circuit isolation if necessary.

Secondary unit substation transformers will be the cast-coil type for "mission critical" facilities, including data/communication facilities, laboratories, and medical buildings. Secondary unit substation transformers will also be the cast-coil type for general office/classroom buildings, and other significant buildings. Unit substations with dry-type transformers will be considered only for non-critical facilities that have extreme constraints on construction cost. The Family Housing and Apartments will us outdoor, pad-mounted, oil-filled transformers.

12.11.3 Emergency Power System

For the West Campus emergency power systems, dedicated generators for individual buildings will be the primary approach.

Small distribution plants serving selected clusters of buildings will also be considered, depending on locations and phasing considerations.

Generators will be located in inconspicuous areas like mechanical yards, or near loading dock locations away from pedestrian traffic. Skid mounted tanks under generators will be used whenever possible. Underground diesel fuel tanks shall be avoided.

Generators will be low-emission type meeting the latest EPA requirements. State-of-the-Art technology including digital control, common rail fuel injection, and electronic governors will be included whenever possible. Sound attenuated enclosures with critical grade silencers will be used to minimize sound pollution.

12.11.4 Lighting System

Whenever possible, state of the art lighting technology, including induction lighting, high power compact fluorescent lamps, and high power LED fixtures, will be applied in place of the conventional high intensity discharge (HID) metal halide and high pressure sodium fixtures.

Induction lighting is becoming one of the newest technologies in lighting. It offers many features that make it an attractive light source. With a 100,000-hour rated life (compared to 10,000-hour for fluorescent and 20,000-hour for HID), induction lighting maintenance effort is minimal. Color quality is excellent. Color shift is almost nonexistent over a wide range of temperature and voltage fluctuations. Efficiency and reliability is also excellent. Unlike HID lamps, induction fixtures can perform start and restart functions instantly under hot and cold conditions.

LED lamps share most intrinsic characteristic with those of induction technology, including extreme long life, high efficiency, and superior color rendition. However, LED fixtures are not available for high intensity applications like roadway and parking lot lighting at the current time. With its small size and durability, LED lamps are ideal for walkway and step lighting. LED products are also available for sign and façade lighting.

12.11.5 Alternative Energy Power Generation Systems

Two major alternative energy power generation systems should be considered during all phases of construction. These are solar photovoltaic systems and fuel cell systems. (Cogeneration is not feasible in this application for the reasons stated in Chapter 8.)

As with any alternative energy projects in which the first cost is usually high, special funding processes and financing approaches may be needed to make these projects economically feasible. Federal and State tax credits and rebates, as well as incentive programs from the local utility companies, should be utilized whenever applicable to offset the high cost of these alternative energy projects.

12.11.5.1 Solar Photovoltaic Systems

Photovoltaic systems are solar cells that produce electricity directly from sunlight. The solar cells are made of thin layers of semiconducting material, usually silicon. The layers are treated with special compounds, to create an unbalanced electron configuration. When light strikes a sandwich of the different layers, electrons start flowing and electric current is created. Photovoltaic cells generate direct-current electricity, which can be stored in batteries or converted instantly to alternating current using solid state or rotary inverter. The harvested power can be used locally on the particular building site or can be fed back to the power distribution grid for general usage for all facilities on the same grid.

12.11.5.2 Fuel Cell Systems

A fuel cell operates similar to a battery. However, unlike a battery, a fuel cell does not run down or require recharging. It produces energy in the form of electricity as long as fuel is supplied. A fuel cell consists of two electrodes sandwiched around an electrolyte. Fuel cells generate electric power by combining hydrogen (hydrogen generated from fuels such as methanol and natural gas) with oxygen. Hydrogen fuel is fed into the "anode" of the fuel cell. Oxygen (or air) enters the fuel cell through the cathode. Accelerated by a catalyst, the hydrogen atom splits into a proton and an electron, which take different paths to the cathode. The proton passes through the electrolyte. The electrons create a separate current that can be utilized before they return to the cathode, where they are reunited with the hydrogen and oxygen in a molecule of water.

A fuel cell system, which includes a “fuel reformer”, can utilize the hydrogen from any hydrocarbon fuel (i.e. from natural gas, methanol, and even gasoline). Since the fuel cell relies on chemistry and not combustion, air emissions from this type of a system are much lower than air emissions from the cleanest fuel combustion processes. Fuel cells operate without combustion. The only by-products are pure water and heat. Since the fuel is converted directly to electricity, a fuel cell can operate at much higher efficiencies than internal combustion engines, extracting more electricity from the same amount of fuel. The fuel cell itself has no moving parts, making it a quiet and reliable source of power.

Fuel cells can be used in various configurations. These include a parallel grid configuration with the power distribution grid for peak shaving, and a cogeneration configuration for simultaneous electricity generation and heat recovery for space and water heating.

12.12 Codes and Standards

All electrical work will comply with the latest editions of the following codes and standards:

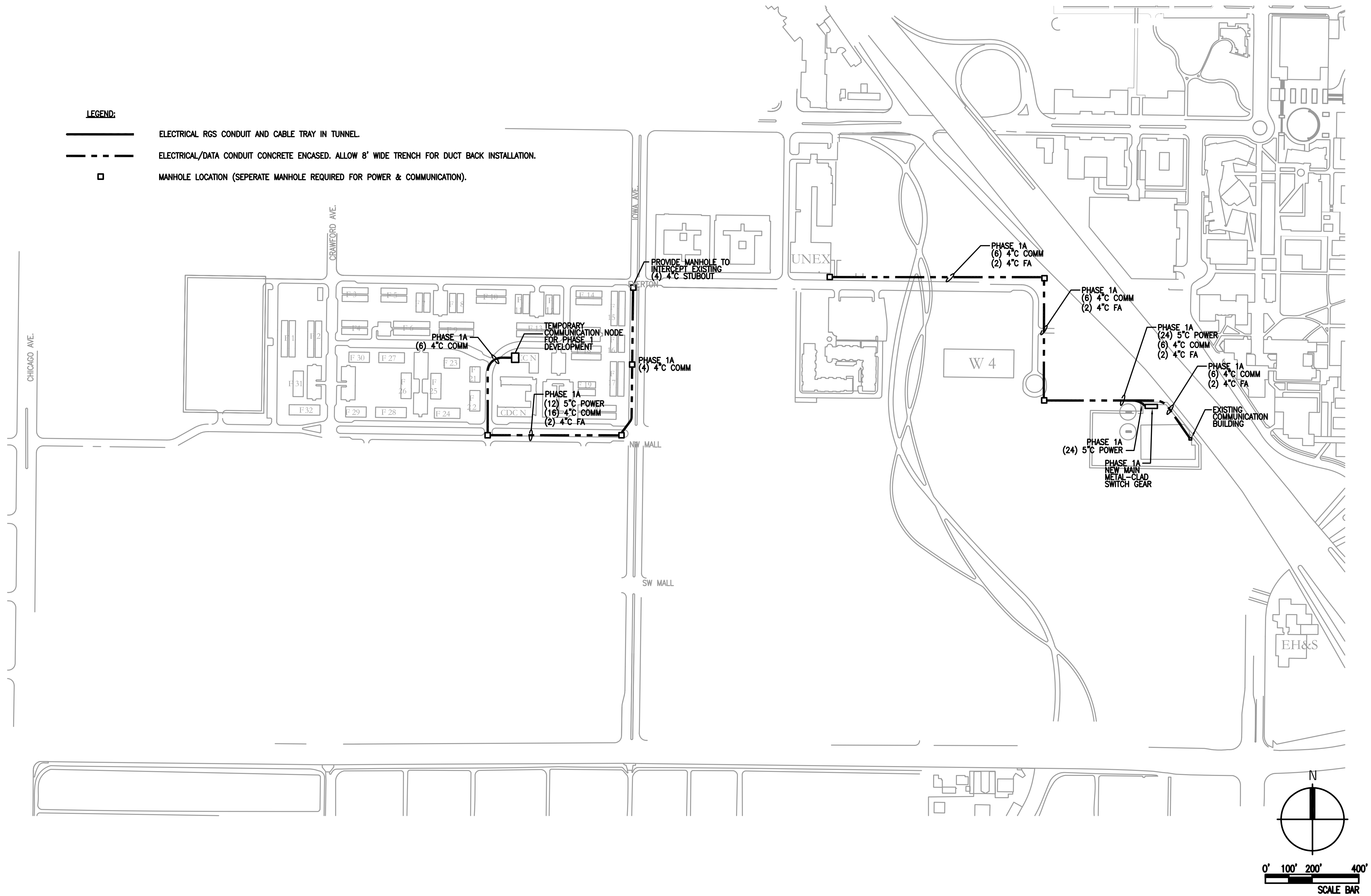
- California Code of Regulations, Title 24
    - Part 3, the California Electrical Code
    - Part 6, the California Energy Code
    - Part 9, the California Fire Code
- National Fire Protection Association (NFPA)
- National Electric Code (NEC)
- National Electrical Manufacturer’s Association (NEMA)
- Institute of Electrical and Electronic Engineers (IEEE)
- American National Standards Institute (ANSI)
- Underwriters Laboratories, Inc. (UL)
- State of California General Order 95 – Rules for Overhead Electrical Line Construction
- State of California General Order 128 – Rules for Construction of Underground Electrical Supply and Communication System.
- University of California Riverside Design Guidelines
- City of Riverside Public Utility Standards
- All local agencies having jurisdiction

12.13 Electrical Power Distribution System Cost Summary

This study includes conceptual-level cost estimates for electrical power distribution system development. Details of these cost estimates are included in the Appendix to this report. Costs include mark-ups, sales taxes, and contingencies, but do not include soft costs. See additional notes on the detailed tables.

- Phase 1A Housing: $ 0
- Phase 1A Campus: $ 2,306,000
- Phase 1B: $ 2,812,000
- Phase 1: $ 3,320,000
- Phase 2 Housing: $ 0
- Phase 2 Campus: $ 9,892,000
- Phase 3: $ 7,825,000
- Phase 4: $ 5,299,000

Estimated Total for the Build-Out of the Electrical Power Distribution System: $ 31,454,000.



UC RIVERSIDE UNIVERSITY OF CALIFORNIA

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CIVIL ENGINEERS
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FACILITIES PLANNERS
Walker Macy

Revision	Description	Date
△	Phase 1 Implementation Plan Report	10/31/07
△	Admistrative Draft Report	02/11/08
△	Final Report	03/14/08
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Sheet Title

Figure 12-1A
West Campus Development
Phase 1A
Elec/Data Comm Backbone
Pathway Infrastructure
(2010)

Sheet No.

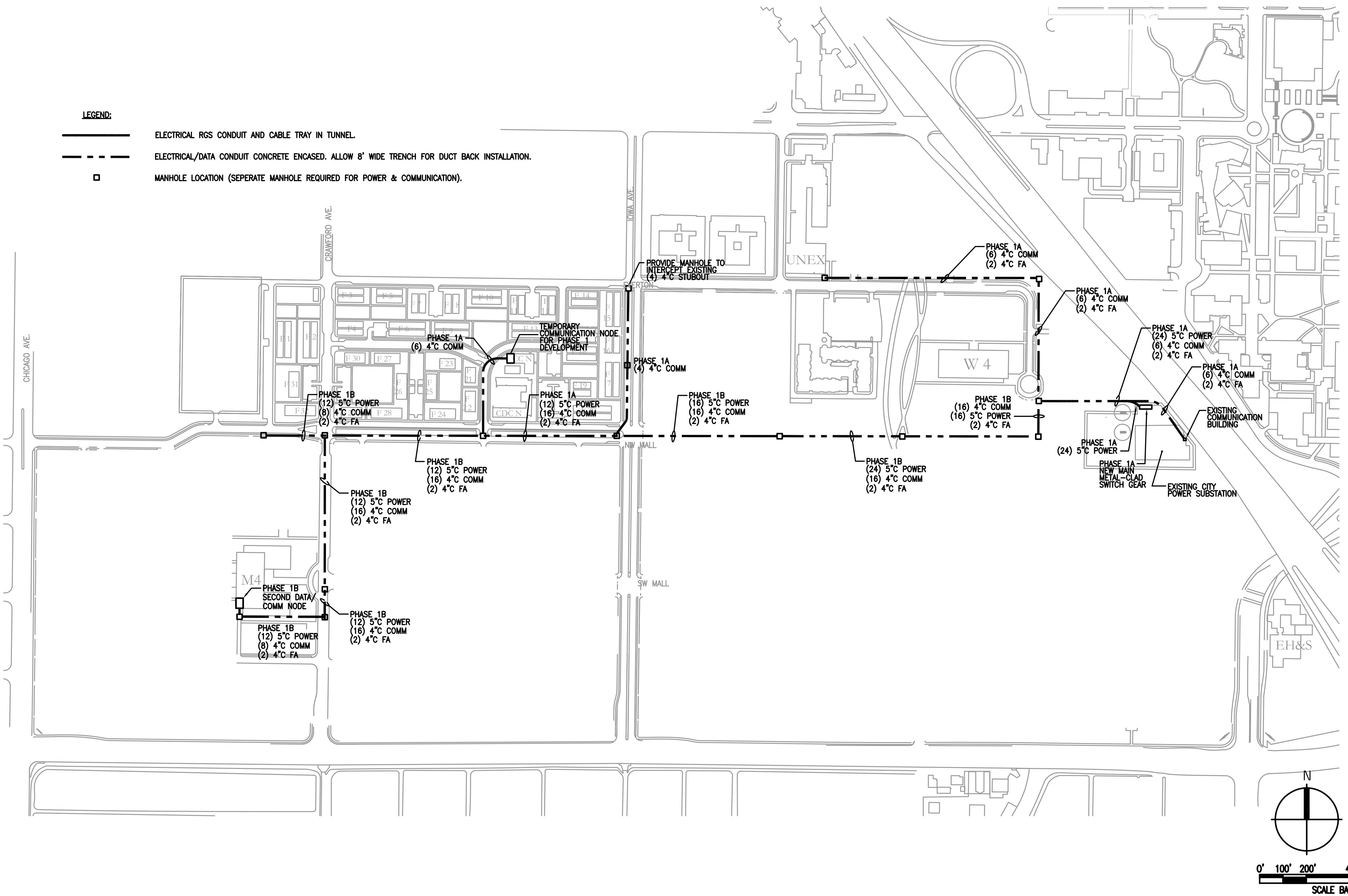

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Figure 12-1B
West Campus Development
Phase 1B
Elec/Data Comm Backbone
Pathway Infrastructure
(2010)

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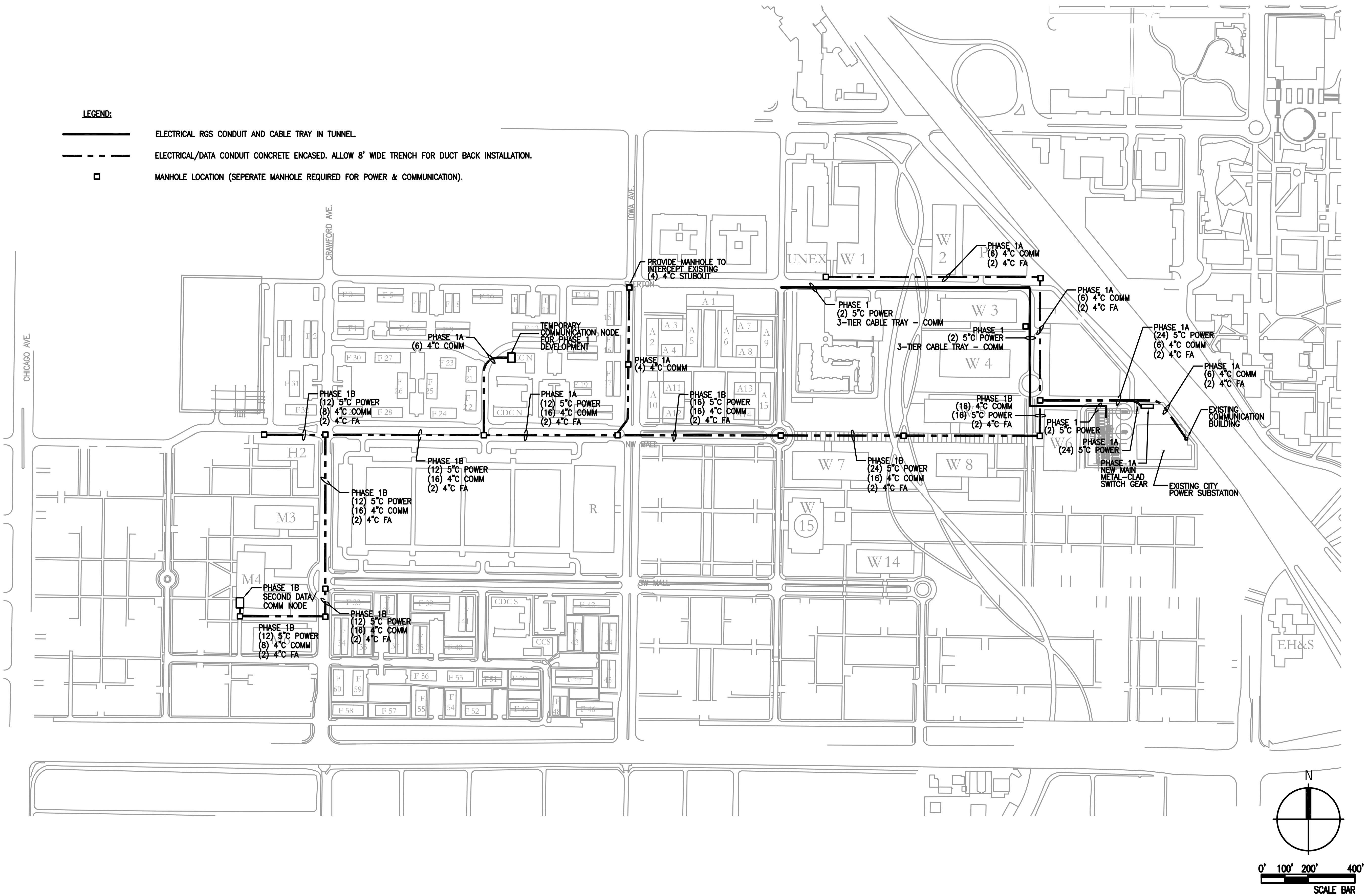

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Figure 12-1
West Campus Development
Phase 1
Elec/Data Comm Backbone
Pathway Infrastructure
(2010)

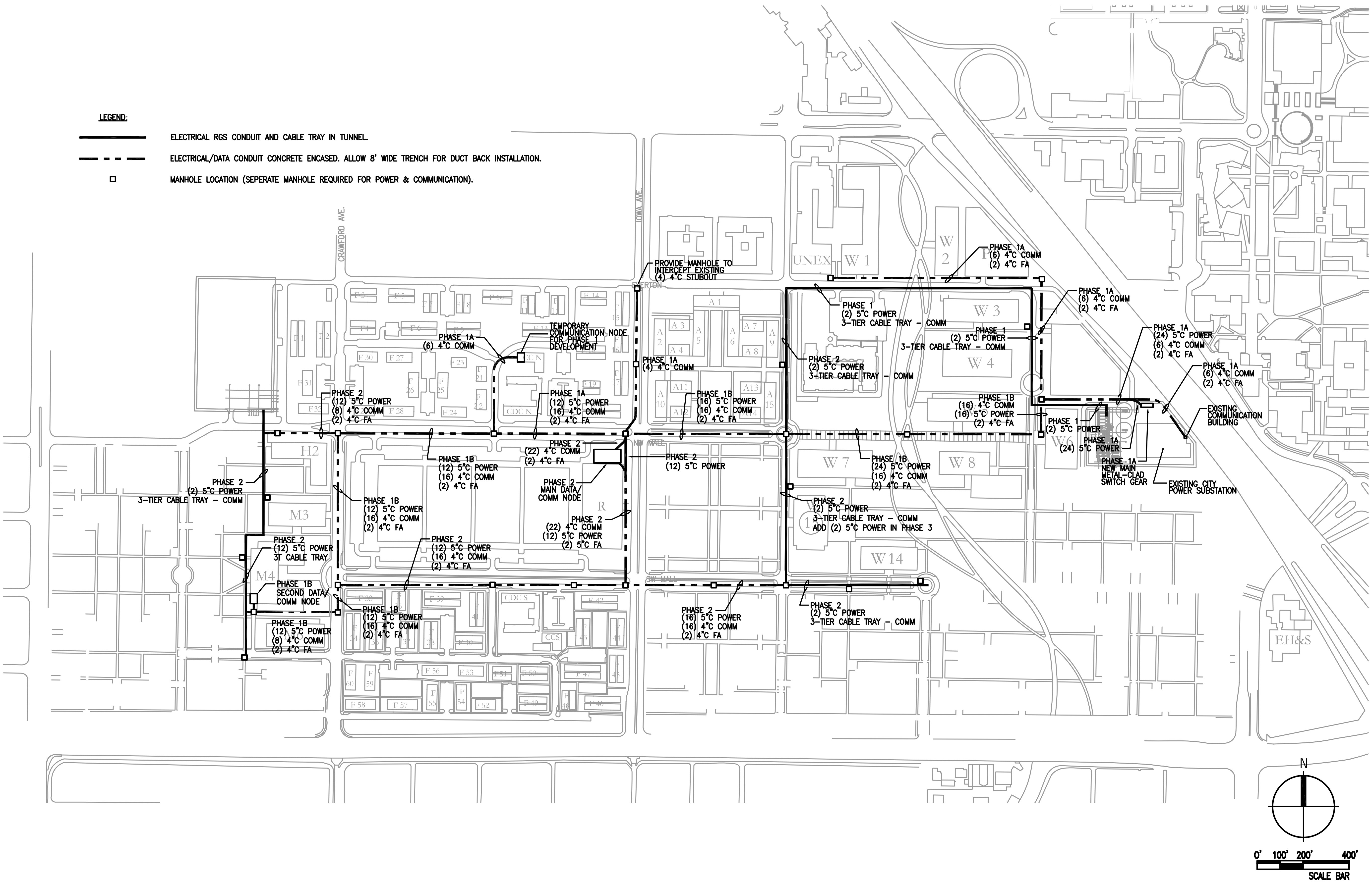
Sheet No.

LEGEND:

ELECTRICAL RGS CONDUIT AND CABLE TRAY IN TUNNEL.

ELECTRICAL/DATA CONDUIT CONCRETE ENCASED. ALLOW 8' WIDE TRENCH FOR DUCT BACK INSTALLATION.

MANHOLE LOCATION (SEPERATE MANHOLE REQUIRED FOR POWER & COMMUNICATION).



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Sheet Title

Figure 12-2
West Campus Development
Phase 2
Elec/Data Comm Backbone
Pathway Infrastructure
(2015)

Sheet No.

LEGEND:

ELECTRICAL RGS CONDUIT AND CABLE TRAY IN TUNNEL.

ELECTRICAL/DATA CONDUIT CONCRETE ENCASED. ALLOW 8' WIDE TRENCH FOR DUCT BACK INSTALLATION.

MANHOLE LOCATION (SEPERATE MANHOLE REQUIRED FOR POWER & COMMUNICATION).

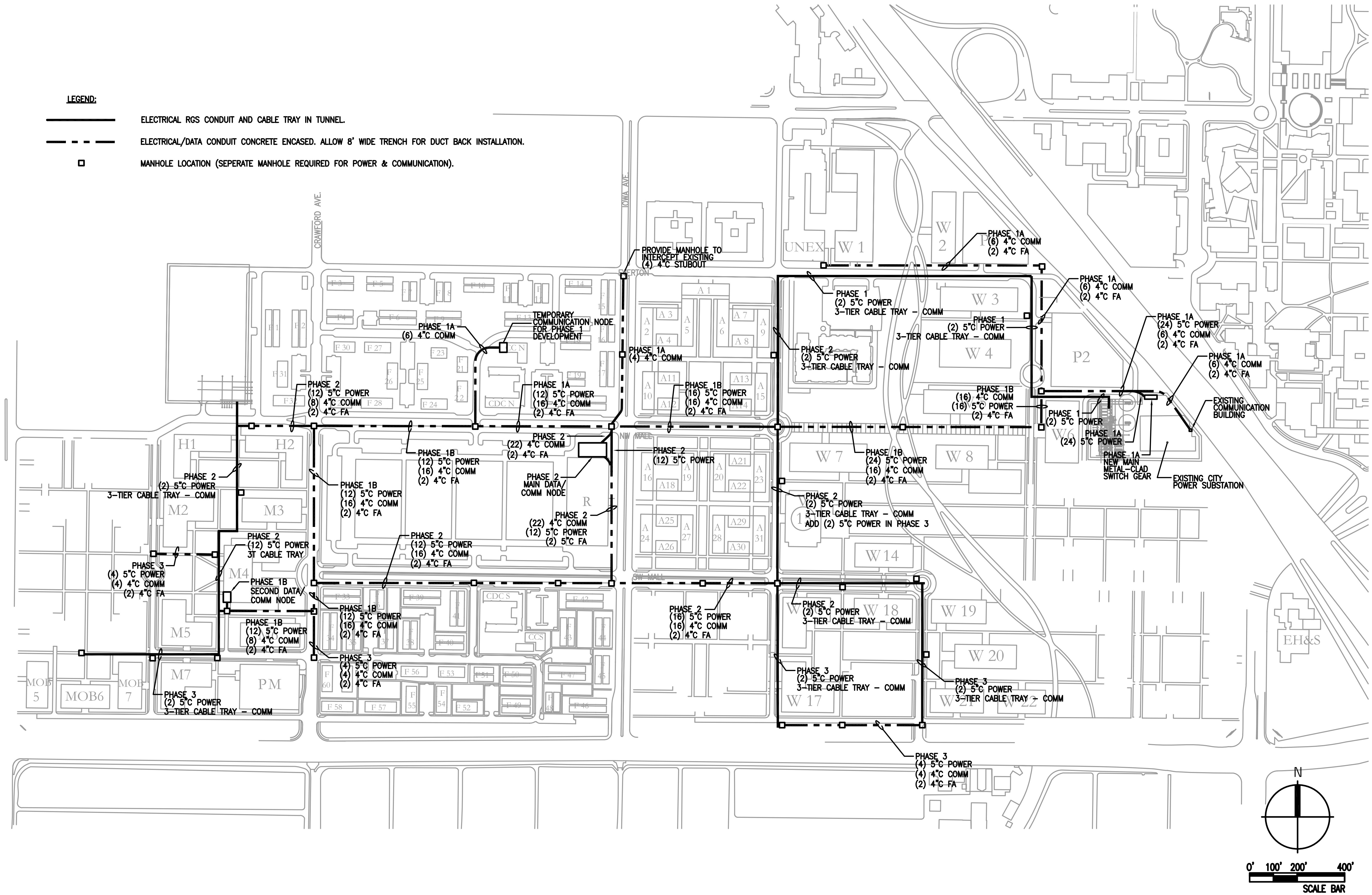

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Figure 12-3
West Campus Development Phase 3
Elec/Data Comm Backbone Pathway Infrastructure (2020)

Sheet No.

LEGEND:

ELECTRICAL RGS CONDUIT AND CABLE TRAY IN TUNNEL.

ELECTRICAL/DATA CONDUIT CONCRETE ENCASED. ALLOW 8' WIDE TRENCH FOR DUCT BACK INSTALLATION.

MANHOLE LOCATION (SEPERATE MANHOLE REQUIRED FOR POWER & COMMUNICATION).

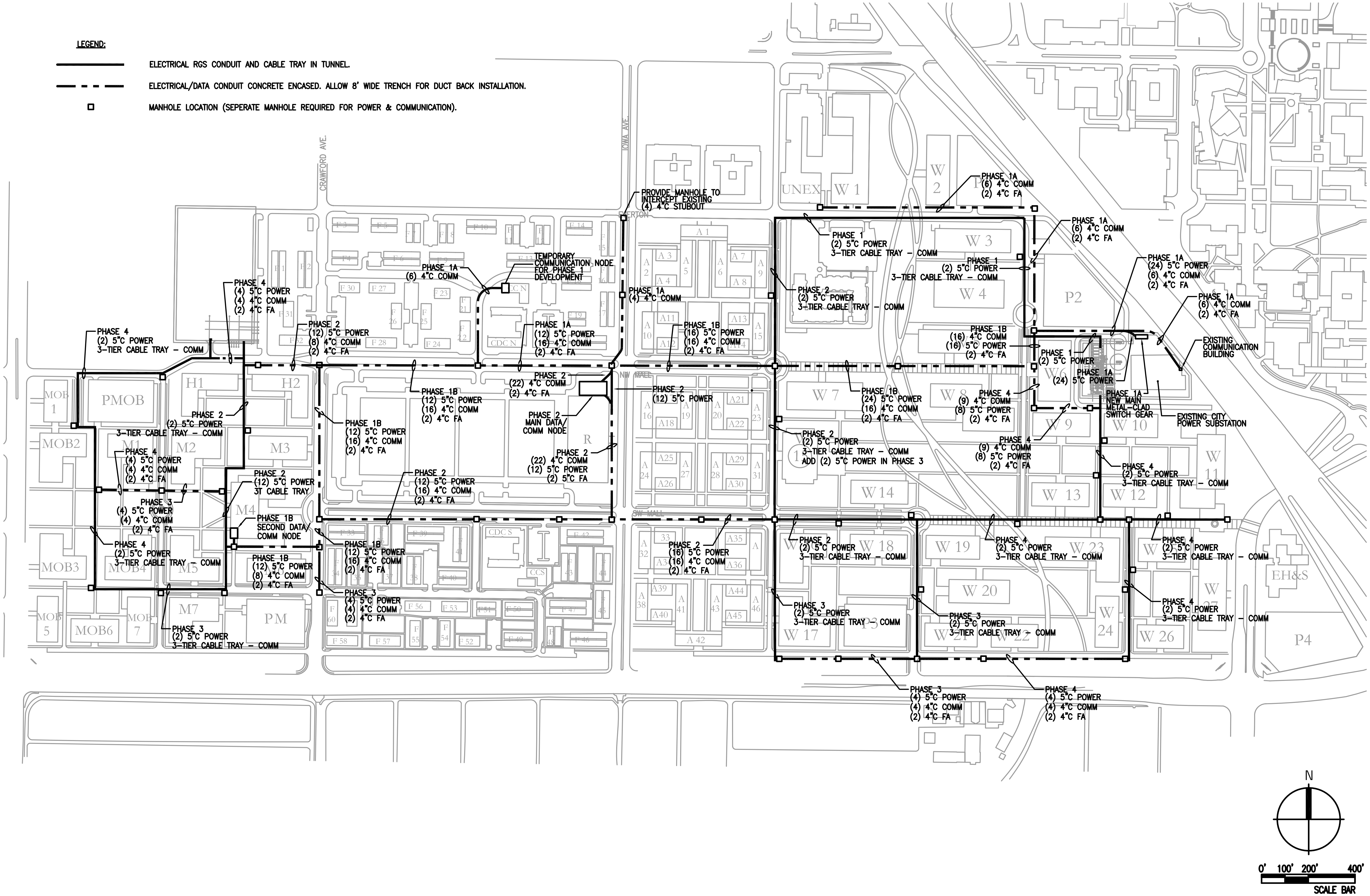

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Figure 12-4
West Campus Development Phase 4 Elec/Data Comm Backbone Pathway Infrastructure (2025)

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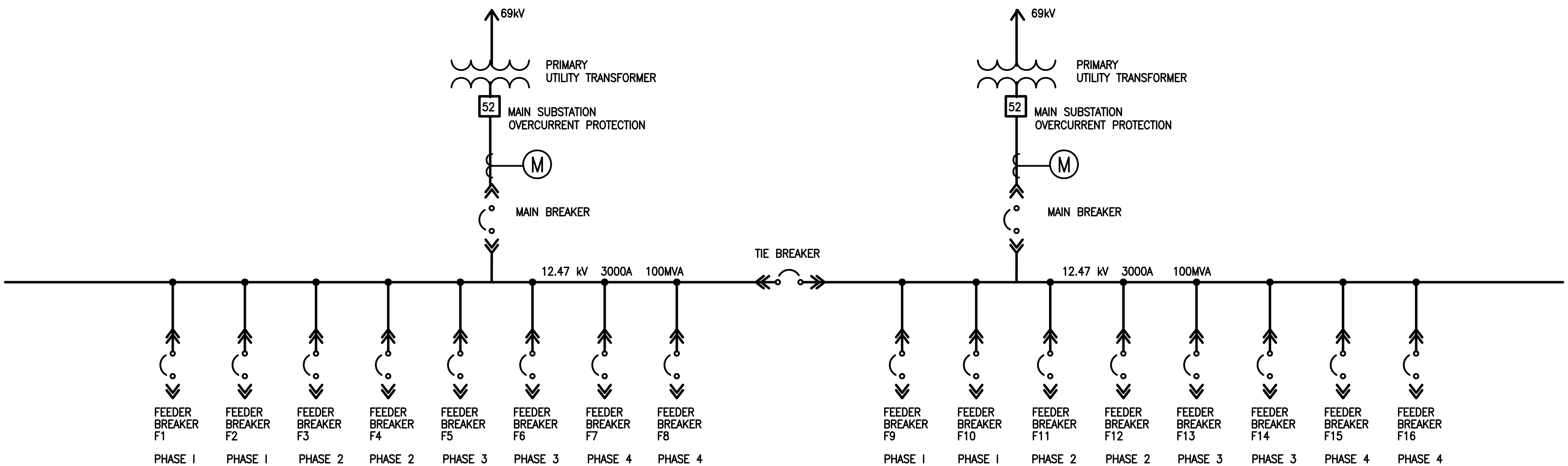

MAIN METAL CLAD SWITCHGEAR CIRCUIT ARRANGEMENT

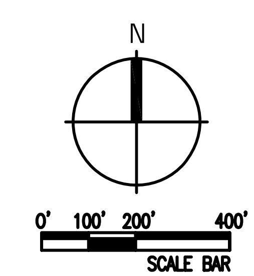

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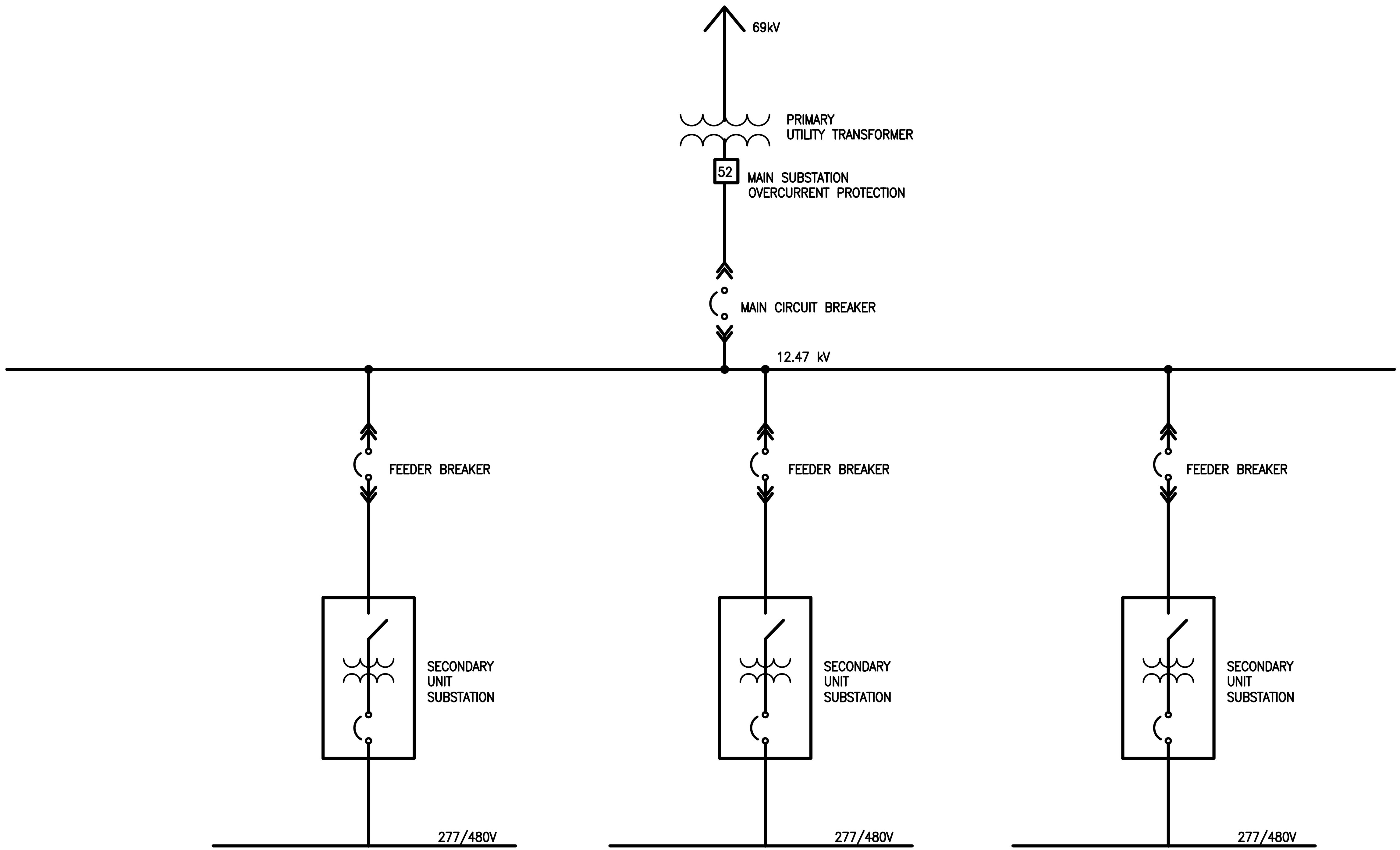
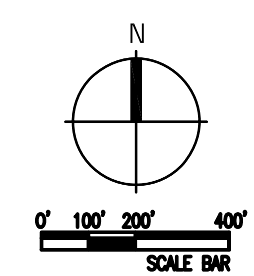
FIGURE 12-5
MAIN
METAL CLAD
SWITCHGEAR
CIRCUIT
ARRANGEMENT

Sheet No.



SIMPLE RADIAL DISTRIBUTION SYSTEM



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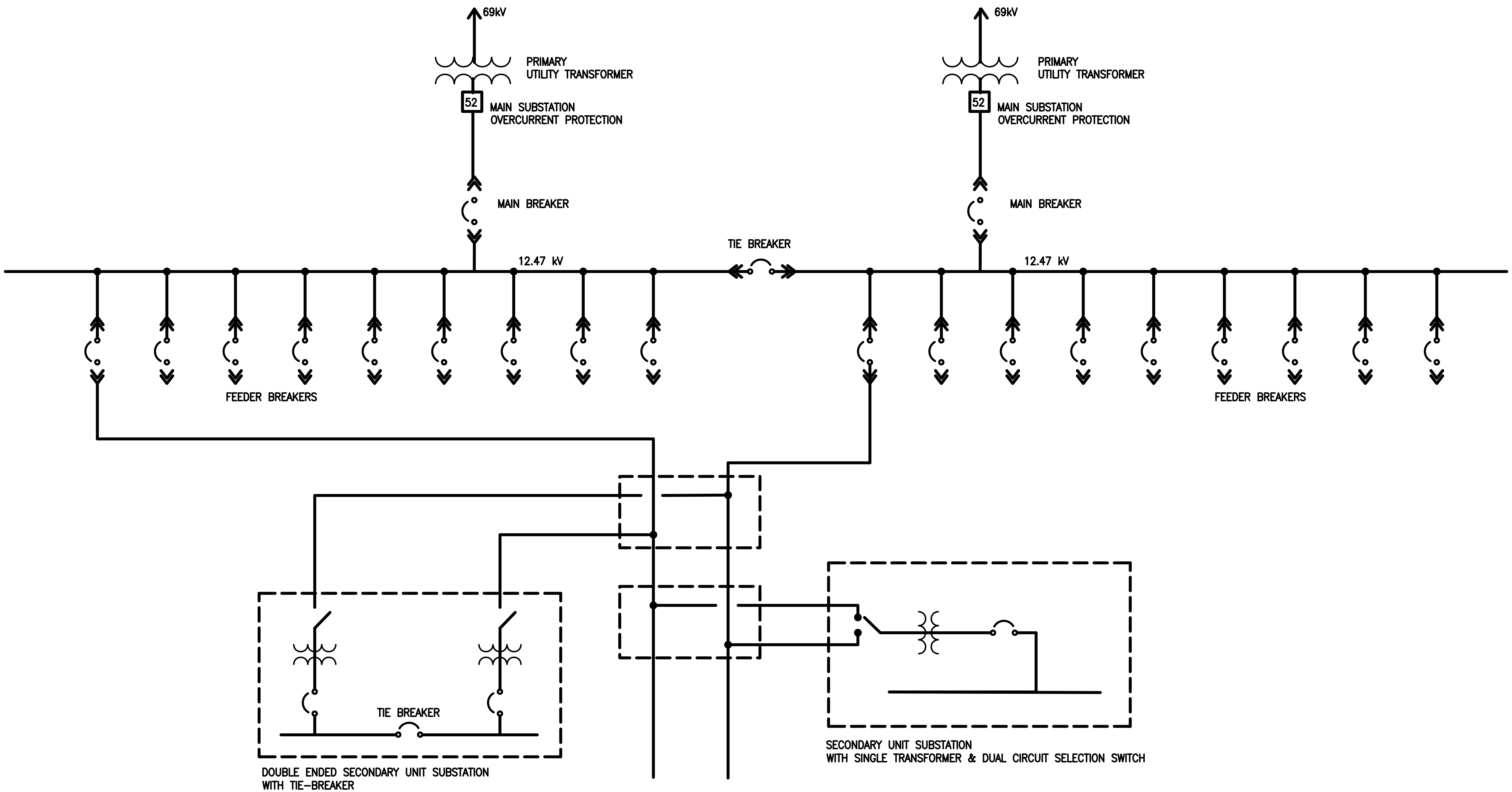
Sheet Title

FIGURE 12-6
SIMPLE
RADIAL
DISTRIBUTION
SYSTEM

Sheet No.



PRIMARY SELECTIVE SPOT NETWORK SYSTEM

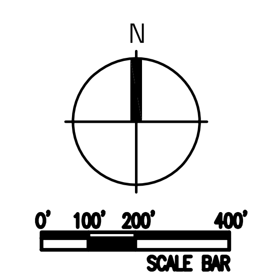


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FIGURE 12-7
PRIMARY SELECTIVE SPOT NETWORK SYSTEM

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CHAPTER 13

DATA/TELECOMMUNICATIONS SYSTEMS

Information Technology (IT) has rapidly become a major resource in all higher education facilities. Advanced IT infrastructure enables students, faculty, and staff to communicate to anyone, from anyplace, at anytime, through access to the full range information resources needed in the learning and teaching experience. Information technologies increase student access to information providers and resources by making them available, independent of time and place. They permit the student to control the learning style and process. They increase the opportunities for institutional sharing of programs, resources, and services.

The purpose of this IT Backbone Infrastructure Planning is to establish a strategy to develop the required infrastructure to meet the campus plans, goals and needs for communication and data transmission through the year 2050 and beyond. This IT Backbone Master Plan includes an analysis of the campus backbone, includes the utility connections, data/communication node, raceway infrastructure and cabling to campus buildings.

The major objectives include:

- Provide a new underground support structure of duct banks and manholes to create pathways throughout the campus for the use of Information Technology cabling.
- Identify data/communication node requirement to assist with maintaining critical data and communication services during system failures, construction, maintenance and repair of the IT system.
- Develop a secondary path for a redundant connection to the local Point of Presence (PoP) for all communication connections outside of the campus.
- Provide redundant cabling from alternate paths to campus nodes.
- Provide security and support systems, such as, standby power generation, space conditioning, emergency lighting, special fire suppression, physical security and monitoring for the data/communication node during abnormal conditions for loss of power form utility system interruptions, natural disasters, or local emergencies.

13.1 Existing Data/Telecommunications Systems Infrastructure

The existing East Campus facilities (Telecommunication Building and Statistics Computer Data Center) do not have sufficient space to support the West Campus expansion. New telecommunication nodes will be needed on the West Campus.

The existing telecommunications infrastructure on the West Campus is very limited. There is fiber optic connection to the existing power substation near parking lot 30. In addition, there is an existing telecommunications manhole by Human Resources, located on the northeast area of West Campus. It has been decided that the West Campus Infrastructure Development Study (WCIDS), and its associated utilities infrastructure projects, will not relocate this manhole. Manhole relocation, if required, will be done by a future building project. Connections to the manhole will be located so as to avoid future conflicts.

13.2 Data/Telecommunications Systems Node Location Analysis

A main data/communication node will be supported by an AC-DC uninterruptible power system (UPS), and diesel generators with minimum 8-hour fuel supply. A typical UPS is supported by 15 to 30 minutes battery capacity to allow seamless power transition during power outages to allow generator start-up to pick up all critical loads. A UPS battery occupies a large amount of floor space, and is considered a hazardous material. For the West Campus, 5 minutes of battery capacity with 2 backup generators is recommended. With the additional generator, the battery quantity can be reduced to less than 30% of a conventional system.

The emergency system will provide 100 percent back-up power to all critical electronic, security, lighting, fire protection and HVAC equipment. In addition to an automatic fire alarm system, a dry fire suppression system, similar to FM-200 or Inergen will be installed. An area of 8,000 to 10,000 square feet (sf) will be required based on the initial evaluation.

Several potential locations have been considered, including an area near the Phase 1 building area and an area next to the Recreation building. Another node with an NEC hybrid phone switch will be required at the Medical School. A site analysis will be done to identify the preferred location from a campus planning and utility standpoint. System criteria will be developed as part of the analysis.

13.3 Data/Telecommunications Duct Bank and Manhole Sizing Criteria

The telecommunications raceway and manholes infrastructure will be designed using the Campus Guidelines.

Telecommunications raceways can be installed in duct bank systems, and in underground utilities tunnels. This will entail study in coordination with the means to distribute chilled water and heating hot water distribution piping around West Campus. Please see Chapter 9, section 9.4 for more details on this. 3-tier cable tray would be installed in the utilities tunnel. They should be rack-mounted on the opposite side of any high temperature water piping whenever possible.

The following items identify additional requirements for duct bank applications:

- All conduits will be 4-inch Schedule 40 PVC.
- Conduits will be concrete-encased, end-to-end.
- Buried conduits, encased in concrete, will be installed using fixed spacers between all conduits.
- All duct banks will be installed a minimum of 36 inches below grade.

- Utility marking tape will be installed 12 inches below the surface, directly above the conduit.

- Conduit runs will be made in large straight sections.

- When conduit bends are required, wide sweeps will be designed for at least a 40-foot radius.

- If ninety-degree bends cannot be avoided, they will be located at the end of the conduit runs, with a minimum of a 60-inch radius.

- Conduit quantities between manholes will be sized for the cable requirements to serve the campus telecommunication loads to the build-out year 2025.

- Main backbone conduit quantities will be between (16) 4" conduit and (36) 4" conduit. Recommended quantities and location are identified on Figure 12-1 through 12-4 for each phase.

- Minimum (4) 4" conduit will be provided to each building.

- The quantity of 4-inch conduits that will feed a building will be as listed in the chart below. The number of conduits may change based on building occupancy and use.

Building Gross Floor Space, sf	Number of 4-Inch Conduits
10,000 – 30,000	4
30,000 – 50,000	6
50,000 – 75,000	8
75,000 – 125,000	12

- Manholes sizes will be 6'x12'x7' or 8x'14'x7', dependent on the number of conduits expected to enter the manhole.

- Manholes will be rated for H-20-44 Traffic Bridge Loading with round 36-inch diameter lids, ladder, Sch-40 terminators and 4" recess sump.

13.4 Telecommunications Cabling Types

Telecommunications services will be supplied using single-mode fiber optic cable. Single-mode fiber optic cable will provide the bandwidth required for all services up to 50 to 60 km. Costs for fiber optic based systems continue to decrease, while the growing number of supported applications makes fiber an ever more reasonable media choice.

Air Blown Fiber Tubing, with minimum (1) 18 strand single mode fiber, will be provided to each building. All connectors will be type ST. Spare conduit will be provided for future expansion.

Standardizing on single-mode fiber only for all backbone connections is recommended.

Copper twisted-pair cable will also be used to support telephone services, as well as other signaling requirements.

24 AWG cables will be used up to 2,500 feet. All underground cable will be filled and have bonded sheath.

Plastic-Insulated Conductor (PIC) cable with color-coded 25-pair binder groups, protected by a shield and heavy outer cover, will be used.

Cables, 900 pair and larger, will have the sheath bonded to the wrap to reduce the potential for kinking and damage to the cable during placement.

All cables will be constructed with water-exclusion gel, since the cables may be exposed to water.

Cables will be sized to provide 1.5 to 2 pair for every 125 assignable square feet in building as a starting point. The design will allow no more than 85% to be used over the life of the cable. Cable sizes will be varied based on known usage and required applications specific to each building.

13.5 Wireless Network Services

The University of California has established a goal of providing wireless network access throughout most, if not all, areas of each campus. The design will permit the campus to achieve these goals by providing adequate infrastructure duct and cable capacity for wireless network access at each building via the building BDF. The campus will be able to install wireless access points within each building and install antennas inside and outside each building to provide the wireless access. The final placement of these devices will be determined through a detailed wireless survey to be conducted by the Campus IT Department to achieve the maximum area to be served, quantity of users, quality of signal, and speed.

13.6 Voice Over IP

The emerging Voice over Internet Protocol (VoIP) technology is revolutionizing the telecommunications industry through the convergence of voice, video, fax, and data. This relatively new technology can drastically reduce long-distance costs and provide opportunities for the colleges to expand existing voice services and to add some new services, as they are needed. VoIP technology will enable voice services using data network infrastructure.

The VoIP option will minimize the outside plant copper trunk cable requirements since the phone signal will be carried by the data fiber backbone infrastructure.

While the technology has greatly improved over the last several years, many of the actual products required to deliver enhanced services are still emerging. The following factors will be considered:

- The conventional telephone network is a proven reliable system for delivering phone calls. Phones just work base on our daily experience. Internet, e-mail, and other related devices are far more complex and therefore function within a far greater margin of error. Few people really panic when their e-mail goes down for 30 minutes. It is expected from time to time. However a half hour of no dial tone can easily send people into distress. The major current concern for VoIP is reliability.

- VoIP is dependant on local wall power. Current phone runs on power that is provided over the line from the central office. With VoIP, a local power outage will interrupt phone service unless the computer is supported by backup power source.

- VoIP uses IP-addressed phone numbers, not North American Numbering Plan Administration (NANP) phone numbers. There is no current protocol to associate a geographic 911 call center with an IP address.

- VoIP uses an Internet connection. It is susceptible to all inherent problems normally associated with broadband internet services including latency, packet delay, packet loss, jitter and virus.

- Phone conversations can become distorted or lost because of transmission errors. Improvement of stability in Internet data transfer needs to be guaranteed before VoIP could truly replace traditional phones.

For telecommunications planning purposes, Traditional Time Division Multiplexing (TDM) and limited VoIP protocol will be set up for voice communication at the West Campus. Large scale migration towards VoIP will be done cautiously based on technological advances and future analysis. Consideration will be emphasized on a flexible patching scheme to allow seamless transition, as well as cost and downtime reduction. Hybrid telephone switches (supports both VoIP and TDM), similar to the NEC unit that the University currently employs, will be considered for the West Campus expansion.

13.7 Adding Redundant Point Of Presence (POP) Connections

A minimum of two Point Of Presence (POP) connections is recommended for a major university of this scale. Multiple redundant paths will be included. The University currently has some redundancy built-in for both data and voice services. Another POP is important and will serve to add additional redundancy to the telecommunication networks.

Different media of copper and fiber will be considered for being able to connect to more than one service provider through a different and independent path. This will increase the speed and dependability of the campus connection to the outside world and provide additional leverage for the University in service contract negotiation. The additional connection will also help to fulfill increasing capacity demand of the campus.

13.8 Data/Telecommunications System Alternatives

13.8.1 Single Main Node vs. Multiple Nodes

One alternative is for a single data/communication node serve the entire West Campus. Another alternative is for there to be multiple nodes, including one to serve the east side of West Campus, Academic Core, Apartments, and the Recreation Building. The Medical School section of West Campus would be served by another one.

13.8.2 Criteria for Analysis

The criteria for developing and analyzing West Campus power distribution system configuration include the following:

- System requirements
- Demands and capacities
- Phasing implications
- Cost

13.8.3 System Requirements

The infrastructure will be designed to accommodate all data/telecommunication equipment load growth through the Year 2050 with a margin of spare capacity.

13.8.4 Demands and Capacities

Data/telecommunications is a dynamic evolving technology. In the past, thousands of copper cables were replaced with a few fiber optics with increased capacity and improved performance in a campus environment. However, until the data network can meet all the requirements of voice network. The use of copper along with fiber optic cables with a limited number of voice nodes is the preferred plan for the voice network.

Demands and capacities will be predicted based on current technology with the expectation of calculated improvement factor.

13.9 Phasing Implications

The development of the data/communications conduit pathway shown on the phasing plans in Figures 12-1A through 12-4 are based on the building development strategy for West Campus expansion. Considerations are emphasized on function, reliability, redundancy, flexibility, and maintainability. Conduit duct bank will be located in areas which have the lowest possibility of being disturbed due to future building construction. Loop feed configuration is recommended, such that each major area is fed from two different directions to guarantee the reliability and redundancy of the raceway infrastructure.

13.9.1 Phase 1A

Phase 1A is the very first implementation stage. It consists of the north phase of Family Student Housing (F1 through F33), Child Development Center North (CDC N), and Community Center North (CC N). One academic building (W4) will also be implemented under Phase 1A. A temporary communications node will be place within the Family Student Housing Area F20 with all associated raceway infrastructure to support Phase 1A housing operation. Another temporary communication node will be established in Building W4 during Phase 1A; this node will also support phase 1 Buildings - W1, W3 and W5. Both temporary nodes will be consolidated to the West Campus main data/communications node during Phase 2 construction. Buildings involved in Phase 1A development and their corresponding communication raceways are shown on Figure 12-1A.

13.9.2 Phase 1B

Under Phase 1B, the first building (M4) of the Medical School will be constructed. A data/communications node will be established as part of the M4 Building. This node will be used to serve all the medical school facilities in the future. Buildings involved in Phase 1B development and their corresponding communications raceways are shown on Figure 12-1B.

13.9.3 Phase 1

Under Phase 1, three academic buildings (W1, W3, and W5) will be located in the northeast area of the campus. Buildings involved in Phase 1 development and their corresponding communications raceways are shown on Figure 12-1.

13.9.4 Phase 2

Under Phase 2, six academic buildings (W2, W6, W7, W8, W14, and W15) will be constructed generally in the central part of the Academic core (east end of West Campus). Three buildings (H2, M3, and M6) of the Medical School will be added to the west end of West Campus. Apartments, A1 through A15, will be located in the north central area of the campus. Family Housing (F34 through F60), Child Development Center South (CDC S), Community Center South (CC S), and the Recreation Building (R) will also be implemented under Phase 2. The West Campus main communications node will be created in Phase 2 to house all voice electronics, data electronics, academic servers and administrative servers. Cable and raceway infrastructure will be extended to link data/communications nodes at building M4 (Phase 1B). The temporary node created under Phase 1A implementation will be consolidated at this main node location. Buildings involved during Phase 2 development and their corresponding communications raceways are shown on Figure 12-2.

13.9.5 Phase 3

Under Phase 3, seven academic buildings (W16, W17, W18, W19, W20, W21, and W22) will be constructed generally in the south part of the Academic core (east end of West Campus). Also, Apartments, A16 through A31, will be located in the central area of the campus. Medical School buildings (H1, M2, M5, M7, MOB5, MOB6, and MOB7) will be implemented on the west end of

West Campus. Buildings involved in Phase 3 development and their corresponding communications raceways are shown on Figure 12-3.

13.9.6 Phase 4

Under Phase 4, ten academic buildings (W9, W10, W11, W12, W13, W23, W24, W25, W26, and W27) will be constructed generally in the southeast part of the Academic core (east end of West Campus). Medical School buildings (M1, MOB1, MOB2, MOB3, and MOB4) will be added to the west end of West Campus. Buildings involved in Phase 4 development and their corresponding communications raceways are shown on Figure 12-4.

13.10 Recommended Data/Telecommunications System Implementation Plan

There is no distinct advantage for establishing the main data/communications node adjacent to the central plant as in the case of main power distribution equipment. The logical location for the first node appears to be next to or at the Recreation Building, near the center of the West Campus. The facility can be built as an independent structure and eventually attached to the Recreation Building if the two structures cannot be built at the same time due to phasing and programming requirements.

A limited multiple node configuration, implemented during Phase 1B and 2, is preferred to allow necessary adjustment to synchronize with technology evolution without abandoning large quantities of existing equipment/infrastructure investment.

All telecommunications traffic will have a redundant path. Redundant Central Office (CO) trunks and connectivity to the Internet from the Telecom building on the East and an additional Telecom building on the West will be designed and implemented.

The telecommunications cabling will be routed through separate and common manholes and backbone raceway systems in looped configuration, sometimes known as dual homing, or redundant rings. This method will further enhance the reliability of the infrastructure.

The telecommunications infrastructure, installed underground, will be in a multi-loop configuration. Additional loops can be added following the West Campus phased implementation. New and existing loops will share common manholes to allow multiple pathways to each building to enhance flexibility and reliability.

The major communication pathway loop will be planned along the NW Mall and SW Mall in a figure 8 configuration.

This routing is optimal to serve buildings, both within the “Figure 8” loops, and to extend out from the “Figure 8” loop, using branch connections to the main infrastructure loop. Future buildings constructed under different phases will be required to install all required duct banks for branch connections to the main infrastructure loops as part of their project budget.

13.10 Codes and Standards

All data/telecommunications system work will comply with the latest editions of the following codes and standards:

- California Code of Regulations, Title 24
  - Part 3, the California Electrical Code
  - Part 6, the California Energy Code
  - Part 9, the California Fire Code
- National Fire Protection Association (NFPA)
- National Electric Code (NEC)
- National Electrical Manufacturer's Association (NEMA)
- Institute of Electrical and Electronic Engineers (IEEE)
- Electronic Industry Association – EIA
- Telecommunications Industry Association – TIA
- Building Industry Consulting Services International (BICSI)
- American National Standards Institute (ANSI)
- Underwriters Laboratories, Inc. (UL)
- State of California General Order 95 – Rules for Overhead Electrical Line Construction
- State of California General Order 128 – Rules for Construction of Underground Electrical Supply and Communication System.
- University of California Riverside Design Guidelines
- City of Riverside Public Utility Standards
- All local agencies having jurisdiction

13.11 Data/Telecommunication Systems Cost Summary

This study includes conceptual-level cost estimates for data/telecommunications systems development. Details of these cost estimates are included in the Appendix to this report. Costs include mark-ups, sales taxes, and contingencies, but do not include soft costs. See additional notes on the detailed tables.

•	Phase 1A Housing:	$	880,000
•	Phase 1A Campus:	$	1,164,000
•	Phase 1B:	$	7,675,000
•	Phase 1:	$	757,000
•	Phase 2 Housing:	$	0
•	Phase 2 Campus:	$	13,504,000
•	Phase 3:	$	2,425,000
•	Phase 4:	$	1,951,000

Estimated Total for the Build-Out of the Data/Telecommunications Systems: $ 28,356,000

CHAPTER 14

FIRE ALARM SYSTEM

14.1 Existing Fire Alarm Systems

The existing East Campus fire alarm system is a Simplex 4190 addressable system. The system utilizes both the Simplex IDNet and older generation MAPNET II protocol with 2-wire communication circuits. Most buildings on the existing East Campus have manual type fire alarm systems, connected to the Simplex system, with complete smoke detector coverage in buildings completed after 1991.

14.2 Fire Alarm System Basis of Design

The new West Campus fire alarm systems will be a multiplex, solid-state, automatic and manual systems with addressable devices. Fire alarm systems will comply with NFPA, CFC, CEC, and University life/safety requirements. Equipment will be UL- and CSFM-listed, power-limited, electrically supervised systems with battery back-up.

System component will include control panels, remote annunciator panels, manual pull stations, audio alarm devices, visual alarm units, sprinkler flow and tamper switches, smoke detectors, heat detectors, terminal cabinets, and wiring.

14.2.1 Initiating Devices

- All areas will be protected by smoke detectors in every room. Design and installation of automatic fire detectors will conform to NFPA 72.
- Provide smoke detectors at each elevator lobby and both heat and smoke detectors in elevator machine rooms. Smoke detectors will be used to recall elevator cars to pre-assigned floor levels.
- Area smoke detectors will be programmed through relay interface to control fire/smoke dampers and to shut down the HVAC systems.
- Provide flow and tamper switches at each sprinkler flow valve. Flow and tamper switches will be zoned individually per building and per floor level. Provide a separately zoned tamper switch at each post indicating valve.
- Install manual pull stations in areas required by code.
- A voice evacuation system will be provided in high-rise buildings and assembly areas with occupancy of 1,000 or more.

14.2.2 Alarm Devices

- Provide sufficient audible device coverage for all areas per NFPA 72.
- Visual alarm strobes will be provided in all public areas and toilets per ADA requirements.
- Visual alarm strobes will be mounted at 80 inches above finished floor (AFF) or 6 inches under the ceiling, whichever is lower.

14.2.3 Fire Alarm System Wiring

- Wiring will be in dedicated conduit separated from all other systems. Fire alarm system wiring will not be spliced. Wiring will be continuous between devices. Most interior addressable systems require one twisted shielded pair of #18 AWG for each addressable loop.
- All underground conduits will be encased in concrete 3 inches thick on all sides with 1-1/2-inch minimum separation between signal conduits and 12-inch separation from power conduits. Minimum depth of underground conduits will be 24 inches to the top of concrete encasement.
- Multi mode fiber optics will be used for exterior networking cable.

14.3 Fire Alarm System Architecture

The fire alarm system for the West Campus will utilize existing proprietary Simplex fire alarm communication protocol. This type of fire alarm system is well-suited for large campus applications like UC Riverside's West Campus.

14.4.1 Criteria for Analysis

The criteria for developing and analyzing the West Campus fire alarm system configuration include the following:

- System requirements
- Demands and capacities
- Phasing implications
- Cost

14.4.2 System Requirements

The fire alarm system will be designed to be backward compatible with the existing system on East Campus. The system will have the capability to support equipment load growth through the build-out year 2025, with a margin of spare capacity.

14.4.4 Demands and Capacities

The fire alarm system will have the capacity, including all addressable points, to cover smoke detectors, manual pull stations, and control and monitoring modules, required for all phases of construction.

14.4.5 Phasing Implications

The construction of West Campus buildings is estimated to spread over a period of approximately 18 years. Equipment compatibility is crucial to ensure proper fire alarm function throughout the years.

14.5 Recommended Fire Alarm System Implementation Plan

The existing proprietary Simplex fire alarm communication protocol will be extended to serve the West Campus. All new fire alarm panels for the West Campus will be properly integrated into the network, and provide two-way communication needed for monitoring and control of all fire alarm and detection functions. The system will be on-site programmable to provide mapping logic for inputs and outputs, and for custom labeling additions and revisions.

All new fire alarm system will be fully automatic with electrically supervised signal-initiating circuits and alarm circuits.

Equipment will include:

- Control panel
- Remote annunciators
- Dual technology – photometric/ionization smoke detector
- Fix rating and rate-of-rise heat detectors
- Audio alarm devices
- Visual alarm devices
- Manual pull stations
- Sprinkler riser flow and tamper switches
- Control and monitoring modules for elevator and mechanical equipment interface

A Class A (style 7) fiber optic communication loop will be utilized for network connection. The underground fire alarm raceway will follow the same pathway of the data/communication backbone.

14.6 Codes and Standards

All fire alarm work will comply with the latest editions of the following codes and standards:

- California Code of Regulations, Title 24
  - Part 3, the California Electrical Code
  - Part 9, the California Fire Code
- National Fire Protection Association (NFPA)
- National Electric Code (NEC)
- National Electrical Manufacturer's Association (NEMA)
- Institute of Electrical and Electronic Engineers (IEEE)
- American National Standards Institute (ANSI)
- Underwriters Laboratories, Inc. (UL)
- University of California Riverside Design Guidelines

14.7 Fire Alarm System Cost Summary

This study includes conceptual-level cost estimates for fire alarm site network system development. Details of these cost estimates are included in the Appendix to this report. Costs include mark-ups, sales taxes, and contingencies, but do not include soft costs. See additional notes on the detailed tables.

- Phase 1A Housing: $ 0
- Phase 1A Campus: $ 364,000
- Phase 1B: $ 161,000
- Phase 1: $ 231,000
- Phase 2 Housing: $ 0
- Phase 2 Campus: $ 459,000
- Phase 3: $ 295,000
- Phase 4: $ 332,000

Estimated Total for the Build-Out of the Fire Alarm Site Network System: $ 1,842,000.

CHAPTER 15

UTILITIES INFRASTRUCTURE PROJECTS COSTS AND IMPLEMENTATION PLAN

15.1 Utilities Infrastructure Projects Costs

15.1.1 Cost Summary of Phased Utilities Infrastructure Projects

Table 15-1. Summary of the Costs of the West Campus Utilities Infrastructure Projects[a]

Utilities Traffic Hardscape Landscape System	Phase 1A Housing, dollars	Phase 1A Campus[c], dollars	Phase 1B, dollars	Phase 1, dollars	Phase 2 Housing, dollars	Phase 2 Campus, dollars	Phase 3, dollars	Phase 4, dollars	Total, dollars
Landscape and Hardscape	9,962,000	6,524,000	2,476,000	5,932,000	8,891,000	25,651,000	18,978,000	20,308,000	98,722,000
Domestic Water and Fire Water	128,000	98,000	167,000	448,000	271,000	569,000	2,886,000	583,000	5,150,000
Irrigation Water	197,000	32,000	80,000	70,000	196,000	236,000	387,000	433,000	1,631,000
Sanitary Sewer	583,000	87,000	57,000	5,000	556,000	346,000	483,000	361,000	2,478,000
Storm Drain	253,000	1,000	0	169,000	541,000	254,000	27,000	0	1,245,000
Traffic	625,000	208,000	345,000	0	208,000	208,000	0	0	1,594,000
Central Plants	0	0	0	12,122,000	0	10,443,000	8,026,000	3,037,000	33,628,000
Chilled Water and Heating Hot Water	0	0	0	3,006,000	0	4,521,000	1,908,000	5,489,000	14,924,000
Energy Management System[b]	0	0	0	150,000	0	175,000	90,000	125,000	540,000
Natural Gas	0	11,000	109,000	367,000	0	298,000	82,000	401,000	1,268,000
Electrical Power Distribution	0	2,306,000	2,812,000	3,320,000	0	9,892,000	7,825,000	5,299,000	31,454,000
Data Telecom-munications	880,000	1,164,000	7,675,000	757,000	0	13,504,000	2,425,000	1,951,000	28,356,000
Fire Alarm System	0	364,000	161,000	231,000	0	459,000	295,000	332,000	1,842,000
Totals	12,628,000	10,795,000[c]	13,882,000	26,577,000	10,663,000	66,556,000	43,412,000	38,319,000	222,832,000

[a] All dollars are in 2008 dollars. Installed unit costs in the cost summary tables include material, sales tax, installation, equipment, programming, subcontractor's mark-up, and design contingency. Costs do not include soft costs, permitting, design fees, and management fees.

[b] It is important to recognize that only the costs of the EMS front end, the central plants' EMS points, and the EMS backbone around campus are included here. Only these EMS costs are related to utilities infrastructure projects. The vast majority of EMS costs (not included here) will not be part of the utilities infrastructure projects, but rather will be part of the individual building projects.

[c] The Phase 1A Campus total cost includes the covering (piping) and landscaping of Gage Canal over its entire length on West Campus, including on the CalTrans property.

15.1.2 Aggressive Sustainability Impact on Central Plant Costs

If an aggressive sustainability implementation strategy for all West Campus buildings is maintained by UC Riverside throughout West Campus development, then there will be an estimated first cost savings of about $5,711,000 in central plant development and CHW and HHW piping distribution. The estimated total first cost for the build-out of the central plants and CHW and HHW distribution systems decreases from $48,552,000 without aggressive sustainability implementation to $42,841,000 with aggressive sustainability. (See Table 15-2.) As such, it can be seen that an aggressive sustainability implementation strategy for all West Campus buildings will have both first cost savings and on-going energy savings.

Table 15-2. Summary of the Costs of the Central Plants with Aggressive Sustainability Implementation

Utilities Traffic Hardscape Landscape System	Phase 1A, dollars	Phase 1B, dollars	Phase 1, dollars	Phase 2, dollars	Phase 3, dollars	Phase 4, dollars	Total, dollars
Central Plants	0	0	10,319,000	9,340,000	6,320,000	2,281,000	28,260,000
Chilled Water and Heating Hot Water	0	0	2,924,000	4,452,000	1,859,000	5,346,000	14,581,000

15.1.3 General Assumptions on Costs of Phased Utilities Infrastructure Projects

It is important to understand some of the general assumptions associated with the development of the costs of the phased utilities infrastructure projects. These are listed below.

- See Appendix A-9 for cost summary tables and background data used to develop costs for each utility, landscape/hardscape, and traffic.

- All dollars are expressed in 2008 dollars.

- Installed unit costs in the cost summary tables include material, sales tax, installation, equipment, programming, subcontractor's mark-up, and design contingency (10%).

- Costs do not include soft costs, permitting, design fees, management fees, building risk insurance, and phasing requirements within each packaged utilities infrastructure project.

- Landscape, plaza or path costs do not include any costs within a 10-foot offset of each master plan footprint. Such costs assumed to be within building budgets.

- The Phase 1A Campus total cost includes the covering (piping) and landscaping of Gage Canal over its entire length on West Campus, including on the CalTrans property. Phase 1A Campus total cost also includes the EMS for Building W4. This is actually a building cost, which should be backed out of the Phase 1A Campus total cost.

- Landscape costs for W4 allow for bioswale landscape.

- Landscape costs items include the following:

Landscape
  - Sod or seeded finish lawn, irrigated (includes soil preparation)
  - Shrubs and groundcover, irrigated (where applicable)

Trees
  - 3" caliper trees from UCR Plant List

Landscape Lighting
  - Pedestrian-scale light poles or bollards
  - 277/480V connecting to nearby building panels

Plazas
  - Concrete paving with unit paver details
  - seat walls
  - 3" caliper trees in planters
  - furnishings (benches, trash, bike racks)
  - pedestrian-scale lighting

Paths
  - 6' concrete (housing areas) or 10' concrete (academic areas)
  - Limited Furnishings (benches, trash cans, bicycle racks)

NW/SW Pedestrian Walks
  - 30' concrete walk with special paver bands or details
  - furnishings (benches, trash, bike racks)
  - shrubs and groundcover on edges
  - 3" caliper trees 30' on-center

Temporary Gage Canal Path

- 10’ asphalt path, no furnishings

Gage Canal Piping

- Temporary water diversion dam
- Demolition of the original Gage Canal
- Wet soil removal and disposal
- Sub-grade preparation
- Control points surveying, engineering and testing costs
- Importing of clean fill to meet grades and cover the pipes
- Installation and grouting of two fifty-four inch reinforced concrete pipes
- Upstream and downstream transition structures
- Fencing
- City of Riverside and Gage Canal plan check and legal fees.

Interim Gage Canal Landscape

- Sod or seeded finish lawn, irrigated

Final Gage Canal Landscape

- Naturalistic shrubs, trees
- Dry wash/arroyo
- Pedestrian bridges and furnishings

Type 1 Roads

- 24’ concrete paving and sub-grade
- concrete curbs and gutters
- 10’ sidewalks both sides
- 6' tree lawns
- 3" caliper street trees 30' on center
- street lighting 70’ on-center
- signage

Type 2 Roads

- 24’ asphalt paving and sub-grade
- concrete curbs and gutters
- 8’ sidewalks both sides
- 5' tree lawns
- 3" caliper street trees 30' on-center
- street lighting 70’ on-center
- signage

Surface Parking

- Asphalt paving and sub-grade
- Concrete curbs and Gutters
- 3" caliper street trees in planters
- Lighting
- signage and striping
- 6’ internal pedestrian circulation walks

MLK Stormwater Planting

- Naturalistic shrubs, trees

Recreation Fields

- Sod or seeded finish lawn, irrigated
- Athletic furnishings (benches, backstops, goalposts)
- Lighting
- Fencing
- Changing rooms/restrooms/drinking fountains not included

- Domestic water and fire water system material unit prices derived from "2008 California Heavy Construction Costs", and are shown in the Water Cost Summary table (Material Unit Costs tab) in Appendix A-9. Material costs for each item are listed in the column headed "Material."

- Irrigation water system material unit prices derived from "2008 California Heavy Construction Costs", and are shown in the Irrigation Cost Summary table (Material Unit Costs tab) in Appendix A-9. Material costs for each item are listed in the column headed "Material."

- Sanitary sewer system material unit prices derived from "2008 California Heavy Construction Costs", and are shown in the Sewer Cost Summary table (Material Unit Costs tab) in Appendix A-9. Material costs for each item are listed in the column headed "Material."

- Storm drain system material unit prices derived from "2008 California Heavy Construction Costs", and are shown in the Storm Drain Cost Summary table (Material Unit Costs tab) in Appendix A-9. Material costs for each item are listed in the column headed "Material."

- Mechanical equipment costs, piping costs, other mechanical costs, and gas piping costs were derived from estimates provided from mechanical equipment suppliers, from recently estimated campus central plant and infrastructure projects, and from the Means cost estimating guide. Mechanical equipment costs are presented in the Mechanical Equipment Costs table in Appendix A-9.

- Only the costs of the EMS front end, the central plants' EMS points, and the EMS backbone around campus are included here. Only these EMS costs are related to utilities infrastructure projects. The vast majority of EMS costs (not included here) will not be part of the utilities infrastructure projects, but rather will be part of the individual building projects.

- EMS costs were based on other California university building examples for which the same EMS point coverage and philosophy were used. Approximately 9.6 points per 1,000 square feet was used. Cost per point was $405. This includes the controls subcontractor's mark-up but not the general contractor's mark-up; and, being a bid, is after consideration of design and construction contingency. The EMS cost per VAV box, installed and programmed, was $1,500.

- Electrical, data, and fire alarm system costs were developed from estimates provided from electrical equipment suppliers and from the Means cost estimating guide.

15.2 Utilities Infrastructure Projects Implementation Plan

This section groups all the various infrastructure projects for each utility/traffic/landscape/hardscape into a packaged utilities infrastructure project for each phase. Total cost is $222,832,000 without escalation factors. The narratives of the various utilities infrastructure projects follows. That is, in turn, followed by tabularized format for the various utilities infrastructure projects.

15.2.1 UTILITIES INFRASTRUCTURE PROJECT #1: Phase 1A Housing

The Phase 1A Housing Packaged Utilities Infrastructure Project (UTILITIES INFRASTRUCTURE PROJECT #1) includes the sub-projects listed below. Also, see Table 15-3.

Total cost in 2008 dollars is estimated to be $12,628,000. Assuming the mid-point of construction of this project to be in 2010, and a 4% annual escalation factor, this project is projected to cost $13,658,000. Design is expected to take about 9 months and construction is expected to take about 1.5 years.

15.2.1.1 Landscape/Hardscape

- Family Student Housing North landscape, site clearing, site grading and preparation, trees, landscape lighting, and paths

- CDC North landscape, site clearing, site grading and preparation, trees, landscape lighting, and paths

- Type 2 Roads (NW Mall west of Iowa Avenue (both sides, including median)

- Type 2 Roads (Family Student Housing North)

- Surface Parking CDC North (funded separately)

15.2.1.2 Domestic Water and Fire Water System

- Construct an 8-inch waterline to the north of the Family Student Housing North and then southerly along Cranford Avenue to the intersection of the entrance street to the Family Student Housing project where it connects to the existing City waterline (see Figure 3.4).

15.2.1.3 Irrigation Water System

- Construct 8-inch and 6-inch PVC irrigation water pipe from existing agricultural water line at Node J94 (see Figure 4.3) to Family Student Housing North

15.2.1.4 Sanitary Sewer System

- Construct 8-inch PVC sewer mains and 6-inch PVC sewer laterals for Family Student Housing North (see Figure 5.2.1). Sewer mains generally flow westerly to Cranford Avenue (McKinley Avenue) then northerly to the existing City sewer system located at the intersection of Cranford Avenue and Everton Place.

15.2.1.5 Storm Drain System

- Construct 18-inch to 42-inch RCP, manholes, catch basins, and junction structure south of Family Student Housing North. Construct concrete v-ditch and parkway culvert west of Family Student Housing North (see Figure 6.2.1).

15.2.1.6 Traffic Control

- Provide traffic signalization at Iowa Avenue at NW Mall

- Provide traffic signalization at Iowa Avenue at Everton Place (one-half the cost attributable to Family Housing North and one-half the cost attributable to Campus)

15.2.1.7 Central Plants

- No work

15.2.1.8 Chilled Water and Heating Hot Water Distribution Systems

- No work

15.2.1.9 Energy Management System

- No work related to utilities infrastructure

15.2.1.10 Natural Gas System

- No utilities infrastructure work. Family Student Housing North will be served directly by SCG, and the housing units will be individually-metered by SCG.

15.2.1.11 Electrical Power Distribution System

- No utilities infrastructure work. The Family Student Housing North electrical system will be directly connected to the Utility Company power grid, and the housing units will be individually-metered by the electrical utility.

15.2.1.12 Data/Telecommunications System

- Provide a temporary communications node in the Family Student Housing North F20.

- Provide an uninterruptible power system for the communications node.
- Provide a conduit duct bank connecting to the existing conduit stub-out at Iowa Avenue.

15.2.1.13 Fire Alarm System

- No utilities infrastructure work. The Family Student Housing North fire alarm system will be a stand-alone fire alarm system provided as part of that building project.

15.2.2 UTILITIES INFRASTRUCTURE PROJECT #2: Phase 1A Campus

The Phase 1A Campus Packaged Utilities Infrastructure Project (UTILITIES INFRASTRUCTURE PROJECT #2) includes the sub-projects listed below. Also, see Table 15-4.

Total cost in 2008 dollars is estimated to be $10,795,000. Assuming the mid-point of construction of this project to be in 2010, and a 4% annual escalation factor, this project is projected to cost $11,676,000. Design is expected to take about 9 months and construction is expected to take about 18 months.

15.2.2.1 Landscape/Hardscape

- Building W4 landscape, site clearing, site grading and preparation, trees, landscape lighting, paths, and plazas
- Gage Canal covering, landscape, site clearing, site grading and preparation, trees, landscape lighting, paths, and plazas associated with Building W4
- Type 2 Roads (Half-Street Improve Everton Place--Iowa to Caltrans)
- Type 2 Roads (Everton Place through Caltrans to circle east of W4)
- Traffic circle/turnaround east of Building W4
- Temporary 8-foot asphalt path to Lot 30
- Surface Parking P2 (funded separately)
- Surface Parking Highlander Footprint (additional to existing lot) (funded separately)

15.2.2.2 Domestic Water and Fire Water System

- Construct a 10-inch water main from the City connection easterly in Everton Place and then southerly as a 12-inch waterline in the proposed street to provide service to building W4 (see Figure 3.4). This will be a temporary connection.

15.2.2.3 Irrigation Water System

- Construct an 8-inch PVC irrigation water pipe from existing agricultural water line at Node J48 (see Figure 4.3) to Building W4

15.2.2.4 Sanitary Sewer System

- Construct an 8-inch PVC sewer main in Everton Place and the access road to Building W4. Connect the 8-inch PVC sewer main to the east end of the existing City sewer main in Everton place.

- Construct a 6-inch PVC sewer lateral (see Figure 5.2.2) to Building W4.

15.2.2.5 Storm Drain System

- Construct a 1,000-foot bioswale surrounding Building W4 to divert water away from the building and disperse it to sheet flow, similar to preconstruction conditions (see Figure 6.2.2).

15.2.2.6 Traffic Control

- Provide traffic signalization at Iowa Avenue at Everton Place (one-half the cost attributable to Family Housing North and one-half the cost attributable to Campus)

15.2.2.7 Central Plants

- No work

15.2.2.8 Chilled Water and Heating Hot Water Distribution Systems

- No work

15.2.2.9 Energy Management System

- No work related to utilities infrastructure

15.2.2.10 Natural Gas System

- Provide a 2-inch gas pipe and meter for Building W4 from a connection at the Everton Place 2-inch SCG gas line, northeast of International Village.

15.2.2.11 Electrical Power Distribution System

- Provide new 12.47 kV switchgear adjacent to the Utility Company substation

- Extend primary circuits to Building W4

- Provide new electrical conduit duct bank

15.2.2.12 Data/Telecommunications System

- Provide a temporary communications node in Building W4.
- Install conduit duct bank from the existing communications building near Utility Company to new Building.

15.2.2.13 Fire Alarm System

- Connect the new fire alarm system at Building W4 to the Campus fire alarm network.

15.2.3 UTILITIES INFRASTRUCTURE PROJECT #3: Phase 1B

The Phase 1B Packaged Utilities Infrastructure Project (UTILITIES INFRASTRUCTURE PROJECT #3) includes the sub-projects listed below. Also, see Table 15-5.

Total cost in 2008 dollars is estimated to be $13,882,000. Assuming the mid-point of construction of this project to be in 2011, and a 4% annual escalation factor, this project is projected to cost $15,615,000. Design is expected to take about 9 months and construction is expected to take about 18 months.

15.2.3.1 Landscape/Hardscape

- Building M4 landscape, site clearing, site grading and preparation, trees, landscape lighting, paths, and plazas
- Type 2 Roads (Cranford to NW Mall (48' paved))
- Surface parking PM (funded separately)

15.2.3.2 Domestic Water and Fire Water System

- Construct an 8-inch waterline, valves, and fire hydrants in Cranford Avenue from the Family Student Housing connection, southerly to Northwest Mall.
- Continue the 8-inch waterline, valves, and fire hydrants easterly in Northwest Mall to Building F20.
- Construct a 10-inch waterline, valves, and fire hydrants southerly in Cranford Avenue to Southwest Mall and Building M4 (see Figure 3.5).

15.2.3.3 Irrigation Water System

- Construct an 8-inch PVC irrigation water pipe at Node J42 (see Figure 4.4) of the Phase 1A irrigation system southerly to Building M4

15.2.3.4 Sanitary Sewer System

- Construct an 8-inch PVC sewer main in Cranford Avenue connecting to the Phase 1A sewer main.

- Construct a 6-inch PVC sewer lateral (see Figure 5.3) to Building M4.

15.2.3.5 Storm Drain System

- Not applicable. Site should be graded to drain away from building. Water will sheet flow to existing drainage facilities adjacent to site.

15.2.3.6 Traffic Control

- Provide traffic signalization at Cranford Avenue at MLK Jr. Blvd.

15.2.3.7 Central Plants

- No work

15.2.3.8 Chilled Water and Heating Hot Water Distribution Systems

- No work

15.2.3.9 Energy Management System

- No work related to utilities infrastructure

15.2.3.10 Natural Gas System

- Provide a 6-inch gas pipe and meter for Building M4 at the Medical School from the connection at the MLK Jr. Blvd. 4-inch SCG gas line, halfway between Chicago Avenue and Iowa Avenue. The gas pipe branch directly to Building M4 will be 1-inch, but the 6-inch gas pipe is sized for the Medical School Central Plant, which will be first implemented in Phase 2.

15.2.3.11 Electrical Power Distribution System

- Provide new circuit breakers at main 12.47 kV switchgear.

- Extend primary circuits to Building M4.

- Provide additional electrical conduit duct bank.

15.2.3.12 Data/Telecommunications System

- Extend communications network to the new communications node in Building M4.

- Provide additional communications conduit duct bank.
- Provide redundant generators to serve the communications node.
- Provide an uninterruptible power system with batteries to serve the communications node.

15.2.3.13 Fire Alarm System

- Connect the new fire alarm system at Building M4 to the Campus fire alarm network.

15.2.4 UTILITIES INFRASTRUCTURE PROJECT #4: Phase 1

The Phase 1 Packaged Utilities Infrastructure Project (UTILITIES INFRASTRUCTURE PROJECT #4) includes the sub-projects listed below. Also, see Table 15-6.

Total cost in 2008 dollars is estimated to be $26,577,000. Assuming the mid-point of construction of this project to be in 2013, and a 4% annual escalation factor, this project is projected to cost $32,335,000. Design is expected to take about 12 months and construction is expected to take about 24 months.

15.2.4.1 Landscape/Hardscape

- Landscape, site clearing, site grading and preparation, trees, landscape lighting, paths, and plazas associated with Phase 1 building projects
- Type 1 Roads (Vehicular Malls)--NW Mall east of Iowa Avenue, both sides
- Type 2 Roads (West UNEX half-street)
- NW Pedestrian Walk
- UNEX/Conference Center landscape, site clearing, site grading and preparation
- North Gage Canal landscape, site clearing, site grading and preparation, trees, landscape lighting, and paths

15.2.4.2 Domestic Water and Fire Water System

- Connect to the existing 12-inch UCR water main in West Campus Drive near Hinderaker Hall.
- Construct a 12-inch transmission main from the West Campus Drive connection westerly under the freeway to the 12-inch waterline in the proposed street near Building W3.
- Construct a 10-inch line in Everton Place from the end of the 10-inch line westerly of Gage Canal to Iowa Avenue and connect to the 8-inch line.

- Disconnect the temporary City connection near Building W1.
- Disconnect the temporary City connection in Everton Place and Iowa Avenue.
- Re-valve the City connection in Cranford Avenue near Building F2. This connection will be used for a secondary water supply connection and provide emergency backup.

15.2.4.3 Irrigation Water System

- Connect PVC irrigation water pipe at Node J30 (see Figure 4.5) and run 8-inch pipe northerly to a 6-inch pipe running westerly

15.2.4.4 Sanitary Sewer System

- Connect 6-inch PVC sewer laterals from Phase 1 buildings to existing 8-inch PVC sewer mains installed in previous phases.

15.2.4.5 Storm Drain System

- Construct 18-inch to 30-inch RCP, manholes, catch basins, and curb inlets south of Phase 1 buildings in the Northwest Mall connecting to the Phase 1A storm drain at Iowa Avenue south of Family Student Housing North (see Figures 6.3.1 and 6.3.2).

15.2.4.6 Traffic Control

- No work

15.2.4.7 Central Plants

- Construct the Main Central Plant building
- Provide two 800-ton electrical centrifugal chillers at the Main Central Plant
- Provide two 1,900-ton cooling tower cells at the Main Central Plant
- Provide one 30,000 ton-hour, above-ground, insulated, welded-steel, CHW TES tank at the Main Central Plant
- Provide two 1,280 gpm primary CHW pumps at the Main Central Plant
- Provide two 2,000 gpm secondary CHW pumps at the Main Central Plant
- Provide two 2,240 gpm condenser water pumps at the Main Central Plant
- Provide two 10-MMBtuh gas-fired boilers at the Main Central Plant
- Provide two 340 gpm primary HHW pumps at the Main Central Plant

- Provide two 1,000 gpm secondary HHW pumps at the Main Central Plant

- Provide associated piping, electrical, and appurtenances at the Main Central Plant

15.2.4.8 Chilled Water and Heating Hot Water Distribution Systems

- Provide an Academic Core utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-1 and 9-5, from the Main Central Plant, west towards building W5, north along the east side of buildings W3/W4/W5, west along the north side of building W3, and west along the south side of buildings W1 and UNEX, terminating just southeast of UNEX. Connect Building W4, constructed under Phase 1A, to central plant service. Retain its building chiller and boiler plant in standby.

15.2.4.9 Energy Management System

- Provide the front end of the EMS at the Main Central Plant and the Main Central Plant EMS points

- Provide the EMS backbone in the Academic Core utilities tunnel for service to the Phase 1A, 1B, and 1 buildings.

15.2.4.10 Natural Gas System

- Provide a 6-inch gas pipe and meter for the Main Campus Central Plant from the connection at the Canyon Crest 4-inch SCG gas line, just southwest of I-215. In addition, provide a second 6-inch gas pipe from the connection at the Everton Place 2-inch SCG gas line, northeast of International Village. This second tap is for various Phase 1 Main Campus buildings along that route and for additional central plant gas reliability. This second line will be installed in the utilities tunnel.

15.2.4.11 Electrical Power Distribution System

- Provide new circuit breakers at main 12.47 kV switchgear.

- Extend primary circuits to Phase 1 Buildings.

- Provide additional electrical conduit duct bank.

- Install new electrical conduit in the utilities tunnel.

15.2.4.12 Data/Telecommunications System

- Extend communications duct bank to Phase 1 Buildings.

- Provide additional communications conduit duct bank.

- Install new communications conduit in the utilities tunnel.

15.2.4.13 Fire Alarm System

- Connect new fire alarm system to Campus fire alarm network.

15.2.5 UTILITIES INFRASTRUCTURE PROJECT #5: Phase 2 Housing

The Phase 2 Housing Packaged Utilities Infrastructure Project (UTILITIES INFRASTRUCTURE PROJECT #5) includes the sub-projects listed below. Also, see Table 15-7.

Total cost in 2008 dollars is estimated to be $10,663,000. Assuming the mid-point of construction of this project to be in 2018, and a 4% annual escalation factor, this project is projected to cost $15,784,000. Design is expected to take about 9 months and construction is expected to take about 18 months.

15.2.5.1 Landscape/Hardscape

- Family Student Housing South landscape, site clearing, site grading and preparation, trees, landscape lighting, and paths
- CDC South landscape, site clearing, site grading and preparation, trees, landscape lighting, and paths
- Apartments landscape, site clearing, site grading and preparation, trees, landscape lighting, and paths
- Type 2 Roads (Family Student Housing South)
- Surface Parking Family Housing South
- Surface Parking CDC South

15.2.5.2 Domestic Water and Fire Water System

- Construct 10-inch waterlines in the Southwest Mall and surrounding Family Student Housing South (see Figure 3.7).

15.2.5.3 Irrigation Water System

- Construct 8-inch and 10-inch PVC irrigation water pipes encircling Family Student Housing South. Connect at Node J70 (see Figure 4.6).

15.2.5.4 Sanitary Sewer System

- Construct 8-inch PVC sewer mains and 6-inch PVC sewer laterals for Family Student Housing South (see Figure 5.5.1). Sewer mains generally flow westerly to Cranford Avenue (McKinley Avenue) then southerly to the existing sewer system located parallel and adjacent to Martin Luther King Jr. Boulevard.

15.2.5.5 Storm Drain System

- Construct 18-inch to 48-inch RCP, manholes, catch basins, grate inlets, trapezoidal swales, and junction structures north and south of Family Student Housing South (see Figure 6.4.1).

15.2.5.6 Traffic Control

- Provide traffic signalization at Iowa Avenue at SW Mall (one-half the cost attributable to Family Housing South and one-half the cost attributable to Campus)

15.2.5.7 Central Plants

- No work

15.2.5.8 Chilled Water and Heating Hot Water Distribution Systems

- No work

15.2.5.9 Energy Management System

- No work

15.2.5.10 Natural Gas System

- No utilities infrastructure work. Family Student Housing South will be served directly by SCG, and the housing units will be individually-metered by SCG.

15.2.5.11 Electrical Power Distribution System

- No utilities infrastructure work. The Family Student Housing South electrical system will be directly connected to the Utility Company power grid, and the housing units will be individually-metered by the electrical utility.

15.2.5.12 Data/Telecommunications System

- No utilities infrastructure work.

15.2.5.13 Fire Alarm System

- No utilities infrastructure work. The Family Student Housing South fire alarm system will be a stand-alone fire alarm system provided as part of that building project.

15.2.6 UTILITIES INFRASTRUCTURE PROJECT #6: Phase 2 Campus

The Phase 2 Campus Packaged Utilities Infrastructure Project (UTILITIES INFRASTRUCTURE PROJECT #6) includes the sub-projects listed below. Also, see Table 15-8.

Total cost in 2008 dollars is estimated to be $66,556,000. Assuming the mid-point of construction of this project to be in 2018, and a 4% annual escalation factor, this project is projected to cost $98,519,000. Design is expected to take about 18 months and construction is expected to take about 30 months.

15.2.6.1 Landscape/Hardscape

- Academic Core landscape, trees, landscape lighting, paths, and plazas
- Conference Center landscape, trees, landscape lighting, paths, and plazas
- SW Pedestrian Walk - first segment
- Type 1 Roads (Vehicular Malls) - SW Mall, both sides
- Type 2 Roads
- MLK stormwater landscape
- Recreation fields landscape, site clearing, site grading and preparation, and trees
- Recreation fields surface parking (funded separately)
- Surface parking P4 (funded separately)

15.2.6.2 Domestic Water and Fire Water System

- Construct a 12-inch water main, valves, and fire hydrants in the proposed street from Building W4 to Building W9 (see Figure 3.7).
- Construct a 10-inch waterline, valves, and fire hydrants in the proposed street from Everton Place near the University Extension Building, southerly to the Southwest Mall (see Figure 3.7).
- Construct a 12-inch waterline, valves, and fire hydrants in Southwest Mall from Building W15 to Building W14 (see Figure 3.7).
- Construct an 8-inch waterline, valves, and fire hydrants in the Northwest Mall south of Apartments A1 through A15 (see Figure 3.7).
- Construct a 10-inch waterline, valves, and fire hydrants in the Northwest Mall north of Buildings W7 and W8 (see Figure 3.7).

15.2.6.3 Irrigation Water System

- Construct 6-inch and 8-inch PVC irrigation water pipes from Nodes J36 and J94 (see Figure 4.6) and the existing agricultural irrigation pipe in Iowa Avenue
- Construct 8-inch PVC irrigation water pipes from Node J46 (see Figure 4.6)
- Construct 10-inch PVC irrigation water pipes from Node J52 (see Figure 4.6)

15.2.6.4 Sanitary Sewer System

- Construct 8-inch PVC sewer mains to the east and south of Apartments A1 through A15. Construct 8-inch PVC sewer mains to the west and south of Buildings W7, W15, and W14. Construct 6-inch PVC sewer laterals from the campus buildings to the sewer mains (see Figure 5.5.2). Sewer mains generally flow southwesterly to Cranford Avenue (McKinley Avenue) then southerly to the existing sewer system located parallel and adjacent to Martin Luther King Jr. Boulevard.

15.2.6.5 Storm Drain System

- Construct 18-inch to 48-inch RCP, manholes, catch basins, grate inlets, trapezoidal swales, and junction structures south of Phase 2 campus buildings and adjacent to the north side of Martin Luther King Jr. Boulevard to Iowa Avenue (see Figures 6.4.1 and 6.4.2).

15.2.6.6 Traffic Control

- Provide traffic signalization at Iowa Avenue at SW Mall (one-half the cost attributable to Family Housing South and one-half the cost attributable to Campus)

15.2.6.7 Central Plants

- Provide one 1,600-ton electrical centrifugal chiller at the Main Central Plant
- Provide one 1,900-ton cooling tower cell at the Main Central Plant
- Provide one 2,560 gpm primary CHW pump at the Main Central Plant
- Provide one 2,000 gpm secondary CHW pump at the Main Central Plant
- Provide one 4,480 gpm condenser water pump at the Main Central Plant
- Provide two 20-MMBtuh gas-fired boilers at the Main Central Plant
- Provide two 670 gpm primary HHW pumps at the Main Central Plant
- Provide one 1,000 gpm secondary HHW pump at the Main Central Plant

- Provide associated piping, electrical, and appurtenances at the Main Central Plant
- Construct the Medical School Central Plant building
- Provide two 800-ton electrical centrifugal chillers at the Medical School Central Plant
- Provide two 1,000-ton cooling tower cells at the Medical School Central Plant
- Provide two 1,280 gpm primary CHW pumps at the Medical School Central Plant
- Provide two 1,300 gpm secondary CHW pumps at the Medical School Central Plant
- Provide two 2,240 gpm condenser water pumps at the Medical School Central Plant
- Provide one 10-MMBtuh and two 5-MMBtuh gas-fired boilers at the Medical School Central Plant
- Provide one 340 gpm and two 170 gpm primary HHW pumps at the Medical School Central Plant
- Provide two 500 gpm secondary HHW pumps at the Medical School Central Plant
- Provide associated piping, electrical, and appurtenances at the Medical School Central Plant

15.2.6.8 Chilled Water and Heating Hot Water Distribution Systems

- Extend the Academic Core utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-2 and 9-6, from the Phase 1 terminus just southeast of UNEX, south along the west side of International Village and buildings W7 and W15, east along the south side of buildings W15 and W14, terminating just southeast of building W14.
- Provide a Medical School utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-2 and 9-6, from the Medical School Central Plant, south along the west side of buildings H2, M3, M4, and M6, terminating just southwest of building M6. Connect Building M4, constructed under Phase 1B, to central plant service. Retain its building chiller and boiler plant in standby.

15.2.6.9 Energy Management System

- Provide the Medical School Central Plant EMS front end and the Medical School Central Plant EMS points.
- Extend the EMS backbone in the Academic Core and Medical School utilities tunnels for service to the Phase 2 buildings.

15.2.6.10 Natural Gas System

- Provide a 2-inch gas pipe, which will be tapped off the Everton Place 2-inch SCG gas line, northeast of International Village. This pipe will extend throughout the utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 2 Main Campus buildings along that route.

- Provide a 6-inch gas pipe on the Medical School Campus, from the terminus in Phase 1B southwest of Building M6, and extending north in the utilities tunnel to the Medical School Central Plant.

15.2.6.11 Electrical Power Distribution System

- Provide new circuit breakers at main 12.47 kV switchgear.

- Extend primary circuits to Phase 2 Buildings.

- Provide additional electrical conduit duct bank.

- Install new electrical conduit in the utilities tunnel.

15.2.6.12 Data/Telecommunications System

- Extend communications duct bank to Phase 2 Buildings.

- Provide additional communications conduit ductbank.

- Install new communications conduit in the utilities tunnel.

- Establish main communications node next to Recreation Building (R).

- Provide redundant generators to serve the main communications node.

- Provide an uninterruptible power system with batteries to serve the main communications node.

- Temporary communications nodes created during Phase 1A will be consolidated at the main communications node.

15.2.6.13 Fire Alarm System

- Connect new fire alarm systems to Campus fire alarm network.

15.2.7 UTILITIES INFRASTRUCTURE PROJECT #7: Phase 3

The Phase 3 Packaged Utilities Infrastructure Project (UTILITIES INFRASTRUCTURE PROJECT #7) includes the sub-projects listed below. Also, see Table 15-9.

Total cost in 2008 dollars is estimated to be $43,412,000. Assuming the mid-point of construction of this project to be in 2023, and a 4% annual escalation factor, this project is projected to cost $78,183,000. Design is expected to take about 15 months and construction is expected to take about 27 months.

15.2.7.1 Landscape/Hardscape

- Academic Core landscape, trees, landscape lighting, paths, and plazas
- School of Medicine landscape, trees, landscape lighting, paths, and plazas
- Apartments landscape, trees, landscape lighting, and paths
- Pedestrian bridge across freeway
- Type 2 Roads
- MLK stormwater landscape
- Surface Parking P3 (funded separately)
- Surface Parking PMOB (funded separately)

15.2.7.2 Domestic Water and Fire Water System

- Construct a 10-inch waterline, valves, and fire hydrants adjacent to Martin Luther King Jr. Boulevard from Building W17 to Building W22.
- Construct an 8-inch waterline from Southwest Mall near Building W19 to Martin Luther King Jr. Boulevard.
- Extend the 12-inch waterline in Southwest Mall from Building W18 to the east side of Building W19.
- Construct an 8-inch waterline in Northwest Mall from Cranford Avenue, westerly to the proposed street west of Building H1. Continue the 8-inch waterline southerly in the proposed street to Martin Luther King Jr. Boulevard.
- Construct a 10-inch waterline adjacent to Martin Luther King Jr. Boulevard from Cranford Avenue to Chicago Avenue.

- Connect to the existing 10-inch City waterline in Chicago Avenue. This connection will be used for a secondary water supply connection and provide emergency backup.

- Construct 2,464,500 gallons of water storage. The construction of additional storage facilities should be coordinated with the requirements for storage of the East Campus build-out.

15.2.7.3 Irrigation Water System

- Construct 8-inch PVC irrigation water pipe from Node J80 (see Figure 4.7) to supply the medical buildings

- Construct 8-inch PVC irrigation water pipes from Node J68 of the 10-inch Phase 2 irrigation system (see Figure 4.7)

- Construct 8-inch and 10-inch PVC irrigation water pipes from Node J52 (see Figure 4.7)

- Construct 8-inch and 10-inch PVC irrigation water pipes from Node J56 (see Figure 4.7)

15.2.7.4 Sanitary Sewer System

- Construct 8-inch PVC sewer mains and 6-inch PVC sewer laterals adjacent to the medical buildings located near the intersection of Chicago Avenue and Martin Luther King Jr. Boulevard (see Figure 5.6.1).

- Construct 8-inch PVC sewer mains and 6-inch PVC sewer laterals adjacent to the Campus Buildings W16 through W22 (see Figure 5.6.2).

15.2.7.5 Storm Drain System

- Construct an extension of the east end of the Phase 2 trapezoidal swale just north of Martin Luther King Jr. Boulevard (see Figure 6.5.2).

15.2.7.6 Traffic Control

- No work

15.2.7.7 Central Plants

- Provide one 1,600-ton electrical centrifugal chiller at the Main Central Plant

- Provide one 1,900-ton cooling tower cell at the Main Central Plant

- Provide one 30,000 ton-hour, above-ground, insulated, welded-steel, CHW TES tank at the Main Central Plant

- Provide one 2,560 gpm primary CHW pump at the Main Central Plant

- Provide one 2,000 gpm secondary CHW pump at the Main Central Plant
- Provide one 4,480 gpm condenser water pump at the Main Central Plant
- Provide one 20-MMBtuh gas-fired boiler at the Main Central Plant
- Provide one 670 gpm primary HHW pump at the Main Central Plant
- Provide one 1,000 gpm secondary HHW pump at the Main Central Plant
- Provide associated piping, electrical, and appurtenances at the Main Central Plant
- Provide one 800-ton electrical centrifugal chiller at the Medical School Central Plant
- Provide two 1,000-ton cooling tower cells at the Medical School Central Plant
- Provide one 24,000 ton-hour, above-ground, insulated, welded-steel, CHW TES tank at the Medical School Central Plant
- Provide one 1,280 gpm primary CHW pump at the Medical School Central Plant
- Provide one 1,300 gpm secondary CHW pump at the Medical School Central Plant
- Provide one 2,240 gpm condenser water pump at the Medical School Central Plant
- Provide one 10-MMBtuh gas-fired boiler at the Medical School Central Plant
- Provide one 340 gpm primary HHW pump at the Medical School Central Plant
- Provide two 500 gpm secondary HHW pumps at the Medical School Central Plant
- Provide associated piping, electrical, and appurtenances at the Medical School Central Plant

15.2.7.8 Chilled Water and Heating Hot Water Distribution Systems

- Extend the Academic Core utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-3 and 9-7, south in a spur along the west side of Buildings W16 and W17 for service to those buildings. Also, extend the utilities tunnels and CHWS, CHWR, HHWS, and HHWR piping south in a spur along the west side of Buildings W19 and W21 for service to Buildings W18, W19, W20, W21, and W22.
- Extend the Medical School utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-3 and 9-7, from the Phase 2 terminus just southwest of building M6, west along the north side of buildings M7/MOB7/MOB6, terminating just north of building MOB6.

15.2.7.9 Energy Management System

- Provide EMS points for the expanded central plant systems in the Main Central Plant and the Medical School Central Plant.

- Extend the EMS backbone in the Academic Core and Medical School utilities tunnels for service to the Phase 3 buildings.

15.2.7.10 Natural Gas System

- Extend the 2-inch gas pipe in the Academic Core utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 3 Academic Core and Apartments buildings along that route.

- Extend 2-inch gas pipe in the Medical School utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 3 Medical School buildings along that route.

15.2.7.11 Electrical Power Distribution System

- Provide new circuit breakers at main 12.47 kV switchgear.

- Extend primary circuits to Phase 3 Buildings.

- Provide additional electrical conduit ductbank.

- Install new electrical conduit in the utilities tunnel.

15.2.7.12 Data/Telecommunications System

- Extend the communications duct bank to Phase 3 Buildings.

- Provide additional communications conduit duct bank.

- Install communications conduits in the utilities tunnel.

15.2.7.13 Fire Alarm System

- Connect new fire alarm systems to Campus fire alarm network.

15.2.8 UTILITIES INFRASTRUCTURE PROJECT #8: Phase 4

The Phase 4 Packaged Utilities Infrastructure Project (UTILITIES INFRASTRUCTURE PROJECT #8) includes the sub-projects listed below. Also, see Table 15-10.

Total cost in 2008 dollars is estimated to be $38,319,000. Assuming the mid-point of construction of this project to be in 2028, and a 4% annual escalation factor, this project is projected to cost $83,962,000. Design is expected to take about 15 months and construction is expected to take about 27 months.

15.2.8.1 Landscape/Hardscape

- Academic Core landscape, trees, landscape lighting, paths, and plazas
- Medical Offices landscape, trees, landscape lighting, paths, and plazas
- Apartments landscape, trees, landscape lighting, and paths
- SW Pedestrian Walk - final segment
- Type 2 Roads
- MLK stormwater landscape

15.2.8.2 Domestic Water and Fire Water System

- Extend an 8-inch waterline in Northwest Mall from Building H1 to Building MOB1.
- Extend the 10-inch waterline in Martin Luther King Jr. Boulevard, easterly from Building W22 to Canyon Crest Drive.
- Construct an 8-inch and 10-inch waterline in Southwest Mall, easterly from Building W19 to Canyon Crest Drive.
- Extend the 12-inch waterline in the proposed street from Building W9 to Southwest Mall.
- Construct an 8-inch waterline in Canyon Crest Drive from Martin Luther King Jr. Boulevard to Southwest Mall.
- Construct an 8-inch waterline from Building W9, easterly to the northeast corner of Building W11. This waterline may be required to be installed in an earlier phase depending upon the timing of the plant facilities located between Building W6 and the electrical substation.
- Extend the 8-inch waterline from Building W11, southerly to Southwest Mall.

- Construct a 10-inch waterline in Southwest Mall from Building W13 to Canyon Crest Drive.

- Construct an 8-inch waterline from the existing 8-inch UCR waterline that is under Interstate 215 (see Figure 3.9).

15.2.8.3 Irrigation Water System

- Construct 6-inch PVC irrigation water pipe from Node J82 (see Figure 4.8)

- Construct 10-inch and 12-inch PVC irrigation water pipes from Node J74 (see Figure 4.8) of the Phase 2 irrigation system

- Construct 8-inch and 10-inch PVC irrigation water pipes from Nodes J92, J58, and J63 (see Figure 4.8)

15.2.8.4 Sanitary Sewer System

- Construct 8-inch PVC sewer mains and 6-inch PVC sewer laterals adjacent to the medical buildings located near the intersection of Chicago Avenue and 12th Street (see Figure 5.7.1).

- Construct 8-inch PVC sewer mains and 6-inch PVC sewer laterals adjacent to the Campus Buildings W23 through W27 (see Figure 5.7.2).

15.2.8.5 Storm Drain System

- No work

15.2.8.6 Traffic Control

- No work

15.2.8.7 Central Plants

- Provide one 1,600-ton electrical centrifugal chiller at the Main Central Plant

- Provide one 2,560 gpm primary CHW pump at the Main Central Plant

- Provide two 2,000 gpm secondary CHW pumps at the Main Central Plant

- Provide one 4,480 gpm condenser water pump at the Main Central Plant

- Provide one 20-MMBtuh gas-fired boiler at the Main Central Plant

- Provide one 670 gpm primary HHW pump at the Main Central Plant

- Provide one 1,000 gpm secondary HHW pump at the Main Central Plant

- Provide associated piping, electrical, and appurtenances at the Main Central Plant
- Provide one 800-ton electrical centrifugal chiller at the Medical School Central Plant
- Provide one 1,280 gpm primary CHW pump at the Medical School Central Plant
- Provide one 1,300 gpm secondary CHW pump at the Medical School Central Plant
- Provide one 2,240 gpm condenser water pump at the Medical School Central Plant
- Provide one 10-MMBtuh gas-fired boiler at the Medical School Central Plant
- Provide one 340 gpm primary HHW pump at the Medical School Central Plant
- Provide one 500 gpm secondary HHW pump at the Medical School Central Plant
- Provide associated piping, electrical, and appurtenances at the Medical School Central Plant

15.2.8.8 Chilled Water and Heating Hot Water Distribution Systems

- Extend the Academic Core utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-4 and 9-8, from the Phase 2 terminus just southeast of building W14, east along the north side of building W19 and south side of building W13, north between buildings W13 and W12 and north between buildings W9 and W10, and back to the Main Central Plant, thus completing the loop.
- Extend the Academic Core utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-4 and 9-8, east in a spur between Buildings W12 and W25 for service to Buildings W11 and W27. Also, extend the utilities tunnels and CHWS, CHWR, HHWS, and HHWR piping south between Buildings W23 and W25 and between W24 and W26, to serve those buildings.
- Extend the Medical School utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-4 and 9-8, from the Phase 3 terminus just north of building MOB6, north between buildings MOB3 and MOB4 and north between buildings MOB2 and M1, north along the east side of building MOB1, east along the north side of PMOB (parking structure), and back to the Medical School Central Plant, thus completing the loop.

15.2.8.9 Energy Management System

- Provide EMS points for the expanded central plant systems in the Main Central Plant and the Medical School Central Plant.
- Extend the EMS backbone in the Academic Core and Medical School utilities tunnels for service to the Phase 4 buildings.

15.2.8.10 Natural Gas System

- Extend the 2-inch gas pipe in the Academic Core utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 4 Academic Core buildings along that route. In so doing, it will loop back to the gas pipe in the Main Campus Central Plant.

- Extend 2-inch gas pipe in the Medical School utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 4 Medical School buildings along that route. In so doing, it will loop back to the gas pipe in the Medical School Central Plant.

15.2.8.11 Electrical Power Distribution System

- Provide new circuit breakers at main 12.47 kV switchgear.

- Extend primary circuits to Phase 4 buildings.

- Provide additional electrical conduit duct bank.

- Install new electrical conduit in the utilities tunnel.

15.2.8.12 Data/Telecommunications System

- Extend communications duct bank to Phase 4 buildings.

- Provide additional communications conduit duct bank.

- Install communications conduits in the utilities tunnel.

15.2.8.13 Fire Alarm System

- Connect new fire alarm systems to Campus fire alarm network.

Table 15-3. Tabularized Implementation of UCR West Campus Utilities Infrastructure Project #1 (Phase 1A Housing)

Component	Cost	Specific Sub Project
Utilities Infrastructure Project #1 (Phase 1A Housing) - $12,628,000		
Landscape Hardscape	**$9,962,000**	Family Student Housing North landscape, site clearing, site grading and preparation, trees, landscape lighting, and paths
		CDC North landscape, site clearing, site grading and preparation, trees, landscape lighting, and paths
		Type 2 Roads (NW Mall west of Iowa Avenue (both sides, including median)
		Type 2 Roads (Family Student Housing North)
		Surface Parking CDC North (funded separately)
Domestic Water and Fire Water System	**$128,000**	Construct an 8-inch waterline to the north of the Family Student Housing North and then southerly along Cranford Avenue to the intersection of the entrance street to the Family Student Housing project where it connects to the existing City waterline (see Figure 3.4).
Irrigation Water System	**$197,000**	Construct 8-inch and 6-inch PVC irrigation water pipe from existing agricultural water line at Node J94 (see Figure 4.3) to Family Student Housing North
Sanitary Sewer System	**$583,000**	Construct 8-inch PVC sewer mains and 6-inch PVC sewer laterals for Family Student Housing North (see Figure 5.2.1). Sewer mains generally flow westerly to Cranford Avenue (McKinley Avenue) then northerly to the existing City sewer system located at the intersection of Cranford Avenue and Everton Place.
Storm Drain System	**$253,000**	Construct 18-inch to 42-inch RCP, manholes, catch basins, and junction structure south of Family Student Housing North. Construct concrete v-ditch and parkway culvert west of Family Student Housing North (see Figure 6.2.1).
Traffic Control	**$625,000**	Provide traffic signalization at Iowa Avenue at NW Mall
		Provide traffic signalization at Iowa Avenue at Everton Place (one-half the cost attributable to Family Housing North and one-half the cost attributable to Campus)
Data/Telecommunications System	**$880,000**	Provide a temporary communications node in the Family Student Housing North F20.
		Provide an uninterruptible power system for the communications node.
		Provide a conduit duct bank connecting to the existing conduit stub-out at Iowa Avenue.
Total	**$12,628,000**	

Table 15-4. Tabularized Implementation of UCR West Campus Utilities Infrastructure Project #2 (Phase 1A Campus)

Component	Cost	Specific Sub Project
Utilities Infrastructure Project #2 (Phase 1A Campus) - $10,795,000 [a]		
Landscape Hardscape	**$6,524,000**	Building W4 landscape, site clearing, site grading and preparation, trees, landscape lighting, paths, and plazas
		Gage Canal covering, landscape, site clearing, site grading and preparation, trees, landscape lighting, paths, and plazas associated with Building W4
		Type 2 Roads (Half-Street Improve Everton Place--Iowa to Caltrans)
		Type 2 Roads (Everton Place through Caltrans to circle east of W4)
		Traffic circle/turnaround east of Building W4
		Temporary 8-foot asphalt path to Lot 30
		Surface Parking P2 (funded separately)
		Surface Parking Highlander Footprint (additional to existing lot) (funded separately)
Domestic Water and Fire Water System	**$98,000**	Construct a 10-inch water main from the City connection easterly in Everton Place and then southerly as a 12-inch waterline in the proposed street to provide service to building W4 (see Figure 3.4). This will be a temporary connection.
Irrigation Water System	**$32,000**	Construct an 8-inch PVC irrigation water pipe from existing agricultural water line at Node J48 (see Figure 4.3) to Building W4
Sanitary Sewer System	**$87,000**	Construct an 8-inch PVC sewer main in Everton Place and the access road to Building W4. Connect the 8-inch PVC sewer main to the east end of the existing City sewer main in Everton place.
		Construct a 6-inch PVC sewer lateral (see Figure 5.2.2) to Building W4.
Storm Drain System	**$1,000**	Construct a 1,000-foot bioswale surrounding Building W4 to divert water away from the building and disperse it to sheet flow, similar to preconstruction conditions (see Figure 6.2.2).
Traffic Control	**$208,000**	Provide traffic signalization at Iowa Avenue at Everton Place (one-half the cost attributable to Family Housing North and one-half the cost attributable to Campus)
Natural Gas System	**$11,000**	Provide a 2-inch gas pipe and meter for Building W4 from a connection at the Everton Place 2-inch SCG gas line, northeast of International Village.
Electrical Power Distribution System	**$2,306,000**	Provide new 12.47 kV switchgear adjacent to the Utility Company substation
		Extend primary circuits to Building W4
		Provide new electrical conduit duct bank

Component	Cost	Specific Sub Project
Data/Telecommunications System	**$1,164,000**	Provide a temporary communications node in Building W4.
		Install conduit duct bank from the existing communications building near Utility Company to new Building.
Fire Alarm System	**$364,000**	Connect the new fire alarm system at Building W4 to the Campus fire alarm network.
Total	**$10,795,000** [a]	

[a] The Phase 1A Campus total cost includes the covering (piping) and landscaping of Gage Canal over its entire length on West Campus, including on the CalTrans property.

Table 15-5. Tabularized Implementation of UCR West Campus Utilities Infrastructure Project #3 (Phase 1B)

Component	Cost	Specific Sub Project
Utilities Infrastructure Project #3 (Phase 1B) - $13,882,000		
Landscape Hardscape	**$2,476,000**	Building M4 landscape, site clearing, site grading and preparation, trees, landscape lighting, paths, and plazas
		Type 2 Roads (Cranford to NW Mall (48' paved))
		Surface parking PM (funded separately)
Domestic Water and Fire Water System	**$167,000**	Construct an 8-inch waterline, valves, and fire hydrants in Cranford Avenue from the Family Student Housing connection, southerly to Northwest Mall.
		Continue the 8-inch waterline, valves, and fire hydrants easterly in Northwest Mall to Building F20.
		Construct a 10-inch waterline, valves, and fire hydrants southerly in Cranford Avenue to Southwest Mall and Building M4 (see Figure 3.5).
Irrigation Water System	**$80,000**	Construct an 8-inch PVC irrigation water pipe at Node J42 (see Figure 4.4) of the Phase 1A irrigation system southerly to Building M4
Sanitary Sewer System	**$57,000**	Construct an 8-inch PVC sewer main in Cranford Avenue connecting to the Phase 1A sewer main.
		Construct a 6-inch PVC sewer lateral (see Figure 5.3) to Building M4.
Traffic Control	**$345,000**	Provide traffic signalization at Cranford Avenue at MLK Jr. Blvd.
Natural Gas System	**$109,000**	Provide a 6-inch gas pipe and meter for Building M4 at the Medical School from the connection at the MLK Jr. Blvd. 4-inch SCG gas line, halfway between Chicago Avenue and Iowa Avenue. The gas pipe branch directly to Building M4 will be 1-inch, but the 6-inch gas pipe is sized for the Medical School Central Plant, which will be first implemented in Phase 2.
Electrical Power Distribution System	**$2,812,000**	Provide new circuit breakers at main 12.47 kV switchgear.
		Extend primary circuits to Building M4.
		Provide additional electrical conduit duct bank.
Data/Telecommunications System	**$7,675,000**	Extend communications network to the new communications node in Building M4.
		Provide additional communications conduit duct bank.
		Provide redundant generators to serve the communications node.
		Provide an uninterruptible power system with batteries to serve the communications node.
Fire Alarm System	**$161,000**	Connect the new fire alarm system at Building M4 to the Campus fire alarm network.
Total	**$13,882,000**	

Table 15-6. Tabularized Implementation of UCR West Campus Utilities Infrastructure Project #4 (Phase 1)

Component	Cost	Specific Sub Project
Utilities Infrastructure Project #4 (Phase 1) - $26,577,000		
Landscape Hardscape	**$5,932,000**	Landscape, site clearing, site grading and preparation, trees, landscape lighting, paths, and plazas associated with Phase 1 building projects
		Type 1 Roads (Vehicular Malls)--NW Mall east of Iowa Avenue, both sides
		Type 2 Roads (West UNEX half-street)
		NW Pedestrian Walk
		UNEX/Conference Center landscape, site clearing, site grading and preparation
		North Gage Canal landscape, site clearing, site grading and preparation, trees, landscape lighting, and paths
Domestic Water and Fire Water System	**$448,000**	Connect to the existing 12-inch UCR water main in West Campus Drive near Hinderaker Hall.
		Construct a 12-inch transmission main from the West Campus Drive connection westerly under the freeway to the 12-inch waterline in the proposed street near Building W3.
		Construct a 10-inch line in Everton Place from the end of the 10-inch line westerly of Gage Canal to Iowa Avenue and connect to the 8-inch line.
		Disconnect the temporary City connection near Building W1.
		Disconnect the temporary City connection in Everton Place and Iowa Avenue.
		Re-valve the City connection in Cranford Avenue near Building F2. This connection will be used for a secondary water supply connection and provide emergency backup.
Irrigation Water System	**$70,000**	Connect PVC irrigation water pipe at Node J30 (see Figure 4.5) and run 8-inch pipe northerly to a 6-inch pipe running westerly
Sanitary Sewer System	**$5,000**	Connect 6-inch PVC sewer laterals from Phase 1 buildings to existing 8-inch PVC sewer mains installed in previous phases.
Storm Drain System	**$169,000**	Construct 18-inch to 30-inch RCP, manholes, catch basins, and curb inlets south of Phase 1 buildings in the Northwest Mall connecting to the Phase 1A storm drain at Iowa Avenue south of Family Student Housing North (see Figures 6.3.1 and 6.3.2).

Component	Cost	Specific Sub Project
Central Plants	**$12,122,000**	Construct the Main Central Plant building
		Provide two 800-ton electrical centrifugal chillers at the Main Central Plant
		Provide two 1,900-ton cooling tower cells at the Main Central Plant
		Provide one 30,000 ton-hour, above-ground, insulated, welded-steel, CHW TES tank at the Main Central Plant
		Provide two 1,280 gpm primary CHW pumps at the Main Central Plant
		Provide two 2,000 gpm secondary CHW pumps at the Main Central Plant
		Provide two 2,240 gpm condenser water pumps at the Main Central Plant
		Provide two 10-MMBtuh gas-fired boilers at the Main Central Plant
		Provide two 340 gpm primary HHW pumps at the Main Central Plant
		Provide two 1,000 gpm secondary HHW pumps at the Main Central Plant
		Provide associated piping, electrical, and appurtenances at the Main Central Plant
Chilled Water and Heating Hot Water	**$3,006,000**	Provide an Academic Core utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-1 and 9-5, from the Main Central Plant, west towards building W5, north along the east side of buildings W3/W4/W5, west along the north side of building W3, and west along the south side of buildings W1 and UNEX, terminating just southeast of UNEX. Connect Building W4, constructed under Phase 1A, to central plant service. Retain its building chiller and boiler plant in standby.
Energy Management System	**$150,000**	Provide the front end of the EMS at the Main Central Plant and the Main Central Plant EMS points,
		Provide the EMS backbone in the Academic Core utilities tunnel for service to the Phase 1A, 1B, and 1 buildings.
Natural Gas System	**$367,000**	Provide a 6-inch gas pipe and meter for the Main Campus Central Plant from the connection at the Canyon Crest 4-inch SCG gas line, just southwest of I-215. In addition, provide a second 6-inch gas pipe from the connection at the Everton Place 2-inch SCG gas line, northeast of International Village. This second tap is for various Phase 1 Main Campus buildings along that route and for additional central plant gas reliability. This second line will be installed in the utilities tunnel.
Electrical Power Distribution System	**$3,320,000**	Provide new circuit breakers at main 12.47 kV switchgear.
		Extend primary circuits to Phase 1 Buildings.
		Provide additional electrical conduit duct bank.
		Install new electrical conduit in the utilities tunnel.

Component	Cost	Specific Sub Project
Data/Telecommunications System	**$757,000**	Extend communications duct bank to Phase 1 Buildings.
		Provide additional communications conduit duct bank.
		Install new communications conduit in the utilities tunnel.
Fire Alarm System	**$231,000**	Connect new fire alarm system to Campus fire alarm network.
Total	**$26,577,000**	

Table 15-7. Tabularized Implementation of UCR West Campus Utilities Infrastructure Project #5 (Phase 2 Housing)

Component	Cost	Specific Sub Project
Utilities Infrastructure Project #5 (Phase 2 Housing) - $10,663,000		
Landscape Hardscape	**$8,891,000**	Family Student Housing South landscape, site clearing, site grading and preparation, trees, landscape lighting, and paths
		CDC South landscape, site clearing, site grading and preparation, trees, landscape lighting, and paths
		Apartments landscape, site clearing, site grading and preparation, trees, landscape lighting, and paths
		Type 2 Roads (Family Student Housing South)
		Surface Parking Family Housing South
		Surface Parking CDC South
Domestic Water and Fire Water System	**$271,000**	Construct 10-inch waterlines in the Southwest Mall and surrounding Family Student Housing South (see Figure 3.7).
Irrigation Water System	**$196,000**	Construct 8-inch and 10-inch PVC irrigation water pipes encircling Family Student Housing South. Connect at Node J70 (see Figure 4.6).
Sanitary Sewer System	**$556,000**	Construct 8-inch PVC sewer mains and 6-inch PVC sewer laterals for Family Student Housing South (see Figure 5.5.1). Sewer mains generally flow westerly to Cranford Avenue (McKinley Avenue) then southerly to the existing sewer system located parallel and adjacent to Martin Luther King Jr. Boulevard.
Storm Drain System	**$541,000**	Construct 18-inch to 48-inch RCP, manholes, catch basins, grate inlets, trapezoidal swales, and junction structures north and south of Family Student Housing South (see Figure 6.4.1).
Traffic Control	**$208,000**	Provide traffic signalization at Iowa Avenue at SW Mall (one-half the cost attributable to Family Housing South and one-half the cost attributable to Campus)
Total	**$10,663,000**	

Table 15-8. Tabularized Implementation of UCR West Campus Utilities Infrastructure Project #6 (Phase 2 Campus)

Component	Cost	Specific Sub Project
Utilities Infrastructure Project #6 (Phase 2 Campus) - $66,556,000		
Landscape Hardscape	**$25,651,000**	Academic Core landscape, trees, landscape lighting, paths, and plazas
		Conference Center landscape, trees, landscape lighting, paths, and plazas
		SW Pedestrian Walk - first segment
		Type 1 Roads (Vehicular Malls) - SW Mall, both sides
		Type 2 Roads
		MLK stormwater landscape
		Recreation fields landscape, site clearing, site grading and preparation, and trees
		Recreation fields surface parking (funded separately)
		Surface parking P4 (funded separately)
Domestic Water and Fire Water System	**$569,000**	Construct a 12-inch water main, valves, and fire hydrants in the proposed street from Building W4 to Building W9 (see Figure 3.7).
		Construct a 10-inch waterline, valves, and fire hydrants in the proposed street from Everton Place near the University Extension Building, southerly to the Southwest Mall (see Figure 3.7).
		Construct a 12-inch waterline, valves, and fire hydrants in Southwest Mall from Building W15 to Building W14 (see Figure 3.7).
		Construct an 8-inch waterline, valves, and fire hydrants in the Northwest Mall south of Apartments A1 through A15 (see Figure 3.7).
		Construct a 10-inch waterline, valves, and fire hydrants in the Northwest Mall north of Buildings W7 and W8 (see Figure 3.7).
Irrigation Water System	**$236,000**	Construct 6-inch and 8-inch PVC irrigation water pipes from Nodes J36 and J94 (see Figure 4.6) and the existing agricultural irrigation pipe in Iowa Avenue
		Construct 8-inch PVC irrigation water pipes from Node J46 (see Figure 4.6)
		Construct 10-inch PVC irrigation water pipes from Node J52 (see Figure 4.6)
Sanitary Sewer System	**$346,000**	Construct 8-inch PVC sewer mains to the east and south of Apartments A1 through A15. Construct 8-inch PVC sewer mains to the west and south of Buildings W7, W15, and W14. Construct 6-inch PVC sewer laterals from the campus buildings to the sewer mains (see Figure 5.5.2). Sewer mains generally flow southwesterly to Cranford Avenue (McKinley Avenue) then southerly to the existing sewer system located parallel and adjacent to Martin Luther King Jr. Boulevard.

Component	Cost	Specific Sub Project
Storm Drain System	**$254,000**	Construct 18-inch to 48-inch RCP, manholes, catch basins, grate inlets, trapezoidal swales, and junction structures south of Phase 2 campus buildings and adjacent to the north side of Martin Luther King Jr. Boulevard to Iowa Avenue (see Figures 6.4.1 and 6.4.2).
Traffic Control	**$208,000**	Provide traffic signalization at Iowa Avenue at SW Mall (one-half the cost attributable to Family Housing South and one-half the cost attributable to Campus)
Central Plants	**$10,443,000**	Provide one 1,600-ton electrical centrifugal chiller at the Main Central Plant
		Provide one 1,900-ton cooling tower cell at the Main Central Plant
		Provide one 2,560 gpm primary CHW pump at the Main Central Plant
		Provide one 2,000 gpm secondary CHW pump at the Main Central Plant
		Provide one 4,480 gpm condenser water pump at the Main Central Plant
		Provide two 20-MMBtuh gas-fired boilers at the Main Central Plant
		Provide two 670 gpm primary HHW pumps at the Main Central Plant
		Provide one 1,000 gpm secondary HHW pump at the Main Central Plant
		Provide associated piping, electrical, and appurtenances at the Main Central Plant
		Construct the Medical School Central Plant building
		Provide two 800-ton electrical centrifugal chillers at the Medical School Central Plant
		Provide two 1,000-ton cooling tower cells at the Medical School Central Plant
		Provide two 1,280 gpm primary CHW pumps at the Medical School Central Plant
		Provide two 1,300 gpm secondary CHW pumps at the Medical School Central Plant
		Provide two 2,240 gpm condenser water pumps at the Medical School Central Plant
		Provide one 10-MMBtuh and two 5-MMBtuh gas-fired boilers at the Medical School Central Plant
		Provide one 340 gpm and two 170 gpm primary HHW pumps at the Medical School Central Plant
		Provide two 500 gpm secondary HHW pumps at the Medical School Central Plant
		Provide associated piping, electrical, and appurtenances at the Medical School Central Plant

Component	Cost	Specific Sub Project
Chilled Water and Heating Hot Water	**$4,521,000**	Extend the Academic Core utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-2 and 9-6, from the Phase 1 terminus just southeast of UNEX, south along the west side of International Village and buildings W7 and W15, east along the south side of buildings W15 and W14, terminating just southeast of building W14.
		Provide a Medical School utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-2 and 9-6, from the Medical School Central Plant, south along the west side of buildings H2, M3, M4, and M6, terminating just southwest of building M6. Connect Building M4, constructed under Phase 1B, to central plant service. Retain its building chiller and boiler plant in standby.
Energy Management System	**$175,000**	Provide the Medical School Central Plant EMS front end and the Medical School Central Plant EMS points.
		Extend the EMS backbone in the Academic Core and Medical School utilities tunnels for service to the Phase 2 buildings.
Natural Gas System	**$298,000**	Provide a 2-inch gas pipe, which will be tapped off the Everton Place 2-inch SCG gas line, northeast of International Village. This pipe will extend throughout the utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 2 Main Campus buildings along that route.
		Provide a 6-inch gas pipe on the Medical School Campus, from the terminus in Phase 1B southwest of Building M6, and extending north in the utilities tunnel to the Medical School Central Plant.
Electrical Power Distribution System	**$9,892,000**	Provide new circuit breakers at main 12.47 kV switchgear.
		Extend primary circuits to Phase 2 Buildings.
		Provide additional electrical conduit duct bank.
		Install new electrical conduit in the utilities tunnel.
Data/Telecommunications System	**$13,504,000**	Extend communications duct bank to Phase 2 Buildings.
		Provide additional communications conduit ductbank.
		Install new communications conduit in the utilities tunnel.
		Establish main communications node next to Recreation Building (R).
		Provide redundant generators to serve the main communications node.
		Provide an uninterruptible power system with batteries to serve the main communications node.
		Temporary communications nodes created during Phase 1A will be consolidated at the main communications node.
Fire Alarm System	**$459,000**	Connect new fire alarm systems to Campus fire alarm network.
Total	**$66,556,000**	

Table 15-9. Tabularized Implementation of UCR West Campus Utilities Infrastructure Project #7 (Phase 3)

Component	Cost	Specific Sub Project
Utilities Infrastructure Project #7 (Phase 3) - $43,412,000		
Landscape Hardscape	**$18,978,000**	Academic Core landscape, trees, landscape lighting, paths, and plazas
		School of Medicine landscape, trees, landscape lighting, paths, and plazas
		Apartments landscape, trees, landscape lighting, and paths
		Pedestrian bridge across freeway
		Type 2 Roads
		MLK stormwater landscape
		Surface Parking P3 (funded separately)
		Surface Parking PMOB (funded separately)
Domestic Water and Fire Water System	**$2,886,000**	Construct a 10-inch waterline, valves, and fire hydrants adjacent to Martin Luther King Jr. Boulevard from Building W17 to Building W22.
		Construct an 8-inch waterline from Southwest Mall near Building W19 to Martin Luther King Jr. Boulevard.
		Extend the 12-inch waterline in Southwest Mall from Building W18 to the east side of Building W19.
		Construct an 8-inch waterline in Northwest Mall from Cranford Avenue, westerly to the proposed street west of Building H1. Continue the 8-inch waterline southerly in the proposed street to Martin Luther King Jr. Boulevard.
		Construct a 10-inch waterline adjacent to Martin Luther King Jr. Boulevard from Cranford Avenue to Chicago Avenue.
		Connect to the existing 10-inch City waterline in Chicago Avenue. This connection will be used for a secondary water supply connection and provide emergency backup.
		Construct 2,464,500 gallons of water storage. The construction of additional storage facilities should be coordinated with the requirements for storage of the East Campus build-out.
Irrigation Water System	**$387,000**	Construct 8-inch PVC irrigation water pipe from Node J80 (see Figure 4.7) to supply the medical buildings
		Construct 8-inch PVC irrigation water pipes from Node J68 of the 10-inch Phase 2 irrigation system (see Figure 4.7)
		Construct 8-inch and 10-inch PVC irrigation water pipes from Node J52 (see Figure 4.7)
		Construct 8-inch and 10-inch PVC irrigation water pipes from Node J56 (see Figure 4.7)

Component	Cost	Specific Sub Project
Sanitary Sewer System	**$483,000**	Construct 8-inch PVC sewer mains and 6-inch PVC sewer laterals adjacent to the medical buildings located near the intersection of Chicago Avenue and Martin Luther King Jr. Boulevard (see Figure 5.6.1).
		Construct 8-inch PVC sewer mains and 6-inch PVC sewer laterals adjacent to the Campus Buildings W16 through W22 (see Figure 5.6.2).
Storm Drain System	**$27,000**	Construct an extension of the east end of the Phase 2 trapezoidal swale just north of Martin Luther King Jr. Boulevard (see Figure 6.5.2).
Central Plants	**$8,026,000**	Provide one 1,600-ton electrical centrifugal chiller at the Main Central Plant
		Provide one 1,900-ton cooling tower cell at the Main Central Plant
		Provide one 30,000 ton-hour, above-ground, insulated, welded-steel, CHW TES tank at the Main Central Plant
		Provide one 2,560 gpm primary CHW pump at the Main Central Plant
		Provide one 2,000 gpm secondary CHW pump at the Main Central Plant
		Provide one 4,480 gpm condenser water pump at the Main Central Plant
		Provide one 20-MMBtuh gas-fired boiler at the Main Central Plant
		Provide one 670 gpm primary HHW pump at the Main Central Plant
		Provide one 1,000 gpm secondary HHW pump at the Main Central Plant
		Provide associated piping, electrical, and appurtenances at the Main Central Plant
		Provide one 800-ton electrical centrifugal chiller at the Medical School Central Plant
		Provide two 1,000-ton cooling tower cells at the Medical School Central Plant
		Provide one 24,000 ton-hour, above-ground, insulated, welded-steel, CHW TES tank at the Medical School Central Plant
		Provide one 1,280 gpm primary CHW pump at the Medical School Central Plant
		Provide one 1,300 gpm secondary CHW pump at the Medical School Central Plant
		Provide one 2,240 gpm condenser water pump at the Medical School Central Plant
		Provide one 10-MMBtuh gas-fired boiler at the Medical School Central Plant
		Provide one 340 gpm primary HHW pump at the Medical School Central Plant
		Provide two 500 gpm secondary HHW pumps at the Medical School Central Plant
		Provide associated piping, electrical, and appurtenances at the Medical School Central Plant

Component	Cost	Specific Sub Project
Chilled Water and Heating Hot Water	**$1,908,000**	Extend the Academic Core utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-3 and 9-7, south in a spur along the west side of Buildings W16 and W17 for service to those buildings. Also, extend the utilities tunnels and CHWS, CHWR, HHWS, and HHWR piping south in a spur along the west side of Buildings W19 and W21 for service to Buildings W18, W19, W20, W21, and W22.
		Extend the Medical School utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-3 and 9-7, from the Phase 2 terminus just southwest of building M6, west along the north side of buildings M7/MOB7/MOB6, terminating just north of building MOB6.
Energy Management System	**$90,000**	Provide EMS points for the expanded central plant systems in the Main Central Plant and the Medical School Central Plant.
		Extend the EMS backbone in the Academic Core and Medical School utilities tunnels for service to the Phase 3 buildings.
Natural Gas System	**$82,000**	Extend the 2-inch gas pipe in the Academic Core utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 3 Academic Core and Apartments buildings along that route.
		Extend 2-inch gas pipe in the Medical School utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 3 Medical School buildings along that route.
Electrical Power Distribution System	**$7,825,000**	Provide new circuit breakers at main 12.47 kV switchgear.
		Extend primary circuits to Phase 3 Buildings.
		Provide additional electrical conduit duct bank.
		Install new electrical conduit in the utilities tunnel.
Data/Telecommunications System	**$2,425,000**	Extend the communications duct bank to Phase 3 Buildings.
		Provide additional communications conduit duct bank.
		Install communications conduits in the utilities tunnel.
Fire Alarm System	**$295,000**	Connect new fire alarm systems to Campus fire alarm network.
Total	**$43,412,000**	

Table 15-10. Tabularized Implementation of UCR West Campus Utilities Infrastructure Project #8 (Phase 4)

Component	Cost	Specific Sub Project
Utilities Infrastructure Project #8 (Phase 4) - $38,319,000		
Landscape Hardscape	**$20,308,000**	Academic Core landscape, trees, landscape lighting, paths, and plazas
		Medical Offices landscape, trees, landscape lighting, paths, and plazas
		Apartments landscape, trees, landscape lighting, and paths
		SW Pedestrian Walk - final segment
		Type 2 Roads
		MLK stormwater landscape
Domestic Water and Fire Water System	**$583,000**	Extend an 8-inch waterline in Northwest Mall from Building H1 to Building MOB1.
		Extend the 10-inch waterline in Martin Luther King Jr. Boulevard, easterly from Building W22 to Canyon Crest Drive.
		Construct an 8-inch and 10-inch waterline in Southwest Mall, easterly from Building W19 to Canyon Crest Drive.
		Extend the 12-inch waterline in the proposed street from Building W9 to Southwest Mall.
		Construct an 8-inch waterline in Canyon Crest Drive from Martin Luther King Jr. Boulevard to Southwest Mall.
		Construct an 8-inch waterline from Building W9, easterly to the northeast corner of Building W11. This waterline may be required to be installed in an earlier phase depending upon the timing of the plant facilities located between Building W6 and the electrical substation.
		Extend the 8-inch waterline from Building W11, southerly to Southwest Mall.
		Construct a 10-inch waterline in Southwest Mall from Building W13 to Canyon Crest Drive.
		Construct an 8-inch waterline from the existing 8-inch UCR waterline that is under Interstate 215 (see Figure 3.9).
Irrigation Water System	**$433,000**	Construct 6-inch PVC irrigation water pipe from Node J82 (see Figure 4.8)
		Construct 10-inch and 12-inch PVC irrigation water pipes from Node J74 (see Figure 4.8) of the Phase 2 irrigation system
		Construct 8-inch and 10-inch PVC irrigation water pipes from Nodes J92, J58, and J63 (see Figure 4.8)
Sanitary Sewer System	**$361,000**	Construct 8-inch PVC sewer mains and 6-inch PVC sewer laterals adjacent to the medical buildings located near the intersection of Chicago Avenue and 12th Street (see Figure 5.7.1).
		Construct 8-inch PVC sewer mains and 6-inch PVC sewer laterals adjacent to the Campus Buildings W23 through W27 (see Figure 5.7.2).

Component	Cost	Specific Sub Project
Central Plants	**$3,037,000**	Provide one 1,600-ton electrical centrifugal chiller at the Main Central Plant
		Provide one 2,560 gpm primary CHW pump at the Main Central Plant
		Provide two 2,000 gpm secondary CHW pumps at the Main Central Plant
		Provide one 4,480 gpm condenser water pump at the Main Central Plant
		Provide one 20-MMBtuh gas-fired boiler at the Main Central Plant
		Provide one 670 gpm primary HHW pump at the Main Central Plant
		Provide one 1,000 gpm secondary HHW pump at the Main Central Plant
		Provide associated piping, electrical, and appurtenances at the Main Central Plant
		Provide one 800-ton electrical centrifugal chiller at the Medical School Central Plant
		Provide one 1,280 gpm primary CHW pump at the Medical School Central Plant
		Provide one 1,300 gpm secondary CHW pump at the Medical School Central Plant
		Provide one 2,240 gpm condenser water pump at the Medical School Central Plant
		Provide one 10-MMBtuh gas-fired boiler at the Medical School Central Plant
		Provide one 340 gpm primary HHW pump at the Medical School Central Plant
		Provide one 500 gpm secondary HHW pump at the Medical School Central Plant
		Provide associated piping, electrical, and appurtenances at the Medical School Central Plant
Chilled Water and Heating Hot Water	**$5,489,000**	Extend the Academic Core utilities tunnel and CHWS, CHWR, HHWS, HHWR piping in the sizes indicated on Figures 9-4 and 9-8, from the Phase 2 terminus just southeast of Bldg. W14, east along the north side of Bldg. W19 and south side of Bldg. W13, north between Bldgs. W13 and W12 and north between Bldg. W9 and W10, and back to the Main Central Plant, thus completing the loop.
		Extend the Academic Core utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-4 and 9-8, east in a spur between Bldgs. W12 and W25 for service to Bldgs. W11 and W27. Also, extend the utilities tunnels and CHWS, CHWR, HHWS, and HHWR piping south between Bldgs. W23 and W25 and between Bldgs. W24 and W26, to serve those buildings.
		Extend the Medical School utilities tunnel and CHWS, CHWR, HHWS, and HHWR piping in the sizes indicated on Figures 9-4 and 9-8, from the Phase 3 terminus just north of Building MOB6, north between Buildings MOB3 and MOB4 and north between Buildings MOB2 and M1, north along the east side of Building MOB1, east along the north side of PMOB (parking structure), and back to the Medical School Central Plant, thus completing the loop.

Component	Cost	Specific Sub Project
Energy Management System	**$125,000**	Provide EMS points for the expanded central plant systems in the Main Central Plant and the Medical School Central Plant.
		Extend the EMS backbone in the Academic Core and Medical School utilities tunnels for service to the Phase 4 buildings.
Natural Gas System	**$401,000**	Extend the 2-inch gas pipe in the Academic Core utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 4 Academic Core buildings along that route. In so doing, it will loop back to the gas pipe in the Main Campus Central Plant.
		Extend 2-inch gas pipe in the Medical School utilities tunnel, paralleling the CHW and HHW pipe extensions to serve various new Phase 4 Medical School buildings along that route. In so doing, it will loop back to the gas pipe in the Medical School Central Plant.
Electrical Power Distribution System	**$5,299,000**	Provide new circuit breakers at main 12.47 kV switchgear.
		Extend primary circuits to Phase 4 buildings.
		Provide additional electrical conduit duct bank.
		Install new electrical conduit in the utilities tunnel.
Data/Telecommunications System	**$1,951,000**	Extend communications duct bank to Phase 4 buildings.
		Provide additional communications conduit duct bank.
		Install communications conduits in the utilities tunnel.
Fire Alarm System	**$332,000**	Connect new fire alarm systems to Campus fire alarm network.
Total	**$38,319,000**	

CHAPTER 16

SUSTAINABILITY CONSIDERATIONS

16.1 Overview of Sustainability for West Campus Development

This chapter summarizes the sustainability features that have been incorporated into the West Campus Infrastructure Development Study. Many of these features have been presented and described in the previous chapters, but this chapter brings them all together and summarizes them as recommended sustainability features that UC Riverside should consider implementing as part of West Campus development.

The sustainability features are organized in terms of the internationally-recognized Leadership in Energy and Environmental Design (LEED) format for ease of reference. This will also be useful for claiming LEED Silver (or equivalent) points for West Campus building projects as a UC Riverside goal.

16.1.1 University of California Policy on Sustainable Practices

The University of California (UC) is committed to climate neutrality. UC signed the ACUPCC climate neutrality pledge, which can be found at http://www.presidentsclimatecommitment.org/. The following selection of guidelines, excerpted verbatim from directives updated in 2007, summarizes key UC system-wide guidelines in support of sustainable practices. These sustainability guidelines will be subject to continuous review and will be updated as UC policy changes. The most recent guidelines can be found at: http://www.ucop.edu/ucophome/coordrev/policy/

16.1.2 General Guidelines

- Incorporate the principles of energy efficiency and sustainability in all planning, capital projects, renovation projects, operations and maintenance within budgetary constraints and programmatic requirements.

- Minimize the use of non-renewable energy sources on behalf of the University's built environment by creating a portfolio approach to energy use, including the use of local renewable energy and purchase of green power from the grid as well as conservation measures that reduce energy consumption.

- Incorporate alternative means of transportation to/from and within the campus to improve the quality of life on campus and in the surrounding community. The campuses will continue their strong commitment to provide affordable on-campus housing, in order to reduce the volume of commutes to and from campus.

- Track, report, and minimize greenhouse gas emissions on behalf of University operations.

- Minimize the amount of University generated waste sent to landfill. Strive to eventually send nothing to landfills.

- Utilize the University's purchasing power to meet its sustainability objectives.

16.1.3 UC Riverside Sustainability Policies

UC Riverside is required to adhere to the minimum standards outlined above and, similar to each UC campus, has developed a campus baseline to identify areas in which the campus would automatically obtain LEED points. There will undoubtedly be future revisions to this baseline. In addition, UC Riverside has adopted the following benchmarks for implementation as feasible within budget parameters:

- Capital building projects involving new construction will pursue LEED Silver Certification or equivalent.

- Capital building projects involving renovation will comply with the UC President's Green Building Design policy for existing buildings.

Note: *UC Riverside's Green Building Policy is under development and should supplement the information in this document upon campus approval.*

16.2 Sustainable Sites

16.2.1 LEED ND (Neighborhood Development)

Consider design and planning for new development that incorporates principles and standards outlined in the LEED ND (Neighborhood Development) program, which is currently in preliminary evaluation with test projects. These standards would be particularly applicable to residential uses and cover a range of topics in a context larger than green building, such as transportation efficiency, mixing of land uses, social networks, and green infrastructure.

16.2.2 Family Housing Gardens

Consider including vegetable gardens and fruit trees and plants within Family Housing developments, providing a connection to the landscape and an opportunity to reduce costs of living in a healthful, sustainable way.

16.2.3 Light Pollution Reduction

Site lighting criteria will be adopted and site lighting will be designed to maintain safe light levels.

A computerized photometric model will be used to analyze the site lighting, thereby achieving safe lighting levels, while at the same time absolutely minimizing light trespass off-site, night sky pollution, nighttime glare, and adverse impacts to nocturnal environments.

Site lighting fixtures will be designed with full cutoff luminaries, integrated internal shielding, and precision controlled optics.

16.3 Water Efficiency

16.3.1 Water Efficient Landscaping

- Minimize irrigation through the selection of plants appropriate to Sunset Climate Zone 19 (USDA Zone 9b). Focus the use of turf and plants requiring more irrigation and maintenance on high-use areas such as courtyards and malls that require a walkable surface.

- On the West Campus, maximize the use of native or climate-appropriate and drought-tolerant plantings where feasible. Select broad-canopy trees and shrubs where appropriate to maximize shading and evaporative cooling. Select low-maintenance plantings, according to the Plant Material Palette, Appendix A in the UCR 2007 Design Guidelines.

- Select water-efficient turf varieties such as Marathon III dwarf tall fescue (see Plant Material Palette)

- Incorporate UC Riverside's Integrated Pest Management policies in plant selection.

- Promote water conservation by using a computer-regulated irrigation system as well as efficient subterranean drip irrigation systems. Time the use of irrigation for early morning hours, not mid-afternoon.

- Eliminate use of irrigation where possible through the selection of climate-adapted plants

- Use graywater or reclaimed water as an alternative source of irrigation water.

16.3.2 Innovative Wastewater Technologies

- Design for natural infiltration and evaporation where possible to reduce water run-off during storm events. Include provisions for water harvest and storage (cisterns) where feasible.

- Use permeable paving materials that allow rainwater infiltration where feasible, particularly for secondary paths and roads.

- Promote the filtering of run-off from roofs and paving via bio-swales, filter strips, stormwater planters, and other water-quality enhancing techniques. Given the relatively low levels of stormwater runoff, rooftops may be better suited to photovoltaic panels than green roofs. Rooftops should at least be surfaced with reflective surfaces to reduce albedo and reduce cooling loads within the building.

- Minimize scale of surface parking lots, and use multi-level parking garages. West Campus will gradually transform its surface parking lots into multi-level parking garages.

- Design surface parking lots with stormwater drainage detention swales for runoff interception, filtration and storage.

16.3.3 Water Use Reduction

16.3.3.1 Use of Reclaimed Water for Irrigation and in Cooling Towers

Reclaimed water may be distributed throughout campus under this project for use in campus irrigation and in the central plant cooling towers. This reclaimed water is highly-treated wastewater effluent. The result is that substantial amounts of potable water will be conserved.

Reclaimed water may be used in the cooling towers condenser water systems. Since condenser water systems are open systems from which substantial amounts of water are evaporated through cooling towers, use of reclaimed water in those systems would represent a significant savings of potable water.

16.4 Energy & Atmosphere

An ultimate sustainability goal regarding energy efficiency is to strive to building net-zero (or net-positive) energy consuming buildings. This means that any building implemented will produce at least as much energy as it consumes, thereby having a “net-zero” (or better) impact on energy consumption.

16.4.1 Optimize Energy Performance

16.4.1.1 High Efficiency Chillers with VFDs

The electrical centrifugal chillers selected will have average efficiency ratings between 0.37 kw/ton and 0.55 kw/ton, depending on chiller speed and load. This is exceptionally high chiller efficiency, which will result in significant energy savings.

Also, the compressor on each electrical centrifugal chiller will be provided with a variable frequency drive (VFD). This allows the large chiller compressor to respond to cooling load changes by varying speed rather than by other, less energy-efficient means. The result will be substantial energy savings in chiller operation.

16.4.1.2 High CHW ΔT Central Plants

The central chiller plants will consist of electrical centrifugal chillers. The chiller plants will be designed to achieve a very high 30°F CHW ΔT, meaning chilled water supply (CHWS) at 38°F (adjustable) and chilled water return (CHWR) at 68°F. This high CHW ΔT translates into a substantial first cost savings in that CHW pumps, CHW pipes, and any CHW TES tank can be downsized proportionately while providing the same capacity. In addition, CHW pumping costs and motor horsepower energy are substantially reduced since less CHW is pumped for the same cooling capacity delivered.

To achieve the 30°F CHW ΔT, individual chillers will be paired up in series, with each chiller in the pair nominally achieving a 15°F CHW ΔT. The chiller pairs will be arranged in parallel. To preserve this high 30°F CHW ΔT, the design criteria for all new cooling coils on West Campus shall be designed for 40°F CHWS and 70°F CHWR.

16.4.1.3 High HHW ΔT Central Plants

The central plant boilers will produce 190°F HHW supply water and will operate in parallel on a 60°F ΔT. This HHW ΔT (190 °F HHWS; 130 °F HHWR) is very high, and will result in significant energy savings from needing to pump less HHW for a given amount of heating delivered. To preserve this high HHW ΔT, the design criteria for all new heating coils on campus will be 180 °F HHWS and 120 °F HHWR, where possible.

16.4.1.4 Thermal Energy Storage

Thermal energy storage (TES) involves the generation of cooling during less expensive non-peak cooling hours, and storing that cooling for use during peak cooling hours. By generating and storing cooling during cooler off-peak hours, the cooling generation process uses significantly less energy. Also, by having the chillers operate at full load whenever they are operating, the chillers run more efficiently than when they are tracking demand at part loads.

16.4.1.5 Cooling Towers with VFD-Driven Fans

The cooling tower fans will be fitted with VFDs that allow them to respond to condenser water heat changes by varying speed. This will be coupled with automatic control logic through the energy management system (EMS) to vary the fan speed based on condenser water supply (CDWS) temperature, an automatic CDWS temperature reset schedule, and other chiller plant parameters. The idea is to optimize overall chiller/cooling tower plant energy efficiency performance by considering all parameters for the most optimal operating conditions to meet any given cooling load.

16.4.1.6 Demand Controlled Ventilation

It is envisioned that all large assembly spaces and large classrooms have Demand Control Ventilation (DCV). DCV entails using space CO_2 sensors, which in turn, modulate the outside air (OSA) flow at the air handling unit economizer, based on measured CO_2 levels in the spaces served by the air handling unit. Rather than the air handling unit providing the code minimum OSA based on maximum design conditions for people loading, the necessary OSA will be provided to maintain CO_2 levels below setpoint. In this way, during the large periods of time when the occupancy of the space is not at maximum, more partially-conditioned return air can be used instead of unconditioned outside air. This translates into substantial energy savings.

16.4.1.7 Variable Air Volume and LACS for Wet Labs

Wet labs use large amounts of outside air since recirculation of generally conditioned return air is not allowed by code. To ameliorate the high energy consumption associated with this, a computerized laboratory airflow control system (LACS) can be used. The LACS is an energy-efficient approach to providing code-compliant and safe HVAC to labs with fume hoods. Code-compliant air velocity is maintained across the face of a fume hood, however the air flow in cfm can be automatically modulated as the sash is lowered or if a proximity sensor detects no motion (human) in front of the fume hood for 30 seconds. The variable air volume (VAV) fume hood exhaust system is integrated through an LACS with VAV supply air to the lab to maintain proper adjacent space pressure relationships. In addition, variable frequency drives (VFDs) on the fume hood exhaust fans and air handling unit supply fan modulate fan speed and air flow accordingly. The substantial energy savings come from lower fan motor brake-horsepowers (lower electricity consumption) and from avoiding the heating and cooling of excessive outside make-up air.

In addition to VAV labs with LACS, automatic sashes for fume hoods should be implemented. These are relatively inexpensive control features that save significant amounts of energy and demonstrate quick paybacks. Basically, they are additional controls on each fume hood that detect when a person is no longer standing in front of the fume hood. When so sensed, the controls automatically lower the fume hood sash, which in turn, allows airflow through the fume hood to be substantially reduced.

16.4.1.8 Heat Recovery for 100% Outside Air Systems

100% outside air (OSA) systems, such as wet labs, use large amounts of OSA since recirculation of generally conditioned return air is not allowed by code. To reduce the high energy consumption associated with this, heat recovery can be used on the exhaust air. During hot days, the relative coolness of the exhaust air is used to pre-cool the hot incoming outside air. During cold days, the relative warmth of the exhaust air is used to pre-heat the cold incoming outside air. A run-around loop is used between the two air streams to affect the heat transfer.

16.4.1.9 High Efficiency Lighting

The first step in implementing high efficiency lighting is to maximize the use of daylighting and automatic daylighting controls. This is more fully described in paragraph 16.6.3.

Whenever possible, state of the art site lighting technology, including induction lighting, high power compact fluorescent lamps, and high power light emitting diode (LED) fixtures, will be applied in place of the conventional high intensity discharge (HID) metal halide and high pressure sodium fixtures.

Induction lighting is becoming one of the newest technologies in lighting. It offers many features that make it an attractive light source. With a 100,000-hour rated life (compared to 10,000-hour for fluorescent and 20,000-hour for HID), induction lighting maintenance effort is minimal. Color quality is excellent. Color shift is almost nonexistent over a wide range of temperature and voltage fluctuations. Efficiency and reliability is also excellent. Unlike HID lamps, induction fixtures can perform start and restart functions instantly under hot and cold conditions.

LED lamps share most intrinsic characteristic with those of induction technology, including extreme long life, high efficiency, and superior color rendition. These are tiny, purely electronic lights that are extremely energy efficient and have a very long life. Each LED is about the size of a pencil eraser, so hundreds of them are used together in an array. The LEDs are replacing the old-style incandescent halogen bulbs rated at between 50 and 150 watts.

However, LED fixtures are generally not available for high intensity applications like roadway and parking lot lighting at the current time. With its small size and durability, LED lamps are ideal for walkway lighting, step lighting, and traffic signals. LED products are also available for sign and façade lighting.

The new traffic lights for the UCR West Campus will be made out of LED arrays. Most cities in the United States are in the process of replacing their incandescent traffic lights with LED units because of three significant advantages:

- **LED lights are brighter**. The LED arrays fill the entire "hole" and have equal brightness across the entire surface, making them brighter overall.

- **LED bulbs last for years**, while halogen bulbs last for months. Replacing bulbs costs money for the trucks and people who do the work, and it also ties up traffic. Increasing the replacement interval can save an organization substantial money.

- **LED bulbs are more energy efficient.**

The energy savings of LED lights can be substantial. Assume that a traffic light uses 100-watt bulbs today. The light is on 24 hours a day, so it uses 2.4 kilowatt-hours per day. If you assume that power costs an average of 8 cents per kilowatt-hour, that means that one traffic signal costs about 20 cents a day to operate, or about $73 per year. There are perhaps eight signals per intersection, so that's almost $600 per year in power per intersection. A big city has thousands of intersections, so it can cost millions of dollars just to power all the traffic lights. LED bulbs might consume 15 or 20 watts instead of 100, so the power consumption drops by a factor of five or six. A city can easily save a million dollars a year by replacing all of the bulbs with LED units. These low-energy bulbs also open the possibility of using solar panels instead of running an electrical line, which saves money in remote areas.

16.4.1.10 Lighting Controls

Site lighting control will be performed through the campus energy management system (EMS). Photo sensors will be connected to the EMS as analog input points to create specific parameters for programming. Digital outputs from the EMS in conjunction with lighting contactors will facilitate control functions tailored to individual areas. Interior areas with skylights can be controlled in the same manner.

Occupancy controls and motion detectors will be used inside buildings to automatically control interior lighting. Interior lighting will also be controlled by the EMS.

Finally, daylighting controls will be used to automatically turn off certain lighting banks when sufficient daylighting is available.

16.4.2 On-Site Renewable Energy

16.4.2.1 Solar Photovoltaic Systems

Photovoltaic systems are solar cells that produce electricity directly from sunlight. The solar cells are made of thin layers of semiconducting material, usually silicon. The layers are treated with special compounds, to create an unbalanced electron configuration. When light strikes a sandwich of the different layers, electrons start flowing and electric current is created. Photovoltaic cells generate direct-current electricity, which can be stored in batteries or converted instantly to alternating current using solid state or rotary inverter. The harvested power can be used locally on the particular building site or can be fed back to the power distribution grid for general usage for all facilities on the same grid.

16.4.2.2 Fuel Cells

A fuel cell operates similar to a battery. However, unlike a battery, a fuel cell does not run down or require recharging. It produces energy in the form of electricity as long as fuel is supplied. A fuel cell consists of two electrodes sandwiched around an electrolyte. Fuel cells generate electric power by combining hydrogen (hydrogen generated from fuels such as methanol and natural gas) with oxygen. Hydrogen fuel is fed into the "anode" of the fuel cell. Oxygen (or air) enters the fuel cell through the cathode. Accelerated by a catalyst, the hydrogen atom splits into a proton and an electron, which take different paths to the cathode. The proton passes through the electrolyte. The electrons create a separate current that can be utilized before they return to the cathode, where they are reunited with the hydrogen and oxygen in a molecule of water.

A fuel cell system, which includes a “fuel reformer”, can utilize the hydrogen from any hydrocarbon fuel (i.e. from natural gas, methanol, and even gasoline). Since the fuel cell relies on chemistry and not combustion, air emissions from this type of a system are much lower than air emissions from the cleanest fuel combustion processes. Fuel cells operate without combustion. The only by-products are pure water and heat. Since the fuel is converted directly to electricity, a fuel cell can operate at much higher efficiencies than internal combustion engines, extracting more electricity from the same amount of fuel. The fuel cell itself has no moving parts, making it a quiet and reliable source of power.

Fuel cells can be used in various configurations. These include a parallel grid configuration with the power distribution grid for peak shaving, and a cogeneration configuration for simultaneous electricity generation and heat recovery for space and water heating.

It should be noted that fuels cells that use hydrogen are most appropriate when coupled with hydrogen-generating systems that use non-fossil fuel energy sources. In this way, the fuel cell is truly a renewable energy source. If fossil fuels are used to generate the hydrogen, then there is much less gained in terms of avoiding negative impacts on the climate and reducing fossil fuel energy consumption.

16.4.3 Enhanced Commissioning

16.4.3.1 Central Plant and Building Peer Review and Commissioning

Peer review of utilities infrastructure project is highly recommended, particularly for the central plant components, which have relatively sophisticated systems and controls that need to be designed and constructed properly to achieve their desired energy efficient performance.

Commissioning of these central plant systems is similarly highly recommended to ensure that the intended energy efficient sequence of operations are, in fact, translated from design and construction to actual operation.

Peer review and commissioning are also recommended for individual building projects because of the sophistication of their HVAC systems and because they must be compatibly integrated with the campus central plant systems.

16.4.4 Enhanced Refrigerant Management

16.4.4.1 Use of Non-Ozone-Depleting Refrigerants in Chillers

The central chiller plants will be comprised of electrical centrifugal chillers. All these chillers will use refrigerants with a zero ozone depletion factor (ODF). This means that the refrigerants will not have any potential to deplete the Earth's protective atmospheric ozone layer. The electrical centrifugal chillers will use refrigerant R-134a (HFC-134a).

16.4.5 Measurement & Verification

16.4.5.1 Networked DDC EMS with a Web-Enabled Platform

West Campus will have a new campus-wide energy management system (EMS). The new EMS will have advanced networked, direct digital controls, and a web-enabled platform. As such, there will be the capability to accomplish all monitoring and control point adjustments by qualified, password-enabled operators from any web-connected computer in the world. This extensive automated control of all significant energy-consuming equipment will result in substantial energy savings, optimal space comfort control, and ease of operation and maintenance.

16.4.5.2 Extensive Building Metering for Tracking and Trending Energy Use

All central plant-connected buildings planned for West Campus will be individually metered for chilled water, heating hot water, electricity, and natural gas. These meters will be connected to the EMS for the purpose of tracking and trending energy use.

The numerous residential units of Family Housing (Family Apartments and Family Townhouses) will be individually-metered for electricity and gas from off-site utilities. Their cooling and heating will be powered by electricity and/or fueled by natural gas, which will be billed directly from the utility to the residential occupant.

16.5 Materials & Resources

16.5.1 Recycled Content

- Use paving materials with post-consumer recycled content (recycled asphalt for example).

16.5.2 Regional Materials

- When possible, select materials that are extracted or manufactured within 500 miles of UC Riverside.

16.6 Indoor Environmental Quality

16.6.1 Outdoor Air Delivery Monitoring

16.6.1.1 Demand Controlled Ventilation

It is envisioned that all large assembly spaces and large classrooms have Demand Control Ventilation (DCV). DCV entails using space CO_2 sensors, which in turn, modulate the outside air (OSA) flow at the air handling unit economizer, based on measured CO_2 levels in the spaces served by the air handling unit. Rather than the air handling unit providing the code minimum OSA based on maximum design conditions for people loading, the necessary OSA will be provided to maintain CO_2 levels below setpoint. This is a more definitive means of ensuring that indoor air quality is maintained.

16.6.2 Controllability of Systems, Lighting

Lighting control, for both site lighting and interior lighting, will be performed through the campus Energy Management System (EMS). Photo sensors will be connected to the EMS as analog input points to create specific parameters for programming. Digital outputs from the EMS in conjunction with lighting contactors will facilitate control functions tailored to individual areas. Interior areas with skylights can be controlled in the same manner.

16.6.3 Daylight & Views

Consider orientation of new buildings elongated on an east-west axis to maximize solar orientation and daylighting while reducing glare and solar gain from morning and evening sun. Large north-facing windows in Riverside's sunny climate will introduce diffuse, cooler light to buildings.

The central plant buildings will be designed with day-lighting, high efficiency light fixtures, and natural ventilation features to minimize energy usage in the buildings.

In other campus buildings, daylighting controls will be used to automatically turn off certain lighting banks when sufficient daylighting is available.

Structural landscape and trees adjacent to buildings can contribute to energy-efficiency through shading and evaporative cooling.

16.7 Innovation & Design

16.7.1 Innovation in Design

Numerous sustainable design features are envisioned for West Campus development. In this regard, there will be ample opportunities to apply for LEED points related to "Innovation in Design.

16.7.2 LEED Accredited Professional

Richard Henrikson, who prepared the West Campus Infrastructure Development Study, is a LEED Accredited Professional.

APPENDICES

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ASSUMPTIONS AND CRITERIA

UC RIVERSIDE
WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

CIVIL SYSTEMS ASSUMPTIONS AND CRITERIA

Domestic Water and Fire Water Distribution Systems

Resident person water consumption	70 gallons/day
Non-resident person water consumption	20 gallons/day
Landscaping irrigation water demand	60% of total water demand
Fire flows: Single family residence w/o sprinklers:	500 gpm @ minimum 20 psi
Fire flows: Single family residence w/ sprinklers:	1,000 gpm @ minimum 20 psi
Fire flows: Multiple residential condominiums:	1,500 gpm @ minimum 20 psi
Fire flows: Commercial:	1,750-8,000 gpm @ minimum 20 psi
Fire flows: Industrial:	1,750-8,000 gpm @ minimum 20 psi

Water pressure at corner of Iowa Ave. and Everton Pl.:	77 to 86 psi
Residual pressure at 1,561 gpm at corner of Iowa Ave. and Everton Pl.:	72 psi

West Campus population for projecting water demand: 10,856
West Campus population includes:

- 714 Students living in Family Student Housing
- 2,787 Students living in Apartments
- 1,428 (2 x 714) Non-student family members living in the 714 Family Student Housing units

Irrigation Water Distribution System

- Irrigation water for Phase 1 will be used only for landscaping irrigation and not agriculture irrigation water.
- For Phase 1, the analysis utilizes an inexhaustible supply, whether from surface or ground water, which flows by gravity through the distribution system as the major system for distributing the water by gravity and under pressure.
- The required quantities of irrigation water for landscaping are as follows:

Landscaping Irrigation Water (IW)	=	60% x total domestic water
	=	60% x 492,130 = 295,278 GPD

Sanitary Sewer Wastewater Collection System

- Pipe shall be designed to flow at 0.5 D or less at design flow. Minimum pipe slope shall be 0.4%.
- Minimum design velocity shall be 2 feet per second (fps) and maximum design velocity shall be 10 fps.
- Desirable design depth 8 feet.
- Recommended depth of lateral at property line is 6 feet (minimum 4 feet).
- Minimum pipe diameter shall be 8-inch.
- Typical manhole spacing shall be 300 to 500 feet, with consideration made for the line size, alignment, and site topography.
- Preferred locations for sewers are 5 feet north or 5 feet east of centerline.
- All sewers shall be contained in the street Right of Way or, if necessary, in a dedicated easement (minimum 10-foot width).
- All recommendations of the State Department of Health Services, relative to crossing and parallel lines with water supply lines, shall be complied with.
- Academic Buildings:
    - Q_a = 00.00250 cubic feet per second (cfs) per acre (ac)
- Family Housing:
    - Q_a = 0.00845 cubic feet per second (cfs) per acre (ac)
      R 30 (78 person per acre)

Storm Drain System

Pipes and catch basin sizes will be assumed until the hydrology study for Phase 1 though 4 has been completed.

- Using the rational method for calculation of total discharge for each catch basin and applying the hydraulic equations for sizing the pipe.
- Pipes shall, where practical, be designed to flow full.

- For major drains, full 100-year storms shall be contained within the street right-of-way.
- Maximum design velocity shall be to 20 feet per second (fps).
- Minimum grade on any storm drain shall be 00010.
- Storm drains shall be constructed of reinforced concrete pipe (RCP).
- Minimum pipe size shall be 18 inches.

TRAFFIC CONTROL ASSUMPTIONS AND CRITERIA

The traffic related to the Phase 1 development has been calculated and determined based on accepted traffic engineering practices. The following provides a list of the general assumptions used in determining the amount of “New” traffic trips that will result with the increase in the student population and subsequent developments.

- Increase of 2,000 students for Phase 1.
- Staff will increase as a percentage of students (10%) for a total of 200 new staff members.
- 50% of new students will live on campus.
- Family units are for full-time students and their families. As such, a percentage of trips will be assigned outside the campus zone for trips to work and school for children. Parking for these units will be within the complex.
- Child Development Center is available for use by full-time students. However, traffic will be generated due to drop off and pick up by parents who may or may not live within walking distance.
- Conference Center will be used as an “office” with a portion of visitors and staff driving to the center.
- A 50% internal capture rate has been applied to all trips generated by Phase 1 development.
- Parking ratios were based on 300 gsf per space.
- Parking for all of the classrooms will be in surface lots (P2 and P4).

MECHANICAL SYSTEMS ASSUMPTIONS AND CRITERIA

Space Cooling

Buildings Designed at About 20% Better than Title 24

Classroom and office buildings	350 sf/ton
Child development center	350 sf/ton
Community center	350 sf/ton
Wet lab buildings	300 sf/ton
Residential	450 sf/ton
Conference	350 sf/ton
Hospital	300 sf/ton
Research	300 sf/ton
Student center	300 sf/ton
Medical office building	300 sf/ton

Buildings Designed with Aggressive Sustainability Measures at About 40% to 45% Better than Title 24

Classroom and office buildings	475 sf/ton
Child development center	475 sf/ton
Community center	475 sf/ton
Wet lab buildings	400 sf/ton
Residential	550 sf/ton
Conference	475 sf/ton
Hospital	400 sf/ton
Research	400 sf/ton
Student center	400 sf/ton
Medical office building	400 sf/ton

Peak Cooling Load Diversity Factor	70%

CHW temperatures generated at central plant	38°F CHWS/68°F CHWR
CHW temperatures for cooling coils	40°F CHWS/70°F CHWR
CHW ΔT for cooling coils	30°F ΔT
CHW ΔT for TES	25°F ΔT
CHW ΔT for pipe sizing	20°F ΔT

- Pipe mains are sized for CHW flows to serve West Campus peak diversified cooling loads to Build-out (2025).

- Pipe mains are sized using a maximum water velocity of 9 fps or a maximum friction loss of 3 feet per 100 feet of equivalent length.

- No central plant cooling service for Family Student Housing, Recreation Building, Child Development Centers, and Community Centers.

- Standby equipment capacity is generally one extra piece of equipment.

Space Heating

Buildings Designed at About 20% Better than Title 24

Classroom and office buildings	18 Btu/hr/sf
Child development center	18 Btu/hr/sf
Community center	18 Btu/hr/sf
Wet lab buildings	22 Btu/hr/sf
Residential	24 Btu/hr/sf
Conference	18 Btu/hr/sf
Hospital	22 Btu/hr/sf
Research	22 Btu/hr/sf
Student center	22 Btu/hr/sf
Medical office building	22 Btu/hr/sf

Buildings Designed with Aggressive Sustainability Measures at About 40% to 45% Better than Title 24

Classroom and office buildings	14 Btuh/sf
Child development center	14 Btuh/sf
Community center	14 Btuh/sf
Wet lab buildings	16 Btuh/sf
Residential	19 Btuh/sf
Conference	14 Btuh/sf
Hospital	16 Btuh/sf
Research	16 Btuh/sf
Student center	16 Btuh/sf
Medical office building	16 Btuh/sf

Peak Heating Load Diversity Factor	85%

HHW temperatures generated at central plant	38°F CHWS/68°F CHWR
HHW temperatures for cooling coils	40°F CHWS/70°F CHWR
HHW ΔT for cooling coils	30°F ΔT
HHW ΔT for TES	25°F ΔT
HHW ΔT for pipe sizing	20°F ΔT

- Pipe mains are sized for HHW flows to serve West Campus peak diversified heating loads to Build-out (2025).

- Pipe mains are sized using a maximum water velocity of 9 fps or a maximum friction loss of 3 feet per 100 feet of equivalent length.

- No central plant heating service for Family Housing Recreation Building, Child Development Centers, and Community Centers.

- Standby equipment capacity is generally one extra piece of equipment.

NATURAL GAS DISTRIBUTION SYSTEM ASSUMPTIONS AND CRITERIA

Gas Loads Assumptions

The gas loads were estimated based on the following assumptions:

- Central plant boiler gas loads are based on the conservative planning scenario in Chapter 8. These are in turn developed from the heating assumptions developed in Chapter 8. Central plant boiler gas loads are expressed in cubic feet per hour (cfh), and are figured as follows: cfh = (MMBtuh output x 1,000,000 Btu/MMBtu x 1 cf/1,000 Btu)/0.8 efficiency).

- Individual Family Apartment gas loads are assumed to be 140 cfh each, considering diversity and load factor. Total connected gas load in each apartment includes gas-based space heating forced air unit (FAU) (40 cfh), a gas range (65 cfh), a gas water heater (40 cfh), and a gas dryer (35 cfh).

- Individual Family Townhouse gas loads are assumed to be 200 cfh each, considering diversity and load factor. Total connected gas load in each apartment includes gas-based space heating forced air unit (FAU) (60 cfh), a gas range (65 cfh), a gas water heater (50 cfh), and a gas dryer (35 cfh).

- Gas Load of Phase 1A Family Apartments is figured as 286,200 sf/800 sf/unit x 140 cfh = 50,085 cfh.

- Gas Load of Phase 2 Family Apartments is figured as 288,372 sf/800 sf/unit x 140 cfh = 50,465 cfh.

- Gas Load of Phase 1A Family Townhouses is figured as 106,458 sf/1,400 sf/unit x 200 cfh = 15,208 cfh.

- Gas Load of Phase 2 Family Townhouses is figured as 89,052 sf/1,400 sf/unit x 200 cfh = 12,722 cfh.

- Gas Load of Recreation Building is figured as: Space heating: 16 Btuh/sf x 65,000 sf x 1 cf/1,000 Btu)/0.8 efficiency = 1,300 cfh; DHW heating = 2,000 cfh

- Gas Load of Community Centers and Child Development Center is figured as: 14 Btuh/sf x 39,600 sf x 1 cf/1,000 Btu)/0.8 efficiency = 700 cfh; DHW heating = 500 cfh

- Individual Apartment (Apartments and Graduate Housing) gas loads are assumed to be 70 cfh each, considering diversity and load factor. Total connected gas load in each apartment includes a gas range (65 cfh) and a gas dryer (35 cfh). Space heating and DHW heating are accomplished by central plant-based heating hot water.

- Gas Load of Phase 2 Apartments is figured as 294,000 sf/800 sf/unit x 70 cfh = 25,725 cfh.

- Gas Load of Phase 2 Graduate Housing is figured as 125,000 sf/800 sf/unit x 70 cfh = 10,938 cfh.

- Gas Load of Phase 3 Apartments is figured as 300,000 sf/800 sf/unit x 70 cfh = 26,250 cfh.
- Gas Load of Phase 3 Graduate Housing is figured as 125,000 sf/800 sf/unit x 70 cfh = 10,938 cfh.

- Gas Load of Phase 4 Apartments is figured as 294,000 sf/800 sf/unit x 70 cfh = 25,725 cfh.

- Gas Load of other campus buildings is assumed to be and average of 1,000 cfh per building. Space heating and DHW heating are accomplished by central plant-based heating hot water.

Gas Piping Routing Criteria

- The main loops of gas piping will be installed in accordance with the West Campus phasing plan.

- The gas pipe routes are selected so as to minimize the length and cost of the piping.

- Where possible, main gas pipes take the same route as the CHW and HHW piping mains so that they can be installed in the utilities tunnels.

- Where gas pipes do not parallel the path of the CHW and HHW piping mains, the main gas pipes will be direct-buried.

- Gas pipe branches to individual buildings, except for central plant buildings, will be installed under the various building projects, not the utilities infrastructure projects.

Gas Pipe Sizing Criteria

- Gas pipe mains are sized for gas flows to serve West Campus peak gas loads to Build-Out.

- Gas pipe sizing is based on 20 psig available immediately downstream of the SCG gas meter, with no more than 10 psig pressure loss through the gas mains to the buildings.

ELECTRICAL SYSTEMS ASSUMPTIONS AND CRITERIA

	CONNECTED LOAD	DEMAND FACTOR
Residential units	16 VA/sf	0.23
Classrooms and offices	15 VA/sf	0.35
Classrooms with wet labs	17 VA/sf	0.35
Student center	15 VA/sf	0.35
Conference center	12 VA/sf	0.35
Child development center	14 VA/sf	0.35
Community center	14 VA/sf	0.35
Hospital	22 VA/sf	0.35
Medical building with wet labs	17 VA/sf	0.35
Research building with wet labs	17 VA/sf	0.35
Vivarium	22 VA/sf	0.35
Recreation center	15 VA/sf	0.35

- Load analysis shown on Table 12-1 is conducted without using contribution from alternative energy sources, such as photovoltaic systems and fuel cells.

- The total demand load can be reduced by approximately 8% to 14% if an aggressive approach to sustainable energy is utilized.

- Electrical services for residential units will be connected to the main University power grid with University-owned metering equipment connecting to the energy management system.

- Electric cooking appliances will be used in residential units.

UCR Campus Aggregate Master Plan Study
WEST CAMPUS PLAN CAPACITY

	Bldg #	FOOTPRINT	STORIES	TOTAL GSF		
Core Academic Area						
Conference Center	W 1	54,000	5	270,000		
Conference Center	W 2	30,000	4	120,000		
	W 3	32,000	4	128,000		
	W 4	36,000	4	144,000		
	W 5	35,000	5	175,000		
	W 6	36,500	5	182,500		
	W 7	39,000	5	195,000		
	W 8	44,000	5	220,000		
	W 9	24,400	4	97,600		
	W 10	23,000	5	115,000		
	W 11	55,000	5	275,000		
	W 12	23,000	4	92,000		
	W 13	24,500	4	98,000		
	W 14	24,500	4	98,000		
Student Center	W 15	34,000	5	170,000	** Tower=1600gsf*	
	W 16	31,000	5	155,000		
	W 17	33,000	5	165,000		
	W 18	24,600	4	98,400		
	W 19	23,000	5	115,000		
	W 20	26,000	4	104,000		
	W 21	22,500	5	112,500		
	W 22	20,000	5	100,000		
	W 23	41,000	4	164,000		
	W 24	22,000	5	110,000		
	W 25	20,000	4	80,000		
	W 26	20,000	5	100,000		
	W 27	37,000	5	185,000		
	Total Core Academic Area Square Footage			**3,869,000**	**GSF**	
Medical School						
Research	M1	30,000	4	120,000		
Research	M2	32,000	4	128,000		
Research	M3	25,000	4	100,000		
Education	M4	56,000	4	224,000		
Ambulatory Care	M5	30,000	4	120,000		
Ambulatory Care	M6	25,000	4	100,000		
Research	M7	31,000	4	124,000		
Underground Vivarium	MV	23,000	1	23,000		
			Total	**939,000**		
	Total Academic Area & Medical School			**4,808,000**		
Housing						
			Family Housing	770,082		
			Apartments	888,000		
	Subtotal West Campus Housing			**1,658,082**	*1,881,470*	*2003 Strategic Housing Plan*
Grad Housing						
Within Medical Campus	H1	25,000	5	125,000		
	H2	25,000	5	125,000		
			Total	**250,000**	*(300du @ 850gsf/du)*	
Rec Building						
	R	65,000	1	**65,000**		
Child Development and Community Centers						
	CDC 1	14,800	1	14,800		
	CDC 2	14,800	1	14,800		
	CC N			5,200		
	CC S			4,800		
				39,600		
Medical Office Buildings (+incubator space)						
	MOB 1	18,000	4	72,000		
	MOB 2	31,000	4	124,000		
	MOB 3	30,000	4	120,000		
	MOB 4	30,000	5	150,000		
	MOB 5	17,500	4	70,000		
	MOB 6	20,500	4	82,000		
	MOB 7	19,500	4	78,000		
		166,500	**Total**	**696,000**		
Subtotal West Campus Gross Square Footage				**7,516,682**	*	
	** Does not include Parking or Support/Maintenance. New EH&S not included.*					
Parking Garages						
(note, garage floor heights are typ. 10', so 7-story garage is roughly equivalent to 5-story academic building)						
Academic Area	P1	57,000	7	399,000		
	P2	76,100	7	532,700		
	P3	48,000	7	336,000		
	P4	86,000	7	602,000		
				1,869,700	350gsf/space	
				Parking Subtotal for Academic Area		**5,342**
Medical School Area	PM	47,000	7	329,000	940	
	PMOB	50,500	7	353,500	1,010	
				682,500	350gsf/space	
				Parking Subtotal for Medical School Area		**1,950**
				Total West Campus Parking		**7,292** spaces*
				**Does not include Housing or Recreation Field parking*		
Total New West Campus Gross Square Footage (with parking garages)				**10,068,882**		
Existing UCR Building to Remain						
	UNEX		4	196,641		
				196,641		
Total West Campus Gross Square Footage (with existing building)				**10,265,523**		

UCR Campus Aggregate Master Plan Study
WEST CAMPUS PLAN CAPACITY

	Bldg #	FOOTPRINT	STORIES	TOTAL GSF	
Housing					
Family Housing					
Apartments	F 1	9,360	2	18,720	
	F 2	9,360	2	18,720	
	F 3	6,660	2	13,320	
	F 4	6,660	2	13,320	
	F 5	6,660	2	13,320	
	F 6	9,360	2	18,720	
	F 7	4,920	2	9,840	
	F 8	4,920	2	9,840	
	F 9	9,360	2	18,720	
	F 10	7,620	2	15,240	
	F 11	4,920	2	9,840	
	F 12	4,920	2	9,840	
	F 13	9,840	2	19,680	
	F 14	6,660	2	13,320	
	F 15	8,880	2	17,760	
	F 16	4,440	2	8,880	
	F 17	8,880	2	17,760	
	F 18	7,620	2	15,240	
	F 19	4,440	2	8,880	
	F 20	7,620	2	15,240	
Townhouses	F 21	2,903	2	5,806	
	F 22	3,872	2	7,744	
	F 23	2,903	2	5,806	
	F 24	4,840	2	9,680	
	F 25	4,840	2	9,680	
	F 26	4,840	2	9,680	
	F 27	4,840	2	9,680	
	F 28	5,807	2	11,614	
	F 29	3,872	2	7,744	
	F 30	3,872	2	7,744	
	F 31	4,840	2	9,680	
	F 32	5,800	2	11,600	
				392,658	**Subtotal,**
Apartments	F 33	9,360	2	18,720	
	F 34	9,360	2	18,720	
	F 35	7,154	2	14,308	
	F 36	4,920	2	9,840	
	F 37	7,154	2	14,308	
	F 38	7,154	2	14,308	
	F 39	9,360	2	18,720	
	F 40	7,154	2	14,308	
	F 41	8,880	2	17,760	
	F 42	9,360	2	18,720	
	F 43	7,154	2	14,308	
	F 44	7,154	2	14,308	
	F 45	7,154	2	14,308	
	F 46	9,360	2	18,720	
	F 47	9,360	2	18,720	
	F 48	4,920	2	9,840	
	F 49	7,154	2	14,308	
	F 50	7,154	2	14,308	
	F 51	4,920	2	9,840	
Townhouses	F 52	3,872	2	7,744	
	F 53	4,840	2	9,680	
	F 54	4,840	2	9,680	
	F 55	4,840	2	9,680	
	F 56	4,840	2	9,680	
	F 57	5,807	2	11,614	
	F 58	5,807	2	11,614	
	F 59	4,840	2	9,680	
	F 60	4,840	2	9,680	
				377,424	**Subtotal,**
		Family Housing Total		**770,082**	

Apartments					
	A 1	10,000	3	30,000	
	A 2	8,000	3	24,000	
	A 3	4,500	3	13,500	
	A 4	4,500	3	13,500	
	A 5	10,000	3	30,000	
	A 6	10,000	3	30,000	
	A 7	4,500	3	13,500	
	A 8	4,500	3	13,500	
	A 9	8,000	3	24,000	
	A 10	8,000	3	24,000	
	A 11	4,500	3	13,500	
	A 12	4,500	3	13,500	
	A 13	4,500	3	13,500	
	A 14	4,500	3	13,500	
	A 15	8,000	3	24,000	
	A 16	8,000	3	24,000	
	A 17	4,500	3	13,500	
	A 18	4,500	3	13,500	
	A 19	8,000	3	24,000	
	A 20	8,000	3	24,000	
	A 21	4,500	3	13,500	
	A 22	4,500	3	13,500	
	A 23	8,000	3	24,000	
	A 24	8,000	3	24,000	
	A 25	4,500	3	13,500	
	A 26	4,500	3	13,500	
	A 27	8,000	3	24,000	
	A 28	8,000	3	24,000	
	A 29	4,500	3	13,500	
	A 30	4,500	3	13,500	
	A 31	8,000	3	24,000	
	A 32	8,000	3	24,000	
	A 33	4,500	3	13,500	
	A 34	4,500	3	13,500	
	A 35	4,500	3	13,500	
	A 36	4,500	3	13,500	
	A 37	8,000	3	24,000	
	A 38	8,000	3	24,000	
	A 39	4,500	3	13,500	
	A 40	4,500	3	13,500	
	A 41	10,000	3	30,000	
	A 42	10,000	3	30,000	
	A 43	10,000	3	30,000	
	A 44	4,500	3	13,500	
	A 45	4,500	3	13,500	
	A 46	8,000	3	24,000	
		Apartments Total		**888,000**	
Total West Campus Family Housing and Apartments (gsf)				**1,658,082**	
		2003 Strategic Housing Plan (p77)		***1,881,470***	
Other Buildings					
	CDC N			14,800	
	CDC S			14,800	
	CC N			5,200	
	CC S			4,800	
	R			65,000	
				104,600	

APPENDIX A-2

COOLING LOADS TABLES

UC RIVERSIDE
WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

Table 8-1. West Campus Building Cooling Load Analysis for All Future Buildings

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS (*)	Cumulative Diversified Peak Cooling Load, TONS	Peak CHW Flow, GPM (**)
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty o	144,000	144,000	300	480	480	336	336	576
1-3	1A	F 1	Apartments	Family Apartments	18,720	162,720	450	42	522	29	365	50
1-3	1A	F 2	Apartments	Family Apartments	18,720	181,440	450	42	563	29	394	50
1-3	1A	F 3	Apartments	Family Apartments	13,320	194,760	450	30	593	21	415	36
1-3	1A	F 4	Apartments	Family Apartments	13,320	208,080	450	30	622	21	436	36
1-3	1A	F 5	Apartments	Family Apartments	13,320	221,400	450	30	652	21	456	36
1-3	1A	F 6	Apartments	Family Apartments	18,720	240,120	450	42	694	29	486	50
1-3	1A	F 7	Apartments	Family Apartments	9,840	249,960	450	22	715	15	501	26
1-3	1A	F 8	Apartments	Family Apartments	9,840	259,800	450	22	737	15	516	26
1-3	1A	F 9	Apartments	Family Apartments	18,720	278,520	450	42	779	29	545	50
1-3	1A	F 10	Apartments	Family Apartments	15,240	293,760	450	34	813	24	569	41
1-3	1A	F 11	Apartments	Family Apartments	9,840	303,600	450	22	835	15	584	26
1-3	1A	F 12	Apartments	Family Apartments	9,840	313,440	450	22	857	15	600	26
1-3	1A	F 13	Apartments	Family Apartments	19,680	333,120	450	44	900	31	630	52
1-3	1A	F 14	Apartments	Family Apartments	13,320	346,440	450	30	930	21	651	36
1-3	1A	F 15	Apartments	Family Apartments	17,760	364,200	450	39	969	28	679	47
1-3	1A	F 16	Apartments	Family Apartments	8,880	373,080	450	20	989	14	692	24
1-3	1A	F 17	Apartments	Family Apartments	17,760	390,840	450	39	1,029	28	720	47
1-3	1A	F 18	Apartments	Family Apartments	15,240	406,080	450	34	1,062	24	744	41
1-3	1A	F 19	Apartments	Family Apartments	8,880	414,960	450	20	1,082	14	757	24
1-3	1A	F 20	Apartments	Family Apartments	15,240	430,200	450	34	1,116	24	781	41
1-3	1A	F 21	Townhouses	Family Townhouses	5,806	436,006	450	13	1,129	9	790	15
1-3	1A	F 22	Townhouses	Family Townhouses	7,744	443,750	450	17	1,146	12	802	21
1-3	1A	F 23	Townhouses	Family Townhouses	5,806	449,556	450	13	1,159	9	811	15
1-3	1A	F 24	Townhouses	Family Townhouses	9,680	459,236	450	22	1,181	15	826	26
1-3	1A	F 25	Townhouses	Family Townhouses	9,680	468,916	450	22	1,202	15	841	26
1-3	1A	F 26	Townhouses	Family Townhouses	9,680	478,596	450	22	1,224	15	856	26
1-3	1A	F 27	Townhouses	Family Townhouses	9,680	488,276	450	22	1,245	15	872	26
1-3	1A	F 28	Townhouses	Family Townhouses	11,614	499,890	450	26	1,271	18	890	31
1-3	1A	F 29	Townhouses	Family Townhouses	7,744	507,634	450	17	1,288	12	902	21
1-3	1A	F 30	Townhouses	Family Townhouses	7,744	515,378	450	17	1,305	12	914	21
1-3	1A	F 31	Townhouses	Family Townhouses	9,680	525,058	450	22	1,327	15	929	26
1-3	1A	F 32	Townhouses	Family Townhouses	11,600	536,658	450	26	1,353	18	947	31
1-3	1A	CDC N	Child Dev. Center	Child development center	14,800	551,458	350	42	1,395	30	976	51
1-3	1A	CC N	Community Cente	Community center	5,200	556,658	350	15	1,410	10	987	18
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	780,658	350	640	2,050	448	1,435	768
4-5	1	W 1	Conference Cente	Conference	270,000	1,050,658	350	771	2,821	540	1,975	926
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	1,170,658	350	343	3,164	240	2,215	411
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	1,345,658	350	500	3,664	350	2,565	600
6-10	2	W 2	Conference Cente	Conference	120,000	1,465,658	350	343	4,007	240	2,805	411
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,648,158	350	521	4,528	365	3,170	626
6-10	2	W 7	Academic	Classrooms, wet labs, faculty o	195,000	1,843,158	300	650	5,178	455	3,625	780
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	2,063,158	350	629	5,807	440	4,065	754
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	2,161,158	350	280	6,087	196	4,261	336
6-10	2	W 15	Student Center	Student Center	170,000	2,331,158	300	567	6,654	397	4,657	680
6-10	2	M3	Research	Wet labs, faculty offices	100,000	2,431,158	300	333	6,987	233	4,891	400
6-10	2	M6	Ambulatory Care	Hospital	100,000	2,531,158	300	333	7,320	233	5,124	400
6-10	2	MV	Vivarium	Vivarium	23,000	2,554,158	300	77	7,397	54	5,178	92
6-10	2	H2	Graduate Housing	Apartments	125,000	2,679,158	450	278	7,675	194	5,372	333
6-10	2	R	Recreation	Recreation center	65,000	2,744,158	300	217	7,891	152	5,524	260
6-10	2	A 1	Apartments	Apartments	30,000	2,774,158	450	67	7,958	47	5,571	80
6-10	2	A 2	Apartments	Apartments	24,000	2,798,158	450	53	8,011	37	5,608	64
6-10	2	A 3	Apartments	Apartments	13,500	2,811,658	450	30	8,041	21	5,629	36
6-10	2	A 4	Apartments	Apartments	13,500	2,825,158	450	30	8,071	21	5,650	36
6-10	2	A 5	Apartments	Apartments	30,000	2,855,158	450	67	8,138	47	5,697	80
6-10	2	A 6	Apartments	Apartments	30,000	2,885,158	450	67	8,205	47	5,743	80
6-10	2	A 7	Apartments	Apartments	13,500	2,898,658	450	30	8,235	21	5,764	36

Table 8-1. West Campus Building Cooling Load Analysis for All Future Buildings

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS (*)	Cumulative Diversified Peak Cooling Load, TONS	Peak CHW Flow, GPM (**)
6-10	2	A 8	Apartments	Apartments	13,500	2,912,158	450	30	8,265	21	5,785	36
6-10	2	A 9	Apartments	Apartments	24,000	2,936,158	450	53	8,318	37	5,823	64
6-10	2	A 10	Apartments	Apartments	24,000	2,960,158	450	53	8,371	37	5,860	64
6-10	2	A 11	Apartments	Apartments	13,500	2,973,658	450	30	8,401	21	5,881	36
6-10	2	A 12	Apartments	Apartments	13,500	2,987,158	450	30	8,431	21	5,902	36
6-10	2	A 13	Apartments	Apartments	13,500	3,000,658	450	30	8,461	21	5,923	36
6-10	2	A 14	Apartments	Apartments	13,500	3,014,158	450	30	8,491	21	5,944	36
6-10	2	A 15	Apartments	Apartments	24,000	3,038,158	450	53	8,545	37	5,981	64
6-10	2	F 33	Apartments	Family Apartments	18,720	3,056,878	450	42	8,586	29	6,010	50
6-10	2	F 34	Apartments	Family Apartments	18,720	3,075,598	450	42	8,628	29	6,039	50
6-10	2	F 35	Apartments	Family Apartments	14,308	3,089,906	450	32	8,660	22	6,062	38
6-10	2	F 36	Apartments	Family Apartments	9,840	3,099,746	450	22	8,681	15	6,077	26
6-10	2	F 37	Apartments	Family Apartments	14,308	3,114,054	450	32	8,713	22	6,099	38
6-10	2	F 38	Apartments	Family Apartments	14,308	3,128,362	450	32	8,745	22	6,122	38
6-10	2	F 39	Apartments	Family Apartments	18,720	3,147,082	450	42	8,787	29	6,151	50
6-10	2	F 40	Apartments	Family Apartments	14,308	3,161,390	450	32	8,818	22	6,173	38
6-10	2	F 41	Apartments	Family Apartments	17,760	3,179,150	450	39	8,858	28	6,201	47
6-10	2	F 42	Apartments	Family Apartments	18,720	3,197,870	450	42	8,900	29	6,230	50
6-10	2	F 43	Apartments	Family Apartments	14,308	3,212,178	450	32	8,931	22	6,252	38
6-10	2	F 44	Apartments	Family Apartments	14,308	3,226,486	450	32	8,963	22	6,274	38
6-10	2	F 45	Apartments	Family Apartments	14,308	3,240,794	450	32	8,995	22	6,296	38
6-10	2	F 46	Apartments	Family Apartments	18,720	3,259,514	450	42	9,037	29	6,326	50
6-10	2	F 47	Apartments	Family Apartments	18,720	3,278,234	450	42	9,078	29	6,355	50
6-10	2	F 48	Apartments	Family Apartments	9,840	3,288,074	450	22	9,100	15	6,370	26
6-10	2	F 49	Apartments	Family Apartments	14,308	3,302,382	450	32	9,132	22	6,392	38
6-10	2	F 50	Apartments	Family Apartments	14,308	3,316,690	450	32	9,164	22	6,415	38
6-10	2	F 51	Apartments	Family Apartments	9,840	3,326,530	450	22	9,185	15	6,430	26
6-10	2	F 52	Townhouses	Family Townhouses	7,744	3,334,274	450	17	9,203	12	6,442	21
6-10	2	F 53	Townhouses	Family Townhouses	9,680	3,343,954	450	22	9,224	15	6,457	26
6-10	2	F 54	Townhouses	Family Townhouses	9,680	3,353,634	450	22	9,246	15	6,472	26
6-10	2	F 55	Townhouses	Family Townhouses	9,680	3,363,314	450	22	9,267	15	6,487	26
6-10	2	F 56	Townhouses	Family Townhouses	9,680	3,372,994	450	22	9,289	15	6,502	26
6-10	2	F 57	Townhouses	Family Townhouses	11,614	3,384,608	450	26	9,315	18	6,520	31
6-10	2	F 58	Townhouses	Family Townhouses	11,614	3,396,222	450	26	9,340	18	6,538	31
6-10	2	F 59	Townhouses	Family Townhouses	9,680	3,405,902	450	22	9,362	15	6,553	26
6-10	2	F 60	Townhouses	Family Townhouses	9,680	3,415,582	450	22	9,383	15	6,568	26
6-10	2	CDC S	Child Dev. Center	Child development center	14,800	3,430,382	350	42	9,426	30	6,598	51
6-10	2	CC S	Community Cente	Community center	4,800	3,435,182	350	14	9,439	10	6,608	16
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	3,590,182	350	443	9,882	310	6,918	531
11-15	3	W 17	Academic	Classrooms, wet labs, faculty o	165,000	3,755,182	300	550	10,432	385	7,303	660
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	3,853,582	350	281	10,713	197	7,499	337
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	3,968,582	350	329	11,042	230	7,729	394
11-15	3	W 20	Academic	Classrooms, wet labs, faculty o	104,000	4,072,582	300	347	11,389	243	7,972	416
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	4,185,082	350	321	11,710	225	8,197	386
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	4,285,082	350	286	11,996	200	8,397	343
11-15	3	M2	Research	Wet labs, faculty offices	128,000	4,413,082	300	427	12,422	299	8,696	512
11-15	3	M5	Ambulatory Care	Hospital	120,000	4,533,082	300	400	12,822	280	8,976	480
11-15	3	M7	Research	Wet labs, faculty offices	124,000	4,657,082	300	413	13,236	289	9,265	496
11-15	3	H1	Graduate Housing	Apartments	125,000	4,782,082	450	278	13,514	194	9,459	333
11-15	3	MOB 5	Medical Office Bld	Wet labs, doctor offices	70,000	4,852,082	300	233	13,747	163	9,623	280
11-15	3	MOB 6	Medical Office Bld	Wet labs, doctor offices	82,000	4,934,082	300	273	14,020	191	9,814	328
11-15	3	MOB 7	Medical Office Bld	Wet labs, doctor offices	78,000	5,012,082	300	260	14,280	182	9,996	312
11-15	3	A 16	Apartments	Apartments	24,000	5,036,082	450	53	14,334	37	10,033	64
11-15	3	A 17	Apartments	Apartments	13,500	5,049,582	450	30	14,364	21	10,054	36
11-15	3	A 18	Apartments	Apartments	13,500	5,063,082	450	30	14,394	21	10,075	36

Table 8-1. West Campus Building Cooling Load Analysis for All Future Buildings

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS (*)	Cumulative Diversified Peak Cooling Load, TONS	Peak CHW Flow, GPM (**)
11-15	3	A 19	Apartments	Apartments	24,000	5,087,082	450	53	14,447	37	10,113	64
11-15	3	A 20	Apartments	Apartments	24,000	5,111,082	450	53	14,500	37	10,150	64
11-15	3	A 21	Apartments	Apartments	13,500	5,124,582	450	30	14,530	21	10,171	36
11-15	3	A 22	Apartments	Apartments	13,500	5,138,082	450	30	14,560	21	10,192	36
11-15	3	A 23	Apartments	Apartments	24,000	5,162,082	450	53	14,614	37	10,229	64
11-15	3	A 24	Apartments	Apartments	24,000	5,186,082	450	53	14,667	37	10,267	64
11-15	3	A 25	Apartments	Apartments	13,500	5,199,582	450	30	14,697	21	10,288	36
11-15	3	A 26	Apartments	Apartments	13,500	5,213,082	450	30	14,727	21	10,309	36
11-15	3	A 27	Apartments	Apartments	24,000	5,237,082	450	53	14,780	37	10,346	64
11-15	3	A 28	Apartments	Apartments	24,000	5,261,082	450	53	14,834	37	10,383	64
11-15	3	A 29	Apartments	Apartments	13,500	5,274,582	450	30	14,864	21	10,404	36
11-15	3	A 30	Apartments	Apartments	13,500	5,288,082	450	30	14,894	21	10,425	36
11-15	3	A 31	Apartments	Apartments	24,000	5,312,082	450	53	14,947	37	10,463	64
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	5,409,682	350	279	15,226	195	10,658	335
16-20	4	W 10	Academic	Classrooms, wet labs, faculty o	115,000	5,524,682	300	383	15,609	268	10,926	460
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	5,799,682	350	786	16,395	550	11,476	943
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	5,891,682	350	263	16,658	184	11,660	315
16-20	4	W 13	Academic	Classrooms, wet labs, faculty o	98,000	5,989,682	300	327	16,984	229	11,889	392
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	6,153,682	350	469	17,453	328	12,217	562
16-20	4	W 24	Academic	Classrooms, wet labs, faculty o	110,000	6,263,682	300	367	17,820	257	12,474	440
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	6,343,682	350	229	18,048	160	12,634	274
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	6,443,682	350	286	18,334	200	12,834	343
16-20	4	W 27	Academic	Classrooms, wet labs, faculty o	185,000	6,628,682	300	617	18,950	432	13,265	740
16-20	4	M1	Research	Wet labs, faculty offices	120,000	6,748,682	300	400	19,350	280	13,545	480
16-20	4	MOB 1	Medical Office Bld	Wet labs, doctor offices	72,000	6,820,682	300	240	19,590	168	13,713	288
16-20	4	MOB 2	Medical Office Bld	Wet labs, doctor offices	124,000	6,944,682	300	413	20,004	289	14,003	496
16-20	4	MOB 3	Medical Office Bld	Wet labs, doctor offices	120,000	7,064,682	300	400	20,404	280	14,283	480
16-20	4	MOB 4	Medical Office Bld	Wet labs, doctor offices	150,000	7,214,682	300	500	20,904	350	14,633	600
16-20	4	A 32	Apartments	Apartments	24,000	7,238,682	450	53	20,957	37	14,670	64
16-20	4	A 33	Apartments	Apartments	13,500	7,252,182	450	30	20,987	21	14,691	36
16-20	4	A 34	Apartments	Apartments	13,500	7,265,682	450	30	21,017	21	14,712	36
16-20	4	A 35	Apartments	Apartments	13,500	7,279,182	450	30	21,047	21	14,733	36
16-20	4	A 36	Apartments	Apartments	13,500	7,292,682	450	30	21,077	21	14,754	36
16-20	4	A 37	Apartments	Apartments	24,000	7,316,682	450	53	21,130	37	14,791	64
16-20	4	A 38	Apartments	Apartments	24,000	7,340,682	450	53	21,184	37	14,829	64
16-20	4	A 39	Apartments	Apartments	13,500	7,354,182	450	30	21,214	21	14,850	36
16-20	4	A 40	Apartments	Apartments	13,500	7,367,682	450	30	21,244	21	14,871	36
16-20	4	A 41	Apartments	Apartments	30,000	7,397,682	450	67	21,310	47	14,917	80
16-20	4	A 42	Apartments	Apartments	30,000	7,427,682	450	67	21,377	47	14,964	80
16-20	4	A 43	Apartments	Apartments	30,000	7,457,682	450	67	21,444	47	15,011	80
16-20	4	A 44	Apartments	Apartments	13,500	7,471,182	450	30	21,474	21	15,032	36
16-20	4	A 45	Apartments	Apartments	13,500	7,484,682	450	30	21,504	21	15,053	36
16-20	4	A 46	Apartments	Apartments	24,000	7,508,682	450	53	21,557	37	15,090	64
					7,508,682			**21,557**		**15,090**		**25,869**

* Diversity factor is 70%

** CHW flow is figured as peak cooling load (tons) x 12,000/500/20°F CHW ΔT

Table 8-2. West Campus Building Cooling Load Analysis for a Single Central Plant

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS	Cumulative Diversified Peak Cooling	Peak CHW Flow, GPM (**)
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty	144,000	144,000	300	480	480	336	336	576
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	368,000	350	640	1,120	448	784	768
4-5	1	W 1	Conference Cente	Conference	270,000	638,000	350	771	1,891	540	1,324	926
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	758,000	350	343	2,234	240	1,564	411
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	933,000	350	500	2,734	350	1,914	600
6-10	2	W 2	Conference Cente	Conference	120,000	1,053,000	350	343	3,077	240	2,154	411
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,235,500	350	521	3,599	365	2,519	626
6-10	2	W 7	Academic	Classrooms, wet labs, faculty	195,000	1,430,500	300	650	4,249	455	2,974	780
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	1,650,500	350	629	4,877	440	3,414	754
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	1,748,500	350	280	5,157	196	3,610	336
6-10	2	W 15	Student Center	Student Center	170,000	1,918,500	300	567	5,724	397	4,007	680
6-10	2	M3	Research	Wet labs, faculty offices	100,000	2,018,500	300	333	6,057	233	4,240	400
6-10	2	M6	Ambulatory Care	Hospital	100,000	2,118,500	300	333	6,390	233	4,473	400
6-10	2	MV	Vivarium	Vivarium	23,000	2,141,500	300	77	6,467	54	4,527	92
6-10	2	H2	Graduate Housin	Apartments	125,000	2,266,500	450	278	6,745	194	4,721	333
6-10	2	R	Recreation	Recreation center	65,000	2,331,500	300	217	6,962	152	4,873	260
6-10	2	A 1	Apartments	Apartments	30,000	2,361,500	450	67	7,028	47	4,920	80
6-10	2	A 2	Apartments	Apartments	24,000	2,385,500	450	53	7,082	37	4,957	64
6-10	2	A 3	Apartments	Apartments	13,500	2,399,000	450	30	7,112	21	4,978	36
6-10	2	A 4	Apartments	Apartments	13,500	2,412,500	450	30	7,142	21	4,999	36
6-10	2	A 5	Apartments	Apartments	30,000	2,442,500	450	67	7,208	47	5,046	80
6-10	2	A 6	Apartments	Apartments	30,000	2,472,500	450	67	7,275	47	5,092	80
6-10	2	A 7	Apartments	Apartments	13,500	2,486,000	450	30	7,305	21	5,113	36
6-10	2	A 8	Apartments	Apartments	13,500	2,499,500	450	30	7,335	21	5,134	36
6-10	2	A 9	Apartments	Apartments	24,000	2,523,500	450	53	7,388	37	5,172	64
6-10	2	A 10	Apartments	Apartments	24,000	2,547,500	450	53	7,442	37	5,209	64
6-10	2	A 11	Apartments	Apartments	13,500	2,561,000	450	30	7,472	21	5,230	36
6-10	2	A 12	Apartments	Apartments	13,500	2,574,500	450	30	7,502	21	5,251	36
6-10	2	A 13	Apartments	Apartments	13,500	2,588,000	450	30	7,532	21	5,272	36
6-10	2	A 14	Apartments	Apartments	13,500	2,601,500	450	30	7,562	21	5,293	36
6-10	2	A 15	Apartments	Apartments	24,000	2,625,500	450	53	7,615	37	5,330	64
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	2,780,500	350	443	8,058	310	5,640	531
11-15	3	W 17	Academic	Classrooms, wet labs, faculty	165,000	2,945,500	300	550	8,608	385	6,025	660
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	3,043,900	350	281	8,889	197	6,222	337
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	3,158,900	350	329	9,217	230	6,452	394
11-15	3	W 20	Academic	Classrooms, wet labs, faculty	104,000	3,262,900	300	347	9,564	243	6,695	416
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	3,375,400	350	321	9,886	225	6,920	386
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	3,475,400	350	286	10,171	200	7,120	343
11-15	3	M2	Research	Wet labs, faculty offices	128,000	3,603,400	300	427	10,598	299	7,419	512
11-15	3	M5	Ambulatory Care	Hospital	120,000	3,723,400	300	400	10,998	280	7,699	480
11-15	3	M7	Research	Wet labs, faculty offices	124,000	3,847,400	300	413	11,411	289	7,988	496
11-15	3	H1	Graduate Housin	Apartments	125,000	3,972,400	450	278	11,689	194	8,182	333
11-15	3	MOB 5	Medical Office Bl	Wet labs, doctor offices	70,000	4,042,400	300	233	11,922	163	8,346	280
11-15	3	MOB 6	Medical Office Bl	Wet labs, doctor offices	82,000	4,124,400	300	273	12,196	191	8,537	328
11-15	3	MOB 7	Medical Office Bl	Wet labs, doctor offices	78,000	4,202,400	300	260	12,456	182	8,719	312
11-15	3	A 16	Apartments	Apartments	24,000	4,226,400	450	53	12,509	37	8,756	64
11-15	3	A 17	Apartments	Apartments	13,500	4,239,900	450	30	12,539	21	8,777	36
11-15	3	A 18	Apartments	Apartments	13,500	4,253,400	450	30	12,569	21	8,798	36
11-15	3	A 19	Apartments	Apartments	24,000	4,277,400	450	53	12,622	37	8,836	64
11-15	3	A 20	Apartments	Apartments	24,000	4,301,400	450	53	12,676	37	8,873	64
11-15	3	A 21	Apartments	Apartments	13,500	4,314,900	450	30	12,706	21	8,894	36

Table 8-2. West Campus Building Cooling Load Analysis for a Single Central Plant												
Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS	Cumulative Diversified Peak Cooling	Peak CHW Flow, GPM (**)
11-15	3	A 22	Apartments	Apartments	13,500	4,328,400	450	30	12,736	21	8,915	36
11-15	3	A 23	Apartments	Apartments	24,000	4,352,400	450	53	12,789	37	8,952	64
11-15	3	A 24	Apartments	Apartments	24,000	4,376,400	450	53	12,842	37	8,990	64
11-15	3	A 25	Apartments	Apartments	13,500	4,389,900	450	30	12,872	21	9,011	36
11-15	3	A 26	Apartments	Apartments	13,500	4,403,400	450	30	12,902	21	9,032	36
11-15	3	A 27	Apartments	Apartments	24,000	4,427,400	450	53	12,956	37	9,069	64
11-15	3	A 28	Apartments	Apartments	24,000	4,451,400	450	53	13,009	37	9,106	64
11-15	3	A 29	Apartments	Apartments	13,500	4,464,900	450	30	13,039	21	9,127	36
11-15	3	A 30	Apartments	Apartments	13,500	4,478,400	450	30	13,069	21	9,148	36
11-15	3	A 31	Apartments	Apartments	24,000	4,502,400	450	53	13,122	37	9,186	64
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	4,600,000	350	279	13,401	195	9,381	335
16-20	4	W 10	Academic	Classrooms, wet labs, faculty	115,000	4,715,000	300	383	13,785	268	9,649	460
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	4,990,000	350	786	14,570	550	10,199	943
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	5,082,000	350	263	14,833	184	10,383	315
16-20	4	W 13	Academic	Classrooms, wet labs, faculty	98,000	5,180,000	300	327	15,160	229	10,612	392
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	5,344,000	350	469	15,628	328	10,940	562
16-20	4	W 24	Academic	Classrooms, wet labs, faculty	110,000	5,454,000	300	367	15,995	257	11,197	440
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	5,534,000	350	229	16,224	160	11,357	274
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	5,634,000	350	286	16,509	200	11,557	343
16-20	4	W 27	Academic	Classrooms, wet labs, faculty	185,000	5,819,000	300	617	17,126	432	11,988	740
16-20	4	M1	Research	Wet labs, faculty offices	120,000	5,939,000	300	400	17,526	280	12,268	480
16-20	4	MOB 1	Medical Office Bld	Wet labs, doctor offices	72,000	6,011,000	300	240	17,766	168	12,436	288
16-20	4	MOB 2	Medical Office Bld	Wet labs, doctor offices	124,000	6,135,000	300	413	18,179	289	12,726	496
16-20	4	MOB 3	Medical Office Bld	Wet labs, doctor offices	120,000	6,255,000	300	400	18,579	280	13,006	480
16-20	4	MOB 4	Medical Office Bld	Wet labs, doctor offices	150,000	6,405,000	300	500	19,079	350	13,356	600
16-20	4	A 32	Apartments	Apartments	24,000	6,429,000	450	53	19,133	37	13,393	64
16-20	4	A 33	Apartments	Apartments	13,500	6,442,500	450	30	19,163	21	13,414	36
16-20	4	A 34	Apartments	Apartments	13,500	6,456,000	450	30	19,193	21	13,435	36
16-20	4	A 35	Apartments	Apartments	13,500	6,469,500	450	30	19,223	21	13,456	36
16-20	4	A 36	Apartments	Apartments	13,500	6,483,000	450	30	19,253	21	13,477	36
16-20	4	A 37	Apartments	Apartments	24,000	6,507,000	450	53	19,306	37	13,514	64
16-20	4	A 38	Apartments	Apartments	24,000	6,531,000	450	53	19,359	37	13,552	64
16-20	4	A 39	Apartments	Apartments	13,500	6,544,500	450	30	19,389	21	13,573	36
16-20	4	A 40	Apartments	Apartments	13,500	6,558,000	450	30	19,419	21	13,594	36
16-20	4	A 41	Apartments	Apartments	30,000	6,588,000	450	67	19,486	47	13,640	80
16-20	4	A 42	Apartments	Apartments	30,000	6,618,000	450	67	19,553	47	13,687	80
16-20	4	A 43	Apartments	Apartments	30,000	6,648,000	450	67	19,619	47	13,734	80
16-20	4	A 44	Apartments	Apartments	13,500	6,661,500	450	30	19,649	21	13,755	36
16-20	4	A 45	Apartments	Apartments	13,500	6,675,000	450	30	19,679	21	13,776	36
16-20	4	A 46	Apartments	Apartments	24,000	6,699,000	450	53	19,733	37	13,813	64
					6,699,000			**19,733**		**13,813**		**23,679**

* Diversity factor is 70%

** CHW flow is figured as peak cooling load (tons) x 12,000/500/20°F CHW ΔT

Table 8-3. West Campus Building Cooling Load Analysis for Two Central Plants

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS	Cumulative Diversified Peak Cooling	Peak CHW Flow, GPM (**)
Main Central Plant												
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty	144,000	144,000	300	480	480	336	336	576
4-5	1	W 1	Conference Cente	Conference	270,000	414,000	350	771	1,251	540	876	926
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	534,000	350	343	1,594	240	1,116	411
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	709,000	350	500	2,094	350	1,466	600
6-10	2	W 2	Conference Cente	Conference	120,000	829,000	350	343	2,437	240	1,706	411
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,011,500	350	521	2,959	365	2,071	626
6-10	2	W 7	Academic	Classrooms, wet labs, faculty	195,000	1,206,500	300	650	3,609	455	2,526	780
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	1,426,500	350	629	4,237	440	2,966	754
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	1,524,500	350	280	4,517	196	3,162	336
6-10	2	W 15	Student Center	Student Center	170,000	1,694,500	300	567	5,084	397	3,559	680
6-10	2	R	Recreation	Recreation center	65,000	1,759,500	300	217	5,300	152	3,710	260
6-10	2	A 1	Apartments	Apartments	30,000	1,789,500	450	67	5,367	47	3,757	80
6-10	2	A 2	Apartments	Apartments	24,000	1,813,500	450	53	5,420	37	3,794	64
6-10	2	A 3	Apartments	Apartments	13,500	1,827,000	450	30	5,450	21	3,815	36
6-10	2	A 4	Apartments	Apartments	13,500	1,840,500	450	30	5,480	21	3,836	36
6-10	2	A 5	Apartments	Apartments	30,000	1,870,500	450	67	5,547	47	3,883	80
6-10	2	A 6	Apartments	Apartments	30,000	1,900,500	450	67	5,614	47	3,930	80
6-10	2	A 7	Apartments	Apartments	13,500	1,914,000	450	30	5,644	21	3,951	36
6-10	2	A 8	Apartments	Apartments	13,500	1,927,500	450	30	5,674	21	3,972	36
6-10	2	A 9	Apartments	Apartments	24,000	1,951,500	450	53	5,727	37	4,009	64
6-10	2	A 10	Apartments	Apartments	24,000	1,975,500	450	53	5,780	37	4,046	64
6-10	2	A 11	Apartments	Apartments	13,500	1,989,000	450	30	5,810	21	4,067	36
6-10	2	A 12	Apartments	Apartments	13,500	2,002,500	450	30	5,840	21	4,088	36
6-10	2	A 13	Apartments	Apartments	13,500	2,016,000	450	30	5,870	21	4,109	36
6-10	2	A 14	Apartments	Apartments	13,500	2,029,500	450	30	5,900	21	4,130	36
6-10	2	A 15	Apartments	Apartments	24,000	2,053,500	450	53	5,954	37	4,168	64
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	2,208,500	350	443	6,397	310	4,478	531
11-15	3	W 17	Academic	Classrooms, wet labs, faculty	165,000	2,373,500	300	550	6,947	385	4,863	660
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	2,471,900	350	281	7,228	197	5,059	337
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	2,586,900	350	329	7,556	230	5,289	394
11-15	3	W 20	Academic	Classrooms, wet labs, faculty	104,000	2,690,900	300	347	7,903	243	5,532	416
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	2,803,400	350	321	8,224	225	5,757	386
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	2,903,400	350	286	8,510	200	5,957	343
11-15	3	A 16	Apartments	Apartments	24,000	2,927,400	450	53	8,564	37	5,994	64
11-15	3	A 17	Apartments	Apartments	13,500	2,940,900	450	30	8,594	21	6,015	36
11-15	3	A 18	Apartments	Apartments	13,500	2,954,400	450	30	8,624	21	6,036	36
11-15	3	A 19	Apartments	Apartments	24,000	2,978,400	450	53	8,677	37	6,074	64
11-15	3	A 20	Apartments	Apartments	24,000	3,002,400	450	53	8,730	37	6,111	64
11-15	3	A 21	Apartments	Apartments	13,500	3,015,900	450	30	8,760	21	6,132	36
11-15	3	A 22	Apartments	Apartments	13,500	3,029,400	450	30	8,790	21	6,153	36
11-15	3	A 23	Apartments	Apartments	24,000	3,053,400	450	53	8,844	37	6,190	64
11-15	3	A 24	Apartments	Apartments	24,000	3,077,400	450	53	8,897	37	6,228	64
11-15	3	A 25	Apartments	Apartments	13,500	3,090,900	450	30	8,927	21	6,249	36
11-15	3	A 26	Apartments	Apartments	13,500	3,104,400	450	30	8,957	21	6,270	36
11-15	3	A 27	Apartments	Apartments	24,000	3,128,400	450	53	9,010	37	6,307	64
11-15	3	A 28	Apartments	Apartments	24,000	3,152,400	450	53	9,064	37	6,344	64
11-15	3	A 29	Apartments	Apartments	13,500	3,165,900	450	30	9,094	21	6,365	36
11-15	3	A 30	Apartments	Apartments	13,500	3,179,400	450	30	9,124	21	6,386	36
11-15	3	A 31	Apartments	Apartments	24,000	3,203,400	450	53	9,177	37	6,424	64
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	3,301,000	350	279	9,456	195	6,619	335
16-20	4	W 10	Academic	Classrooms, wet labs, faculty	115,000	3,416,000	300	383	9,839	268	6,887	460
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	3,691,000	350	786	10,625	550	7,437	943
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	3,783,000	350	263	10,888	184	7,621	315
16-20	4	W 13	Academic	Classrooms, wet labs, faculty	98,000	3,881,000	300	327	11,214	229	7,850	392
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	4,045,000	350	469	11,683	328	8,178	562
16-20	4	W 24	Academic	Classrooms, wet labs, faculty	110,000	4,155,000	300	367	12,050	257	8,435	440
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	4,235,000	350	229	12,278	160	8,595	274
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	4,335,000	350	286	12,564	200	8,795	343
16-20	4	W 27	Academic	Classrooms, wet labs, faculty	185,000	4,520,000	300	617	13,180	432	9,226	740

Table 8-3. West Campus Building Cooling Load Analysis for Two Central Plants

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS	Cumulative Diversified Peak Cooling	Peak CHW Flow, GPM (**)
16-20	4	A 32	Apartments	Apartments	24,000	4,544,000	450	53	13,234	37	9,264	64
16-20	4	A 33	Apartments	Apartments	13,500	4,557,500	450	30	13,264	21	9,285	36
16-20	4	A 34	Apartments	Apartments	13,500	4,571,000	450	30	13,294	21	9,306	36
16-20	4	A 35	Apartments	Apartments	13,500	4,584,500	450	30	13,324	21	9,327	36
16-20	4	A 36	Apartments	Apartments	13,500	4,598,000	450	30	13,354	21	9,348	36
16-20	4	A 37	Apartments	Apartments	24,000	4,622,000	450	53	13,407	37	9,385	64
16-20	4	A 38	Apartments	Apartments	24,000	4,646,000	450	53	13,460	37	9,422	64
16-20	4	A 39	Apartments	Apartments	13,500	4,659,500	450	30	13,490	21	9,443	36
16-20	4	A 40	Apartments	Apartments	13,500	4,673,000	450	30	13,520	21	9,464	36
16-20	4	A 41	Apartments	Apartments	30,000	4,703,000	450	67	13,587	47	9,511	80
16-20	4	A 42	Apartments	Apartments	30,000	4,733,000	450	67	13,654	47	9,558	80
16-20	4	A 43	Apartments	Apartments	30,000	4,763,000	450	67	13,720	47	9,604	80
16-20	4	A 44	Apartments	Apartments	13,500	4,776,500	450	30	13,750	21	9,625	36
16-20	4	A 45	Apartments	Apartments	13,500	4,790,000	450	30	13,780	21	9,646	36
16-20	4	A 46	Apartments	Apartments	24,000	4,814,000	450	53	13,834	37	9,684	64
					4,814,000			**13,834**		**9,684**		**16,601**

* Diversity factor is 70%
** CHW flow is figured as peak cooling load (tons) x 12,000/500/20°F CHW ΔT

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS (*)	Cumulative Diversified Peak Cooling Load, TONS	Peak CHW Flow, GPM (**)
Medical School Central Plant												
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	224,000	350	640	640	448	448	768
5-10	2	M3	Research	Wet labs, faculty offices	100,000	324,000	300	333	973	233	681	400
5-10	2	M6	Ambulatory Care	Hospital	100,000	424,000	300	333	1,307	233	915	400
5-10	2	MV	Vivarium	Vivarium	23,000	447,000	300	77	1,383	54	968	92
5-10	2	H2	Graduate Housin	Apartments	125,000	572,000	450	278	1,661	194	1,163	333
11-15	3	M2	Research	Wet labs, faculty offices	128,000	700,000	300	427	2,088	299	1,461	512
11-15	3	M5	Ambulatory Care	Hospital	120,000	820,000	300	400	2,488	280	1,741	480
11-15	3	M7	Research	Wet labs, faculty offices	124,000	944,000	300	413	2,901	289	2,031	496
11-15	3	H1	Graduate Housin	Apartments	125,000	1,069,000	450	278	3,179	194	2,225	333
11-15	3	MOB 5	Medical Office Bl	Wet labs, doctor offices	70,000	1,139,000	300	233	3,412	163	2,389	280
11-15	3	MOB 6	Medical Office Bl	Wet labs, doctor offices	82,000	1,221,000	300	273	3,686	191	2,580	328
11-15	3	MOB 7	Medical Office Bl	Wet labs, doctor offices	78,000	1,299,000	300	260	3,946	182	2,762	312
16-20	4	M1	Research	Wet labs, faculty offices	120,000	1,419,000	300	400	4,346	280	3,042	480
16-20	4	MOB 1	Medical Office Bl	Wet labs, doctor offices	72,000	1,491,000	300	240	4,586	168	3,210	288
16-20	4	MOB 2	Medical Office Bl	Wet labs, doctor offices	124,000	1,615,000	300	413	4,999	289	3,499	496
16-20	4	MOB 3	Medical Office Bl	Wet labs, doctor offices	120,000	1,735,000	300	400	5,399	280	3,779	480
16-20	4	MOB 4	Medical Office Bl	Wet labs, doctor offices	150,000	1,885,000	300	500	5,899	350	4,129	600
					1,661,000			**5,259**		**3,681**		**6,311**

* Diversity factor is 70%
** CHW flow is figured as peak cooling load (tons) x 12,000/500/20°F CHW ΔT

Table 8A-1. West Campus Building Cooling Load Analysis for All Future Buildings with Sustainable Design Considerations												
Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS (*)	Cumulative Diversified Peak Cooling Load, TONS	Peak CHW Flow, GPM (**)
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty o	144,000	144,000	400	360	360	252	252	432
1-3	1A	F 1	Apartments	Family Apartments	18,720	162,720	550	34	394	24	276	41
1-3	1A	F 2	Apartments	Family Apartments	18,720	181,440	550	34	428	24	300	41
1-3	1A	F 3	Apartments	Family Apartments	13,320	194,760	550	24	452	17	317	29
1-3	1A	F 4	Apartments	Family Apartments	13,320	208,080	550	24	477	17	334	29
1-3	1A	F 5	Apartments	Family Apartments	13,320	221,400	550	24	501	17	351	29
1-3	1A	F 6	Apartments	Family Apartments	18,720	240,120	550	34	535	24	374	41
1-3	1A	F 7	Apartments	Family Apartments	9,840	249,960	550	18	553	13	387	21
1-3	1A	F 8	Apartments	Family Apartments	9,840	259,800	550	18	571	13	399	21
1-3	1A	F 9	Apartments	Family Apartments	18,720	278,520	550	34	605	24	423	41
1-3	1A	F 10	Apartments	Family Apartments	15,240	293,760	550	28	632	19	443	33
1-3	1A	F 11	Apartments	Family Apartments	9,840	303,600	550	18	650	13	455	21
1-3	1A	F 12	Apartments	Family Apartments	9,840	313,440	550	18	668	13	468	21
1-3	1A	F 13	Apartments	Family Apartments	19,680	333,120	550	36	704	25	493	43
1-3	1A	F 14	Apartments	Family Apartments	13,320	346,440	550	24	728	17	510	29
1-3	1A	F 15	Apartments	Family Apartments	17,760	364,200	550	32	760	23	532	39
1-3	1A	F 16	Apartments	Family Apartments	8,880	373,080	550	16	777	11	544	19
1-3	1A	F 17	Apartments	Family Apartments	17,760	390,840	550	32	809	23	566	39
1-3	1A	F 18	Apartments	Family Apartments	15,240	406,080	550	28	837	19	586	33
1-3	1A	F 19	Apartments	Family Apartments	8,880	414,960	550	16	853	11	597	19
1-3	1A	F 20	Apartments	Family Apartments	15,240	430,200	550	28	880	19	616	33
1-3	1A	F 21	Townhouses	Family Townhouses	5,806	436,006	550	11	891	7	624	13
1-3	1A	F 22	Townhouses	Family Townhouses	7,744	443,750	550	14	905	10	634	17
1-3	1A	F 23	Townhouses	Family Townhouses	5,806	449,556	550	11	916	7	641	13
1-3	1A	F 24	Townhouses	Family Townhouses	9,680	459,236	550	18	933	12	653	21
1-3	1A	F 25	Townhouses	Family Townhouses	9,680	468,916	550	18	951	12	666	21
1-3	1A	F 26	Townhouses	Family Townhouses	9,680	478,596	550	18	968	12	678	21
1-3	1A	F 27	Townhouses	Family Townhouses	9,680	488,276	550	18	986	12	690	21
1-3	1A	F 28	Townhouses	Family Townhouses	11,614	499,890	550	21	1,007	15	705	25
1-3	1A	F 29	Townhouses	Family Townhouses	7,744	507,634	550	14	1,021	10	715	17
1-3	1A	F 30	Townhouses	Family Townhouses	7,744	515,378	550	14	1,035	10	725	17
1-3	1A	F 31	Townhouses	Family Townhouses	9,680	525,058	550	18	1,053	12	737	21
1-3	1A	F 32	Townhouses	Family Townhouses	11,600	536,658	550	21	1,074	15	752	25
1-3	1A	CDC N	Child Dev. Center	Child development center	14,800	551,458	475	31	1,105	22	774	37
1-3	1A	CC N	Community Cente	Community center	5,200	556,658	475	11	1,116	8	781	13
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	780,658	475	472	1,588	330	1,111	566
4-5	1	W 1	Conference Cente	Conference	270,000	1,050,658	475	568	2,156	398	1,509	682
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	1,170,658	475	253	2,409	177	1,686	303
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	1,345,658	475	368	2,777	258	1,944	442
6-10	2	W 2	Conference Cente	Conference	120,000	1,465,658	475	253	3,030	177	2,121	303
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,648,158	475	384	3,414	269	2,390	461
6-10	2	W 7	Academic	Classrooms, wet labs, faculty o	195,000	1,843,158	400	488	3,901	341	2,731	585
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	2,063,158	475	463	4,365	324	3,055	556
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	2,161,158	475	206	4,571	144	3,200	248
6-10	2	W 15	Student Center	Student Center	170,000	2,331,158	400	425	4,996	298	3,497	510
6-10	2	M3	Research	Wet labs, faculty offices	100,000	2,431,158	400	250	5,246	175	3,672	300
6-10	2	M6	Ambulatory Care	Hospital	100,000	2,531,158	400	250	5,496	175	3,847	300
6-10	2	MV	Vivarium	Vivarium	23,000	2,554,158	400	58	5,553	40	3,887	69
6-10	2	H2	Graduate Housing	Apartments	125,000	2,679,158	550	227	5,781	159	4,046	273
6-10	2	R	Recreation	Recreation center	65,000	2,744,158	400	163	5,943	114	4,160	195
6-10	2	A 1	Apartments	Apartments	30,000	2,774,158	550	55	5,998	38	4,198	65
6-10	2	A 2	Apartments	Apartments	24,000	2,798,158	550	44	6,041	31	4,229	52
6-10	2	A 3	Apartments	Apartments	13,500	2,811,658	550	25	6,066	17	4,246	29
6-10	2	A 4	Apartments	Apartments	13,500	2,825,158	550	25	6,090	17	4,263	29
6-10	2	A 5	Apartments	Apartments	30,000	2,855,158	550	55	6,145	38	4,301	65
6-10	2	A 6	Apartments	Apartments	30,000	2,885,158	550	55	6,200	38	4,340	65
6-10	2	A 7	Apartments	Apartments	13,500	2,898,658	550	25	6,224	17	4,357	29

Table 8A-1. West Campus Building Cooling Load Analysis for All Future Buildings with Sustainable Design Considerations

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS (*)	Cumulative Diversified Peak Cooling Load, TONS	Peak CHW Flow, GPM (**)
6-10	2	A 8	Apartments	Apartments	13,500	2,912,158	550	25	6,249	17	4,374	29
6-10	2	A 9	Apartments	Apartments	24,000	2,936,158	550	44	6,292	31	4,405	52
6-10	2	A 10	Apartments	Apartments	24,000	2,960,158	550	44	6,336	31	4,435	52
6-10	2	A 11	Apartments	Apartments	13,500	2,973,658	550	25	6,360	17	4,452	29
6-10	2	A 12	Apartments	Apartments	13,500	2,987,158	550	25	6,385	17	4,469	29
6-10	2	A 13	Apartments	Apartments	13,500	3,000,658	550	25	6,410	17	4,487	29
6-10	2	A 14	Apartments	Apartments	13,500	3,014,158	550	25	6,434	17	4,504	29
6-10	2	A 15	Apartments	Apartments	24,000	3,038,158	550	44	6,478	31	4,534	52
6-10	2	F 33	Apartments	Family Apartments	18,720	3,056,878	550	34	6,512	24	4,558	41
6-10	2	F 34	Apartments	Family Apartments	18,720	3,075,598	550	34	6,546	24	4,582	41
6-10	2	F 35	Apartments	Family Apartments	14,308	3,089,906	550	26	6,572	18	4,600	31
6-10	2	F 36	Apartments	Family Apartments	9,840	3,099,746	550	18	6,590	13	4,613	21
6-10	2	F 37	Apartments	Family Apartments	14,308	3,114,054	550	26	6,616	18	4,631	31
6-10	2	F 38	Apartments	Family Apartments	14,308	3,128,362	550	26	6,642	18	4,649	31
6-10	2	F 39	Apartments	Family Apartments	18,720	3,147,082	550	34	6,676	24	4,673	41
6-10	2	F 40	Apartments	Family Apartments	14,308	3,161,390	550	26	6,702	18	4,691	31
6-10	2	F 41	Apartments	Family Apartments	17,760	3,179,150	550	32	6,734	23	4,714	39
6-10	2	F 42	Apartments	Family Apartments	18,720	3,197,870	550	34	6,768	24	4,738	41
6-10	2	F 43	Apartments	Family Apartments	14,308	3,212,178	550	26	6,794	18	4,756	31
6-10	2	F 44	Apartments	Family Apartments	14,308	3,226,486	550	26	6,820	18	4,774	31
6-10	2	F 45	Apartments	Family Apartments	14,308	3,240,794	550	26	6,846	18	4,792	31
6-10	2	F 46	Apartments	Family Apartments	18,720	3,259,514	550	34	6,880	24	4,816	41
6-10	2	F 47	Apartments	Family Apartments	18,720	3,278,234	550	34	6,914	24	4,840	41
6-10	2	F 48	Apartments	Family Apartments	9,840	3,288,074	550	18	6,932	13	4,852	21
6-10	2	F 49	Apartments	Family Apartments	14,308	3,302,382	550	26	6,958	18	4,871	31
6-10	2	F 50	Apartments	Family Apartments	14,308	3,316,690	550	26	6,984	18	4,889	31
6-10	2	F 51	Apartments	Family Apartments	9,840	3,326,530	550	18	7,002	13	4,901	21
6-10	2	F 52	Townhouses	Family Townhouses	7,744	3,334,274	550	14	7,016	10	4,911	17
6-10	2	F 53	Townhouses	Family Townhouses	9,680	3,343,954	550	18	7,034	12	4,924	21
6-10	2	F 54	Townhouses	Family Townhouses	9,680	3,353,634	550	18	7,051	12	4,936	21
6-10	2	F 55	Townhouses	Family Townhouses	9,680	3,363,314	550	18	7,069	12	4,948	21
6-10	2	F 56	Townhouses	Family Townhouses	9,680	3,372,994	550	18	7,087	12	4,961	21
6-10	2	F 57	Townhouses	Family Townhouses	11,614	3,384,608	550	21	7,108	15	4,975	25
6-10	2	F 58	Townhouses	Family Townhouses	11,614	3,396,222	550	21	7,129	15	4,990	25
6-10	2	F 59	Townhouses	Family Townhouses	9,680	3,405,902	550	18	7,146	12	5,002	21
6-10	2	F 60	Townhouses	Family Townhouses	9,680	3,415,582	550	18	7,164	12	5,015	21
6-10	2	CDC S	Child Dev. Center	Child development center	14,800	3,430,382	475	31	7,195	22	5,037	37
6-10	2	CC S	Community Cente	Community center	4,800	3,435,182	475	10	7,205	7	5,044	12
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	3,590,182	475	326	7,532	228	5,272	392
11-15	3	W 17	Academic	Classrooms, wet labs, faculty o	165,000	3,755,182	400	413	7,944	289	5,561	495
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	3,853,582	475	207	8,151	145	5,706	249
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	3,968,582	475	242	8,393	169	5,875	291
11-15	3	W 20	Academic	Classrooms, wet labs, faculty o	104,000	4,072,582	400	260	8,653	182	6,057	312
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	4,185,082	475	237	8,890	166	6,223	284
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	4,285,082	475	211	9,101	147	6,370	253
11-15	3	M2	Research	Wet labs, faculty offices	128,000	4,413,082	400	320	9,421	224	6,594	384
11-15	3	M5	Ambulatory Care	Hospital	120,000	4,533,082	400	300	9,721	210	6,804	360
11-15	3	M7	Research	Wet labs, faculty offices	124,000	4,657,082	400	310	10,031	217	7,021	372
11-15	3	H1	Graduate Housing	Apartments	125,000	4,782,082	550	227	10,258	159	7,181	273
11-15	3	MOB 5	Medical Office Bld	Wet labs, doctor offices	70,000	4,852,082	400	175	10,433	123	7,303	210
11-15	3	MOB 6	Medical Office Bld	Wet labs, doctor offices	82,000	4,934,082	400	205	10,638	144	7,447	246
11-15	3	MOB 7	Medical Office Bld	Wet labs, doctor offices	78,000	5,012,082	400	195	10,833	137	7,583	234
11-15	3	A 16	Apartments	Apartments	24,000	5,036,082	550	44	10,877	31	7,614	52
11-15	3	A 17	Apartments	Apartments	13,500	5,049,582	550	25	10,901	17	7,631	29
11-15	3	A 18	Apartments	Apartments	13,500	5,063,082	550	25	10,926	17	7,648	29

Table 8A-1. West Campus Building Cooling Load Analysis for All Future Buildings with Sustainable Design Considerations

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS (*)	Cumulative Diversified Peak Cooling Load, TONS	Peak CHW Flow, GPM (**)
11-15	3	A 19	Apartments	Apartments	24,000	5,087,082	550	44	10,969	31	7,679	52
11-15	3	A 20	Apartments	Apartments	24,000	5,111,082	550	44	11,013	31	7,709	52
11-15	3	A 21	Apartments	Apartments	13,500	5,124,582	550	25	11,037	17	7,726	29
11-15	3	A 22	Apartments	Apartments	13,500	5,138,082	550	25	11,062	17	7,743	29
11-15	3	A 23	Apartments	Apartments	24,000	5,162,082	550	44	11,106	31	7,774	52
11-15	3	A 24	Apartments	Apartments	24,000	5,186,082	550	44	11,149	31	7,805	52
11-15	3	A 25	Apartments	Apartments	13,500	5,199,582	550	25	11,174	17	7,822	29
11-15	3	A 26	Apartments	Apartments	13,500	5,213,082	550	25	11,198	17	7,839	29
11-15	3	A 27	Apartments	Apartments	24,000	5,237,082	550	44	11,242	31	7,869	52
11-15	3	A 28	Apartments	Apartments	24,000	5,261,082	550	44	11,286	31	7,900	52
11-15	3	A 29	Apartments	Apartments	13,500	5,274,582	550	25	11,310	17	7,917	29
11-15	3	A 30	Apartments	Apartments	13,500	5,288,082	550	25	11,335	17	7,934	29
11-15	3	A 31	Apartments	Apartments	24,000	5,312,082	550	44	11,378	31	7,965	52
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	5,409,682	475	205	11,584	144	8,109	247
16-20	4	W 10	Academic	Classrooms, wet labs, faculty o	115,000	5,524,682	400	288	11,871	201	8,310	345
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	5,799,682	475	579	12,450	405	8,715	695
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	5,891,682	475	194	12,644	136	8,851	232
16-20	4	W 13	Academic	Classrooms, wet labs, faculty o	98,000	5,989,682	400	245	12,889	172	9,022	294
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	6,153,682	475	345	13,234	242	9,264	414
16-20	4	W 24	Academic	Classrooms, wet labs, faculty o	110,000	6,263,682	400	275	13,509	193	9,456	330
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	6,343,682	475	168	13,678	118	9,574	202
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	6,443,682	475	211	13,888	147	9,722	253
16-20	4	W 27	Academic	Classrooms, wet labs, faculty o	185,000	6,628,682	400	463	14,351	324	10,045	555
16-20	4	M1	Research	Wet labs, faculty offices	120,000	6,748,682	400	300	14,651	210	10,255	360
16-20	4	MOB 1	Medical Office Bld	Wet labs, doctor offices	72,000	6,820,682	400	180	14,831	126	10,381	216
16-20	4	MOB 2	Medical Office Bld	Wet labs, doctor offices	124,000	6,944,682	400	310	15,141	217	10,598	372
16-20	4	MOB 3	Medical Office Bld	Wet labs, doctor offices	120,000	7,064,682	400	300	15,441	210	10,808	360
16-20	4	MOB 4	Medical Office Bld	Wet labs, doctor offices	150,000	7,214,682	400	375	15,816	263	11,071	450
16-20	4	A 32	Apartments	Apartments	24,000	7,238,682	550	44	15,859	31	11,102	52
16-20	4	A 33	Apartments	Apartments	13,500	7,252,182	550	25	15,884	17	11,119	29
16-20	4	A 34	Apartments	Apartments	13,500	7,265,682	550	25	15,908	17	11,136	29
16-20	4	A 35	Apartments	Apartments	13,500	7,279,182	550	25	15,933	17	11,153	29
16-20	4	A 36	Apartments	Apartments	13,500	7,292,682	550	25	15,958	17	11,170	29
16-20	4	A 37	Apartments	Apartments	24,000	7,316,682	550	44	16,001	31	11,201	52
16-20	4	A 38	Apartments	Apartments	24,000	7,340,682	550	44	16,045	31	11,231	52
16-20	4	A 39	Apartments	Apartments	13,500	7,354,182	550	25	16,069	17	11,249	29
16-20	4	A 40	Apartments	Apartments	13,500	7,367,682	550	25	16,094	17	11,266	29
16-20	4	A 41	Apartments	Apartments	30,000	7,397,682	550	55	16,148	38	11,304	65
16-20	4	A 42	Apartments	Apartments	30,000	7,427,682	550	55	16,203	38	11,342	65
16-20	4	A 43	Apartments	Apartments	30,000	7,457,682	550	55	16,258	38	11,380	65
16-20	4	A 44	Apartments	Apartments	13,500	7,471,182	550	25	16,282	17	11,397	29
16-20	4	A 45	Apartments	Apartments	13,500	7,484,682	550	25	16,307	17	11,415	29
16-20	4	A 46	Apartments	Apartments	24,000	7,508,682	550	44	16,350	31	11,445	52
					7,508,682			**16,350**		**11,445**		**19,620**

* Diversity factor is 70%
** CHW flow is figured as peak cooling load (tons) x 12,000/500/20°F CHW ΔT

Table 8A-2. West Campus Building Cooling Load Analysis for a Single Central Plant with Sustainable Design Considerations												
Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS	Cumulative Diversified Peak Cooling	Peak CHW Flow, GPM (**)
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty	144,000	144,000	400	360	360	252	252	432
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	368,000	475	472	832	330	582	566
4-5	1	W 1	Conference Cente	Conference	270,000	638,000	475	568	1,400	398	980	682
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	758,000	475	253	1,653	177	1,157	303
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	933,000	475	368	2,021	258	1,415	442
6-10	2	W 2	Conference Cente	Conference	120,000	1,053,000	475	253	2,274	177	1,592	303
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,235,500	475	384	2,658	269	1,861	461
6-10	2	W 7	Academic	Classrooms, wet labs, faculty	195,000	1,430,500	400	488	3,145	341	2,202	585
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	1,650,500	475	463	3,609	324	2,526	556
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	1,748,500	475	206	3,815	144	2,670	248
6-10	2	W 15	Student Center	Student Center	170,000	1,918,500	400	425	4,240	298	2,968	510
6-10	2	M3	Research	Wet labs, faculty offices	100,000	2,018,500	400	250	4,490	175	3,143	300
6-10	2	M6	Ambulatory Care	Hospital	100,000	2,118,500	400	250	4,740	175	3,318	300
6-10	2	MV	Vivarium	Vivarium	23,000	2,141,500	400	58	4,797	40	3,358	69
6-10	2	H2	Graduate Housing	Apartments	125,000	2,266,500	550	227	5,025	159	3,517	273
6-10	2	R	Recreation	Recreation center	65,000	2,331,500	400	163	5,187	114	3,631	195
6-10	2	A 1	Apartments	Apartments	30,000	2,361,500	550	55	5,242	38	3,669	65
6-10	2	A 2	Apartments	Apartments	24,000	2,385,500	550	44	5,285	31	3,700	52
6-10	2	A 3	Apartments	Apartments	13,500	2,399,000	550	25	5,310	17	3,717	29
6-10	2	A 4	Apartments	Apartments	13,500	2,412,500	550	25	5,334	17	3,734	29
6-10	2	A 5	Apartments	Apartments	30,000	2,442,500	550	55	5,389	38	3,772	65
6-10	2	A 6	Apartments	Apartments	30,000	2,472,500	550	55	5,444	38	3,810	65
6-10	2	A 7	Apartments	Apartments	13,500	2,486,000	550	25	5,468	17	3,828	29
6-10	2	A 8	Apartments	Apartments	13,500	2,499,500	550	25	5,493	17	3,845	29
6-10	2	A 9	Apartments	Apartments	24,000	2,523,500	550	44	5,536	31	3,875	52
6-10	2	A 10	Apartments	Apartments	24,000	2,547,500	550	44	5,580	31	3,906	52
6-10	2	A 11	Apartments	Apartments	13,500	2,561,000	550	25	5,604	17	3,923	29
6-10	2	A 12	Apartments	Apartments	13,500	2,574,500	550	25	5,629	17	3,940	29
6-10	2	A 13	Apartments	Apartments	13,500	2,588,000	550	25	5,654	17	3,957	29
6-10	2	A 14	Apartments	Apartments	13,500	2,601,500	550	25	5,678	17	3,975	29
6-10	2	A 15	Apartments	Apartments	24,000	2,625,500	550	44	5,722	31	4,005	52
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	2,780,500	475	326	6,048	228	4,234	392
11-15	3	W 17	Academic	Classrooms, wet labs, faculty	165,000	2,945,500	400	413	6,461	289	4,522	495
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	3,043,900	475	207	6,668	145	4,667	249
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	3,158,900	475	242	6,910	169	4,837	291
11-15	3	W 20	Academic	Classrooms, wet labs, faculty	104,000	3,262,900	400	260	7,170	182	5,019	312
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	3,375,400	475	237	7,407	166	5,185	284
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	3,475,400	475	211	7,617	147	5,332	253
11-15	3	M2	Research	Wet labs, faculty offices	128,000	3,603,400	400	320	7,937	224	5,556	384
11-15	3	M5	Ambulatory Care	Hospital	120,000	3,723,400	400	300	8,237	210	5,766	360
11-15	3	M7	Research	Wet labs, faculty offices	124,000	3,847,400	400	310	8,547	217	5,983	372
11-15	3	H1	Graduate Housing	Apartments	125,000	3,972,400	550	227	8,774	159	6,142	273
11-15	3	MOB 5	Medical Office Bld	Wet labs, doctor offices	70,000	4,042,400	400	175	8,949	123	6,265	210
11-15	3	MOB 6	Medical Office Bld	Wet labs, doctor offices	82,000	4,124,400	400	205	9,154	144	6,408	246
11-15	3	MOB 7	Medical Office Bld	Wet labs, doctor offices	78,000	4,202,400	400	195	9,349	137	6,545	234
11-15	3	A 16	Apartments	Apartments	24,000	4,226,400	550	44	9,393	31	6,575	52
11-15	3	A 17	Apartments	Apartments	13,500	4,239,900	550	25	9,418	17	6,592	29
11-15	3	A 18	Apartments	Apartments	13,500	4,253,400	550	25	9,442	17	6,609	29
11-15	3	A 19	Apartments	Apartments	24,000	4,277,400	550	44	9,486	31	6,640	52
11-15	3	A 20	Apartments	Apartments	24,000	4,301,400	550	44	9,529	31	6,671	52
11-15	3	A 21	Apartments	Apartments	13,500	4,314,900	550	25	9,554	17	6,688	29

Table 8A-2. West Campus Building Cooling Load Analysis for a Single Central Plant with Sustainable Design Considerations

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS	Cumulative Diversified Peak Cooling	Peak CHW Flow, GPM (**)
11-15	3	A 22	Apartments	Apartments	13,500	4,328,400	550	25	9,578	17	6,705	29
11-15	3	A 23	Apartments	Apartments	24,000	4,352,400	550	44	9,622	31	6,735	52
11-15	3	A 24	Apartments	Apartments	24,000	4,376,400	550	44	9,666	31	6,766	52
11-15	3	A 25	Apartments	Apartments	13,500	4,389,900	550	25	9,690	17	6,783	29
11-15	3	A 26	Apartments	Apartments	13,500	4,403,400	550	25	9,715	17	6,800	29
11-15	3	A 27	Apartments	Apartments	24,000	4,427,400	550	44	9,758	31	6,831	52
11-15	3	A 28	Apartments	Apartments	24,000	4,451,400	550	44	9,802	31	6,861	52
11-15	3	A 29	Apartments	Apartments	13,500	4,464,900	550	25	9,827	17	6,879	29
11-15	3	A 30	Apartments	Apartments	13,500	4,478,400	550	25	9,851	17	6,896	29
11-15	3	A 31	Apartments	Apartments	24,000	4,502,400	550	44	9,895	31	6,926	52
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	4,600,000	475	205	10,100	144	7,070	247
16-20	4	W 10	Academic	Classrooms, wet labs, faculty	115,000	4,715,000	400	288	10,388	201	7,271	345
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	4,990,000	475	579	10,967	405	7,677	695
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	5,082,000	475	194	11,160	136	7,812	232
16-20	4	W 13	Academic	Classrooms, wet labs, faculty	98,000	5,180,000	400	245	11,405	172	7,984	294
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	5,344,000	475	345	11,751	242	8,226	414
16-20	4	W 24	Academic	Classrooms, wet labs, faculty	110,000	5,454,000	400	275	12,026	193	8,418	330
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	5,534,000	475	168	12,194	118	8,536	202
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	5,634,000	475	211	12,405	147	8,683	253
16-20	4	W 27	Academic	Classrooms, wet labs, faculty	185,000	5,819,000	400	463	12,867	324	9,007	555
16-20	4	M1	Research	Wet labs, faculty offices	120,000	5,939,000	400	300	13,167	210	9,217	360
16-20	4	MOB 1	Medical Office Bld	Wet labs, doctor offices	72,000	6,011,000	400	180	13,347	126	9,343	216
16-20	4	MOB 2	Medical Office Bld	Wet labs, doctor offices	124,000	6,135,000	400	310	13,657	217	9,560	372
16-20	4	MOB 3	Medical Office Bld	Wet labs, doctor offices	120,000	6,255,000	400	300	13,957	210	9,770	360
16-20	4	MOB 4	Medical Office Bld	Wet labs, doctor offices	150,000	6,405,000	400	375	14,332	263	10,033	450
16-20	4	A 32	Apartments	Apartments	24,000	6,429,000	550	44	14,376	31	10,063	52
16-20	4	A 33	Apartments	Apartments	13,500	6,442,500	550	25	14,400	17	10,080	29
16-20	4	A 34	Apartments	Apartments	13,500	6,456,000	550	25	14,425	17	10,097	29
16-20	4	A 35	Apartments	Apartments	13,500	6,469,500	550	25	14,449	17	10,115	29
16-20	4	A 36	Apartments	Apartments	13,500	6,483,000	550	25	14,474	17	10,132	29
16-20	4	A 37	Apartments	Apartments	24,000	6,507,000	550	44	14,518	31	10,162	52
16-20	4	A 38	Apartments	Apartments	24,000	6,531,000	550	44	14,561	31	10,193	52
16-20	4	A 39	Apartments	Apartments	13,500	6,544,500	550	25	14,586	17	10,210	29
16-20	4	A 40	Apartments	Apartments	13,500	6,558,000	550	25	14,610	17	10,227	29
16-20	4	A 41	Apartments	Apartments	30,000	6,588,000	550	55	14,665	38	10,265	65
16-20	4	A 42	Apartments	Apartments	30,000	6,618,000	550	55	14,719	38	10,304	65
16-20	4	A 43	Apartments	Apartments	30,000	6,648,000	550	55	14,774	38	10,342	65
16-20	4	A 44	Apartments	Apartments	13,500	6,661,500	550	25	14,799	17	10,359	29
16-20	4	A 45	Apartments	Apartments	13,500	6,675,000	550	25	14,823	17	10,376	29
16-20	4	A 46	Apartments	Apartments	24,000	6,699,000	550	44	14,867	31	10,407	52
					6,699,000			**14,867**		**10,407**		**17,840**

* Diversity factor is 70%

** CHW flow is figured as peak cooling load (tons) x 12,000/500/20°F CHW ΔT

Table 8A-3. West Campus Building Cooling Load Analysis for Two Central Plants with Sustainable Design Considerations

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS	Cumulative Diversified Peak Cooling	Peak CHW Flow, GPM (**)
Main Central Plant												
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty	144,000	144,000	400	360	360	252	252	432
4-5	1	W 1	Conference Cente	Conference	270,000	414,000	475	568	928	398	650	682
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	534,000	475	253	1,181	177	827	303
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	709,000	475	368	1,549	258	1,085	442
6-10	2	W 2	Conference Cente	Conference	120,000	829,000	475	253	1,802	177	1,261	303
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,011,500	475	384	2,186	269	1,530	461
6-10	2	W 7	Academic	Classrooms, wet labs, faculty	195,000	1,206,500	400	488	2,674	341	1,872	585
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	1,426,500	475	463	3,137	324	2,196	556
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	1,524,500	475	206	3,343	144	2,340	248
6-10	2	W 15	Student Center	Student Center	170,000	1,694,500	400	425	3,768	298	2,638	510
6-10	2	R	Recreation	Recreation center	65,000	1,759,500	400	163	3,931	114	2,752	195
6-10	2	A 1	Apartments	Apartments	30,000	1,789,500	550	55	3,985	38	2,790	65
6-10	2	A 2	Apartments	Apartments	24,000	1,813,500	550	44	4,029	31	2,820	52
6-10	2	A 3	Apartments	Apartments	13,500	1,827,000	550	25	4,054	17	2,837	29
6-10	2	A 4	Apartments	Apartments	13,500	1,840,500	550	25	4,078	17	2,855	29
6-10	2	A 5	Apartments	Apartments	30,000	1,870,500	550	55	4,133	38	2,893	65
6-10	2	A 6	Apartments	Apartments	30,000	1,900,500	550	55	4,187	38	2,931	65
6-10	2	A 7	Apartments	Apartments	13,500	1,914,000	550	25	4,212	17	2,948	29
6-10	2	A 8	Apartments	Apartments	13,500	1,927,500	550	25	4,236	17	2,965	29
6-10	2	A 9	Apartments	Apartments	24,000	1,951,500	550	44	4,280	31	2,996	52
6-10	2	A 10	Apartments	Apartments	24,000	1,975,500	550	44	4,324	31	3,026	52
6-10	2	A 11	Apartments	Apartments	13,500	1,989,000	550	25	4,348	17	3,044	29
6-10	2	A 12	Apartments	Apartments	13,500	2,002,500	550	25	4,373	17	3,061	29
6-10	2	A 13	Apartments	Apartments	13,500	2,016,000	550	25	4,397	17	3,078	29
6-10	2	A 14	Apartments	Apartments	13,500	2,029,500	550	25	4,422	17	3,095	29
6-10	2	A 15	Apartments	Apartments	24,000	2,053,500	550	44	4,465	31	3,126	52
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	2,208,500	475	326	4,792	228	3,354	392
11-15	3	W 17	Academic	Classrooms, wet labs, faculty	165,000	2,373,500	400	413	5,204	289	3,643	495
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	2,471,900	475	207	5,411	145	3,788	249
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	2,586,900	475	242	5,653	169	3,957	291
11-15	3	W 20	Academic	Classrooms, wet labs, faculty	104,000	2,690,900	400	260	5,913	182	4,139	312
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	2,803,400	475	237	6,150	166	4,305	284
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	2,903,400	475	211	6,361	147	4,453	253
11-15	3	A 16	Apartments	Apartments	24,000	2,927,400	550	44	6,404	31	4,483	52
11-15	3	A 17	Apartments	Apartments	13,500	2,940,900	550	25	6,429	17	4,500	29
11-15	3	A 18	Apartments	Apartments	13,500	2,954,400	550	25	6,454	17	4,517	29
11-15	3	A 19	Apartments	Apartments	24,000	2,978,400	550	44	6,497	31	4,548	52
11-15	3	A 20	Apartments	Apartments	24,000	3,002,400	550	44	6,541	31	4,579	52
11-15	3	A 21	Apartments	Apartments	13,500	3,015,900	550	25	6,565	17	4,596	29
11-15	3	A 22	Apartments	Apartments	13,500	3,029,400	550	25	6,590	17	4,613	29
11-15	3	A 23	Apartments	Apartments	24,000	3,053,400	550	44	6,634	31	4,643	52
11-15	3	A 24	Apartments	Apartments	24,000	3,077,400	550	44	6,677	31	4,674	52
11-15	3	A 25	Apartments	Apartments	13,500	3,090,900	550	25	6,702	17	4,691	29
11-15	3	A 26	Apartments	Apartments	13,500	3,104,400	550	25	6,726	17	4,708	29
11-15	3	A 27	Apartments	Apartments	24,000	3,128,400	550	44	6,770	31	4,739	52
11-15	3	A 28	Apartments	Apartments	24,000	3,152,400	550	44	6,814	31	4,769	52
11-15	3	A 29	Apartments	Apartments	13,500	3,165,900	550	25	6,838	17	4,787	29
11-15	3	A 30	Apartments	Apartments	13,500	3,179,400	550	25	6,863	17	4,804	29
11-15	3	A 31	Apartments	Apartments	24,000	3,203,400	550	44	6,906	31	4,834	52
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	3,301,000	475	205	7,112	144	4,978	247
16-20	4	W 10	Academic	Classrooms, wet labs, faculty	115,000	3,416,000	400	288	7,399	201	5,179	345
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	3,691,000	475	579	7,978	405	5,585	695
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	3,783,000	475	194	8,172	136	5,720	232
16-20	4	W 13	Academic	Classrooms, wet labs, faculty	98,000	3,881,000	400	245	8,417	172	5,892	294
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	4,045,000	475	345	8,762	242	6,133	414
16-20	4	W 24	Academic	Classrooms, wet labs, faculty	110,000	4,155,000	400	275	9,037	193	6,326	330
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	4,235,000	475	168	9,206	118	6,444	202
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	4,335,000	475	211	9,416	147	6,591	253
16-20	4	W 27	Academic	Classrooms, wet labs, faculty	185,000	4,520,000	400	463	9,879	324	6,915	555

Table 8A-3. West Campus Building Cooling Load Analysis for Two Central Plants with Sustainable Design Considerations

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS	Cumulative Diversified Peak Cooling	Peak CHW Flow, GPM (**)
16-20	4	A 32	Apartments	Apartments	24,000	4,544,000	550	44	9,922	31	6,946	52
16-20	4	A 33	Apartments	Apartments	13,500	4,557,500	550	25	9,947	17	6,963	29
16-20	4	A 34	Apartments	Apartments	13,500	4,571,000	550	25	9,971	17	6,980	29
16-20	4	A 35	Apartments	Apartments	13,500	4,584,500	550	25	9,996	17	6,997	29
16-20	4	A 36	Apartments	Apartments	13,500	4,598,000	550	25	10,020	17	7,014	29
16-20	4	A 37	Apartments	Apartments	24,000	4,622,000	550	44	10,064	31	7,045	52
16-20	4	A 38	Apartments	Apartments	24,000	4,646,000	550	44	10,108	31	7,075	52
16-20	4	A 39	Apartments	Apartments	13,500	4,659,500	550	25	10,132	17	7,093	29
16-20	4	A 40	Apartments	Apartments	13,500	4,673,000	550	25	10,157	17	7,110	29
16-20	4	A 41	Apartments	Apartments	30,000	4,703,000	550	55	10,211	38	7,148	65
16-20	4	A 42	Apartments	Apartments	30,000	4,733,000	550	55	10,266	38	7,186	65
16-20	4	A 43	Apartments	Apartments	30,000	4,763,000	550	55	10,320	38	7,224	65
16-20	4	A 44	Apartments	Apartments	13,500	4,776,500	550	25	10,345	17	7,241	29
16-20	4	A 45	Apartments	Apartments	13,500	4,790,000	550	25	10,369	17	7,259	29
16-20	4	A 46	Apartments	Apartments	24,000	4,814,000	550	44	10,413	31	7,289	52
					4,814,000			**10,413**		**7,289**		**12,496**

* Diversity factor is 70%
** CHW flow is figured as peak cooling load (tons) x 12,000/500/20°F CHW ΔT

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Cumulative Peak Cooling Load, TONS	Diversified Peak Cooling Load, TONS (*)	Cumulative Diversified Peak Cooling Load, TONS	Peak CHW Flow, GPM (**)
Medical School Central Plant												
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	224,000	475	472	472	330	330	566
5-10	2	M3	Research	Wet labs, faculty offices	100,000	324,000	400	250	722	175	505	300
5-10	2	M6	Ambulatory Care	Hospital	100,000	424,000	400	250	972	175	680	300
5-10	2	MV	Vivarium	Vivarium	23,000	447,000	400	58	1,029	40	720	69
5-10	2	H2	Graduate Housin	Apartments	125,000	572,000	550	227	1,256	159	879	273
11-15	3	M2	Research	Wet labs, faculty offices	128,000	700,000	400	320	1,576	224	1,103	384
11-15	3	M5	Ambulatory Care	Hospital	120,000	820,000	400	300	1,876	210	1,313	360
11-15	3	M7	Research	Wet labs, faculty offices	124,000	944,000	400	310	2,186	217	1,530	372
11-15	3	H1	Graduate Housin	Apartments	125,000	1,069,000	550	227	2,414	159	1,690	273
11-15	3	MOB 5	Medical Office Bl	Wet labs, doctor offices	70,000	1,139,000	400	175	2,589	123	1,812	210
11-15	3	MOB 6	Medical Office Bl	Wet labs, doctor offices	82,000	1,221,000	400	205	2,794	144	1,956	246
11-15	3	MOB 7	Medical Office Bl	Wet labs, doctor offices	78,000	1,299,000	400	195	2,989	137	2,092	234
16-20	4	M1	Research	Wet labs, faculty offices	120,000	1,419,000	400	300	3,289	210	2,302	360
16-20	4	MOB 1	Medical Office Bl	Wet labs, doctor offices	72,000	1,491,000	400	180	3,469	126	2,428	216
16-20	4	MOB 2	Medical Office Bl	Wet labs, doctor offices	124,000	1,615,000	400	310	3,779	217	2,645	372
16-20	4	MOB 3	Medical Office Bl	Wet labs, doctor offices	120,000	1,735,000	400	300	4,079	210	2,855	360
16-20	4	MOB 4	Medical Office Bl	Wet labs, doctor offices	150,000	1,885,000	400	375	4,454	263	3,118	450
					1,661,000			**3,982**		**2,787**		**4,778**

* Diversity factor is 70%
** CHW flow is figured as peak cooling load (tons) x 12,000/500/20°F CHW ΔT

APPENDIX A-3

HEATING LOADS TABLES

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WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

Table 8-5. West Campus Building Heating Load Analysis for All Future Buildings

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty o	144,000	144,000	22	3,168,000	3,168,000	2,692,800	2,692,800	158
1-3	1A	F 1	Apartments	Family Apartments	18,720	162,720	24	449,280	3,617,280	381,888	3,074,688	22
1-3	1A	F 2	Apartments	Family Apartments	18,720	181,440	24	449,280	4,066,560	381,888	3,456,576	22
1-3	1A	F 3	Apartments	Family Apartments	13,320	194,760	24	319,680	4,386,240	271,728	3,728,304	16
1-3	1A	F 4	Apartments	Family Apartments	13,320	208,080	24	319,680	4,705,920	271,728	4,000,032	16
1-3	1A	F 5	Apartments	Family Apartments	13,320	221,400	24	319,680	5,025,600	271,728	4,271,760	16
1-3	1A	F 6	Apartments	Family Apartments	18,720	240,120	24	449,280	5,474,880	381,888	4,653,648	22
1-3	1A	F 7	Apartments	Family Apartments	9,840	249,960	24	236,160	5,711,040	200,736	4,854,384	12
1-3	1A	F 8	Apartments	Family Apartments	9,840	259,800	24	236,160	5,947,200	200,736	5,055,120	12
1-3	1A	F 9	Apartments	Family Apartments	18,720	278,520	24	449,280	6,396,480	381,888	5,437,008	22
1-3	1A	F 10	Apartments	Family Apartments	15,240	293,760	24	365,760	6,762,240	310,896	5,747,904	18
1-3	1A	F 11	Apartments	Family Apartments	9,840	303,600	24	236,160	6,998,400	200,736	5,948,640	12
1-3	1A	F 12	Apartments	Family Apartments	9,840	313,440	24	236,160	7,234,560	200,736	6,149,376	12
1-3	1A	F 13	Apartments	Family Apartments	19,680	333,120	24	472,320	7,706,880	401,472	6,550,848	24
1-3	1A	F 14	Apartments	Family Apartments	13,320	346,440	24	319,680	8,026,560	271,728	6,822,576	16
1-3	1A	F 15	Apartments	Family Apartments	17,760	364,200	24	426,240	8,452,800	362,304	7,184,880	21
1-3	1A	F 16	Apartments	Family Apartments	8,880	373,080	24	213,120	8,665,920	181,152	7,366,032	11
1-3	1A	F 17	Apartments	Family Apartments	17,760	390,840	24	426,240	9,092,160	362,304	7,728,336	21
1-3	1A	F 18	Apartments	Family Apartments	15,240	406,080	24	365,760	9,457,920	310,896	8,039,232	18
1-3	1A	F 19	Apartments	Family Apartments	8,880	414,960	24	213,120	9,671,040	181,152	8,220,384	11
1-3	1A	F 20	Apartments	Family Apartments	15,240	430,200	24	365,760	10,036,800	310,896	8,531,280	18
1-3	1A	F 21	Townhouses	Family Townhouses	5,806	436,006	24	139,344	10,176,144	118,442	8,649,722	7
1-3	1A	F 22	Townhouses	Family Townhouses	7,744	443,750	24	185,856	10,362,000	157,978	8,807,700	9
1-3	1A	F 23	Townhouses	Family Townhouses	5,806	449,556	24	139,344	10,501,344	118,442	8,926,142	7
1-3	1A	F 24	Townhouses	Family Townhouses	9,680	459,236	24	232,320	10,733,664	197,472	9,123,614	12
1-3	1A	F 25	Townhouses	Family Townhouses	9,680	468,916	24	232,320	10,965,984	197,472	9,321,086	12
1-3	1A	F 26	Townhouses	Family Townhouses	9,680	478,596	24	232,320	11,198,304	197,472	9,518,558	12
1-3	1A	F 27	Townhouses	Family Townhouses	9,680	488,276	24	232,320	11,430,624	197,472	9,716,030	12
1-3	1A	F 28	Townhouses	Family Townhouses	11,614	499,890	24	278,736	11,709,360	236,926	9,952,956	14
1-3	1A	F 29	Townhouses	Family Townhouses	7,744	507,634	24	185,856	11,895,216	157,978	10,110,934	9
1-3	1A	F 30	Townhouses	Family Townhouses	7,744	515,378	24	185,856	12,081,072	157,978	10,268,911	9
1-3	1A	F 31	Townhouses	Family Townhouses	9,680	525,058	24	232,320	12,313,392	197,472	10,466,383	12
1-3	1A	F 32	Townhouses	Family Townhouses	11,600	536,658	24	278,400	12,591,792	236,640	10,703,023	14
1-3	1A	CDC N	Child Dev. Center	Child development center	14,800	551,458	18	266,400	12,858,192	226,440	10,929,463	13
1-3	1A	CC N	Community Cente	Community center	5,200	556,658	18	93,600	12,951,792	79,560	11,009,023	5
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	780,658	18	4,032,000	16,983,792	3,427,200	14,436,223	202
4-5	1	W 1	Conference Cente	Conference	270,000	1,050,658	18	4,860,000	21,843,792	4,131,000	18,567,223	243
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	1,170,658	18	2,160,000	24,003,792	1,836,000	20,403,223	108
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	1,345,658	18	3,150,000	27,153,792	2,677,500	23,080,723	158
6-10	2	W 2	Conference Cente	Conference	120,000	1,465,658	18	2,160,000	29,313,792	1,836,000	24,916,723	108
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,648,158	18	3,285,000	32,598,792	2,792,250	27,708,973	164
6-10	2	W 7	Academic	Classrooms, wet labs, faculty o	195,000	1,843,158	22	4,290,000	36,888,792	3,646,500	31,355,473	215
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	2,063,158	18	3,960,000	40,848,792	3,366,000	34,721,473	198
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	2,161,158	18	1,764,000	42,612,792	1,499,400	36,220,873	88
6-10	2	W 15	Student Center	Student Center	170,000	2,331,158	22	3,740,000	46,352,792	3,179,000	39,399,873	187
6-10	2	M3	Research	Wet labs, faculty offices	100,000	2,431,158	22	2,200,000	48,552,792	1,870,000	41,269,873	110
6-10	2	M6	Ambulatory Care	Hospital	100,000	2,531,158	22	2,200,000	50,752,792	1,870,000	43,139,873	110
6-10	2	MV	Vivarium	Vivarium	23,000	2,554,158	22	506,000	51,258,792	430,100	43,569,973	25
6-10	2	H2	Graduate Housing	Apartments	125,000	2,679,158	24	3,000,000	54,258,792	2,550,000	46,119,973	150
6-10	2	R	Recreation	Recreation center	65,000	2,744,158	18	1,170,000	55,428,792	994,500	47,114,473	59
6-10	2	A 1	Apartments	Apartments	30,000	2,774,158	24	720,000	56,148,792	612,000	47,726,473	36
6-10	2	A 2	Apartments	Apartments	24,000	2,798,158	24	576,000	56,724,792	489,600	48,216,073	29
6-10	2	A 3	Apartments	Apartments	13,500	2,811,658	24	324,000	57,048,792	275,400	48,491,473	16
6-10	2	A 4	Apartments	Apartments	13,500	2,825,158	24	324,000	57,372,792	275,400	48,766,873	16
6-10	2	A 5	Apartments	Apartments	30,000	2,855,158	24	720,000	58,092,792	612,000	49,378,873	36
6-10	2	A 6	Apartments	Apartments	30,000	2,885,158	24	720,000	58,812,792	612,000	49,990,873	36
6-10	2	A 7	Apartments	Apartments	13,500	2,898,658	24	324,000	59,136,792	275,400	50,266,273	16
6-10	2	A 8	Apartments	Apartments	13,500	2,912,158	24	324,000	59,460,792	275,400	50,541,673	16
6-10	2	A 9	Apartments	Apartments	24,000	2,936,158	24	576,000	60,036,792	489,600	51,031,273	29

Table 8-5. West Campus Building Heating Load Analysis for All Future Buildings

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
6-10	2	A 10	Apartments	Apartments	24,000	2,960,158	24	576,000	60,612,792	489,600	51,520,873	29
6-10	2	A 11	Apartments	Apartments	13,500	2,973,658	24	324,000	60,936,792	275,400	51,796,273	16
6-10	2	A 12	Apartments	Apartments	13,500	2,987,158	24	324,000	61,260,792	275,400	52,071,673	16
6-10	2	A 13	Apartments	Apartments	13,500	3,000,658	24	324,000	61,584,792	275,400	52,347,073	16
6-10	2	A 14	Apartments	Apartments	13,500	3,014,158	24	324,000	61,908,792	275,400	52,622,473	16
6-10	2	A 15	Apartments	Apartments	24,000	3,038,158	24	576,000	62,484,792	489,600	53,112,073	29
6-10	2	F 33	Apartments	Family Apartments	9,680	3,047,838	24	232,320	62,717,112	197,472	53,309,545	12
6-10	2	F 34	Apartments	Family Apartments	18,720	3,066,558	24	449,280	63,166,392	381,888	53,691,433	22
6-10	2	F 35	Apartments	Family Apartments	18,720	3,085,278	24	449,280	63,615,672	381,888	54,073,321	22
6-10	2	F 36	Apartments	Family Apartments	14,308	3,099,586	24	343,392	63,959,064	291,883	54,365,204	17
6-10	2	F 37	Apartments	Family Apartments	9,840	3,109,426	24	236,160	64,195,224	200,736	54,565,940	12
6-10	2	F 38	Apartments	Family Apartments	14,308	3,123,734	24	343,392	64,538,616	291,883	54,857,824	17
6-10	2	F 39	Apartments	Family Apartments	14,308	3,138,042	24	343,392	64,882,008	291,883	55,149,707	17
6-10	2	F 40	Apartments	Family Apartments	18,720	3,156,762	24	449,280	65,331,288	381,888	55,531,595	22
6-10	2	F 41	Apartments	Family Apartments	14,308	3,171,070	24	343,392	65,674,680	291,883	55,823,478	17
6-10	2	F 42	Apartments	Family Apartments	17,760	3,188,830	24	426,240	66,100,920	362,304	56,185,782	21
6-10	2	F 43	Apartments	Family Apartments	18,720	3,207,550	24	449,280	66,550,200	381,888	56,567,670	22
6-10	2	F 44	Apartments	Family Apartments	14,308	3,221,858	24	343,392	66,893,592	291,883	56,859,553	17
6-10	2	F 45	Apartments	Family Apartments	14,308	3,236,166	24	343,392	67,236,984	291,883	57,151,436	17
6-10	2	F 46	Apartments	Family Apartments	14,308	3,250,474	24	343,392	67,580,376	291,883	57,443,320	17
6-10	2	F 47	Apartments	Family Apartments	18,720	3,269,194	24	449,280	68,029,656	381,888	57,825,208	22
6-10	2	F 48	Apartments	Family Apartments	18,720	3,287,914	24	449,280	68,478,936	381,888	58,207,096	22
6-10	2	F 49	Apartments	Family Apartments	9,840	3,297,754	24	236,160	68,715,096	200,736	58,407,832	12
6-10	2	F 50	Apartments	Family Apartments	14,308	3,312,062	24	343,392	69,058,488	291,883	58,699,715	17
6-10	2	F 51	Apartments	Family Apartments	14,308	3,326,370	24	343,392	69,401,880	291,883	58,991,598	17
6-10	2	F 52	Townhouses	Family Townhouses	9,840	3,336,210	24	236,160	69,638,040	200,736	59,192,334	12
6-10	2	F 53	Townhouses	Family Townhouses	7,744	3,343,954	24	185,856	69,823,896	157,978	59,350,312	9
6-10	2	F 54	Townhouses	Family Townhouses	9,680	3,353,634	24	232,320	70,056,216	197,472	59,547,784	12
6-10	2	F 55	Townhouses	Family Townhouses	9,680	3,363,314	24	232,320	70,288,536	197,472	59,745,256	12
6-10	2	F 56	Townhouses	Family Townhouses	9,680	3,372,994	24	232,320	70,520,856	197,472	59,942,728	12
6-10	2	F 57	Townhouses	Family Townhouses	9,680	3,382,674	24	232,320	70,753,176	197,472	60,140,200	12
6-10	2	F 58	Townhouses	Family Townhouses	11,614	3,394,288	24	278,736	71,031,912	236,926	60,377,125	14
6-10	2	F 59	Townhouses	Family Townhouses	11,614	3,405,902	24	278,736	71,310,648	236,926	60,614,051	14
6-10	2	F 60	Townhouses	Family Townhouses	9,680	3,415,582	24	232,320	71,542,968	197,472	60,811,523	12
6-10	2	CDC S	Child Dev. Center	Child development center	14,800	3,430,382	18	266,400	71,809,368	226,440	61,037,963	13
6-10	2	CC S	Community Cente	Community center	4,800	3,435,182	18	86,400	71,895,768	73,440	61,111,403	4
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	3,590,182	18	2,790,000	74,685,768	2,371,500	63,482,903	140
11-15	3	W 17	Academic	Classrooms, wet labs, faculty o	165,000	3,755,182	22	3,630,000	78,315,768	3,085,500	66,568,403	182
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	3,853,582	18	1,771,200	80,086,968	1,505,520	68,073,923	89
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	3,968,582	18	2,070,000	82,156,968	1,759,500	69,833,423	104
11-15	3	W 20	Academic	Classrooms, wet labs, faculty o	104,000	4,072,582	22	2,288,000	84,444,968	1,944,800	71,778,223	114
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	4,185,082	18	2,025,000	86,469,968	1,721,250	73,499,473	101
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	4,285,082	18	1,800,000	88,269,968	1,530,000	75,029,473	90
11-15	3	M2	Research	Wet labs, faculty offices	128,000	4,413,082	22	2,816,000	91,085,968	2,393,600	77,423,073	141
11-15	3	M5	Ambulatory Care	Hospital	120,000	4,533,082	22	2,640,000	93,725,968	2,244,000	79,667,073	132
11-15	3	M7	Research	Wet labs, faculty offices	124,000	4,657,082	22	2,728,000	96,453,968	2,318,800	81,985,873	136
11-15	3	H1	Graduate Housing	Apartments	125,000	4,782,082	24	3,000,000	99,453,968	2,550,000	84,535,873	150
11-15	3	MOB 5	Medical Office Bld	Wet labs, doctor offices	70,000	4,852,082	22	1,540,000	100,993,968	1,309,000	85,844,873	77
11-15	3	MOB 6	Medical Office Bld	Wet labs, doctor offices	82,000	4,934,082	22	1,804,000	102,797,968	1,533,400	87,378,273	90
11-15	3	MOB 7	Medical Office Bld	Wet labs, doctor offices	78,000	5,012,082	22	1,716,000	104,513,968	1,458,600	88,836,873	86
11-15	3	A 16	Apartments	Apartments	24,000	5,036,082	24	576,000	105,089,968	489,600	89,326,473	29
11-15	3	A 17	Apartments	Apartments	13,500	5,049,582	24	324,000	105,413,968	275,400	89,601,873	16
11-15	3	A 18	Apartments	Apartments	13,500	5,063,082	24	324,000	105,737,968	275,400	89,877,273	16
11-15	3	A 19	Apartments	Apartments	24,000	5,087,082	24	576,000	106,313,968	489,600	90,366,873	29
11-15	3	A 20	Apartments	Apartments	24,000	5,111,082	24	576,000	106,889,968	489,600	90,856,473	29
11-15	3	A 21	Apartments	Apartments	13,500	5,124,582	24	324,000	107,213,968	275,400	91,131,873	16

Table 8-5. West Campus Building Heating Load Analysis for All Future Buildings

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
11-15	3	A 22	Apartments	Apartments	13,500	5,138,082	24	324,000	107,537,968	275,400	91,407,273	16
11-15	3	A 23	Apartments	Apartments	24,000	5,162,082	24	576,000	108,113,968	489,600	91,896,873	29
11-15	3	A 24	Apartments	Apartments	24,000	5,186,082	24	576,000	108,689,968	489,600	92,386,473	29
11-15	3	A 25	Apartments	Apartments	13,500	5,199,582	24	324,000	109,013,968	275,400	92,661,873	16
11-15	3	A 26	Apartments	Apartments	13,500	5,213,082	24	324,000	109,337,968	275,400	92,937,273	16
11-15	3	A 27	Apartments	Apartments	24,000	5,237,082	24	576,000	109,913,968	489,600	93,426,873	29
11-15	3	A 28	Apartments	Apartments	24,000	5,261,082	24	576,000	110,489,968	489,600	93,916,473	29
11-15	3	A 29	Apartments	Apartments	13,500	5,274,582	24	324,000	110,813,968	275,400	94,191,873	16
11-15	3	A 30	Apartments	Apartments	13,500	5,288,082	24	324,000	111,137,968	275,400	94,467,273	16
11-15	3	A 31	Apartments	Apartments	24,000	5,312,082	24	576,000	111,713,968	489,600	94,956,873	29
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	5,409,682	18	1,756,800	113,470,768	1,493,280	96,450,153	88
16-20	4	W 10	Academic	Classrooms, wet labs, faculty c	115,000	5,524,682	22	2,530,000	116,000,768	2,150,500	98,600,653	127
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	5,799,682	18	4,950,000	120,950,768	4,207,500	102,808,153	248
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	5,891,682	18	1,656,000	122,606,768	1,407,600	104,215,753	83
16-20	4	W 13	Academic	Classrooms, wet labs, faculty c	98,000	5,989,682	22	2,156,000	124,762,768	1,832,600	106,048,353	108
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	6,153,682	18	2,952,000	127,714,768	2,509,200	108,557,553	148
16-20	4	W 24	Academic	Classrooms, wet labs, faculty c	110,000	6,263,682	22	2,420,000	130,134,768	2,057,000	110,614,553	121
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	6,343,682	18	1,440,000	131,574,768	1,224,000	111,838,553	72
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	6,443,682	18	1,800,000	133,374,768	1,530,000	113,368,553	90
16-20	4	W 27	Academic	Classrooms, wet labs, faculty c	185,000	6,628,682	22	4,070,000	137,444,768	3,459,500	116,828,053	204
16-20	4	M1	Research	Wet labs, faculty offices	120,000	6,748,682	22	2,640,000	140,084,768	2,244,000	119,072,053	132
16-20	4	MOB 1	Medical Office Bld	Wet labs, doctor offices	72,000	6,820,682	22	1,584,000	141,668,768	1,346,400	120,418,453	79
16-20	4	MOB 2	Medical Office Bld	Wet labs, doctor offices	124,000	6,944,682	22	2,728,000	144,396,768	2,318,800	122,737,253	136
16-20	4	MOB 3	Medical Office Bld	Wet labs, doctor offices	120,000	7,064,682	22	2,640,000	147,036,768	2,244,000	124,981,253	132
16-20	4	MOB 4	Medical Office Bld	Wet labs, doctor offices	150,000	7,214,682	22	3,300,000	150,336,768	2,805,000	127,786,253	165
16-20	4	A 32	Apartments	Apartments	24,000	7,238,682	24	576,000	150,912,768	489,600	128,275,853	29
16-20	4	A 33	Apartments	Apartments	13,500	7,252,182	24	324,000	151,236,768	275,400	128,551,253	16
16-20	4	A 34	Apartments	Apartments	13,500	7,265,682	24	324,000	151,560,768	275,400	128,826,653	16
16-20	4	A 35	Apartments	Apartments	13,500	7,279,182	24	324,000	151,884,768	275,400	129,102,053	16
16-20	4	A 36	Apartments	Apartments	13,500	7,292,682	24	324,000	152,208,768	275,400	129,377,453	16
16-20	4	A 37	Apartments	Apartments	24,000	7,316,682	24	576,000	152,784,768	489,600	129,867,053	29
16-20	4	A 38	Apartments	Apartments	24,000	7,340,682	24	576,000	153,360,768	489,600	130,356,653	29
16-20	4	A 39	Apartments	Apartments	13,500	7,354,182	24	324,000	153,684,768	275,400	130,632,053	16
16-20	4	A 40	Apartments	Apartments	13,500	7,367,682	24	324,000	154,008,768	275,400	130,907,453	16
16-20	4	A 41	Apartments	Apartments	30,000	7,397,682	24	720,000	154,728,768	612,000	131,519,453	36
16-20	4	A 42	Apartments	Apartments	30,000	7,427,682	24	720,000	155,448,768	612,000	132,131,453	36
16-20	4	A 43	Apartments	Apartments	30,000	7,457,682	24	720,000	156,168,768	612,000	132,743,453	36
16-20	4	A 44	Apartments	Apartments	13,500	7,471,182	24	324,000	156,492,768	275,400	133,018,853	16
16-20	4	A 45	Apartments	Apartments	13,500	7,484,682	24	324,000	156,816,768	275,400	133,294,253	16
16-20	4	A 46	Apartments	Apartments	24,000	7,508,682	24	576,000	157,392,768	489,600	133,783,853	29
					7,508,682			**157,392,768**		**133,783,853**		**7,870**

* Diversity factor is 85%

** HHW flow is figured as peak heating load (Btuh)/500/40°F HHW ΔT

Table 8-6. West Campus Building Heating Load Analysis for a Single Central Plant

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty	144,000	144,000	22	3,168,000	3,168,000	2,692,800	2,692,800	158
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	368,000	18	4,032,000	7,200,000	3,427,200	6,120,000	202
4-5	1	W 1	Conference Cente	Conference	270,000	638,000	18	4,860,000	12,060,000	4,131,000	10,251,000	243
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	758,000	18	2,160,000	14,220,000	1,836,000	12,087,000	108
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	933,000	18	3,150,000	17,370,000	2,677,500	14,764,500	158
6-10	2	W 2	Conference Cente	Conference	120,000	1,053,000	18	2,160,000	19,530,000	1,836,000	16,600,500	108
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,235,500	18	3,285,000	22,815,000	2,792,250	19,392,750	164
6-10	2	W 7	Academic	Classrooms, wet labs, faculty	195,000	1,430,500	22	4,290,000	27,105,000	3,646,500	23,039,250	215
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	1,650,500	18	3,960,000	31,065,000	3,366,000	26,405,250	198
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	1,748,500	18	1,764,000	32,829,000	1,499,400	27,904,650	88
6-10	2	W 15	Student Center	Student Center	170,000	1,918,500	22	3,740,000	36,569,000	3,179,000	31,083,650	187
6-10	2	M3	Research	Wet labs, faculty offices	100,000	2,018,500	22	2,200,000	38,769,000	1,870,000	32,953,650	110
6-10	2	M6	Ambulatory Care	Hospital	100,000	2,118,500	22	2,200,000	40,969,000	1,870,000	34,823,650	110
6-10	2	MV	Vivarium	Vivarium	23,000	2,141,500	22	506,000	41,475,000	430,100	35,253,750	25
6-10	2	H2	Graduate Housin	Apartments	125,000	2,266,500	24	3,000,000	44,475,000	2,550,000	37,803,750	150
6-10	2	R	Recreation	Recreation center	65,000	2,331,500	18	1,170,000	45,645,000	994,500	38,798,250	59
6-10	2	A 1	Apartments	Apartments	30,000	2,361,500	24	720,000	46,365,000	612,000	39,410,250	36
6-10	2	A 2	Apartments	Apartments	24,000	2,385,500	24	576,000	46,941,000	489,600	39,899,850	29
6-10	2	A 3	Apartments	Apartments	13,500	2,399,000	24	324,000	47,265,000	275,400	40,175,250	16
6-10	2	A 4	Apartments	Apartments	13,500	2,412,500	24	324,000	47,589,000	275,400	40,450,650	16
6-10	2	A 5	Apartments	Apartments	30,000	2,442,500	24	720,000	48,309,000	612,000	41,062,650	36
6-10	2	A 6	Apartments	Apartments	30,000	2,472,500	24	720,000	49,029,000	612,000	41,674,650	36
6-10	2	A 7	Apartments	Apartments	13,500	2,486,000	24	324,000	49,353,000	275,400	41,950,050	16
6-10	2	A 8	Apartments	Apartments	13,500	2,499,500	24	324,000	49,677,000	275,400	42,225,450	16
6-10	2	A 9	Apartments	Apartments	24,000	2,523,500	24	576,000	50,253,000	489,600	42,715,050	29
6-10	2	A 10	Apartments	Apartments	24,000	2,547,500	24	576,000	50,829,000	489,600	43,204,650	29
6-10	2	A 11	Apartments	Apartments	13,500	2,561,000	24	324,000	51,153,000	275,400	43,480,050	16
6-10	2	A 12	Apartments	Apartments	13,500	2,574,500	24	324,000	51,477,000	275,400	43,755,450	16
6-10	2	A 13	Apartments	Apartments	13,500	2,588,000	24	324,000	51,801,000	275,400	44,030,850	16
6-10	2	A 14	Apartments	Apartments	13,500	2,601,500	24	324,000	52,125,000	275,400	44,306,250	16
6-10	2	A 15	Apartments	Apartments	24,000	2,625,500	24	576,000	52,701,000	489,600	44,795,850	29
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	2,780,500	18	2,790,000	55,491,000	2,371,500	47,167,350	140
11-15	3	W 17	Academic	Classrooms, wet labs, faculty	165,000	2,945,500	22	3,630,000	59,121,000	3,085,500	50,252,850	182
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	3,043,900	18	1,771,200	60,892,200	1,505,520	51,758,370	89
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	3,158,900	18	2,070,000	62,962,200	1,759,500	53,517,870	104
11-15	3	W 20	Academic	Classrooms, wet labs, faculty	104,000	3,262,900	22	2,288,000	65,250,200	1,944,800	55,462,670	114
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	3,375,400	18	2,025,000	67,275,200	1,721,250	57,183,920	101
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	3,475,400	18	1,800,000	69,075,200	1,530,000	58,713,920	90
11-15	3	M2	Research	Wet labs, faculty offices	128,000	3,603,400	22	2,816,000	71,891,200	2,393,600	61,107,520	141
11-15	3	M5	Ambulatory Care	Hospital	120,000	3,723,400	22	2,640,000	74,531,200	2,244,000	63,351,520	132
11-15	3	M7	Research	Wet labs, faculty offices	124,000	3,847,400	22	2,728,000	77,259,200	2,318,800	65,670,320	136
11-15	3	H1	Graduate Housin	Apartments	125,000	3,972,400	24	3,000,000	80,259,200	2,550,000	68,220,320	150
11-15	3	MOB 5	Medical Office Bl	Wet labs, doctor offices	70,000	4,042,400	22	1,540,000	81,799,200	1,309,000	69,529,320	77
11-15	3	MOB 6	Medical Office Bl	Wet labs, doctor offices	82,000	4,124,400	22	1,804,000	83,603,200	1,533,400	71,062,720	90
11-15	3	MOB 7	Medical Office Bl	Wet labs, doctor offices	78,000	4,202,400	22	1,716,000	85,319,200	1,458,600	72,521,320	86

Table 8-6. West Campus Building Heating Load Analysis for a Single Central Plant

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
11-15	3	A 16	Apartments	Apartments	24,000	4,226,400	24	576,000	85,895,200	489,600	73,010,920	29
11-15	3	A 17	Apartments	Apartments	13,500	4,239,900	24	324,000	86,219,200	275,400	73,286,320	16
11-15	3	A 18	Apartments	Apartments	13,500	4,253,400	24	324,000	86,543,200	275,400	73,561,720	16
11-15	3	A 19	Apartments	Apartments	24,000	4,277,400	24	576,000	87,119,200	489,600	74,051,320	29
11-15	3	A 20	Apartments	Apartments	24,000	4,301,400	24	576,000	87,695,200	489,600	74,540,920	29
11-15	3	A 21	Apartments	Apartments	13,500	4,314,900	24	324,000	88,019,200	275,400	74,816,320	16
11-15	3	A 22	Apartments	Apartments	13,500	4,328,400	24	324,000	88,343,200	275,400	75,091,720	16
11-15	3	A 23	Apartments	Apartments	24,000	4,352,400	24	576,000	88,919,200	489,600	75,581,320	29
11-15	3	A 24	Apartments	Apartments	24,000	4,376,400	24	576,000	89,495,200	489,600	76,070,920	29
11-15	3	A 25	Apartments	Apartments	13,500	4,389,900	24	324,000	89,819,200	275,400	76,346,320	16
11-15	3	A 26	Apartments	Apartments	13,500	4,403,400	24	324,000	90,143,200	275,400	76,621,720	16
11-15	3	A 27	Apartments	Apartments	24,000	4,427,400	24	576,000	90,719,200	489,600	77,111,320	29
11-15	3	A 28	Apartments	Apartments	24,000	4,451,400	24	576,000	91,295,200	489,600	77,600,920	29
11-15	3	A 29	Apartments	Apartments	13,500	4,464,900	24	324,000	91,619,200	275,400	77,876,320	16
11-15	3	A 30	Apartments	Apartments	13,500	4,478,400	24	324,000	91,943,200	275,400	78,151,720	16
11-15	3	A 31	Apartments	Apartments	24,000	4,502,400	24	576,000	92,519,200	489,600	78,641,320	29
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	4,600,000	18	1,756,800	94,276,000	1,493,280	80,134,600	88
16-20	4	W 10	Academic	Classrooms, wet labs, faculty	115,000	4,715,000	22	2,530,000	96,806,000	2,150,500	82,285,100	127
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	4,990,000	18	4,950,000	101,756,000	4,207,500	86,492,600	248
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	5,082,000	18	1,656,000	103,412,000	1,407,600	87,900,200	83
16-20	4	W 13	Academic	Classrooms, wet labs, faculty	98,000	5,180,000	22	2,156,000	105,568,000	1,832,600	89,732,800	108
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	5,344,000	18	2,952,000	108,520,000	2,509,200	92,242,000	148
16-20	4	W 24	Academic	Classrooms, wet labs, faculty	110,000	5,454,000	22	2,420,000	110,940,000	2,057,000	94,299,000	121
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	5,534,000	18	1,440,000	112,380,000	1,224,000	95,523,000	72
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	5,634,000	18	1,800,000	114,180,000	1,530,000	97,053,000	90
16-20	4	W 27	Academic	Classrooms, wet labs, faculty	185,000	5,819,000	22	4,070,000	118,250,000	3,459,500	100,512,500	204
16-20	4	M1	Research	Wet labs, faculty offices	120,000	5,939,000	22	2,640,000	120,890,000	2,244,000	102,756,500	132
16-20	4	MOB 1	Medical Office Bld	Wet labs, doctor offices	72,000	6,011,000	22	1,584,000	122,474,000	1,346,400	104,102,900	79
16-20	4	MOB 2	Medical Office Bld	Wet labs, doctor offices	124,000	6,135,000	22	2,728,000	125,202,000	2,318,800	106,421,700	136
16-20	4	MOB 3	Medical Office Bld	Wet labs, doctor offices	120,000	6,255,000	22	2,640,000	127,842,000	2,244,000	108,665,700	132
16-20	4	MOB 4	Medical Office Bld	Wet labs, doctor offices	150,000	6,405,000	22	3,300,000	131,142,000	2,805,000	111,470,700	165
16-20	4	A 32	Apartments	Apartments	24,000	6,429,000	24	576,000	131,718,000	489,600	111,960,300	29
16-20	4	A 33	Apartments	Apartments	13,500	6,442,500	24	324,000	132,042,000	275,400	112,235,700	16
16-20	4	A 34	Apartments	Apartments	13,500	6,456,000	24	324,000	132,366,000	275,400	112,511,100	16
16-20	4	A 35	Apartments	Apartments	13,500	6,469,500	24	324,000	132,690,000	275,400	112,786,500	16
16-20	4	A 36	Apartments	Apartments	13,500	6,483,000	24	324,000	133,014,000	275,400	113,061,900	16
16-20	4	A 37	Apartments	Apartments	24,000	6,507,000	24	576,000	133,590,000	489,600	113,551,500	29
16-20	4	A 38	Apartments	Apartments	24,000	6,531,000	24	576,000	134,166,000	489,600	114,041,100	29
16-20	4	A 39	Apartments	Apartments	13,500	6,544,500	24	324,000	134,490,000	275,400	114,316,500	16
16-20	4	A 40	Apartments	Apartments	13,500	6,558,000	24	324,000	134,814,000	275,400	114,591,900	16
16-20	4	A 41	Apartments	Apartments	30,000	6,588,000	24	720,000	135,534,000	612,000	115,203,900	36
16-20	4	A 42	Apartments	Apartments	30,000	6,618,000	24	720,000	136,254,000	612,000	115,815,900	36
16-20	4	A 43	Apartments	Apartments	30,000	6,648,000	24	720,000	136,974,000	612,000	116,427,900	36
16-20	4	A 44	Apartments	Apartments	13,500	6,661,500	24	324,000	137,298,000	275,400	116,703,300	16
16-20	4	A 45	Apartments	Apartments	13,500	6,675,000	24	324,000	137,622,000	275,400	116,978,700	16

Table 8-6. West Campus Building Heating Load Analysis for a Single Central Plant													
Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
16-20	4	A 46	Apartments	Apartments	24,000	6,699,000	24	576,000	138,198,000	489,600	117,468,300	29
					6,699,000			**138,198,000**		**117,468,300**		**6,910**

* Diversity factor is 85%

** HHW flow is figured as peak heating load (Btuh)/500/40 °F HHW ΔT

Table 8-7. West Campus Building Heating Load Analysis for Two Central Plants

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
Main Central Plant												
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty o	144,000	144,000	22	3,168,000	3,168,000	2,692,800	2,692,800	158
4-5	1	W 1	Conference Cente	Conference	270,000	414,000	18	4,860,000	8,028,000	4,131,000	6,823,800	243
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	534,000	18	2,160,000	10,188,000	1,836,000	8,659,800	108
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	709,000	18	3,150,000	13,338,000	2,677,500	11,337,300	158
6-10	2	W 2	Conference Cente	Conference	120,000	829,000	18	2,160,000	15,498,000	1,836,000	13,173,300	108
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,011,500	18	3,285,000	18,783,000	2,792,250	15,965,550	164
6-10	2	W 7	Academic	Classrooms, wet labs, faculty o	195,000	1,206,500	22	4,290,000	23,073,000	3,646,500	19,612,050	215
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	1,426,500	18	3,960,000	27,033,000	3,366,000	22,978,050	198
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	1,524,500	18	1,764,000	28,797,000	1,499,400	24,477,450	88
6-10	2	W 15	Student Center	Student Center	170,000	1,694,500	22	3,740,000	32,537,000	3,179,000	27,656,450	187
6-10	2	R	Recreation	Recreation center	65,000	1,759,500	18	1,170,000	33,707,000	994,500	28,650,950	59
6-10	2	A 1	Apartments	Apartments	30,000	1,789,500	24	720,000	34,427,000	612,000	29,262,950	36
6-10	2	A 2	Apartments	Apartments	24,000	1,813,500	24	576,000	35,003,000	489,600	29,752,550	29
6-10	2	A 3	Apartments	Apartments	13,500	1,827,000	24	324,000	35,327,000	275,400	30,027,950	16
6-10	2	A 4	Apartments	Apartments	13,500	1,840,500	24	324,000	35,651,000	275,400	30,303,350	16
6-10	2	A 5	Apartments	Apartments	30,000	1,870,500	24	720,000	36,371,000	612,000	30,915,350	36
6-10	2	A 6	Apartments	Apartments	30,000	1,900,500	24	720,000	37,091,000	612,000	31,527,350	36
6-10	2	A 7	Apartments	Apartments	13,500	1,914,000	24	324,000	37,415,000	275,400	31,802,750	16
6-10	2	A 8	Apartments	Apartments	13,500	1,927,500	24	324,000	37,739,000	275,400	32,078,150	16
6-10	2	A 9	Apartments	Apartments	24,000	1,951,500	24	576,000	38,315,000	489,600	32,567,750	29
6-10	2	A 10	Apartments	Apartments	24,000	1,975,500	24	576,000	38,891,000	489,600	33,057,350	29
6-10	2	A 11	Apartments	Apartments	13,500	1,989,000	24	324,000	39,215,000	275,400	33,332,750	16
6-10	2	A 12	Apartments	Apartments	13,500	2,002,500	24	324,000	39,539,000	275,400	33,608,150	16
6-10	2	A 13	Apartments	Apartments	13,500	2,016,000	24	324,000	39,863,000	275,400	33,883,550	16
6-10	2	A 14	Apartments	Apartments	13,500	2,029,500	24	324,000	40,187,000	275,400	34,158,950	16
6-10	2	A 15	Apartments	Apartments	24,000	2,053,500	24	576,000	40,763,000	489,600	34,648,550	29
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	2,208,500	18	2,790,000	43,553,000	2,371,500	37,020,050	140
11-15	3	W 17	Academic	Classrooms, wet labs, faculty o	165,000	2,373,500	22	3,630,000	47,183,000	3,085,500	40,105,550	182
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	2,471,900	18	1,771,200	48,954,200	1,505,520	41,611,070	89
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	2,586,900	18	2,070,000	51,024,200	1,759,500	43,370,570	104
11-15	3	W 20	Academic	Classrooms, wet labs, faculty o	104,000	2,690,900	22	2,288,000	53,312,200	1,944,800	45,315,370	114
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	2,803,400	18	2,025,000	55,337,200	1,721,250	47,036,620	101
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	2,903,400	18	1,800,000	57,137,200	1,530,000	48,566,620	90
11-15	3	A 16	Apartments	Apartments	24,000	2,927,400	24	576,000	57,713,200	489,600	49,056,220	29
11-15	3	A 17	Apartments	Apartments	13,500	2,940,900	24	324,000	58,037,200	275,400	49,331,620	16
11-15	3	A 18	Apartments	Apartments	13,500	2,954,400	24	324,000	58,361,200	275,400	49,607,020	16
11-15	3	A 19	Apartments	Apartments	24,000	2,978,400	24	576,000	58,937,200	489,600	50,096,620	29
11-15	3	A 20	Apartments	Apartments	24,000	3,002,400	24	576,000	59,513,200	489,600	50,586,220	29
11-15	3	A 21	Apartments	Apartments	13,500	3,015,900	24	324,000	59,837,200	275,400	50,861,620	16
11-15	3	A 22	Apartments	Apartments	13,500	3,029,400	24	324,000	60,161,200	275,400	51,137,020	16
11-15	3	A 23	Apartments	Apartments	24,000	3,053,400	24	576,000	60,737,200	489,600	51,626,620	29
11-15	3	A 24	Apartments	Apartments	24,000	3,077,400	24	576,000	61,313,200	489,600	52,116,220	29
11-15	3	A 25	Apartments	Apartments	13,500	3,090,900	24	324,000	61,637,200	275,400	52,391,620	16
11-15	3	A 26	Apartments	Apartments	13,500	3,104,400	24	324,000	61,961,200	275,400	52,667,020	16
11-15	3	A 27	Apartments	Apartments	24,000	3,128,400	24	576,000	62,537,200	489,600	53,156,620	29
11-15	3	A 28	Apartments	Apartments	24,000	3,152,400	24	576,000	63,113,200	489,600	53,646,220	29
11-15	3	A 29	Apartments	Apartments	13,500	3,165,900	24	324,000	63,437,200	275,400	53,921,620	16
11-15	3	A 30	Apartments	Apartments	13,500	3,179,400	24	324,000	63,761,200	275,400	54,197,020	16
11-15	3	A 31	Apartments	Apartments	24,000	3,203,400	24	576,000	64,337,200	489,600	54,686,620	29
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	3,301,000	18	1,756,800	66,094,000	1,493,280	56,179,900	88
16-20	4	W 10	Academic	Classrooms, wet labs, faculty o	115,000	3,416,000	22	2,530,000	68,624,000	2,150,500	58,330,400	127
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	3,691,000	18	4,950,000	73,574,000	4,207,500	62,537,900	248
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	3,783,000	18	1,656,000	75,230,000	1,407,600	63,945,500	83
16-20	4	W 13	Academic	Classrooms, wet labs, faculty o	98,000	3,881,000	22	2,156,000	77,386,000	1,832,600	65,778,100	108
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	4,045,000	18	2,952,000	80,338,000	2,509,200	68,287,300	148
16-20	4	W 24	Academic	Classrooms, wet labs, faculty o	110,000	4,155,000	22	2,420,000	82,758,000	2,057,000	70,344,300	121
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	4,235,000	18	1,440,000	84,198,000	1,224,000	71,568,300	72
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	4,335,000	18	1,800,000	85,998,000	1,530,000	73,098,300	90

Table 8-7. West Campus Building Heating Load Analysis for Two Central Plants

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
16-20	4	W 27	Academic	Classrooms, wet labs, faculty o	185,000	4,520,000	22	4,070,000	90,068,000	3,459,500	76,557,800	204
16-20	4	A 32	Apartments	Apartments	24,000	4,544,000	24	576,000	90,644,000	489,600	77,047,400	29
16-20	4	A 33	Apartments	Apartments	13,500	4,557,500	24	324,000	90,968,000	275,400	77,322,800	16
16-20	4	A 34	Apartments	Apartments	13,500	4,571,000	24	324,000	91,292,000	275,400	77,598,200	16
16-20	4	A 35	Apartments	Apartments	13,500	4,584,500	24	324,000	91,616,000	275,400	77,873,600	16
16-20	4	A 36	Apartments	Apartments	13,500	4,598,000	24	324,000	91,940,000	275,400	78,149,000	16
16-20	4	A 37	Apartments	Apartments	24,000	4,622,000	24	576,000	92,516,000	489,600	78,638,600	29
16-20	4	A 38	Apartments	Apartments	24,000	4,646,000	24	576,000	93,092,000	489,600	79,128,200	29
16-20	4	A 39	Apartments	Apartments	13,500	4,659,500	24	324,000	93,416,000	275,400	79,403,600	16
16-20	4	A 40	Apartments	Apartments	13,500	4,673,000	24	324,000	93,740,000	275,400	79,679,000	16
16-20	4	A 41	Apartments	Apartments	30,000	4,703,000	24	720,000	94,460,000	612,000	80,291,000	36
16-20	4	A 42	Apartments	Apartments	30,000	4,733,000	24	720,000	95,180,000	612,000	80,903,000	36
16-20	4	A 43	Apartments	Apartments	30,000	4,763,000	24	720,000	95,900,000	612,000	81,515,000	36
16-20	4	A 44	Apartments	Apartments	13,500	4,776,500	24	324,000	96,224,000	275,400	81,790,400	16
16-20	4	A 45	Apartments	Apartments	13,500	4,790,000	24	324,000	96,548,000	275,400	82,065,800	16
16-20	4	A 46	Apartments	Apartments	24,000	4,814,000	24	576,000	97,124,000	489,600	82,555,400	29
					4,814,000			**97,124,000**		**82,555,400**		**4,856**

* Diversity factor is 85%

** HHW flow is figured as peak heating load (Btuh)/500/40 °F HHW ΔT

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
Medical School Central Plant												
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	224,000	18	4,032,000	4,032,000	3,427,200	3,427,200	202
6-10	2	M3	Research	Wet labs, faculty offices	100,000	324,000	22	2,200,000	6,232,000	1,870,000	5,297,200	110
6-10	2	M6	Ambulatory Care	Hospital	100,000	424,000	22	2,200,000	8,432,000	1,870,000	7,167,200	110
6-10	2	MV	Vivarium	Vivarium	23,000	447,000	22	506,000	8,938,000	430,100	7,597,300	25
6-10	2	H2	Graduate Housing	Apartments	125,000	572,000	24	3,000,000	11,938,000	2,550,000	10,147,300	150
11-15	3	M2	Research	Wet labs, faculty offices	128,000	700,000	22	2,816,000	14,754,000	2,393,600	12,540,900	141
11-15	3	M5	Ambulatory Care	Hospital	120,000	820,000	22	2,640,000	17,394,000	2,244,000	14,784,900	132
11-15	3	M7	Research	Wet labs, faculty offices	124,000	944,000	22	2,728,000	20,122,000	2,318,800	17,103,700	136
11-15	3	H1	Graduate Housing	Apartments	125,000	1,069,000	24	3,000,000	23,122,000	2,550,000	19,653,700	150
11-15	3	MOB 5	Medical Office Bld	Wet labs, doctor offices	70,000	1,139,000	22	1,540,000	24,662,000	1,309,000	20,962,700	77
11-15	3	MOB 6	Medical Office Bld	Wet labs, doctor offices	82,000	1,221,000	22	1,804,000	26,466,000	1,533,400	22,496,100	90
11-15	3	MOB 7	Medical Office Bld	Wet labs, doctor offices	78,000	1,299,000	22	1,716,000	28,182,000	1,458,600	23,954,700	86
16-20	4	M1	Research	Wet labs, faculty offices	120,000	1,419,000	22	2,640,000	30,822,000	2,244,000	26,198,700	132
16-20	4	MOB 1	Medical Office Bld	Wet labs, doctor offices	72,000	1,491,000	22	1,584,000	32,406,000	1,346,400	27,545,100	79
16-20	4	MOB 2	Medical Office Bld	Wet labs, doctor offices	124,000	1,615,000	22	2,728,000	35,134,000	2,318,800	29,863,900	136
16-20	4	MOB 3	Medical Office Bld	Wet labs, doctor offices	120,000	1,735,000	22	2,640,000	37,774,000	2,244,000	32,107,900	132
16-20	4	MOB 4	Medical Office Bld	Wet labs, doctor offices	150,000	1,885,000	22	3,300,000	41,074,000	2,805,000	34,912,900	165
					1,661,000			**37,042,000**		**31,485,700**		**1,852**

* Diversity factor is 85%

** HHW flow is figured as peak heating load (Btuh)/500/40 °F HHW ΔT

Table 8A-5. West Campus Building Heating Load Analysis for All Future Buildings with Sustainable Design Considerations

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty o	144,000	144,000	16	2,304,000	2,304,000	1,958,400	1,958,400	115
1-3	1A	F 1	Apartments	Family Apartments	18,720	162,720	19	355,680	2,659,680	302,328	2,260,728	18
1-3	1A	F 2	Apartments	Family Apartments	18,720	181,440	19	355,680	3,015,360	302,328	2,563,056	18
1-3	1A	F 3	Apartments	Family Apartments	13,320	194,760	19	253,080	3,268,440	215,118	2,778,174	13
1-3	1A	F 4	Apartments	Family Apartments	13,320	208,080	19	253,080	3,521,520	215,118	2,993,292	13
1-3	1A	F 5	Apartments	Family Apartments	13,320	221,400	19	253,080	3,774,600	215,118	3,208,410	13
1-3	1A	F 6	Apartments	Family Apartments	18,720	240,120	19	355,680	4,130,280	302,328	3,510,738	18
1-3	1A	F 7	Apartments	Family Apartments	9,840	249,960	19	186,960	4,317,240	158,916	3,669,654	9
1-3	1A	F 8	Apartments	Family Apartments	9,840	259,800	19	186,960	4,504,200	158,916	3,828,570	9
1-3	1A	F 9	Apartments	Family Apartments	18,720	278,520	19	355,680	4,859,880	302,328	4,130,898	18
1-3	1A	F 10	Apartments	Family Apartments	15,240	293,760	19	289,560	5,149,440	246,126	4,377,024	14
1-3	1A	F 11	Apartments	Family Apartments	9,840	303,600	19	186,960	5,336,400	158,916	4,535,940	9
1-3	1A	F 12	Apartments	Family Apartments	9,840	313,440	19	186,960	5,523,360	158,916	4,694,856	9
1-3	1A	F 13	Apartments	Family Apartments	19,680	333,120	19	373,920	5,897,280	317,832	5,012,688	19
1-3	1A	F 14	Apartments	Family Apartments	13,320	346,440	19	253,080	6,150,360	215,118	5,227,806	13
1-3	1A	F 15	Apartments	Family Apartments	17,760	364,200	19	337,440	6,487,800	286,824	5,514,630	17
1-3	1A	F 16	Apartments	Family Apartments	8,880	373,080	19	168,720	6,656,520	143,412	5,658,042	8
1-3	1A	F 17	Apartments	Family Apartments	17,760	390,840	19	337,440	6,993,960	286,824	5,944,866	17
1-3	1A	F 18	Apartments	Family Apartments	15,240	406,080	19	289,560	7,283,520	246,126	6,190,992	14
1-3	1A	F 19	Apartments	Family Apartments	8,880	414,960	19	168,720	7,452,240	143,412	6,334,404	8
1-3	1A	F 20	Apartments	Family Apartments	15,240	430,200	19	289,560	7,741,800	246,126	6,580,530	14
1-3	1A	F 21	Townhouses	Family Townhouses	5,806	436,006	19	110,314	7,852,114	93,767	6,674,297	6
1-3	1A	F 22	Townhouses	Family Townhouses	7,744	443,750	19	147,136	7,999,250	125,066	6,799,363	7
1-3	1A	F 23	Townhouses	Family Townhouses	5,806	449,556	19	110,314	8,109,564	93,767	6,893,129	6
1-3	1A	F 24	Townhouses	Family Townhouses	9,680	459,236	19	183,920	8,293,484	156,332	7,049,461	9
1-3	1A	F 25	Townhouses	Family Townhouses	9,680	468,916	19	183,920	8,477,404	156,332	7,205,793	9
1-3	1A	F 26	Townhouses	Family Townhouses	9,680	478,596	19	183,920	8,661,324	156,332	7,362,125	9
1-3	1A	F 27	Townhouses	Family Townhouses	9,680	488,276	19	183,920	8,845,244	156,332	7,518,457	9
1-3	1A	F 28	Townhouses	Family Townhouses	11,614	499,890	19	220,666	9,065,910	187,566	7,706,024	11
1-3	1A	F 29	Townhouses	Family Townhouses	7,744	507,634	19	147,136	9,213,046	125,066	7,831,089	7
1-3	1A	F 30	Townhouses	Family Townhouses	7,744	515,378	19	147,136	9,360,182	125,066	7,956,155	7
1-3	1A	F 31	Townhouses	Family Townhouses	9,680	525,058	19	183,920	9,544,102	156,332	8,112,487	9
1-3	1A	F 32	Townhouses	Family Townhouses	11,600	536,658	19	220,400	9,764,502	187,340	8,299,827	11
1-3	1A	CDC N	Child Dev. Center	Child development center	14,800	551,458	14	207,200	9,971,702	176,120	8,475,947	10
1-3	1A	CC N	Community Cente	Community center	5,200	556,658	14	72,800	10,044,502	61,880	8,537,827	4
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	780,658	14	3,136,000	13,180,502	2,665,600	11,203,427	157
4-5	1	W 1	Conference Cente	Conference	270,000	1,050,658	14	3,780,000	16,960,502	3,213,000	14,416,427	189
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	1,170,658	14	1,680,000	18,640,502	1,428,000	15,844,427	84
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	1,345,658	14	2,450,000	21,090,502	2,082,500	17,926,927	123
6-10	2	W 2	Conference Cente	Conference	120,000	1,465,658	14	1,680,000	22,770,502	1,428,000	19,354,927	84
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,648,158	14	2,555,000	25,325,502	2,171,750	21,526,677	128
6-10	2	W 7	Academic	Classrooms, wet labs, faculty o	195,000	1,843,158	16	3,120,000	28,445,502	2,652,000	24,178,677	156
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	2,063,158	14	3,080,000	31,525,502	2,618,000	26,796,677	154
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	2,161,158	14	1,372,000	32,897,502	1,166,200	27,962,877	69
6-10	2	W 15	Student Center	Student Center	170,000	2,331,158	16	2,720,000	35,617,502	2,312,000	30,274,877	136
6-10	2	M3	Research	Wet labs, faculty offices	100,000	2,431,158	16	1,600,000	37,217,502	1,360,000	31,634,877	80
6-10	2	M6	Ambulatory Care	Hospital	100,000	2,531,158	16	1,600,000	38,817,502	1,360,000	32,994,877	80
6-10	2	MV	Vivarium	Vivarium	23,000	2,554,158	16	368,000	39,185,502	312,800	33,307,677	18
6-10	2	H2	Graduate Housing	Apartments	125,000	2,679,158	19	2,375,000	41,560,502	2,018,750	35,326,427	119
6-10	2	R	Recreation	Recreation center	65,000	2,744,158	14	910,000	42,470,502	773,500	36,099,927	46
6-10	2	A 1	Apartments	Apartments	30,000	2,774,158	19	570,000	43,040,502	484,500	36,584,427	29
6-10	2	A 2	Apartments	Apartments	24,000	2,798,158	19	456,000	43,496,502	387,600	36,972,027	23
6-10	2	A 3	Apartments	Apartments	13,500	2,811,658	19	256,500	43,753,002	218,025	37,190,052	13
6-10	2	A 4	Apartments	Apartments	13,500	2,825,158	19	256,500	44,009,502	218,025	37,408,077	13
6-10	2	A 5	Apartments	Apartments	30,000	2,855,158	19	570,000	44,579,502	484,500	37,892,577	29
6-10	2	A 6	Apartments	Apartments	30,000	2,885,158	19	570,000	45,149,502	484,500	38,377,077	29
6-10	2	A 7	Apartments	Apartments	13,500	2,898,658	19	256,500	45,406,002	218,025	38,595,102	13
6-10	2	A 8	Apartments	Apartments	13,500	2,912,158	19	256,500	45,662,502	218,025	38,813,127	13
6-10	2	A 9	Apartments	Apartments	24,000	2,936,158	19	456,000	46,118,502	387,600	39,200,727	23

Table 8A-5. West Campus Building Heating Load Analysis for All Future Buildings with Sustainable Design Considerations

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
6-10	2	A 10	Apartments	Apartments	24,000	2,960,158	19	456,000	46,574,502	387,600	39,588,327	23
6-10	2	A 11	Apartments	Apartments	13,500	2,973,658	19	256,500	46,831,002	218,025	39,806,352	13
6-10	2	A 12	Apartments	Apartments	13,500	2,987,158	19	256,500	47,087,502	218,025	40,024,377	13
6-10	2	A 13	Apartments	Apartments	13,500	3,000,658	19	256,500	47,344,002	218,025	40,242,402	13
6-10	2	A 14	Apartments	Apartments	13,500	3,014,158	19	256,500	47,600,502	218,025	40,460,427	13
6-10	2	A 15	Apartments	Apartments	24,000	3,038,158	19	456,000	48,056,502	387,600	40,848,027	23
6-10	2	F 33	Apartments	Family Apartments	9,680	3,047,838	19	183,920	48,240,422	156,332	41,004,359	9
6-10	2	F 34	Apartments	Family Apartments	18,720	3,066,558	19	355,680	48,596,102	302,328	41,306,687	18
6-10	2	F 35	Apartments	Family Apartments	18,720	3,085,278	19	355,680	48,951,782	302,328	41,609,015	18
6-10	2	F 36	Apartments	Family Apartments	14,308	3,099,586	19	271,852	49,223,634	231,074	41,840,089	14
6-10	2	F 37	Apartments	Family Apartments	9,840	3,109,426	19	186,960	49,410,594	158,916	41,999,005	9
6-10	2	F 38	Apartments	Family Apartments	14,308	3,123,734	19	271,852	49,682,446	231,074	42,230,079	14
6-10	2	F 39	Apartments	Family Apartments	14,308	3,138,042	19	271,852	49,954,298	231,074	42,461,153	14
6-10	2	F 40	Apartments	Family Apartments	18,720	3,156,762	19	355,680	50,309,978	302,328	42,763,481	18
6-10	2	F 41	Apartments	Family Apartments	14,308	3,171,070	19	271,852	50,581,830	231,074	42,994,556	14
6-10	2	F 42	Apartments	Family Apartments	17,760	3,188,830	19	337,440	50,919,270	286,824	43,281,380	17
6-10	2	F 43	Apartments	Family Apartments	18,720	3,207,550	19	355,680	51,274,950	302,328	43,583,708	18
6-10	2	F 44	Apartments	Family Apartments	14,308	3,221,858	19	271,852	51,546,802	231,074	43,814,782	14
6-10	2	F 45	Apartments	Family Apartments	14,308	3,236,166	19	271,852	51,818,654	231,074	44,045,856	14
6-10	2	F 46	Apartments	Family Apartments	14,308	3,250,474	19	271,852	52,090,506	231,074	44,276,930	14
6-10	2	F 47	Apartments	Family Apartments	18,720	3,269,194	19	355,680	52,446,186	302,328	44,579,258	18
6-10	2	F 48	Apartments	Family Apartments	18,720	3,287,914	19	355,680	52,801,866	302,328	44,881,586	18
6-10	2	F 49	Apartments	Family Apartments	9,840	3,297,754	19	186,960	52,988,826	158,916	45,040,502	9
6-10	2	F 50	Apartments	Family Apartments	14,308	3,312,062	19	271,852	53,260,678	231,074	45,271,576	14
6-10	2	F 51	Apartments	Family Apartments	14,308	3,326,370	19	271,852	53,532,530	231,074	45,502,651	14
6-10	2	F 52	Townhouses	Family Townhouses	9,840	3,336,210	19	186,960	53,719,490	158,916	45,661,567	9
6-10	2	F 53	Townhouses	Family Townhouses	7,744	3,343,954	19	147,136	53,866,626	125,066	45,786,632	7
6-10	2	F 54	Townhouses	Family Townhouses	9,680	3,353,634	19	183,920	54,050,546	156,332	45,942,964	9
6-10	2	F 55	Townhouses	Family Townhouses	9,680	3,363,314	19	183,920	54,234,466	156,332	46,099,296	9
6-10	2	F 56	Townhouses	Family Townhouses	9,680	3,372,994	19	183,920	54,418,386	156,332	46,255,628	9
6-10	2	F 57	Townhouses	Family Townhouses	9,680	3,382,674	19	183,920	54,602,306	156,332	46,411,960	9
6-10	2	F 58	Townhouses	Family Townhouses	11,614	3,394,288	19	220,666	54,822,972	187,566	46,599,526	11
6-10	2	F 59	Townhouses	Family Townhouses	11,614	3,405,902	19	220,666	55,043,638	187,566	46,787,092	11
6-10	2	F 60	Townhouses	Family Townhouses	9,680	3,415,582	19	183,920	55,227,558	156,332	46,943,424	9
6-10	2	CDC S	Child Dev. Center	Child development center	14,800	3,430,382	14	207,200	55,434,758	176,120	47,119,544	10
6-10	2	CC S	Community Cente	Community center	4,800	3,435,182	14	67,200	55,501,958	57,120	47,176,664	3
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	3,590,182	14	2,170,000	57,671,958	1,844,500	49,021,164	109
11-15	3	W 17	Academic	Classrooms, wet labs, faculty o	165,000	3,755,182	16	2,640,000	60,311,958	2,244,000	51,265,164	132
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	3,853,582	14	1,377,600	61,689,558	1,170,960	52,436,124	69
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	3,968,582	14	1,610,000	63,299,558	1,368,500	53,804,624	81
11-15	3	W 20	Academic	Classrooms, wet labs, faculty o	104,000	4,072,582	16	1,664,000	64,963,558	1,414,400	55,219,024	83
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	4,185,082	14	1,575,000	66,538,558	1,338,750	56,557,774	79
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	4,285,082	14	1,400,000	67,938,558	1,190,000	57,747,774	70
11-15	3	M2	Research	Wet labs, faculty offices	128,000	4,413,082	16	2,048,000	69,986,558	1,740,800	59,488,574	102
11-15	3	M5	Ambulatory Care	Hospital	120,000	4,533,082	16	1,920,000	71,906,558	1,632,000	61,120,574	96
11-15	3	M7	Research	Wet labs, faculty offices	124,000	4,657,082	16	1,984,000	73,890,558	1,686,400	62,806,974	99
11-15	3	H1	Graduate Housing	Apartments	125,000	4,782,082	19	2,375,000	76,265,558	2,018,750	64,825,724	119
11-15	3	MOB 5	Medical Office Bld	Wet labs, doctor offices	70,000	4,852,082	16	1,120,000	77,385,558	952,000	65,777,724	56
11-15	3	MOB 6	Medical Office Bld	Wet labs, doctor offices	82,000	4,934,082	16	1,312,000	78,697,558	1,115,200	66,892,924	66
11-15	3	MOB 7	Medical Office Bld	Wet labs, doctor offices	78,000	5,012,082	16	1,248,000	79,945,558	1,060,800	67,953,724	62
11-15	3	A 16	Apartments	Apartments	24,000	5,036,082	19	456,000	80,401,558	387,600	68,341,324	23
11-15	3	A 17	Apartments	Apartments	13,500	5,049,582	19	256,500	80,658,058	218,025	68,559,349	13
11-15	3	A 18	Apartments	Apartments	13,500	5,063,082	19	256,500	80,914,558	218,025	68,777,374	13
11-15	3	A 19	Apartments	Apartments	24,000	5,087,082	19	456,000	81,370,558	387,600	69,164,974	23
11-15	3	A 20	Apartments	Apartments	24,000	5,111,082	19	456,000	81,826,558	387,600	69,552,574	23
11-15	3	A 21	Apartments	Apartments	13,500	5,124,582	19	256,500	82,083,058	218,025	69,770,599	13

Table 8A-5. West Campus Building Heating Load Analysis for All Future Buildings with Sustainable Design Considerations

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
11-15	3	A 22	Apartments	Apartments	13,500	5,138,082	19	256,500	82,339,558	218,025	69,988,624	13
11-15	3	A 23	Apartments	Apartments	24,000	5,162,082	19	456,000	82,795,558	387,600	70,376,224	23
11-15	3	A 24	Apartments	Apartments	24,000	5,186,082	19	456,000	83,251,558	387,600	70,763,824	23
11-15	3	A 25	Apartments	Apartments	13,500	5,199,582	19	256,500	83,508,058	218,025	70,981,849	13
11-15	3	A 26	Apartments	Apartments	13,500	5,213,082	19	256,500	83,764,558	218,025	71,199,874	13
11-15	3	A 27	Apartments	Apartments	24,000	5,237,082	19	456,000	84,220,558	387,600	71,587,474	23
11-15	3	A 28	Apartments	Apartments	24,000	5,261,082	19	456,000	84,676,558	387,600	71,975,074	23
11-15	3	A 29	Apartments	Apartments	13,500	5,274,582	19	256,500	84,933,058	218,025	72,193,099	13
11-15	3	A 30	Apartments	Apartments	13,500	5,288,082	19	256,500	85,189,558	218,025	72,411,124	13
11-15	3	A 31	Apartments	Apartments	24,000	5,312,082	19	456,000	85,645,558	387,600	72,798,724	23
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	5,409,682	14	1,366,400	87,011,958	1,161,440	73,960,164	68
16-20	4	W 10	Academic	Classrooms, wet labs, faculty o	115,000	5,524,682	16	1,840,000	88,851,958	1,564,000	75,524,164	92
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	5,799,682	14	3,850,000	92,701,958	3,272,500	78,796,664	193
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	5,891,682	14	1,288,000	93,989,958	1,094,800	79,891,464	64
16-20	4	W 13	Academic	Classrooms, wet labs, faculty o	98,000	5,989,682	16	1,568,000	95,557,958	1,332,800	81,224,264	78
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	6,153,682	14	2,296,000	97,853,958	1,951,600	83,175,864	115
16-20	4	W 24	Academic	Classrooms, wet labs, faculty o	110,000	6,263,682	16	1,760,000	99,613,958	1,496,000	84,671,864	88
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	6,343,682	14	1,120,000	100,733,958	952,000	85,623,864	56
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	6,443,682	14	1,400,000	102,133,958	1,190,000	86,813,864	70
16-20	4	W 27	Academic	Classrooms, wet labs, faculty o	185,000	6,628,682	16	2,960,000	105,093,958	2,516,000	89,329,864	148
16-20	4	M1	Research	Wet labs, faculty offices	120,000	6,748,682	16	1,920,000	107,013,958	1,632,000	90,961,864	96
16-20	4	MOB 1	Medical Office Bld	Wet labs, doctor offices	72,000	6,820,682	16	1,152,000	108,165,958	979,200	91,941,064	58
16-20	4	MOB 2	Medical Office Bld	Wet labs, doctor offices	124,000	6,944,682	16	1,984,000	110,149,958	1,686,400	93,627,464	99
16-20	4	MOB 3	Medical Office Bld	Wet labs, doctor offices	120,000	7,064,682	16	1,920,000	112,069,958	1,632,000	95,259,464	96
16-20	4	MOB 4	Medical Office Bld	Wet labs, doctor offices	150,000	7,214,682	16	2,400,000	114,469,958	2,040,000	97,299,464	120
16-20	4	A 32	Apartments	Apartments	24,000	7,238,682	19	456,000	114,925,958	387,600	97,687,064	23
16-20	4	A 33	Apartments	Apartments	13,500	7,252,182	19	256,500	115,182,458	218,025	97,905,089	13
16-20	4	A 34	Apartments	Apartments	13,500	7,265,682	19	256,500	115,438,958	218,025	98,123,114	13
16-20	4	A 35	Apartments	Apartments	13,500	7,279,182	19	256,500	115,695,458	218,025	98,341,139	13
16-20	4	A 36	Apartments	Apartments	13,500	7,292,682	19	256,500	115,951,958	218,025	98,559,164	13
16-20	4	A 37	Apartments	Apartments	24,000	7,316,682	19	456,000	116,407,958	387,600	98,946,764	23
16-20	4	A 38	Apartments	Apartments	24,000	7,340,682	19	456,000	116,863,958	387,600	99,334,364	23
16-20	4	A 39	Apartments	Apartments	13,500	7,354,182	19	256,500	117,120,458	218,025	99,552,389	13
16-20	4	A 40	Apartments	Apartments	13,500	7,367,682	19	256,500	117,376,958	218,025	99,770,414	13
16-20	4	A 41	Apartments	Apartments	30,000	7,397,682	19	570,000	117,946,958	484,500	100,254,914	29
16-20	4	A 42	Apartments	Apartments	30,000	7,427,682	19	570,000	118,516,958	484,500	100,739,414	29
16-20	4	A 43	Apartments	Apartments	30,000	7,457,682	19	570,000	119,086,958	484,500	101,223,914	29
16-20	4	A 44	Apartments	Apartments	13,500	7,471,182	19	256,500	119,343,458	218,025	101,441,939	13
16-20	4	A 45	Apartments	Apartments	13,500	7,484,682	19	256,500	119,599,958	218,025	101,659,964	13
16-20	4	A 46	Apartments	Apartments	24,000	7,508,682	19	456,000	120,055,958	387,600	102,047,564	23
					7,508,682			**120,055,958**		**102,047,564**		**6,003**

* Diversity factor is 85%

** HHW flow is figured as peak heating load (Btuh)/500/40°F HHW ΔT

Table 8A-6. West Campus Building Heating Load Analysis for a Single Central Plant with Sustainable Design Considerations

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty	144,000	144,000	16	2,304,000	2,304,000	1,958,400	1,958,400	115
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	368,000	14	3,136,000	5,440,000	2,665,600	4,624,000	157
4-5	1	W 1	Conference Cente	Conference	270,000	638,000	14	3,780,000	9,220,000	3,213,000	7,837,000	189
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	758,000	14	1,680,000	10,900,000	1,428,000	9,265,000	84
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	933,000	14	2,450,000	13,350,000	2,082,500	11,347,500	123
6-10	2	W 2	Conference Cente	Conference	120,000	1,053,000	14	1,680,000	15,030,000	1,428,000	12,775,500	84
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,235,500	14	2,555,000	17,585,000	2,171,750	14,947,250	128
6-10	2	W 7	Academic	Classrooms, wet labs, faculty	195,000	1,430,500	16	3,120,000	20,705,000	2,652,000	17,599,250	156
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	1,650,500	14	3,080,000	23,785,000	2,618,000	20,217,250	154
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	1,748,500	14	1,372,000	25,157,000	1,166,200	21,383,450	69
6-10	2	W 15	Student Center	Student Center	170,000	1,918,500	16	2,720,000	27,877,000	2,312,000	23,695,450	136
6-10	2	M3	Research	Wet labs, faculty offices	100,000	2,018,500	16	1,600,000	29,477,000	1,360,000	25,055,450	80
6-10	2	M6	Ambulatory Care	Hospital	100,000	2,118,500	16	1,600,000	31,077,000	1,360,000	26,415,450	80
6-10	2	MV	Vivarium	Vivarium	23,000	2,141,500	16	368,000	31,445,000	312,800	26,728,250	18
6-10	2	H2	Graduate Housin	Apartments	125,000	2,266,500	19	2,375,000	33,820,000	2,018,750	28,747,000	119
6-10	2	R	Recreation	Recreation center	65,000	2,331,500	14	910,000	34,730,000	773,500	29,520,500	46
6-10	2	A 1	Apartments	Apartments	30,000	2,361,500	19	570,000	35,300,000	484,500	30,005,000	29
6-10	2	A 2	Apartments	Apartments	24,000	2,385,500	19	456,000	35,756,000	387,600	30,392,600	23
6-10	2	A 3	Apartments	Apartments	13,500	2,399,000	19	256,500	36,012,500	218,025	30,610,625	13
6-10	2	A 4	Apartments	Apartments	13,500	2,412,500	19	256,500	36,269,000	218,025	30,828,650	13
6-10	2	A 5	Apartments	Apartments	30,000	2,442,500	19	570,000	36,839,000	484,500	31,313,150	29
6-10	2	A 6	Apartments	Apartments	30,000	2,472,500	19	570,000	37,409,000	484,500	31,797,650	29
6-10	2	A 7	Apartments	Apartments	13,500	2,486,000	19	256,500	37,665,500	218,025	32,015,675	13
6-10	2	A 8	Apartments	Apartments	13,500	2,499,500	19	256,500	37,922,000	218,025	32,233,700	13
6-10	2	A 9	Apartments	Apartments	24,000	2,523,500	19	456,000	38,378,000	387,600	32,621,300	23
6-10	2	A 10	Apartments	Apartments	24,000	2,547,500	19	456,000	38,834,000	387,600	33,008,900	23
6-10	2	A 11	Apartments	Apartments	13,500	2,561,000	19	256,500	39,090,500	218,025	33,226,925	13
6-10	2	A 12	Apartments	Apartments	13,500	2,574,500	19	256,500	39,347,000	218,025	33,444,950	13
6-10	2	A 13	Apartments	Apartments	13,500	2,588,000	19	256,500	39,603,500	218,025	33,662,975	13
6-10	2	A 14	Apartments	Apartments	13,500	2,601,500	19	256,500	39,860,000	218,025	33,881,000	13
6-10	2	A 15	Apartments	Apartments	24,000	2,625,500	19	456,000	40,316,000	387,600	34,268,600	23
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	2,780,500	14	2,170,000	42,486,000	1,844,500	36,113,100	109
11-15	3	W 17	Academic	Classrooms, wet labs, faculty	165,000	2,945,500	16	2,640,000	45,126,000	2,244,000	38,357,100	132
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	3,043,900	14	1,377,600	46,503,600	1,170,960	39,528,060	69
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	3,158,900	14	1,610,000	48,113,600	1,368,500	40,896,560	81
11-15	3	W 20	Academic	Classrooms, wet labs, faculty	104,000	3,262,900	16	1,664,000	49,777,600	1,414,400	42,310,960	83
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	3,375,400	14	1,575,000	51,352,600	1,338,750	43,649,710	79
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	3,475,400	14	1,400,000	52,752,600	1,190,000	44,839,710	70
11-15	3	M2	Research	Wet labs, faculty offices	128,000	3,603,400	16	2,048,000	54,800,600	1,740,800	46,580,510	102
11-15	3	M5	Ambulatory Care	Hospital	120,000	3,723,400	16	1,920,000	56,720,600	1,632,000	48,212,510	96
11-15	3	M7	Research	Wet labs, faculty offices	124,000	3,847,400	16	1,984,000	58,704,600	1,686,400	49,898,910	99
11-15	3	H1	Graduate Housin	Apartments	125,000	3,972,400	19	2,375,000	61,079,600	2,018,750	51,917,660	119
11-15	3	MOB 5	Medical Office Bld	Wet labs, doctor offices	70,000	4,042,400	16	1,120,000	62,199,600	952,000	52,869,660	56
11-15	3	MOB 6	Medical Office Bld	Wet labs, doctor offices	82,000	4,124,400	16	1,312,000	63,511,600	1,115,200	53,984,860	66
11-15	3	MOB 7	Medical Office Bld	Wet labs, doctor offices	78,000	4,202,400	16	1,248,000	64,759,600	1,060,800	55,045,660	62

Table 8A-6. West Campus Building Heating Load Analysis for a Single Central Plant with Sustainable Design Considerations

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
11-15	3	A 16	Apartments	Apartments	24,000	4,226,400	19	456,000	65,215,600	387,600	55,433,260	23
11-15	3	A 17	Apartments	Apartments	13,500	4,239,900	19	256,500	65,472,100	218,025	55,651,285	13
11-15	3	A 18	Apartments	Apartments	13,500	4,253,400	19	256,500	65,728,600	218,025	55,869,310	13
11-15	3	A 19	Apartments	Apartments	24,000	4,277,400	19	456,000	66,184,600	387,600	56,256,910	23
11-15	3	A 20	Apartments	Apartments	24,000	4,301,400	19	456,000	66,640,600	387,600	56,644,510	23
11-15	3	A 21	Apartments	Apartments	13,500	4,314,900	19	256,500	66,897,100	218,025	56,862,535	13
11-15	3	A 22	Apartments	Apartments	13,500	4,328,400	19	256,500	67,153,600	218,025	57,080,560	13
11-15	3	A 23	Apartments	Apartments	24,000	4,352,400	19	456,000	67,609,600	387,600	57,468,160	23
11-15	3	A 24	Apartments	Apartments	24,000	4,376,400	19	456,000	68,065,600	387,600	57,855,760	23
11-15	3	A 25	Apartments	Apartments	13,500	4,389,900	19	256,500	68,322,100	218,025	58,073,785	13
11-15	3	A 26	Apartments	Apartments	13,500	4,403,400	19	256,500	68,578,600	218,025	58,291,810	13
11-15	3	A 27	Apartments	Apartments	24,000	4,427,400	19	456,000	69,034,600	387,600	58,679,410	23
11-15	3	A 28	Apartments	Apartments	24,000	4,451,400	19	456,000	69,490,600	387,600	59,067,010	23
11-15	3	A 29	Apartments	Apartments	13,500	4,464,900	19	256,500	69,747,100	218,025	59,285,035	13
11-15	3	A 30	Apartments	Apartments	13,500	4,478,400	19	256,500	70,003,600	218,025	59,503,060	13
11-15	3	A 31	Apartments	Apartments	24,000	4,502,400	19	456,000	70,459,600	387,600	59,890,660	23
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	4,600,000	14	1,366,400	71,826,000	1,161,440	61,052,100	68
16-20	4	W 10	Academic	Classrooms, wet labs, faculty	115,000	4,715,000	16	1,840,000	73,666,000	1,564,000	62,616,100	92
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	4,990,000	14	3,850,000	77,516,000	3,272,500	65,888,600	193
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	5,082,000	14	1,288,000	78,804,000	1,094,800	66,983,400	64
16-20	4	W 13	Academic	Classrooms, wet labs, faculty	98,000	5,180,000	16	1,568,000	80,372,000	1,332,800	68,316,200	78
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	5,344,000	14	2,296,000	82,668,000	1,951,600	70,267,800	115
16-20	4	W 24	Academic	Classrooms, wet labs, faculty	110,000	5,454,000	16	1,760,000	84,428,000	1,496,000	71,763,800	88
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	5,534,000	14	1,120,000	85,548,000	952,000	72,715,800	56
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	5,634,000	14	1,400,000	86,948,000	1,190,000	73,905,800	70
16-20	4	W 27	Academic	Classrooms, wet labs, faculty	185,000	5,819,000	16	2,960,000	89,908,000	2,516,000	76,421,800	148
16-20	4	M1	Research	Wet labs, faculty offices	120,000	5,939,000	16	1,920,000	91,828,000	1,632,000	78,053,800	96
16-20	4	MOB 1	Medical Office Bld	Wet labs, doctor offices	72,000	6,011,000	16	1,152,000	92,980,000	979,200	79,033,000	58
16-20	4	MOB 2	Medical Office Bld	Wet labs, doctor offices	124,000	6,135,000	16	1,984,000	94,964,000	1,686,400	80,719,400	99
16-20	4	MOB 3	Medical Office Bld	Wet labs, doctor offices	120,000	6,255,000	16	1,920,000	96,884,000	1,632,000	82,351,400	96
16-20	4	MOB 4	Medical Office Bld	Wet labs, doctor offices	150,000	6,405,000	16	2,400,000	99,284,000	2,040,000	84,391,400	120
16-20	4	A 32	Apartments	Apartments	24,000	6,429,000	19	456,000	99,740,000	387,600	84,779,000	23
16-20	4	A 33	Apartments	Apartments	13,500	6,442,500	19	256,500	99,996,500	218,025	84,997,025	13
16-20	4	A 34	Apartments	Apartments	13,500	6,456,000	19	256,500	100,253,000	218,025	85,215,050	13
16-20	4	A 35	Apartments	Apartments	13,500	6,469,500	19	256,500	100,509,500	218,025	85,433,075	13
16-20	4	A 36	Apartments	Apartments	13,500	6,483,000	19	256,500	100,766,000	218,025	85,651,100	13
16-20	4	A 37	Apartments	Apartments	24,000	6,507,000	19	456,000	101,222,000	387,600	86,038,700	23
16-20	4	A 38	Apartments	Apartments	24,000	6,531,000	19	456,000	101,678,000	387,600	86,426,300	23
16-20	4	A 39	Apartments	Apartments	13,500	6,544,500	19	256,500	101,934,500	218,025	86,644,325	13
16-20	4	A 40	Apartments	Apartments	13,500	6,558,000	19	256,500	102,191,000	218,025	86,862,350	13
16-20	4	A 41	Apartments	Apartments	30,000	6,588,000	19	570,000	102,761,000	484,500	87,346,850	29
16-20	4	A 42	Apartments	Apartments	30,000	6,618,000	19	570,000	103,331,000	484,500	87,831,350	29
16-20	4	A 43	Apartments	Apartments	30,000	6,648,000	19	570,000	103,901,000	484,500	88,315,850	29
16-20	4	A 44	Apartments	Apartments	13,500	6,661,500	19	256,500	104,157,500	218,025	88,533,875	13
16-20	4	A 45	Apartments	Apartments	13,500	6,675,000	19	256,500	104,414,000	218,025	88,751,900	13

Table 8A-6. West Campus Building Heating Load Analysis for a Single Central Plant with Sustainable Design Considerations

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
16-20	4	A 46	Apartments	Apartments	24,000	6,699,000	19	456,000	104,870,000	387,600	89,139,500	23
					6,699,000			**104,870,000**		**89,139,500**		**5,244**

* Diversity factor is 85%
** HHW flow is figured as peak heating load (Btuh)/500/40 °F HHW ΔT

Table 8A-7. West Campus Building Heating Load Analysis for Two Central Plants with Sustainable Design Considerations

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
Main Central Plant												
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty o	144,000	144,000	16	2,304,000	2,304,000	1,958,400	1,958,400	115
4-5	1	W 1	Conference Cente	Conference	270,000	414,000	14	3,780,000	6,084,000	3,213,000	5,171,400	189
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	534,000	14	1,680,000	7,764,000	1,428,000	6,599,400	84
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	709,000	14	2,450,000	10,214,000	2,082,500	8,681,900	123
6-10	2	W 2	Conference Cente	Conference	120,000	829,000	14	1,680,000	11,894,000	1,428,000	10,109,900	84
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,011,500	14	2,555,000	14,449,000	2,171,750	12,281,650	128
6-10	2	W 7	Academic	Classrooms, wet labs, faculty o	195,000	1,206,500	16	3,120,000	17,569,000	2,652,000	14,933,650	156
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	1,426,500	14	3,080,000	20,649,000	2,618,000	17,551,650	154
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	1,524,500	14	1,372,000	22,021,000	1,166,200	18,717,850	69
6-10	2	W 15	Student Center	Student Center	170,000	1,694,500	16	2,720,000	24,741,000	2,312,000	21,029,850	136
6-10	2	R	Recreation	Recreation center	65,000	1,759,500	14	910,000	25,651,000	773,500	21,803,350	46
6-10	2	A 1	Apartments	Apartments	30,000	1,789,500	19	570,000	26,221,000	484,500	22,287,850	29
6-10	2	A 2	Apartments	Apartments	24,000	1,813,500	19	456,000	26,677,000	387,600	22,675,450	23
6-10	2	A 3	Apartments	Apartments	13,500	1,827,000	19	256,500	26,933,500	218,025	22,893,475	13
6-10	2	A 4	Apartments	Apartments	13,500	1,840,500	19	256,500	27,190,000	218,025	23,111,500	13
6-10	2	A 5	Apartments	Apartments	30,000	1,870,500	19	570,000	27,760,000	484,500	23,596,000	29
6-10	2	A 6	Apartments	Apartments	30,000	1,900,500	19	570,000	28,330,000	484,500	24,080,500	29
6-10	2	A 7	Apartments	Apartments	13,500	1,914,000	19	256,500	28,586,500	218,025	24,298,525	13
6-10	2	A 8	Apartments	Apartments	13,500	1,927,500	19	256,500	28,843,000	218,025	24,516,550	13
6-10	2	A 9	Apartments	Apartments	24,000	1,951,500	19	456,000	29,299,000	387,600	24,904,150	23
6-10	2	A 10	Apartments	Apartments	24,000	1,975,500	19	456,000	29,755,000	387,600	25,291,750	23
6-10	2	A 11	Apartments	Apartments	13,500	1,989,000	19	256,500	30,011,500	218,025	25,509,775	13
6-10	2	A 12	Apartments	Apartments	13,500	2,002,500	19	256,500	30,268,000	218,025	25,727,800	13
6-10	2	A 13	Apartments	Apartments	13,500	2,016,000	19	256,500	30,524,500	218,025	25,945,825	13
6-10	2	A 14	Apartments	Apartments	13,500	2,029,500	19	256,500	30,781,000	218,025	26,163,850	13
6-10	2	A 15	Apartments	Apartments	24,000	2,053,500	19	456,000	31,237,000	387,600	26,551,450	23
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	2,208,500	14	2,170,000	33,407,000	1,844,500	28,395,950	109
11-15	3	W 17	Academic	Classrooms, wet labs, faculty o	165,000	2,373,500	16	2,640,000	36,047,000	2,244,000	30,639,950	132
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	2,471,900	14	1,377,600	37,424,600	1,170,960	31,810,910	69
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	2,586,900	14	1,610,000	39,034,600	1,368,500	33,179,410	81
11-15	3	W 20	Academic	Classrooms, wet labs, faculty o	104,000	2,690,900	16	1,664,000	40,698,600	1,414,400	34,593,810	83
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	2,803,400	14	1,575,000	42,273,600	1,338,750	35,932,560	79
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	2,903,400	14	1,400,000	43,673,600	1,190,000	37,122,560	70
11-15	3	A 16	Apartments	Apartments	24,000	2,927,400	19	456,000	44,129,600	387,600	37,510,160	23
11-15	3	A 17	Apartments	Apartments	13,500	2,940,900	19	256,500	44,386,100	218,025	37,728,185	13
11-15	3	A 18	Apartments	Apartments	13,500	2,954,400	19	256,500	44,642,600	218,025	37,946,210	13
11-15	3	A 19	Apartments	Apartments	24,000	2,978,400	19	456,000	45,098,600	387,600	38,333,810	23
11-15	3	A 20	Apartments	Apartments	24,000	3,002,400	19	456,000	45,554,600	387,600	38,721,410	23
11-15	3	A 21	Apartments	Apartments	13,500	3,015,900	19	256,500	45,811,100	218,025	38,939,435	13
11-15	3	A 22	Apartments	Apartments	13,500	3,029,400	19	256,500	46,067,600	218,025	39,157,460	13
11-15	3	A 23	Apartments	Apartments	24,000	3,053,400	19	456,000	46,523,600	387,600	39,545,060	23
11-15	3	A 24	Apartments	Apartments	24,000	3,077,400	19	456,000	46,979,600	387,600	39,932,660	23
11-15	3	A 25	Apartments	Apartments	13,500	3,090,900	19	256,500	47,236,100	218,025	40,150,685	13
11-15	3	A 26	Apartments	Apartments	13,500	3,104,400	19	256,500	47,492,600	218,025	40,368,710	13
11-15	3	A 27	Apartments	Apartments	24,000	3,128,400	19	456,000	47,948,600	387,600	40,756,310	23
11-15	3	A 28	Apartments	Apartments	24,000	3,152,400	19	456,000	48,404,600	387,600	41,143,910	23
11-15	3	A 29	Apartments	Apartments	13,500	3,165,900	19	256,500	48,661,100	218,025	41,361,935	13
11-15	3	A 30	Apartments	Apartments	13,500	3,179,400	19	256,500	48,917,600	218,025	41,579,960	13
11-15	3	A 31	Apartments	Apartments	24,000	3,203,400	19	456,000	49,373,600	387,600	41,967,560	23
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	3,301,000	14	1,366,400	50,740,000	1,161,440	43,129,000	68
16-20	4	W 10	Academic	Classrooms, wet labs, faculty o	115,000	3,416,000	16	1,840,000	52,580,000	1,564,000	44,693,000	92
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	3,691,000	14	3,850,000	56,430,000	3,272,500	47,965,500	193
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	3,783,000	14	1,288,000	57,718,000	1,094,800	49,060,300	64
16-20	4	W 13	Academic	Classrooms, wet labs, faculty o	98,000	3,881,000	16	1,568,000	59,286,000	1,332,800	50,393,100	78
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	4,045,000	14	2,296,000	61,582,000	1,951,600	52,344,700	115
16-20	4	W 24	Academic	Classrooms, wet labs, faculty o	110,000	4,155,000	16	1,760,000	63,342,000	1,496,000	53,840,700	88
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	4,235,000	14	1,120,000	64,462,000	952,000	54,792,700	56
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	4,335,000	14	1,400,000	65,862,000	1,190,000	55,982,700	70

Table 8A-7. West Campus Building Heating Load Analysis for Two Central Plants with Sustainable Design Considerations

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
16-20	4	W 27	Academic	Classrooms, wet labs, faculty o	185,000	4,520,000	16	2,960,000	68,822,000	2,516,000	58,498,700	148
16-20	4	A 32	Apartments	Apartments	24,000	4,544,000	19	456,000	69,278,000	387,600	58,886,300	23
16-20	4	A 33	Apartments	Apartments	13,500	4,557,500	19	256,500	69,534,500	218,025	59,104,325	13
16-20	4	A 34	Apartments	Apartments	13,500	4,571,000	19	256,500	69,791,000	218,025	59,322,350	13
16-20	4	A 35	Apartments	Apartments	13,500	4,584,500	19	256,500	70,047,500	218,025	59,540,375	13
16-20	4	A 36	Apartments	Apartments	13,500	4,598,000	19	256,500	70,304,000	218,025	59,758,400	13
16-20	4	A 37	Apartments	Apartments	24,000	4,622,000	19	456,000	70,760,000	387,600	60,146,000	23
16-20	4	A 38	Apartments	Apartments	24,000	4,646,000	19	456,000	71,216,000	387,600	60,533,600	23
16-20	4	A 39	Apartments	Apartments	13,500	4,659,500	19	256,500	71,472,500	218,025	60,751,625	13
16-20	4	A 40	Apartments	Apartments	13,500	4,673,000	19	256,500	71,729,000	218,025	60,969,650	13
16-20	4	A 41	Apartments	Apartments	30,000	4,703,000	19	570,000	72,299,000	484,500	61,454,150	29
16-20	4	A 42	Apartments	Apartments	30,000	4,733,000	19	570,000	72,869,000	484,500	61,938,650	29
16-20	4	A 43	Apartments	Apartments	30,000	4,763,000	19	570,000	73,439,000	484,500	62,423,150	29
16-20	4	A 44	Apartments	Apartments	13,500	4,776,500	19	256,500	73,695,500	218,025	62,641,175	13
16-20	4	A 45	Apartments	Apartments	13,500	4,790,000	19	256,500	73,952,000	218,025	62,859,200	13
16-20	4	A 46	Apartments	Apartments	24,000	4,814,000	19	456,000	74,408,000	387,600	63,246,800	23
					4,814,000			**74,408,000**		**63,246,800**		**3,720**

* Diversity factor is 85%
** HHW flow is figured as peak heating load (Btuh)/500/40 °F HHW ΔT

Year	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Cumulative Peak Heating Load, BTU/HR	Diversified Peak Heating Load, BTU/HR (*)	Cumulative Diversified Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)
Medical School Central Plant												
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	224,000	14	3,136,000	3,136,000	2,665,600	2,665,600	157
6-10	2	M3	Research	Wet labs, faculty offices	100,000	324,000	16	1,600,000	4,736,000	1,360,000	4,025,600	80
6-10	2	M6	Ambulatory Care	Hospital	100,000	424,000	16	1,600,000	6,336,000	1,360,000	5,385,600	80
6-10	2	MV	Vivarium	Vivarium	23,000	447,000	16	368,000	6,704,000	312,800	5,698,400	18
6-10	2	H2	Graduate Housing	Apartments	125,000	572,000	19	2,375,000	9,079,000	2,018,750	7,717,150	119
11-15	3	M2	Research	Wet labs, faculty offices	128,000	700,000	16	2,048,000	11,127,000	1,740,800	9,457,950	102
11-15	3	M5	Ambulatory Care	Hospital	120,000	820,000	16	1,920,000	13,047,000	1,632,000	11,089,950	96
11-15	3	M7	Research	Wet labs, faculty offices	124,000	944,000	16	1,984,000	15,031,000	1,686,400	12,776,350	99
11-15	3	H1	Graduate Housing	Apartments	125,000	1,069,000	19	2,375,000	17,406,000	2,018,750	14,795,100	119
11-15	3	MOB 5	Medical Office Bld	Wet labs, doctor offices	70,000	1,139,000	16	1,120,000	18,526,000	952,000	15,747,100	56
11-15	3	MOB 6	Medical Office Bld	Wet labs, doctor offices	82,000	1,221,000	16	1,312,000	19,838,000	1,115,200	16,862,300	66
11-15	3	MOB 7	Medical Office Bld	Wet labs, doctor offices	78,000	1,299,000	16	1,248,000	21,086,000	1,060,800	17,923,100	62
16-20	4	M1	Research	Wet labs, faculty offices	120,000	1,419,000	16	1,920,000	23,006,000	1,632,000	19,555,100	96
16-20	4	MOB 1	Medical Office Bld	Wet labs, doctor offices	72,000	1,491,000	16	1,152,000	24,158,000	979,200	20,534,300	58
16-20	4	MOB 2	Medical Office Bld	Wet labs, doctor offices	124,000	1,615,000	16	1,984,000	26,142,000	1,686,400	22,220,700	99
16-20	4	MOB 3	Medical Office Bld	Wet labs, doctor offices	120,000	1,735,000	16	1,920,000	28,062,000	1,632,000	23,852,700	96
16-20	4	MOB 4	Medical Office Bld	Wet labs, doctor offices	150,000	1,885,000	16	2,400,000	30,462,000	2,040,000	25,892,700	120
					1,661,000			**27,326,000**		**23,227,100**		**1,366**

* Diversity factor is 85%
** HHW flow is figured as peak heating load (Btuh)/500/40 °F HHW ΔT

APPENDIX A-4

CHW PIPING DISTRIBUTION TABLES

UC RIVERSIDE
WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

Table 9-1. Main Campus Chilled Water Distribution Flow Analysis (25°F ΔT)							
Building Name	**Year**	**Total GSF**	**Peak Cooling Load, SF/TON**	**Peak Cooling Load, TONS**	**Peak CHW Flow, GPM (**)**	**Diversified Peak CHW Flow, GPM (**)**	**CHW Pipe Size, INCHES (***)**
Segment 7-8 (Loop Completion)							
Segment 7-8 Pipe Size							**10**
Segment 6-7							
A32-A37	2025	102,000	450	227	218		6
W16	2020	155,000	350	443	425		6
A38-A46	2025	192,000	450	427	410		6
W17	2020	165,000	350	471	453		6
A24-A31	2015	150,000	450	333	320		6
W15	2015	170,000	300	567	544		6
					2,369	**2,014**	
Segment 6-7 Pipe Size							**12**
Segment 7-South							
A32-A37	2025	102,000	450	227	218		6
W16	2020	155,000	350	443	425		6
A38-A46	2025	192,000	450	427	410		6
W17	2020	165,000	350	471	453		6
					1,505	**1,279**	
Segment 7-South Pipe Size							**10**
Segment 5-6							
A32-A37	2025	102,000	450	227	218		6
W16	2020	155,000	350	443	425		6
A38-A46	2025	192,000	450	427	410		6
W17	2020	165,000	350	471	453		6
A24-A31	2015	150,000	450	333	320		6
W15	2015	170,000	300	567	544		6
A16-A23	2015	150,000	450	333	320		6
W7	2015	195,000	300	650	624		8
					3,313	**2,650**	
Segment 5-6 Pipe Size							**12**
Segment 4-5							
A32-A37	2025	102,000	450	227	218		6
W16	2020	155,000	350	443	425		6
A38-A46	2025	192,000	450	427	410		6
W17	2020	165,000	350	471	453		6
A24-A31	2015	150,000	450	333	320		6
W15	2015	170,000	300	567	544		6
A16-A23	2015	150,000	450	333	320		6
W7	2015	195,000	300	650	624		8
A1-A9	2010	192,000	450	427	410		6
A10-A15	2010	102,000	450	227	218		4
					3,940	**2,955**	
Segment 4-5 Pipe Size							**14**
Segment 3-4							
A32-A37	2025	102,000	450	227	218		6
W16	2020	155,000	350	443	425		6
A38-A46	2025	192,000	450	427	410		6
W17	2020	165,000	350	471	453		6
A24-A31	2015	150,000	450	333	320		6
W15	2015	170,000	300	567	544		6
A16-A23	2015	150,000	450	333	320		6
W7	2015	195,000	300	650	624		8
A1-A9	2010	192,000	450	427	410		6
A10-A15	2010	102,000	450	227	218		6
W2	2015	120,000	350	343	329		6
W1	2010	270,000	350	771	741		8
					5,010	**3,757**	
Segment 3-4 Pipe Size							**16**
Segment 2-3							
A32-A37	2025	102,000	450	227	218		6
W16	2020	155,000	350	443	425		6
A38-A46	2025	192,000	450	427	410		6
W17	2020	165,000	350	471	453		6
A24-A31	2015	150,000	450	333	320		6
W15	2015	170,000	300	567	544		6
A16-A23	2015	150,000	450	333	320		6
W7	2015	195,000	300	650	624		8
A1-A9	2010	192,000	450	427	410		6
A10-A15	2010	102,000	450	227	218		6
W2	2015	120,000	350	343	329		6
W1	2010	270,000	350	771	741		8
W4	2010	144,000	350	411	395		6
W3	2010	120,000	350	343	329		6
					5,734	**4,014**	
Segment 2-3 Pipe Size							**16**
Segment 1-2							
A32-A37	2025	102,000	450	227	218		6
W16	2020	155,000	350	443	425		6
A38-A46	2025	192,000	450	427	410		6
W17	2020	165,000	350	471	453		6
A24-A31	2015	150,000	450	333	320		6
W15	2015	170,000	300	567	544		6
A16-A23	2015	150,000	450	333	320		6
W7	2015	195,000	300	650	624		8
A1-A9	2010	192,000	450	427	410		6
A10-A15	2010	102,000	450	227	218		6
W2	2015	120,000	350	343	329		6
W1	2010	270,000	350	771	741		8
W4	2010	144,000	350	411	395		6
W3	2010	120,000	350	343	329		6
W6	2015	182,500	350	521	501		6
W8	2015	220,000	350	629	603		6
W5	2010	175,000	350	500	480		6
					7,318	**5,123**	
Segment 1-2 Pipe Size							**18**
Segment 7-8 (Loop Completion)							

Table 9-1. Main Campus Chilled Water Distribution Flow Analysis (25°F ΔT)

Building Name	Year	Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Peak CHW Flow, GPM (**)	Diversified Peak CHW Flow, GPM (**)	CHW Pipe Size, INCHES (***)
Segment 7-8 Pipe Size							**10**
Segment 8-9							
W14	2015	98,000	350	280	269		6
W18	2020	98,400	350	281	270		6
					539	**512**	
Segment 8-9 Pipe Size							**10**
Segment 9-10							
W14	2015	98,000	350	280	269		6
W18	2020	98,400	350	281	270		6
W22	2020	100,000	350	286	274		6
W21	2020	112,500	350	321	309		6
W20	2020	104,000	300	347	333		6
W19	2020	115,000	350	329	315		6
					1,770	**1,504**	
Segment 9-10 Pipe Size							**10**
Segment 9-South							
W18	2020	98,400	350	281	270		6
W22	2020	100,000	350	286	274		6
W21	2020	112,500	350	321	309		6
W20	2020	104,000	300	347	333		6
W19	2020	115,000	350	329	315		6
					1,501	**1,276**	
Segment 9-South Pipe Size							**10**
Segment 10-11							
W14	2015	98,000	350	280	269		6
W18	2020	98,400	350	281	270		6
W22	2020	100,000	350	286	274		6
W21	2020	112,500	350	321	309		6
W20	2020	104,000	300	347	333		6
W19	2020	115,000	350	329	315		6
W11	2025	275,000	350	786	754		8
W27	2025	185,000	300	617	592		6
W26	2025	100,000	350	286	274		6
W24	2025	110,000	300	367	352		6
W25	2025	80,000	350	229	219		6
W23	2025	164,000	350	469	450		6
					4,412	**3,309**	
Segment 10-11 Pipe Size							**16**
Segment 10-East							
W11	2025	275,000	350	786	754		8
W27	2025	185,000	300	617	592		6
W26	2025	100,000	350	286	274		6
W24	2025	110,000	300	367	352		6
W25	2025	80,000	350	229	219		6
W23	2025	164,000	350	469	450		6
					2,642	**2,113**	
Segment 10-East							**12**
Segment 10-East-East							
W11	2025	275,000	350	786	754		8
W27	2025	185,000	300	617	592		6
					1,346	**1,279**	
Segment 10-East							**10**
Segment 10-East-South							
W26	2025	100,000	350	286	274		6
W24	2025	110,000	300	367	352		6
W25	2025	80,000	350	229	219		6
W23	2025	164,000	350	469	450		6
					1,296	**1,101**	
Segment 10-East-South							**10**
Segment 11-12							
W14	2015	98,000	350	280	269		6
W18	2020	98,400	350	281	270		6
W22	2020	100,000	350	286	274		6
W21	2020	112,500	350	321	309		6
W20	2020	104,000	300	347	333		6
W19	2020	115,000	350	329	315		6
W11	2025	275,000	350	786	754		8
W27	2025	185,000	300	617	592		6
W26	2025	100,000	350	286	274		6
W24	2025	110,000	300	367	352		6
W25	2025	80,000	350	229	219		6
W23	2025	164,000	350	469	450		6
W13	2020	155,000	350	443	425		6
W12	2025	92,000	350	263	252		6
W10	2025	115,000	300	383	368		6
W9	2025	97,600	350	279	268		6
					5,725	**4,007**	
Segment 11-12 Pipe Size							**18**

* Diversity factor is between 70% and 100% depending on the number of buildings on each pipe segment
** CHW flow is figured as peak cooling load (tons) x 12,000/500/25°F CHW ΔT
*** Pipe size based on less than 3.0 feet of friction loss per 100 equivalent feet of pipe, but velocity not to exceed 9 fps

Table 9-2. Medical School Chilled Water Distribution Flow Analysis (25°F ΔT)							
Building Name	**Year**	**Total GSF**	**Peak Cooling Load, SF/TON**	**Peak Cooling Load, TONS**	**Peak CHW Flow, GPM (**)**	**Diversified Peak CHW Flow, GPM (**)**	**CHW Pipe Size, INCHES (***)**
Segment 18-19 (Loop Completion)							
Segment 18-19 Pipe Size							**8**
Segment 17-18							
M5	2020	120,000	300	400	384		6
M7	2020	124,000	300	413	397		6
					781	**742**	
Segment 17-18 Pipe Size							**8**
Segment 16-17							
M5	2020	120,000	300	400	384		6
M7	2020	124,000	300	413	397		6
M6	2015	100,000	300	333	320		6
					1,101	**991**	
Segment 16-17 Pipe Size							**8**
Segment 15-16							
M5	2020	120,000	300	400	384		6
M7	2020	124,000	300	413	397		6
M6	2015	100,000	300	333	320		6
M4	2015	224,000	350	640	614		8
					1,715	**1,458**	
Segment 15-16 Pipe Size							**10**
Segment 14-15							
M5	2020	120,000	300	400	384		6
M7	2020	124,000	300	413	397		6
M6	2015	100,000	300	333	320		6
M4	2015	224,000	350	640	614		8
M2	2020	128,000	300	427	410		6
M3	2015	100,000	300	333	320		6
					2,445	**1,834**	
Segment 14-15 Pipe Size							**12**
Segment 13-14							
M5	2020	120,000	300	400	384		6
M7	2020	124,000	300	413	397		6
M6	2015	100,000	300	333	320		6
M4	2015	224,000	350	640	614		8
M2	2020	128,000	300	427	410		6
M3	2015	100,000	300	333	320		6
H1	2020	125,000	450	278	267		6
H2	2015	125,000	450	278	267		6
					2,978	**2,234**	
Segment 13-14 Pipe Size							**12**
Segment 18-19 (Loop Completion)							
Segment 18-19 Pipe Size							**8**
Segment 19-20							
MOB4	2025	150,000	300	500	480		6
MOB7	2020	78,000	300	260	250		6
					730	**693**	
Segment 19-20 Pipe Size							**8**
Segment 20-21							
MOB4	2025	150,000	300	500	480		6
MOB7	2020	78,000	300	260	250		6
MOB6	2020	82,000	300	273	262		6
MOB5	2020	70,000	300	233	224		6
MOB3	2025	120,000	300	400	384		6
					1,600	**1,360**	
Segment 20-21 Pipe Size							**10**
Segment 21-22							
MOB4	2025	150,000	300	500	480		6
MOB7	2020	78,000	300	260	250		6
MOB6	2020	82,000	300	273	262		6
MOB5	2020	70,000	300	233	224		6
MOB3	2025	120,000	300	400	384		6
MOB2	2025	124,000	300	413	397		6
M1	2025	120,000	300	400	384		6
MOB1	2025	72,000	300	240	230		6
					2,611	**1,958**	
Segment 21-22 Pipe Size							**12**

* Diversity factor is between 75% and 100% depending on the number of buildings on each pipe segment

** CHW flow is figured as peak cooling load (tons) x 12,000/500/25°F CHW ΔT

*** Pipe size based on less than 3.0 feet of friction loss per 100 equivalent feet of pipe, but velocity not to exceed 9 fps

Table 9A-1. Main Campus Chilled Water Distribution Flow Analysis (25°F ΔT) with Sustainable Design							
Building Name	**Year**	**Total GSF**	**Peak Cooling Load, SF/TON**	**Peak Cooling Load, TONS**	**Peak CHW Flow, GPM (**)**	**Diversified Peak CHW Flow, GPM (**)**	**CHW Pipe Size, INCHES (***)**
Segment 7-8 (Loop Completion)							
Segment 7-8 Pipe Size							**10**
Segment 6-7							
A32-A37	2025	102,000	550	185	178		4
W16	2020	155,000	475	326	313		6
A38-A46	2025	192,000	550	349	335		6
W17	2020	165,000	475	347	333		6
A24-A31	2015	150,000	550	273	262		6
W15	2015	170,000	400	425	408		6
					1,830	**1,555**	
Segment 6-7 Pipe Size							**10**
Segment 7-South							
A32-A37	2025	102,000	550	185	178		4
W16	2020	155,000	475	326	313		6
A38-A46	2025	192,000	550	349	335		6
W17	2020	165,000	475	347	333		6
					1,160	**986**	
Segment 7-South Pipe Size							**8**
Segment 5-6							
A32-A37	2025	102,000	550	185	178		4
W16	2020	155,000	475	326	313		6
A38-A46	2025	192,000	550	349	335		6
W17	2020	165,000	475	347	333		6
A24-A31	2015	150,000	550	273	262		6
W15	2015	170,000	400	425	408		6
A16-A23	2015	150,000	550	273	262		6
W7	2015	195,000	400	488	468		6
					2,560	**2,048**	
Segment 5-6 Pipe Size							**12**
Segment 4-5							
A32-A37	2025	102,000	550	185	178		4
W16	2020	155,000	475	326	313		6
A38-A46	2025	192,000	550	349	335		6
W17	2020	165,000	475	347	333		6
A24-A31	2015	150,000	550	273	262		6
W15	2015	170,000	400	425	408		6
A16-A23	2015	150,000	550	273	262		6
W7	2015	195,000	400	488	468		6
A1-A9	2010	192,000	550	349	335		6
A10-A15	2010	102,000	550	185	178		4
					3,073	**2,305**	
Segment 4-5 Pipe Size							**12**
Segment 3-4							
A32-A37	2025	102,000	550	185	178		4
W16	2020	155,000	475	326	313		6
A38-A46	2025	192,000	550	349	335		6
W17	2020	165,000	475	347	333		6
A24-A31	2015	150,000	550	273	262		6
W15	2015	170,000	400	425	408		6
A16-A23	2015	150,000	550	273	262		6
W7	2015	195,000	400	488	468		6
A1-A9	2010	192,000	550	349	335		6
A10-A15	2010	102,000	550	185	178		4
W2	2015	120,000	475	253	243		6
W1	2010	270,000	475	568	546		6
					3,861	**2,896**	
Segment 3-4 Pipe Size							**14**
Segment 2-3							
A32-A37	2025	102,000	550	185	178		4
W16	2020	155,000	475	326	313		6
A38-A46	2025	192,000	550	349	335		6
W17	2020	165,000	475	347	333		6
A24-A31	2015	150,000	550	273	262		6
W15	2015	170,000	400	425	408		6
A16-A23	2015	150,000	550	273	262		6
W7	2015	195,000	400	488	468		6
A1-A9	2010	192,000	550	349	335		6
A10-A15	2010	102,000	550	185	178		4
W2	2015	120,000	475	253	243		6
W1	2010	270,000	475	568	546		6
W4	2010	144,000	475	303	291		6
W3	2010	120,000	475	253	243		6
					4,394	**3,076**	
Segment 2-3 Pipe Size							**14**
Segment 1-2							
A32-A37	2025	102,000	550	185	178		4
W16	2020	155,000	475	326	313		6
A38-A46	2025	192,000	550	349	335		6
W17	2020	165,000	475	347	333		6
A24-A31	2015	150,000	550	273	262		6
W15	2015	170,000	400	425	408		6
A16-A23	2015	150,000	550	273	262		6
W7	2015	195,000	400	488	468		6
A1-A9	2010	192,000	550	349	335		6
A10-A15	2010	102,000	550	185	178		4
W2	2015	120,000	475	253	243		6
W1	2010	270,000	475	568	546		6
W4	2010	144,000	475	303	291		6
W3	2010	120,000	475	253	243		6
W6	2015	182,500	475	384	369		6
W8	2015	220,000	475	463	445		6
W5	2010	175,000	475	368	354		6
					5,562	**3,893**	
Segment 1-2 Pipe Size							**16**
Segment 7-8 (Loop Completion)							

Table 9A-1. Main Campus Chilled Water Distribution Flow Analysis (25°F ΔT) with Sustainable Design							
Building Name	**Year**	**Total GSF**	**Peak Cooling Load, SF/TON**	**Peak Cooling Load, TONS**	**Peak CHW Flow, GPM (**)**	**Diversified Peak CHW Flow, GPM (**)**	**CHW Pipe Size, INCHES (***)**
Segment 7-8 Pipe Size							**10**
Segment 8-9							
W14	2015	98,000	475	206	198		4
W18	2020	98,400	475	207	199		4
					397	**377**	
Segment 8-9 Pipe Size							**10**
Segment 9-10							
W14	2015	98,000	475	206	198		4
W18	2020	98,400	475	207	199		4
W22	2020	100,000	475	211	202		4
W21	2020	112,500	475	237	227		6
W20	2020	104,000	400	260	250		6
W19	2020	115,000	475	242	232		6
					1,308	**1,112**	
Segment 9-10 Pipe Size							**10**
Segment 9-South							
W18	2020	98,400	475	207	199		4
W22	2020	100,000	475	211	202		4
W21	2020	112,500	475	237	227		6
W20	2020	104,000	400	260	250		6
W19	2020	115,000	475	242	232		6
					1,110	**944**	
Segment 9-South Pipe Size							**8**
Segment 10-11							
W14	2015	98,000	475	206	198		4
W18	2020	98,400	475	207	199		4
W22	2020	100,000	475	211	202		4
W21	2020	112,500	475	237	227		6
W20	2020	104,000	400	260	250		6
W19	2020	115,000	475	242	232		6
W11	2025	275,000	475	579	556		6
W27	2025	185,000	400	463	444		6
W26	2025	100,000	475	211	202		4
W24	2025	110,000	400	275	264		6
W25	2025	80,000	475	168	162		4
W23	2025	164,000	475	345	331		6
					3,267	**2,451**	
Segment 10-11 Pipe Size							**14**
Segment 10-East							
W11	2025	275,000	475	579	556		6
W27	2025	185,000	400	463	444		6
W26	2025	100,000	475	211	202		4
W24	2025	110,000	400	275	264		6
W25	2025	80,000	475	168	162		4
W23	2025	164,000	475	345	331		6
					1,959	**1,567**	
Segment 10-East Pipe Size							**14**
Segment 10-East-East							
W11	2025	275,000	475	579	556		6
W27	2025	185,000	400	463	444		6
					1,000	**950**	
Segment 10-East-East Pipe Size							**8**
Segment 10-East-South							
W26	2025	100,000	475	211	202		4
W24	2025	110,000	400	275	264		6
W25	2025	80,000	475	168	162		4
W23	2025	164,000	475	345	331		6
					959	**815**	
Segment 10-East-South Pipe Size							**8**
Segment 11-12							
W14	2015	98,000	475	206	198		4
W18	2020	98,400	475	207	199		4
W22	2020	100,000	475	211	202		4
W21	2020	112,500	475	237	227		6
W20	2020	104,000	400	260	250		6
W19	2020	115,000	475	242	232		6
W11	2025	275,000	475	579	556		6
W27	2025	185,000	400	463	444		6
W26	2025	100,000	475	211	202		4
W24	2025	110,000	400	275	264		6
W25	2025	80,000	475	168	162		4
W23	2025	164,000	475	345	331		6
W13	2020	155,000	475	326	313		6
W12	2025	92,000	475	194	186		4
W10	2025	115,000	400	288	276		6
W9	2025	97,600	475	205	197		4
					4,240	**2,968**	
Segment 11-12 Pipe Size							**16**

* Diversity factor is between 70% and 100% depending on the number of buildings on each pipe segment
** CHW flow is figured as peak cooling load (tons) x 12,000/500/25°F CHW ΔT
*** Pipe size based on less than 3.0 feet of friction loss per 100 equivalent feet of pipe, but velocity not to exceed 9 fps

Table 9A-2. Medical School Chilled Water Distribution Flow Analysis (25°F ΔT) with Sustainable Design

Building Name	Year	Total GSF	Peak Cooling Load, SF/TON	Peak Cooling Load, TONS	Peak CHW Flow, GPM (**)	Diversified Peak CHW Flow, GPM (**)	CHW Pipe Size, INCHES (***)
Segment 18-19 (Loop Completion)							
Segment 18-19 Pipe Size							**6**
Segment 17-18							
M5	2020	120,000	400	300	288		6
M7	2020	124,000	400	310	298		6
					586	**556**	
Segment 17-18 Pipe Size							**8**
Segment 16-17							
M5	2020	120,000	400	300	288		6
M7	2020	124,000	400	310	298		6
M6	2015	100,000	400	250	240		6
					826	**743**	
Segment 16-17 Pipe Size							**8**
Segment 15-16							
M5	2020	120,000	400	300	288		6
M7	2020	124,000	400	310	298		6
M6	2015	100,000	400	250	240		6
M4	2015	224,000	475	472	453		6
					1,278	**1,087**	
Segment 15-16 Pipe Size							**8**
Segment 14-15							
M5	2020	120,000	400	300	288		6
M7	2020	124,000	400	310	298		6
M6	2015	100,000	400	250	240		6
M4	2015	224,000	475	472	453		6
M2	2020	128,000	400	320	307		6
M3	2015	100,000	400	250	240		6
					1,826	**1,369**	
Segment 14-15 Pipe Size							**10**
Segment 13-14							
M5	2020	120,000	400	300	288		6
M7	2020	124,000	400	310	298		6
M6	2015	100,000	400	250	240		6
M4	2015	224,000	475	472	453		6
M2	2020	128,000	400	320	307		6
M3	2015	100,000	400	250	240		6
H1	2020	125,000	550	227	218		6
H2	2015	125,000	550	227	218		6
					2,262	**1,696**	
Segment 13-14 Pipe Size							**10**
Segment 18-19 (Loop Completion)							
Segment 18-19 Pipe Size							**6**
Segment 19-20							
MOB4	2025	150,000	400	375	360		6
MOB7	2020	78,000	400	195	187		4
					547	**520**	
Segment 19-20 Pipe Size							**8**
Segment 20-21							
MOB4	2025	150,000	400	375	360		6
MOB7	2020	78,000	400	195	187		4
MOB6	2020	82,000	400	205	197		4
MOB5	2020	70,000	400	175	168		4
MOB3	2025	120,000	400	300	288		6
					1,200	**1,020**	
Segment 20-21 Pipe Size							**8**
Segment 21-22							
MOB4	2025	150,000	400	375	360		6
MOB7	2020	78,000	400	195	187		4
MOB6	2020	82,000	400	205	197		4
MOB5	2020	70,000	400	175	168		4
MOB3	2025	120,000	400	300	288		6
MOB2	2025	124,000	400	310	298		6
M1	2025	120,000	400	300	288		6
MOB1	2025	72,000	400	180	173		4
					1,958	**1,469**	
Segment 21-22 Pipe Size							**10**

* Diversity factor is between 75% and 100% depending on the number of buildings on each pipe segment

** CHW flow is figured as peak cooling load (tons) x 12,000/500/25°F CHW ΔT

*** Pipe size based on less than 3.0 feet of friction loss per 100 equivalent feet of pipe, but velocity not to exceed 9 fps

APPENDIX A-5

HHW PIPING DISTRIBUTION TABLES

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WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

Table 9-3. Main Campus Heating Hot Water Distribution Flow Analysis (40°F ΔT)

Building Name	Year	Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)	Peak Diversified HHW Flow, GPM (*)	HHW Pipe Size, INCHES (***)
Segment 7-8 (Loop Completion)							
Segment 7-8 Pipe Size							**8**
Segment 6-7							
A32-A37	2025	102,000	24	2,448,000	122		4
W16	2020	155,000	18	2,790,000	140		4
A38-A46	2025	192,000	24	4,608,000	230		6
W17	2020	165,000	22	3,630,000	182		4
A24-A31	2015	150,000	24	3,600,000	180		4
W15	2015	170,000	22	3,740,000	187		4
					1,041	**989**	
Segment 6-7 Pipe Size							**8**
Segment 7-South							
A32-A37	2025	102,000	24	2,448,000	122		4
W16	2020	155,000	18	2,790,000	140		4
A38-A46	2025	192,000	24	4,608,000	230		6
W17	2020	165,000	22	3,630,000	182		4
					674	**640**	
Segment 7-South Pipe Size							**8**
Segment 5-6							
A32-A37	2025	102,000	24	2,448,000	122		4
W16	2020	155,000	18	2,790,000	140		4
A38-A46	2025	192,000	24	4,608,000	230		6
W17	2020	165,000	22	3,630,000	182		4
A24-A31	2015	150,000	24	3,600,000	180		4
W15	2015	170,000	22	3,740,000	187		4
A16-A23	2015	150,000	24	3,600,000	180		4
W7	2015	195,000	22	4,290,000	215		6
					1,435	**1,292**	
Segment 5-6 Pipe Size							**10**
Segment 4-5							
A32-A37	2025	102,000	24	2,448,000	122		4
W16	2020	155,000	18	2,790,000	140		4
A38-A46	2025	192,000	24	4,608,000	230		6
W17	2020	165,000	22	3,630,000	182		4
A24-A31	2015	150,000	24	3,600,000	180		4
W15	2015	170,000	22	3,740,000	187		4
A16-A23	2015	150,000	24	3,600,000	180		4
W7	2015	195,000	22	4,290,000	215		6
A1-A9	2010	192,000	24	4,608,000	230		6
A10-A15	2010	102,000	24	2,448,000	122		4
					1,788	**1,609**	
Segment 4-5 Pipe Size							**10**
Segment 3-4							
A32-A37	2025	102,000	24	2,448,000	122		4
W16	2020	155,000	18	2,790,000	140		4
A38-A46	2025	192,000	24	4,608,000	230		6
W17	2020	165,000	22	3,630,000	182		4
A24-A31	2015	150,000	24	3,600,000	180		4
W15	2015	170,000	22	3,740,000	187		4
A16-A23	2015	150,000	24	3,600,000	180		4
W7	2015	195,000	22	4,290,000	215		6
A1-A9	2010	192,000	24	4,608,000	230		6
A10-A15	2010	102,000	24	2,448,000	122		4
W2	2015	120,000	18	2,160,000	108		4
W1	2010	270,000	18	4,860,000	243		6
					2,139	**1,818**	
Segment 3-4 Pipe Size							**12**
Segment 2-3							
A32-A37	2025	102,000	24	2,448,000	122		4
W16	2020	155,000	18	2,790,000	140		4
A38-A46	2025	192,000	24	4,608,000	230		6
W17	2020	165,000	22	3,630,000	182		4
A24-A31	2015	150,000	24	3,600,000	180		4
W15	2015	170,000	22	3,740,000	187		4
A16-A23	2015	150,000	24	3,600,000	180		4
W7	2015	195,000	22	4,290,000	215		6
A1-A9	2010	192,000	24	4,608,000	230		6
A10-A15	2010	102,000	24	2,448,000	122		4
W2	2015	120,000	18	2,160,000	108		4
W1	2010	270,000	18	4,860,000	243		6
W4	2010	144,000	22	3,168,000	158		4
W3	2010	120,000	18	2,160,000	108		4
					2,406	**2,045**	
Segment 2-3 Pipe Size							**12**
Segment 1-2							
A32-A37	2025	102,000	24	2,448,000	122		4
W16	2020	155,000	18	2,790,000	140		4
A38-A46	2025	192,000	24	4,608,000	230		6
W17	2020	165,000	22	3,630,000	182		4
A24-A31	2015	150,000	24	3,600,000	180		4
W15	2015	170,000	22	3,740,000	187		4
A16-A23	2015	150,000	24	3,600,000	180		4
W7	2015	195,000	22	4,290,000	215		6
A1-A9	2010	192,000	24	4,608,000	230		6
A10-A15	2010	102,000	24	2,448,000	122		4
W2	2015	120,000	18	2,160,000	108		4
W1	2010	270,000	18	4,860,000	243		6
W4	2010	144,000	22	3,168,000	158		4
W3	2010	120,000	18	2,160,000	108		4
W6	2015	182,500	18	3,285,000	164		4
W8	2015	220,000	18	3,960,000	198		4
W5	2010	175,000	18	3,150,000	158		4
					2,925	**2,486**	
Segment 1-2 Pipe Size							**12**
Segment 7-8 (Loop Completion)							

Table 9-3. Main Campus Heating Hot Water Distribution Flow Analysis (40°F ΔT)

Building Name	Year	Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)	Peak Diversified HHW Flow, GPM (*)	HHW Pipe Size, INCHES (***)
Segment 7-8 Pipe Size							**8**
Segment 8-9							
W14	2015	98,000	18	1,764,000	88		4
W18	2020	98,400	18	1,771,200	89		4
					177	**168**	
Segment 8-9 Pipe Size							**8**
Segment 9-10							
W14	2015	98,000	18	1,764,000	88		4
W18	2020	98,400	18	1,771,200	89		4
W22	2020	100,000	18	1,800,000	90		4
W21	2020	112,500	18	2,025,000	101		4
W20	2020	104,000	22	2,288,000	114		4
W19	2020	115,000	18	2,070,000	104		4
					586	**527**	
Segment 9-10 Pipe Size							**8**
Segment 9-South							
W18	2020	98,400	18	1,771,200	89		4
W22	2020	100,000	18	1,800,000	90		4
W21	2020	112,500	18	2,025,000	101		4
W20	2020	104,000	22	2,288,000	114		4
W19	2020	115,000	18	2,070,000	104		4
					498	**448**	
Segment 9-South							**8**
Segment 10-11							
W14	2015	98,000	18	1,764,000	88		4
W18	2020	98,400	18	1,771,200	89		4
W22	2020	100,000	18	1,800,000	90		4
W21	2020	112,500	18	2,025,000	101		4
W20	2020	104,000	22	2,288,000	114		4
W19	2020	115,000	18	2,070,000	104		4
W11	2025	275,000	18	4,950,000	248		6
W27	2025	185,000	22	4,070,000	204		4
W26	2025	100,000	18	1,800,000	90		4
W24	2025	110,000	22	2,420,000	121		4
W25	2025	80,000	18	1,440,000	72		4
W23	2025	164,000	18	2,952,000	148		4
					1,468	**1,247**	
Segment 10-11 Pipe Size							**10**
Segment 10-East							
W11	2025	275,000	18	4,950,000	248		6
W27	2025	185,000	22	4,070,000	204		4
W26	2025	100,000	18	1,800,000	90		4
W24	2025	110,000	22	2,420,000	121		4
W25	2025	80,000	18	1,440,000	72		4
W23	2025	164,000	18	2,952,000	148		4
					882	**793**	
Segment 10-East Pipe Size							**8**
Segment 10-East-East							
W11	2025	275,000	18	4,950,000	248		6
W27	2025	185,000	22	4,070,000	204		4
					451	**428**	
Segment 10-East-East Pipe Size							**8**
Segment 10-East-South							
W26	2025	100,000	18	1,800,000	90		4
W24	2025	110,000	22	2,420,000	121		4
W25	2025	80,000	18	1,440,000	72		4
W23	2025	164,000	18	2,952,000	148		4
					431	**409**	
Segment 10-East-South Pipe Size							**8**
Segment 11-12							
W14	2015	98,000	18	1,764,000	88		4
W18	2020	98,400	18	1,771,200	89		4
W22	2020	100,000	18	1,800,000	90		4
W21	2020	112,500	18	2,025,000	101		4
W20	2020	104,000	22	2,288,000	114		4
W19	2020	115,000	18	2,070,000	104		4
W11	2025	275,000	18	4,950,000	248		6
W27	2025	185,000	22	4,070,000	204		4
W26	2025	100,000	18	1,800,000	90		4
W24	2025	110,000	22	2,420,000	121		4
W25	2025	80,000	18	1,440,000	72		4
W23	2025	164,000	18	2,952,000	148		4
W13	2020	155,000	22	3,410,000	171		4
W12	2025	92,000	18	1,656,000	83		4
W10	2025	115,000	22	2,530,000	127		4
W9	2025	97,600	18	1,756,800	88		4
					1,935	**1,645**	
Segment 11-12 Pipe Size							**12**

* Diversity factor is between 85% to 100%, depending on the number of buildings on each pipe segment

** HHW flow is figured as peak heating load (Btuh)/500/40°F HHW ΔT

*** Pipe size based on less than 3.0 feet of friction loss per 100 equivalent feet of pipe, but velocity not to exceed 9 fps

Table 9-4. Medical School Heating Hot Water Distribution Flow Analysis (40°F ΔT)

Building Name	Year	Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)	Peak Diversified HHW Flow, GPM (*)	HHW Pipe Size, INCHES (***)
Segment 18-19 (Loop Completion)							
Segment 18-19 Pipe Size							**6**
Segment 17-18							
M5	2020	120,000	22	2,640,000	132		4
M7	2020	124,000	22	2,728,000	136		4
					268	**255**	
Segment 17-18 Pipe Size							**6**
Segment 16-17							
M5	2020	120,000	22	2,640,000	132		4
M7	2020	124,000	22	2,728,000	136		4
M6	2015	100,000	22	2,200,000	110		4
					378	**341**	
Segment 16-17 Pipe Size							**6**
Segment 15-16							
M5	2020	120,000	22	2,640,000	132		4
M7	2020	124,000	22	2,728,000	136		4
M6	2015	100,000	22	2,200,000	110		4
M4	2015	224,000	18	4,032,000	202		4
					580	**522**	
Segment 15-16 Pipe Size							**6**
Segment 14-15							
M5	2020	120,000	22	2,640,000	132		4
M7	2020	124,000	22	2,728,000	136		4
M6	2015	100,000	22	2,200,000	110		4
M4	2015	224,000	18	4,032,000	202		4
M2	2020	128,000	22	2,816,000	141		4
M3	2015	100,000	22	2,200,000	110		4
					831	**748**	
Segment 14-15 Pipe Size							**8**
Segment 13-14							
M5	2020	120,000	22	2,640,000	132		4
M7	2020	124,000	22	2,728,000	136		4
M6	2015	100,000	22	2,200,000	110		4
M4	2015	224,000	18	4,032,000	202		4
M2	2020	128,000	22	2,816,000	141		4
M3	2015	100,000	22	2,200,000	110		4
H1	2020	125,000	24	3,000,000	150		4
H2	2015	125,000	24	3,000,000	150		4
					1,131	**961**	
Segment 13-14 Pipe Size							**8**
Segment 18-19 (Loop Completion)							
Segment 18-19 Pipe Size							**6**
Segment 19-20							
MOB4	2025	150,000	22	3,300,000	165		4
MOB7	2020	78,000	22	1,716,000	86		4
					251	**238**	
Segment 19-20 Pipe Size							**6**
Segment 20-21							
MOB4	2025	150,000	22	3,300,000	165		4
MOB7	2020	78,000	22	1,716,000	86		4
MOB6	2020	82,000	22	1,804,000	90		4
MOB5	2020	70,000	22	1,540,000	77		4
MOB3	2025	120,000	22	2,640,000	132		4
					550	**468**	
Segment 20-21 Pipe Size							**6**
Segment 21-22							
MOB4	2025	150,000	22	3,300,000	165		4
MOB7	2020	78,000	22	1,716,000	86		4
MOB6	2020	82,000	22	1,804,000	90		4
MOB5	2020	70,000	22	1,540,000	77		4
MOB3	2025	120,000	22	2,640,000	132		4
MOB2	2025	124,000	22	2,728,000	136		4
M1	2025	120,000	22	2,640,000	132		4
MOB1	2025	72,000	22	1,584,000	79		4
					898	**673**	
Segment 21-22 Pipe Size							**8**

* Diversity factor is between 85% to 100%, depending on the number of buildings on each pipe segment

** HHW flow is figured as peak heating load (Btuh)/500/40°F HHW ΔT

*** Pipe size based on less than 3.0 feet of friction loss per 100 equivalent feet of pipe, but velocity not to exceed 9 fps

Table 9A-3. Main Campus Heating Hot Water Distribution Flow Analysis (40°F ΔT) with Sustainable Design

Building Name	Year	Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)	Peak Diversified HHW Flow, GPM (*)	HHW Pipe Size, INCHES (***)
Segment 7-8 (Loop Completion)							
Segment 7-8 Pipe Size							**6**
Segment 6-7							
A32-A37	2025	102,000	19	1,938,000	97		4
W16	2020	155,000	14	2,170,000	109		4
A38-A46	2025	192,000	19	3,648,000	182		4
W17	2020	165,000	16	2,640,000	132		4
A24-A31	2015	150,000	19	2,850,000	143		4
W15	2015	170,000	16	2,720,000	136		4
					798	**758**	
Segment 6-7 Pipe Size							**8**
Segment 7-South							
A32-A37	2025	102,000	19	1,938,000	97		4
W16	2020	155,000	14	2,170,000	109		4
A38-A46	2025	192,000	19	3,648,000	182		4
W17	2020	165,000	16	2,640,000	132		4
					520	**494**	
Segment 7-South Pipe Size							**8**
Segment 5-6							
A32-A37	2025	102,000	19	1,938,000	97		4
W16	2020	155,000	14	2,170,000	109		4
A38-A46	2025	192,000	19	3,648,000	182		4
W17	2020	165,000	16	2,640,000	132		4
A24-A31	2015	150,000	19	2,850,000	143		4
W15	2015	170,000	16	2,720,000	136		4
A16-A23	2015	150,000	19	2,850,000	143		4
W7	2015	195,000	16	3,120,000	156		4
					1,097	**987**	
Segment 5-6 Pipe Size							**10**
Segment 4-5							
A32-A37	2025	102,000	19	1,938,000	97		4
W16	2020	155,000	14	2,170,000	109		4
A38-A46	2025	192,000	19	3,648,000	182		4
W17	2020	165,000	16	2,640,000	132		4
A24-A31	2015	150,000	19	2,850,000	143		4
W15	2015	170,000	16	2,720,000	136		4
A16-A23	2015	150,000	19	2,850,000	143		4
W7	2015	195,000	16	3,120,000	156		4
A1-A9	2010	192,000	19	3,648,000	182		4
A10-A15	2010	102,000	19	1,938,000	97		4
					1,376	**1,238**	
Segment 4-5 Pipe Size							**10**
Segment 3-4							
A32-A37	2025	102,000	19	1,938,000	97		4
W16	2020	155,000	14	2,170,000	109		4
A38-A46	2025	192,000	19	3,648,000	182		4
W17	2020	165,000	16	2,640,000	132		4
A24-A31	2015	150,000	19	2,850,000	143		4
W15	2015	170,000	16	2,720,000	136		4
A16-A23	2015	150,000	19	2,850,000	143		4
W7	2015	195,000	16	3,120,000	156		4
A1-A9	2010	192,000	19	3,648,000	182		4
A10-A15	2010	102,000	19	1,938,000	97		4
W2	2015	120,000	14	1,680,000	84		4
W1	2010	270,000	14	3,780,000	189		4
					1,649	**1,402**	
Segment 3-4 Pipe Size							**10**
Segment 2-3							
A32-A37	2025	102,000	19	1,938,000	97		4
W16	2020	155,000	14	2,170,000	109		4
A38-A46	2025	192,000	19	3,648,000	182		4
W17	2020	165,000	16	2,640,000	132		4
A24-A31	2015	150,000	19	2,850,000	143		4
W15	2015	170,000	16	2,720,000	136		4
A16-A23	2015	150,000	19	2,850,000	143		4
W7	2015	195,000	16	3,120,000	156		4
A1-A9	2010	192,000	19	3,648,000	182		4
A10-A15	2010	102,000	19	1,938,000	97		4
W2	2015	120,000	14	1,680,000	84		4
W1	2010	270,000	14	3,780,000	189		4
W4	2010	144,000	16	2,304,000	115		4
W3	2010	120,000	14	1,680,000	84		4
					1,848	**1,571**	
Segment 2-3 Pipe Size							**10**
Segment 1-2							
A32-A37	2025	102,000	19	1,938,000	97		4
W16	2020	155,000	14	2,170,000	109		4
A38-A46	2025	192,000	19	3,648,000	182		4
W17	2020	165,000	16	2,640,000	132		4
A24-A31	2015	150,000	19	2,850,000	143		4
W15	2015	170,000	16	2,720,000	136		4
A16-A23	2015	150,000	19	2,850,000	143		4
W7	2015	195,000	16	3,120,000	156		4
A1-A9	2010	192,000	19	3,648,000	182		4
A10-A15	2010	102,000	19	1,938,000	97		4
W2	2015	120,000	14	1,680,000	84		4
W1	2010	270,000	14	3,780,000	189		4
W4	2010	144,000	16	2,304,000	115		4
W3	2010	120,000	14	1,680,000	84		4
W6	2015	182,500	14	2,555,000	128		4
W8	2015	220,000	14	3,080,000	154		4
W5	2010	175,000	14	2,450,000	123		4
					2,253	**1,915**	
Segment 1-2 Pipe Size							**12**
Segment 7-8 (Loop Completion)							

Table 9A-3. Main Campus Heating Hot Water Distribution Flow Analysis (40°F ΔT) with Sustainable Design

Building Name	Year	Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)	Peak Diversified HHW Flow, GPM (*)	HHW Pipe Size, INCHES (***)
Segment 7-8 Pipe Size							**6**
Segment 8-9							
W14	2015	98,000	14	1,372,000	69		3
W18	2020	98,400	14	1,377,600	69		3
					137	**131**	
Segment 8-9 Pipe Size							**6**
Segment 9-10							
W14	2015	98,000	14	1,372,000	69		3
W18	2020	98,400	14	1,377,600	69		3
W22	2020	100,000	14	1,400,000	70		3
W21	2020	112,500	14	1,575,000	79		3
W20	2020	104,000	16	1,664,000	83		4
W19	2020	115,000	14	1,610,000	81		4
					450	**405**	
Segment 9-10 Pipe Size							**6**
Segment 9-South							
W18	2020	98,400	14	1,377,600	69		3
W22	2020	100,000	14	1,400,000	70		3
W21	2020	112,500	14	1,575,000	79		3
W20	2020	104,000	16	1,664,000	83		4
W19	2020	115,000	14	1,610,000	81		4
					381	**343**	
Segment 9-South Pipe Size							**6**
Segment 10-11							
W14	2015	98,000	14	1,372,000	69		3
W18	2020	98,400	14	1,377,600	69		3
W22	2020	100,000	14	1,400,000	70		3
W21	2020	112,500	14	1,575,000	79		3
W20	2020	104,000	16	1,664,000	83		4
W19	2020	115,000	14	1,610,000	81		4
W11	2025	275,000	14	3,850,000	193		4
W27	2025	185,000	16	2,960,000	148		4
W26	2025	100,000	14	1,400,000	70		3
W24	2025	110,000	16	1,760,000	88		4
W25	2025	80,000	14	1,120,000	56		3
W23	2025	164,000	14	2,296,000	115		4
					1,119	**951**	
Segment 10-11 Pipe Size							**8**
Segment 10-East							
W11	2025	275,000	14	3,850,000	193		4
W27	2025	185,000	16	2,960,000	148		4
W26	2025	100,000	14	1,400,000	70		3
W24	2025	110,000	16	1,760,000	88		4
W25	2025	80,000	14	1,120,000	56		3
W23	2025	164,000	14	2,296,000	115		4
					669	**602**	
Segment 10-East Pipe Size							**8**
Segment 10-East-East							
W11	2025	275,000	14	3,850,000	193		4
W27	2025	185,000	16	2,960,000	148		4
					341	**323**	
Segment 10-East-East Pipe Size							**6**
Segment 10-East-South							
W26	2025	100,000	14	1,400,000	70		3
W24	2025	110,000	16	1,760,000	88		4
W25	2025	80,000	14	1,120,000	56		3
W23	2025	164,000	14	2,296,000	115		4
					329	**312**	
Segment 10-East-South Pipe Size							**6**
Segment 11-12							
W14	2015	98,000	14	1,372,000	69		3
W18	2020	98,400	14	1,377,600	69		3
W22	2020	100,000	14	1,400,000	70		3
W21	2020	112,500	14	1,575,000	79		3
W20	2020	104,000	16	1,664,000	83		4
W19	2020	115,000	14	1,610,000	81		4
W11	2025	275,000	14	3,850,000	193		4
W27	2025	185,000	16	2,960,000	148		4
W26	2025	100,000	14	1,400,000	70		3
W24	2025	110,000	16	1,760,000	88		4
W25	2025	80,000	14	1,120,000	56		3
W23	2025	164,000	14	2,296,000	115		4
W13	2020	155,000	16	2,480,000	124		4
W12	2025	92,000	14	1,288,000	64		3
W10	2025	115,000	16	1,840,000	92		4
W9	2025	97,600	14	1,366,400	68		3
					1,468	**1,248**	
Segment 11-12 Pipe Size							**12**

* Diversity factor is between 85% to 100%, depending on the number of buildings on each pipe segment
** HHW flow is figured as peak heating load (Btuh)/500/40°F HHW ΔT
*** Pipe size based on less than 3.0 feet of friction loss per 100 equivalent feet of pipe, but velocity not to exceed 9 fps

Table 9A-4. Medical School Heating Hot Water Distribution Flow Analysis (40°F ΔT) with Sustainable Design

Building Name	Year	Total GSF	Peak Heating Load, BTU/HR/SF	Peak Heating Load, BTU/HR	Peak HHW Flow, GPM (**)	Peak Diversified HHW Flow, GPM (*)	HHW Pipe Size, INCHES (***)
Segment 18-19 (Loop Completion)							
Segment 18-19 Pipe Size							**6**
Segment 17-18							
M5	2020	120,000	16	1,920,000	96		4
M7	2020	124,000	16	1,984,000	99		4
					195	**185**	
Segment 17-18 Pipe Size							**6**
Segment 16-17							
M5	2020	120,000	16	1,920,000	96		4
M7	2020	124,000	16	1,984,000	99		4
M6	2015	100,000	16	1,600,000	80		4
					275	**248**	
Segment 16-17 Pipe Size							**6**
Segment 15-16							
M5	2020	120,000	16	1,920,000	96		4
M7	2020	124,000	16	1,984,000	99		4
M6	2015	100,000	16	1,600,000	80		4
M4	2015	224,000	14	3,136,000	157		4
					432	**389**	
Segment 15-16 Pipe Size							**6**
Segment 14-15							
M5	2020	120,000	16	1,920,000	96		4
M7	2020	124,000	16	1,984,000	99		4
M6	2015	100,000	16	1,600,000	80		4
M4	2015	224,000	14	3,136,000	157		4
M2	2020	128,000	16	2,048,000	102		4
M3	2015	100,000	16	1,600,000	80		4
					614	**553**	
Segment 14-15 Pipe Size							**8**
Segment 13-14							
M5	2020	120,000	16	1,920,000	96		4
M7	2020	124,000	16	1,984,000	99		4
M6	2015	100,000	16	1,600,000	80		4
M4	2015	224,000	14	3,136,000	157		4
M2	2020	128,000	16	2,048,000	102		4
M3	2015	100,000	16	1,600,000	80		4
H1	2020	125,000	19	2,375,000	119		4
H2	2015	125,000	19	2,375,000	119		4
					852	**724**	
Segment 13-14 Pipe Size							**8**
Segment 18-19 (Loop Completion)							
Segment 18-19 Pipe Size							**6**
Segment 19-20							
MOB4	2025	150,000	16	2,400,000	120		4
MOB7	2020	78,000	16	1,248,000	62		3
					182	**173**	
Segment 19-20 Pipe Size							**6**
Segment 20-21							
MOB4	2025	150,000	16	2,400,000	120		4
MOB7	2020	78,000	16	1,248,000	62		3
MOB6	2020	82,000	16	1,312,000	66		3
MOB5	2020	70,000	16	1,120,000	56		3
MOB3	2025	120,000	16	1,920,000	96		4
					400	**340**	
Segment 20-21 Pipe Size							**6**
Segment 21-22							
MOB4	2025	150,000	16	2,400,000	120		4
MOB7	2020	78,000	16	1,248,000	62		3
MOB6	2020	82,000	16	1,312,000	66		3
MOB5	2020	70,000	16	1,120,000	56		3
MOB3	2025	120,000	16	1,920,000	96		4
MOB2	2025	124,000	16	1,984,000	99		4
M1	2025	120,000	16	1,920,000	96		4
MOB1	2025	72,000	16	1,152,000	58		3
					653	**490**	
Segment 21-22 Pipe Size							**6**

* Diversity factor is between 85% to 100%, depending on the number of buildings on each pipe segment

** HHW flow is figured as peak heating load (Btuh)/500/40°F HHW Δ T

*** Pipe size based on less than 3.0 feet of friction loss per 100 equivalent feet of pipe, but velocity not to exceed 9 fps

APPENDIX A-6

ELECTRICAL POWER LOADS TABLES

UC RIVERSIDE
WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

Table 12-1 West Campus Building Electrical Load Analysis

	Apartment	Townhome	Classroom Bldg w/ Offices	Classroom Bldg w/ Offices & Labs	Student Center	Hospital	Research Labs & Offices	Community Center	Child Development Center	Recreation Center	Doctor Offices w/ Labs	Vivarium
Lighting-watt/sf	3	3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.5	2
HVAC-watt/sf	7	7	7.5	8	8	10	9	7.5	7.5	8	8	9
Receptacle-watt/sf	2	2	2	2	2	2	2	2	2	2	2	2
Appliance-watt/sf	3	3	0	0	0	2	0	1	1	0	1	2
Computer-watt/sf	0	0	2	2	1	2	2	0	0	0	2	0
Lab Equip-watt/sf	0	0	0	2	0	6	2	0	0	0	2	2
Total - watt/sf	15	15	12.7	15.2	12.2	23.2	16.2	11.7	11.7	11.2	16.5	17
Demand Factor	0.23	0.23	0.35	0.35	0.35	0.45	0.35	0.35	0.35	0.35	0.35	0.6
Demand Load-watt/sf	3.45	3.45	4.445	5.32	4.27	10.44	5.67	4.095	4.095	3.92	5.775	10.2

Table 12-2 West Campus Electrical Load Analysis

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Electrical Load Density, WATT/SF	Electrical Connected Load, kVA	Cumulative Electrical Connected Load kVA	Demand Factor	Demand Load kVA on Campus Grid	Demand Load kVA on Utility Grid	Cumulative Electrical Demand Load kVA on Campus Grid	Cumulative Electrical Demand Load kVA on Utility Grid
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty office	144,000	144,000	15.2	2,189	2,189	0.35	766		766	-
1-3	1A	F 1	Apartments	Family Apartments	18,720	162,720	15.0	281	2,470	0.23		65	766	65
1-3	1A	F 2	Apartments	Family Apartments	18,720	181,440	15.0	281	2,750	0.23		65	766	129
1-3	1A	F 3	Apartments	Family Apartments	13,320	194,760	15.0	200	2,950	0.23		46	766	175
1-3	1A	F 4	Apartments	Family Apartments	13,320	208,080	15.0	200	3,150	0.23		46	766	221
1-3	1A	F 5	Apartments	Family Apartments	13,320	221,400	15.0	200	3,350	0.23		46	766	267
1-3	1A	F 6	Apartments	Family Apartments	18,720	240,120	15.0	281	3,631	0.23		65	766	332
1-3	1A	F 7	Apartments	Family Apartments	9,840	249,960	15.0	148	3,778	0.23		34	766	366
1-3	1A	F 8	Apartments	Family Apartments	9,840	259,800	15.0	148	3,926	0.23		34	766	400
1-3	1A	F 9	Apartments	Family Apartments	18,720	278,520	15.0	281	4,207	0.23		65	766	464
1-3	1A	F 10	Apartments	Family Apartments	15,240	293,760	15.0	229	4,435	0.23		53	766	517
1-3	1A	F 11	Apartments	Family Apartments	9,840	303,600	15.0	148	4,583	0.23		34	766	551
1-3	1A	F 12	Apartments	Family Apartments	9,840	313,440	15.0	148	4,730	0.23		34	766	585
1-3	1A	F 13	Apartments	Family Apartments	19,680	333,120	15.0	295	5,026	0.23		68	766	652
1-3	1A	F 14	Apartments	Family Apartments	13,320	346,440	15.0	200	5,225	0.23		46	766	698
1-3	1A	F 15	Apartments	Family Apartments	17,760	364,200	15.0	266	5,492	0.23		61	766	760
1-3	1A	F 16	Apartments	Family Apartments	8,880	373,080	15.0	133	5,625	0.23		31	766	790
1-3	1A	F 17	Apartments	Family Apartments	17,760	390,840	15.0	266	5,891	0.23		61	766	852
1-3	1A	F 18	Apartments	Family Apartments	15,240	406,080	15.0	229	6,120	0.23		53	766	904
1-3	1A	F 19	Apartments	Family Apartments	8,880	414,960	15.0	133	6,253	0.23		31	766	935
1-3	1A	F 20	Apartments	Family Apartments	15,240	430,200	15.0	229	6,482	0.23		53	766	987
1-3	1A	F 21	Townhouses	Family Townhouses	5,806	436,006	15.0	87	6,569	0.23	-	20	766	1,007
1-3	1A	F 22	Townhouses	Family Townhouses	7,744	443,750	15.0	116	6,685	0.23		27	766	1,034
1-3	1A	F 23	Townhouses	Family Townhouses	5,806	449,556	15.0	87	6,772	0.23		20	766	1,054
1-3	1A	F 24	Townhouses	Family Townhouses	9,680	459,236	15.0	145	6,917	0.23		33	766	1,088
1-3	1A	F 25	Townhouses	Family Townhouses	9,680	468,916	15.0	145	7,063	0.23		33	766	1,121
1-3	1A	F 26	Townhouses	Family Townhouses	9,680	478,596	15.0	145	7,208	0.23		33	766	1,154
1-3	1A	F 27	Townhouses	Family Townhouses	9,680	488,276	15.0	145	7,353	0.23		33	766	1,188
1-3	1A	F 28	Townhouses	Family Townhouses	11,614	499,890	15.0	174	7,527	0.23		40	766	1,228
1-3	1A	F 29	Townhouses	Family Townhouses	7,744	507,634	15.0	116	7,643	0.23		27	766	1,255
1-3	1A	F 30	Townhouses	Family Townhouses	7,744	515,378	15.0	116	7,759	0.23		27	766	1,281
1-3	1A	F 31	Townhouses	Family Townhouses	9,680	525,058	15.0	145	7,905	0.23		33	766	1,315
1-3	1A	F 32	Townhouses	Family Townhouses	11,600	536,658	15.0	174	8,079	0.23		40	766	1,355
1-3	1A	CDC N	Child Dev. Center N	Child development center	14,800	551,458	11.7	173	8,252	0.35	61		827	1,355
1-3	1A	CC N	Community Center N	Community center	5,200	556,658	11.7	61	8,313	0.35	21		848	1,355
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	780,658	12.7	2,845	11,157	0.35	996		1,844	1,355
4-5	1	W 1	Conference Center	Conference	270,000	1,050,658	11.7	3,159	14,316	0.35	1,106		2,949	1,355
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	1,170,658	12.7	1,524	15,840	0.35	533		3,483	1,355
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	1,345,658	12.7	2,223	18,063	0.35	778		4,261	1,355
6-10	2	W 2	Conference Center	Conference	120,000	1,465,658	11.7	1,404	19,467	0.35	491		4,752	1,355
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,648,158	12.7	2,318	21,785	0.35	811		5,563	1,355
6-10	2	W 7	Academic	Classrooms, wet labs, faculty office	195,000	1,843,158	15.2	2,964	24,749	0.35	1,037		6,601	1,355
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	2,063,158	12.7	2,794	27,543	0.35	978		7,578	1,355
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	2,161,158	12.7	1,245	28,787	0.35	436		8,014	1,355
6-10	2	W 15	Student Center	Student Center	170,000	2,331,158	12.2	2,074	30,861	0.35	726		8,740	1,355
6-10	2	M3	Research	Wet labs, faculty offices	100,000	2,431,158	15.2	1,520	32,381	0.35	532		9,272	1,355
6-10	2	M6	Ambulatory Care	Hospital	100,000	2,531,158	23.2	2,320	34,701	0.45	1,044		10,316	1,355
6-10	2	MV	Vivarium	Vivarium	23,000	2,554,158	17.0	391	35,092	0.60	235		10,551	1,355
6-10	2	H2	Graduate Housing	Apartments	125,000	2,679,158	16.0	2,000	37,092	0.23	460		11,011	1,355
6-10	2	R	Recreation	Recreation center	65,000	2,744,158	11.2	728	37,820	0.35	255		11,265	1,355
6-10	2	A 1	Apartments	Apartments	30,000	2,774,158	15.0	450	38,270	0.23	104		11,369	1,355
6-10	2	A 2	Apartments	Apartments	24,000	2,798,158	15.0	360	38,630	0.23	83		11,452	1,355
6-10	2	A 3	Apartments	Apartments	13,500	2,811,658	15.0	203	38,833	0.23	47		11,498	1,355
6-10	2	A 4	Apartments	Apartments	13,500	2,825,158	15.0	203	39,035	0.23	47		11,545	1,355
6-10	2	A 5	Apartments	Apartments	30,000	2,855,158	15.0	450	39,485	0.23	104		11,648	1,355
6-10	2	A 6	Apartments	Apartments	30,000	2,885,158	15.0	450	39,935	0.23	104		11,752	1,355
6-10	2	A 7	Apartments	Apartments	13,500	2,898,658	15.0	203	40,138	0.23	47		11,798	1,355

Table 12-2 West Campus Electrical Load Analysis

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Electrical Load Density, WATT/SF	Electrical Connected Load, kVA	Cumulative Electrical Connected Load kVA	Demand Factor	Demand Load kVA on Campus Grid	Demand Load kVA on Utility Grid	Cumulative Electrical Demand Load kVA on Campus Grid	Cumulative Electrical Demand Load kVA on Utility Grid
6-10	2	A 8	Apartments	Apartments	13,500	2,912,158	15.0	203	40,340	0.23	47		11,845	1,355
6-10	2	A 9	Apartments	Apartments	24,000	2,936,158	15.0	360	40,700	0.23	83		11,928	1,355
6-10	2	A 10	Apartments	Apartments	24,000	2,960,158	15.0	360	41,060	0.23	83		12,011	1,355
6-10	2	A 11	Apartments	Apartments	13,500	2,973,658	15.0	203	41,263	0.23	47		12,057	1,355
6-10	2	A 12	Apartments	Apartments	13,500	2,987,158	15.0	203	41,465	0.23	47		12,104	1,355
6-10	2	A 13	Apartments	Apartments	13,500	3,000,658	15.0	203	41,668	0.23	47		12,150	1,355
6-10	2	A 14	Apartments	Apartments	13,500	3,014,158	15.0	203	41,870	0.23	47		12,197	1,355
6-10	2	A 15	Apartments	Apartments	24,000	3,038,158	15.0	360	42,230	0.23	83		12,280	1,355
6-10	2	F 33	Apartments	Family Apartments	18,720	3,056,878	15.0	281	42,511	0.23	65		12,344	1,355
6-10	2	F 34	Apartments	Family Apartments	18,720	3,075,598	15.0	281	42,792	0.23	65		12,409	1,355
6-10	2	F 35	Apartments	Family Apartments	14,308	3,089,906	15.0	215	43,007	0.23	49		12,458	1,355
6-10	2	F 36	Apartments	Family Apartments	9,840	3,099,746	15.0	148	43,154	0.23	34		12,492	1,355
6-10	2	F 37	Apartments	Family Apartments	14,308	3,114,054	15.0	215	43,369	0.23	49		12,542	1,355
6-10	2	F 38	Apartments	Family Apartments	14,308	3,128,362	15.0	215	43,583	0.23	49		12,591	1,355
6-10	2	F 39	Apartments	Family Apartments	18,720	3,147,082	15.0	281	43,864	0.23	65		12,655	1,355
6-10	2	F 40	Apartments	Family Apartments	14,308	3,161,390	15.0	215	44,079	0.23	49		12,705	1,355
6-10	2	F 41	Apartments	Family Apartments	17,760	3,179,150	15.0	266	44,345	0.23	61		12,766	1,355
6-10	2	F 42	Apartments	Family Apartments	18,720	3,197,870	15.0	281	44,626	0.23	65		12,831	1,355
6-10	2	F 43	Apartments	Family Apartments	14,308	3,212,178	15.0	215	44,841	0.23	49		12,880	1,355
6-10	2	F 44	Apartments	Family Apartments	14,308	3,226,486	15.0	215	45,055	0.23	49		12,929	1,355
6-10	2	F 45	Apartments	Family Apartments	14,308	3,240,794	15.0	215	45,270	0.23	49		12,979	1,355
6-10	2	F 46	Apartments	Family Apartments	18,720	3,259,514	15.0	281	45,551	0.23	65		13,043	1,355
6-10	2	F 47	Apartments	Family Apartments	18,720	3,278,234	15.0	281	45,831	0.23	65		13,108	1,355
6-10	2	F 48	Apartments	Family Apartments	9,840	3,288,074	15.0	148	45,979	0.23	34		13,142	1,355
6-10	2	F 49	Apartments	Family Apartments	14,308	3,302,382	15.0	215	46,194	0.23	49		13,191	1,355
6-10	2	F 50	Apartments	Family Apartments	14,308	3,316,690	15.0	215	46,408	0.23	49		13,241	1,355
6-10	2	F 51	Apartments	Family Apartments	9,840	3,326,530	15.0	148	46,556	0.23	34		13,275	1,355
6-10	2	F 52	Townhouses	Family Townhouses	7,744	3,334,274	15.0	116	46,672	0.23	27		13,301	1,355
6-10	2	F 53	Townhouses	Family Townhouses	9,680	3,343,954	15.0	145	46,817	0.23	33		13,335	1,355
6-10	2	F 54	Townhouses	Family Townhouses	9,680	3,353,634	15.0	145	46,962	0.23	33		13,368	1,355
6-10	2	F 55	Townhouses	Family Townhouses	9,680	3,363,314	15.0	145	47,108	0.23	33		13,401	1,355
6-10	2	F 56	Townhouses	Family Townhouses	9,680	3,372,994	15.0	145	47,253	0.23	33		13,435	1,355
6-10	2	F 57	Townhouses	Family Townhouses	11,614	3,384,608	15.0	174	47,427	0.23	40		13,475	1,355
6-10	2	F 58	Townhouses	Family Townhouses	11,614	3,396,222	15.0	174	47,601	0.23	40		13,515	1,355
6-10	2	F 59	Townhouses	Family Townhouses	9,680	3,405,902	15.0	145	47,746	0.23	33		13,548	1,355
6-10	2	F 60	Townhouses	Family Townhouses	9,680	3,415,582	15.0	145	47,892	0.23	33		13,582	1,355
6-10	2	CDC S	Child Dev. Center S	Child development center	14,800	3,430,382	11.7	173	48,065	0.35	61		13,642	1,355
6-10	2	CC S	Community Center S	Community center	4,800	3,435,182	11.7	56	48,121	0.35	20		13,662	1,355
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	3,590,182	12.7	1,969	50,090	0.35	689		14,351	1,355
11-15	3	W 17	Academic	Classrooms, wet labs, faculty office	165,000	3,755,182	15.2	2,508	52,598	0.35	878		15,229	1,355
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	3,853,582	12.7	1,250	53,847	0.35	437		15,666	1,355
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	3,968,582	12.7	1,461	55,308	0.35	511		16,177	1,355
11-15	3	W 20	Academic	Classrooms, wet labs, faculty office	104,000	4,072,582	15.2	1,581	56,888	0.35	553		16,731	1,355
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	4,185,082	12.7	1,429	58,317	0.35	500		17,231	1,355
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	4,285,082	12.7	1,270	59,587	0.35	445		17,675	1,355
11-15	3	M2	Research	Wet labs, faculty offices	128,000	4,413,082	15.2	1,946	61,533	0.35	681		18,356	1,355
11-15	3	M5	Ambulatory Care	Hospital	120,000	4,533,082	23.2	2,784	64,317	0.45	1,253		19,609	1,355
11-15	3	M7	Research	Wet labs, faculty offices	124,000	4,657,082	15.2	1,885	66,202	0.35	660		20,269	1,355
11-15	3	H1	Graduate Housing	Apartments	125,000	4,782,082	15.0	1,875	68,077	0.23	431		20,700	1,355
11-15	3	MOB 5	Medical Office Bldg.	Wet labs, doctor offices	70,000	4,852,082	16.5	1,155	69,232	0.35	404		21,104	1,355
11-15	3	MOB 6	Medical Office Bldg.	Wet labs, doctor offices	82,000	4,934,082	16.5	1,353	70,585	0.35	474		21,578	1,355
11-15	3	MOB 7	Medical Office Bldg.	Wet labs, doctor offices	78,000	5,012,082	16.5	1,287	71,872	0.35	450		22,028	1,355
11-15	3	A 16	Apartments	Apartments	24,000	5,036,082	15.0	360	72,232	0.23	83		22,111	1,355
11-15	3	A 17	Apartments	Apartments	13,500	5,049,582	15.0	203	72,434	0.23	47		22,158	1,355
11-15	3	A 18	Apartments	Apartments	13,500	5,063,082	15.0	203	72,637	0.23	47		22,204	1,355
11-15	3	A 19	Apartments	Apartments	24,000	5,087,082	15.0	360	72,997	0.23	83		22,287	1,355
11-15	3	A 20	Apartments	Apartments	24,000	5,111,082	15.0	360	73,357	0.23	83		22,370	1,355

Table 12-2 West Campus Electrical Load Analysis

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Electrical Load Density, WATT/SF	Electrical Connected Load, kVA	Cumulative Electrical Connected Load kVA	Demand Factor	Demand Load kVA on Campus Grid	Demand Load kVA on Utility Grid	Cumulative Electrical Demand Load kVA on Campus Grid	Cumulative Electrical Demand Load kVA on Utility Grid
11-15	3	A 21	Apartments	Apartments	13,500	5,124,582	15.0	203	73,559	0.23	47		22,416	1,355
11-15	3	A 22	Apartments	Apartments	13,500	5,138,082	15.0	203	73,762	0.23	47		22,463	1,355
11-15	3	A 23	Apartments	Apartments	24,000	5,162,082	15.0	360	74,122	0.23	83		22,546	1,355
11-15	3	A 24	Apartments	Apartments	24,000	5,186,082	15.0	360	74,482	0.23	83		22,629	1,355
11-15	3	A 25	Apartments	Apartments	13,500	5,199,582	15.0	203	74,684	0.23	47		22,675	1,355
11-15	3	A 26	Apartments	Apartments	13,500	5,213,082	15.0	203	74,887	0.23	47		22,722	1,355
11-15	3	A 27	Apartments	Apartments	24,000	5,237,082	15.0	360	75,247	0.23	83		22,804	1,355
11-15	3	A 28	Apartments	Apartments	24,000	5,261,082	15.0	360	75,607	0.23	83		22,887	1,355
11-15	3	A 29	Apartments	Apartments	13,500	5,274,582	15.0	203	75,809	0.23	47		22,934	1,355
11-15	3	A 30	Apartments	Apartments	13,500	5,288,082	15.0	203	76,012	0.23	47		22,980	1,355
11-15	3	A 31	Apartments	Apartments	24,000	5,312,082	15.0	360	76,372	0.23	83		23,063	1,355
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	5,409,682	12.7	1,240	77,611	0.35	434		23,497	1,355
16-20	4	W 10	Academic	Classrooms, wet labs, faculty office	115,000	5,524,682	15.2	1,748	79,359	0.35	612		24,109	1,355
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	5,799,682	12.7	3,493	82,852	0.35	1,222		25,331	1,355
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	5,891,682	12.7	1,168	84,020	0.35	409		25,740	1,355
16-20	4	W 13	Academic	Classrooms, wet labs, faculty office	98,000	5,989,682	15.2	1,490	85,510	0.35	521		26,262	1,355
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	6,153,682	12.7	2,083	87,592	0.35	729		26,990	1,355
16-20	4	W 24	Academic	Classrooms, wet labs, faculty office	110,000	6,263,682	15.2	1,672	89,264	0.35	585		27,576	1,355
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	6,343,682	12.7	1,016	90,280	0.35	356		27,931	1,355
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	6,443,682	12.7	1,270	91,550	0.35	445		28,376	1,355
16-20	4	W 27	Academic	Classrooms, wet labs, faculty office	185,000	6,628,682	15.2	2,812	94,362	0.35	984		29,360	1,355
16-20	4	M1	Research	Wet labs, faculty offices	120,000	6,748,682	15.2	1,824	96,186	0.35	638		29,998	1,355
16-20	4	MOB 1	Medical Office Bldg.	Wet labs, doctor offices	72,000	6,820,682	16.5	1,188	97,374	0.35	416		30,414	1,355
16-20	4	MOB 2	Medical Office Bldg.	Wet labs, doctor offices	124,000	6,944,682	16.5	2,046	99,420	0.35	716		31,130	1,355
16-20	4	MOB 3	Medical Office Bldg.	Wet labs, doctor offices	120,000	7,064,682	16.5	1,980	101,400	0.35	693		31,823	1,355
16-20	4	MOB 4	Medical Office Bldg.	Wet labs, doctor offices	150,000	7,214,682	16.5	2,475	103,875	0.35	866		32,690	1,355
16-20	4	A 32	Apartments	Apartments	24,000	7,238,682	15.0	360	104,235	0.23	83		32,772	1,355
16-20	4	A 33	Apartments	Apartments	13,500	7,252,182	15.0	203	104,438	0.23	47		32,819	1,355
16-20	4	A 34	Apartments	Apartments	13,500	7,265,682	15.0	203	104,640	0.23	47		32,865	1,355
16-20	4	A 35	Apartments	Apartments	13,500	7,279,182	15.0	203	104,843	0.23	47		32,912	1,355
16-20	4	A 36	Apartments	Apartments	13,500	7,292,682	15.0	203	105,045	0.23	47		32,959	1,355
16-20	4	A 37	Apartments	Apartments	24,000	7,316,682	15.0	360	105,405	0.23	83		33,041	1,355
16-20	4	A 38	Apartments	Apartments	24,000	7,340,682	15.0	360	105,765	0.23	83		33,124	1,355
16-20	4	A 39	Apartments	Apartments	13,500	7,354,182	15.0	203	105,968	0.23	47		33,171	1,355
16-20	4	A 40	Apartments	Apartments	13,500	7,367,682	15.0	203	106,170	0.23	47		33,217	1,355
16-20	4	A 41	Apartments	Apartments	30,000	7,397,682	15.0	450	106,620	0.23	104		33,321	1,355
16-20	4	A 42	Apartments	Apartments	30,000	7,427,682	15.0	450	107,070	0.23	104		33,424	1,355
16-20	4	A 43	Apartments	Apartments	30,000	7,457,682	15.0	450	107,520	0.23	104		33,528	1,355
16-20	4	A 44	Apartments	Apartments	13,500	7,471,182	15.0	203	107,723	0.23	47		33,574	1,355
16-20	4	A 45	Apartments	Apartments	13,500	7,484,682	15.0	203	107,925	0.23	47		33,621	1,355
16-20	4	A 46	Apartments	Apartments	24,000	7,508,682	15.0	360	108,285	0.23	83		33,704	1,355
												-		
					7,508,682			**108,285**			**33,704**	**1,355**	**33,704**	**1,355**

Table 12-1A West Campus Building Electrical Load Density with Aggressive Sustainable Design Considerations

	Apartment	Townhome	Classroom Bldg w/ Offices	Classroom Bldg w/ Offices & Labs	Student Center	Hospital	Research Labs & Offices	Community Center	Child Development Center	Recreation Center	Doctor Offices w/ Labs	Vivarium
Lighting-watt/sf	3	3	1.1	1.1	1.1	1.2	1.2	1.1	1.1	1.2	1.5	2
HVAC-watt/sf	7	7	5.6	6	6	7.5	6.8	5.6	5.6	6	6	6.8
Receptacle-watt/sf	2	2	2	2	2	2	2	2	2	2	2	2
Appliance-watt/sf	3	3	0	0	0	2	0	1	1	0	1	2
Computer-watt/sf	0	0	2	2	1	2	2	0	0	0	2	0
Lab Equip-watt/sf	0	0	0	2	0	6	2	0	0	0	2	2
Total - watt/sf	15	15	10.7	13.1	10.1	20.7	14	9.7	9.7	9.2	14.5	14.8
Demand Factor w/ solar contribution	0.2	0.2	0.32	0.32	0.32	0.42	0.32	0.32	0.32	0.32	0.32	0.55
Demand Load-watt/sf	3.00	3.00	3.42	4.19	3.23	8.69	4.48	3.10	3.10	2.94	4.64	8.14

Table 12-2A West Campus Electrical Load Analysis with Aggressive Sustainable Design Considerations

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Electrical Load Density, WATT/SF	Electrical Connected Load, kVA	Cumulative Electrical Connected Load kVA	Demand Factor	Demand Load kVA on Campus Grid	Demand Load kVA on Utility Grid	Cumulative Electrical Demand Load kVA on Campus Grid	Cumulative Electrical Demand Load kVA on Utility Grid
1-3	1A	W 4	Academic	Classrooms, wet labs, faculty office	144,000	144,000	13.1	1,886	1,886	0.32	604		604	-
1-3	1A	F 1	Apartments	Family Apartments	18,720	162,720	15.0	281	2,167	0.20		56	604	56
1-3	1A	F 2	Apartments	Family Apartments	18,720	181,440	15.0	281	2,448	0.20		56	604	112
1-3	1A	F 3	Apartments	Family Apartments	13,320	194,760	15.0	200	2,648	0.20		40	604	152
1-3	1A	F 4	Apartments	Family Apartments	13,320	208,080	15.0	200	2,848	0.20		40	604	192
1-3	1A	F 5	Apartments	Family Apartments	13,320	221,400	15.0	200	3,047	0.20		40	604	232
1-3	1A	F 6	Apartments	Family Apartments	18,720	240,120	15.0	281	3,328	0.20		56	604	288
1-3	1A	F 7	Apartments	Family Apartments	9,840	249,960	15.0	148	3,476	0.20		30	604	318
1-3	1A	F 8	Apartments	Family Apartments	9,840	259,800	15.0	148	3,623	0.20		30	604	347
1-3	1A	F 9	Apartments	Family Apartments	18,720	278,520	15.0	281	3,904	0.20		56	604	404
1-3	1A	F 10	Apartments	Family Apartments	15,240	293,760	15.0	229	4,133	0.20		46	604	449
1-3	1A	F 11	Apartments	Family Apartments	9,840	303,600	15.0	148	4,280	0.20		30	604	479
1-3	1A	F 12	Apartments	Family Apartments	9,840	313,440	15.0	148	4,428	0.20		30	604	508
1-3	1A	F 13	Apartments	Family Apartments	19,680	333,120	15.0	295	4,723	0.20		59	604	567
1-3	1A	F 14	Apartments	Family Apartments	13,320	346,440	15.0	200	4,923	0.20		40	604	607
1-3	1A	F 15	Apartments	Family Apartments	17,760	364,200	15.0	266	5,189	0.20		53	604	661
1-3	1A	F 16	Apartments	Family Apartments	8,880	373,080	15.0	133	5,323	0.20		27	604	687
1-3	1A	F 17	Apartments	Family Apartments	17,760	390,840	15.0	266	5,589	0.20		53	604	741
1-3	1A	F 18	Apartments	Family Apartments	15,240	406,080	15.0	229	5,818	0.20		46	604	786
1-3	1A	F 19	Apartments	Family Apartments	8,880	414,960	15.0	133	5,951	0.20		27	604	813
1-3	1A	F 20	Apartments	Family Apartments	15,240	430,200	15.0	229	6,179	0.20		46	604	859
1-3	1A	F 21	Townhouses	Family Townhouses	5,806	436,006	15.0	87	6,266	0.20	-	17	604	876
1-3	1A	F 22	Townhouses	Family Townhouses	7,744	443,750	15.0	116	6,383	0.20		23	604	899
1-3	1A	F 23	Townhouses	Family Townhouses	5,806	449,556	15.0	87	6,470	0.20		17	604	917
1-3	1A	F 24	Townhouses	Family Townhouses	9,680	459,236	15.0	145	6,615	0.20		29	604	946
1-3	1A	F 25	Townhouses	Family Townhouses	9,680	468,916	15.0	145	6,760	0.20		29	604	975
1-3	1A	F 26	Townhouses	Family Townhouses	9,680	478,596	15.0	145	6,905	0.20		29	604	1,004
1-3	1A	F 27	Townhouses	Family Townhouses	9,680	488,276	15.0	145	7,051	0.20		29	604	1,033
1-3	1A	F 28	Townhouses	Family Townhouses	11,614	499,890	15.0	174	7,225	0.20		35	604	1,068
1-3	1A	F 29	Townhouses	Family Townhouses	7,744	507,634	15.0	116	7,341	0.20		23	604	1,091
1-3	1A	F 30	Townhouses	Family Townhouses	7,744	515,378	15.0	116	7,457	0.20		23	604	1,114
1-3	1A	F 31	Townhouses	Family Townhouses	9,680	525,058	15.0	145	7,602	0.20		29	604	1,143
1-3	1A	F 32	Townhouses	Family Townhouses	11,600	536,658	15.0	174	7,776	0.20		35	604	1,178
1-3	1A	CDC N	Child Dev. Center N	Child development center	14,800	551,458	9.7	144	7,920	0.32	46		650	1,178
1-3	1A	CC N	Community Center N	Community center	5,200	556,658	9.7	50	7,970	0.32	16		666	1,178
1-3	1B	M4	Education	Classrooms, faculty offices	224,000	780,658	10.7	2,397	10,367	0.32	767		1,433	1,178
4-5	1	W 1	Conference Center	Conference	270,000	1,050,658	9.7	2,619	12,986	0.32	838		2,271	1,178
4-5	1	W 3	Academic	Classrooms, faculty offices	120,000	1,170,658	10.7	1,284	14,270	0.32	411		2,682	1,178
4-5	1	W 5	Academic	Classrooms, faculty offices	175,000	1,345,658	10.7	1,873	16,143	0.32	599		3,281	1,178
6-10	2	W 2	Conference Center	Conference	120,000	1,465,658	9.7	1,164	17,307	0.32	372		3,653	1,178
6-10	2	W 6	Academic	Classrooms, faculty offices	182,500	1,648,158	10.7	1,953	19,259	0.32	625		4,278	1,178
6-10	2	W 7	Academic	Classrooms, wet labs, faculty office	195,000	1,843,158	13.1	2,555	21,814	0.32	817		5,096	1,178
6-10	2	W 8	Academic	Classrooms, faculty offices	220,000	2,063,158	10.7	2,354	24,168	0.32	753		5,849	1,178
6-10	2	W 14	Academic	Classrooms, faculty offices	98,000	2,161,158	10.7	1,049	25,216	0.32	336		6,184	1,178
6-10	2	W 15	Student Center	Student Center	170,000	2,331,158	10.1	1,717	26,933	0.32	549		6,734	1,178
6-10	2	M3	Research	Wet labs, faculty offices	100,000	2,431,158	13.1	1,310	28,243	0.32	419		7,153	1,178
6-10	2	M6	Ambulatory Care	Hospital	100,000	2,531,158	20.7	2,070	30,313	0.42	869		8,023	1,178
6-10	2	MV	Vivarium	Vivarium	23,000	2,554,158	14.8	340	30,654	0.55	187		8,210	1,178
6-10	2	H2	Graduate Housing	Apartments	125,000	2,679,158	16.0	2,000	32,654	0.23	460		8,670	1,178
6-10	2	R	Recreation	Recreation center	65,000	2,744,158	9.2	598	33,252	0.32	191		8,861	1,178
6-10	2	A 1	Apartments	Apartments	30,000	2,774,158	15.0	450	33,702	0.20	90		8,951	1,178
6-10	2	A 2	Apartments	Apartments	24,000	2,798,158	15.0	360	34,062	0.20	72		9,023	1,178
6-10	2	A 3	Apartments	Apartments	13,500	2,811,658	15.0	203	34,264	0.20	41		9,064	1,178
6-10	2	A 4	Apartments	Apartments	13,500	2,825,158	15.0	203	34,467	0.20	41		9,104	1,178
6-10	2	A 5	Apartments	Apartments	30,000	2,855,158	15.0	450	34,917	0.20	90		9,194	1,178
6-10	2	A 6	Apartments	Apartments	30,000	2,885,158	15.0	450	35,367	0.20	90		9,284	1,178
6-10	2	A 7	Apartments	Apartments	13,500	2,898,658	15.0	203	35,569	0.20	41		9,325	1,178

Table 12-2A West Campus Electrical Load Analysis with Aggressive Sustainable Design Considerations

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Electrical Load Density, WATT/SF	Electrical Connected Load, kVA	Cumulative Electrical Connected Load kVA	Demand Factor	Demand Load kVA on Campus Grid	Demand Load kVA on Utility Grid	Cumulative Electrical Demand Load kVA on Campus Grid	Cumulative Electrical Demand Load kVA on Utility Grid
6-10	2	A 8	Apartments	Apartments	13,500	2,912,158	15.0	203	35,772	0.20	41		9,365	1,178
6-10	2	A 9	Apartments	Apartments	24,000	2,936,158	15.0	360	36,132	0.20	72		9,437	1,178
6-10	2	A 10	Apartments	Apartments	24,000	2,960,158	15.0	360	36,492	0.20	72		9,509	1,178
6-10	2	A 11	Apartments	Apartments	13,500	2,973,658	15.0	203	36,694	0.20	41		9,550	1,178
6-10	2	A 12	Apartments	Apartments	13,500	2,987,158	15.0	203	36,897	0.20	41		9,590	1,178
6-10	2	A 13	Apartments	Apartments	13,500	3,000,658	15.0	203	37,099	0.20	41		9,631	1,178
6-10	2	A 14	Apartments	Apartments	13,500	3,014,158	15.0	203	37,302	0.20	41		9,671	1,178
6-10	2	A 15	Apartments	Apartments	24,000	3,038,158	15.0	360	37,662	0.20	72		9,743	1,178
6-10	2	F 33	Apartments	Family Apartments	18,720	3,056,878	15.0	281	37,943	0.20	56		9,799	1,178
6-10	2	F 34	Apartments	Family Apartments	18,720	3,075,598	15.0	281	38,223	0.20	56		9,855	1,178
6-10	2	F 35	Apartments	Family Apartments	14,308	3,089,906	15.0	215	38,438	0.20	43		9,898	1,178
6-10	2	F 36	Apartments	Family Apartments	9,840	3,099,746	15.0	148	38,586	0.20	30		9,928	1,178
6-10	2	F 37	Apartments	Family Apartments	14,308	3,114,054	15.0	215	38,800	0.20	43		9,971	1,178
6-10	2	F 38	Apartments	Family Apartments	14,308	3,128,362	15.0	215	39,015	0.20	43		10,014	1,178
6-10	2	F 39	Apartments	Family Apartments	18,720	3,147,082	15.0	281	39,296	0.20	56		10,070	1,178
6-10	2	F 40	Apartments	Family Apartments	14,308	3,161,390	15.0	215	39,510	0.20	43		10,113	1,178
6-10	2	F 41	Apartments	Family Apartments	17,760	3,179,150	15.0	266	39,777	0.20	53		10,166	1,178
6-10	2	F 42	Apartments	Family Apartments	18,720	3,197,870	15.0	281	40,058	0.20	56		10,222	1,178
6-10	2	F 43	Apartments	Family Apartments	14,308	3,212,178	15.0	215	40,272	0.20	43		10,265	1,178
6-10	2	F 44	Apartments	Family Apartments	14,308	3,226,486	15.0	215	40,487	0.20	43		10,308	1,178
6-10	2	F 45	Apartments	Family Apartments	14,308	3,240,794	15.0	215	40,701	0.20	43		10,351	1,178
6-10	2	F 46	Apartments	Family Apartments	18,720	3,259,514	15.0	281	40,982	0.20	56		10,407	1,178
6-10	2	F 47	Apartments	Family Apartments	18,720	3,278,234	15.0	281	41,263	0.20	56		10,463	1,178
6-10	2	F 48	Apartments	Family Apartments	9,840	3,288,074	15.0	148	41,411	0.20	30		10,493	1,178
6-10	2	F 49	Apartments	Family Apartments	14,308	3,302,382	15.0	215	41,625	0.20	43		10,536	1,178
6-10	2	F 50	Apartments	Family Apartments	14,308	3,316,690	15.0	215	41,840	0.20	43		10,579	1,178
6-10	2	F 51	Apartments	Family Apartments	9,840	3,326,530	15.0	148	41,987	0.20	30		10,608	1,178
6-10	2	F 52	Townhouses	Family Townhouses	7,744	3,334,274	15.0	116	42,104	0.20	23		10,631	1,178
6-10	2	F 53	Townhouses	Family Townhouses	9,680	3,343,954	15.0	145	42,249	0.20	29		10,661	1,178
6-10	2	F 54	Townhouses	Family Townhouses	9,680	3,353,634	15.0	145	42,394	0.20	29		10,690	1,178
6-10	2	F 55	Townhouses	Family Townhouses	9,680	3,363,314	15.0	145	42,539	0.20	29		10,719	1,178
6-10	2	F 56	Townhouses	Family Townhouses	9,680	3,372,994	15.0	145	42,684	0.20	29		10,748	1,178
6-10	2	F 57	Townhouses	Family Townhouses	11,614	3,384,608	15.0	174	42,859	0.20	35		10,782	1,178
6-10	2	F 58	Townhouses	Family Townhouses	11,614	3,396,222	15.0	174	43,033	0.20	35		10,817	1,178
6-10	2	F 59	Townhouses	Family Townhouses	9,680	3,405,902	15.0	145	43,178	0.20	29		10,846	1,178
6-10	2	F 60	Townhouses	Family Townhouses	9,680	3,415,582	15.0	145	43,323	0.20	29		10,875	1,178
6-10	2	CDC S	Child Dev. Center S	Child development center	14,800	3,430,382	9.7	144	43,467	0.32	46		10,921	1,178
6-10	2	CC S	Community Center S	Community center	4,800	3,435,182	9.7	47	43,513	0.32	15		10,936	1,178
11-15	3	W 16	Academic	Classrooms, faculty offices	155,000	3,590,182	10.7	1,659	45,172	0.32	531		11,467	1,178
11-15	3	W 17	Academic	Classrooms, wet labs, faculty office	165,000	3,755,182	13.1	2,162	47,333	0.32	692		12,159	1,178
11-15	3	W 18	Academic	Classrooms, faculty offices	98,400	3,853,582	10.7	1,053	48,386	0.32	337		12,496	1,178
11-15	3	W 19	Academic	Classrooms, faculty offices	115,000	3,968,582	10.7	1,231	49,617	0.32	394		12,889	1,178
11-15	3	W 20	Academic	Classrooms, wet labs, faculty office	104,000	4,072,582	13.1	1,362	50,979	0.32	436		13,325	1,178
11-15	3	W 21	Academic	Classrooms, faculty offices	112,500	4,185,082	10.7	1,204	52,183	0.32	385		13,710	1,178
11-15	3	W 22	Academic	Classrooms, faculty offices	100,000	4,285,082	10.7	1,070	53,253	0.32	342		14,053	1,178
11-15	3	M2	Research	Wet labs, faculty offices	128,000	4,413,082	13.1	1,677	54,930	0.32	537		14,589	1,178
11-15	3	M5	Ambulatory Care	Hospital	120,000	4,533,082	20.7	2,484	57,414	0.42	1,043		15,633	1,178
11-15	3	M7	Research	Wet labs, faculty offices	124,000	4,657,082	13.1	1,624	59,038	0.32	520		16,153	1,178
11-15	3	H1	Graduate Housing	Apartments	125,000	4,782,082	15.0	1,875	60,913	0.20	375		16,528	1,178
11-15	3	MOB 5	Medical Office Bldg.	Wet labs, doctor offices	70,000	4,852,082	14.5	1,015	61,928	0.32	325		16,852	1,178
11-15	3	MOB 6	Medical Office Bldg.	Wet labs, doctor offices	82,000	4,934,082	14.5	1,189	63,117	0.32	380		17,233	1,178
11-15	3	MOB 7	Medical Office Bldg.	Wet labs, doctor offices	78,000	5,012,082	14.5	1,131	64,248	0.32	362		17,595	1,178
11-15	3	A 16	Apartments	Apartments	24,000	5,036,082	15.0	360	64,608	0.20	72		17,667	1,178
11-15	3	A 17	Apartments	Apartments	13,500	5,049,582	15.0	203	64,811	0.20	41		17,707	1,178
11-15	3	A 18	Apartments	Apartments	13,500	5,063,082	15.0	203	65,013	0.20	41		17,748	1,178
11-15	3	A 19	Apartments	Apartments	24,000	5,087,082	15.0	360	65,373	0.20	72		17,820	1,178
11-15	3	A 20	Apartments	Apartments	24,000	5,111,082	15.0	360	65,733	0.20	72		17,892	1,178

Table 12-2A West Campus Electrical Load Analysis with Aggressive Sustainable Design Considerations

Years	Phase	Building Name	Planning Category	Planned Use	Total GSF	Running Total GSF	Electrical Load Density, WATT/SF	Electrical Connected Load, kVA	Cumulative Electrical Connected Load kVA	Demand Factor	Demand Load kVA on Campus Grid	Demand Load kVA on Utility Grid	Cumulative Electrical Demand Load kVA on Campus Grid	Cumulative Electrical Demand Load kVA on Utility Grid
11-15	3	A 21	Apartments	Apartments	13,500	5,124,582	15.0	203	65,936	0.20	41		17,932	1,178
11-15	3	A 22	Apartments	Apartments	13,500	5,138,082	15.0	203	66,138	0.20	41		17,973	1,178
11-15	3	A 23	Apartments	Apartments	24,000	5,162,082	15.0	360	66,498	0.20	72		18,045	1,178
11-15	3	A 24	Apartments	Apartments	24,000	5,186,082	15.0	360	66,858	0.20	72		18,117	1,178
11-15	3	A 25	Apartments	Apartments	13,500	5,199,582	15.0	203	67,061	0.20	41		18,157	1,178
11-15	3	A 26	Apartments	Apartments	13,500	5,213,082	15.0	203	67,263	0.20	41		18,198	1,178
11-15	3	A 27	Apartments	Apartments	24,000	5,237,082	15.0	360	67,623	0.20	72		18,270	1,178
11-15	3	A 28	Apartments	Apartments	24,000	5,261,082	15.0	360	67,983	0.20	72		18,342	1,178
11-15	3	A 29	Apartments	Apartments	13,500	5,274,582	15.0	203	68,186	0.20	41		18,382	1,178
11-15	3	A 30	Apartments	Apartments	13,500	5,288,082	15.0	203	68,388	0.20	41		18,423	1,178
11-15	3	A 31	Apartments	Apartments	24,000	5,312,082	15.0	360	68,748	0.20	72		18,495	1,178
16-20	4	W 9	Academic	Classrooms, faculty offices	97,600	5,409,682	10.7	1,044	69,792	0.32	334		18,829	1,178
16-20	4	W 10	Academic	Classrooms, wet labs, faculty office	115,000	5,524,682	13.1	1,507	71,299	0.32	482		19,311	1,178
16-20	4	W 11	Academic	Classrooms, faculty offices	275,000	5,799,682	10.7	2,943	74,241	0.32	942		20,253	1,178
16-20	4	W 12	Academic	Classrooms, faculty offices	92,000	5,891,682	10.7	984	75,226	0.32	315		20,568	1,178
16-20	4	W 13	Academic	Classrooms, wet labs, faculty office	98,000	5,989,682	13.1	1,284	76,510	0.32	411		20,978	1,178
16-20	4	W 23	Academic	Classrooms, faculty offices	164,000	6,153,682	10.7	1,755	78,264	0.32	562		21,540	1,178
16-20	4	W 24	Academic	Classrooms, wet labs, faculty office	110,000	6,263,682	13.1	1,441	79,705	0.32	461		22,001	1,178
16-20	4	W 25	Academic	Classrooms, faculty offices	80,000	6,343,682	10.7	856	80,561	0.32	274		22,275	1,178
16-20	4	W 26	Academic	Classrooms, faculty offices	100,000	6,443,682	10.7	1,070	81,631	0.32	342		22,617	1,178
16-20	4	W 27	Academic	Classrooms, wet labs, faculty office	185,000	6,628,682	13.1	2,424	84,055	0.32	776		23,393	1,178
16-20	4	M1	Research	Wet labs, faculty offices	120,000	6,748,682	13.1	1,572	85,627	0.32	503		23,896	1,178
16-20	4	MOB 1	Medical Office Bldg.	Wet labs, doctor offices	72,000	6,820,682	14.5	1,044	86,671	0.32	334		24,230	1,178
16-20	4	MOB 2	Medical Office Bldg.	Wet labs, doctor offices	124,000	6,944,682	14.5	1,798	88,469	0.32	575		24,805	1,178
16-20	4	MOB 3	Medical Office Bldg.	Wet labs, doctor offices	120,000	7,064,682	14.5	1,740	90,209	0.32	557		25,362	1,178
16-20	4	MOB 4	Medical Office Bldg.	Wet labs, doctor offices	150,000	7,214,682	14.5	2,175	92,384	0.32	696		26,058	1,178
16-20	4	A 32	Apartments	Apartments	24,000	7,238,682	15.0	360	92,744	0.20	72		26,130	1,178
16-20	4	A 33	Apartments	Apartments	13,500	7,252,182	15.0	203	92,946	0.20	41		26,171	1,178
16-20	4	A 34	Apartments	Apartments	13,500	7,265,682	15.0	203	93,149	0.20	41		26,211	1,178
16-20	4	A 35	Apartments	Apartments	13,500	7,279,182	15.0	203	93,351	0.20	41		26,252	1,178
16-20	4	A 36	Apartments	Apartments	13,500	7,292,682	15.0	203	93,554	0.20	41		26,292	1,178
16-20	4	A 37	Apartments	Apartments	24,000	7,316,682	15.0	360	93,914	0.20	72		26,364	1,178
16-20	4	A 38	Apartments	Apartments	24,000	7,340,682	15.0	360	94,274	0.20	72		26,436	1,178
16-20	4	A 39	Apartments	Apartments	13,500	7,354,182	15.0	203	94,476	0.20	41		26,477	1,178
16-20	4	A 40	Apartments	Apartments	13,500	7,367,682	15.0	203	94,679	0.20	41		26,517	1,178
16-20	4	A 41	Apartments	Apartments	30,000	7,397,682	15.0	450	95,129	0.20	90		26,607	1,178
16-20	4	A 42	Apartments	Apartments	30,000	7,427,682	15.0	450	95,579	0.20	90		26,697	1,178
16-20	4	A 43	Apartments	Apartments	30,000	7,457,682	15.0	450	96,029	0.20	90		26,787	1,178
16-20	4	A 44	Apartments	Apartments	13,500	7,471,182	15.0	203	96,231	0.20	41		26,828	1,178
16-20	4	A 45	Apartments	Apartments	13,500	7,484,682	15.0	203	96,434	0.20	41		26,868	1,178
16-20	4	A 46	Apartments	Apartments	24,000	7,508,682	15.0	360	96,794	0.20	72		26,940	1,178
												-		
					7,508,682			**96,794**			**26,940**	**1,178**	**26,940**	**1,178**

APPENDIX A-7

TRAFFIC TABLES

UC RIVERSIDE
WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

Technical Appendix

EXISTING PEAK HOUR COUNTS

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Thursday January 17, 2008

N-S STREET: Chicago Avenue
E-W STREET: 3rd & Blaine Street

TIME	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W	PED COUNT			
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	33	106	31	20	49	10	249	13	25	12	15	75	49	189	1	1	4	1
07:15-07:30	49	116	28	41	42	13	289	17	44	19	16	76	42	214	10	10	5	2
07:30-07:45	38	147	49	48	90	5	377	24	81	21	22	105	42	295	2	14	8	1
07:45-08:00	43	159	68	74	72	25	441	29	145	27	46	121	75	443	8	30	12	3
08:00-08:15	50	147	34	51	84	17	383	25	65	8	42	111	60	311	0	3	3	6
08:15-08:30	45	137	26	22	69	19	318	16	57	15	20	88	45	241	1	1	2	1
08:30-08:45	37	102	21	28	44	12	244	24	51	15	23	66	29	208	0	0	2	0
08:45-09:00	24	122	28	35	67	24	300	16	39	18	33	64	38	208	0	1	0	5
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	26	118	43	78	209	37	511	31	142	59	56	88	25	401	2	4	3	3
16:15-16:30	29	93	42	68	241	24	497	27	129	78	60	81	23	398	6	2	3	3
16:30-16:45	16	127	30	63	212	26	474	37	177	56	61	67	20	418	0	5	2	5
16:45-17:00	17	77	21	51	203	20	389	42	188	71	63	58	13	435	0	0	0	2
17:00-17:15	24	88	26	64	249	20	471	23	195	50	52	61	13	394	1	0	1	3
17:15-17:30	20	95	34	68	203	25	445	40	209	68	74	76	19	486	0	0	0	0
17:30-17:45	17	109	41	61	210	29	467	31	184	49	50	58	16	388	0	2	1	0
17:45-18:00	19	89	33	67	193	22	423	28	178	53	56	55	18	388	0	2	0	3

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

SR 66, ST 315, SL 195
EL 94, ET 348, ER 71
07:30-08:30
WR 222, WT 425, WL 130
NL 176, NT 590, NR 177

ADJUSTED PEAK HOUR VOLUMES-AM

SR ___ ST ___ SL ___
EL ___ ET ___ ER ___
___
WR ___ WT ___ WL ___
NL ___ NT ___ NR ___

CALCULATED PEAK HOUR VOLUMES-NOON

SR 0, ST 0, SL 0
EL 0, ET 0, ER 0
14:00-15:00
WR 0, WT 0, WL 0
NL 0, NT 0, NR 0

ADJUSTED PEAK HOUR VOLUMES-NOON

SR ___ ST ___ SL ___
EL ___ ET ___ ER ___
___
WR ___ WT ___ WL ___
NL ___ NT ___ NR ___

CALCULATED PEAK HOUR VOLUMES-PM

SR 107, ST 865, SL 260
EL 137, ET 636, ER 264
16:00-17:00
WR 81, WT 294, WL 240
NL 88, NT 415, NR 136

ADJUSTED PEAK HOUR VOLUMES-PM

SR ___ ST ___ SL ___
EL ___ ET ___ ER ___
___
WR ___ WT ___ WL ___
NL ___ NT ___ NR ___

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Wednesday January 16, 2008

N-S STREET: 215 Freeway SB Ramps
E-W STREET: Blaine Street

TIME	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W	PED COUNT			
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	0	0	0	69	7	60	136	0	70	41	32	82	0	225	7	1	0	6
07:15-07:30	0	0	0	88	5	44	137	0	65	37	28	104	0	234	25	9	0	12
07:30-07:45	0	0	0	95	4	51	150	0	109	52	25	109	0	295	44	8	0	31
07:45-08:00	0	0	0	89	4	73	166	0	184	41	26	171	0	422	82	26	0	70
08:00-08:15	0	0	0	97	3	83	183	0	128	49	31	134	0	342	10	3	0	11
08:15-08:30	0	0	0	70	4	51	125	0	57	37	31	91	0	216	0	1	0	0
08:30-08:45	0	0	0	87	1	32	120	0	70	38	33	89	0	230	0	1	0	1
08:45-09:00	0	0	0	79	7	66	152	0	59	43	46	109	0	257	2	3	0	3
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	0	0	0	49	44	27	120	0	147	134	36	103	0	420	2	0	0	1
16:15-16:30	0	0	0	68	65	39	172	0	105	121	50	98	0	374	3	3	0	1
16:30-16:45	0	0	0	84	50	66	200	0	108	129	57	92	0	386	2	0	0	2
16:45-17:00	0	0	0	69	54	45	168	0	143	146	60	106	0	455	2	4	0	0
17:00-17:15	0	0	0	66	54	44	164	0	159	160	43	78	0	440	1	0	0	0
17:15-17:30	0	0	0	67	65	52	184	0	163	165	60	94	0	482	3	0	0	3
17:30-17:45	0	0	0	74	46	51	171	0	166	168	57	99	0	490	3	0	0	1
17:45-18:00	0	0	0	69	41	23	133	0	168	157	61	98	0	484	0	6	0	1

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

		251	16	369		
		SR	ST	SL		
0	EL				WR	0
486	ET		07:15-08:15		WT	518
179	ER				WL	110
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-AM

		____	____	____		
		SR	ST	SL		
____	EL				WR	____
____	ET		______		WT	____
____	ER				WL	____
		NL	NT	NR		
		____	____	____		

CALCULATED PEAK HOUR VOLUMES-NOON

		0	0	0		
		SR	ST	SL		
0	EL				WR	0
0	ET		14:00-15:00		WT	0
0	ER				WL	0
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-NOON

		____	____	____		
		SR	ST	SL		
____	EL				WR	____
____	ET		______		WT	____
____	ER				WL	____
		NL	NT	NR		
		____	____	____		

CALCULATED PEAK HOUR VOLUMES-PM

		192	219	276		
		SR	ST	SL		
0	EL				WR	0
631	ET		16:45-17:45		WT	377
639	ER				WL	220
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-PM

		____	____	____		
		SR	ST	SL		
____	EL				WR	____
____	ET		______		WT	____
____	ER				WL	____
		NL	NT	NR		
		____	____	____		

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Wednesday January 16, 2008

TIME	N-S STREET: 215 NB Ramp							E-W STREET: Blaine Street							PED COUNT			
	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W				
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	45	0	93	0	0	0	138	36	107	0	0	76	143	362	6	1	0	0
07:15-07:30	47	1	91	0	0	0	139	28	124	0	0	74	117	343	25	8	0	0
07:30-07:45	41	4	103	0	0	0	148	51	161	0	0	101	148	461	47	18	0	0
07:45-08:00	73	0	100	0	0	0	173	63	213	0	0	120	112	508	84	24	0	1
08:00-08:15	43	0	99	0	0	0	142	30	147	0	0	114	122	413	10	2	0	0
08:15-08:30	35	2	89	0	0	0	126	25	109	0	0	68	127	329	0	1	0	0
08:30-08:45	45	4	71	0	0	0	120	19	131	0	0	89	101	340	1	0	0	0
08:45-09:00	40	5	72	0	0	0	117	22	112	0	0	111	100	345	2	2	0	0

14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

16:00-16:15	30	0	59	0	0	0	89	21	163	0	0	124	108	416	0	6	0	0
16:15-16:30	32	1	64	0	0	0	97	26	151	0	0	106	125	408	2	1	0	0
16:30-16:45	32	1	62	0	0	0	95	41	160	0	0	134	116	451	3	2	0	0
16:45-17:00	26	0	63	0	0	0	89	22	204	0	0	93	116	435	1	0	0	0
17:00-17:15	25	1	51	0	0	0	77	35	194	0	0	131	124	484	3	0	0	0
17:15-17:30	24	0	73	0	0	0	97	30	198	0	0	127	143	498	3	0	0	0
17:30-17:45	22	0	74	0	0	0	96	37	183	0	0	132	111	463	3	7	0	0
17:45-18:00	21	1	57	0	0	0	79	16	182	0	0	119	105	422	1	0	0	0

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

		0	0	0		
		SR	ST	SL		
172	EL				WR	499
645	ET		07:15-08:15		WT	409
0	ER				WL	0
		NL	NT	NR		
		204	5	393		

ADJUSTED PEAK HOUR VOLUMES-AM

		SR	ST	SL		
____	EL				WR	____
____	ET		____		WT	____
____	ER				WL	____
		NL	NT	NR		

CALCULATED PEAK HOUR VOLUMES-NOON

		0	0	0		
		SR	ST	SL		
0	EL				WR	0
0	ET		14:00-15:00		WT	0
0	ER				WL	0
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-NOON

		SR	ST	SL		
____	EL				WR	____
____	ET		____		WT	____
____	ER				WL	____
		NL	NT	NR		

CALCULATED PEAK HOUR VOLUMES-PM

		0	0	0		
		SR	ST	SL		
124	EL				WR	494
779	ET		16:45-17:45		WT	483
0	ER				WL	0
		NL	NT	NR		
		97	1	261		

ADJUSTED PEAK HOUR VOLUMES-PM

		SR	ST	SL		
____	EL				WR	____
____	ET		____		WT	____
____	ER				WL	____
		NL	NT	NR		

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Tuesday January 29, 2008

TIME	N-S STREET: Iowa Avenue							E-W STREET: Blaine Street							PED COUNT			
	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W				
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	31	122	7	19	79	42	300	110	47	14	11	88	20	290	1	3	4	1
07:15-07:30	30	130	17	14	63	54	308	105	45	15	11	105	14	295	6	1	0	4
07:30-07:45	45	167	21	22	91	49	395	118	87	25	27	121	27	405	17	8	4	4
07:45-08:00	34	172	29	42	150	67	494	98	132	33	29	121	41	454	3	10	4	2
08:00-08:15	28	150	27	39	96	63	403	108	137	29	29	100	32	435	0	5	3	1
08:15-08:30	34	152	22	18	76	46	348	94	54	16	23	86	30	303	1	0	2	4
08:30-08:45	31	111	22	23	65	49	301	94	69	16	19	56	21	275	1	2	4	6
08:45-09:00	29	105	24	18	73	54	303	86	72	24	26	88	20	316	1	0	3	5
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	46	123	40	35	180	54	478	65	71	49	25	67	24	301	6	5	5	11
16:15-16:30	31	103	26	52	213	44	469	69	95	65	24	66	22	341	2	9	3	6
16:30-16:45	37	91	30	50	196	56	460	56	99	60	21	81	29	346	3	5	9	7
16:45-17:00	44	122	30	67	197	49	509	70	104	61	25	56	24	340	2	2	2	3
17:00-17:15	53	148	41	33	174	50	499	69	89	68	42	76	35	379	1	4	1	7
17:15-17:30	59	129	32	34	197	34	485	80	125	69	45	76	27	422	4	1	2	2
17:30-17:45	42	111	42	59	200	34	488	83	120	70	37	63	23	396	4	2	4	0
17:45-18:00	36	89	38	41	191	35	430	79	107	63	26	54	24	353	2	2	2	1

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

07:30-08:30

- SR 225, ST 413, SL 121
- EL 418, ET 410, ER 103
- WR 130, WT 428, WL 108
- NL 141, NT 641, NR 99

ADJUSTED PEAK HOUR VOLUMES-AM

SR ____ ST ____ SL ____
EL ____ ET ____ ER ____
WR ____ WT ____ WL ____
NL ____ NT ____ NR ____

CALCULATED PEAK HOUR VOLUMES-NOON

14:00-15:00

- SR 0, ST 0, SL 0
- EL 0, ET 0, ER 0
- WR 0, WT 0, WL 0
- NL 0, NT 0, NR 0

ADJUSTED PEAK HOUR VOLUMES-NOON

SR ____ ST ____ SL ____
EL ____ ET ____ ER ____
WR ____ WT ____ WL ____
NL ____ NT ____ NR ____

CALCULATED PEAK HOUR VOLUMES-PM

16:45-17:45

- SR 167, ST 768, SL 193
- EL 302, ET 438, ER 268
- WR 109, WT 271, WL 149
- NL 198, NT 510, NR 145

ADJUSTED PEAK HOUR VOLUMES-PM

SR ____ ST ____ SL ____
EL ____ ET ____ ER ____
WR ____ WT ____ WL ____
NL ____ NT ____ NR ____

Turning Movement Count Analysis

TURNING MOVEMENT COUNT

Prepared by: G.E. Traffic Surveys

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Wednesday January 16, 2008

N-S STREET: Chicago Avenue — E-W STREET: Linden Street

TIME	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W	PED COUNT			
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	3	143	20	10	65	4	245	8	9	4	22	14	13	70	5	2	1	2
07:15-07:30	4	165	28	20	73	7	297	8	10	2	16	12	17	65	12	3	4	2
07:30-07:45	8	162	36	31	89	6	332	12	27	12	36	25	37	149	42	10	5	11
07:45-08:00	4	222	49	65	99	10	449	12	36	7	54	46	71	226	53	2	3	5
08:00-08:15	5	211	41	33	97	3	390	3	24	6	39	35	35	142	6	0	0	2
08:15-08:30	4	176	22	11	79	14	306	9	15	6	25	16	10	81	3	0	2	5
08:30-08:45	2	145	33	6	99	4	289	5	10	6	14	7	10	52	3	0	0	1
08:45-09:00	5	134	28	13	103	5	288	4	13	2	13	10	24	66	3	1	2	0

14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

16:00-16:15	17	138	24	31	276	19	505	5	15	9	30	25	27	111	3	1	0	2
16:15-16:30	12	121	34	25	313	27	532	14	18	4	31	22	10	99	4	1	2	6
16:30-16:45	15	123	38	28	271	28	503	8	18	6	31	23	21	107	4	2	0	3
16:45-17:00	13	107	41	40	280	46	527	6	25	16	19	28	22	116	5	5	0	7
17:00-17:15	15	109	38	36	281	29	508	9	22	16	39	33	29	148	2	1	0	22
17:15-17:30	17	111	34	55	273	44	534	5	19	7	32	38	23	124	3	5	0	4
17:30-17:45	16	105	48	41	315	26	551	9	17	7	20	25	20	98	2	0	0	1
17:45-18:00	15	101	43	36	297	27	519	7	15	7	21	26	22	98	0	2	0	1

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

		33	364	140		
		SR	ST	SL		
36	EL				WR	153
102	ET		07:30-08:30		WT	122
31	ER				WL	154
		NL	NT	NR		
		21	771	148		

ADJUSTED PEAK HOUR VOLUMES-AM

		___	___	___		
		SR	ST	SL		
___	EL				WR	___
___	ET		___		WT	___
___	ER				WL	___
		NL	NT	NR		
		___	___	___		

CALCULATED PEAK HOUR VOLUMES-NOON

		0	0	0		
		SR	ST	SL		
0	EL				WR	0
0	ET		14:00-15:00		WT	0
0	ER				WL	0
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-NOON

		___	___	___		
		SR	ST	SL		
___	EL				WR	___
___	ET		___		WT	___
___	ER				WL	___
		NL	NT	NR		
		___	___	___		

CALCULATED PEAK HOUR VOLUMES-PM

		145	1149	172		
		SR	ST	SL		
29	EL				WR	94
83	ET		16:45-17:45		WT	124
46	ER				WL	110
		NL	NT	NR		
		61	432	161		

ADJUSTED PEAK HOUR VOLUMES-PM

		___	___	___		
		SR	ST	SL		
___	EL				WR	___
___	ET		___		WT	___
___	ER				WL	___
		NL	NT	NR		
		___	___	___		

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Wednesday January 16, 2008

N-S STREET: Iowa Avenue
E-W STREET: Linden Street

TIME	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W	PED COUNT			
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	20	110	4	8	74	21	237	6	9	12	9	18	15	69	2	1	8	1
07:15-07:30	11	136	8	4	73	16	248	22	10	4	14	21	8	79	1	0	3	1
07:30-07:45	36	140	19	4	96	53	348	32	21	5	14	38	19	129	4	0	4	3
07:45-08:00	50	161	25	12	123	91	462	32	38	17	19	52	14	172	5	0	1	4
08:00-08:15	20	150	29	16	97	38	350	35	38	18	27	31	20	169	7	1	2	4
08:15-08:30	12	128	19	13	87	25	284	14	10	7	10	16	14	71	1	1	0	0
08:30-08:45	9	104	10	11	90	16	240	12	16	7	12	16	11	74	0	0	5	1
08:45-09:00	15	121	17	5	113	28	299	12	13	7	7	14	13	66	0	1	4	2
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	15	158	33	13	238	20	477	33	28	28	36	24	1	150	4	3	3	2
16:15-16:30	12	134	34	9	251	20	460	37	22	24	36	22	1	142	0	3	2	10
16:30-16:45	10	123	39	14	248	22	456	29	41	28	30	31	5	164	2	1	1	6
16:45-17:00	7	141	35	12	248	27	470	39	36	30	32	14	8	159	0	0	0	7
17:00-17:15	15	157	41	16	250	28	507	35	39	44	24	32	2	176	0	1	0	1
17:15-17:30	14	150	25	16	277	21	503	23	39	21	23	33	2	141	0	1	0	2
17:30-17:45	11	136	30	13	218	20	428	20	21	31	32	23	2	129	1	4	1	9
17:45-18:00	15	158	33	11	239	21	477	33	28	28	36	24	1	150	4	3	3	2

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

207 403 45
SR ST SL

113 EL — WR 67
107 ET — 07:30-08:30 — WT 137
47 ER — WL 70

NL NT NR
118 579 92

ADJUSTED PEAK HOUR VOLUMES-AM

SR ST SL
EL WR
ET WT
ER WL
NL NT NR

CALCULATED PEAK HOUR VOLUMES-NOON

0 0 0
SR ST SL

0 EL — WR 0
0 ET — 14:00-15:00 — WT 0
0 ER — WL 0

NL NT NR
0 0 0

ADJUSTED PEAK HOUR VOLUMES-NOON

SR ST SL
EL WR
ET WT
ER WL
NL NT NR

CALCULATED PEAK HOUR VOLUMES-PM

98 1023 58
SR ST SL

126 EL — WR 17
155 ET — 16:30-17:30 — WT 110
123 ER — WL 109

NL NT NR
46 571 140

ADJUSTED PEAK HOUR VOLUMES-PM

SR ST SL
EL WR
ET WT
ER WL
NL NT NR

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Thursday January 10, 2008

TIME	N-S STREET: Chicago Avenue							E-W STREET: University Avenue							PED COUNT			
	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W				
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	31	141	13	18	47	12	262	29	60	16	16	59	6	186	3	0	0	8
07:15-07:30	47	165	19	21	50	18	320	42	53	22	15	72	20	224	3	6	2	10
07:30-07:45	59	198	21	24	75	34	411	49	99	14	17	91	7	277	9	2	4	13
07:45-08:00	72	236	32	20	90	28	478	47	77	21	25	113	15	298	7	3	1	15
08:00-08:15	37	160	36	15	84	35	367	46	83	15	23	105	10	282	2	3	1	7
08:15-08:30	40	153	21	15	71	29	329	31	67	38	20	77	23	256	5	4	1	7
08:30-08:45	44	105	23	21	49	20	262	36	92	24	20	78	15	265	4	10	3	14
08:45-09:00	38	120	18	27	66	18	287	43	89	35	22	67	13	269	3	5	5	8
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	53	116	38	44	243	29	523	46	172	87	54	89	16	464	7	16	7	10
16:15-16:30	46	110	32	48	248	31	515	47	197	103	56	99	18	520	11	9	4	20
16:30-16:45	53	90	43	32	268	28	514	56	206	111	73	105	12	563	6	15	5	31
16:45-17:00	69	90	27	43	220	23	472	52	222	115	58	90	18	555	3	11	4	22
17:00-17:15	49	84	25	34	229	15	436	42	165	104	89	85	20	505	10	19	5	6
17:15-17:30	66	99	31	46	239	20	501	32	203	133	89	105	22	584	7	8	6	17
17:30-17:45	53	87	32	42	261	16	491	32	196	117	91	104	19	559	6	9	4	21
17:45-18:00	58	81	38	47	254	14	492	59	215	112	80	77	19	562	9	22	9	20

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

		126	320	74		
		SR	ST	SL		
173	EL				WR	55
326	ET		07:30-08:30		WT	386
88	ER				WL	85
		NL	NT	NR		
		208	747	110		

ADJUSTED PEAK HOUR VOLUMES-AM

		SR	ST	SL		
	EL				WR	
	ET				WT	
	ER				WL	
		NL	NT	NR		

CALCULATED PEAK HOUR VOLUMES-NOON

		0	0	0		
		SR	ST	SL		
0	EL				WR	0
0	ET		14:00-15:00		WT	0
0	ER				WL	0
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-NOON

		SR	ST	SL		
	EL				WR	
	ET				WT	
	ER				WL	
		NL	NT	NR		

CALCULATED PEAK HOUR VOLUMES-PM

		86	956	155		
		SR	ST	SL		
182	EL				WR	72
796	ET		16:30-17:30		WT	385
463	ER				WL	309
		NL	NT	NR		
		237	363	126		

ADJUSTED PEAK HOUR VOLUMES-PM

		SR	ST	SL		
	EL				WR	
	ET				WT	
	ER				WL	
		NL	NT	NR		

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Wednesday January 9, 2008

TIME	N-S STREET: Iowa Avenue							E-W STREET: University Avenue							PED COUNT			
	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W				
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	17	108	11	24	37	14	211	21	41	7	7	69	23	168	1	4	2	1
07:15-07:30	12	120	16	28	44	16	236	28	79	14	19	60	25	225	4	4	1	0
07:30-07:45	14	135	28	27	53	25	282	29	85	14	22	82	42	274	2	22	0	0
07:45-08:00	15	163	32	39	73	28	350	38	81	14	27	88	58	306	4	37	4	4
08:00-08:15	21	141	18	36	71	23	310	35	94	18	17	89	44	297	2	13	2	2
08:15-08:30	13	105	14	34	48	23	237	37	85	10	14	83	23	252	4	9	4	2
08:30-08:45	17	89	22	24	68	24	244	23	82	15	21	91	27	259	9	32	1	1
08:45-09:00	19	81	23	35	78	21	257	22	97	18	20	69	33	259	7	46	3	3
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	25	86	24	57	158	54	404	56	180	35	44	89	35	439	3	44	3	8
16:15-16:30	19	106	30	48	172	49	424	54	171	27	26	90	39	407	7	25	3	1
16:30-16:45	28	76	31	47	125	46	353	56	188	31	47	93	19	434	13	30	11	7
16:45-17:00	25	91	29	69	191	48	453	56	185	57	37	82	33	450	11	41	14	13
17:00-17:15	27	89	43	67	174	48	448	66	194	45	37	102	33	477	18	26	5	10
17:15-17:30	39	93	29	53	190	52	456	39	232	33	46	108	36	494	3	32	6	3
17:30-17:45	13	96	29	69	219	45	471	54	219	39	39	83	16	450	10	25	6	5
17:45-18:00	14	92	28	71	217	42	464	58	229	35	34	81	18	455	12	33	4	5

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

		99	245	136		
		SR	ST	SL		
139	EL				WR	167
345	ET		07:30-08:30		WT	342
56	ER				WL	80
		NL	NT	NR		
		63	544	92		

ADJUSTED PEAK HOUR VOLUMES-AM

		____	____	____		
		SR	ST	SL		
____	EL				WR	____
____	ET		______		WT	____
____	ER				WL	____
		NL	NT	NR		
		____	____	____		

CALCULATED PEAK HOUR VOLUMES-NOON

		0	0	0		
		SR	ST	SL		
0	EL				WR	0
0	ET		14:00-15:00		WT	0
0	ER				WL	0
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-NOON

		____	____	____		
		SR	ST	SL		
____	EL				WR	____
____	ET		______		WT	____
____	ER				WL	____
		NL	NT	NR		
		____	____	____		

CALCULATED PEAK HOUR VOLUMES-PM

		187	800	260		
		SR	ST	SL		
217	EL				WR	103
874	ET		17:00-18:00		WT	374
152	ER				WL	156
		NL	NT	NR		
		93	370	129		

ADJUSTED PEAK HOUR VOLUMES-PM

		____	____	____		
		SR	ST	SL		
____	EL				WR	____
____	ET		______		WT	____
____	ER				WL	____
		NL	NT	NR		
		____	____	____		

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Thursday January 17, 2008

N-S STREET: 215 SB Ramp
E-W STREET: University Avenue

TIME	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W	PED COUNT			
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	0	0	0	20	0	32	52	0	60	73	11	115	0	259	0	10	0	0
07:15-07:30	0	0	0	42	2	45	89	0	51	62	3	162	0	278	0	5	0	0
07:30-07:45	0	0	0	83	13	40	136	0	74	56	12	130	0	272	0	29	0	0
07:45-08:00	0	0	0	122	11	53	186	0	87	50	11	136	0	284	0	119	0	0
08:00-08:15	0	0	0	83	1	51	135	0	78	60	7	143	0	288	1	65	0	0
08:15-08:30	0	0	0	63	1	42	106	0	66	63	13	124	0	266	0	31	0	0
08:30-08:45	0	0	0	52	0	50	102	0	72	75	7	113	0	267	0	43	0	1
08:45-09:00	0	0	0	66	2	84	152	0	81	63	18	129	0	291	1	67	0	1
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	0	0	0	18	81	17	116	0	135	159	31	136	0	461	0	71	0	0
16:15-16:30	0	0	0	19	58	16	93	0	98	155	26	132	0	411	1	70	0	0
16:30-16:45	0	0	0	9	50	25	84	0	107	171	42	130	0	450	0	59	0	0
16:45-17:00	0	0	0	9	62	28	99	0	137	158	35	162	0	492	0	125	0	0
17:00-17:15	0	0	0	12	46	23	81	0	147	197	49	187	0	580	2	168	0	0
17:15-17:30	0	0	0	11	30	18	59	0	125	195	65	181	0	566	0	94	0	0
17:30-17:45	0	0	0	10	45	24	79	0	112	174	42	134	0	462	1	74	0	0
17:45-18:00	0	0	0	13	52	20	85	0	106	171	55	133	0	465	0	75	0	0

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM (07:30-08:30)

SR	ST	SL	EL	ET	ER	WR	WT	WL	NL	NT	NR
186	26	351	0	305	229	0	533	43	0	0	0

ADJUSTED PEAK HOUR VOLUMES-AM

SR	ST	SL	EL	ET	ER	WR	WT	WL	NL	NT	NR
___	___	___	___	___	___	___	___	___	___	___	___

CALCULATED PEAK HOUR VOLUMES-NOON (14:00-15:00)

SR	ST	SL	EL	ET	ER	WR	WT	WL	NL	NT	NR
0	0	0	0	0	0	0	0	0	0	0	0

ADJUSTED PEAK HOUR VOLUMES-NOON

SR	ST	SL	EL	ET	ER	WR	WT	WL	NL	NT	NR
___	___	___	___	___	___	___	___	___	___	___	___

CALCULATED PEAK HOUR VOLUMES-PM (16:45-17:45)

SR	ST	SL	EL	ET	ER	WR	WT	WL	NL	NT	NR
93	183	42	0	521	724	0	664	191	0	0	0

ADJUSTED PEAK HOUR VOLUMES-PM

SR	ST	SL	EL	ET	ER	WR	WT	WL	NL	NT	NR
___	___	___	___	___	___	___	___	___	___	___	___

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Thursday January 17, 2008

TIME	N-S STREET: 215 N/B Ramps							E-W STREET: University Avenue							PED COUNT			
	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W				
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	0	0	0	12	0	93	105	26	52	1	2	38	28	147	0	0	0	0
07:15-07:30	1	0	1	22	0	141	165	16	70	0	0	25	12	123	0	0	0	0
07:30-07:45	0	0	0	24	0	105	129	28	134	1	0	40	18	221	0	0	0	0
07:45-08:00	0	0	0	11	0	95	106	13	202	0	0	55	14	284	0	0	0	0
08:00-08:15	0	0	1	14	0	93	108	19	141	0	0	56	21	237	0	0	0	0
08:15-08:30	0	0	0	25	0	89	114	20	118	0	0	47	20	205	0	0	0	0
08:30-08:45	0	0	2	21	0	83	106	18	109	1	0	37	19	184	0	0	0	0
08:45-09:00	0	0	1	15	0	90	106	24	120	0	0	66	17	227	0	0	0	0
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	0	0	0	18	0	85	103	40	111	0	0	102	31	284	0	0	0	0
16:15-16:30	0	0	0	17	0	57	74	22	94	2	0	101	33	252	0	0	0	0
16:30-16:45	0	0	0	16	0	67	83	24	94	0	0	111	31	260	0	0	0	0
16:45-17:00	0	0	0	22	0	87	109	24	118	0	0	108	30	280	0	0	0	0
17:00-17:15	0	0	1	16	0	62	79	57	109	0	0	182	56	404	0	0	0	0
17:15-17:30	0	0	0	15	0	76	91	46	91	0	0	166	49	352	0	0	0	0
17:30-17:45	0	0	0	17	0	48	65	32	90	0	0	126	47	295	0	0	0	0
17:45-18:00	0	0	0	13	0	63	76	31	85	0	0	133	32	281	0	0	0	0

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM							ADJUSTED PEAK HOUR VOLUMES-AM						
		382	0	74					___	___	___		
		SR	ST	SL					SR	ST	SL		
80	EL				WR	73	___	EL				WR	___
595	ET		07:30-08:30		WT	198	___	ET		___		WT	___
1	ER				WL	0	___	ER				WL	___
		NL	NT	NR					NL	NT	NR		
		0	0	1					___	___	___		
CALCULATED PEAK HOUR VOLUMES-NOON							**ADJUSTED PEAK HOUR VOLUMES-NOON**						
		0	0	0					___	___	___		
		SR	ST	SL					SR	ST	SL		
0	EL				WR	0	___	EL				WR	___
0	ET		14:00-15:00		WT	0	___	ET		___		WT	___
0	ER				WL	0	___	ER				WL	___
		NL	NT	NR					NL	NT	NR		
		0	0	0					___	___	___		
CALCULATED PEAK HOUR VOLUMES-PM							**ADJUSTED PEAK HOUR VOLUMES-PM**						
		273	0	70					___	___	___		
		SR	ST	SL					SR	ST	SL		
159	EL				WR	182	___	EL				WR	___
408	ET		16:45-17:45		WT	582	___	ET		___		WT	___
0	ER				WL	0	___	ER				WL	___
		NL	NT	NR					NL	NT	NR		
		0	0	1					___	___	___		

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Tuesday January 29, 2008

N-S STREET: West Campus Drive **E-W STREET:** University Avenue

TIME	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W	PED COUNT			
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	18	0	34	0	0	0	52	0	36	34	21	16	0	107	0	13	0	0
07:15-07:30	27	0	33	0	0	0	60	0	51	58	27	26	0	162	0	12	0	0
07:30-07:45	27	0	54	0	0	0	81	0	59	94	32	34	0	219	0	29	0	0
07:45-08:00	30	0	73	0	0	0	103	0	77	129	70	31	0	307	0	105	1	2
08:00-08:15	48	0	99	0	0	0	147	0	83	79	63	50	0	275	0	63	0	0
08:15-08:30	24	0	50	0	0	0	74	0	66	65	38	38	0	207	0	33	0	0
08:30-08:45	19	0	41	0	0	0	60	0	47	56	66	65	0	234	0	24	0	0
08:45-09:00	41	0	45	0	0	0	86	0	52	78	33	38	0	201	0	67	0	0
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	49	0	42	0	0	0	91	0	71	51	66	65	0	253	0	52	0	2
16:15-16:30	39	0	32	0	0	0	71	0	50	49	53	89	0	241	0	34	0	0
16:30-16:45	50	0	42	0	0	0	92	0	69	50	82	113	0	314	0	43	1	2
16:45-17:00	71	0	49	0	0	0	120	0	65	52	89	97	0	303	0	57	0	0
17:00-17:15	87	0	74	0	0	0	161	0	74	46	101	144	0	365	0	144	0	0
17:15-17:30	79	0	59	0	0	0	138	0	75	49	97	146	0	367	0	52	0	1
17:30-17:45	33	0	34	0	0	0	67	0	59	54	85	99	0	297	0	28	0	0
17:45-18:00	49	0	42	0	0	0	91	0	71	51	66	65	0	253	0	52	0	2

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

07:30-08:30

SR	ST	SL	EL	ET	ER	WR	WT	WL	NL	NT	NR
0	0	0	0	285	367	0	153	203	129	0	276

ADJUSTED PEAK HOUR VOLUMES-AM

SR ST SL / EL ET ER / WR WT WL / NL NT NR

CALCULATED PEAK HOUR VOLUMES-NOON

14:00-15:00

SR	ST	SL	EL	ET	ER	WR	WT	WL	NL	NT	NR
0	0	0	0	0	0	0	0	0	0	0	0

ADJUSTED PEAK HOUR VOLUMES-NOON

SR ST SL / EL ET ER / WR WT WL / NL NT NR

CALCULATED PEAK HOUR VOLUMES-PM

16:30-17:30

SR	ST	SL	EL	ET	ER	WR	WT	WL	NL	NT	NR
0	0	0	0	283	197	0	500	369	287	0	224

ADJUSTED PEAK HOUR VOLUMES-PM

SR ST SL / EL ET ER / WR WT WL / NL NT NR

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Wednesday January 9. 2008

N-S STREET: Iowa Avenue — E-W STREET: Everton Place

TIME	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W	PED COUNT			
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	0	125	8	4	44	0	181	0	0	0	0	0	4	4	0	0	0	0
07:15-07:30	0	129	10	9	63	0	211	0	0	0	2	0	7	9	0	0	1	0
07:30-07:45	0	181	10	4	73	0	268	0	0	0	2	0	4	6	0	0	0	0
07:45-08:00	0	183	10	8	101	0	302	0	0	0	3	0	7	10	0	0	1	0
08:00-08:15	0	166	26	7	100	0	299	0	0	0	3	0	3	6	0	0	0	0
08:15-08:30	0	122	18	10	57	0	207	0	0	0	3	0	8	11	0	0	0	0
08:30-08:45	0	118	21	5	91	0	235	0	0	0	6	0	3	9	0	0	0	0
08:45-09:00	0	102	28	7	106	0	243	0	0	0	3	0	17	20	0	0	0	0
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	0	129	4	8	216	0	357	0	0	0	5	0	8	13	0	0	0	0
16:15-16:30	0	118	5	7	207	0	337	0	0	0	4	0	9	13	0	0	0	0
16:30-16:45	0	104	3	5	192	0	304	0	0	0	14	0	14	28	0	0	2	0
16:45-17:00	0	119	5	13	267	0	404	0	0	0	9	0	10	19	0	0	1	0
17:00-17:15	0	145	7	4	247	0	403	0	0	0	20	0	13	33	0	0	0	0
17:15-17:30	0	129	9	9	262	0	409	0	0	0	12	0	7	19	0	0	1	0
17:30-17:45	0	110	8	10	262	0	390	0	0	0	6	0	9	15	0	0	0	0
17:45-18:00	0	108	9	11	259	0	387	0	0	0	10	0	9	19	0	0	0	0

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

		0	337	28		
		SR	ST	SL		
0	EL				WR	21
0	ET		07:15-08:15		WT	0
0	ER				WL	10
		NL	NT	NR		
		0	659	56		

ADJUSTED PEAK HOUR VOLUMES-AM

		____	____	____		
		SR	ST	SL		
____	EL				WR	____
____	ET		____		WT	____
____	ER				WL	____
		NL	NT	NR		
		____	____	____		

CALCULATED PEAK HOUR VOLUMES-NOON

		0	0	0		
		SR	ST	SL		
0	EL				WR	0
0	ET		14:00-15:00		WT	0
0	ER				WL	0
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-NOON

		____	____	____		
		SR	ST	SL		
____	EL				WR	____
____	ET		____		WT	____
____	ER				WL	____
		NL	NT	NR		
		____	____	____		

CALCULATED PEAK HOUR VOLUMES-PM

		0	1038	36		
		SR	ST	SL		
0	EL				WR	39
0	ET		16:45-17:45		WT	0
0	ER				WL	47
		NL	NT	NR		
		0	503	29		

ADJUSTED PEAK HOUR VOLUMES-PM

		____	____	____		
		SR	ST	SL		
____	EL				WR	____
____	ET		____		WT	____
____	ER				WL	____
		NL	NT	NR		
		____	____	____		

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Thursday January 17, 2008

TIME	N-S STREET: LOT 30							E-W STREET: Martin Luther King Blvd							PED COUNT			
	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W				
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	1	1	0	1	0	1	4	9	96	1	3	293	2	404	0	2	1	0
07:15-07:30	2	0	0	3	0	1	6	19	107	0	3	354	10	493	0	0	2	0
07:30-07:45	0	0	0	3	0	3	6	88	132	0	5	340	15	580	0	0	0	0
07:45-08:00	2	0	0	3	0	0	5	134	201	0	1	301	24	661	1	5	0	1
08:00-08:15	0	0	0	3	0	0	3	80	160	0	1	281	28	550	0	0	0	0
08:15-08:30	0	0	0	1	0	4	5	28	130	0	1	232	28	419	0	0	0	0
08:30-08:45	1	1	0	2	0	2	6	36	153	0	5	208	13	415	0	0	0	0
08:45-09:00	0	0	1	3	0	4	8	49	118	0	3	261	12	443	0	0	0	0
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	0	0	0	34	0	33	67	7	456	1	1	162	2	629	0	2	0	0
16:15-16:30	1	0	1	28	0	23	53	5	486	0	0	166	2	659	0	0	0	0
16:30-16:45	0	0	3	20	0	17	40	8	480	0	2	158	1	649	0	0	0	1
16:45-17:00	1	0	0	25	0	42	68	18	508	0	0	221	1	748	0	1	0	0
17:00-17:15	3	0	0	53	0	94	150	6	522	0	2	272	0	802	0	0	0	0
17:15-17:30	2	0	0	71	0	109	182	2	455	0	4	217	0	678	0	1	0	1
17:30-17:45	0	0	1	13	0	26	40	5	504	0	4	216	0	729	0	0	0	0
17:45-18:00	0	0	0	19	0	19	38	13	501	0	0	199	2	715	0	0	0	0

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

		4	0	12		
		SR	ST	SL		
321	EL				WR	77
600	ET		07:15-08:15		WT	1276
0	ER				WL	10
		NL	NT	NR		
		4	0	0		

ADJUSTED PEAK HOUR VOLUMES-AM

		SR	ST	SL		
	EL				WR	
	ET				WT	
	ER				WL	
		NL	NT	NR		

CALCULATED PEAK HOUR VOLUMES-NOON

		0	0	0		
		SR	ST	SL		
0	EL				WR	0
0	ET		14:00-15:00		WT	0
0	ER				WL	0
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-NOON

		SR	ST	SL		
	EL				WR	
	ET				WT	
	ER				WL	
		NL	NT	NR		

CALCULATED PEAK HOUR VOLUMES-PM

		271	0	162		
		SR	ST	SL		
31	EL				WR	1
1989	ET		16:45-17:45		WT	926
0	ER				WL	10
		NL	NT	NR		
		6	0	1		

ADJUSTED PEAK HOUR VOLUMES-PM

		SR	ST	SL		
	EL				WR	
	ET				WT	
	ER				WL	
		NL	NT	NR		

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Tuesday January 15, 2008

N-S STREET: Canyon Crest Drive — E-W STREET: Martin Luther King Boulevard

TIME	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W	PED COUNT			
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	251	40	121	12	9	7	440	14	26	65	18	39	1	163	0	0	3	0
07:15-07:30	226	64	129	10	13	2	444	21	30	80	25	69	8	233	0	0	0	0
07:30-07:45	301	103	140	11	20	5	580	30	41	86	28	59	2	246	0	0	10	1
07:45-08:00	305	152	126	11	24	22	640	34	64	81	27	91	8	305	0	0	9	8
08:00-08:15	313	108	102	4	22	17	566	39	44	83	29	94	10	299	0	0	7	2
08:15-08:30	234	89	77	15	18	8	441	27	36	73	24	91	16	267	1	0	3	1
08:30-08:45	189	87	78	2	16	6	378	21	35	50	24	64	3	197	0	1	7	5
08:45-09:00	227	84	69	3	9	8	400	29	39	53	28	57	3	209	0	1	12	6
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	95	52	19	15	75	24	280	44	196	262	24	47	5	578	0	0	4	5
16:15-16:30	78	45	28	20	76	17	264	33	256	291	36	61	3	680	0	0	3	0
16:30-16:45	60	41	22	21	88	24	256	27	245	277	28	54	11	642	0	0	2	4
16:45-17:00	91	55	34	21	85	28	314	25	227	252	27	76	11	618	1	0	5	7
17:00-17:15	51	51	33	36	120	53	344	64	312	238	39	67	8	728	0	0	1	5
17:15-17:30	96	32	40	39	189	66	462	42	249	237	38	73	3	642	0	0	4	4
17:30-17:45	71	56	27	31	137	31	353	21	236	275	47	57	7	643	0	0	7	21
17:45-18:00	77	47	29	19	106	39	317	36	246	308	38	57	7	692	0	0	5	2

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

		52	84	41		
		SR	ST	SL		
130	EL				WR	36
185	ET		07:30-08:30		WT	335
323	ER				WL	108
		NL	NT	NR		
		1153	452	445		

ADJUSTED PEAK HOUR VOLUMES-AM

		SR	ST	SL		
____	EL				WR	____
____	ET		____		WT	____
____	ER				WL	____
		NL	NT	NR		

CALCULATED PEAK HOUR VOLUMES-NOON

		0	0	0		
		SR	ST	SL		
0	EL				WR	0
0	ET		14:00-15:00		WT	0
0	ER				WL	0
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-NOON

		SR	ST	SL		
____	EL				WR	____
____	ET		____		WT	____
____	ER				WL	____
		NL	NT	NR		

CALCULATED PEAK HOUR VOLUMES-PM

		189	552	125		
		SR	ST	SL		
163	EL				WR	25
1043	ET		17:00-18:00		WT	254
1058	ER				WL	162
		NL	NT	NR		
		295	186	129		

ADJUSTED PEAK HOUR VOLUMES-PM

		SR	ST	SL		
____	EL				WR	____
____	ET		____		WT	____
____	ER				WL	____
		NL	NT	NR		

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Tuesday January 15, 2008

TIME	N-S STREET: SB I-215 Ramps							E-W STREET: Martin Luther King Boulevard							PED COUNT			
	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W				
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	0	0	0	6	5	25	36	0	139	30	2	35	0	206	0	0	0	0
07:15-07:30	0	0	0	10	18	42	70	0	134	48	3	67	0	252	0	0	0	0
07:30-07:45	0	0	0	3	21	43	67	0	156	38	6	61	0	261	0	0	0	0
07:45-08:00	0	0	0	1	16	50	67	0	131	74	5	84	0	294	0	0	0	0
08:00-08:15	0	0	0	3	5	62	70	0	116	37	7	79	0	239	0	0	0	0
08:15-08:30	0	0	0	1	1	58	60	0	86	44	3	75	0	208	0	0	0	0
08:30-08:45	0	0	0	1	3	33	37	0	92	27	2	61	0	182	0	0	0	0
08:45-09:00	0	0	0	3	0	36	39	0	69	44	3	50	0	166	0	0	0	0
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	0	0	0	2	60	17	79	0	25	198	1	55	0	279	0	0	0	0
16:15-16:30	0	0	0	1	40	19	60	0	35	249	1	66	0	351	0	0	0	0
16:30-16:45	0	0	0	0	45	21	66	0	29	232	4	67	0	332	0	0	0	0
16:45-17:00	0	0	0	1	36	19	56	0	34	222	1	94	0	351	0	0	0	0
17:00-17:15	0	0	0	0	21	33	54	0	53	276	2	69	0	400	0	0	0	0
17:15-17:30	0	0	0	1	31	31	63	0	63	225	0	83	0	371	0	0	0	0
17:30-17:45	0	0	0	1	13	23	37	0	36	248	2	82	0	368	0	0	0	0
17:45-18:00	0	0	0	2	7	30	39	0	29	223	1	66	0	319	0	0	0	0

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

		197	60	17		
		SR	ST	SL		
0	EL				WR	0
537	ET		07:15-08:15		WT	291
197	ER				WL	21
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-AM

		____	____	____		
		SR	ST	SL		
____	EL				WR	____
____	ET		______		WT	____
____	ER				WL	____
		NL	NT	NR		
		____	____	____		

CALCULATED PEAK HOUR VOLUMES-NOON

		0	0	0		
		SR	ST	SL		
0	EL				WR	0
0	ET		14:00-15:00		WT	0
0	ER				WL	0
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-NOON

		____	____	____		
		SR	ST	SL		
____	EL				WR	____
____	ET		______		WT	____
____	ER				WL	____
		NL	NT	NR		
		____	____	____		

CALCULATED PEAK HOUR VOLUMES-PM

		106	101	3		
		SR	ST	SL		
0	EL				WR	0
186	ET		16:45-17:45		WT	328
971	ER				WL	5
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-PM

		____	____	____		
		SR	ST	SL		
____	EL				WR	____
____	ET		______		WT	____
____	ER				WL	____
		NL	NT	NR		
		____	____	____		

Turning Movement Count Analysis

TURNING MOVEMENT COUNT

Prepared by: G.E. Traffic Surveys

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Tuesday January 15, 2008

N-S STREET: 215 N/B Ramps
E-W STREET: Martin Luther King Boulevard

TIME	NORTH BOUND LEFT	NORTH BOUND THRU	NORTH BOUND RIGHT	SOUTH BOUND LEFT	SOUTH BOUND THRU	SOUTH BOUND RIGHT	N-S TOTAL	EAST BOUND LEFT	EAST BOUND THRU	EAST BOUND RIGHT	WEST BOUND LEFT	WEST BOUND THRU	WEST BOUND RIGHT	E-W TOTAL	PED COUNT NL	PED COUNT SL	PED COUNT EL	PED COUNT WL
07:00-07:15	39	2	0	0	0	0	41	142	0	0	0	0	0	142	0	0	0	0
07:15-07:30	68	0	0	0	0	0	68	146	0	0	0	0	0	146	0	0	0	0
07:30-07:45	67	3	0	0	0	0	70	155	0	0	0	0	0	155	0	0	0	0
07:45-08:00	93	4	0	0	0	0	97	135	0	0	0	0	0	135	0	0	0	0
08:00-08:15	83	5	0	0	0	0	88	118	0	0	0	0	0	118	0	0	0	0
08:15-08:30	79	0	0	0	0	0	79	88	0	0	0	0	0	88	0	0	0	0
08:30-08:45	61	2	0	0	0	0	63	95	0	0	0	0	0	95	0	0	0	0
08:45-09:00	56	1	0	0	0	0	57	70	0	0	0	0	0	70	0	0	0	0
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	54	0	0	0	0	0	54	29	0	0	0	0	0	29	0	0	0	0
16:15-16:30	69	0	0	0	0	0	69	36	0	0	0	0	0	36	0	0	0	0
16:30-16:45	70	0	0	0	0	0	70	28	0	0	0	0	0	28	0	0	0	0
16:45-17:00	96	1	0	0	0	0	97	34	0	0	0	0	0	34	0	0	0	0
17:00-17:15	73	0	0	0	0	0	73	54	0	0	0	0	0	54	0	0	0	0
17:15-17:30	80	0	0	0	0	0	80	64	0	0	0	0	0	64	0	0	0	0
17:30-17:45	84	0	0	0	0	0	84	36	0	0	0	0	0	36	0	0	0	0
17:45-18:00	69	0	0	0	0	0	69	30	0	0	0	0	0	30	0	0	0	0

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

		0	0	0		
		SR	ST	SL		
554	EL				WR	0
0	ET		07:15-08:15		WT	0
0	ER				WL	0
		NL	NT	NR		
		311	12	0		

ADJUSTED PEAK HOUR VOLUMES-AM

		___	___	___		
		SR	ST	SL		
___	EL				WR	___
___	ET		___		WT	___
___	ER				WL	___
		NL	NT	NR		
		___	___	___		

CALCULATED PEAK HOUR VOLUMES-NOON

		0	0	0		
		SR	ST	SL		
0	EL				WR	0
0	ET		14:00-15:00		WT	0
0	ER				WL	0
		NL	NT	NR		
		0	0	0		

ADJUSTED PEAK HOUR VOLUMES-NOON

		___	___	___		
		SR	ST	SL		
___	EL				WR	___
___	ET		___		WT	___
___	ER				WL	___
		NL	NT	NR		
		___	___	___		

CALCULATED PEAK HOUR VOLUMES-PM

		0	0	0		
		SR	ST	SL		
188	EL				WR	0
0	ET		16:45-17:45		WT	0
0	ER				WL	0
		NL	NT	NR		
		333	1	0		

ADJUSTED PEAK HOUR VOLUMES-PM

		___	___	___		
		SR	ST	SL		
___	EL				WR	___
___	ET		___		WT	___
___	ER				WL	___
		NL	NT	NR		
		___	___	___		

Turning Movement Count Analysis

TURNING MOVEMENT COUNT

Prepared by: G.E. Traffic Surveys

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Tuesday January 8, 2008

N-S STREET: Chicago Avenue
E-W STREET: Martin Luther King Boulevard

TIME	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W	PED COUNT			
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	119	163	23	9	37	23	374	18	75	16	11	164	35	319	0	0	0	1
07:15-07:30	168	176	45	7	38	27	461	28	101	28	6	172	38	373	0	1	0	0
07:30-07:45	172	245	61	15	62	22	577	28	107	27	8	163	44	377	1	0	0	0
07:45-08:00	172	244	77	20	53	30	596	39	184	37	8	148	30	446	1	1	0	0
08:00-08:15	204	218	51	15	44	35	567	27	143	33	10	157	28	398	0	2	0	1
08:15-08:30	159	191	39	10	50	26	475	39	109	34	14	170	36	402	0	0	0	1
08:30-08:45	102	141	29	16	44	20	352	34	112	36	9	115	35	341	0	2	0	2
08:45-09:00	98	175	35	12	54	34	408	37	103	24	14	127	33	338	1	2	2	0
14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	41	71	28	86	236	54	516	46	266	115	36	106	31	600	0	0	0	0
16:15-16:30	29	91	25	106	264	41	556	38	288	165	33	96	31	651	3	2	0	0
16:30-16:45	29	96	29	80	233	43	510	41	298	157	49	101	25	671	2	0	0	0
16:45-17:00	33	85	23	99	290	51	581	33	319	201	54	103	32	742	1	1	0	0
17:00-17:15	34	65	11	95	254	57	516	46	334	215	45	144	24	808	2	0	0	0
17:15-17:30	37	75	16	97	261	53	539	45	304	201	88	150	27	815	2	0	4	3
17:30-17:45	36	62	11	75	252	40	476	46	326	175	62	117	22	748	3	2	0	2
17:45-18:00	31	59	14	83	248	36	471	41	339	186	57	91	20	734	0	0	0	0

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

113 209 60
SR ST SL

133 EL — WR 138
543 ET — 07:30-08:30 — WT 638
131 ER — WL 40

NL NT NR
707 898 228

ADJUSTED PEAK HOUR VOLUMES-AM

SR ___ ST ___ SL ___
EL ___ WR ___
ET ___ ___ WT ___
ER ___ WL ___
NL ___ NT ___ NR ___

CALCULATED PEAK HOUR VOLUMES-NOON

0 0 0
SR ST SL

0 EL — WR 0
0 ET — 14:00-15:00 — WT 0
0 ER — WL 0

NL NT NR
0 0 0

ADJUSTED PEAK HOUR VOLUMES-NOON

SR ___ ST ___ SL ___
EL ___ WR ___
ET ___ ___ WT ___
ER ___ WL ___
NL ___ NT ___ NR ___

CALCULATED PEAK HOUR VOLUMES-PM

201 1057 366
SR ST SL

170 EL — WR 105
1283 ET — 16:45-17:45 — WT 514
792 ER — WL 249

NL NT NR
140 287 61

ADJUSTED PEAK HOUR VOLUMES-PM

SR ___ ST ___ SL ___
EL ___ WR ___
ET ___ ___ WT ___
ER ___ WL ___
NL ___ NT ___ NR ___

TURNING MOVEMENT COUNT

PROJECT NAME: UCR Riverside West Campus Study
PROJECT NO: 27089
DATE: Tuesday January 8, 2008

N-S STREET: Iowa Avenue
E-W STREET: Martin Luther King Boulevard

TIME	NORTH BOUND			SOUTH BOUND			N-S	EAST BOUND			WEST BOUND			E-W	PED COUNT			
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	TOTAL	NL	SL	EL	WL
07:00-07:15	0	0	0	43	0	34	77	35	75	0	0	183	114	407	0	0	0	0
07:15-07:30	0	0	0	46	0	16	62	61	83	0	0	206	118	468	0	0	0	0
07:30-07:45	0	0	0	81	0	31	112	68	101	0	0	198	121	488	0	0	0	0
07:45-08:00	0	0	0	88	0	23	111	74	143	0	0	179	114	510	0	0	0	0
08:00-08:15	0	0	0	48	0	31	79	64	113	0	0	202	131	510	0	0	0	0
08:15-08:30	0	0	0	39	0	37	76	53	118	0	0	128	112	411	0	0	1	0
08:30-08:45	0	0	0	43	0	24	67	56	94	0	0	162	110	422	0	0	0	0
08:45-09:00	0	0	0	38	0	26	64	67	104	0	0	171	133	475	0	0	0	0

14:00-14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15-14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30-14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45-15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

16:00-16:15	0	0	0	169	0	62	231	45	329	0	0	124	84	582	1	0	1	0
16:15-16:30	0	0	0	207	0	48	255	50	379	0	0	118	73	620	1	0	0	0
16:30-16:45	0	0	0	187	0	71	258	49	380	0	0	138	84	651	1	0	0	0
16:45-17:00	0	0	0	192	0	54	246	48	396	0	0	136	92	672	0	0	0	0
17:00-17:15	0	0	0	181	0	72	253	33	394	0	0	211	96	734	2	0	0	0
17:15-17:30	0	0	0	167	0	76	243	40	394	0	0	182	81	697	0	0	0	0
17:30-17:45	0	0	0	187	0	68	255	45	362	0	0	122	50	579	2	0	0	0
17:45-18:00	0	0	0	199	0	55	254	38	397	0	0	134	52	621	0	0	0	0

PEAK-HOUR VOLUME ANALYSIS

CALCULATED PEAK HOUR VOLUMES-AM

07:15-08:15

SR	ST	SL
101	0	263

EL	ET	ER	WR	WT	WL
267	440	0	484	785	0

NL	NT	NR
0	0	0

ADJUSTED PEAK HOUR VOLUMES-AM

SR ST SL
EL ET ER
WR WT WL
NL NT NR

CALCULATED PEAK HOUR VOLUMES-NOON

14:00-15:00

SR	ST	SL
0	0	0

EL	ET	ER	WR	WT	WL
0	0	0	0	0	0

NL	NT	NR
0	0	0

ADJUSTED PEAK HOUR VOLUMES-NOON

SR ST SL
EL ET ER
WR WT WL
NL NT NR

CALCULATED PEAK HOUR VOLUMES-PM

16:30-17:30

SR	ST	SL
273	0	727

EL	ET	ER	WR	WT	WL
170	1564	0	353	667	0

NL	NT	NR
0	0	0

ADJUSTED PEAK HOUR VOLUMES-PM

SR ST SL
EL ET ER
WR WT WL
NL NT NR

EXISTING 24 HOUR TUBE COUNTS

City Traffic Counters
626.256.4171

Site Code:
Station ID:
Martin Luther King Jr Blvd
Bt Kansas & Chicago
Latitude: 0' 0.000 Undefined

Start Time	29-Jan-08 Tue	West	East	Total
12:00 AM		26	38	64
12:15		26	24	50
12:30		25	24	49
12:45		15	9	24
01:00		21	26	47
01:15		9	15	24
01:30		16	17	33
01:45		13	16	29
02:00		13	16	29
02:15		8	12	20
02:30		6	16	22
02:45		8	17	25
03:00		6	9	15
03:15		12	4	16
03:30		12	13	25
03:45		13	8	21
04:00		21	7	28
04:15		37	20	57
04:30		59	29	88
04:45		48	20	68
05:00		53	14	67
05:15		68	22	90
05:30		94	29	123
05:45		84	55	139
06:00		149	40	189
06:15		124	68	192
06:30		190	102	292
06:45		288	110	398
07:00		251	90	341
07:15		**332**	150	**482**
07:30		**368**	196	**564**
07:45		**364**	**231**	**595**
08:00		**370**	**184**	**554**
08:15		298	**168**	466
08:30		254	**204**	458
08:45		191	126	317
09:00		152	129	281
09:15		162	140	302
09:30		170	125	295
09:45		200	166	366
10:00		142	136	278
10:15		151	130	281
10:30		126	144	270
10:45		135	164	299
11:00		140	158	298
11:15		152	134	286
11:30		156	190	346
11:45		138	156	294
Total		5696	3901	9597
Percent		59.4%	40.6%	
Peak		07:15	07:45	07:15
Vol.		1434	787	2195
P.H.F.		0.969	0.852	0.922

City Traffic Counters
626.256.4171

Site Code:
Station ID:
Martin Luther King Jr Blvd
Bt Kansas & Chicago
Latitude: 0' 0.000 Undefined

Start Time	29-Jan-08 Tue	West	East	Total
12:00 PM		176	194	370
12:15		155	210	365
12:30		146	212	358
12:45		172	185	357
01:00		161	196	357
01:15		164	176	340
01:30		170	200	370
01:45		168	227	395
02:00		158	298	456
02:15		**210**	300	510
02:30		**241**	326	567
02:45		**209**	363	572
03:00		**186**	365	551
03:15		180	396	576
03:30		163	360	523
03:45		212	366	578
04:00		202	361	563
04:15		174	440	614
04:30		165	425	590
04:45		205	**532**	**737**
05:00		190	**510**	**700**
05:15		244	**528**	**772**
05:30		174	**508**	**682**
05:45		166	522	688
06:00		136	400	536
06:15		178	374	552
06:30		162	302	464
06:45		144	252	396
07:00		124	254	378
07:15		122	198	320
07:30		126	162	288
07:45		88	148	236
08:00		97	180	277
08:15		96	123	219
08:30		76	90	166
08:45		72	120	192
09:00		78	119	197
09:15		88	114	202
09:30		80	85	165
09:45		72	77	149
10:00		46	74	120
10:15		52	72	124
10:30		53	54	107
10:45		39	38	77
11:00		37	42	79
11:15		30	54	84
11:30		15	38	53
11:45		23	26	49
Total		6425	11596	18021
Percent		35.7%	64.3%	
Peak		14:15	16:45	16:45
Vol.		846	2078	2891
P.H.F.		0.878	0.977	0.936
Grand Total		12121	15497	27618
Percent		43.9%	56.1%	

ADT Not Calculated

City Traffic Counters
626.256.4171

Site Code:
Station ID:
Martin Luther King Jr Blvd
Bt Iowa & Canyon Crest
Latitude: 0' 0.000 Undefined

Start Time	29-Jan-08 Tue	West	East	Total
12:00 AM		22	41	63
12:15		24	27	51
12:30		25	22	47
12:45		10	18	28
01:00		18	24	42
01:15		16	20	36
01:30		10	21	31
01:45		11	21	32
02:00		9	17	26
02:15		4	17	21
02:30		12	20	32
02:45		11	16	27
03:00		7	8	15
03:15		9	8	17
03:30		6	15	21
03:45		8	15	23
04:00		19	6	25
04:15		29	18	47
04:30		54	28	82
04:45		47	16	63
05:00		46	12	58
05:15		56	28	84
05:30		88	34	122
05:45		107	44	151
06:00		101	44	145
06:15		150	65	215
06:30		202	70	272
06:45		280	122	402
07:00		264	106	370
07:15		**308**	148	**456**
07:30		**332**	**216**	**548**
07:45		**277**	**300**	**577**
08:00		**324**	**217**	**541**
08:15		250	**155**	405
08:30		217	160	377
08:45		202	152	354
09:00		202	156	358
09:15		156	198	354
09:30		158	180	338
09:45		175	152	327
10:00		149	140	289
10:15		154	151	305
10:30		122	180	302
10:45		154	175	329
11:00		190	158	348
11:15		166	128	294
11:30		136	173	309
11:45		161	191	352
Total		5478	4233	9711
Percent		56.4%	43.6%	
Peak		07:15	07:30	07:15
Vol.		1241	888	2122
P.H.F.		0.934	0.740	0.919

City Traffic Counters
626.256.4171

Site Code:
Station ID:
Martin Luther King Jr Blvd
Bt Iowa & Canyon Crest
Latitude: 0' 0.000 Undefined

Start Time	29-Jan-08 Tue	West	East	Total
12:00 PM		193	214	407
12:15		162	233	395
12:30		195	213	408
12:45		221	192	413
01:00		163	238	401
01:15		166	239	405
01:30		182	294	476
01:45		176	356	532
02:00		212	356	568
02:15		252	374	626
02:30		190	372	562
02:45		170	368	538
03:00		210	438	648
03:15		180	460	640
03:30		254	435	689
03:45		267	453	720
04:00		214	460	674
04:15		182	**464**	646
04:30		**195**	**512**	**707**
04:45		**202**	**498**	**700**
05:00		**296**	**479**	**775**
05:15		**284**	463	**747**
05:30		165	492	657
05:45		181	508	689
06:00		152	473	625
06:15		202	478	680
06:30		192	425	617
06:45		146	332	478
07:00		128	335	463
07:15		122	306	428
07:30		110	222	332
07:45		92	176	268
08:00		96	184	280
08:15		122	117	239
08:30		83	93	176
08:45		75	108	183
09:00		114	110	224
09:15		98	111	209
09:30		94	88	182
09:45		41	68	109
10:00		74	88	162
10:15		66	86	152
10:30		48	54	102
10:45		32	41	73
11:00		38	55	93
11:15		40	52	92
11:30		25	39	64
11:45		22	36	58
Total		7124	13188	20312
Percent		35.1%	64.9%	
Peak		16:30	16:15	16:30
Vol.		977	1953	2929
P.H.F.		0.825	0.954	0.945
Grand Total		12602	17421	30023
Percent		42.0%	58.0%	

ADT Not Calculated

City Traffic Counters
626.256.4171

Site Code:
Station ID:
Martin Luther King Jr Blvd
Bt Chicago & Iowa
Latitude: 0' 0.000 Undefined

Start Time	29-Jan-08 Tue	West	East	Total
12:00 AM		26	32	58
12:15		21	18	39
12:30		26	16	42
12:45		12	10	22
01:00		20	18	38
01:15		8	16	24
01:30		12	17	29
01:45		9	17	26
02:00		8	17	25
02:15		7	10	17
02:30		9	16	25
02:45		8	14	22
03:00		7	8	15
03:15		10	6	16
03:30		8	14	22
03:45		10	11	21
04:00		21	7	28
04:15		29	16	45
04:30		46	28	74
04:45		36	16	52
05:00		38	16	54
05:15		46	20	66
05:30		72	38	110
05:45		82	45	127
06:00		76	43	119
06:15		114	58	172
06:30		166	84	250
06:45		200	122	322
07:00		178	90	268
07:15		**199**	**180**	**379**
07:30		**237**	**216**	**453**
07:45		**198**	**296**	**494**
08:00		**220**	**222**	**442**
08:15		190	160	350
08:30		162	154	316
08:45		132	157	289
09:00		111	132	243
09:15		110	128	238
09:30		126	142	268
09:45		144	150	294
10:00		138	122	260
10:15		112	118	230
10:30		89	139	228
10:45		109	144	253
11:00		131	135	266
11:15		139	104	243
11:30		119	138	257
11:45		128	152	280
Total		4099	3812	7911
Percent		51.8%	48.2%	
Peak		07:15	07:15	07:15
Vol.		854	914	1768
P.H.F.		0.901	0.772	0.895

City Traffic Counters
626.256.4171

Site Code:
Station ID:
Martin Luther King Jr Blvd
Bt Chicago & Iowa
Latitude: 0' 0.000 Undefined

Start Time	29-Jan-08 Tue	West	East	Total
12:00 PM		142	170	312
12:15		149	191	340
12:30		132	172	304
12:45		150	150	300
01:00		136	158	294
01:15		131	159	290
01:30		149	202	351
01:45		146	228	374
02:00		162	288	450
02:15		197	262	459
02:30		176	294	470
02:45		190	283	473
03:00		146	331	477
03:15		156	324	480
03:30		180	313	493
03:45		200	317	517
04:00		188	306	494
04:15		166	358	524
04:30		182	**364**	**546**
04:45		**220**	**412**	**632**
05:00		**248**	**368**	**616**
05:15		**249**	**360**	**609**
05:30		**202**	342	544
05:45		166	376	542
06:00		170	319	489
06:15		178	328	506
06:30		150	287	437
06:45		106	218	324
07:00		110	224	334
07:15		115	164	279
07:30		88	158	246
07:45		84	105	189
08:00		86	126	212
08:15		85	90	175
08:30		72	81	153
08:45		64	87	151
09:00		87	96	183
09:15		69	74	143
09:30		76	67	143
09:45		40	54	94
10:00		48	65	113
10:15		46	43	89
10:30		37	36	73
10:45		33	33	66
11:00		27	43	70
11:15		36	47	83
11:30		18	28	46
11:45		20	21	41
Total		6008	9522	15530
Percent		38.7%	61.3%	
Peak		16:45	16:30	16:30
Vol.		919	1504	2403
P.H.F.		0.923	0.913	0.951
Grand Total		10107	13334	23441
Percent		43.1%	56.9%	

ADT Not Calculated

City Traffic Counters
626.256.4171

Site Code: 000000000000
Station ID:
Canyon Crest
N/O Martin Luther King Jr Blvd
Latitude: 0' 0.000 Undefined

Start Time	29-Jan-08 Tue	North	South	Total
12:00 AM		7	32	39
12:15		7	25	32
12:30		12	16	28
12:45		6	8	14
01:00		6	7	13
01:15		5	3	8
01:30		1	2	3
01:45		4	6	10
02:00		1	3	4
02:15		3	3	6
02:30		2	1	3
02:45		0	3	3
03:00		3	2	5
03:15		2	3	5
03:30		1	1	2
03:45		0	3	3
04:00		4	1	5
04:15		3	1	4
04:30		7	0	7
04:45		6	1	7
05:00		4	2	6
05:15		8	3	11
05:30		10	2	12
05:45		25	4	29
06:00		18	2	20
06:15		36	3	39
06:30		54	13	67
06:45		56	14	70
07:00		59	13	72
07:15		90	14	104
07:30		170	34	204
07:45		229	48	277
08:00		199	44	243
08:15		118	39	157
08:30		110	38	148
08:45		124	38	162
09:00		76	32	108
09:15		84	38	122
09:30		102	62	164
09:45		60	40	100
10:00		53	41	94
10:15		52	28	80
10:30		72	31	103
10:45		90	60	150
11:00		76	107	183
11:15		44	70	114
11:30		56	50	106
11:45		66	64	130
Total		2221	1055	3276
Percent		67.8%	32.2%	
Peak		07:30	11:00	07:30
Vol.		716	291	881
P.H.F.		0.782	0.680	0.795

City Traffic Counters
626.256.4171

Site Code: 000000000000
Station ID:
Canyon Crest
N/O Martin Luther King Jr Blvd
Latitude: 0' 0.000 Undefined

Start Time	29-Jan-08 Tue	North	South	Total
12:00 PM		60	106	166
12:15		86	76	162
12:30		98	102	200
12:45		92	80	172
01:00		78	72	150
01:15		76	56	132
01:30		70	58	128
01:45		94	78	172
02:00		68	132	200
02:15		48	89	137
02:30		42	61	103
02:45		63	68	131
03:00		72	134	206
03:15		94	92	186
03:30		102	150	252
03:45		90	118	208
04:00		80	122	202
04:15		85	109	194
04:30		76	**177**	**253**
04:45		124	**157**	**281**
05:00		68	**274**	**342**
05:15		72	**232**	**304**
05:30		70	172	242
05:45		65	153	218
06:00		**79**	178	257
06:15		**96**	134	230
06:30		**94**	156	250
06:45		**114**	92	206
07:00		46	106	152
07:15		60	78	138
07:30		46	75	121
07:45		79	74	153
08:00		54	105	159
08:15		49	78	127
08:30		38	62	100
08:45		54	74	128
09:00		45	78	123
09:15		51	46	97
09:30		24	67	91
09:45		25	36	61
10:00		25	68	93
10:15		35	42	77
10:30		23	36	59
10:45		17	36	53
11:00		29	38	67
11:15		14	26	40
11:30		20	20	40
11:45		10	28	38
Total		3000	4601	7601
Percent		39.5%	60.5%	
Peak		18:00	16:30	16:30
Vol.		383	840	1180
P.H.F.		0.772	0.766	0.863
Grand Total		5221	5656	10877
Percent		48.0%	52.0%	

ADT Not Calculated

City Traffic Counters
626.256.4171

Site Code : 000000000000
Start Date: 01/28/2008
File I.D. : C:\DOCUMENTS
Page : 2

Street name :Iowa Ave Cross street:N/O Martin Luther King Jr Blvd ,

Tuesday

Begin Time	South A.M.		South P.M.		North A.M.		North P.M.		Combined A.M.		Combined P.M.	
12:00 01/29	30		111		26		113		56		224	
12:15	28		131		17		108		45		239	
12:30	20		103		14		99		34		202	
12:45	13	91	98	443	10	67	142	462	23	158	240	905
01:00	19		170		5		117		24		287	
01:15	20		162		14		101		34		263	
01:30	11		151		14		133		25		284	
01:45	12	62	202	685	6	39	89	440	18	101	291	1125
02:00	7		194		7		110		14		304	
02:15	10		190		7		125		17		315	
02:30	6		185		2		129		8		314	
02:45	13	36	214	783	7	23	104	468	20	59	318	1251
03:00	2		210		5		125		7		335	
03:15	10		232		7		159		17		391	
03:30	7		213		3		116		10		329	
03:45	8	27	214	869	7	22	172	572	15	49	386	1441
04:00	8		247		2		114		10		361	
04:15	7		223		7		95		14		318	
04:30	7		246		10		98		17		344	
04:45	7	29	265	981	13	32	111	418	20	61	376	1399
05:00	2		288		14		125		16		413	
05:15	6		258		13		179		19		437	
05:30	16		268		20		121		36		389	
05:45	18	42	265	1079	39	86	95	520	57	128	360	1599
06:00	16		240		46		99		62		339	
06:15	25		249		45		105		70		354	
06:30	28		226		69		108		97		334	
06:45	27	96	184	899	101	261	115	427	128	357	299	1326
07:00	62		177		137		76		199		253	
07:15	54		167		136		85		190		252	
07:30	70		142		159		63		229		205	
07:45	99	285	110	596	191	623	70	294	290	908	180	890
08:00	101		117		203		48		304		165	
08:15	81		90		180		70		261		160	
08:30	54		79		126		86		180		165	
08:45	64	300	76	362	134	643	64	268	198	943	140	630
09:00	68		65		153		70		221		135	
09:15	110		72		114		61		224		133	
09:30	104		61		83		69		187		130	
09:45	79	361	57	255	93	443	48	248	172	804	105	503
10:00	60		43		85		28		145		71	
10:15	67		52		75		61		142		113	
10:30	85		52		75		33		160		85	
10:45	76	288	37	184	93	328	29	151	169	616	66	335
11:00	86		26		88		26		174		52	
11:15	95		36		123		25		218		61	
11:30	89		21		75		33		164		54	
11:45	91	361	40	123	81	367	20	104	172	728	60	227
Totals	1978		7259		2934		4372		4912		11631	
Day Totals		9237				7306				16543		
Split %	40.2%		62.4%		59.7%		37.5%					
Peak Hour	09:00		04:45		07:30		03:00		07:30		04:45	
Volume	361		1079		733		572		1084		1615	
P.H.F.	.82		.93		.90		.83		.89		.92	

City Traffic Counters
626.256.4171

Site Code : 000000000000
Start Date: 01/28/2008
File I.D. : C:\DOCUMENTS
Page : 2

Street name :Everton Pl Cross street:E/O Iowa Ave

Begin Time	West A.M.		West P.M.		East A.M.		East P.M.		Combined A.M.		Combined P.M.	
12:00 01/29	2		17		4		4		6		21	
12:15	1		26		6		15		7		41	
12:30	0		19		3		12		3		31	
12:45	5	8	12	74	1	14	21	52	6	22	33	126
01:00	1		15		3		14		4		29	
01:15	0		20		2		27		2		47	
01:30	2		13		1		25		3		38	
01:45	1	4	7	55	2	8	7	73	3	12	14	128
02:00	2		12		2		20		4		32	
02:15	0		11		1		10		1		21	
02:30	0		10		2		8		2		18	
02:45	0	2	68	101	2	7	4	42	2	9	72	143
03:00	0		20		0		9		0		29	
03:15	1		24		0		12		1		36	
03:30	2		22		1		10		3		32	
03:45	0	3	18	84	0	1	9	40	0	4	27	124
04:00	0		16		0		8		0		24	
04:15	0		12		0		5		0		17	
04:30	0		21		0		6		0		27	
04:45	0	*	23	72	1	1	6	25	1	1	29	97
05:00	0		18		1		11		1		29	
05:15	0		30		3		15		3		45	
05:30	0		29		0		10		0		39	
05:45	0	*	9	86	2	6	27	63	2	6	36	149
06:00	0		14		3		24		3		38	
06:15	1		17		4		22		5		39	
06:30	2		16		4		12		6		28	
06:45	2	5	7	54	3	14	13	71	5	19	20	125
07:00	6		17		5		6		11		23	
07:15	8		10		18		12		26		22	
07:30	8		11		16		5		24		16	
07:45	7	29	16	54	21	60	8	31	28	89	24	85
08:00	12		17		22		6		34		23	
08:15	9		21		25		7		34		28	
08:30	15		10		27		10		42		20	
08:45	14	50	18	66	21	95	4	27	35	145	22	93
09:00	22		20		22		11		44		31	
09:15	11		11		13		9		24		20	
09:30	11		16		9		8		20		24	
09:45	6	50	13	60	11	55	8	36	17	105	21	96
10:00	11		4		13		8		24		12	
10:15	11		11		10		9		21		20	
10:30	3		10		7		6		10		16	
10:45	1	26	6	31	5	35	8	31	6	61	14	62
11:00	5		4		3		3		8		7	
11:15	10		5		8		4		18		9	
11:30	4		1		4		6		8		7	
11:45	10	29	7	17	14	29	5	18	24	58	12	35
Totals	206		754		325		509		531		1263	
Day Totals		960				834				1794		
Split %	38.7%		59.7%		61.2%		40.3%					
Peak Hour	08:30		02:45		07:45		12:45		08:15		02:45	
Volume	62		134		95		87		155		169	
P.H.F.	.70		.49		.87		.80		.88		.58	

Tuesday

City Traffic Counters
626.256.4171

Site Code : 000000000000
Start Date: 01/28/2008
File I.D. : C:\DOCUMENTS
Page : 2

Street name :Chicago Ave Cross street:N/O Martin Luther King Jr Blvd ,

Tuesday

Begin Time	North A.M.		North P.M.		South A.M.		South P.M.		Combined A.M.		Combined P.M.	
12:00 01/29	10		141		16		164		26		305	
12:15	15		135		13		150		28		285	
12:30	12		141		10		136		22		277	
12:45	9	46	149	566	10	49	157	607	19	95	306	1173
01:00	10		154		7		173		17		327	
01:15	10		131		10		186		20		317	
01:30	1		147		11		221		12		368	
01:45	8	29	132	564	18	46	264	844	26	75	396	1408
02:00	5		155		8		257		13		412	
02:15	4		138		6		270		10		408	
02:30	7		167		6		293		13		460	
02:45	5	21	165	625	4	24	247	1067	9	45	412	1692
03:00	8		193		4		314		12		507	
03:15	4		155		6		277		10		432	
03:30	4		154		4		324		8		478	
03:45	6	22	162	664	6	20	327	1242	12	42	489	1906
04:00	10		158		4		347		14		505	
04:15	6		177		4		398		10		575	
04:30	8		149		6		357		14		506	
04:45	19	43	137	621	11	25	339	1441	30	68	476	2062
05:00	18		141		10		303		28		444	
05:15	31		170		12		277		43		447	
05:30	33		170		18		299		51		469	
05:45	71	153	145	626	25	65	278	1157	96	218	423	1783
06:00	85		175		34		340		119		515	
06:15	80		121		45		322		125		443	
06:30	108		91		40		253		148		344	
06:45	154	427	92	479	63	182	233	1148	217	609	325	1627
07:00	204		91		72		216		276		307	
07:15	176		80		72		155		248		235	
07:30	229		72		88		134		317		206	
07:45	316	925	58	301	114	346	90	595	430	1271	148	896
08:00	313		57		95		106		408		163	
08:15	234		60		90		57		324		117	
08:30	190		47		57		77		247		124	
08:45	145	882	55	219	84	326	60	300	229	1208	115	519
09:00	178		55		108		53		286		108	
09:15	140		60		120		53		260		113	
09:30	119		70		114		62		233		132	
09:45	113	550	53	238	90	432	60	228	203	982	113	466
10:00	123		33		87		44		210		77	
10:15	112		38		134		42		246		80	
10:30	127		44		109		31		236		75	
10:45	130	492	27	142	123	453	35	152	253	945	62	294
11:00	139		12		134		36		273		48	
11:15	134		16		122		16		256		32	
11:30	149		17		135		23		284		40	
11:45	139	561	18	63	140	531	15	90	279	1092	33	153
Totals	4151		5108		2499		8871		6650		13979	
Day Totals		9259				11370				20629		
Split %	62.4%		36.5%		37.5%		63.4%					
Peak Hour	07:30		02:30		11:00		04:00		07:30		03:45	
Volume	1092		680		531		1441		1479		2075	
P.H.F.	.86		.88		.94		.90		.85		.90	

Level of Service at Studied Roadway Segments

The performance criteria used for evaluating volumes and capacities on the City street system for this element were estimated using the Highway Capacity Manual (HCM) based LOS Tables shown in the following **Table A.** This table was also used to calculate segment LOS for the development of the Riverside County General Plan Circulation Element.

Traffic volumes used to develop these LOS calculations were obtained through a count program initiated for this analysis. All of the counts were taken in January 2008. Counts were taken at a total of 9 roadway segments.

Table B documents existing average daily traffic for segments within the study area.

1. Martin Luther King Junior Boulevard between Kansas Ave and Chicago Ave
2. Martin Luther King Junior Boulevard between Chicago Avenue and Iowa Avenue
3. Martin Luther King Junior Boulevard between Iowa Ave and Canyon Crest Drive
4. Chicago Avenue north of Martin Luther King Junior Boulevard
5. Chicago Avenue south of University Avenue
6. Iowa Avenue north of Martin Luther King Junior Boulevard
7. Iowa Avenue south of University Avenue
8. Everton Place east of Iowa Avenue
9. Canyon Crest north of MLK Blvd

Table A
Roadway Capacity and Level of Service Criteria

Roadway Classification	Number of Lanes	Maximum Two-Way Average Daily Traffic (ADT)				
		LOS A	LOS B	LOS C	LOS D	LOS E
Collector	2	7,800	9,100	10,400	11,700	13,000
Collector	4	15,540	18,130	20,700	23,300	25,900
Secondary Arterial	2	10,800	12,600	14,400	16,200	18,000
Secondary Arterial	4	21,540	25,130	28,700	32,300	35,900
Major Arterial	2	10,800	12,600	14,400	16,200	18,000
Major Arterial	4	21,540	25,130	28,700	32,300	35,900

Source: Riverside County General Plan

V/C: Vehicles over Capacity
LOS A: 0.00 - 0.60
LOS B: 0.61 – 0.70
LOS C: 0.71 - 0.80
LOS D: 0.81 – 0.90
LOS E: 0.91 – 1.0
LOS F: Over 1.0

Table B
Existing Average Daily Traffic Volumes for Roadway Segments

Roadway		Between	Street Class.	LOS (E) Capacity	Existing ADT (both dir)	V/C	Existing LOS
1	MLK Jr. Blvd.	Kansas to Chicago Ave	Major	35,900	27618	0.769	C
2	MLK Jr. Blvd	Chicago Ave to Iowa Avenue	Major	35,900	23441	0.653	B
3	MLK Jr. Blvd	Iowa Ave to Canyon Crest	Major	35,900	30023	0.836	D
4	Chicago Avenue	North of MLK Blvd	Major	35,900	20629	0.575	A
5	Iowa Avenue	North of MLK Blvd	Sec.	18,000	16543	0.919	E
6	Everton Place	East of Iowa Ave	Collector	13,000	1794	0.138	A
7	Canyon Crest Dr	North of MLK Blvd	Major	35,900	10877	0.302	A

EXISTING INTERSECTION
ROADWAY GEOMETRICS AND MEASUREMENTS

INTERSECTION WORKSHEETS

INTERSECTION: Chicago AV @ Blaine/3rd

CITY: RIV

PROJECT:

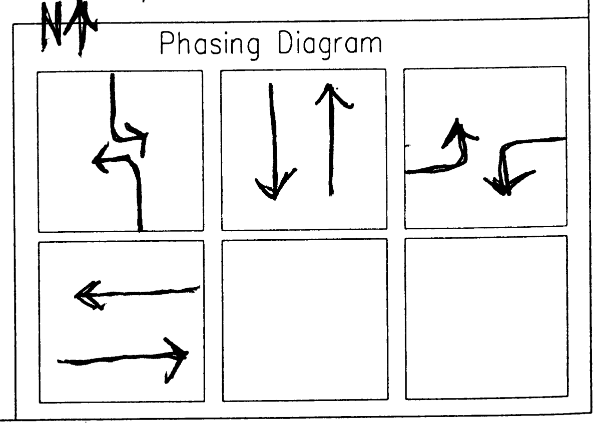
DATE: 1-25-08

ANALYST:

Cycle Length (green to green in Sec.)

N/S ____

E/W ____



1

SUPPLEMENTAL INTERSECTION WORKSHEETS

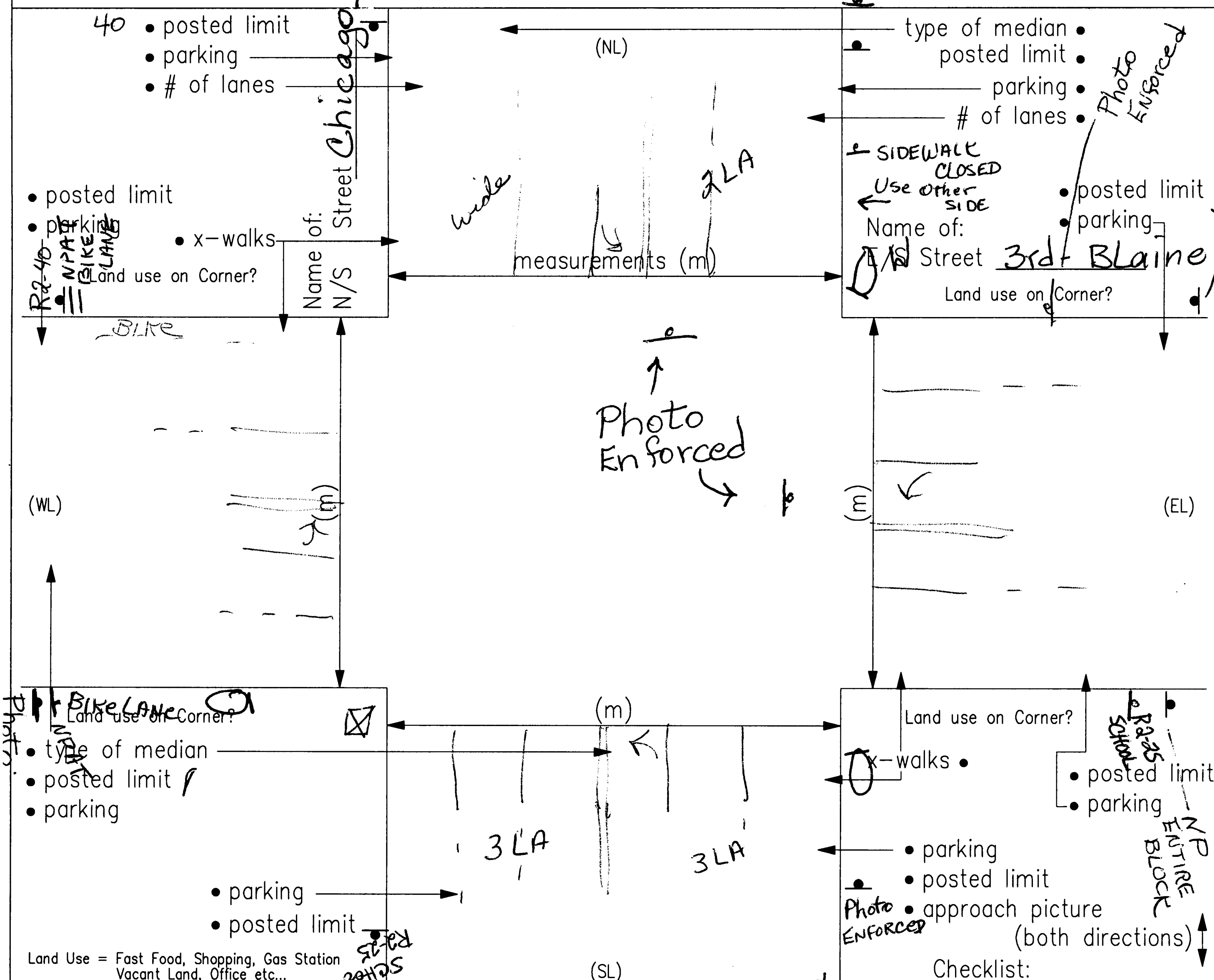
INTERSECTION: Chicago @ Blaine/3rd

DATE: 1-17-08

CITY: RIVERSIDE

ANALYST: GE

PROJECT:



Checklist:
- Parking Control at corner then parking so of inters
- Posted Limit
- # of Lanes
- Land Use in Area
- Sidewalks all 4 Legs
- Amt of Driveways
- Type of Median
  - a. raise median
  - b. dbl stripe 4 LEGS
  - c. none
  - d. two-way lt pocket

TYPE OF LEFT TURN

(A) UNPROTECTED — R Y G

(B) PROTECTED LT — LEFT ON GREEN ARROW ONLY

(C) PROTECTED/PERMITTED LT — LEFT TURN YIELD ON GREEN

NL B EL B

SL B WL B

TYPE OF RIGHT TURN

(D) UNPROTECTED — R Y G

(E) NO TURN ON RED

RIGHT ARROW (F) — R Y G Y G

NL A EL A

SL A WL A

NL - North Leg EL - East Leg

SL - South Leg WL - West Leg

(Pictures) → of each approach showing lane measurements + signal

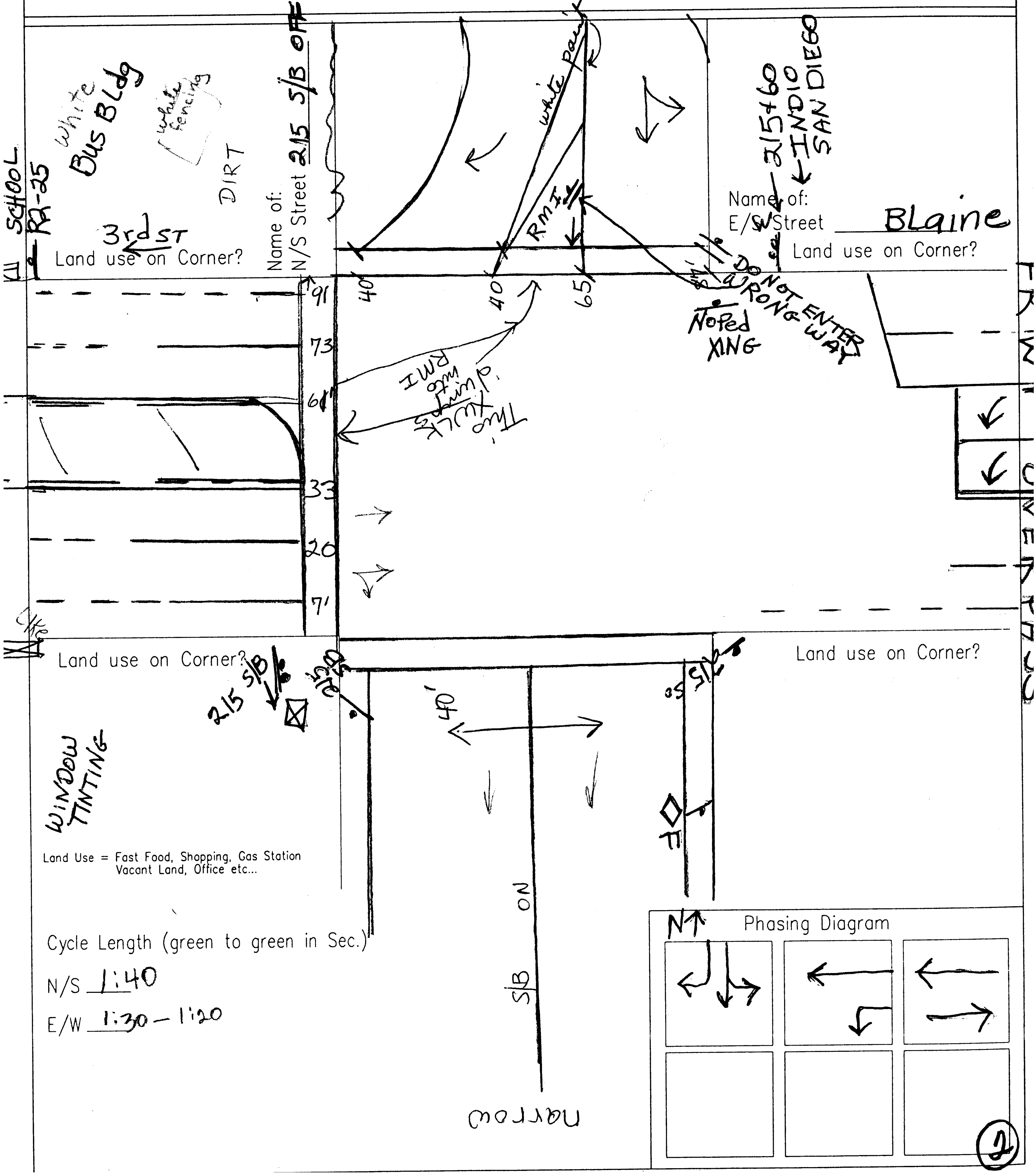
(1)

INTERSECTION WORKSHEETS

SHEET 1 OF 2
Film #4
17-27

INTERSECTION: 3rd @ 215 S/B RAMPS
CITY: RIV   Blaine
PROJECT:

DATE: 1-10-08
ANALYST: GE



Cycle Length (green to green in Sec.)

N/S 1:40

E/W 1:30 – 1:20

2

Map 6 8 6

SUPPLEMENTAL INTERSECTION WORKSHEETS

Film #4

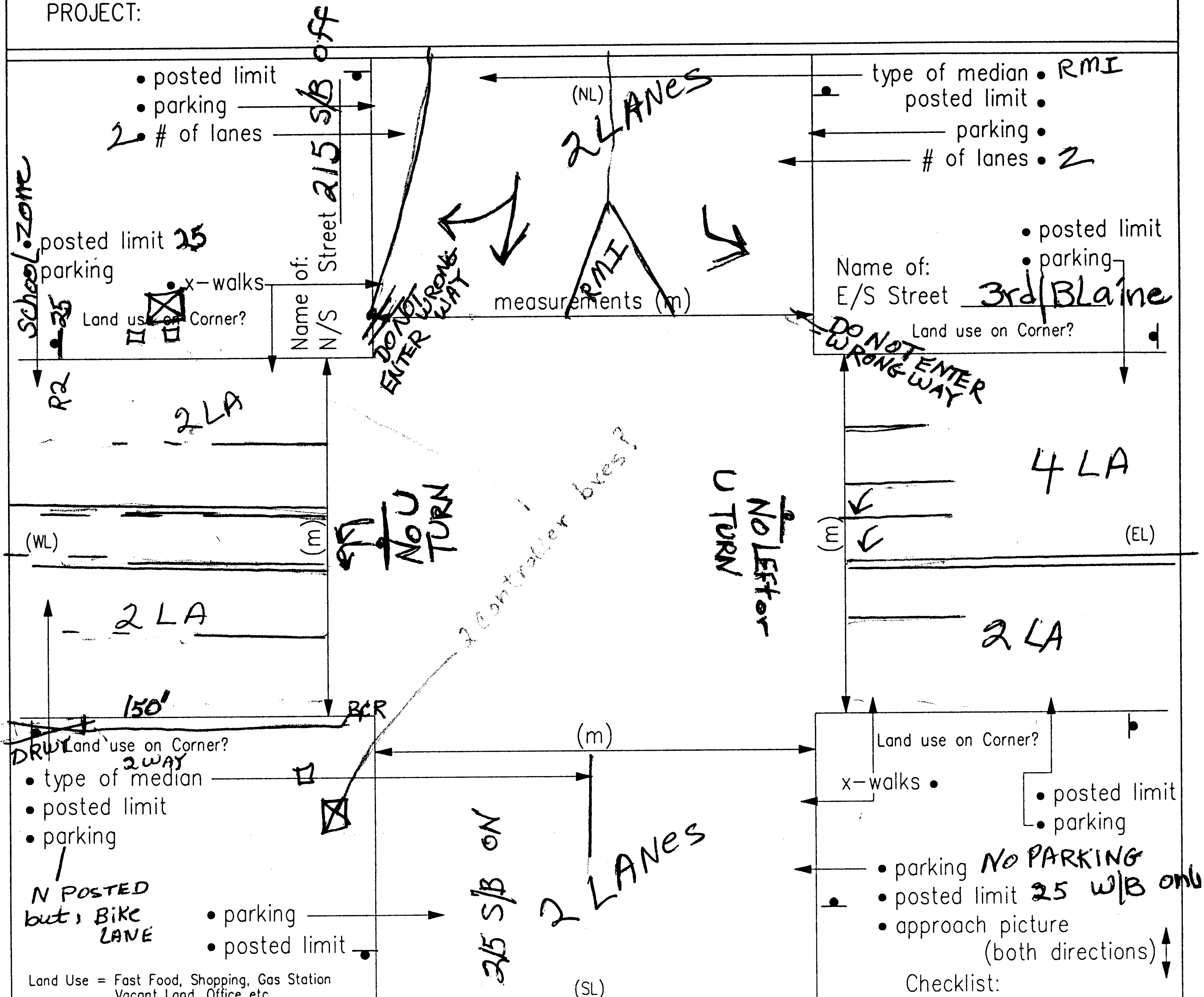
INTERSECTION: Blaine-3rd @ 215 S/B RAMPS

DATE: 1-10-08 16-5

CITY:

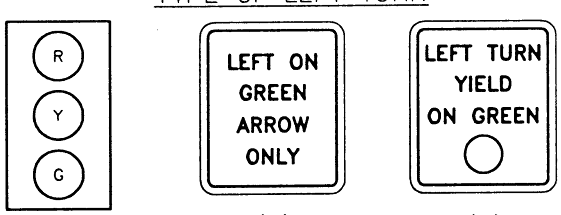
ANALYST:

PROJECT:



Checklist:
- Parking Control
- Posted Limit
- # of Lanes
- Land Use in Area — Bus to W, FRWY
- Sidewalks — E/W both
- Amt of Driveways — none
- Type of Median
  a. raise median — NL leg
  b. dbl stripe — EL leg
  c. none
  d. two-way lt pocket — W Leg just before intersect

TYPE OF LEFT TURN

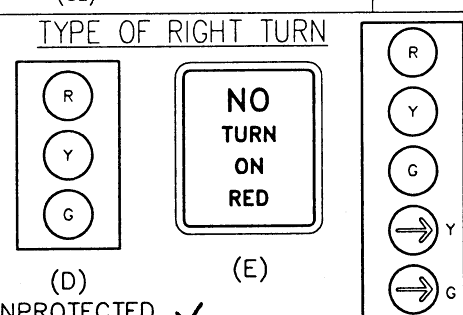


(A) UNPROTECTED — NL A, SL X

(B) PROTECTED LT — EL B, WL X

(C) PROTECTED/PERMITTED LT

TYPE OF RIGHT TURN



(D) UNPROTECTED — NL D, SL X

(E) — EL X, WL D

RIGHT ARROW (F)

NL - North Leg EL - East Leg

SL - South Leg WL - West Leg

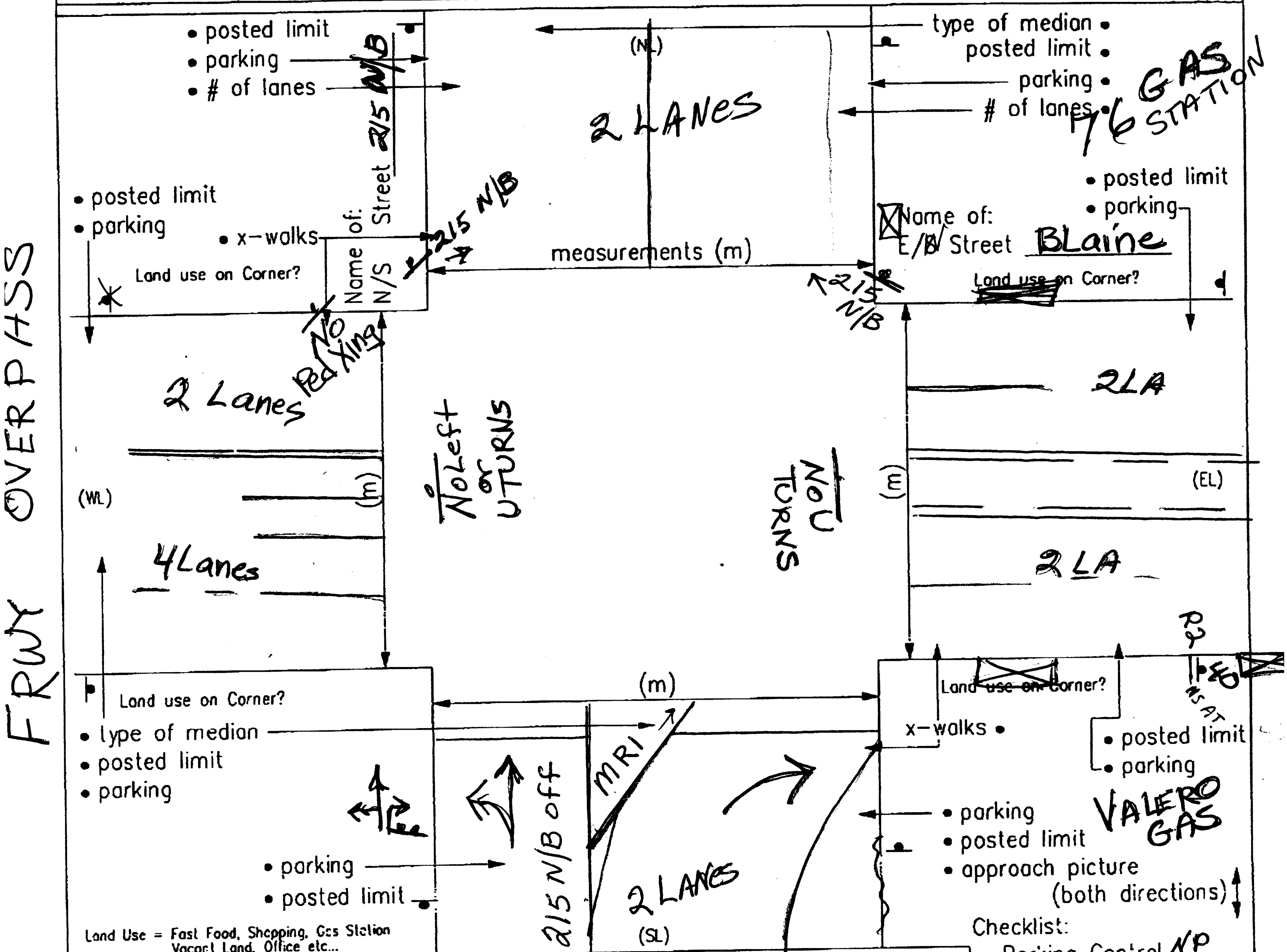
(Pictures) → of each approach showing lane measurements + signal

(1)

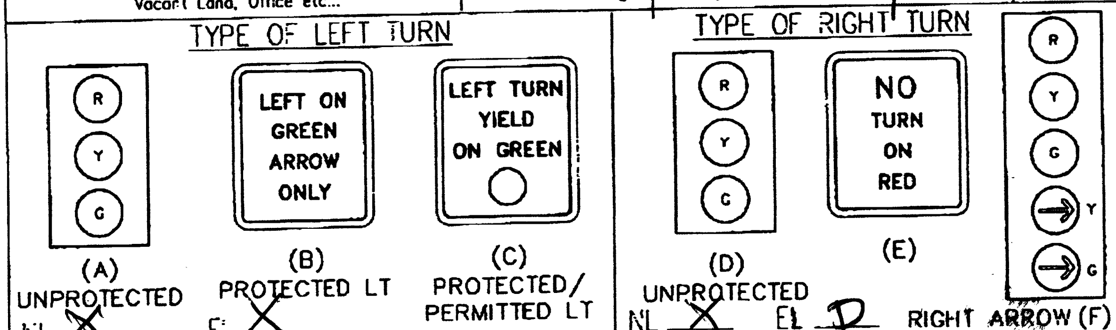
FILM #4
SHEET 2 OF 2 (first of roll)
27→17

SUPPLEMENTAL INTERSECTION WORKSHEETS

INTERSECTION: Blaine-3rd @ 215 N/B RAMPS
DATE: 1-10-08
CITY: RIVERSIDE
ANALYST: GE
PROJECT:



Checklist:
- Parking Control NP
- Posted Limit 40 E/B only
- # of Lanes
- Land Use in Area
- Sidewalks – E + W Legs
- Amt of Driveways – few GAS STATION
- Type of Median
  a. raise median S Leg
  b. dbl stripe – W leg
  c. none
  d. two-way lt pocket E Leg



NL X EL X
SL A WL B

NL X EL D
SL D WL X

NL – North Leg EL – East Leg
SL – South Leg WL – West Leg

(Pictures) → of each approach showing lane measurements + signal

INTERSECTION WORKSHEETS

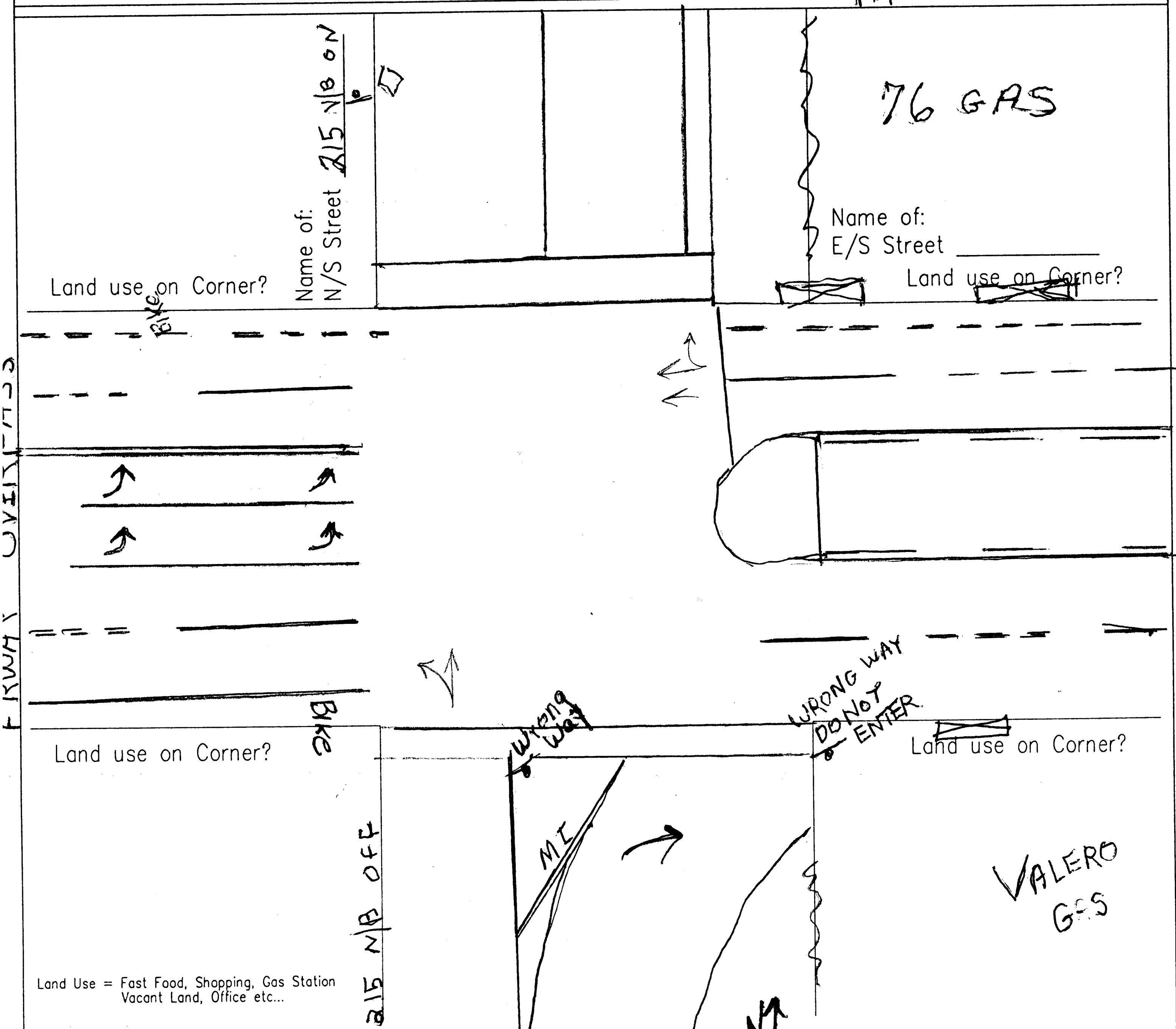
INTERSECTION: BLAINE 3rd @ 215 N/B RAMPS

DATE: 1-10-08

CITY: RIV

ANALYST:

PROJECT:



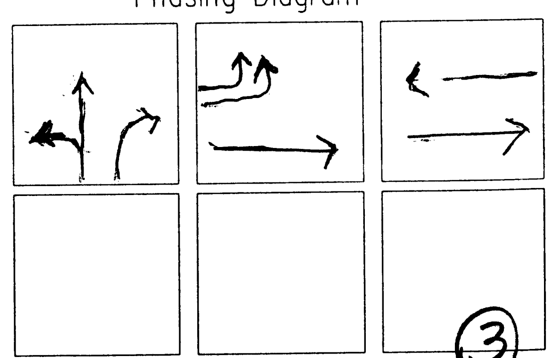
Cycle Length (green to green in Sec.)

N/S 1:10

E/W 1:20

No Arrows on signal

Phasing Diagram

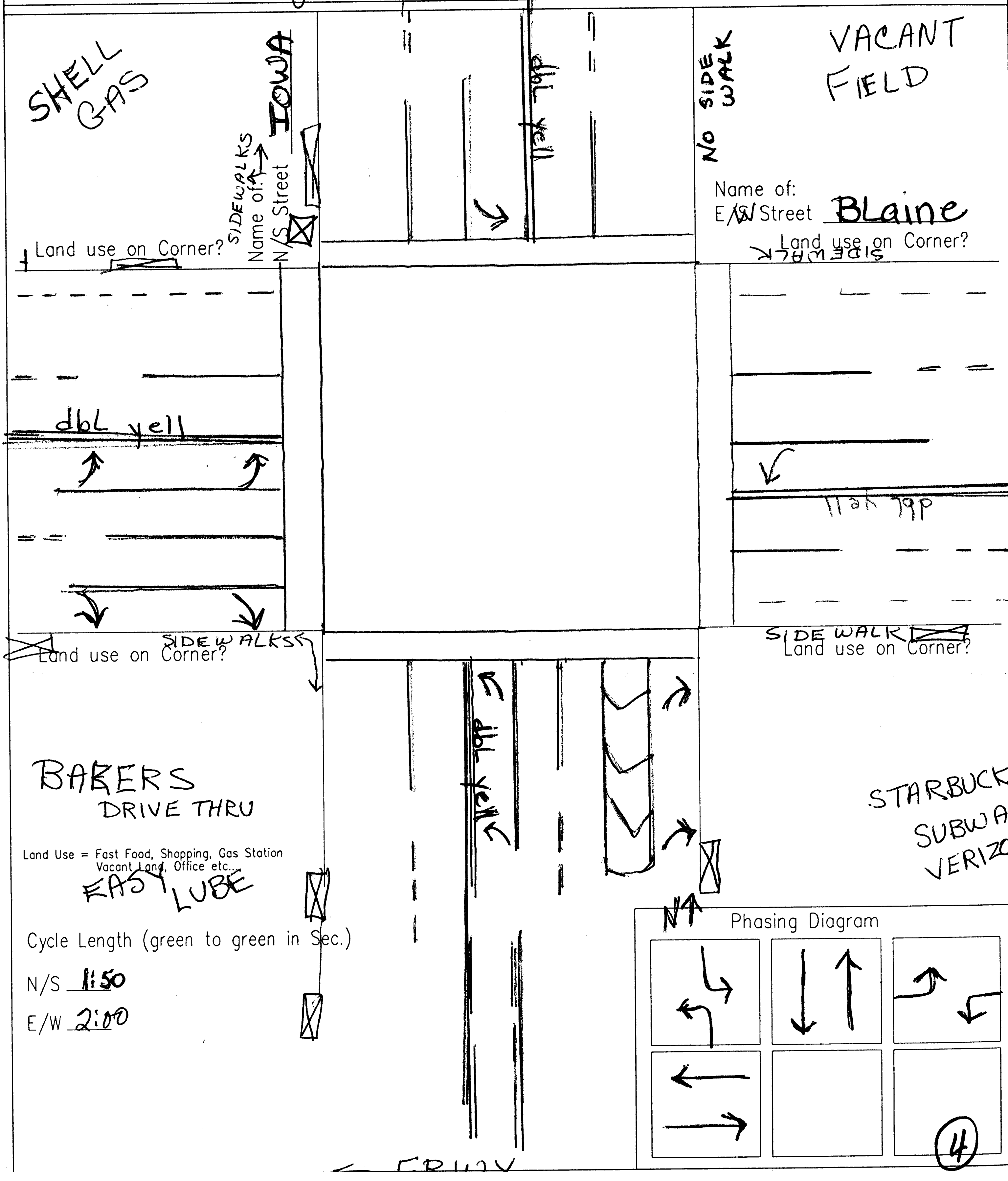


3

INTERSECTION WORKSHEETS

INTERSECTION: IOWA @ Blaine
CITY: RIV
PROJECT:

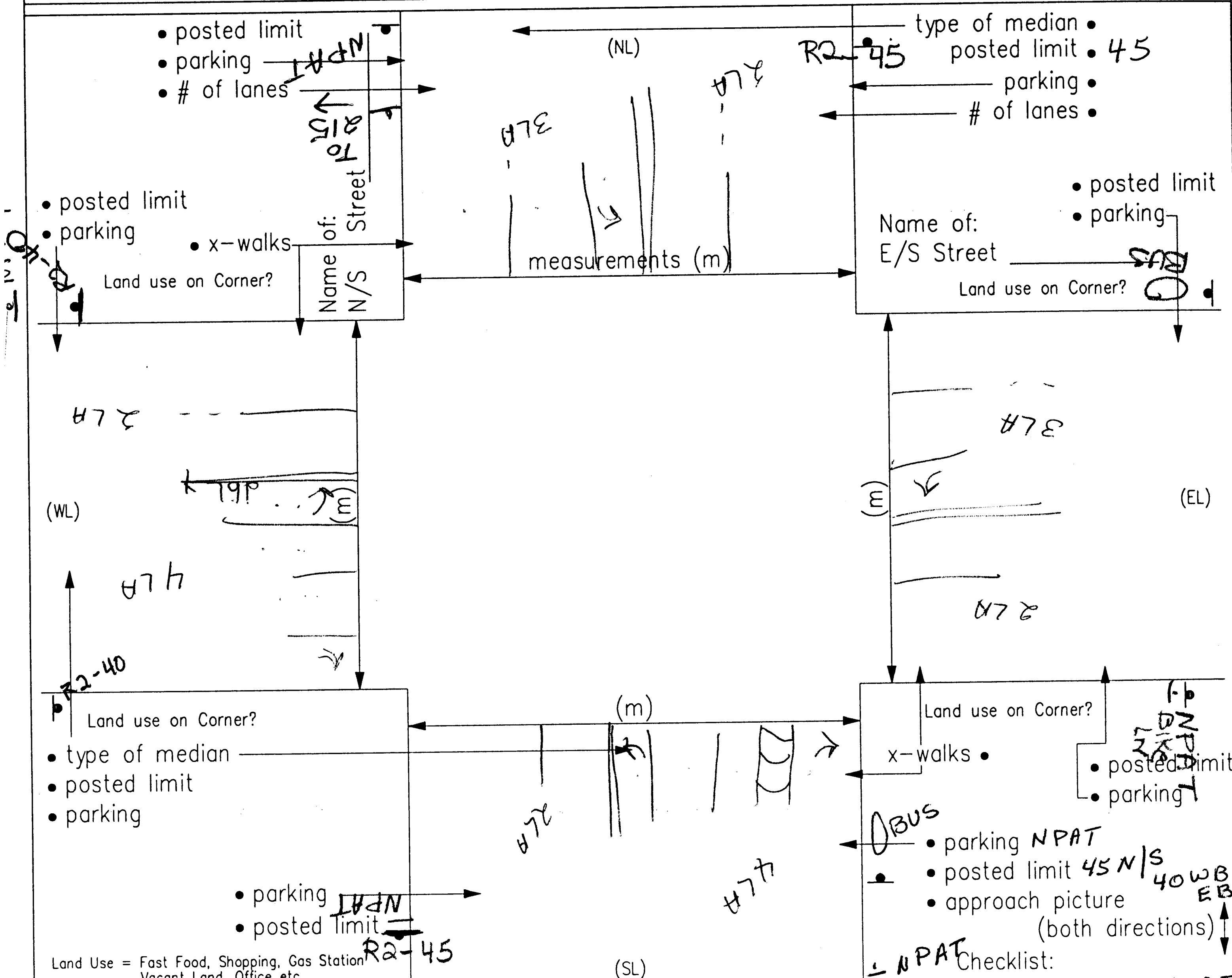
DATE: 1-25-08
ANALYST:



SUPPLEMENTAL INTERSECTION WORKSHEETS

INTERSECTION: IOWA @ Blaine
CITY: RIV
PROJECT:

DATE:
ANALYST:



NPAT Checklist:
- Parking Control NPAT
- Posted Limit
- # of Lanes
- Land Use in Area
- Sidewalks
- Amt of Driveways Commer Moderate #
- Type of Median
  - a. raise median
  - b. dbl stripe 4 WAYS
  - c. none
  - d. two-way lt pocket

S + N of intersection

TYPE OF LEFT TURN

(A) UNPROTECTED	(B) PROTECTED LT	(C) PROTECTED/ PERMITTED LT
R / Y / G	LEFT ON GREEN ARROW ONLY	LEFT TURN YIELD ON GREEN

NL B EL B
SL B WL B

TYPE OF RIGHT TURN

(D) UNPROTECTED	(E)	RIGHT ARROW (F)
R / Y / G	NO TURN ON RED	R / Y / G / Y / G

NL D EL D
SL D WL D

NL – North Leg EL – East Leg
SL – South Leg WL – West Leg

(Pictures)→of each approach showing lane measurements + signal

(IL)

SUPPLEMENTAL INTERSECTION WORKSHEETS

INTERSECTION: Chicago@ LINDEN

DATE: 1-16

CITY: RIV

ANALYST:

PROJECT:

(NL)

• posted limit
NOT POSTED • parking
3 • # of lanes

Name of: N/S Street Chicago

• posted limit
• parking NP AT
• x-walks No Tracks
Land use on Corner?

School R2-25 • type of median • dbl yell
• posted limit • 25
• parking • Not POSTED
• # of lanes • 2

3 LA
2 LA

measurements (m)

• posted limit
• parking NPAT
Name of: E/S Street LINDEN
Land use on Corner?

narrow

(WL)
3 LA
(m)

(m)
3 LA
(EL)
2 LA

Land use on Corner?
• type of median
• posted limit 40
• parking

(m)

Land use on Corner?
• x-walks
Temporary FRWY Detour 25
R2-25 School NPAT
• posted limit
• parking

2 LA
3 LA

• parking
• posted limit R2-40

• parking NP - E/W
• posted limit
• approach picture (both directions)

NOT POSTED NP but too narrow

Land Use = Fast Food, Shopping, Gas Station Vacant Land, Office etc...

(SL)

Checklist:
- Parking Control
- Posted Limit
- # of Lanes
- Land Use in Area
- Sidewalks ALL 4 Leg
- Amt of Driveways few
- Type of Median
  a. raise median
  b. dbl stripe ALL 4 leg
  c. none
  d. two-way lt pocket

TYPE OF LEFT TURN

R Y G — (A) UNPROTECTED

LEFT ON GREEN ARROW ONLY — (B) PROTECTED LT

LEFT TURN YIELD ON GREEN — (C) PROTECTED/ PERMITTED LT

NL B EL B
SL B WL B

TYPE OF RIGHT TURN

R Y G — (D) UNPROTECTED

NO TURN ON RED — (E)

R Y G Y G — RIGHT ARROW (F)

NL D EL D
SL D WL D

NL - North Leg EL - East Leg
SL - South Leg WL - West Leg

(Pictures) → of each approach showing lane measurements + signal

INTERSECTION WORKSHEETS

SHEET 1 OF 2

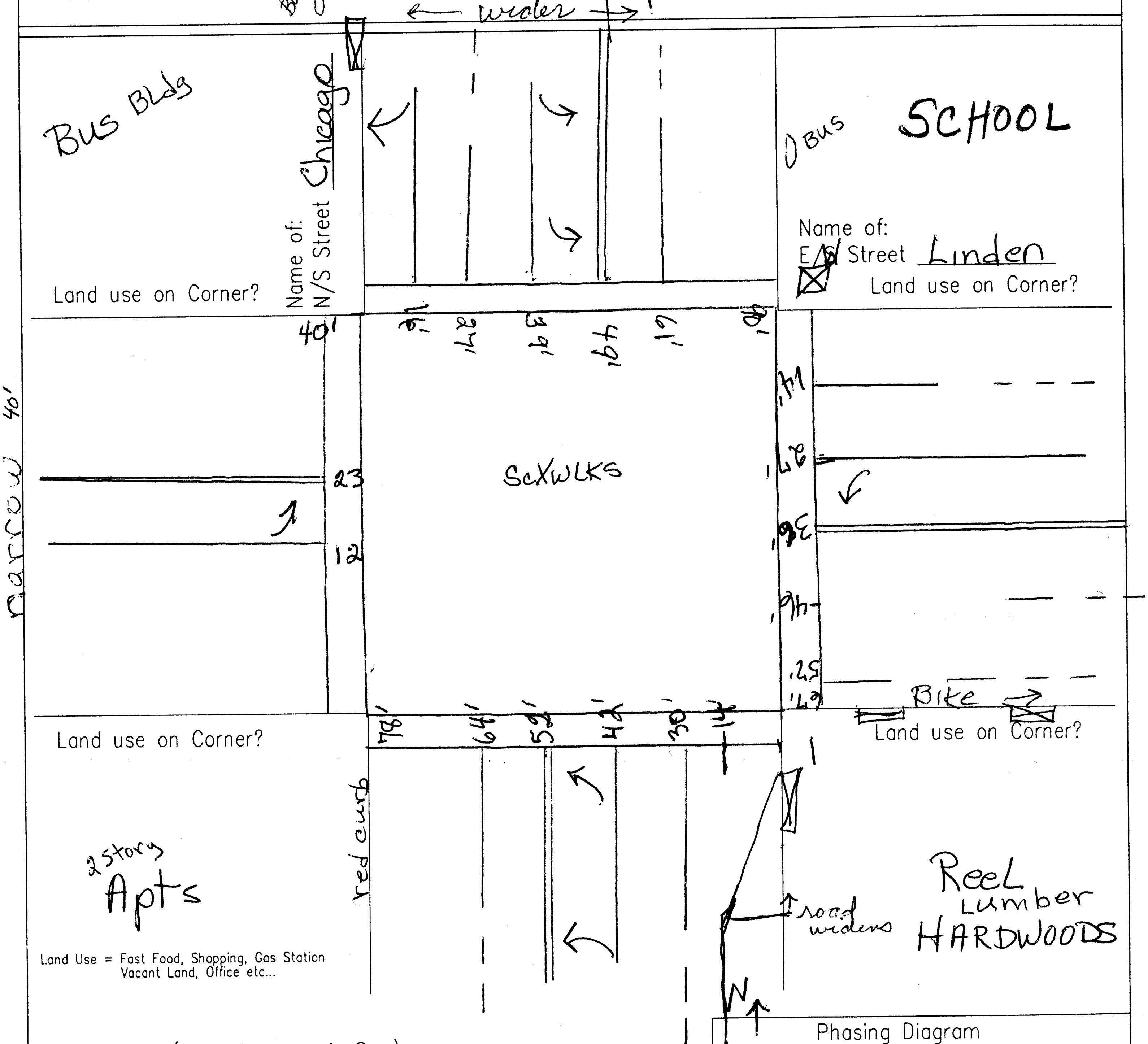
INTERSECTION: Chicago @ Linden

CITY:

PROJECT:

DATE: 1-16-08 #7

ANALYST: GE

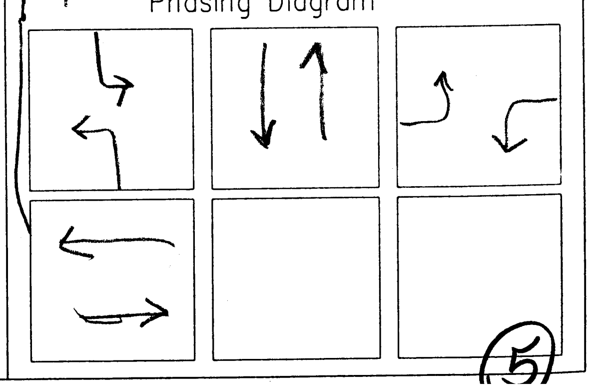


Cycle Length (green to green in Sec.)

N/S :40

E/W 1:25

Phasing Diagram



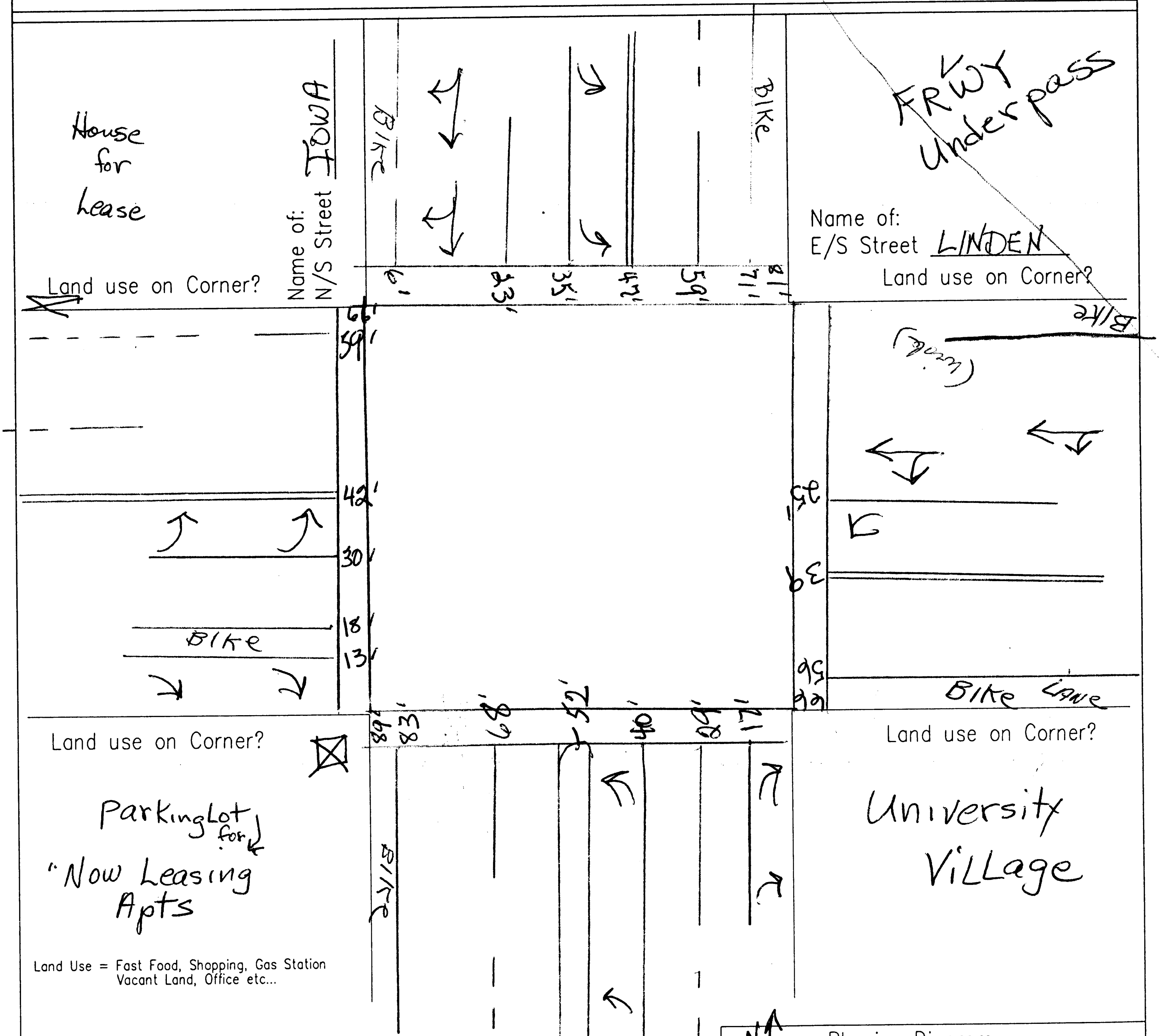
(5)

INTERSECTION WORKSHEETS

Film #7

INTERSECTION: IOWA @ LINDEN
CITY:
PROJECT:

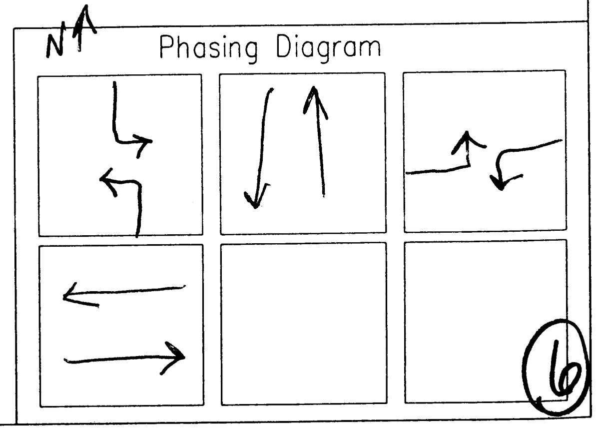
DATE:
ANALYST:



Cycle Length (green to green in Sec.)

N/S :50

E/W 1:15



6

SUPPLEMENTAL INTERSECTION WORKSHEETS

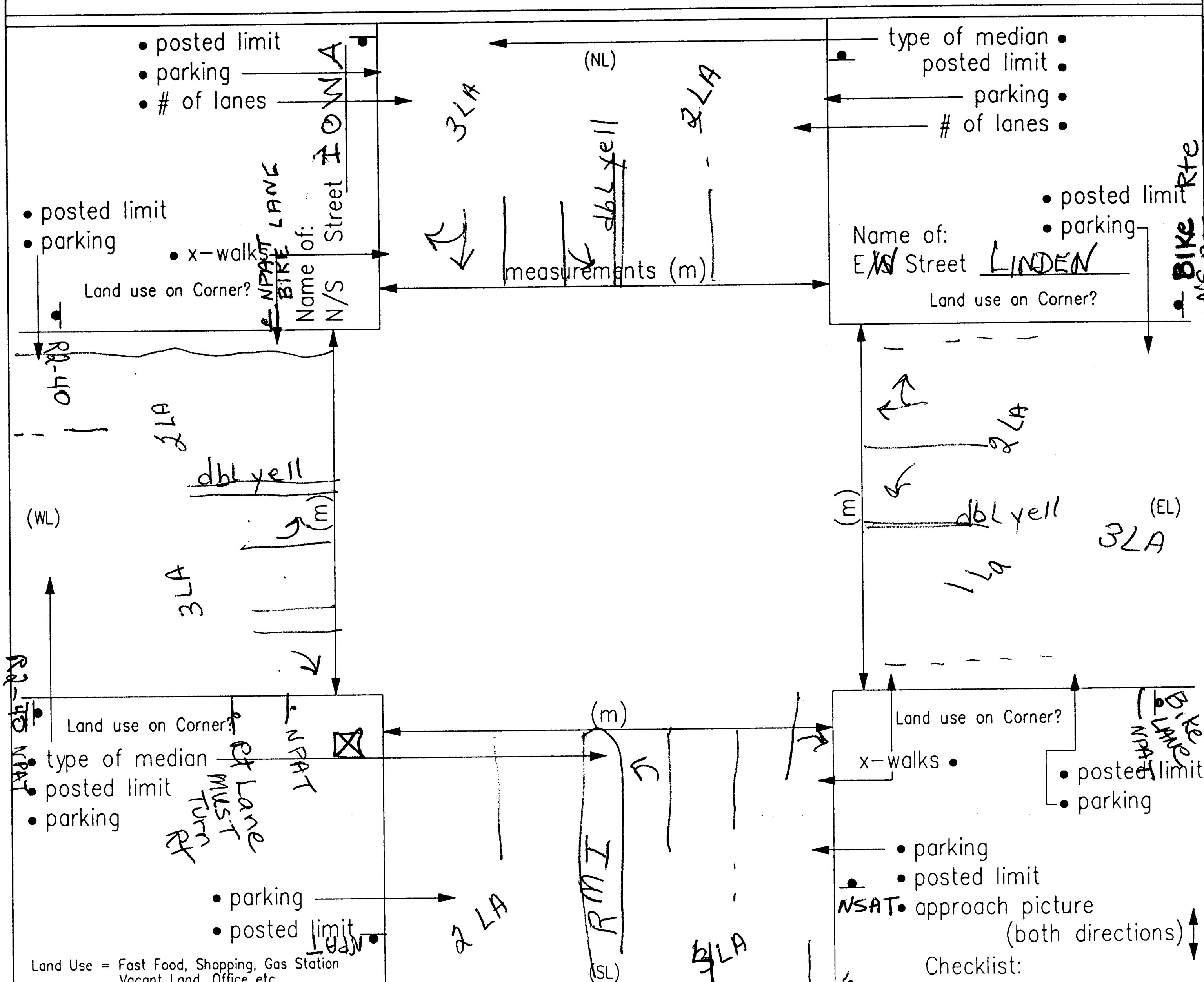
INTERSECTION: IOWA @ LINDEN

DATE:

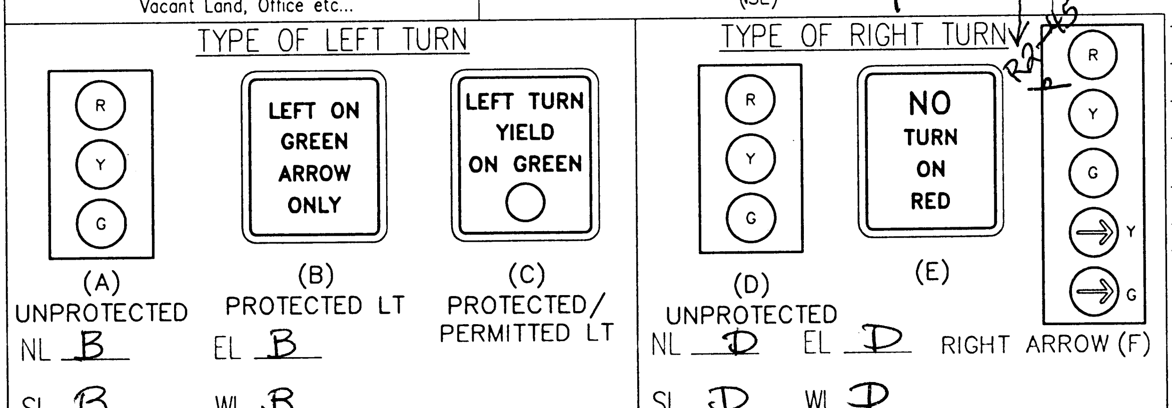
CITY:

ANALYST:

PROJECT:



Checklist:
- Parking Control
- Posted Limit E/B 40 45 N/B
- # of Lanes
- Land Use in Area
- Sidewalks
- Amt of Driveways
- Type of Median
  - a. raise median
  - b. dbl stripe
  - c. none
  - d. two-way lt pocket



NL – North Leg   EL – East Leg

SL – South Leg   WL – West Leg

(Pictures) → of each approach showing lane measurements + signal

INTERSECTION WORKSHEETS

SHEET 1 OF 2

FiLm #1 → 7-0

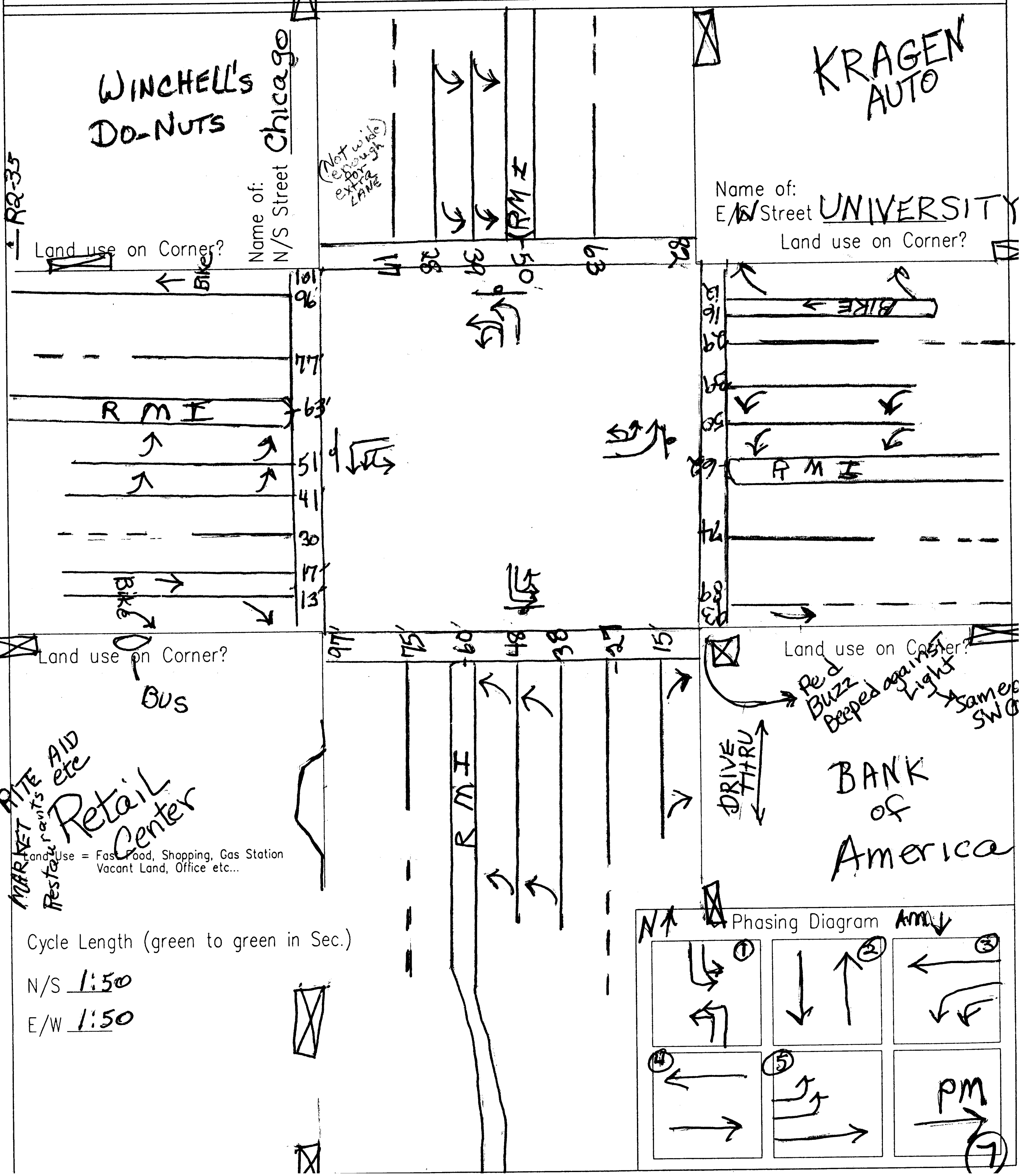
INTERSECTION: Chicago Av @ University A.

CITY: RIVERSIDE

PROJECT:

DATE: 1-10-08

ANALYST: GE



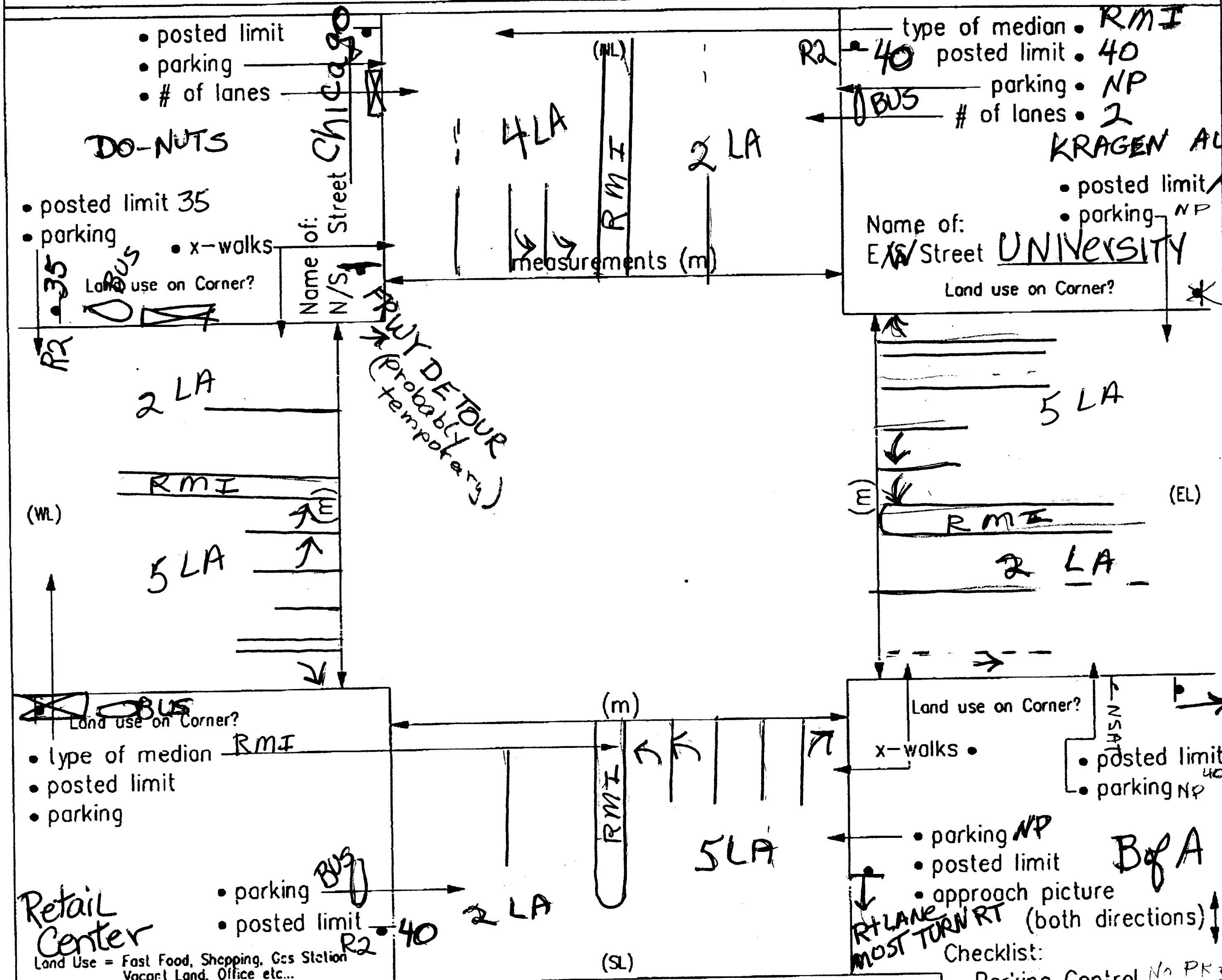
Cycle Length (green to green in Sec.)

N/S 1:50

E/W 1:50

SUPPLEMENTAL INTERSECTION WORKSHEETS

INTERSECTION: Chicago @ University
DATE: 1-10-08
CITY: RIV
ANALYST: GE
PROJECT:



Checklist:
- Parking Control No PK
- Posted Limit 40 N/S 35 WB
- # of Lanes
- Land Use in Area
- Sidewalks ALL 4
- Amt of Driveways Few Commerc
- Type of Median R
  - a. raise median ALL 4 Legs
  - b. dbl stripe
  - c. none
  - d. two-way lt pocket

TYPE OF LEFT TURN

R Y G — (A) UNPROTECTED

LEFT ON GREEN ARROW ONLY — (B) PROTECTED LT

LEFT TURN YIELD ON GREEN — (C) PROTECTED/PERMITTED LT

NL B EL B
SL B WL B

TYPE OF RIGHT TURN

R Y G — (D) UNPROTECTED

NO TURN ON RED — (E)

R Y G → Y → G — RIGHT ARROW (F)

NL D EL D
SL D WL D

NL - North Leg EL - East Leg
SL - South Leg WL - West Leg

(Pictures)→ of each approach showing lane measurements + signal

Sign ↗ RT LANE MUST TURN RT

(7)

INTERSECTION WORKSHEETS

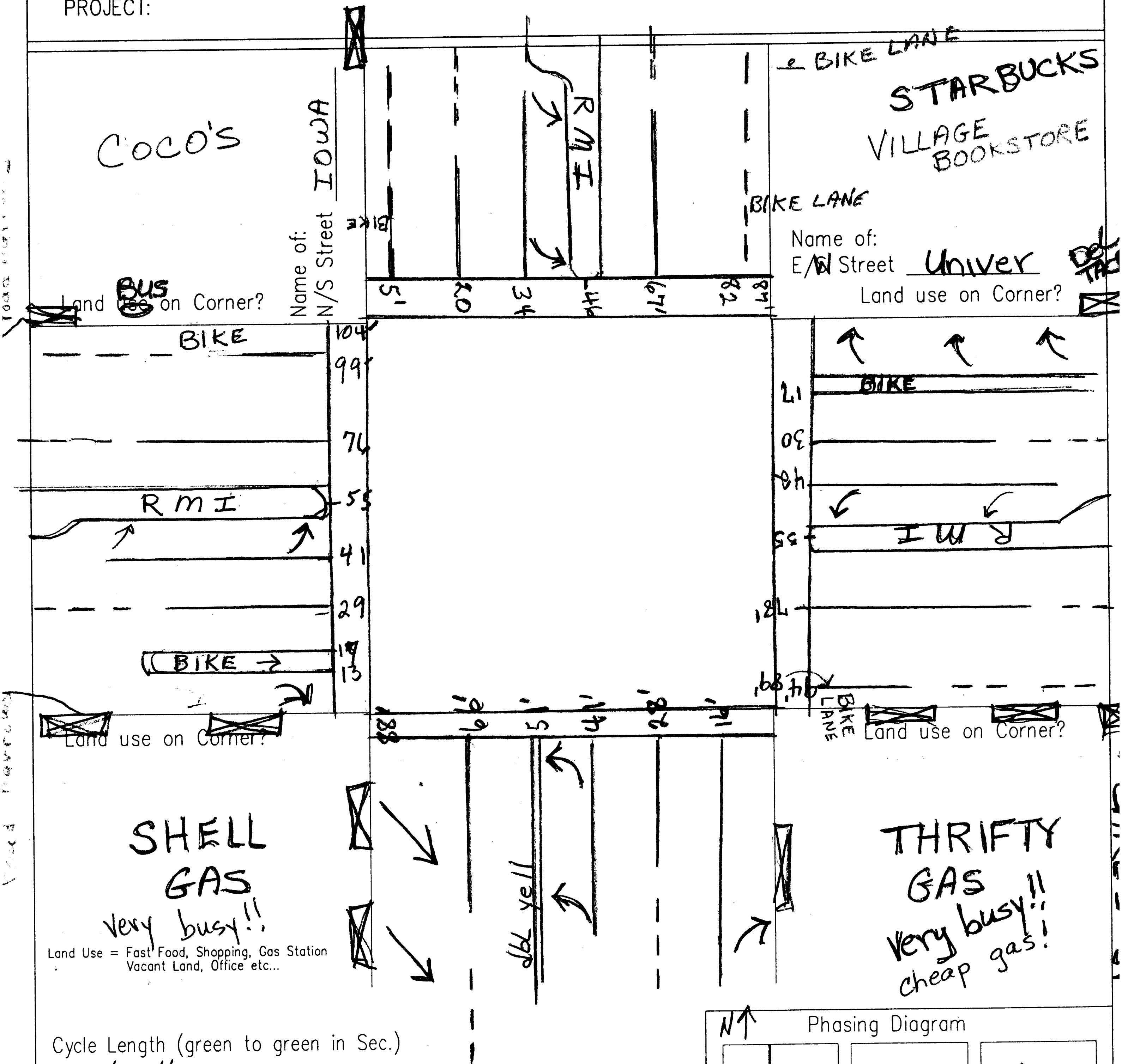
INTERSECTION: IOWA @ University

DATE: 1-09-08 Film #3

CITY: RIVERSIDE

ANALYST: GE

PROJECT:

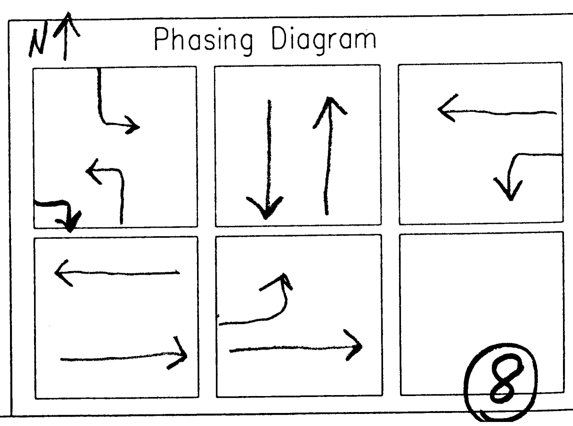


Cycle Length (green to green in Sec.)

N/S 1'40"

E/W 1'40"

Phasing Diagram



SUPPLEMENTAL INTERSECTION WORKSHEETS

INTERSECTION: IOWA @ University
CITY: RIV
PROJECT: Photo Enforced — Univ Detour

DATE: 1-9-08
ANALYST: GE
R2-45

North-west corner:
- posted limit NPAT BIKE LANE
- parking
- # of lanes 3

COCOS

- posted limit
- parking
- x-walks

Name of: N/S Street IOWA

NPAT
Land use on Corner? BUS

(NL)
3 Lanes
MI
Bike
2 LANES
measurements (m)

North-east corner:
- type of median • raised
- NPAT posted limit •
- parking •
- # of lanes • 2

STARBUCKS
NPAT BIKE LANE
- posted limit
- parking NP

Name of: E/S Street UNIV
Photo ENFOR
NPAT
Land use on Corner?

(WL)
2 Lanes
MI
4 Lanes

(EL)
4 Lanes
MI
2 Lanes

Do NOT BLOCK INTERS

South-west corner:
NPAT
Land use on Corner?
- type of median
- posted limit
- parking NP

Photo ENFORCED
Shell gas
- parking NP
- posted limit

Land Use = Fast Food, Shopping, Gas Station Vacant Land, Office etc...

(m)
2 Lanes
4 Lanes
(SL)

South-east corner:
Land use on Corner?
Bike
R2-35
- x-walks • NPAT BIKE LANE
- posted limit
- parking

Photo ENFORCED
- parking NP
- ~~posted limit~~ NP
Rt LANE MUST TURN RT
- approach picture (both directions)

Checklist:
- Parking Control NPAT
- Posted Limit
- # of Lanes
- Land Use in Area
- Sidewalks all legs-yes
- Amt of Driveways few Commercial Exits
- Type of Median
  - a. raise median
  - b. dbl stripe
  - c. none
  - d. two-way lt pocket

TYPE OF LEFT TURN

(A) UNPROTECTED — R Y G

(B) PROTECTED LT — LEFT ON GREEN ARROW ONLY

(C) PROTECTED/PERMITTED LT — LEFT TURN YIELD ON GREEN

NL B EL B
SL B WL B

TYPE OF RIGHT TURN

(D) UNPROTECTED — R Y G

(E) NO TURN ON RED

RIGHT ARROW (F) — R Y G → Y → G

NL ___ EL ___
SL ___ WL F

NL – North Leg EL – East Leg
~~SL – South Leg WL – West Leg~~

(Pictures) → of each approach showing lane measurements + signal

SUPPLEMENTAL INTERSECTION WORKSHEETS #3

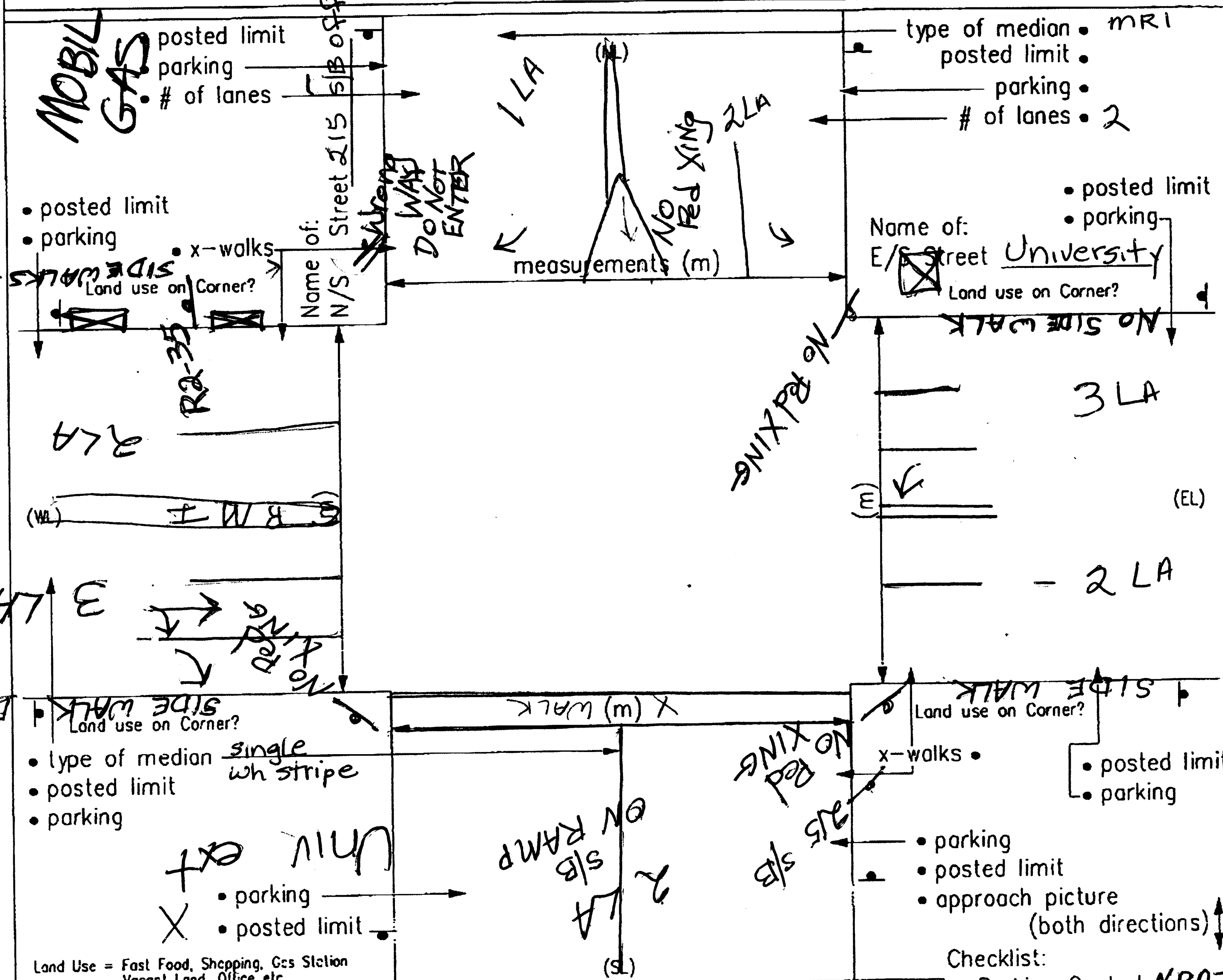
INTERSECTION: UNIV @ 215 S/B RAMPS

DATE: 1-09-08

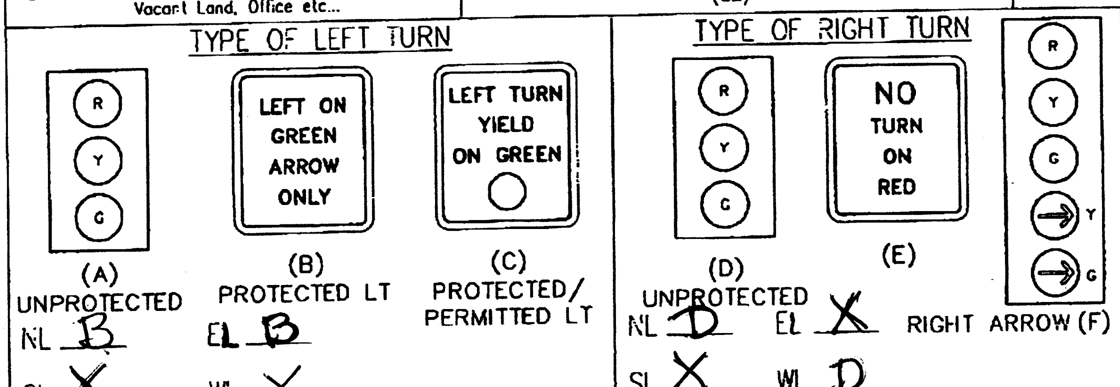
CITY: RIVERSIDE

ANALYST: GE

PROJECT:



Checklist:
- Parking Control NPAT
- Posted Limit 35 WB
- # of Lanes
- Land Use in Area
- Sidewalks – E & W Legs
- Amt of Driveways – 2 gas station
- Type of Median R in WL
  - a. raise median W, N
  - b. dbl stripe E
  - c. none
  - d. two-way lt pocket



NL – North Leg EL – East Leg

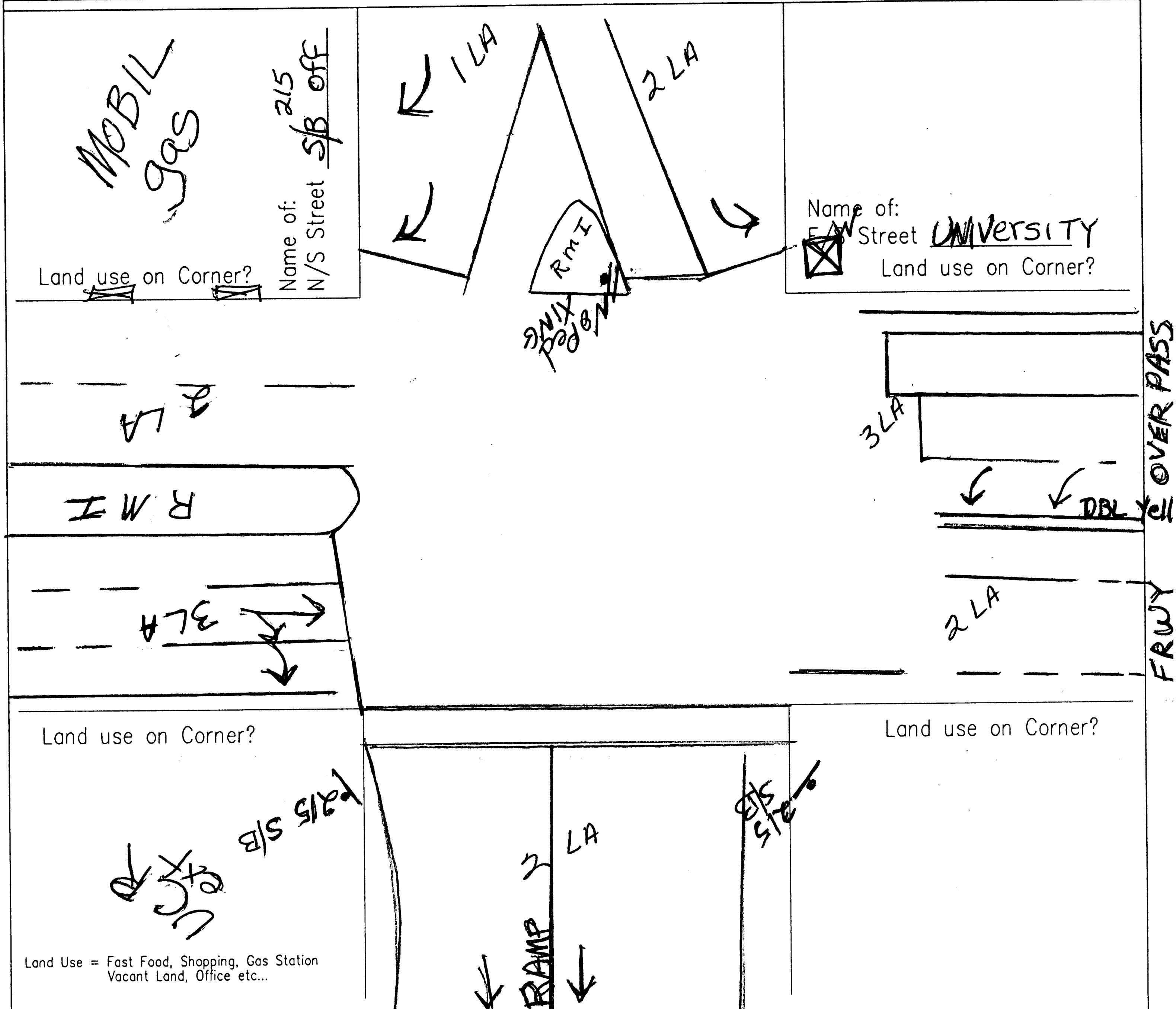
SL – South Leg WL – West Leg

(Pictures) → of each approach showing lane measurements + signal

No SIDEWALK EL NS

INTERSECTION WORKSHEETS

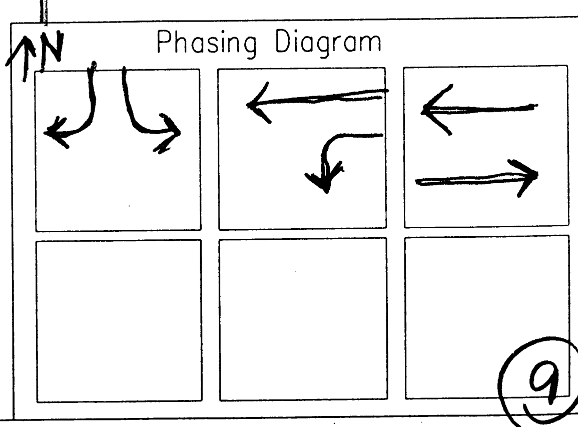
INTERSECTION: Univ @ 215 S/B RAMPS
DATE: 1-09-08
CITY: RIV
ANALYST: GE
PROJECT:



Cycle Length (green to green in Sec.)

N/S 1:10

E/W 1:10 – 1:30



SUPPLEMENTAL INTERSECTION WORKSHEETS

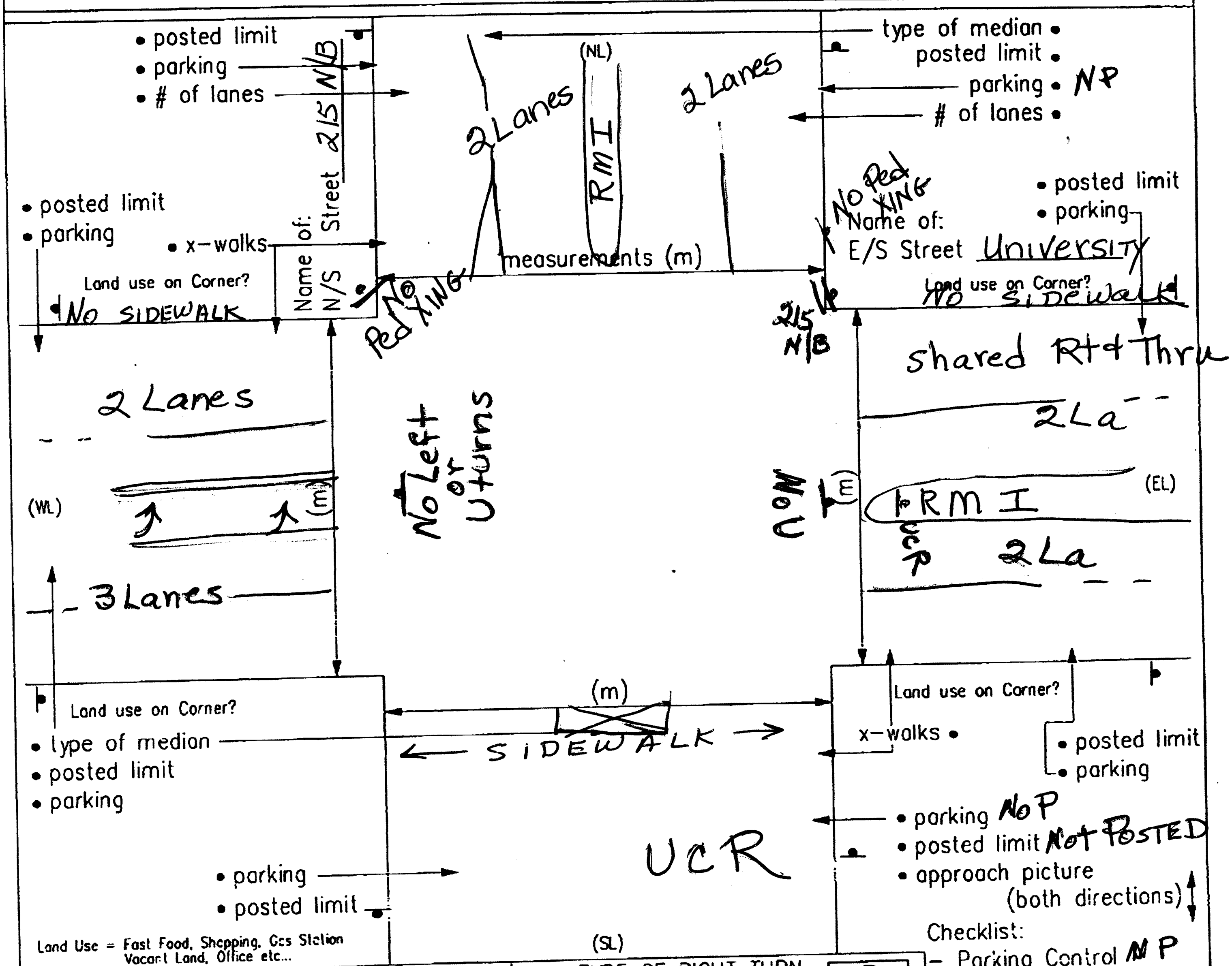
INTERSECTION: UNIV @ 215 N/B RAMPS

DATE: 1-09-08

CITY: RIV

ANALYST:

PROJECT:



Checklist:
- Parking Control NP
- Posted Limit NP
- # of Lanes
- Land Use in Area UCR FRWY
- Sidewalks SS
- Amt of Driveways 1
- Type of Median
  a. raise median N Leg & E Leg
  b. dbl stripe W Leg
  c. none
  d. two-way lt pocket

TYPE OF LEFT TURN

(A) UNPROTECTED [R / Y / G signal]

(B) PROTECTED LT [LEFT ON GREEN ARROW ONLY]

(C) PROTECTED/PERMITTED LT [LEFT TURN YIELD ON GREEN]

NL D EL X

SL X WL B

TYPE OF RIGHT TURN

(D) UNPROTECTED [R / Y / G signal]

(E) [NO TURN ON RED]

RIGHT ARROW (F) [R / Y / G / → Y / → G signal]

NL D EL D

SL X WL X

NL – North Leg EL – East Leg

SL – South Leg WL – West Leg

(Pictures) → of each approach showing lane measurements + signal

INTERSECTION WORKSHEETS

SHEET 1 OF 2 Film #2

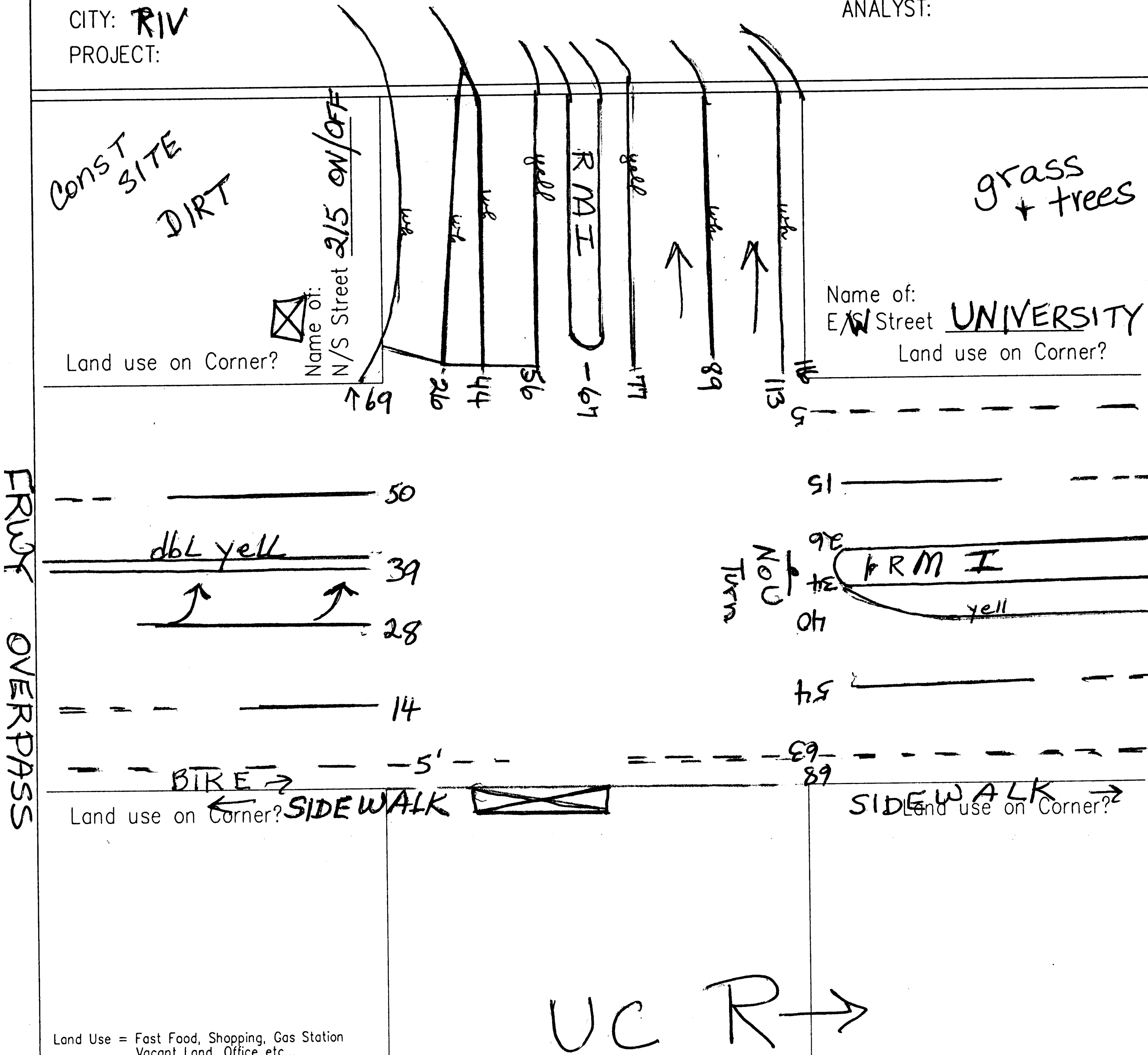
INTERSECTION: UNIV @ 215 N/B RAMPS

DATE: 1-09-08

CITY: RIV

ANALYST:

PROJECT:



Name of: N/S Street 215 ON/OFF

Land use on Corner?

Name of: E/W Street UNIVERSITY

Land use on Corner?

Land use on Corner?

Land use on Corner?

Land Use = Fast Food, Shopping, Gas Station Vacant Land, Office etc...

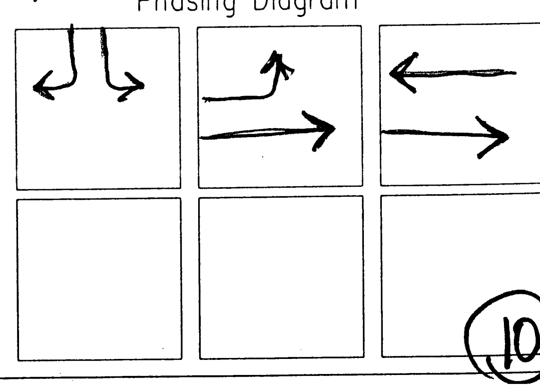
Cycle Length (green to green in Sec.)

N/S ____

E/W ____

N

Phasing Diagram



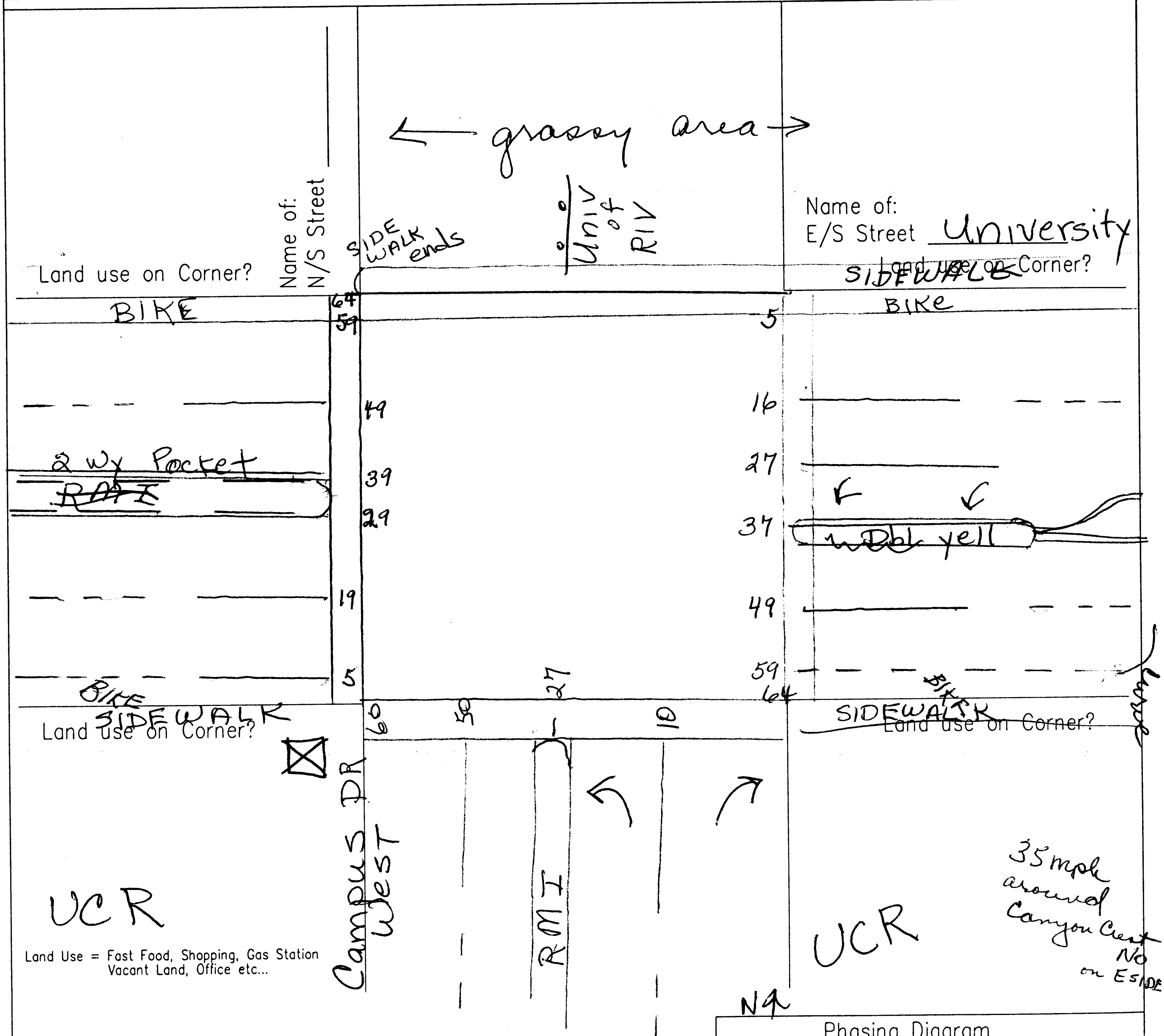
10

INTERSECTION WORKSHEETS

SHEET 1 OF 2
#9

INTERSECTION: University @ Campus West Dr
CITY: RIVERSIDE
PROJECT: UCR

DATE: 1-29-08
ANALYST: GE

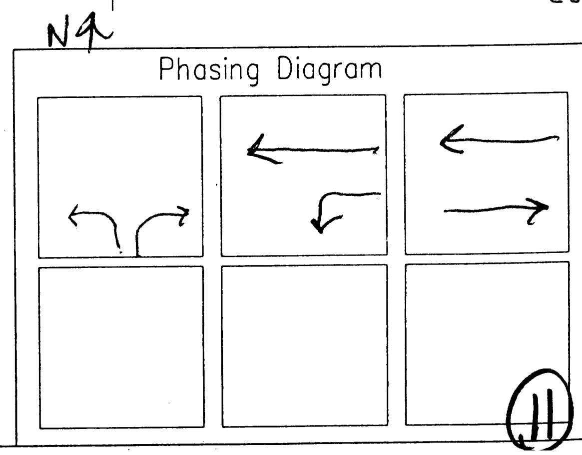


Cycle Length (green to green in Sec.)

N/S ____

E/W ____

Comments:
* witnessed cars in S Leg turning L out of both lanes



SUPPLEMENTAL INTERSECTION WORKSHEETS #9

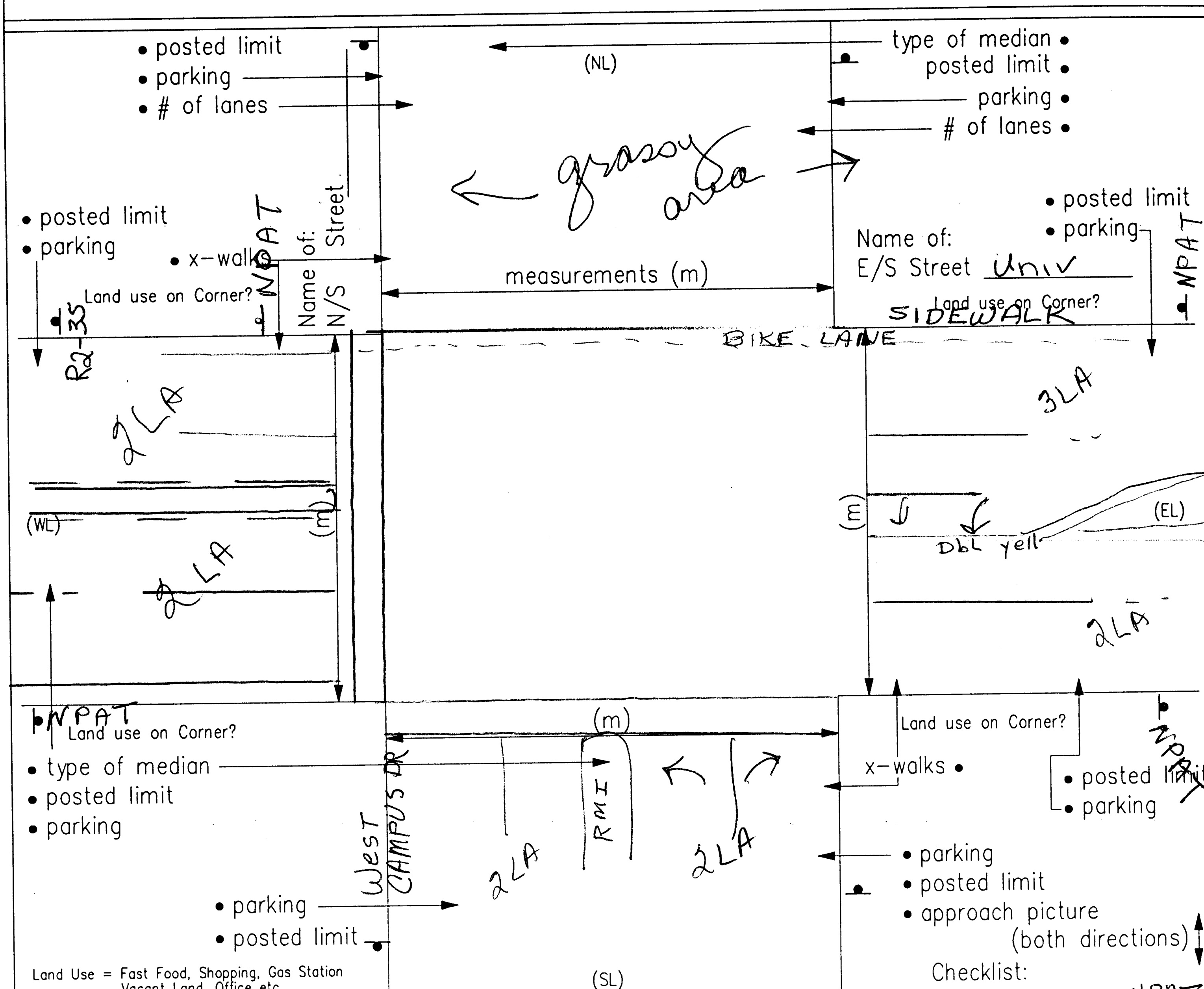
INTERSECTION: University @ Campus West

DATE: 1-29-08

CITY:

ANALYST:

PROJECT:



TYPE OF LEFT TURN

(A) UNPROTECTED — NL X, SL A

(B) PROTECTED LT (LEFT ON GREEN ARROW ONLY) — EL B, WL X

(C) PROTECTED/PERMITTED LT (LEFT TURN YIELD ON GREEN)

TYPE OF RIGHT TURN

(D) UNPROTECTED — NL X, EL X, SL D, WL D

(E) NO TURN ON RED

RIGHT ARROW (F)

Checklist:

- Parking Control NPAT
- Posted Limit 35 W/B
- # of Lanes
- Land Use in Area
- Sidewalks yes
- Amt of Driveways 2 for school purpose
- Type of Median
  - a. raise median S Leg
  - b. dbl stripe E Leg
  - c. none
  - d. two-way lt pocket W Leg

NL - North Leg   EL - East Leg

SL - South Leg   WL - West Leg

(Pictures)→ of each approach showing lane measurements + signal

SUPPLEMENTAL INTERSECTION WORKSHEETS

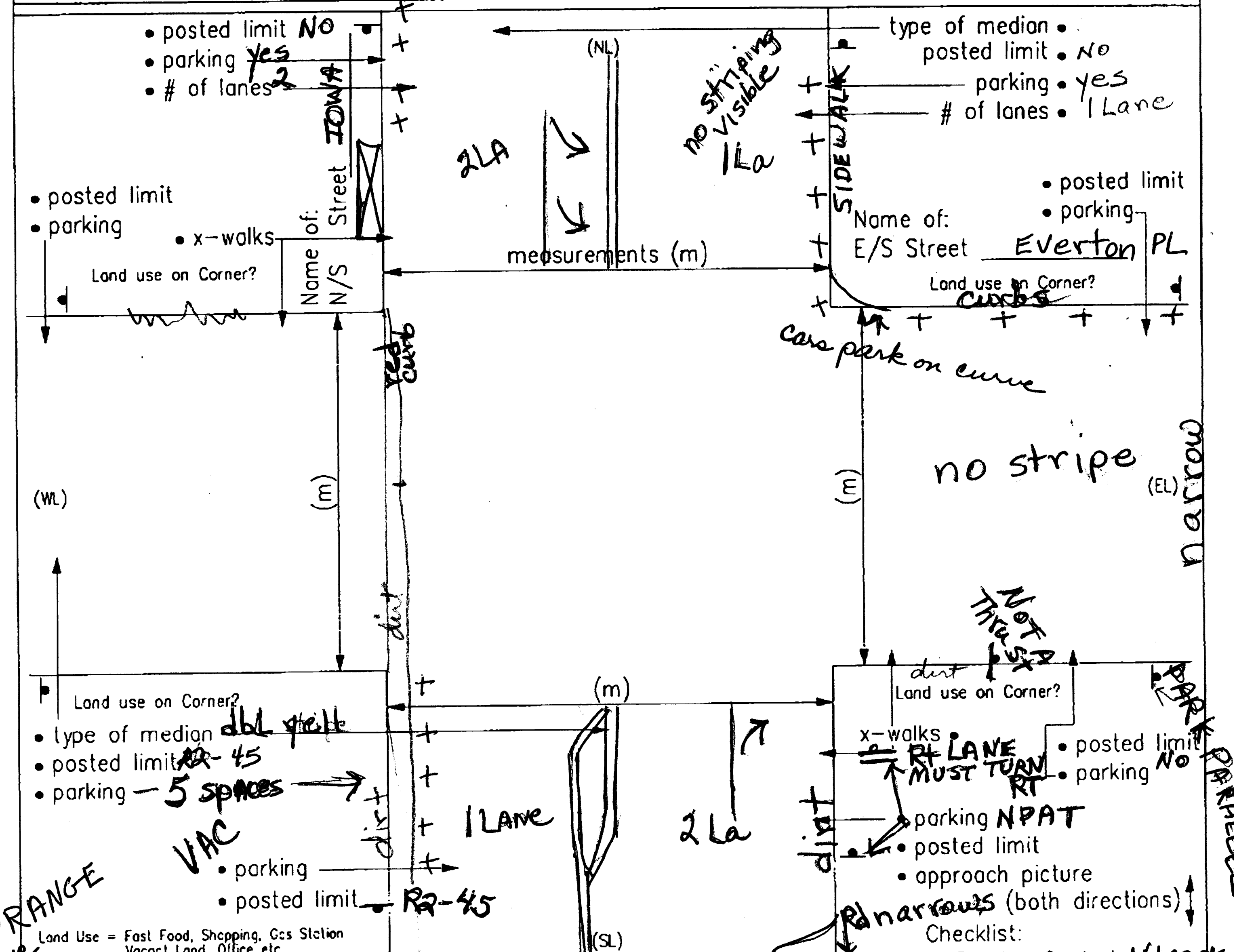
INTERSECTION: IOWA @ Everton PL

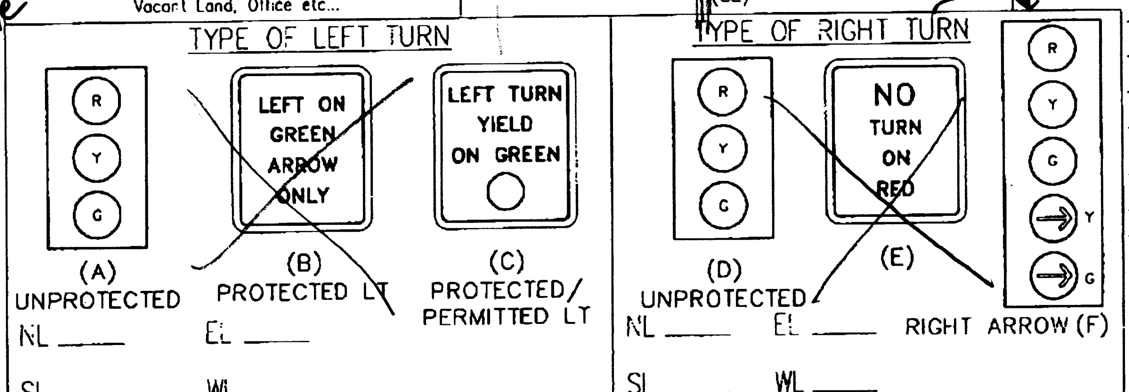
DATE: 1-08-08

CITY: RIV

ANALYST:

PROJECT:





Checklist:
- Parking Control N Leg + EL
- Posted Limit Not POSTED
- # of Lanes
- Land Use in Area
- Sidewalks
- Amt of Driveways few
- Type of Median
  - a. raise median
  - b. dbl stripes Leg
  - c. none
  - d. two-way lt pocket

No of intersection

NL – North Leg EL – East Leg

SL – South Leg WL – West Leg

(Pictures) → of each approach showing lane measurements + signal

INTERSECTION WORKSHEETS

Film #2

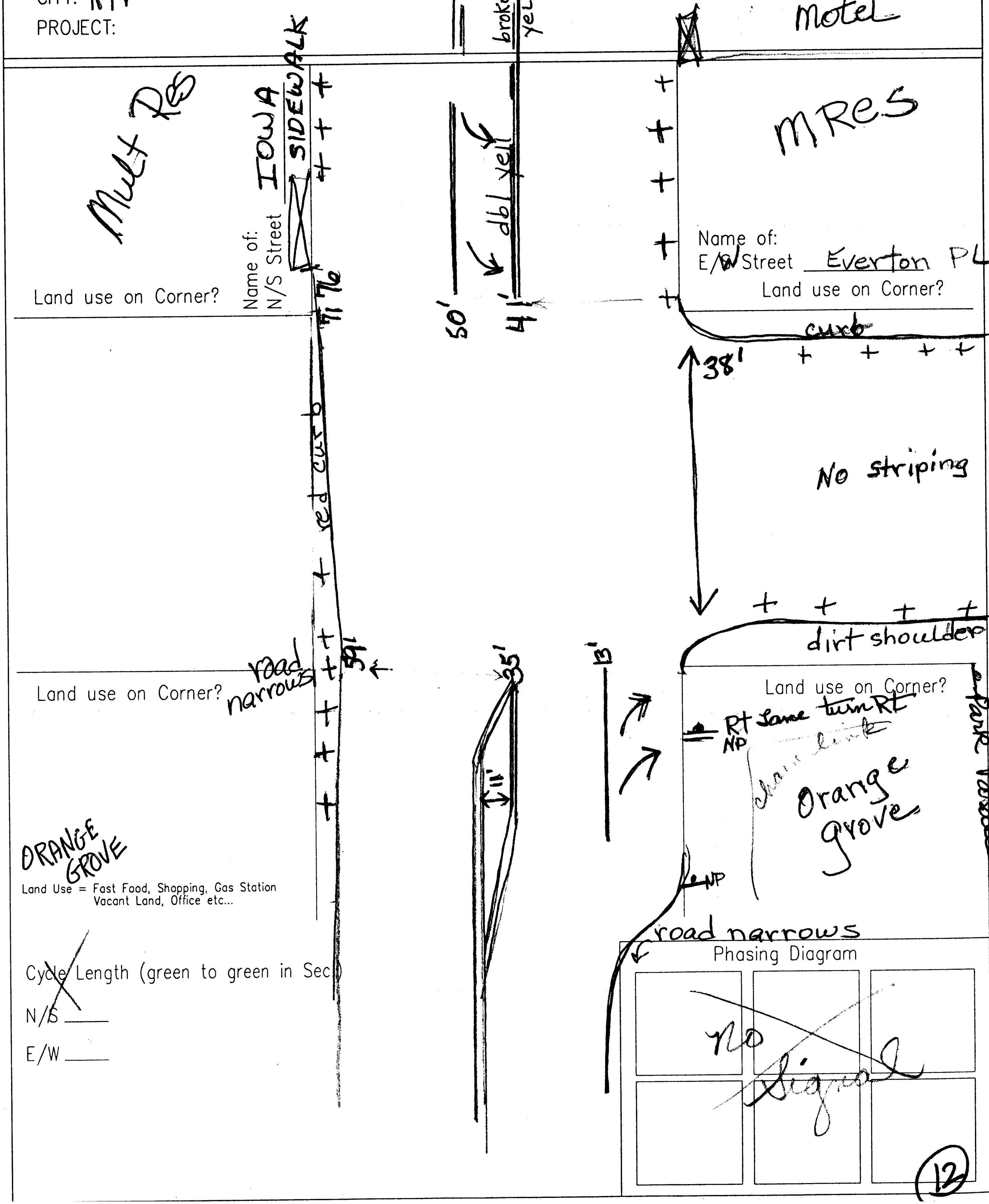
INTERSECTION: IOWA @ Everton PL

CITY: RIV

PROJECT:

DATE: 1-8-08

ANALYST:



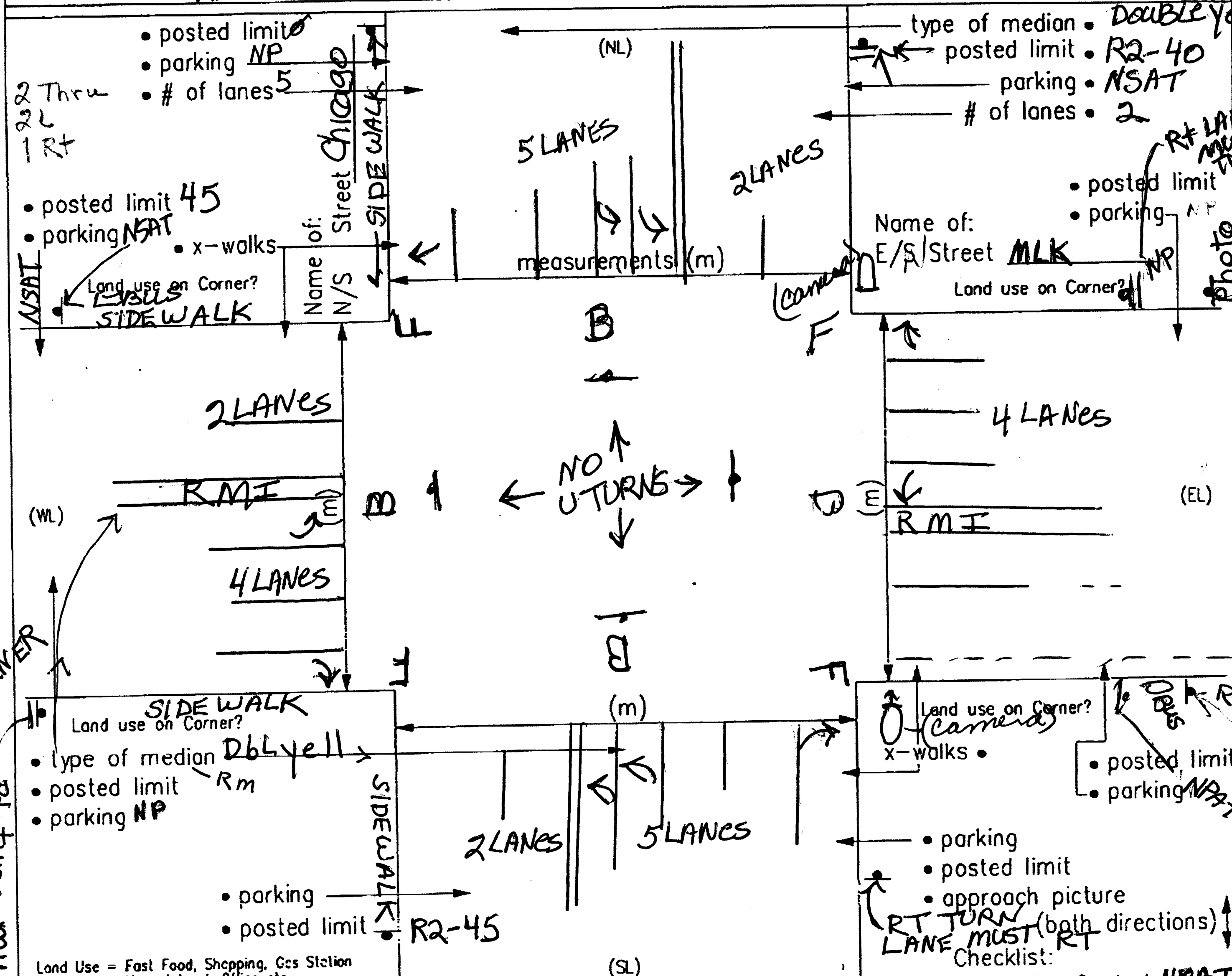
SHEET 2 OF 2
#1 FILM

SUPPLEMENTAL INTERSECTION WORKSHEETS

INTERSECTION: Chicago @ MLK
CITY: RIVERSIDE
PROJECT: Rt MUST TURN RT

Camera

DATE: 1-8-08
ANALYST: GE



TYPE OF LEFT TURN		
(A) UNPROTECTED	(B) PROTECTED LT (LEFT ON GREEN ARROW ONLY)	(C) PROTECTED/PERMITTED LT (LEFT TURN YIELD ON GREEN)

NL B EL B
SL B WL B

TYPE OF RIGHT TURN		
(D) UNPROTECTED	(E) NO TURN ON RED	RIGHT ARROW (F)

NL F EL F
SL F WL F

Checklist:
- Parking Control NPAT
- Posted Limit
- # of Lanes
- Land Use in Area
- Sidewalks NW+SW
- Amt of Driveways few
- Type of Median
  a. raise median E/W
  b. dbl stripe N/S
  c. none
  d. two-way lt pocket

NL – North Leg EL – East Leg
SL – South Leg WL – West Leg

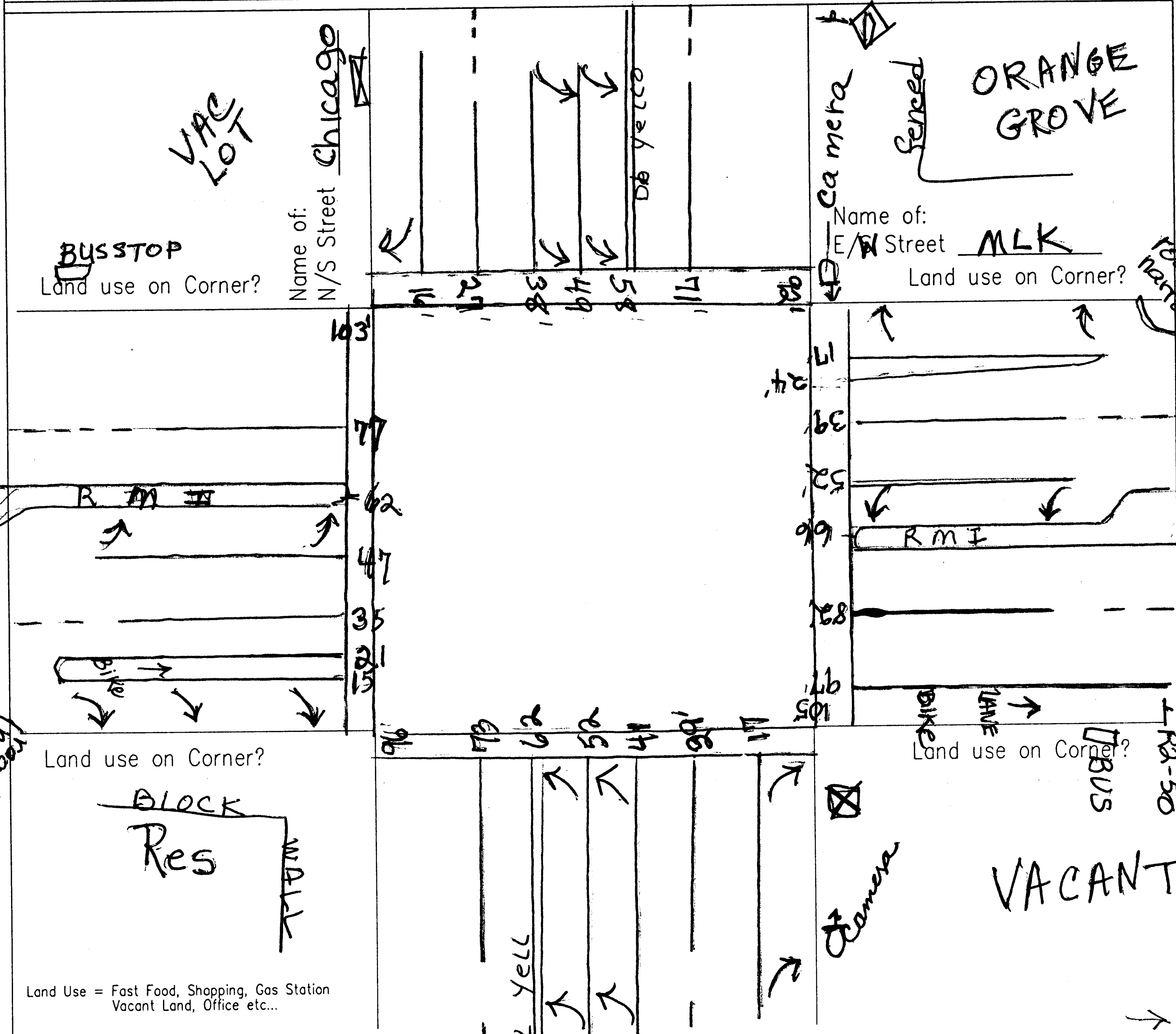
(Pictures) → of each approach showing lane measurements + signal

13

INTERSECTION WORKSHEETS

INTERSECTION: Chicago / MLK
CITY: RIVERSIDE
PROJECT:

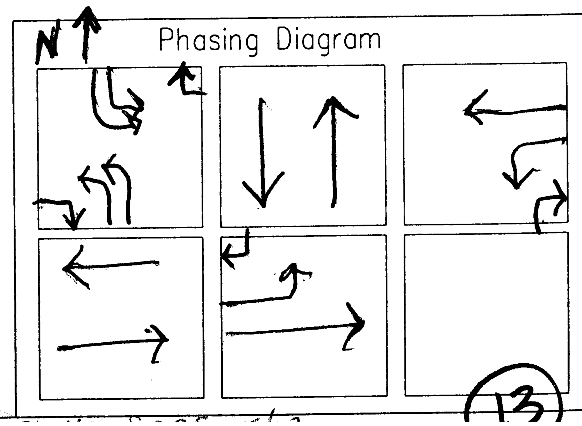
DATE: 1-8-08
ANALYST: GE



Cycle Length (green to green in Sec.)

N/S 130 + 140

E/W 135

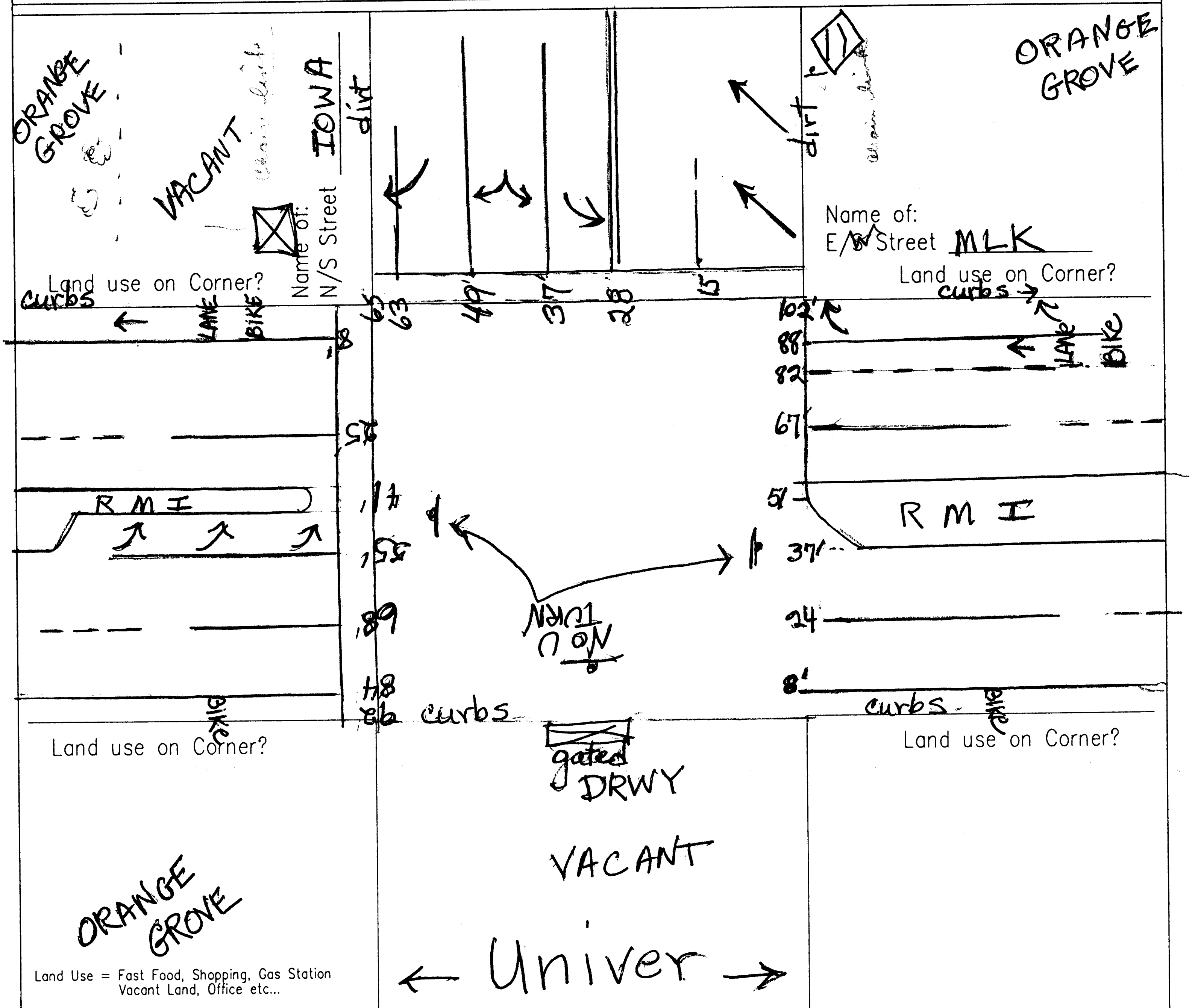


INTERSECTION WORKSHEETS

Film # 1

INTERSECTION: IOWA @ MLK
CITY: RIV
PROJECT:

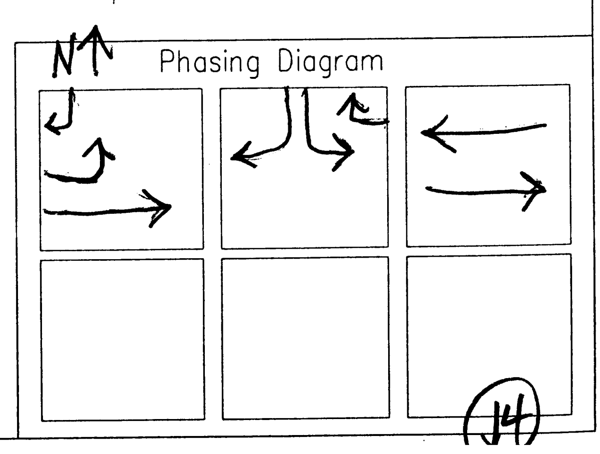
DATE: 1-08-08
ANALYST: GE



Cycle Length (green to green in Sec.)

N/S 2:00

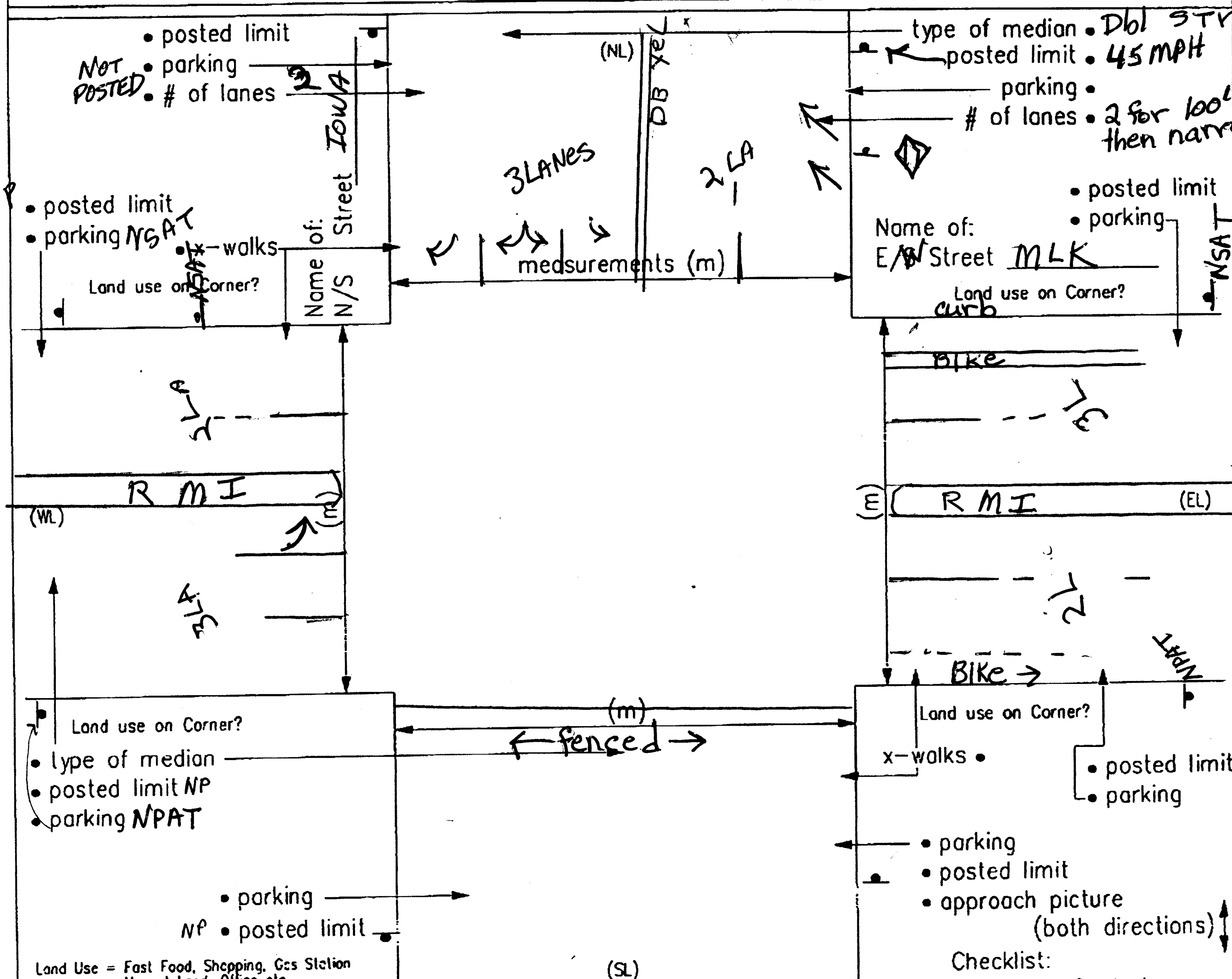
E/W 1:10 & 1:40



SUPPLEMENTAL INTERSECTION WORKSHEETS

INTERSECTION: IOWA @ MLK
CITY: RIVERSIDE
PROJECT:

DATE: 1-8-08
ANALYST: GE



Checklist:
- Parking Control
- Posted Limit 45 N/B → Not Posted others
- # of Lanes
- Land Use in Area Univer of VAC An
- Sidewalks None
- Amt of Driveways few
- Type of Median
  a. raise median E/W
  b. dbl stripe NL
  c. none
  d. two-way lt pocket

TYPE OF LEFT TURN			TYPE OF RIGHT TURN		
R Y G	LEFT ON GREEN ARROW ONLY	LEFT TURN YIELD ON GREEN	R Y G	NO TURN ON RED	R Y G →Y →G
(A) UNPROTECTED	(B) PROTECTED LT	(C) PROTECTED/ PERMITTED LT	(D) UNPROTECTED	(E)	RIGHT ARROW (F)

NL B EL X
SL X WL B

NL F EL F
SL X WL X

NL – North Leg EL – East Leg
SL – South Leg WL – West Leg

(Pictures) → of each approach showing lane measurements + signal

SUPPLEMENTAL INTERSECTION WORKSHEETS

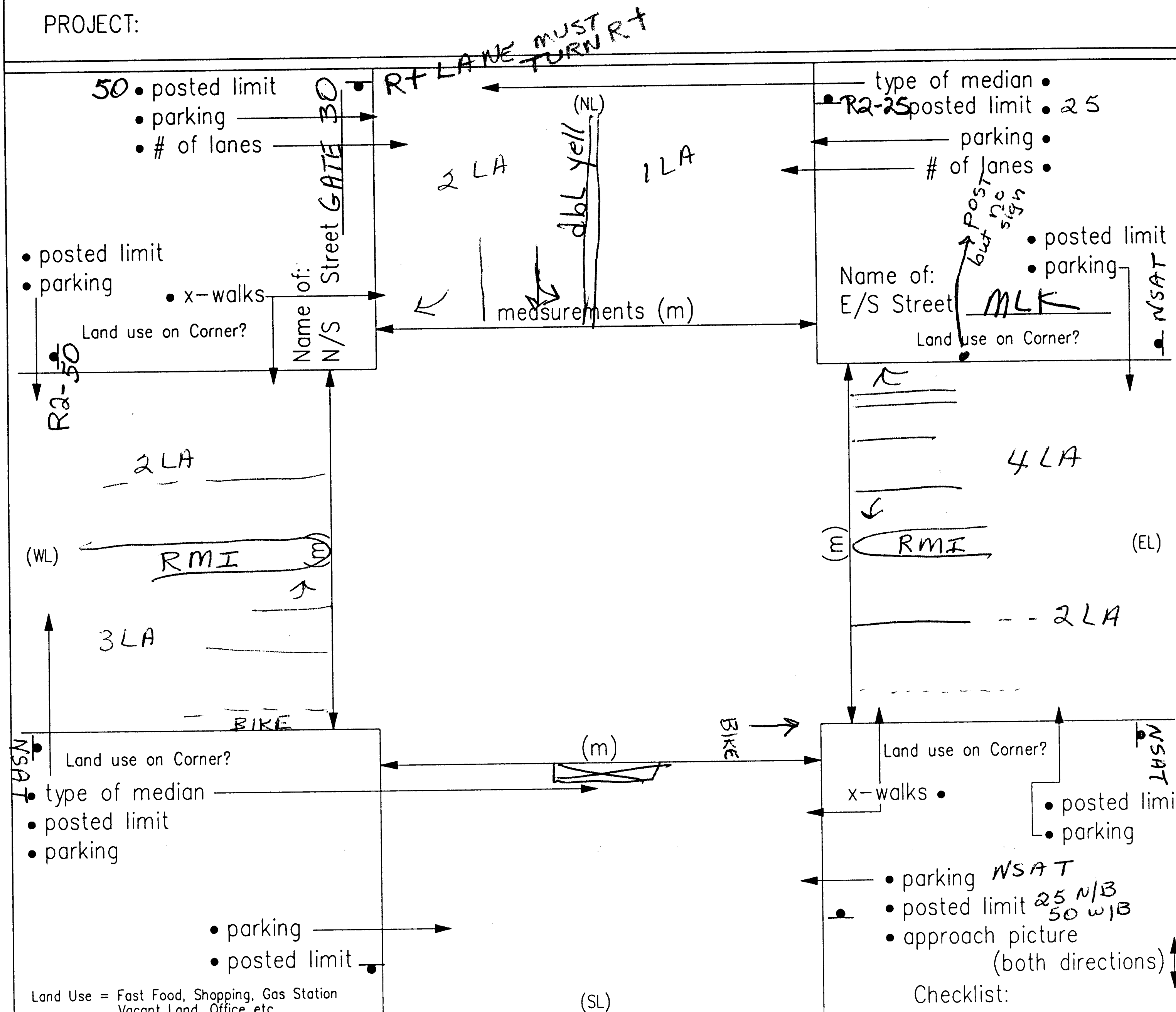
INTERSECTION: MLK @ GATE 30

CITY: RIV

PROJECT:

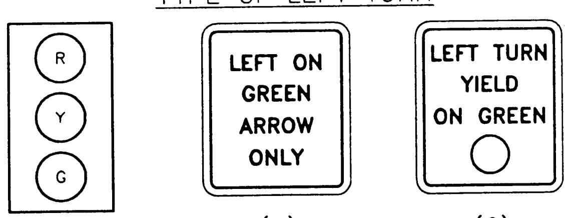
DATE:

ANALYST:



Checklist:
- Parking Control
- Posted Limit
- # of Lanes
- Land Use in Area
- Sidewalks NO
- Amt of Driveways only 1
- Type of Median
  a. raise median E/W
  b. dbl stripe N Leg
  c. none
  d. two-way lt pocket

TYPE OF LEFT TURN

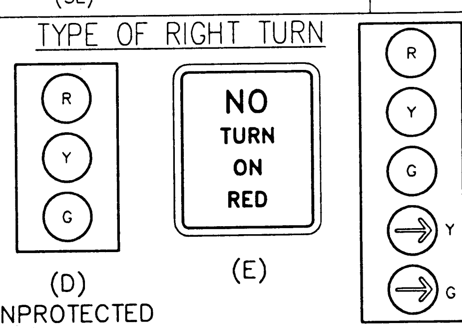


(A) UNPROTECTED — (B) PROTECTED LT — (C) PROTECTED/PERMITTED LT

NL A EL B

SL A DRWY WL B

TYPE OF RIGHT TURN



(D) UNPROTECTED — (E) — RIGHT ARROW (F)

NL D EL D

SL D WL D

NL – North Leg EL – East Leg

SL – South Leg WL – West Leg

(Pictures) → of each approach showing lane measurements + signal

15

INTERSECTION WORKSHEETS

film #5

INTERSECTION: MLK @ GATE 30

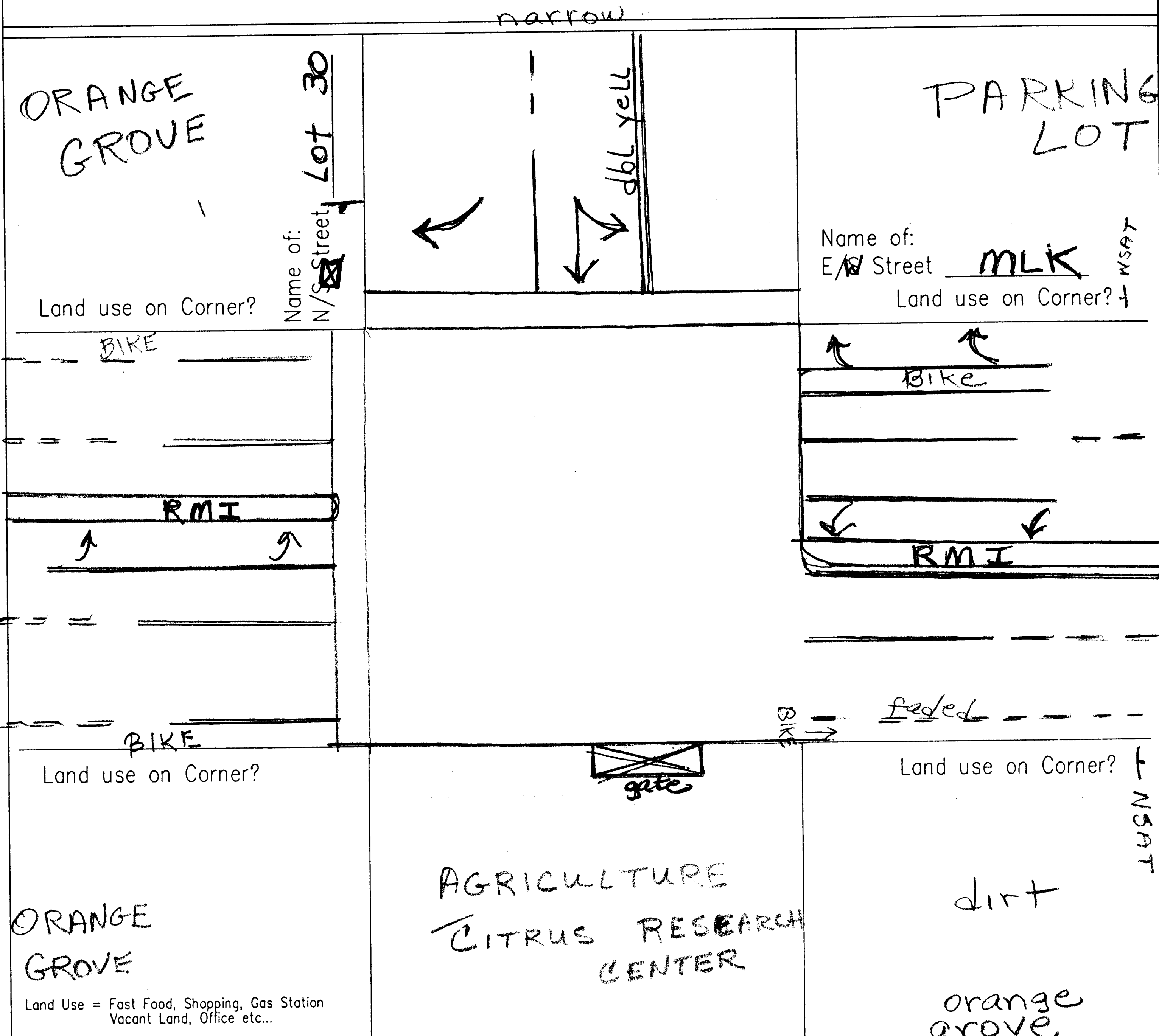
CITY: RIV

PROJECT:

UCR

DATE: 1-25-08

ANALYST:



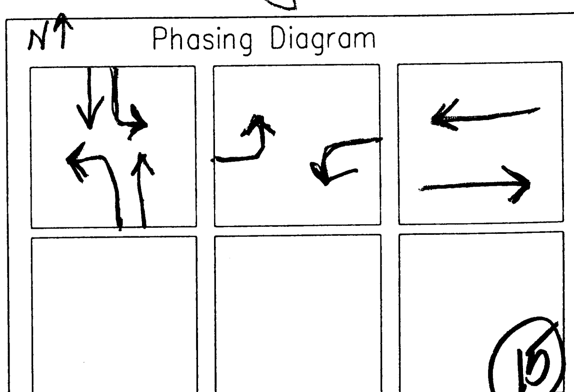
Land Use = Fast Food, Shopping, Gas Station Vacant Land, Office etc...

Cycle Length (green to green in Sec.)

N/S 1:05

E/W 1:00

Phasing Diagram



15

INTERSECTION WORKSHEETS

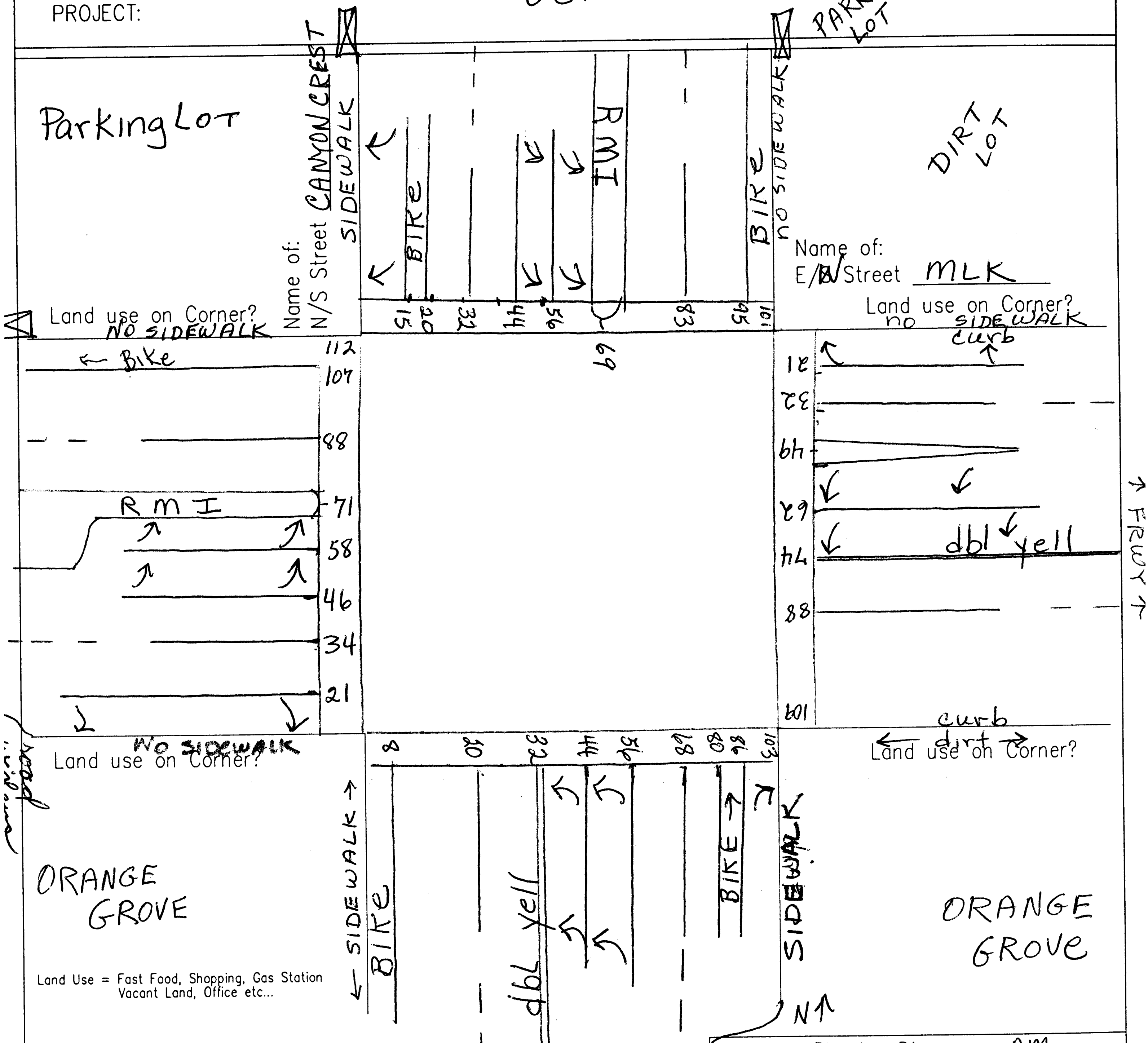
INTERSECTION: MLK @ Canyon Crest

CITY: RIVERSIDE

PROJECT:

DATE: 1-15-08

ANALYST:



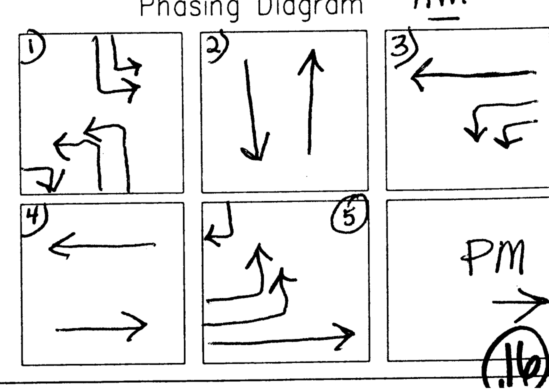
Land Use = Fast Food, Shopping, Gas Station Vacant Land, Office etc...

Cycle Length (green to green in Sec.)

N/S 1:50

E/W 1:45

Phasing Diagram AM



(16)

SUPPLEMENTAL INTERSECTION WORKSHEETS

INTERSECTION: MLK @ Canyon Crest Dr
CITY: RIVERSIDE
PROJECT:

DATE: 1-15-08
ANALYST: GE

North-west corner
- No • posted limit
- No • parking
- • # of lanes 5
- detour sycamore
- • posted limit
- • parking
- • x-walks
- NPAT, Bike Lane
- Land use on Corner?
- Name of: N/S Street CAN CR

(NL)
5 LA, 2 LA, RMI
measurements (m)
No U

North-east corner
- • type of median Closed to thru traffic
- posted limit • No
- parking • No
- # of lanes • 2
- • posted limit
- • parking
- Rt Lane MOST TURN Rt
- Detour
- Name of: E/W Street MLK
- Land use on Corner?

(WL)
2 LA, RMI, No U, 5 LA, (m)

(EL)
5 LA, No U, (m), dbl yell, 2 LA

(SL)
No U, (m), dbl yell, 2 LA, 5 LA

South-west corner
- Land use on Corner?
- NPAT
- • type of median
- • posted limit No
- • parking No
- temp Sycamore MLK Detour
- • parking
- • posted limit NPAT

Land Use = Fast Food, Shopping, Gas Station Vacant Land, Office etc...

South-east corner
- Land use on Corner?
- x-walks •
- • posted limit
- • parking
- • parking No
- • posted limit No
- • approach picture (both directions)
- NPAT

Checklist:
- Parking Control
- Posted Limit Not Posted
- # of Lanes
- Land Use in Area
- Sidewalks
- Amt of Driveways none
- Type of Median
  - a. raise median w+ N
  - b. dbl stripe E + S
  - c. none
  - d. two-way lt pocket

TYPE OF LEFT TURN

(A) UNPROTECTED — signal: R, Y, G
(B) PROTECTED LT — sign: LEFT ON GREEN ARROW ONLY
(C) PROTECTED/PERMITTED LT — sign: LEFT TURN YIELD ON GREEN

NL B EL B
SL B WL B

TYPE OF RIGHT TURN

(D) UNPROTECTED — signal: R, Y, G
(E) — sign: NO TURN ON RED
RIGHT ARROW (F) — signal: R, Y, G, Y (arrow), G (arrow)

NL F EL D
SL D WL F

NL – North Leg EL – East Leg
SL – South Leg WL – West Leg

(Pictures) → of each approach showing lane measurements + signal

SUPPLEMENTAL INTERSECTION WORKSHEETS

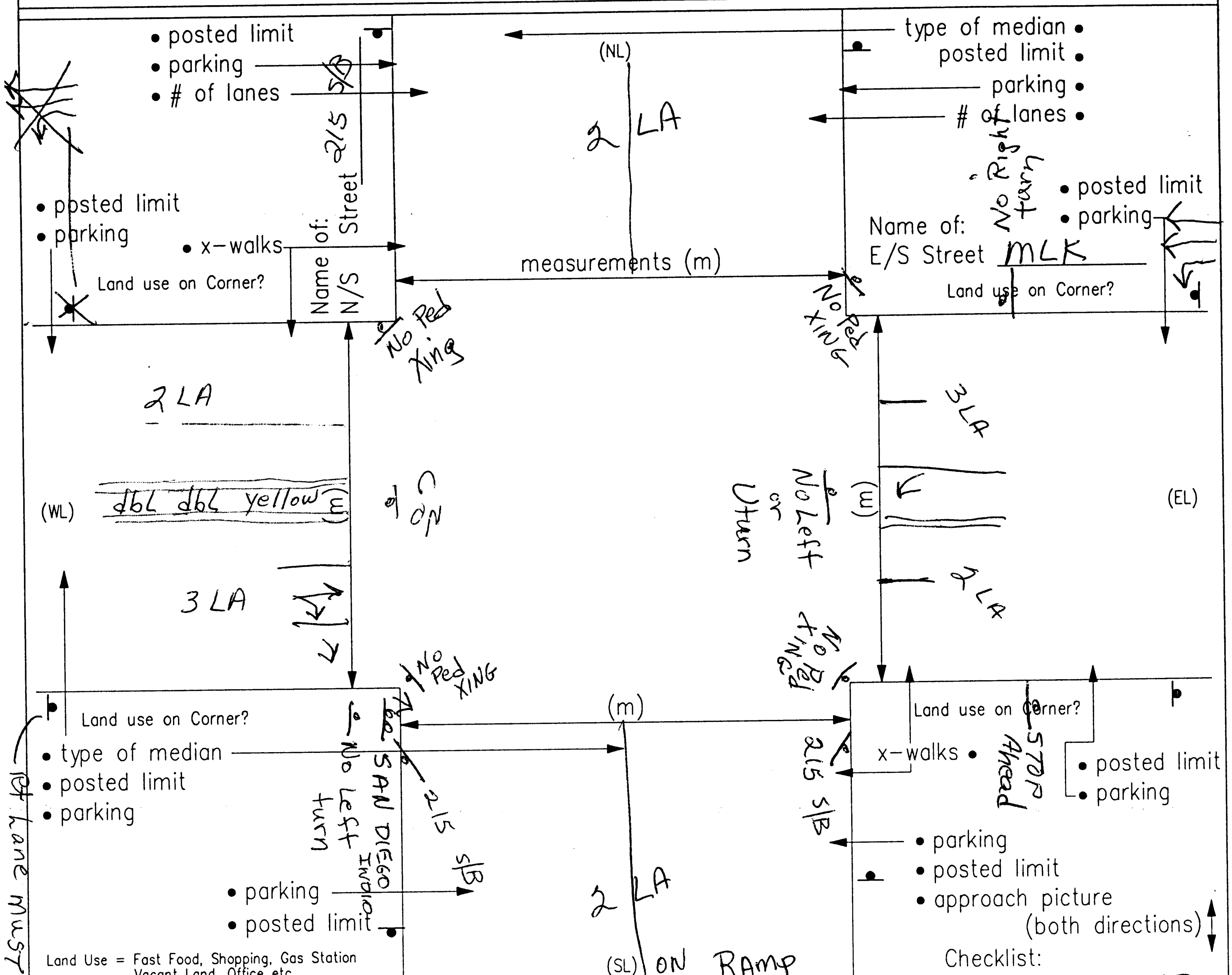
INTERSECTION: 215 S/B @ MLK

CITY:

PROJECT:

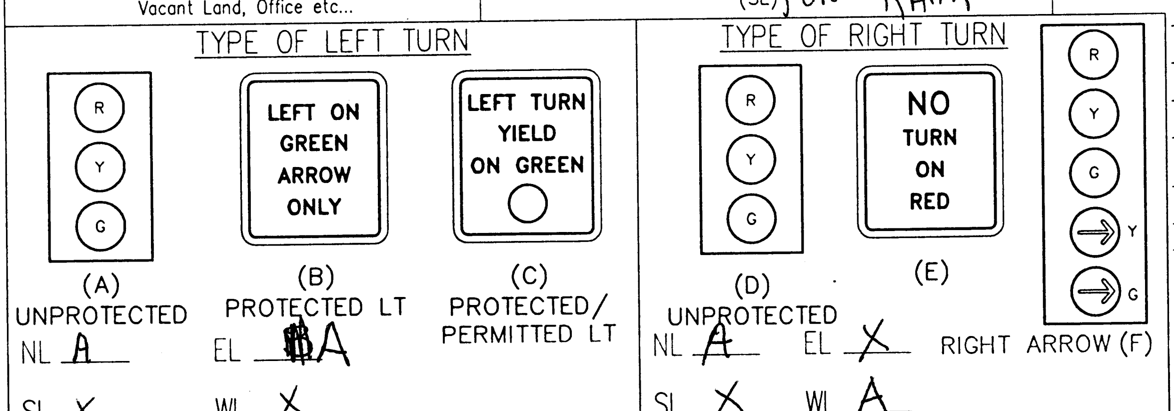
DATE:

ANALYST:



Checklist:

- Parking Control NP
- Posted Limit No
- # of Lanes
- Land Use in Area
- Sidewalks No SIDEWALK
- Amt of Driveways None
- Type of Median
  - a. raise median none
  - b. dbl stripe E/W Legs
  - c. none
  - d. two-way lt pocket



NL – North Leg EL – East Leg

SL – South Leg WL – West Leg

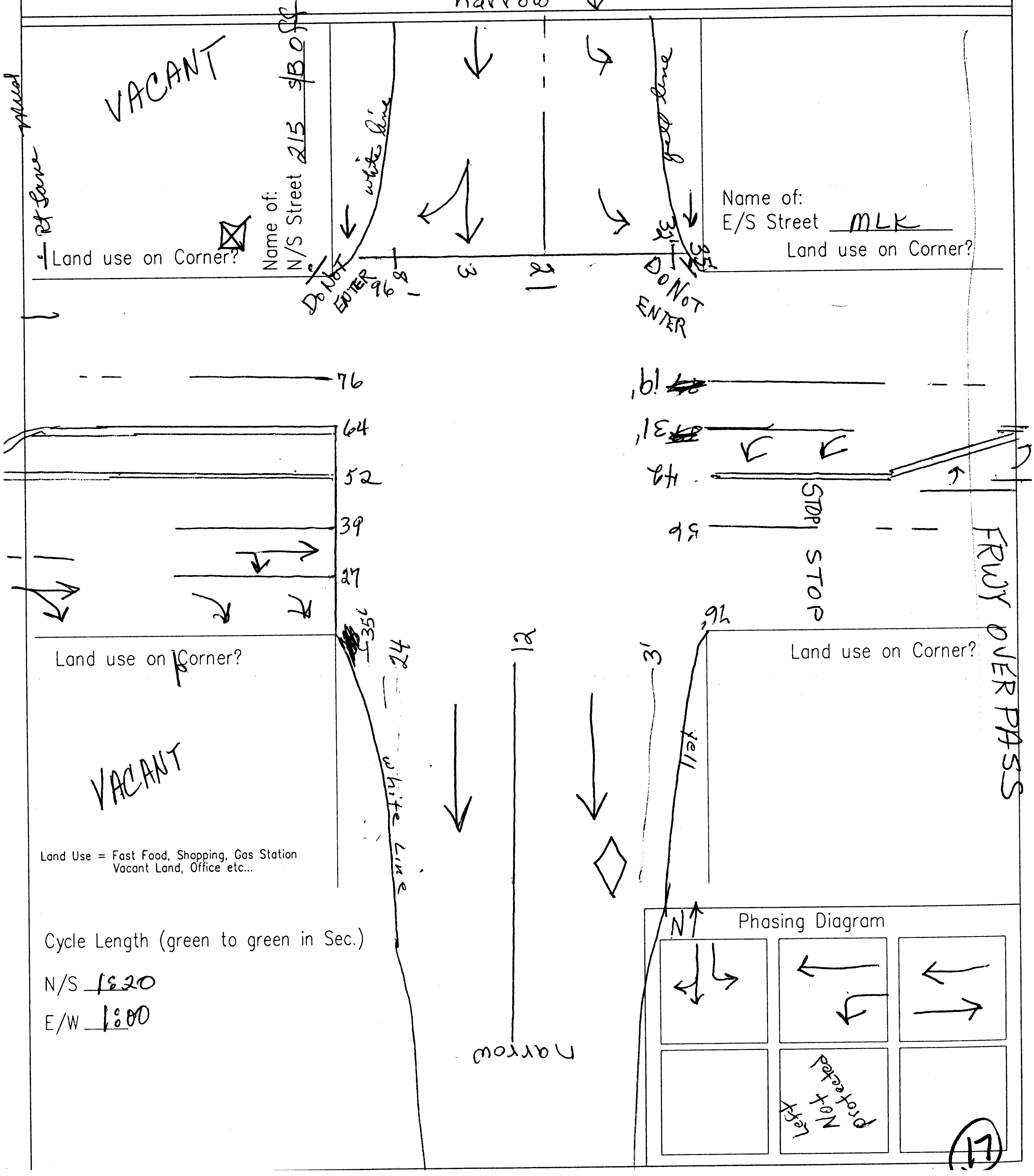
(Pictures)→of each approach showing lane measurements + signal

INTERSECTION WORKSHEETS

SHEET 1 OF 2
Film # 6

INTERSECTION: MLK @ 215 S/B
CITY: RIV
PROJECT:

DATE: 1-15-08
ANALYST: GE



SUPPLEMENTAL INTERSECTION WORKSHEETS #5

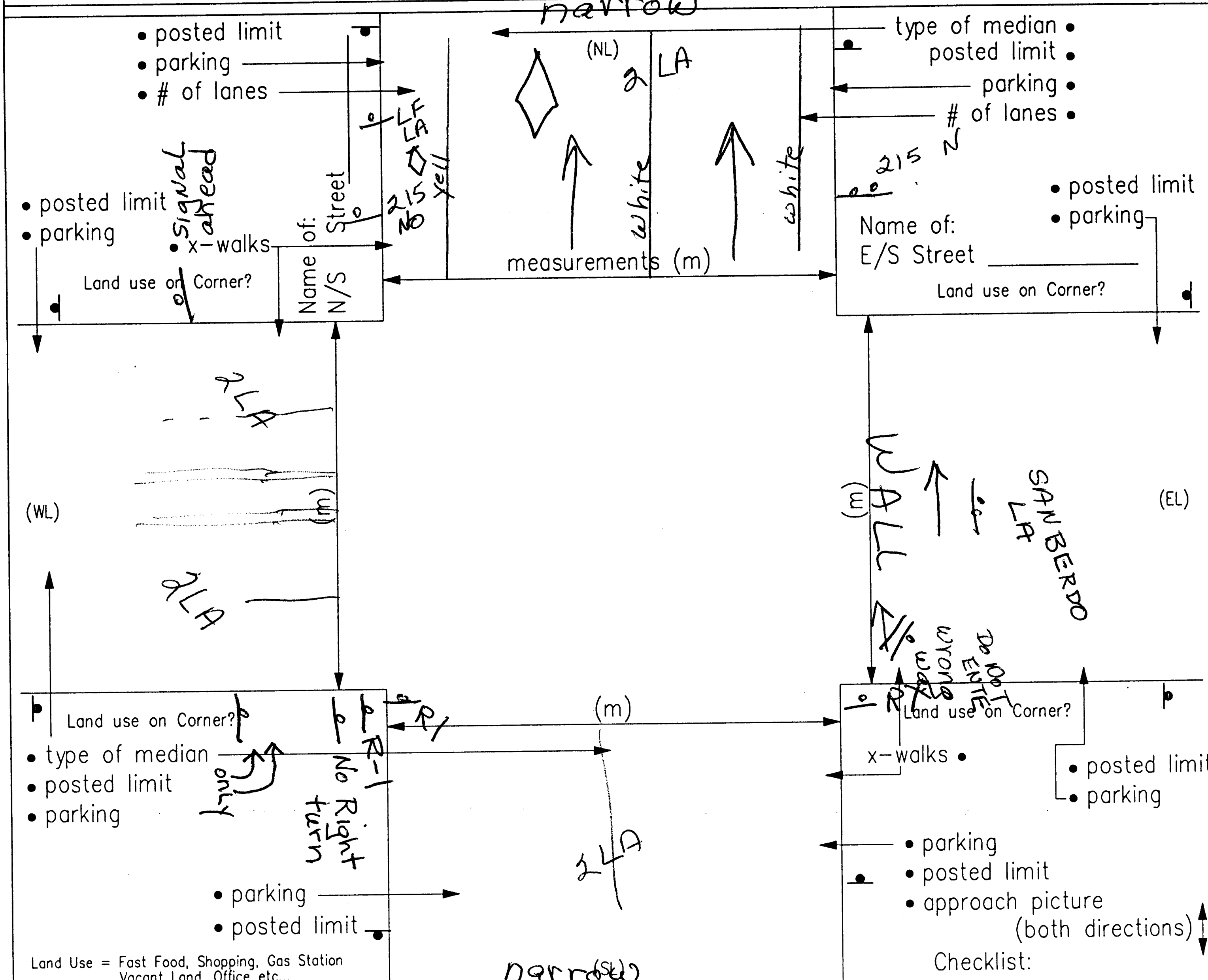
INTERSECTION: MILK @ 215 N/B RAMPS

CITY:

PROJECT:

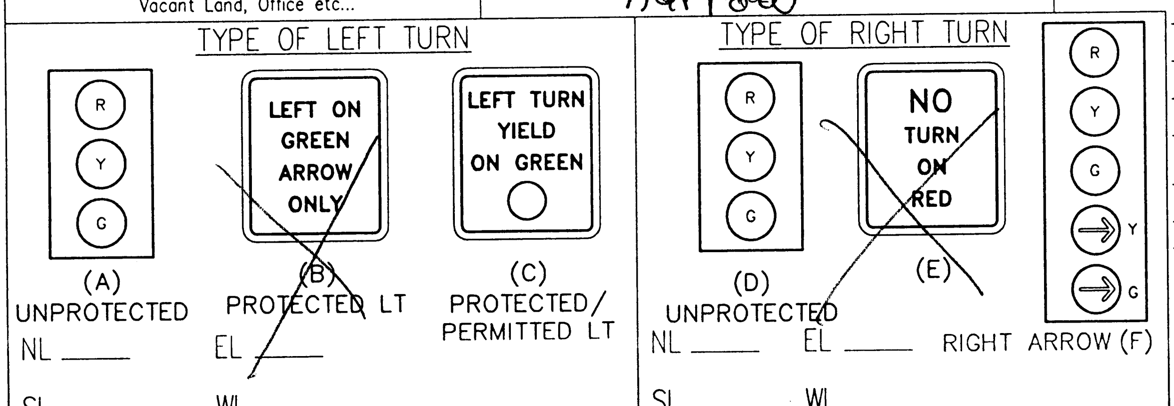
DATE:

ANALYST:



Checklist:

- Parking Control
- Posted Limit
- # of Lanes
- Land Use in Area
- Sidewalks NO
- Amt of Driveways No
- Type of Median NO
  - a. raise median
  - b. dbl stripe E Leg
  - c. none
  - d. two-way lt pocket



NL - North Leg EL - East Leg

SL - South Leg WL - West Leg

(Pictures) → of each approach showing lane measurements + signal

INTERSECTION WORKSHEETS

#5

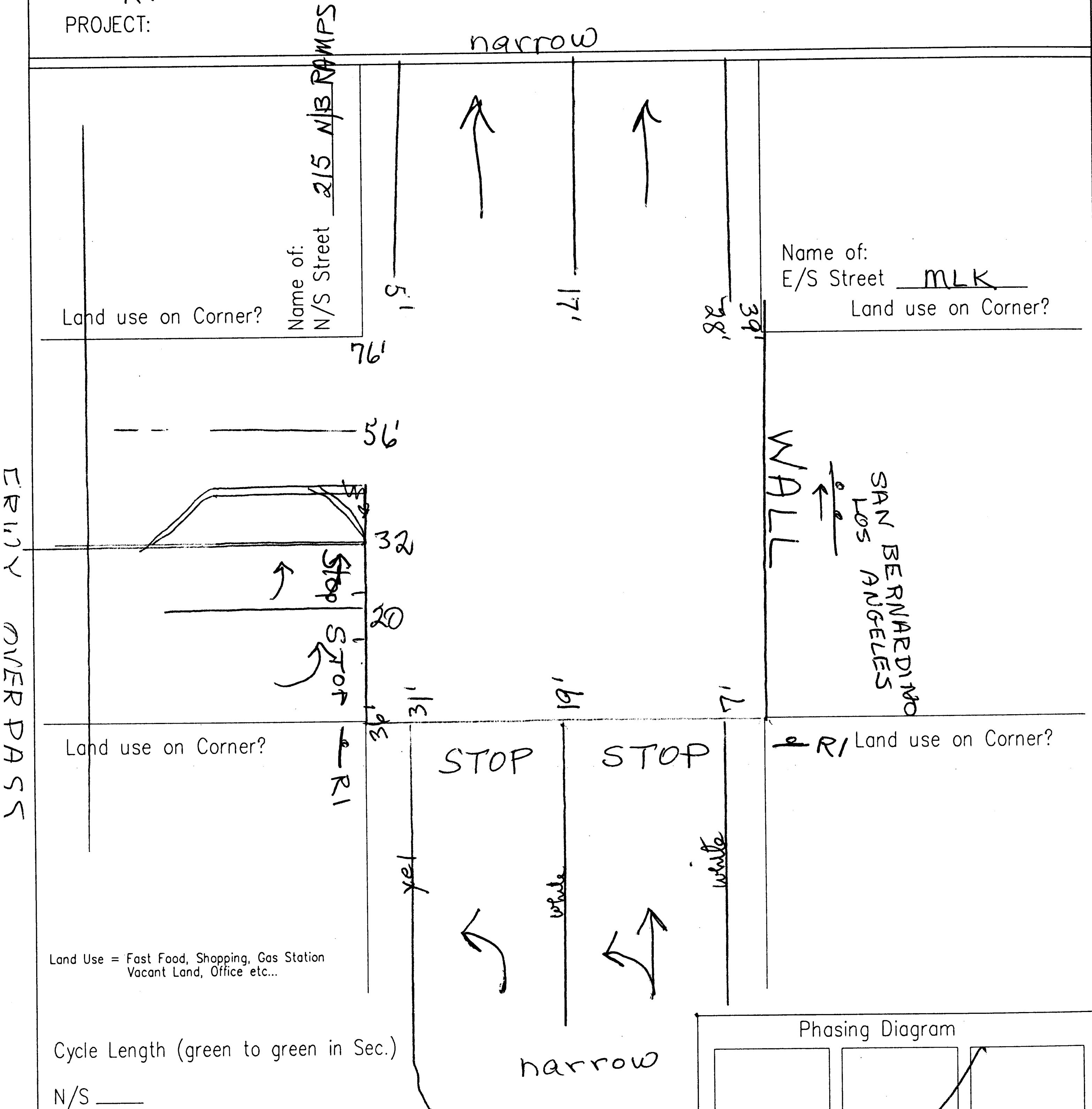
INTERSECTION: MLK@215 N|B

CITY: RIV

PROJECT:

DATE:

ANALYST:



Land Use = Fast Food, Shopping, Gas Station
Vacant Land, Office etc...

Cycle Length (green to green in Sec.)

N/S ____

E/W ____

Phasing Diagram

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INTERSECTION WORKSHEETS

SHEET 1 OF 2
film #8

INTERSECTION: Canyon Crest @ University
CITY: RIV
PROJECT:

DATE: 1-25-08
ANALYST:

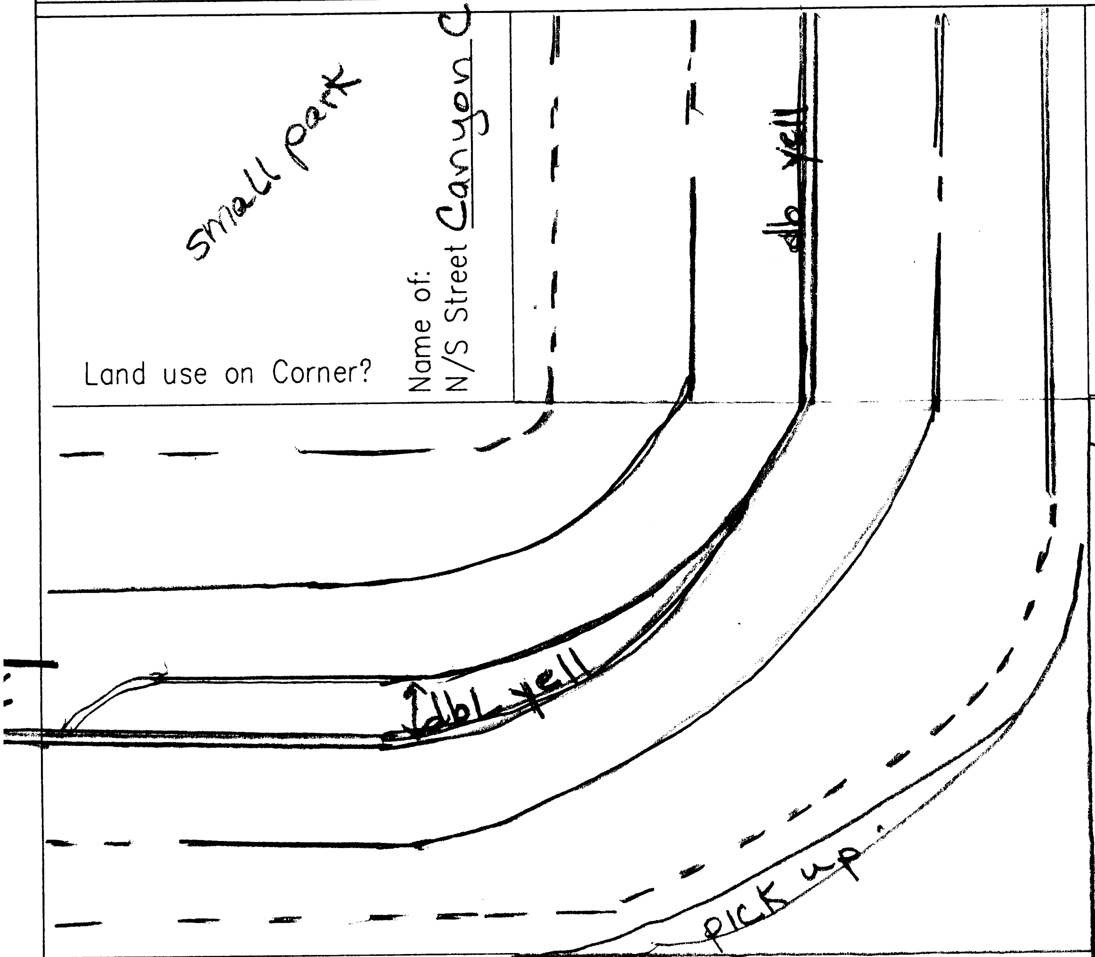
Land use on Corner? small park

Name of: N/S Street Canyon Crest

HARRISON FIELD

Name of: E/S Street X

Land use on Corner?



NPAT

UCR

Land use on Corner? UNIVERSITY AV

Land use on Corner?

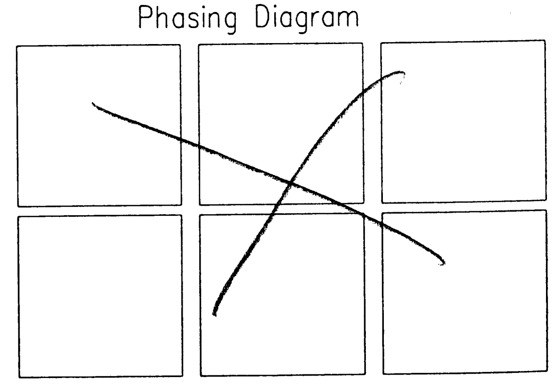
Land Use = Fast Food, Shopping, Gas Station
Vacant Land, Office etc...

Cycle Length (green to green in Sec.)

N/S X

E/W X

Phasing Diagram



SUPPLEMENTAL INTERSECTION WORKSHEETS

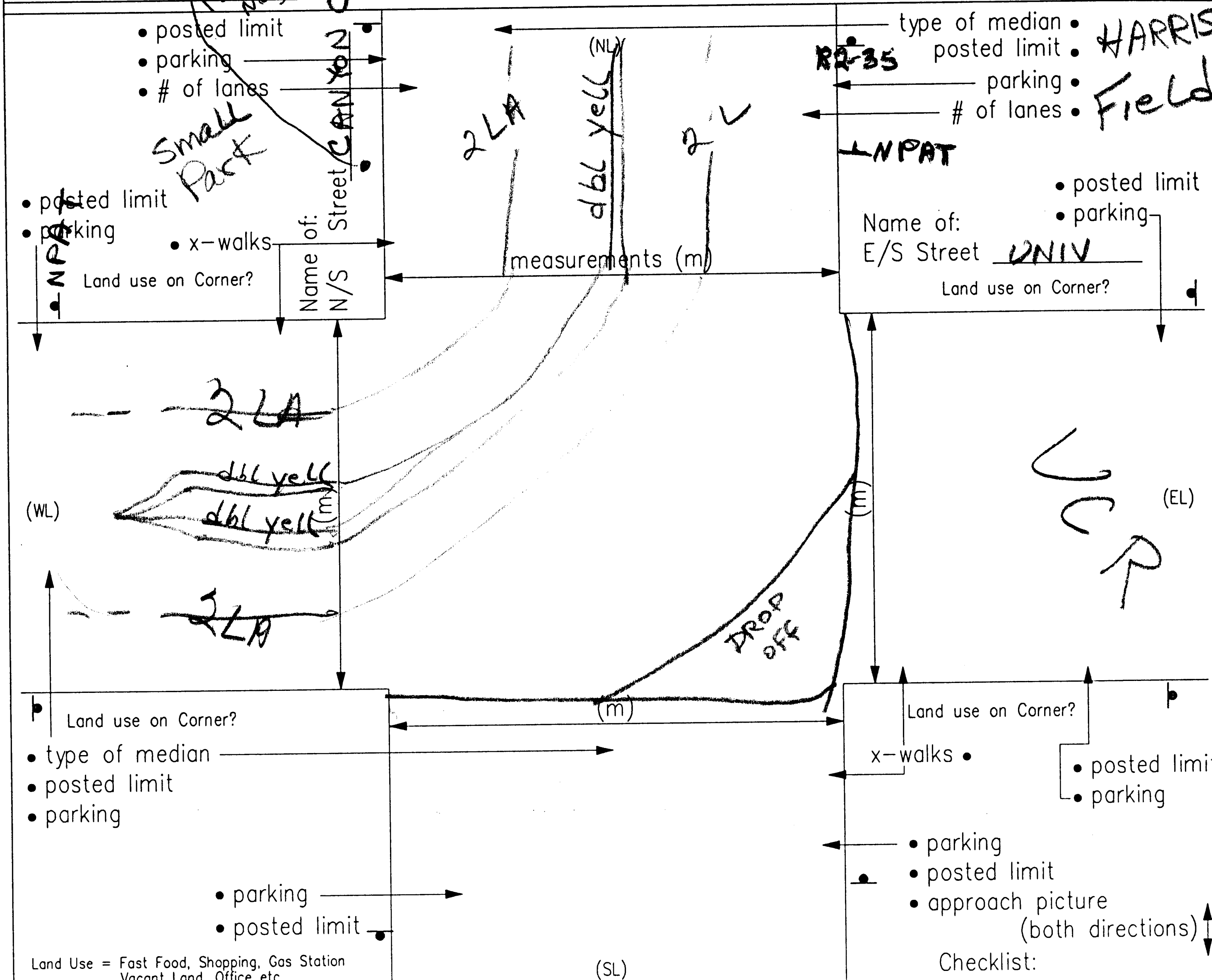
INTERSECTION: Canyon Crest @Univ

CITY: RIV

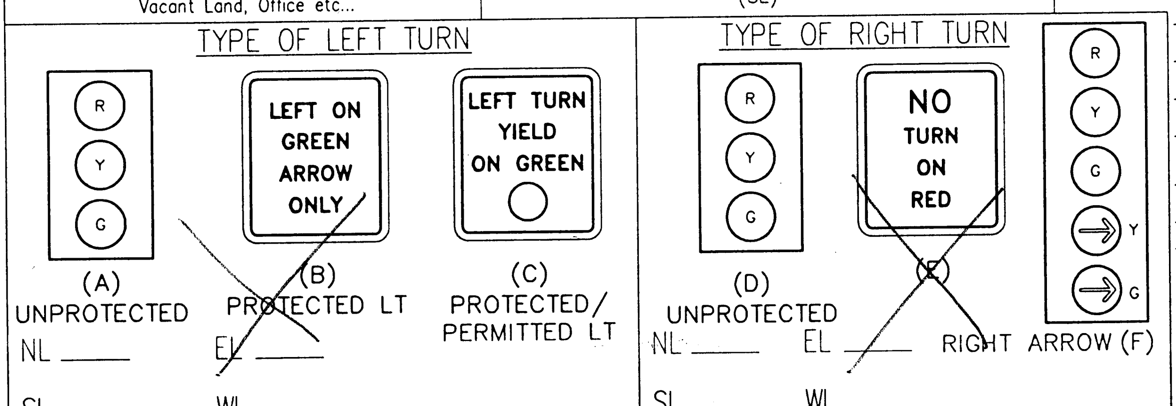
PROJECT:

DATE:

ANALYST:



Checklist:
- Parking Control
- Posted Limit 35 NB
- # of Lanes
- Land Use in Area
- Sidewalks
- Amt of Driveways
- Type of Median
  - a. raise median
  - b. dbl stripe ✓
  - c. none
  - d. two-way lt pocket



NL – North Leg EL – East Leg

SL – South Leg WL – West Leg

(Pictures)→of each approach showing lane measurements + signal

CALCULATION OF PEAK HOUR FACTOR

Location: LOT 30 AT MLK BLVD

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:15-8:15	4	0	0	12	0	4	321	600	0	10	1276	77
Highest 15 min	2			3		3	134	201	0	5	354	28
PHF	0.5	#DIV/0!	#DIV/0!	1.0	#DIV/0!	0.33	0.60	0.75	#DIV/0!	0.50	0.90	0.69
PM Peak												
16:45-17:45	6	0	1	162	0	271	31	1989	0	10	926	0
Highest 15 min	3	0	1	71	0	109	18	522	0	4	272	0
PHF	0.50	#DIV/0!	0.25	0.57	#DIV/0!	0.62	0.43	0.95	#DIV/0!	0.63	0.85	#DIV/0!

Location: CANYON CREST AT MLK BLVD

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:30-8:30	1153	452	445	41	84	52	130	185	323	108	335	36
Highest 15 min	313	152	140	15	24	22	39	64	86	29	94	16
PHF	0.92	0.74	0.79	0.68	0.88	0.59	0.83	0.72	0.94	0.93	0.89	0.56
PM Peak												
17:00-18:00	295	186	129	125	552	189	163	1043	1058	162	254	25
Highest 15 min	96	56	40	39	189	66	64	312	308	47	73	8
PHF	0.77	0.83	0.81	0.80	0.73	0.72	0.64	0.84	0.86	0.86	0.87	0.78

Location: CHICAGO AT LINDEN

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:30-8:30	21	771	148	140	364	33	36	102	31	154	122	153
Highest 15 min	8	222	49	65	99	14	12	36	12	54	46	71
PHF	0.66	0.87	0.76	0.54	0.92	0.59	0.75	0.71	0.65	0.71	0.66	0.54
PM Peak												
16:45-17:45	61	432	161	172	1149	145	29	83	46	110	124	94
Highest 15 min	17	111	48	55	315	46	9	25	16	39	38	29
PHF	0.90	0.97	0.84	0.78	0.91	0.79	0.81	0.83	0.72	0.71	0.82	0.81

Location: CHICAGO AT UNIVERSITY

	Direction											
AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:30-8:30	208	747	110	74	320	126	173	326	88	85	386	55
Highest 15 min	72	236	36	24	90	35	49	99	38	25	113	23
PHF	0.72	0.79	0.76	0.77	0.89	0.90	0.88	0.82	0.58	0.85	0.85	0.60
PM Peak												
16:30-17:30	237	363	126	155	956	86	182	796	463	309	385	72
Highest 15 min	69	99	43	46	268	28	56	222	133	89	105	22
PHF	0.86	0.92	0.73	0.84	0.89	0.77	0.81	0.90	0.87	0.87	0.92	0.82

Location: IOWA AT UNIVERSITY

	Direction											
AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:30-8:30	63	544	92	136	245	99	139	345	56	80	342	167
Highest 15 min	21	163	32	39	73	28	38	94	18	27	89	58
PHF	0.75	0.83	0.72	0.87	0.84	0.88	0.91	0.92	0.78	0.74	0.96	0.72
PM Peak												
17:00-18:00	93	370	129	260	800	187	217	874	152	156	374	103
Highest 15 min	39	96	43	69	219	52	66	232	45	46	108	36
PHF	0.60	0.96	0.75	0.94	0.91	0.90	0.82	0.94	0.84	0.85	0.87	0.72

Location: 215 NB RAMPS AT MLK BLVD

	Direction											
AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:15-8:15	311	12	0	0	0	0	554	0	0	0	0	0
Highest 15 min	93	5	0	0	0	0	155	0	0	0	0	0
PHF	0.84	0.60	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.89	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
PM Peak												
16:45-17:45	333	1	0	0	0	0	188	0	0	0	0	0
Highest 15 min	96	1	0	0	0	0	64	0	0	0	0	0
PHF	0.87	0.25	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.73	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Location: 215 SB RAMPS AT MLK BLVD

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:15-8:15	0	0	0	17	60	197	0	537	197	21	291	0
Highest 15 min	0	0	0	10	21	62	0	156	74	7	84	0
PHF	#DIV/0!	#DIV/0!	#DIV/0!	0.43	0.71	0.79	#DIV/0!	0.86	0.67	0.75	0.87	#DIV/0!
PM Peak												
16:45-17:45	0	0	0	3	101	106	0	186	971	5	328	0
Highest 15 min	0	0	0	1	36	33	0	63	276	2	94	0
PHF	#DIV/0!	#DIV/0!	#DIV/0!	0.75	0.70	0.80	#DIV/0!	0.74	0.88	0.63	0.87	#DIV/0!

Location: IOWA AT EVERTON

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:15-8:15	0	659	56	28	337	0	0	0	0	10	0	21
Highest 15 min	0	183	26	8	101	0	0	0	0	3	0	7
PHF	#DIV/0!	0.90	0.54	0.88	0.83	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.83	#DIV/0!	0.75
PM Peak												
16:45-17:45	0	503	29	36	1038	0	0	0	0	47	0	39
Highest 15 min	0	145	9	13	267	0	0	0	0	20	0	13
PHF	#DIV/0!	0.87	0.81	0.69	0.97	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.59	#DIV/0!	0.75

Location: CHICAGO AT MLK BLVD

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:30-8:30	707	898	228	60	209	113	133	543	131	40	638	138
Highest 15 min	204	245	77	20	62	35	39	184	37	14	170	44
PHF	0.87	0.92	0.7	0.8	0.8	0.81	0.85	0.74	0.9	0.71	0.94	0.78
PM Peak												
16:45-17:45	140	287	61	366	1057	201	170	1283	792	249	514	105
Highest 15 min	37	85	23	99	290	57	46	334	215	88	150	32
PHF	0.95	0.84	0.66	0.92	0.91	0.88	0.92	0.96	0.92	0.71	0.86	0.82

Location: IOWA AT MLK BLVD

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:15-8:15	0	0	0	263	0	101	267	440	0	0	785	484
Highest 15 min	0	0	0	88	0	31	74	143	0	0	206	131
PHF	#DIV/0!	#DIV/0!	#DIV/0!	0.75	#DIV/0!	0.81	0.90	0.77	#DIV/0!	#DIV/0!	0.95	0.92
PM Peak												
16:30-17:30	0	0	0	727	0	273	170	1564	0	0	667	353
Highest 15 min	0	0	0	192	0	76	49	396	0	0	211	96
PHF	#DIV/0!	#DIV/0!	#DIV/0!	0.95	#DIV/0!	0.90	0.87	0.99	#DIV/0!	#DIV/0!	0.79	0.92

Location: CHICAGO AT 3RD AND BLAIN

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:30-8:30	176	590	177	195	315	66	94	348	71	130	425	222
Highest 15 min	50	159	68	74	90	25	29	145	27	46	121	75
PHF	0.88	0.93	0.65	0.66	0.88	0.66	0.81	0.60	0.66	0.71	0.88	0.74
PM Peak												
16:00-17:00	88	415	136	260	865	107	137	636	264	240	294	81
Highest 15 min	29	127	43	78	241	37	42	188	78	63	88	25
PHF	0.76	0.82	0.79	0.83	0.90	0.72	0.82	0.85	0.85	0.95	0.84	0.81

Location: IOWA AT LINDEN

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:30-8:30	118	579	92	45	403	207	113	107	47	70	137	67
Highest 15 min	50	161	29	16	123	91	35	38	18	27	52	19
PHF	0.59	0.90	0.8	0.7	0.8	0.57	0.81	0.70	0.7	0.65	0.66	0.88
PM Peak												
16:30-17:30	46	571	140	58	1023	98	126	155	123	109	110	17
Highest 15 min	15	157	41	16	277	28	39	41	44	32	33	8
PHF	0.77	0.91	0.85	0.91	0.92	0.88	0.81	0.95	0.70	0.85	0.83	0.53

Location: 215 NB RAMPS AT UNIVERSITY

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:30-8:30	0	0	1	74	0	382	80	595	1	0	198	73
Highest 15 min	0	0	1	25	0	105	28	202	1	0	56	21
PHF	#DIV/0!	#DIV/0!	0.25	0.74	#DIV/0!	0.91	0.71	0.74	0.25	#DIV/0!	0.88	0.87
PM Peak												
16:45-17:45	0	0	1	70	0	273	159	408	0	0	582	182
Highest 15 min	0	0	1	22	0	87	57	118	0	0	182	56
PHF	#DIV/0!	#DIV/0!	0.25	0.80	#DIV/0!	0.78	0.70	0.86	#DIV/0!	#DIV/0!	0.80	0.81

Location: 215 SB RAMPS AT BLAINE STREET

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:15-8:15	0	0	0	369	16	251	0	486	179	110	518	0
Highest 15 min	0	0	0	97	5	83	0	184	52	31	171	0
PHF	#DIV/0!	#DIV/0!	#DIV/0!	0.95	0.80	0.76	#DIV/0!	0.66	0.86	0.89	0.76	#DIV/0!
PM Peak												
16:45-17:45	0	0	0	276	219	192	0	631	639	220	377	0
Highest 15 min	0	0	0	74	65	52	0	166	168	60	106	0
PHF	#DIV/0!	#DIV/0!	#DIV/0!	0.93	0.84	0.92	#DIV/0!	0.95	0.95	0.92	0.89	#DIV/0!

Location: 215 SB RAMP AT UNIVERSITY

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:30-8:30	0	0	0	351	26	186	0	305	229	43	533	0
Highest 15 min	0	0	0	122	13	53	0	87	63	13	143	0
PHF	#DIV/0!	#DIV/0!	#DIV/0!	0.7	0.5	0.88	#DIV/0!	0.88	0.9	0.83	0.93	#DIV/0!
PM Peak												
16:45-17:45	0	0	0	42	183	93	0	521	724	191	664	0
Highest 15 min	0	0	0	12	62	28	0	147	197	65	187	0
PHF	#DIV/0!	#DIV/0!	#DIV/0!	0.88	0.74	0.83	#DIV/0!	0.89	0.92	0.73	0.89	#DIV/0!

Location: 215 NB RAMPS AT BLAINE ST

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:15-8:15	204	5	393	0	0	0	172	645	0	0	409	499
Highest 15 min	73	4	103	0	0	0	63	213	0	0	120	148
PHF	0.70	0.31	0.95	#DIV/0!	#DIV/0!	#DIV/0!	0.68	0.76	#DIV/0!	#DIV/0!	0.85	0.84
PM Peak												
16:45-17:45	97	1	261	0	0	0	124	779	0	0	483	494
Highest 15 min	26	1	74	0	0	0	37	204	0	0	132	143
PHF	0.93	0.25	0.88	#DIV/0!	#DIV/0!	#DIV/0!	0.84	0.95	#DIV/0!	#DIV/0!	0.91	0.86

Location: IOWA AVENUE AT BLAINE STREET

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:30-8:30	141	641	99	121	413	225	418	410	103	108	428	130
Highest 15 min	45	172	29	42	150	67	118	137	29	29	121	41
PHF	0.78	0.93	0.85	0.72	0.69	0.84	0.89	0.75	0.89	0.93	0.88	0.79
PM Peak												
16:45-17:45	198	510	145	193	768	167	302	438	268	149	271	109
Highest 15 min	59	148	42	67	200	50	83	125	70	45	76	35
PHF	0.84	0.86	0.86	0.72	0.96	0.84	0.91	0.88	0.96	0.83	0.89	0.78

Location: WEST CAMPUS DRIVE AT UNIVERSITY AVENUE

Direction

AM Peak	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:30-8:30	129	0	276	0	0	0	0	285	367	203	153	0
Highest 15 min	48	0	99	0	0	0	0	83	129	70	50	0
PHF	0.67	#DIV/0!	0.70	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.86	0.71	0.73	0.77	#DIV/0!
PM Peak												
16:45-17:45	287	0	224	0	0	0	0	283	197	369	500	0
Highest 15 min	87	0	74	0	0	0	0	75	52	101	146	0
PHF	0.82	#DIV/0!	0.76	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.94	0.95	0.91	0.86	#DIV/0!

LEVEL OF SERVICE ANALYSIS

EXISTING CONDITIONS
AM AND PM PEAK HOUR

UCR West Campus Development Plan
Existing Conditions
AM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	24.3	0.468	C	24.3	0.468	+ 0.000 D/V
# 21 I-215/SR-60 SB Ramp at Univers	C	22.9	0.431	C	22.9	0.431	+ 0.000 D/V
# 23 West Campus at University Ave	C	27.4	0.680	C	27.4	0.680	+ 0.000 D/V
# 58 Iowa Ave at University Ave	D	35.4	0.490	D	35.4	0.490	+ 0.000 D/V
# 78 Iowa Ave at MLK Blvd	B	19.9	0.517	B	19.9	0.517	+ 0.000 D/V
# 83 Lot 30/MLK BLvd	C	21.0	0.718	C	21.0	0.718	+ 0.000 D/V
# 85 Canyon Crest Dr at MLK BLvd	C	24.6	0.563	C	24.6	0.563	+ 0.000 D/V
#109 Iowa Ave at Everton Place	C	17.1	0.000	C	17.1	0.000	+ 0.000 D/V
#124 Iowa Ave at Linden St	C	30.4	0.557	C	30.5	0.557	+ 0.000 D/V
#137 Chicago Ave at MLK Blvd	C	31.8	0.576	C	31.8	0.576	+ 0.000 D/V
#151 Chicago Ave at University Aven	C	33.4	0.495	C	33.4	0.495	+ 0.000 D/V
#159 Chicago Ave at Linden Street	C	31.9	0.647	C	31.9	0.647	+ 0.000 D/V
#196 Iowa Ave at Blaine St	D	37.5	0.806	D	37.5	0.806	+ 0.000 D/V
#207 I-215/SR-60 NB Ramp at Blain S	C	23.6	0.644	C	23.6	0.644	+ 0.000 D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	24.0	0.531	C	24.0	0.531	+ 0.000 D/V
#237 Chicago Ave at 3rd Street	D	41.8	0.708	D	41.8	0.708	+ 0.000 D/V
#291 I-215 SB Ramp/MLK Blvd	B	17.7	0.370	B	17.7	0.370	+ 0.000 D/V
#292 I-215 NB Ramps/MLK Blvd	B	14.6	0.540	B	14.6	0.540	+ 0.000 V/C

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                      UCR West Campus Development Plan
                             Existing Conditions
                                   AM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
            2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #20 I-215/SR-60 NB Ramps at University
********************************************************************************
Cycle (sec):          110              Critical Vol./Cap.(X):          0.468
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        24.3
Optimal Cycle:         36              Level Of Service:                   C
********************************************************************************
Street Name:        I-215/SR-60 NB Ramps              University Avenue
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:        Protected        Protected         Protected         Permitted
Rights:           Include          Include           Include           Include
Min. Green:    0    0    7     7    0    7     7    7    7     0    7    7
Lanes:        0  0  0  0  1    1  0  0  0  1    1  0  1  1  0    0  1  0  1  0
------------|----------------||----------------||----------------||----------------|
Volume Module: Existing AM Peak
Base Vol:      0    0    1    74    0  382    80  595    1     0  198   73
Growth Adj: 1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Initial Bse:   0    0    1    74    0  382    80  595    1     0  198   73
User Adj:   1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:    1.00 1.00 0.25  0.74 1.00 0.91  0.71 0.74 0.25  1.00 0.88 0.87
PHF Volume:    0    0    4   100    0  420   113  804    4     0  225   84
Reduct Vol:    0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:   0    0    4   100    0  420   113  804    4     0  225   84
PCE Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:    0    0    4   100    0  420   113  804    4     0  225   84
------------|----------------||----------------||----------------||----------------|
Saturation Flow Module:
Sat/Lane:   1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
Adjustment: 1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Lanes:      0.00 0.00 1.00  1.00 0.00 1.00  1.00 1.99 0.01  0.00 1.46 0.54
Final Sat.:    0    0 1900  1900    0 1900  1900 3781   19     0 2768 1032
------------|----------------||----------------||----------------||----------------|
Capacity Analysis Module:
Vol/Sat:    0.00 0.00 0.00  0.05 0.00 0.22  0.06 0.21 0.21  0.00 0.08 0.08
Crit Moves: ****                      ****       ****
Green/Cycle: 0.00 0.00 0.01  0.39 0.00 0.40  0.38 0.53 0.53  0.00 0.15 0.15
Volume/Cap: 0.00 0.00 0.17  0.14 0.00 0.56  0.15 0.40 0.40  0.00 0.56 0.56
Delay/Veh:   0.0  0.0 56.9  22.0  0.0 26.5  22.4 15.6 15.6   0.0 44.9 44.9
User DelAdj: 1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:  0.0  0.0 56.9  22.0  0.0 26.5  22.4 15.6 15.6   0.0 44.9 44.9
LOS by Move:   A    A    E     C    A    C     C    B    B     A    D    D
HCM2kAvgQ:     0    0    0     2    0   11     2    8    8     0    6    6
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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UCR West Campus Development Plan
Existing Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #21 I-215/SR-60 SB Ramp at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.431
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	22.9
Optimal Cycle:	29	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Include			Include			Include	
Min. Green:	0	0	0	7	0	7	0	7	7	7	7	0
Lanes:		0 0 0 0 0			0 1 0 1 0			0 0 1 1 1			1 0 2 0 0	
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	351	26	186	0	305	229	43	533	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	351	26	186	0	305	229	43	533	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.70	0.50	0.88	1.00	0.88	0.90	0.83	0.93	1.00
PHF Volume:	0	0	0	501	52	211	0	347	254	52	573	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	501	52	211	0	347	254	52	573	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	501	52	211	0	347	254	52	573	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.20	0.80	0.00	1.73	1.27	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	375	1525	0	3287	2413	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.26	0.14	0.14	0.00	0.11	0.11	0.03	0.15	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.61	0.61	0.61	0.00	0.24	0.24	0.07	0.31	0.00
Volume/Cap:	0.00	0.00	0.00	0.43	0.23	0.23	0.00	0.43	0.43	0.39	0.48	0.00
Delay/Veh:	0.0	0.0	0.0	10.6	9.0	9.0	0.0	32.3	32.3	46.3	28.1	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	10.6	9.0	9.0	0.0	32.3	32.3	46.3	28.1	0.0
LOS by Move:	A	A	A	B	A	A	A	C	C	D	C	A
HCM2kAvgQ:	0	0	0	8	4	4	0	5	5	2	7	0

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                              Existing Conditions
                                    AM Peak
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
              2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #23 West Campus at University Ave
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):          0.680
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):         27.4
Optimal Cycle:         46              Level Of Service:                   C
********************************************************************************
Street Name:                West Campus                  University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:    7     0     7    0     0     0    0     7     7    7     7     0
Lanes:         1  0  0  0  1   0  0  0  0  0   0  0  1  1  0   1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM peak
Base Vol:     129     0   276     0     0     0     0   285   367   203   153     0
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:  129     0   276     0     0     0     0   285   367   203   153     0
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.67  1.00  0.70  1.00  1.00  1.00  1.00  0.86  0.71  0.73  0.77  1.00
PHF Volume:   193     0   394     0     0     0     0   331   517   278   199     0
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  193     0   394     0     0     0     0   331   517   278   199     0
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   193     0   394     0     0     0     0   331   517   278   199     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  0.00  1.00  0.00  0.00  0.00  0.00  1.00  1.00  1.00  2.00  0.00
Final Sat.:  1900     0  1900     0     0     0     0  1900  1900  1900  3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.10  0.00  0.21  0.00  0.00  0.00  0.00  0.17  0.27  0.15  0.05  0.00
Crit Moves:              ****                                  ****  ****
Green/Cycle: 0.31  0.00  0.31  0.00  0.00  0.00  0.00  0.40  0.40  0.22  0.61  0.00
Volume/Cap:  0.33  0.00  0.68  0.00  0.00  0.00  0.00  0.44  0.68  0.68  0.09  0.00
Delay/Veh:   27.2   0.0  33.8   0.0   0.0   0.0   0.0  22.0  26.3  40.7   7.8   0.0
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  27.2   0.0  33.8   0.0   0.0   0.0   0.0  22.0  26.3  40.7   7.8   0.0
LOS by Move:    C     A     C     A     A     A     A     C     C     D     A     A
HCM2kAvgQ:      5     0    12     0     0     0     0     7    14     9     1     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
Existing Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.490
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	35.4
Optimal Cycle:	36	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 2 0 1			1 0 1 1 0			1 0 2 0 1			1 0 2 0 1		
Volume Module: Existing AM Peak												
Base Vol:	63	544	92	136	245	99	139	345	56	80	342	167
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	63	544	92	136	245	99	139	345	56	80	342	167
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.75	0.83	0.72	0.87	0.84	0.88	0.91	0.92	0.91	0.74	0.96	0.72
PHF Volume:	84	655	128	156	292	113	153	375	62	108	356	232
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	84	655	128	156	292	113	153	375	62	108	356	232
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	84	655	128	156	292	113	153	375	62	108	356	232
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.44	0.56	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	2742	1058	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.04	0.17	0.07	0.08	0.11	0.11	0.08	0.10	0.03	0.06	0.09	0.12
Crit Moves:		****		****			****					****
Green/Cycle:	0.18	0.35	0.35	0.17	0.34	0.34	0.16	0.26	0.44	0.15	0.25	0.25
Volume/Cap:	0.24	0.49	0.19	0.49	0.32	0.32	0.49	0.38	0.07	0.37	0.38	0.49
Delay/Veh:	42.1	30.7	27.1	46.4	29.8	29.8	46.8	36.7	19.2	46.4	37.6	39.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	42.1	30.7	27.1	46.4	29.8	29.8	46.8	36.7	19.2	46.4	37.6	39.3
LOS by Move:	D	C	C	D	C	C	D	D	B	D	D	D
HCM2kAvgQ:	3	9	3	6	5	5	6	6	1	4	6	8

Note: Queue reported is the number of cars per lane.

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                    UCR West Campus Development Plan
                           Existing Conditions
                                 AM Peak
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                    Level Of Service Computation Report
            2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #78 Iowa Ave at MLK Blvd
********************************************************************************
Cycle (sec):          110               Critical Vol./Cap.(X):         0.517
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        19.9
Optimal Cycle:         33               Level Of Service:                  B
********************************************************************************
Street Name:                Iowa Avenue                       MLK Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected         Protected
Rights:           Include            Ovl            Include            Ovl
Min. Green:    0    0     0    7    7     7    7    7     0    0    7     7
Lanes:        0  0  0  0  0    1  0  1! 0  1    1  0  2  0  0    0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      0    0     0  263    0   101  267  440     0    0  785   484
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:   0    0     0  263    0   101  267  440     0    0  785   484
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 0.75 1.00  0.81 0.90 0.77  1.00 1.00 0.95  0.92
PHF Volume:    0    0     0  351    0   125  297  571     0    0  826   526
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:   0    0     0  351    0   125  297  571     0    0  826   526
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:    0    0     0  351    0   125  297  571     0    0  826   526
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       0.00 0.00  0.00 1.74 0.00  1.26 1.00 2.00  0.00 0.00 2.00  1.00
Final Sat.:    0    0     0 3302    0  2398 1900 3800     0    0 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.00  0.00 0.11 0.00  0.05 0.16 0.15  0.00 0.00 0.22  0.28
Crit Moves:                  ****            ****                  ****
Green/Cycle: 0.00 0.00  0.00 0.21 0.00  0.51 0.30 0.72  0.00 0.00 0.42  0.63
Volume/Cap:  0.00 0.00  0.00 0.52 0.00  0.10 0.52 0.21  0.00 0.00 0.52  0.44
Delay/Veh:    0.0  0.0   0.0 39.4  0.0  14.1 32.6  5.0   0.0  0.0 23.9  10.9
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:   0.0  0.0   0.0 39.4  0.0  14.1 32.6  5.0   0.0  0.0 23.9  10.9
LOS by Move:   A    A     A    D    A     B    C    A     A    A    C     B
HCM2kAvgQ:     0    0     0    7    0     2    9    3     0    0   10     9
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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UCR West Campus Development Plan
Existing Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.718
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	21.0
Optimal Cycle:	51	Level Of Service:	C

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	1 0	0 0	0	0 1	0 0	1	1 0	1 1	0	1 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	4	0	0	12	0	4	321	600	0	10	1276	77
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	4	0	0	12	0	4	321	600	0	10	1276	77
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.50	1.00	1.00	1.00	1.00	0.33	0.60	0.75	1.00	0.50	0.90	0.69
PHF Volume:	8	0	0	12	0	12	535	800	0	20	1418	112
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	8	0	0	12	0	12	535	800	0	20	1418	112
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	8	0	0	12	0	12	535	800	0	20	1418	112
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	0.00	1.00	0.00	1.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	1900	0	0	1900	0	1900	1900	3800	0	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.01	0.00	0.01	0.28	0.21	0.00	0.01	0.37	0.06
Crit Moves:				****			****				****	
Green/Cycle:	0.07	0.00	0.00	0.07	0.00	0.07	0.37	0.64	0.00	0.21	0.48	0.48
Volume/Cap:	0.06	0.00	0.00	0.09	0.00	0.09	0.77	0.33	0.00	0.05	0.77	0.12
Delay/Veh:	43.6	0.0	0.0	43.8	0.0	43.8	33.3	8.4	0.0	31.4	23.3	14.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.6	0.0	0.0	43.8	0.0	43.8	33.3	8.4	0.0	31.4	23.3	14.2
LOS by Move:	D	A	A	D	A	D	C	A	A	C	C	B
HCM2kAvgQ:	0	0	0	0	0	0	16	6	0	0	19	2

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Existing Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.563
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.6
Optimal Cycle:	41	Level Of Service:	C

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	1153	452	445	41	84	52	130	185	323	108	335	36
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	1153	452	445	41	84	52	130	185	323	108	335	36
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.74	0.79	0.68	0.88	0.59	0.83	0.72	0.94	0.93	0.89	0.56
PHF Volume:	1253	611	563	60	95	88	157	257	344	116	376	64
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	1253	611	563	60	95	88	157	257	344	116	376	64
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	1253	611	563	60	95	88	157	257	344	116	376	64
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3600	3800	1900	3600	3800	1900	3600	3800	1900	3600	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.35	0.16	0.30	0.02	0.03	0.05	0.04	0.07	0.18	0.03	0.10	0.03
Crit Moves:	****				****		****				****	
Green/Cycle:	0.61	0.56	0.56	0.11	0.06	0.13	0.08	0.13	0.74	0.12	0.17	0.17
Volume/Cap:	0.57	0.29	0.53	0.15	0.43	0.35	0.57	0.51	0.24	0.28	0.57	0.20
Delay/Veh:	14.4	14.1	17.2	48.5	55.9	48.0	56.4	49.1	4.9	48.9	46.7	42.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	14.4	14.1	17.2	48.5	55.9	48.0	56.4	49.1	4.9	48.9	46.7	42.7
LOS by Move:	B	B	B	D	E	D	E	D	A	D	D	D
HCM2kAvgQ:	15	6	13	1	2	3	4	5	4	2	7	2

Note: Queue reported is the number of cars per lane.

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                      UCR West Campus Development Plan
                             Existing Conditions
                                   AM Peak
--------------------------------------------------------------------------------

                     Level Of Service Computation Report
           2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #109 Iowa Ave at Everton Place
********************************************************************************
Average Delay (sec/veh):       0.8      Worst Case Level Of Service: C[ 17.1]
********************************************************************************
Street Name:              Iowa Avenue                      Everton Place
Approach:        North Bound      South Bound        East Bound        West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled       Stop Sign         Stop Sign
Rights:            Include          Include          Include           Include
Lanes:          0  0  1  0  1   1  0  1  0  0   0  0  0  0  0   1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Exsting AM Peak
Base Vol:         0  659    56    28  337     0     0    0     0    10    0    21
Growth Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:      0  659    56    28  337     0     0    0     0    10    0    21
User Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:       1.00 0.90  0.54  0.88 0.83  1.00  1.00 1.00  1.00  0.83 1.00  0.75
PHF Volume:       0  732   104    32  406     0     0    0     0    12    0    28
Reduct Vol:       0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:       0  732   104    32  406     0     0    0     0    12    0    28
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4 xxxx   6.2
FollowUpTim:xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx   836 xxxx xxxxx  xxxx xxxx xxxxx  1202 xxxx   732
Potent Cap.: xxxx xxxx xxxxx   807 xxxx xxxxx  xxxx xxxx xxxxx   206 xxxx   424
Move Cap.:   xxxx xxxx xxxxx   807 xxxx xxxxx  xxxx xxxx xxxxx   200 xxxx   424
Volume/Cap:  xxxx xxxx  xxxx  0.04 xxxx  xxxx  xxxx xxxx  xxxx  0.06 xxxx  0.07
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx   0.1 xxxx xxxxx  xxxx xxxx xxxxx   0.2 xxxx   0.2
Control Del:xxxxx xxxx xxxxx   9.6 xxxx xxxxx xxxxx xxxx xxxxx  24.2 xxxx  14.1
LOS by Move:    *    *     *     A    *     *     *    *     *     C    *     B
Movement:       LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx            xxxxxx            xxxxxx             17.1
ApproachLOS:        *                 *                 *                 C
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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-----------------------------------------------------------------------------
                    UCR West Campus Development Plan
                          Existing Conditions
                                AM Peak
-----------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
*****************************************************************************
Intersection #124 Iowa Ave at Linden St
*****************************************************************************
Cycle (sec):          110              Critical Vol./Cap.(X):        0.557
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):      30.5
Optimal Cycle:         36              Level Of Service:                C
*****************************************************************************
Street Name:               Iowa Avenue                      Linden Street
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:    7     7     7    7     7     7    7     7     7    7     7     7
Lanes:        1  0  2  0  1    1  0  1  1  0    1  0  1  0  1    1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:     118   579    92    45   403   207   113   107    47    70   137    67
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:  118   579    92    45   403   207   113   107    47    70   137    67
Added Vol:      0     0     0     0     0     0     0     0     0     0     0     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:  118   579    92    45   403   207   113   107    47    70   137    67
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.59  0.90  0.80  0.70  0.80  0.57  0.81  0.70  0.70  0.65  0.66  0.88
PHF Volume:   200   643   115    64   504   363   140   153    67   108   208    76
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  200   643   115    64   504   363   140   153    67   108   208    76
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   200   643   115    64   504   363   140   153    67   108   208    76
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  2.00  1.00  1.00  1.16  0.84  1.00  1.00  1.00  1.00  1.00  1.00
Final Sat.:  1900  3800  1900  1900  2208  1592  1900  1900  1900  1900  1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.11  0.17  0.06  0.03  0.23  0.23  0.07  0.08  0.04  0.06  0.11  0.04
Crit Moves:  ****                    ****        ****                    ****
Green/Cycle: 0.19  0.44  0.44  0.16  0.41  0.41  0.13  0.18  0.18  0.14  0.20  0.20
Volume/Cap:  0.56  0.39  0.14  0.21  0.56  0.56  0.56  0.44  0.19  0.39  0.56  0.20
Delay/Veh:   42.3  21.3  18.7  40.1  25.3  25.3  47.5  40.8  38.3  43.5  41.7  37.3
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  42.3  21.3  18.7  40.1  25.3  25.3  47.5  40.8  38.3  43.5  41.7  37.3
LOS by Move:    D     C     B     D     C     C     D     D     D     D     D     D
HCM2kAvgQ:      7     7     2     2    11    11     5     5     2     4     7     2
*****************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                             Existing Conditions
                                   AM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
            2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #137 Chicago Ave at MLK Blvd
********************************************************************************
Cycle (sec):          130              Critical Vol./Cap.(X):         0.576
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        31.8
Optimal Cycle:         37              Level Of Service:                  C
********************************************************************************
Street Name:               Chicago Avenue              Martin Luther King Blvd
Approach:        North Bound      South Bound       East Bound        West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected         Protected         Protected
Rights:             Ovl              Ovl               Ovl               Ovl
Min. Green:     7     7     7     7     7     7     7     7     7     7     7     7
Lanes:         2  0  2  0  1   2  0  2  0  1   1  0  2  0  1   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      707  898   228    60  209   113   133  543   131    40  638   138
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   707  898   228    60  209   113   133  543   131    40  638   138
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.87 0.92  0.70  0.80 0.80  0.81  0.85 0.74  0.90  0.71 0.94  0.78
PHF Volume:    813  976   326    75  261   140   156  734   146    56  679   177
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   813  976   326    75  261   140   156  734   146    56  679   177
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    813  976   326    75  261   140   156  734   146    56  679   177
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:        2.00 2.00  1.00  2.00 2.00  1.00  1.00 2.00  1.00  1.00 2.00  1.00
Final Sat.:   3800 3800  1900  3800 3800  1900  1900 3800  1900  1900 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.21 0.26  0.17  0.02 0.07  0.07  0.08 0.19  0.08  0.03 0.18  0.09
Crit Moves:        ****        ****             ****                   ****
Green/Cycle:  0.37 0.43  0.54  0.06 0.12  0.26  0.14 0.34  0.71  0.10 0.30  0.36
Volume/Cap:   0.57 0.59  0.32  0.34 0.57  0.28  0.59 0.57  0.11  0.29 0.59  0.26
Delay/Veh:    30.6 26.4  15.7  55.2 51.7  35.9  52.0 33.1   5.5  50.7 36.4  27.3
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   30.6 26.4  15.7  55.2 51.7  35.9  52.0 33.1   5.5  50.7 36.4  27.3
LOS by Move:     C    C     B     E    D     D     D    C     A     D    D     C
HCM2kAvgQ:      12   14     7     2    5     4     6   11     2     2   11     5
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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UCR West Campus Development Plan
Existing Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.495
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	33.4
Optimal Cycle:	41	Level Of Service:	C

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 1 1 0			2 0 2 0 1			2 0 2 0 1		
Volume Module: Existing AM Peak												
Base Vol:	208	747	110	74	320	126	173	326	88	85	386	55
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	208	747	110	74	320	126	173	326	88	85	386	55
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.72	0.79	0.76	0.77	0.89	0.90	0.88	0.82	0.58	0.85	0.85	0.60
PHF Volume:	289	946	145	96	360	140	197	398	152	100	454	92
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	289	946	145	96	360	140	197	398	152	100	454	92
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	289	946	145	96	360	140	197	398	152	100	454	92
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.44	0.56	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	2735	1065	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.08	0.25	0.08	0.03	0.13	0.13	0.05	0.10	0.08	0.03	0.12	0.05
Crit Moves:		****		****			****				****	
Green/Cycle:	0.20	0.50	0.50	0.06	0.35	0.35	0.10	0.22	0.22	0.12	0.24	0.24
Volume/Cap:	0.37	0.50	0.15	0.43	0.37	0.37	0.50	0.47	0.36	0.21	0.50	0.20
Delay/Veh:	41.4	20.3	16.4	55.9	29.1	29.1	51.8	41.2	40.2	47.6	39.9	36.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	41.4	20.3	16.4	55.9	29.1	29.1	51.8	41.2	40.2	47.6	39.9	36.7
LOS by Move:	D	C	B	E	C	C	D	D	D	D	D	D
HCM2kAvgQ:	5	12	3	2	7	7	4	7	5	2	8	3

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Existing Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	0.647
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	31.9
Optimal Cycle:	43	Level Of Service:	C

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 1 1 0			1 0 2 0 1			1 0 0 1 0			1 0 1 1 0		
Volume Module: Existing AM Peak												
Base Vol:	21	771	148	140	364	33	36	102	31	154	122	153
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	21	771	148	140	364	33	36	102	31	154	122	153
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.66	0.87	0.76	0.54	0.92	0.59	0.75	0.71	0.65	0.71	0.66	0.54
PHF Volume:	32	886	195	259	396	56	48	144	48	217	185	283
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	32	886	195	259	396	56	48	144	48	217	185	283
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	32	886	195	259	396	56	48	144	48	217	185	283
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.64	0.36	1.00	2.00	1.00	1.00	0.75	0.25	1.00	1.00	1.00
Final Sat.:	1900	3115	685	1900	3800	1900	1900	1426	474	1900	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.02	0.28	0.28	0.14	0.10	0.03	0.03	0.10	0.10	0.11	0.10	0.15
Crit Moves:		****		****			****					****
Green/Cycle:	0.25	0.42	0.42	0.20	0.38	0.38	0.07	0.14	0.14	0.16	0.22	0.22
Volume/Cap:	0.07	0.67	0.67	0.67	0.28	0.08	0.36	0.73	0.73	0.73	0.44	0.67
Delay/Veh:	28.5	24.3	24.3	41.3	21.9	20.2	46.0	51.8	51.8	49.5	33.8	38.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	28.5	24.3	24.3	41.3	21.9	20.2	46.0	51.8	51.8	49.5	33.8	38.1
LOS by Move:	C	C	C	D	C	C	D	D	D	D	C	D
HCM2kAvgQ:	1	14	14	8	4	1	2	7	7	8	5	9

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Existing Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	0.806
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	37.5
Optimal Cycle:	67	Level Of Service:	D

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Include			Include			Include	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:		1 0 2 0 1			1 0 1 1 0			1 0 2 0 1			1 0 1 1 0	
Volume Module: Existing AM Peak												
Base Vol:	141	641	99	121	413	225	418	410	103	108	428	130
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	141	641	99	121	413	225	418	410	103	108	428	130
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.78	0.93	0.85	0.72	0.69	0.84	0.89	0.75	0.89	0.93	0.88	0.79
PHF Volume:	181	689	116	168	599	268	470	547	116	116	486	165
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	181	689	116	168	599	268	470	547	116	116	486	165
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	181	689	116	168	599	268	470	547	116	116	486	165
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.38	0.62	1.00	2.00	1.00	1.00	1.49	0.51
Final Sat.:	1900	3800	1900	1900	2625	1175	1900	3800	1900	1900	2839	961
Capacity Analysis Module:												
Vol/Sat:	0.10	0.18	0.06	0.09	0.23	0.23	0.25	0.14	0.06	0.06	0.17	0.17
Crit Moves:	****				****		****				****	
Green/Cycle:	0.12	0.27	0.27	0.13	0.28	0.28	0.31	0.35	0.35	0.17	0.21	0.21
Volume/Cap:	0.81	0.67	0.23	0.67	0.81	0.81	0.81	0.41	0.17	0.36	0.81	0.81
Delay/Veh:	61.9	34.4	28.7	48.4	37.9	37.9	40.0	24.9	22.7	37.4	43.4	43.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	61.9	34.4	28.7	48.4	37.9	37.9	40.0	24.9	22.7	37.4	43.4	43.4
LOS by Move:	E	C	C	D	D	D	D	C	C	D	D	D
HCM2kAvgQ:	8	10	3	6	14	14	15	6	2	3	12	12

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                              Existing Conditions
                                    AM Peak
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
             2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #207 I-215/SR-60 NB Ramp at Blain Street
********************************************************************************
Cycle (sec):          110                Critical Vol./Cap.(X):         0.644
Loss Time (sec):        8 (Y+R=4.0 sec)  Average Delay (sec/veh):        23.6
Optimal Cycle:         43                Level Of Service:                  C
********************************************************************************
Street Name:          I-215/SR-60 NB Ramps                 Blain Street
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:     7    7    7    0    0    0    7    7    0    0    7    7
Lanes:        0  1  0  0  1   0  0  0  0  0   2  0  2  0  0   0  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:     204    5   393    0    0    0   172  645    0     0  409   499
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  204    5   393    0    0    0   172  645    0     0  409   499
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.70 0.31  0.95 1.00 1.00  1.00  0.68 0.76  1.00  1.00 0.85  0.84
PHF Volume:   291   16   414    0    0    0   253  849    0     0  481   594
Reduct Vol:     0    0     0    0    0    0     0    0    0     0    0     0
Reduced Vol:  291   16   414    0    0    0   253  849    0     0  481   594
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   291   16   414    0    0    0   253  849    0     0  481   594
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.95 0.05  1.00 0.00 0.00  0.00  2.00 2.00  0.00  0.00 1.00  1.00
Final Sat.:  1800  100  1900    0    0    0  3800 3800    0     0 1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.16 0.16  0.22 0.00 0.00  0.00  0.07 0.22  0.00  0.00 0.25  0.31
Crit Moves:             ****                  ****                        ****
Green/Cycle: 0.34 0.34  0.34 0.00 0.00  0.00  0.10 0.59  0.00  0.00 0.49  0.49
Volume/Cap:  0.48 0.48  0.64 0.00 0.00  0.00  0.64 0.38  0.00  0.00 0.52  0.64
Delay/Veh:   29.3 29.3  33.0  0.0  0.0   0.0  51.0 12.1   0.0   0.0 19.7  22.0
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  29.3 29.3  33.0  0.0  0.0   0.0  51.0 12.1   0.0   0.0 19.7  22.0
LOS by Move:    C    C     C    A    A     A     D    B     A     A    B     C
HCM2kAvgQ:      8    8    12    0    0     0     5    7     0     0   11    15
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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UCR West Campus Development Plan
Existing Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	0.531
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.0
Optimal Cycle:	34	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0 0 0 0			0 1 0 0 1			0 0 1 1 0			2 0 2 0 0		
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	369	16	251	0	486	179	110	518	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	369	16	251	0	486	179	110	518	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.95	0.80	0.76	1.00	0.66	0.86	0.89	0.76	1.00
PHF Volume:	0	0	0	388	20	330	0	736	208	124	682	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	388	20	330	0	736	208	124	682	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	388	20	330	0	736	208	124	682	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.95	0.05	1.00	0.00	1.56	0.44	2.00	2.00	0.00
Final Sat.:	0	0	0	1807	93	1900	0	2963	837	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.21	0.21	0.17	0.00	0.25	0.25	0.03	0.18	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.40	0.40	0.40	0.00	0.47	0.47	0.06	0.53	0.00
Volume/Cap:	0.00	0.00	0.00	0.53	0.53	0.43	0.00	0.53	0.53	0.53	0.34	0.00
Delay/Veh:	0.0	0.0	0.0	27.8	27.8	26.1	0.0	22.9	22.9	57.0	16.3	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	27.8	27.8	26.1	0.0	22.9	22.9	57.0	16.3	0.0
LOS by Move:	A	A	A	C	C	C	A	C	C	E	B	A
HCM2kAvgQ:	0	0	0	11	11	9	0	12	12	3	7	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Existing Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	0.708
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	41.8
Optimal Cycle:	51	Level Of Service:	D

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	176	590	177	195	315	66	94	348	71	130	425	222
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	176	590	177	195	315	66	94	348	71	130	425	222
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.88	0.93	0.65	0.66	0.88	0.66	0.81	0.60	0.66	0.71	0.88	0.74
PHF Volume:	200	634	272	295	358	100	116	580	108	183	483	300
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	200	634	272	295	358	100	116	580	108	183	483	300
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	200	634	272	295	358	100	116	580	108	183	483	300
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.40	0.60	1.00	1.56	0.44	1.00	1.69	0.31	1.00	1.23	0.77
Final Sat.:	1900	2659	1141	1900	2970	830	1900	3205	595	1900	2344	1456
Capacity Analysis Module:												
Vol/Sat:	0.11	0.24	0.24	0.16	0.12	0.12	0.06	0.18	0.18	0.10	0.21	0.21
Crit Moves:		****		****			****				****	
Green/Cycle:	0.26	0.34	0.34	0.22	0.30	0.30	0.09	0.25	0.25	0.13	0.29	0.29
Volume/Cap:	0.41	0.71	0.71	0.71	0.41	0.41	0.71	0.74	0.74	0.74	0.71	0.71
Delay/Veh:	37.3	36.5	36.5	48.8	34.0	34.0	66.7	44.7	44.7	61.0	40.2	40.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	37.3	36.5	36.5	48.8	34.0	34.0	66.7	44.7	44.7	61.0	40.2	40.2
LOS by Move:	D	D	D	D	C	C	E	D	D	E	D	D
HCM2kAvgQ:	6	15	15	11	7	7	6	13	13	8	14	14

Note: Queue reported is the number of cars per lane.

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                    UCR West Campus Development Plan
                           Existing Conditions
                                 AM Peak
---------------------------------------------------------------------------------
                    Level Of Service Computation Report
           2000 HCM Operations Method (Base Volume Alternative)
*********************************************************************************
Intersection #291 I-215 SB Ramp/MLK Blvd
*********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         0.370
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       17.7
Optimal Cycle:         26              Level Of Service:                 B
*********************************************************************************
Street Name:               I-215 SB Ramps                       MLK Blvd
Approach:       North Bound       South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted         Permitted         Permitted         Permitted
Rights:          Include           Include           Include           Include
Min. Green:   0     0     0    7     7     7    0     7     7    7     7     0
Lanes:        0  0  0  0  0    1  0  0  1  0    0  0  1  1  1    1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:       0    0     0    17   60   197     0  537   197    21  291     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0    17   60   197     0  537   197    21  291     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  0.43 0.71  0.79  1.00 0.86  0.67  0.75 0.87  1.00
PHF Volume:     0    0     0    40   85   249     0  624   294    28  334     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:    0    0     0    40   85   249     0  624   294    28  334     0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:     0    0     0    40   85   249     0  624   294    28  334     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.00 0.00  0.00  1.00 0.25  0.75  0.00 2.00  1.00  1.00 2.00  0.00
Final Sat.:     0    0     0  1900  481  1419     0 3800  1900  1900 3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.00  0.00  0.02 0.18  0.18  0.00 0.16  0.15  0.01 0.09  0.00
Crit Moves:                        ****              ****
Green/Cycle: 0.00 0.00  0.00  0.48 0.48  0.48  0.00 0.44  0.44  0.44 0.44  0.00
Volume/Cap:  0.00 0.00  0.00  0.04 0.37  0.37  0.00 0.37  0.35  0.03 0.20  0.00
Delay/Veh:    0.0  0.0   0.0  14.1 16.9  16.9   0.0 18.6  18.3  15.7 17.0   0.0
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   0.0  0.0   0.0  14.1 16.9  16.9   0.0 18.6  18.3  15.7 17.0   0.0
LOS by Move:    A    A     A     B    B     B     A    B     B     B    B     A
HCM2kAvgQ:      0    0     0     1    6     6     0    6     6     0    3     0
*********************************************************************************
Note: Queue reported is the number of cars per lane.
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                     UCR West Campus Development Plan
                            Existing Conditions
                                  AM Peak
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                    Level Of Service Computation Report
          2000 HCM 4-Way Stop Method (Base Volume Alternative)
********************************************************************************
Intersection #292 I-215 NB Ramps/MLK Blvd
********************************************************************************
Cycle (sec):         100                Critical Vol./Cap.(X):        0.540
Loss Time (sec):       0 (Y+R=4.0 sec)  Average Delay (sec/veh):       14.6
Optimal Cycle:         0                Level Of Service:                 B
********************************************************************************
Street Name:               I-215 NB Ramp                        MLK BLvd
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Min. Green:     0    0    0     0    0    0     0    0    0     0    0    0
Lanes:        1  1  0  0  0   0  0  0  0  0   2  0  0  0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: existing AM Peak
Base Vol:     311   12    0     0    0    0   554    0    0     0    0    0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  311   12    0     0    0    0   554    0    0     0    0    0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.84 0.60  1.00  1.00 1.00  1.00  0.89 1.00  1.00  1.00 1.00  1.00
PHF Volume:   370   20    0     0    0    0   622    0    0     0    0    0
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:  370   20    0     0    0    0   622    0    0     0    0    0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   370   20    0     0    0    0   622    0    0     0    0    0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.90 0.10  0.00  0.00 0.00  0.00  2.00 0.00  0.00  0.00 0.00  0.00
Final Sat.:  1006   55    0     0    0    0  1154    0    0     0    0    0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.37 0.37  xxxx  xxxx xxxx  xxxx  0.54 xxxx  xxxx  xxxx xxxx  xxxx
Crit Moves:  ****                              ****
Delay/Veh:   12.9 12.9   0.0   0.0  0.0   0.0  15.6  0.0   0.0   0.0  0.0   0.0
Delay Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  12.9 12.9   0.0   0.0  0.0   0.0  15.6  0.0   0.0   0.0  0.0   0.0
LOS by Move:   B    B    *     *    *    *     C    *    *     *    *    *
ApproachDel:      12.9             xxxxxx            15.6            xxxxxx
Delay Adj:        1.00              xxxxx            1.00             xxxxx
ApprAdjDel:       12.9             xxxxxx            15.6            xxxxxx
LOS by Appr:        B                 *                C                *
AllWayAvgQ:   0.5  0.5   0.0   0.0  0.0   0.0   1.1  0.0   0.0   0.0  0.0   0.0
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #292 I-215 NB Ramps/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.572
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	15.4
Optimal Cycle:	0	Level Of Service:	C

Street Name:	I-215 NB Ramp						MLK BLvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 1	0	0 0	0 0	0	0 0	2 0	0	0 0	0 0	0	0 0
Volume Module: existing AM Peak												
Base Vol:	311	12	0	0	0	0	554	0	0	0	0	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	327	13	0	0	0	0	582	0	0	0	0	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	327	13	0	0	0	0	582	0	0	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.60	1.00	1.00	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00
PHF Volume:	389	21	0	0	0	0	654	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	389	21	0	0	0	0	654	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	389	21	0	0	0	0	654	0	0	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.90	0.10	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
Final Sat.:	995	54	0	0	0	0	1143	0	0	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.39	0.39	xxxx	xxxx	xxxx	xxxx	0.57	xxxx	xxxx	xxxx	xxxx	xxxx
Crit Moves:	****						****					
Delay/Veh:	13.4	13.3	0.0	0.0	0.0	0.0	16.6	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	13.4	13.3	0.0	0.0	0.0	0.0	16.6	0.0	0.0	0.0	0.0	0.0
LOS by Move:	B	B	*	*	*	*	C	*	*	*	*	*
ApproachDel:		13.4			xxxxxx			16.6			xxxxxx	
Delay Adj:		1.00			xxxxx			1.00			xxxxx	
ApprAdjDel:		13.4			xxxxxx			16.6			xxxxxx	
LOS by Appr:		B			*			C			*	
AllWayAvgQ:	0.6	0.6	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0

UC Riverside West Campus Development
Existing Conditions
PM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	25.2	0.598	C	25.2	0.598	+ 0.000 D/V
# 21 I-215/SR-60 SB Ramp at Univers	B	19.4	0.528	B	19.4	0.528	+ 0.000 D/V
# 23 West Campus at University Ave	C	24.7	0.578	C	24.7	0.578	+ 0.000 D/V
# 58 Iowa Ave at University Ave	D	40.6	0.760	D	40.6	0.760	+ 0.000 D/V
# 78 Iowa Ave at MLK Blvd	C	21.5	0.701	C	21.5	0.701	+ 0.000 D/V
# 83 Lot 30/MLK BLvd	C	33.3	0.903	C	33.3	0.903	+ 0.000 D/V
# 85 Canyon Crest Dr at MLK BLvd	E	65.1	1.108	E	65.1	1.108	+ 0.000 D/V
#109 Iowa Ave at Everton Place	F	92.2	0.000	F	92.2	0.000	+ 0.000 D/V
#124 Iowa Ave at Linden St	C	25.2	0.546	C	25.3	0.546	+ 0.000 D/V
#137 Chicago Ave at MLK Blvd	D	52.8	1.011	D	52.8	1.011	+ 0.000 D/V
#151 Chicago Ave at University Aven	D	42.9	0.842	D	42.9	0.842	+ 0.000 D/V
#159 Chicago Ave at Linden Street	C	24.5	0.595	C	24.5	0.595	+ 0.000 D/V
#196 Iowa Ave at Blaine St	D	35.8	0.737	D	35.8	0.737	+ 0.000 D/V
#207 I-215/SR-60 NB Ramp at Blain S	B	18.2	0.536	B	18.2	0.536	+ 0.000 D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	30.8	0.756	C	30.8	0.756	+ 0.000 D/V
#237 Chicago Ave at 3rd Street	D	44.7	0.819	D	44.7	0.819	+ 0.000 D/V
#291 I-215 SB Ramp/MLK Blvd	B	12.5	0.474	B	12.5	0.474	+ 0.000 D/V
#292 I-215 NB Ramps/MLK Blvd	B	10.7	0.313	B	10.7	0.313	+ 0.000 V/C

UC Riverside West Campus Development
Existing Conditions
PM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
#109 Iowa Ave at Everton Place	No / No	??? / ???
#292 I-215 NB Ramps/MLK Blvd	No	???

```
--------------------------------------------------------------------------------
                         UC Riverside West Campus Development
                                Existing Conditions
                                     PM Peak
--------------------------------------------------------------------------------
                         Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #109 Iowa Ave at Everton Place
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        0  0  1  0  1   1  0  1  0  0   0  0  0  0  0   1  0  0  0  1
Initial Vol:   0  503   29    36 1038    0    0    0     0     47    0    39
ApproachDel:     xxxxxx           xxxxxx           xxxxxx            92.2
------------|---------------||---------------||---------------||---------------|
Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=2.2]
   FAIL - Vehicle-hours less than 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=86]
   FAIL - Approach volume less than 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=1692]
   SUCCEED - Total volume greater than or equal to 650 for intersection
             with less than four approaches.
--------------------------------------------------------------------------------
```

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

```
-------------------------------------------------------------------------------
                  UC Riverside West Campus Development
                          Existing Conditions
                                PM Peak
-------------------------------------------------------------------------------
               Peak Hour Volume Signal Warrant Report [Urban]
*******************************************************************************
Intersection #109 Iowa Ave at Everton Place
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        0  0  1  0  1    1  0  1  0  0    0  0  0  0  0    1  0  0  0  1
Initial Vol:    0  503    29    36 1038     0     0     0     0    47     0    39
------------|---------------||---------------||---------------||---------------|
Major Street Volume:            1606
Minor Approach Volume:            86
Minor Approach Volume Threshold: 170
-------------------------------------------------------------------------------
```

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UC Riverside West Campus Development
Existing Conditions
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 1	0 0	0	0 0	0 0	0	2 0	0 0	0	0 0	0 0	0
Initial Vol:	333	1	0	0	0	0	188	0	0	0	0	0

Major Street Volume: 334
Minor Approach Volume: 188
Minor Approach Volume Threshold: 846

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

```
--------------------------------------------------------------------------------
                    UC Riverside West Campus Development
                            Existing Conditions
                                  PM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
             2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #20 I-215/SR-60 NB Ramps at University
********************************************************************************
Cycle (sec):          110               Critical Vol./Cap.(X):         0.598
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        25.2
Optimal Cycle:         39               Level Of Service:                  C
********************************************************************************
Street Name:          I-215/SR-60 NB Ramps             University Avenue
Approach:       North Bound     South Bound      East Bound      West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected       Protected        Protected        Permitted
Rights:          Include         Include          Include          Include
Min. Green:    0     0     7     7     0     7     7     7     7     0     7     7
Lanes:       0  0  0  0  1   1  0  0  0  1   1  0  1  1  0   0  1  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      0     0     1    70     0   273   159   408     0     0   582   182
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:   0     0     1    70     0   273   159   408     0     0   582   182
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     1.00  1.00  0.25  0.80  1.00  0.78  0.70  0.86  1.00  1.00  0.80  0.81
PHF Volume:    0     0     4    88     0   350   227   474     0     0   728   225
Reduct Vol:    0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   0     0     4    88     0   350   227   474     0     0   728   225
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:    0     0     4    88     0   350   227   474     0     0   728   225
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       0.00  0.00  1.00  1.00  0.00  1.00  1.00  2.00  0.00  0.00  1.53  0.47
Final Sat.:    0     0  1900  1900     0  1900  1900  3800     0     0  2903   897
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00  0.05  0.00  0.18  0.12  0.12  0.00  0.00  0.25  0.25
Crit Moves:  ****                          ****  ****                     ****
Green/Cycle: 0.00  0.00  0.01  0.30  0.00  0.31  0.20  0.62  0.00  0.00  0.42  0.42
Volume/Cap:  0.00  0.00  0.21  0.15  0.00  0.60  0.60  0.20  0.00  0.00  0.60  0.60
Delay/Veh:    0.0   0.0  59.7  28.5   0.0  34.0  42.6   9.2   0.0   0.0  25.4  25.4
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0  59.7  28.5   0.0  34.0  42.6   9.2   0.0   0.0  25.4  25.4
LOS by Move:   A     A     E     C     A     C     D     A     A     A     C     C
DesignQueue:   0     0     0     4     0    16    11     6     0     0    18    18
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

UC Riverside West Campus Development
Existing Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #21 I-215/SR-60 SB Ramp at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.528
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	19.4
Optimal Cycle:	33	Level Of Service:	B

Street Name:	I-215/SR-60 SB Ramp						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	0	7	0	7	7	7	7	0
Lanes:	0 0 0 0 0			0 1 0 1 0			0 0 1 1 1			1 0 2 0 0		
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	42	183	93	0	521	724	191	664	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	42	183	93	0	521	724	191	664	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.88	0.74	0.83	1.00	0.89	0.92	0.73	0.89	1.00
PHF Volume:	0	0	0	48	247	112	0	585	787	262	746	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	48	247	112	0	585	787	262	746	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	48	247	112	0	585	787	262	746	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.23	1.22	0.55	0.00	1.28	1.72	1.00	2.00	0.00
Final Sat.:	0	0	0	446	2309	1046	0	2431	3269	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.11	0.11	0.11	0.00	0.24	0.24	0.14	0.20	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.20	0.20	0.20	0.00	0.46	0.46	0.26	0.72	0.00
Volume/Cap:	0.00	0.00	0.00	0.53	0.53	0.53	0.00	0.53	0.53	0.53	0.27	0.00
Delay/Veh:	0.0	0.0	0.0	36.3	36.3	36.3	0.0	19.7	19.7	32.7	5.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	36.3	36.3	36.3	0.0	19.7	19.7	32.7	5.0	0.0
LOS by Move:	A	A	A	D	D	D	A	B	B	C	A	A
DesignQueue:	0	0	0	9	9	9	0	15	15	11	6	0

Note: Queue reported is the number of cars per lane.

UC Riverside West Campus Development
Existing Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #23 West Campus at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.578
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.7
Optimal Cycle:	37	Level Of Service:	C

Street Name:	West Campus						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	0	0	0	0	7	7	7	7	0
Lanes:	1 0	0	0 1	0 0	0	0 0	0 0	1	1 0	1 0	2	0 0
Volume Module: Existing PM Peak												
Base Vol:	287	0	224	0	0	0	0	283	197	369	500	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	287	0	224	0	0	0	0	283	197	369	500	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.82	1.00	0.76	1.00	1.00	1.00	1.00	0.94	0.95	0.91	0.86	1.00
PHF Volume:	350	0	295	0	0	0	0	301	207	405	581	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	350	0	295	0	0	0	0	301	207	405	581	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	350	0	295	0	0	0	0	301	207	405	581	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	1.18	0.82	1.00	2.00	0.00
Final Sat.:	1900	0	1900	0	0	0	0	2250	1550	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.18	0.00	0.16	0.00	0.00	0.00	0.00	0.13	0.13	0.21	0.15	0.00
Crit Moves:	****							****		****		
Green/Cycle:	0.32	0.00	0.32	0.00	0.00	0.00	0.00	0.23	0.23	0.37	0.60	0.00
Volume/Cap:	0.58	0.00	0.49	0.00	0.00	0.00	0.00	0.58	0.58	0.58	0.25	0.00
Delay/Veh:	29.8	0.0	28.1	0.0	0.0	0.0	0.0	35.0	35.0	26.5	9.5	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	29.8	0.0	28.1	0.0	0.0	0.0	0.0	35.0	35.0	26.5	9.5	0.0
LOS by Move:	C	A	C	A	A	A	A	D	D	C	A	A
DesignQueue:	14	0	12	0	0	0	0	11	11	15	7	0

Note: Queue reported is the number of cars per lane.

```
-------------------------------------------------------------------------------
                    UC Riverside West Campus Development
                             Existing Conditions
                                   PM Peak
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
              2000 HCM Operations Method (Base Volume Alternative)
*******************************************************************************
Intersection #58 Iowa Ave at University Ave
*******************************************************************************
Cycle (sec):          120              Critical Vol./Cap.(X):          0.760
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        40.6
Optimal Cycle:         59              Level Of Service:                  D
*******************************************************************************
Street Name:                 Iowa Avenue                  University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include            Ovl            Include
Min. Green:     7     7     7    7     7     7    7     7     7    7     7     7
Lanes:        1  0  2  0  1   1  0  1  1  0   1  0  2  0  1   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM
Base Vol:      93   370   129   260   800   187   217   874   152   156   374   103
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:   93   370   129   260   800   187   217   874   152   156   374   103
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.60  0.96  0.75  0.94  0.91  0.90  0.82  0.94  0.84  0.85  0.87  0.72
PHF Volume:   155   385   172   277   879   208   265   930   181   184   430   143
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  155   385   172   277   879   208   265   930   181   184   430   143
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   155   385   172   277   879   208   265   930   181   184   430   143
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  2.00  1.00  1.00  1.62  0.38  1.00  2.00  1.00  1.00  2.00  1.00
Final Sat.:  1900  3800  1900  1900  3074   726  1900  3800  1900  1900  3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.08  0.10  0.09  0.15  0.29  0.29  0.14  0.24  0.10  0.10  0.11  0.08
Crit Moves:  ****                    ****              ****        ****
Green/Cycle: 0.11  0.20  0.20  0.29  0.38  0.38  0.25  0.32  0.43  0.13  0.20  0.20
Volume/Cap:  0.76  0.51  0.46  0.51  0.76  0.76  0.56  0.76  0.22  0.76  0.56  0.37
Delay/Veh:   67.3  43.5  43.2  36.7  35.1  35.1  41.0  39.3  21.7  63.7  44.1  42.0
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  67.3  43.5  43.2  36.7  35.1  35.1  41.0  39.3  21.7  63.7  44.1  42.0
LOS by Move:    E     D     D     D     D     D     D     D     C     E     D     D
DesignQueue:    9    11     9    14    24    24    14    22     7    11    12     8
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

UC Riverside West Campus Development
Existing Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #78 Iowa Ave at MLK Blvd

Cycle (sec):	110	Critical Vol./Cap.(X):	0.701
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	21.5
Optimal Cycle:	49	Level Of Service:	C

Street Name:	Iowa Avenue						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Include			Ovl		
Min. Green:	0	0	0	7	7	7	7	7	0	0	7	7
Lanes:	0 0 0 0 0			1 0 1! 0 1			1 0 2 0 0			0 0 2 0 1		
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	727	0	273	170	1564	0	0	667	353
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	727	0	273	170	1564	0	0	667	353
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.95	1.00	0.90	0.87	0.99	1.00	1.00	0.79	0.92
PHF Volume:	0	0	0	765	0	303	195	1580	0	0	844	384
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	765	0	303	195	1580	0	0	844	384
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	765	0	303	195	1580	0	0	844	384
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.72	0.00	1.28	1.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	0	0	0	3261	0	2439	1900	3800	0	0	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.23	0.00	0.12	0.10	0.42	0.00	0.00	0.22	0.20
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.33	0.00	0.52	0.19	0.59	0.00	0.00	0.41	0.74
Volume/Cap:	0.00	0.00	0.00	0.70	0.00	0.24	0.55	0.70	0.00	0.00	0.55	0.27
Delay/Veh:	0.0	0.0	0.0	33.3	0.0	14.4	42.3	16.6	0.0	0.0	25.4	4.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	33.3	0.0	14.4	42.3	16.6	0.0	0.0	25.4	4.8
LOS by Move:	A	A	A	C	A	B	D	B	A	A	C	A
DesignQueue:	0	0	0	19	0	7	10	22	0	0	16	6

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                        UC Riverside West Campus Development
                                Existing Conditions
                                      PM Peak
--------------------------------------------------------------------------------
                         Level Of Service Computation Report
                 2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #83 Lot 30/MLK BLvd
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):           0.903
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):          33.3
Optimal Cycle:        101              Level Of Service:                    C
********************************************************************************
Street Name:                  Lot 30                           MLK Blvd
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Permitted        Permitted        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:     7    0     7    7    0     7    7    7     0    7    7     7
Lanes:        0  0  0  0  1   0  1  0  0  1   1  0  1  1  0   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:       0    0     1  162    0   271   31 1989     0   10  926     1
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:    0    0     1  162    0   271   31 1989     0   10  926     1
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.50 1.00  0.25 0.57 1.00  0.62 0.43 0.95  1.00 0.63 0.85  1.00
PHF Volume:     0    0     4  284    0   437   72 2094     0   16 1089     1
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:    0    0     4  284    0   437   72 2094     0   16 1089     1
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:     0    0     4  284    0   437   72 2094     0   16 1089     1
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  1.00 1.00  0.87 0.71 1.00  0.85 0.95 1.00  1.00 0.95 1.00  0.85
Lanes:       0.00 0.00  1.00 1.00 0.00  1.00 1.00 2.00  0.00 1.00 2.00  1.00
Final Sat.:     0    0  1644 1357    0  1615 1805 3800     0 1805 3800  1615
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.00  0.00 0.21 0.00  0.27 0.04 0.55  0.00 0.01 0.29  0.00
Crit Moves:                               ****      ****       ****
Green/Cycle: 0.00 0.00  0.28 0.28 0.00  0.28 0.13 0.57  0.00 0.07 0.51  0.51
Volume/Cap:  0.00 0.00  0.01 0.75 0.00  0.97 0.32 0.97  0.00 0.13 0.56  0.00
Delay/Veh:    0.0  0.0  26.0 40.8  0.0  69.2 40.6 33.0   0.0 44.1 16.9  11.8
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:   0.0  0.0  26.0 40.8  0.0  69.2 40.6 33.0   0.0 44.1 16.9  11.8
LOS by Move:    A    A     C    D    A     E    D    C     A    D    B     B
DesignQueue:    0    0     0   12    0    19    4   29     0    1   16     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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UC Riverside West Campus Development
Existing Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	1.108
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	65.1
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	295	186	129	125	552	189	163	1043	1058	162	254	25
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	295	186	129	125	552	189	163	1043	1058	162	254	25
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.83	0.81	0.80	0.73	0.72	0.64	0.84	0.86	0.86	0.87	0.78
PHF Volume:	383	224	159	156	756	263	255	1242	1230	188	292	32
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	383	224	159	156	756	263	255	1242	1230	188	292	32
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	383	224	159	156	756	263	255	1242	1230	188	292	32
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3420	3800	1615	3420	3800	1615	3420	3800	1615	3420	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.11	0.06	0.10	0.05	0.20	0.16	0.07	0.33	0.76	0.06	0.08	0.02
Crit Moves:	****				****				****	****		
Green/Cycle:	0.10	0.17	0.17	0.10	0.18	0.49	0.31	0.58	0.68	0.06	0.32	0.32
Volume/Cap:	1.12	0.34	0.56	0.44	1.12	0.33	0.24	0.56	1.12	0.94	0.24	0.06
Delay/Veh:	138.9	43.7	48.0	51.4	122	18.7	30.6	16.0	85.3	104.2	29.8	28.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	138.9	43.7	48.0	51.4	122	18.7	30.6	16.0	85.3	104.2	29.8	28.0
LOS by Move:	F	D	D	D	F	B	C	B	F	F	C	C
DesignQueue:	12	6	9	5	22	9	6	19	32	6	7	1

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                    UC Riverside West Campus Development
                           Existing Conditions
                                 PM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
           2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #109 Iowa Ave at Everton Place
********************************************************************************
Average Delay (sec/veh):      6.7       Worst Case Level Of Service: F[ 92.2]
********************************************************************************
Street Name:                Iowa Avenue                      Everton Place
Approach:       North Bound       South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled      Uncontrolled       Stop Sign         Stop Sign
Rights:           Include           Include           Include           Include
Lanes:        0  0  1  0  1    1  0  1  0  0    0  0  0  0  0    1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:        0  503    29     36 1038     0     0    0     0     47    0    39
Growth Adj:   1.00 1.00  1.00   1.00 1.00  1.00  1.00 1.00  1.00   1.00 1.00  1.00
Initial Bse:     0  503    29     36 1038     0     0    0     0     47    0    39
User Adj:     1.00 1.00  1.00   1.00 1.00  1.00  1.00 1.00  1.00   1.00 1.00  1.00
PHF Adj:      1.00 0.87  0.81   0.69 0.97  1.00  1.00 1.00  1.00   0.59 1.00  0.75
PHF Volume:      0  578    36     52 1070     0     0    0     0     80    0    52
Reduct Vol:      0    0     0      0    0     0     0    0     0      0    0     0
Final Vol.:      0  578    36     52 1070     0     0    0     0     80    0    52
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx    4.1 xxxx xxxxx xxxxx xxxx xxxxx    6.4 xxxx   6.2
FollowUpTim:xxxxx xxxx xxxxx    2.2 xxxx xxxxx xxxxx xxxx xxxxx    3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    614 xxxx xxxxx  xxxx xxxx xxxxx   1753 xxxx   578
Potent Cap.: xxxx xxxx xxxxx    975 xxxx xxxxx  xxxx xxxx xxxxx     95 xxxx   519
Move Cap.:   xxxx xxxx xxxxx    975 xxxx xxxxx  xxxx xxxx xxxxx     91 xxxx   519
Volume/Cap:  xxxx xxxx  xxxx   0.05 xxxx  xxxx  xxxx xxxx  xxxx   0.87 xxxx  0.10
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx    0.2 xxxx xxxxx  xxxx xxxx xxxxx    4.8 xxxx   0.3
Control Del:xxxxx xxxx xxxxx    8.9 xxxx xxxxx xxxxx xxxx xxxxx  144.0 xxxx  12.7
LOS by Move:    *    *     *      A    *     *     *    *     *      F    *     B
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx   xxxx xxxx xxxxx  xxxx xxxx xxxxx   xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx  xxxxx xxxx xxxxx xxxxx xxxx xxxxx  xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx  xxxxx xxxx xxxxx xxxxx xxxx xxxxx  xxxxx xxxx xxxxx
Shared LOS:     *    *     *      *    *     *     *    *     *      *    *     *
ApproachDel:      xxxxxx            xxxxxx            xxxxxx             92.2
ApproachLOS:        *                 *                 *                 F
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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UC Riverside West Campus Development
Existing Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #124 Iowa Ave at Linden St

Cycle (sec):	110	Critical Vol./Cap.(X):	0.546
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.3
Optimal Cycle:	36	Level Of Service:	C

Street Name:	Iowa Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	1 0	1	1 0	1 0	1
Volume Module: Existing PM Peak												
Base Vol:	46	571	140	58	1023	98	126	155	123	109	110	17
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	46	571	140	58	1023	98	126	155	123	109	110	17
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	46	571	140	58	1023	98	126	155	123	109	110	17
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.91	0.85	0.91	0.92	0.88	0.81	0.95	0.70	0.85	0.83	0.53
PHF Volume:	60	627	165	64	1112	111	156	163	176	128	133	32
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	60	627	165	64	1112	111	156	163	176	128	133	32
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	60	627	165	64	1112	111	156	163	176	128	133	32
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.82	0.18	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1900	3800	1900	1900	3454	346	1900	1900	1900	1900	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.03	0.17	0.09	0.03	0.32	0.32	0.08	0.09	0.09	0.07	0.07	0.02
Crit Moves:	****				****			****		****		
Green/Cycle:	0.06	0.47	0.47	0.18	0.58	0.58	0.15	0.16	0.16	0.12	0.13	0.13
Volume/Cap:	0.49	0.35	0.19	0.19	0.55	0.55	0.54	0.55	0.59	0.55	0.54	0.13
Delay/Veh:	52.9	18.8	17.1	38.5	14.3	14.3	45.4	45.1	46.4	48.2	47.5	42.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	52.9	18.8	17.1	38.5	14.3	14.3	45.4	45.1	46.4	48.2	47.5	42.8
LOS by Move:	D	B	B	D	B	B	D	D	D	D	D	D
DesignQueue:	3	11	5	3	17	17	8	9	9	7	7	2

Note: Queue reported is the number of cars per lane.

UC Riverside West Campus Development
Existing Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	1.011
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	52.8
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Ovl			Ovl			Ovl			Ovl	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 2 0 1			1 0 2 0 1			1 0 2 0 1		
Volume Module: Existing PM Peak												
Base Vol:	140	287	61	366	1057	201	170	1283	792	249	514	105
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	140	287	61	366	1057	201	170	1283	792	249	514	105
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.84	0.66	0.92	0.91	0.88	0.92	0.96	0.92	0.71	0.86	0.82
PHF Volume:	147	342	92	398	1162	228	185	1336	861	351	598	128
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	147	342	92	398	1162	228	185	1336	861	351	598	128
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	147	342	92	398	1162	228	185	1336	861	351	598	128
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.04	0.09	0.05	0.10	0.31	0.12	0.10	0.35	0.45	0.18	0.16	0.07
Crit Moves:	****				****				****	****		
Green/Cycle:	0.06	0.17	0.35	0.19	0.30	0.52	0.22	0.39	0.45	0.18	0.35	0.55
Volume/Cap:	0.66	0.54	0.14	0.54	1.01	0.23	0.44	0.90	1.01	1.01	0.44	0.12
Delay/Veh:	62.8	46.7	26.8	44.3	71.3	15.8	41.3	42.3	66.4	100.3	30.0	13.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	62.8	46.7	26.8	44.3	71.3	15.8	41.3	42.3	66.4	100.3	30.0	13.2
LOS by Move:	E	D	C	D	E	B	D	D	E	F	C	B
DesignQueue:	5	10	4	11	29	8	10	30	36	20	13	4

Note: Queue reported is the number of cars per lane.

UC Riverside West Campus Development
Existing Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.842
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	42.9
Optimal Cycle:	94	Level Of Service:	D

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 1 1 0			2 0 2 0 1			2 0 2 0 1		
Volume Module: Existing PM Peak												
Base Vol:	237	363	126	155	956	86	182	796	463	309	385	72
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	237	363	126	155	956	86	182	796	463	309	385	72
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.92	0.73	0.84	0.89	0.77	0.81	0.90	0.87	0.87	0.92	0.82
PHF Volume:	276	395	173	185	1074	112	225	884	532	355	418	88
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	276	395	173	185	1074	112	225	884	532	355	418	88
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	276	395	173	185	1074	112	225	884	532	355	418	88
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.81	0.19	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3442	358	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.07	0.10	0.09	0.05	0.31	0.31	0.06	0.23	0.28	0.09	0.11	0.05
Crit Moves:	****				****				****	****		
Green/Cycle:	0.09	0.29	0.29	0.16	0.37	0.37	0.15	0.33	0.33	0.11	0.29	0.29
Volume/Cap:	0.84	0.36	0.31	0.30	0.84	0.84	0.38	0.70	0.84	0.84	0.38	0.16
Delay/Veh:	71.6	33.7	33.4	44.3	39.4	39.4	46.0	36.6	47.1	66.5	34.4	32.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	71.6	33.7	33.4	44.3	39.4	39.4	46.0	36.6	47.1	66.5	34.4	32.0
LOS by Move:	E	C	C	D	D	D	D	D	D	E	C	C
DesignQueue:	9	10	8	5	27	27	6	21	26	11	10	4

Note: Queue reported is the number of cars per lane.

UC Riverside West Campus Development
Existing Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	0.595
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.5
Optimal Cycle:	38	Level Of Service:	C

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	1 1	0	1 0	2 0	1	1 0	0 1	0	1 0	1 1	0
Volume Module: Existing PM Peak												
Base Vol:	61	432	161	172	1149	145	29	83	46	110	124	94
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	61	432	161	172	1149	145	29	83	46	110	124	94
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.97	0.84	0.78	0.91	0.79	0.81	0.83	0.72	0.71	0.82	0.81
PHF Volume:	68	445	192	221	1263	184	36	100	64	155	151	116
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	68	445	192	221	1263	184	36	100	64	155	151	116
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	68	445	192	221	1263	184	36	100	64	155	151	116
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.96	0.96	0.95	1.00	0.85	0.95	0.94	0.94	0.95	0.94	0.94
Lanes:	1.00	1.40	0.60	1.00	2.00	1.00	1.00	0.61	0.39	1.00	1.13	0.87
Final Sat.:	1805	2537	1092	1805	3800	1615	1805	1092	698	1805	2010	1543
Capacity Analysis Module:												
Vol/Sat:	0.04	0.18	0.18	0.12	0.33	0.11	0.02	0.09	0.09	0.09	0.08	0.08
Crit Moves:	****				****			****		****		
Green/Cycle:	0.07	0.37	0.37	0.26	0.55	0.55	0.14	0.15	0.15	0.14	0.15	0.15
Volume/Cap:	0.54	0.48	0.48	0.48	0.60	0.21	0.14	0.60	0.60	0.60	0.49	0.49
Delay/Veh:	49.4	24.5	24.5	32.3	15.4	11.3	37.7	43.2	43.2	44.0	39.5	39.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	49.4	24.5	24.5	32.3	15.4	11.3	37.7	43.2	43.2	44.0	39.5	39.5
LOS by Move:	D	C	C	C	B	B	D	D	D	D	D	D
DesignQueue:	4	12	12	9	17	5	2	8	8	8	6	6

Note: Queue reported is the number of cars per lane.

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------------------------------------------------------------------------------
                 UC Riverside West Campus Development
                         Existing Conditions
                               PM Peak
------------------------------------------------------------------------------
                  Level Of Service Computation Report
          2000 HCM Operations Method (Base Volume Alternative)
******************************************************************************
Intersection #196 Iowa Ave at Blaine St
******************************************************************************
Cycle (sec):         100               Critical Vol./Cap.(X):        0.737
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):       35.8
Optimal Cycle:        53               Level Of Service:                D
******************************************************************************
Street Name:               Iowa Avenue                     Blain Street
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:    7     7     7    7     7     7    7     7     7    7     7     7
Lanes:         1  0  2  0  1   1  0  1  1  0   1  0  2  0  1   1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:     198  510   145   193  768   167   302  438   268   149  271   109
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  198  510   145   193  768   167   302  438   268   149  271   109
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.84 0.86  0.86  0.72 0.96  0.84  0.91 0.88  0.96  0.83 0.89  0.78
PHF Volume:   236  593   169   268  800   199   332  498   279   180  304   140
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  236  593   169   268  800   199   332  498   279   180  304   140
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   236  593   169   268  800   199   332  498   279   180  304   140
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 1.60  0.40  1.00 2.00  1.00  1.00 1.37  0.63
Final Sat.:  1900 3800  1900  1900 3044   756  1900 3800  1900  1900 2605  1195
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.12 0.16  0.09  0.14 0.26  0.26  0.17 0.13  0.15  0.09 0.12  0.12
Crit Moves:  ****                  ****        ****                  ****
Green/Cycle: 0.17 0.28  0.28  0.25 0.36  0.36  0.24 0.24  0.24  0.15 0.16  0.16
Volume/Cap:  0.74 0.57  0.32  0.57 0.74  0.74  0.74 0.54  0.61  0.61 0.74  0.74
Delay/Veh:   48.2 31.8  29.2  34.4 30.3  30.3  41.6 33.9  36.2  43.2 44.9  44.9
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  48.2 31.8  29.2  34.4 30.3  30.3  41.6 33.9  36.2  43.2 44.9  44.9
LOS by Move:    D    C     C     C    C     C     D    C     D     D    D     D
DesignQueue:   11   12     7    12   19    19    15   11    12     9   11    11
******************************************************************************
Note: Queue reported is the number of cars per lane.
******************************************************************************
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                   UC Riverside West Campus Development
                           Existing Conditions
                                 PM Peak
--------------------------------------------------------------------------------
                    Level Of Service Computation Report
            2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #207 I-215/SR-60 NB Ramp at Blain Street
********************************************************************************
Cycle (sec):         110              Critical Vol./Cap.(X):          0.536
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):        18.2
Optimal Cycle:        34              Level Of Service:                  B
********************************************************************************
Street Name:        I-215/SR-60 NB Ramps                   Blain Street
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:    7    7     7    0    0     0    7    7     0    0    7     7
Lanes:        0  1  0  0  1   0  0  0  0  0   2  0  2  0  0   0  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      97    1   261    0    0     0  124  779     0    0  483   494
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:   97    1   261    0    0     0  124  779     0    0  483   494
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.93 0.25  0.88 1.00 1.00  1.00 0.84 0.95  1.00 1.00 0.91  0.86
PHF Volume:   104    4   297    0    0     0  148  820     0    0  531   574
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:  104    4   297    0    0     0  148  820     0    0  531   574
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:   104    4   297    0    0     0  148  820     0    0  531   574
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       0.96 0.04  1.00 0.00 0.00  0.00 2.00 2.00  0.00 0.00 1.00  1.00
Final Sat.:  1830   70  1900    0    0     0 3800 3800     0    0 1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.06 0.06  0.16 0.00 0.00  0.00 0.04 0.22  0.00 0.00 0.28  0.30
Crit Moves:             ****                 ****                         ****
Green/Cycle: 0.29 0.29  0.29 0.00 0.00  0.00 0.07 0.64  0.00 0.00 0.56  0.56
Volume/Cap:  0.20 0.20  0.54 0.00 0.00  0.00 0.54 0.34  0.00 0.00 0.50  0.54
Delay/Veh:   29.5 29.5  33.8  0.0  0.0   0.0 51.3  9.4   0.0  0.0 14.7  15.3
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:  29.5 29.5  33.8  0.0  0.0   0.0 51.3  9.4   0.0  0.0 14.7  15.3
LOS by Move:    C    C     C    A    A     A    D    A     A    A    B     B
DesignQueue:    5    5    13    0    0     0    4   10     0    0   15    17
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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UC Riverside West Campus Development
Existing Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	0.756
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	30.8
Optimal Cycle:	58	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0	0 0	0 1	0	0 1	0 0	1	1 0	2 0	2	0 0
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	276	219	192	0	631	639	220	377	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	276	219	192	0	631	639	220	377	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.93	0.84	0.92	1.00	0.95	0.95	0.92	0.89	1.00
PHF Volume:	0	0	0	297	261	209	0	664	673	239	424	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	297	261	209	0	664	673	239	424	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	297	261	209	0	664	673	239	424	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.53	0.47	1.00	0.00	1.00	1.00	2.00	2.00	0.00
Final Sat.:	0	0	0	1011	889	1900	0	1900	1900	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.29	0.29	0.11	0.00	0.35	0.35	0.06	0.11	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.39	0.39	0.39	0.00	0.46	0.46	0.08	0.55	0.00
Volume/Cap:	0.00	0.00	0.00	0.76	0.76	0.28	0.00	0.76	0.77	0.76	0.20	0.00
Delay/Veh:	0.0	0.0	0.0	36.3	36.3	25.5	0.0	28.6	29.0	63.8	14.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	36.3	36.3	25.5	0.0	28.6	29.0	63.8	14.0	0.0
LOS by Move:	A	A	A	D	D	C	A	C	C	E	B	A
DesignQueue:	0	0	0	25	25	9	0	26	27	7	7	0

Note: Queue reported is the number of cars per lane.

UC Riverside West Campus Development
Existing Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

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Intersection #237 Chicago Ave at 3rd Street

****

Cycle (sec):	120	Critical Vol./Cap.(X):	0.819
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	44.7
Optimal Cycle:	73	Level Of Service:	D

****

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module: Existing PM Peak												
Base Vol:	88	415	136	260	865	107	137	636	264	240	294	81
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	88	415	136	260	865	107	137	636	264	240	294	81
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.76	0.82	0.79	0.83	0.90	0.72	0.82	0.85	0.85	0.95	0.84	0.81
PHF Volume:	116	506	172	313	961	149	167	748	311	253	350	100
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	116	506	172	313	961	149	167	748	311	253	350	100
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	116	506	172	313	961	149	167	748	311	253	350	100
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.49	0.51	1.00	1.73	0.27	1.00	1.41	0.59	1.00	1.56	0.44
Final Sat.:	1900	2835	965	1900	3291	509	1900	2685	1115	1900	2956	844
Capacity Analysis Module:												
Vol/Sat:	0.06	0.18	0.18	0.16	0.29	0.29	0.09	0.28	0.28	0.13	0.12	0.12
Crit Moves:	****				****			****		****		
Green/Cycle:	0.08	0.23	0.23	0.21	0.35	0.35	0.21	0.34	0.34	0.16	0.29	0.29
Volume/Cap:	0.73	0.79	0.79	0.79	0.83	0.83	0.42	0.83	0.83	0.83	0.42	0.42
Delay/Veh:	69.6	48.5	48.5	54.9	39.9	39.9	41.6	41.2	41.2	65.6	35.0	35.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	69.6	48.5	48.5	54.9	39.9	39.9	41.6	41.2	41.2	65.6	35.0	35.0
LOS by Move:	E	D	D	D	D	D	D	D	D	E	D	D
DesignQueue:	7	18	18	17	26	26	9	25	25	15	11	11

****

Note: Queue reported is the number of cars per lane.

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                    UC Riverside West Campus Development
                            Existing Conditions
                                  PM Peak
--------------------------------------------------------------------------------

                     Level Of Service Computation Report
            2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #291 I-215 SB Ramp/MLK Blvd
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         0.474
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        12.5
Optimal Cycle:         30              Level Of Service:                 B
********************************************************************************
Street Name:               I-215 SB Ramps                      MLK Blvd
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Permitted        Permitted        Permitted        Permitted
Rights:           Include          Include          Include          Include
Min. Green:     0     0     0    7     7     7    0     7     7    7     7     0
Lanes:        0  0  0  0  0    1  0  0  1  0    0  0  1  1  1    1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:       0     0     0    3   101   106    0   186   971    5   328     0
Growth Adj:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Initial Bse:    0     0     0    3   101   106    0   186   971    5   328     0
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00 0.75  0.70  0.80 1.00  0.74  0.88 0.63  0.87  1.00
PHF Volume:     0     0     0    4   144   133    0   251  1103    8   377     0
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:    0     0     0    4   144   133    0   251  1103    8   377     0
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:     0     0     0    4   144   133    0   251  1103    8   377     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.00  0.00  0.00 1.00  0.52  0.48 0.00  1.00  2.00 1.00  2.00  0.00
Final Sat.:     0     0     0 1900   990   910    0  1900  3800 1900  3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.00  0.15  0.15 0.00  0.13  0.29 0.00  0.10  0.00
Crit Moves:                         ****                    ****
Green/Cycle: 0.00  0.00  0.00 0.31  0.31  0.31 0.00  0.61  0.61 0.61  0.61  0.00
Volume/Cap:  0.00  0.00  0.00 0.01  0.47  0.47 0.00  0.22  0.47 0.01  0.16  0.00
Delay/Veh:    0.0   0.0   0.0 24.0  28.7  28.7  0.0   8.7  10.7  7.5   8.4   0.0
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0 24.0  28.7  28.7  0.0   8.7  10.7  7.5   8.4   0.0
LOS by Move:    A     A     A    C     C     C    A     A     B    A     A     A
DesignQueue:    0     0     0    0    11    11    0     6    13    0     4     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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--------------------------------------------------------------------------------
                  UC Riverside West Campus Development
                          Existing Conditions
                                PM Peak
--------------------------------------------------------------------------------
                    Level Of Service Computation Report
            2000 HCM 4-Way Stop Method (Base Volume Alternative)
********************************************************************************
Intersection #292 I-215 NB Ramps/MLK Blvd
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):        0.313
Loss Time (sec):        0 (Y+R=4.0 sec) Average Delay (sec/veh):      10.7
Optimal Cycle:          0              Level Of Service:                B
********************************************************************************
Street Name:             I-215 NB Ramp                        MLK BLvd
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Min. Green:     0    0    0     0    0    0     0    0    0     0    0    0
Lanes:         1  1  0  0  0   0  0  0  0  0   2  0  0  0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM
Base Vol:     333    1    0     0    0    0   188    0    0     0    0    0
Growth Adj:  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Initial Bse:  333    1    0     0    0    0   188    0    0     0    0    0
User Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:     0.87 0.25 1.00  1.00 1.00 1.00  0.73 1.00 1.00  1.00 1.00 1.00
PHF Volume:   383    4    0     0    0    0   258    0    0     0    0    0
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:  383    4    0     0    0    0   258    0    0     0    0    0
PCE Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:   383    4    0     0    0    0   258    0    0     0    0    0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment:  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Lanes:       1.98 0.02 0.00  0.00 0.00 0.00  2.00 0.00 0.00  0.00 0.00 0.00
Final Sat.:  1223   13    0     0    0    0  1163    0    0     0    0    0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.31 0.31 xxxx  xxxx xxxx xxxx  0.22 xxxx xxxx  xxxx xxxx xxxx
Crit Moves:  ****                            ****
Delay/Veh:   10.9 10.9  0.0   0.0  0.0  0.0  10.3  0.0  0.0   0.0  0.0  0.0
Delay Adj:   1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:  10.9 10.9  0.0   0.0  0.0  0.0  10.3  0.0  0.0   0.0  0.0  0.0
LOS by Move:    B    B    *     *    *    *     B    *    *     *    *    *
ApproachDel:      10.9           xxxxxx            10.3           xxxxxx
Delay Adj:        1.00            xxxxx            1.00            xxxxx
ApprAdjDel:       10.9           xxxxxx            10.3           xxxxxx
LOS by Appr:         B                *               B                *
AllWayAvgQ:    0.4  0.4  0.0   0.0  0.0  0.0   0.3  0.0  0.0   0.0  0.0  0.0
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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2010 BASE CONDITIONS
AM AND PM PEAK HOUR

UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	24.6	0.491	C	24.6	0.491	+ 0.000 D/V
# 21 I-215/SR-60 SB Ramp at Univers	C	23.1	0.453	C	23.1	0.453	+ 0.000 D/V
# 23 West Campus at University Ave	C	28.2	0.714	C	28.2	0.714	+ 0.000 D/V
# 58 Iowa Ave at University Ave	D	35.6	0.514	D	35.6	0.514	+ 0.000 D/V
# 78 Iowa Ave at MLK Blvd	C	20.2	0.543	C	20.2	0.543	+ 0.000 D/V
# 83 Lot 30/MLK BLvd	C	22.9	0.774	C	22.9	0.774	+ 0.000 D/V
# 85 Canyon Crest Dr at MLK BLvd	C	25.1	0.614	C	25.1	0.614	+ 0.000 D/V
#109 Iowa Ave at Everton Place	C	18.1	0.000	C	18.1	0.000	+ 0.000 D/V
#124 Iowa Ave at Linden St	C	30.7	0.584	C	30.7	0.584	+ 0.000 D/V
#137 Chicago Ave at MLK Blvd	C	32.2	0.605	C	32.2	0.605	+ 0.000 D/V
#151 Chicago Ave at University Aven	C	33.6	0.520	C	33.6	0.520	+ 0.000 D/V
#159 Chicago Ave at Linden Street	C	33.9	0.715	C	33.9	0.715	+ 0.000 D/V
#196 Iowa Ave at Blaine St	D	39.3	0.846	D	39.3	0.846	+ 0.000 D/V
#207 I-215/SR-60 NB Ramp at Blain S	C	24.2	0.676	C	24.2	0.676	+ 0.000 D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	24.5	0.558	C	24.5	0.558	+ 0.000 D/V
#237 Chicago Ave at 3rd Street	D	43.1	0.744	D	43.1	0.744	+ 0.000 D/V
#291 I-215 SB Ramp/MLK Blvd	B	17.9	0.388	B	17.9	0.388	+ 0.000 D/V
#292 I-215 NB Ramps/MLK Blvd	C	15.4	0.572	C	15.4	0.572	+ 0.000 V/C

UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #20 I-215/SR-60 NB Ramps at University

Cycle (sec):	110	Critical Vol./Cap.(X):	0.491
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.6
Optimal Cycle:	37	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	7	7	0	7	7	7	7	0	7	7
Lanes:	0 0	0 0	1	1 0	0 0	1	1 0	1 1	0	0 1	0 1	0
Volume Module: Existing AM Peak												
Base Vol:	0	0	1	74	0	382	80	595	1	0	198	73
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	1	78	0	401	84	625	1	0	208	77
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
[redacted]	0	0	1	78	0	401	84	625	1	0	208	[redacted]
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.25	0.74	1.00	0.91	0.71	0.74	0.25	1.00	0.88	0.87
PHF Volume:	0	0	4	105	0	441	118	844	4	0	236	88
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	4	105	0	441	118	844	4	0	236	88
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol:	0	0	4	105	0	441	118	844	4	0	236	88
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.99	0.01	0.00	1.46	0.54
Final Sat.:	0	0	1900	1900	0	1900	1900	3781	19	0	2768	1032
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.06	0.00	0.23	0.06	0.22	0.22	0.00	0.09	0.09
Crit Moves:	****					****		****				
Green/Cycle:	0.00	0.00	0.01	0.38	0.00	0.40	0.38	0.53	0.53	0.00	0.15	0.15
Volume/Cap:	0.00	0.00	0.17	0.14	0.00	0.58	0.16	0.42	0.42	0.00	0.58	0.58
Delay/Veh:	0.0	0.0	56.7	22.1	0.0	27.1	22.4	15.8	15.8	0.0	45.4	45.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	56.7	22.1	0.0	27.1	22.4	15.8	15.8	0.0	45.4	45.4
LOS by Move:	A	A	E	C	A	C	C	B	B	A	D	D
HCM2kAvgQ:	0	0	0	2	0	12	3	9	9	0	6	6

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                            2010 Base Conditions
                                  AM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
7 Intersection #21 I-215/SR-60 SB Ramp at University Ave
********************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):         0.453
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        23.1
Optimal Cycle:         29               Level Of Service:                  C
********************************************************************************
Street Name:         I-215/SR-60 SB Ramp              University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:     0     0     0    7     0     7    0     7     7    7     7     0
Lanes:         0  0  0  0  0   0  1  0  1  0   0  0  1  1  1   1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:       0     0     0  351    26   186    0   305   229   43   533     0
Growth Adj:  1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05
Initial Bse:    0     0     0  369    27   195    0   320   240   45   560     0
Added Vol:      0     0     0    0     0     0    0     0     0    0     0     0
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:    0     0     0  369    27   195    0   320   240   45   560     0
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00 0.70  0.50  0.88 1.00  0.88  0.90 0.83  0.93  1.00
PHF Volume:     0     0     0  527    55   222    0   364   267   54   602     0
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:    0     0     0  527    55   222    0   364   267   54   602     0
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:     0     0     0  527    55   222    0   364   267   54   602     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.00  0.00  0.00 1.00  0.20  0.80 0.00  1.73  1.27 1.00  2.00  0.00
Final Sat.:     0     0     0 1900   375  1525    0  3287  2413 1900  3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.28  0.15  0.15 0.00  0.11  0.11 0.03  0.16  0.00
Crit Moves:                   ****                    ****      ****
Green/Cycle: 0.00  0.00  0.00 0.61  0.61  0.61 0.00  0.24  0.24 0.07  0.31  0.00
Volume/Cap:  0.00  0.00  0.00 0.46  0.24  0.24 0.00  0.46  0.46 0.41  0.51  0.00
Delay/Veh:    0.0   0.0   0.0 10.9   9.1   9.1  0.0  32.5  32.5 46.6  28.4   0.0
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0 10.9   9.1   9.1  0.0  32.5  32.5 46.6  28.4   0.0
LOS by Move:    A     A     A    B     A     A    A     C     C    D     C     A
HCM2kAvgQ:      0     0     0    9     4     4    0     6     6    2     8     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                            2010 Base Conditions
                                  AM Peak
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #23 West Campus at University Ave
********************************************************************************
Cycle (sec):           100                Critical Vol./Cap.(X):          0.714
Loss Time (sec):         8 (Y+R=4.0 sec)  Average Delay (sec/veh):         28.2
Optimal Cycle:          50                Level Of Service:                   C
********************************************************************************
Street Name:                West Campus                  University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|-----------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:     7    0     7     0    0     0     0    7     7     7    7     0
Lanes:         1  0  0  0  1    0  0  0  0  0    0  0  1  1  0    1  0  2  0  0
------------|-----------------||---------------||---------------||---------------|
Volume Module: Existing AM peak
Base Vol:      129    0    276     0    0     0     0  285   367   203  153     0
Growth Adj:   1.05 1.05   1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:   135    0    290     0    0     0     0  299   385   213  161     0
Added Vol:       0    0      0     0    0     0     0    0     0     0    0     0
PasserByVol:     0    0      0     0    0     0     0    0     0     0    0     0
Initial Fut:   135    0    290     0    0     0     0  299   385   213  161     0
User Adj:     1.00 1.00   1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.67 1.00   0.70  1.00 1.00  1.00  1.00 0.86  0.71  0.73 0.77  1.00
PHF Volume:    202    0    414     0    0     0     0  348   543   292  209     0
Reduct Vol:      0    0      0     0    0     0     0    0     0     0    0     0
Reduced Vol:   202    0    414     0    0     0     0  348   543   292  209     0
PCE Adj:      1.00 1.00   1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00   1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    202    0    414     0    0     0     0  348   543   292  209     0
------------|-----------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900   1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   1.00 1.00   1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:        1.00 0.00   1.00  0.00 0.00  0.00  0.00 1.00  1.00  1.00 2.00  0.00
Final Sat.:   1900    0   1900     0    0     0     0 1900  1900  1900 3800     0
------------|-----------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.11 0.00   0.22  0.00 0.00  0.00  0.00 0.18  0.29  0.15 0.05  0.00
Crit Moves:               ****                              ****  ****
Green/Cycle:  0.31 0.00   0.31  0.00 0.00  0.00  0.00 0.40  0.40  0.22 0.61  0.00
Volume/Cap:   0.35 0.00   0.71  0.00 0.00  0.00  0.00 0.46  0.71  0.71 0.09  0.00
Delay/Veh:    27.4  0.0   35.1   0.0  0.0   0.0   0.0 22.2  27.2  42.3  7.9   0.0
User DelAdj:  1.00 1.00   1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   27.4  0.0   35.1   0.0  0.0   0.0   0.0 22.2  27.2  42.3  7.9   0.0
LOS by Move:     C    A      D     A    A     A     A    C     C     D    A     A
HCM2kAvgQ:       5    0     12     0    0     0     0    8    15    10    1     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.514
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	35.6
Optimal Cycle:	36	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	63	544	92	136	245	99	139	345	56	80	342	167
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	66	571	97	143	257	104	146	362	59	84	359	175
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	66	571	97	143	257	104	146	362	59	84	359	175
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.75	0.83	0.72	0.87	0.84	0.88	0.91	0.92	0.91	0.74	0.96	0.72
PHF Volume:	88	688	134	164	306	118	160	394	65	114	374	244
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	88	688	134	164	306	118	160	394	65	114	374	244
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	88	688	134	164	306	118	160	394	65	114	374	244
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.44	0.56	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	2742	1058	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.05	0.18	0.07	0.09	0.11	0.11	0.08	0.10	0.03	0.06	0.10	0.13
Crit Moves:		****		****			****					****
Green/Cycle:	0.18	0.35	0.35	0.17	0.34	0.34	0.16	0.26	0.44	0.15	0.25	0.25
Volume/Cap:	0.26	0.51	0.20	0.51	0.33	0.33	0.51	0.40	0.08	0.40	0.40	0.51
Delay/Veh:	42.9	31.1	27.2	46.9	29.4	29.4	47.3	36.7	19.5	46.9	37.8	39.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	42.9	31.1	27.2	46.9	29.4	29.4	47.3	36.7	19.5	46.9	37.8	39.8
LOS by Move:	D	C	C	D	C	C	D	D	B	D	D	D
HCM2kAvgQ:	3	10	3	6	6	6	6	6	1	4	6	8

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

7 Intersection #78 Iowa Ave at MLK Blvd

Cycle (sec):	110	Critical Vol./Cap.(X):	0.543
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	20.2
Optimal Cycle:	35	Level Of Service:	C

Street Name:	Iowa Avenue						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Include			Ovl		
Min. Green:	0	0	0	7	7	7	7	7	0	0	7	7
Lanes:	0 0	0	0 0	1 0	1!	0 1	1 0	2	0 0	0 0	2	0 1
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	263	0	101	267	440	0	0	785	484
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	276	0	106	280	462	0	0	824	508
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	276	0	106	280	462	0	0	824	508
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.75	1.00	0.81	0.90	0.77	1.00	1.00	0.95	0.92
PHF Volume:	0	0	0	368	0	131	312	600	0	0	868	552
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	368	0	131	312	600	0	0	868	552
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7 Final Vol.:	0	0	0	368	0	131	312	600	0	0	868	552
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.74	0.00	1.26	1.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	0	0	0	3302	0	2398	1900	3800	0	0	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.11	0.00	0.05	0.16	0.16	0.00	0.00	0.23	0.29
Crit Moves:				****			****				****	
Green/Cycle:	0.00	0.00	0.00	0.21	0.00	0.51	0.30	0.72	0.00	0.00	0.42	0.63
Volume/Cap:	0.00	0.00	0.00	0.54	0.00	0.11	0.54	0.22	0.00	0.00	0.54	0.46
Delay/Veh:	0.0	0.0	0.0	39.8	0.0	14.1	33.1	5.1	0.0	0.0	24.3	11.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	39.8	0.0	14.1	33.1	5.1	0.0	0.0	24.3	11.2
LOS by Move:	A	A	A	D	A	B	C	A	A	A	C	B
HCM2kAvgQ:	0	0	0	7	0	2	9	3	0	0	11	10

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.774
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	22.9
Optimal Cycle:	60	Level Of Service:	C

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	1 0 0 0 0			0 1 0 0 1			1 0 1 1 0			1 0 2 0 1		
Volume Module: Existing AM Peak												
Base Vol:	4	0	0	12	0	4	321	600	0	10	1276	77
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	4	0	0	13	0	4	337	630	0	11	1340	81
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	4	0	0	13	0	4	337	630	0	11	1340	81
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.50	1.00	1.00	1.00	1.00	0.33	0.60	0.75	1.00	0.50	0.90	0.69
PHF Volume:	8	0	0	13	0	13	562	840	0	21	1489	117
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	8	0	0	13	0	13	562	840	0	21	1489	117
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	8	0	0	13	0	13	562	840	0	21	1489	117
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.81	1.00	1.00	0.76	1.00	0.85	0.95	1.00	1.00	0.95	1.00	0.85
Lanes:	1.00	0.00	0.00	1.00	0.00	1.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	1530	0	0	1440	0	1615	1805	3800	0	1805	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.01	0.00	0.00	0.01	0.00	0.01	0.31	0.22	0.00	0.01	0.39	0.07
Crit Moves:				****			****				****	
Green/Cycle:	0.07	0.00	0.00	0.07	0.00	0.07	0.38	0.65	0.00	0.20	0.47	0.47
Volume/Cap:	0.08	0.00	0.00	0.12	0.00	0.11	0.83	0.34	0.00	0.06	0.83	0.15
Delay/Veh:	43.8	0.0	0.0	44.2	0.0	44.0	36.5	8.1	0.0	32.1	26.1	15.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.8	0.0	0.0	44.2	0.0	44.0	36.5	8.1	0.0	32.1	26.1	15.0
LOS by Move:	D	A	A	D	A	D	D	A	A	C	C	B
HCM2kAvgQ:	0	0	0	0	0	0	18	6	0	1	22	2

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.614
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.1
Optimal Cycle:	46	Level Of Service:	C

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	1153	452	445	41	84	52	130	185	323	108	335	36
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	1211	475	467	43	88	55	137	194	339	113	352	38
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	1211	475	467	43	88	55	137	194	339	113	352	38
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.74	0.79	0.68	0.88	0.59	0.83	0.72	0.94	0.93	0.89	0.56
PHF Volume:	1316	641	591	63	100	93	164	270	361	122	395	68
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	1316	641	591	63	100	93	164	270	361	122	395	68
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	1316	641	591	63	100	93	164	270	361	122	395	68
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3420	3800	1615	3420	3800	1615	3420	3800	1615	3420	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.38	0.17	0.37	0.02	0.03	0.06	0.05	0.07	0.22	0.04	0.10	0.04
Crit Moves:	****				****		****				****	
Green/Cycle:	0.62	0.58	0.58	0.09	0.06	0.14	0.08	0.13	0.75	0.11	0.17	0.17
Volume/Cap:	0.63	0.29	0.63	0.20	0.45	0.42	0.63	0.53	0.30	0.33	0.63	0.25
Delay/Veh:	15.0	12.7	18.0	50.7	56.1	48.9	58.4	49.6	5.0	49.8	48.5	44.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	15.0	12.7	18.0	50.7	56.1	48.9	58.4	49.6	5.0	49.8	48.5	44.0
LOS by Move:	B	B	B	D	E	D	E	D	A	D	D	D
HCM2kAvgQ:	16	6	15	1	2	4	4	5	4	2	8	2

Note: Queue reported is the number of cars per lane.

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                      UCR West Campus Development Plan
                           2010 Base Conditions
                                  AM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #109 Iowa Ave at Everton Place
********************************************************************************
Average Delay (sec/veh):       0.8       Worst Case Level Of Service: C[ 18.1]
********************************************************************************
Street Name:              Iowa Avenue                      Everton Place
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:         0  0  1  0  1    1  0  1  0  0    0  0  0  0  0    1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Exsting AM Peak
Base Vol:        0  659    56    28  337     0     0    0     0    10    0    21
Growth Adj:   1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:     0  692    59    29  354     0     0    0     0    11    0    22
Added Vol:       0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:     0  692    59    29  354     0     0    0     0    11    0    22
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 0.90  0.54  0.88 0.83  1.00  1.00 1.00  1.00  0.83 1.00  0.75
PHF Volume:      0  769   109    33  426     0     0    0     0    13    0    29
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:      0  769   109    33  426     0     0    0     0    13    0    29
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4 xxxx   6.2
FollowUpTim:xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx   878 xxxx xxxxx  xxxx xxxx xxxxx  1262 xxxx   769
Potent Cap.: xxxx xxxx xxxxx   778 xxxx xxxxx  xxxx xxxx xxxxx   189 xxxx   404
Move Cap.:   xxxx xxxx xxxxx   778 xxxx xxxxx  xxxx xxxx xxxxx   183 xxxx   404
Volume/Cap:  xxxx xxxx  xxxx  0.04 xxxx  xxxx  xxxx xxxx  xxxx  0.07 xxxx  0.07
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx   0.1 xxxx xxxxx  xxxx xxxx xxxxx   0.2 xxxx   0.2
Control Del:xxxxx xxxx xxxxx   9.8 xxxx xxxxx xxxxx xxxx xxxxx  26.1 xxxx  14.6
LOS by Move:    *    *     *     A    *     *     *    *     *     D    *     B
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx           xxxxxx             18.1
ApproachLOS:        *                *                *                 C
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #124 Iowa Ave at Linden St

Cycle (sec):	110	Critical Vol./Cap.(X):	0.584
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	30.7
Optimal Cycle:	38	Level Of Service:	C

Street Name:	Iowa Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Include			Include			Include	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:		1 0 2 0 1			1 0 1 1 0			1 0 1 0 1			1 0 1 0 1	
Volume Module: Existing AM Peak												
Base Vol:	118	579	92	45	403	207	113	107	47	70	137	67
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	124	608	97	47	423	217	119	112	49	74	144	70
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	124	608	97	47	423	217	119	112	49	74	144	70
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.59	0.90	0.80	0.70	0.80	0.57	0.81	0.70	0.70	0.65	0.66	0.88
PHF Volume:	210	676	121	68	529	381	146	161	71	113	218	80
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	210	676	121	68	529	381	146	161	71	113	218	80
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	210	676	121	68	529	381	146	161	71	113	218	80
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.16	0.84	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1900	3800	1900	1900	2208	1592	1900	1900	1900	1900	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.11	0.18	0.06	0.04	0.24	0.24	0.08	0.08	0.04	0.06	0.11	0.04
Crit Moves:	****				****		****				****	
Green/Cycle:	0.19	0.44	0.44	0.16	0.41	0.41	0.13	0.19	0.19	0.14	0.20	0.20
Volume/Cap:	0.58	0.40	0.14	0.22	0.58	0.58	0.58	0.45	0.20	0.42	0.58	0.21
Delay/Veh:	43.1	21.1	18.4	40.8	25.8	25.8	48.4	40.6	38.0	44.2	42.5	37.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.1	21.1	18.4	40.8	25.8	25.8	48.4	40.6	38.0	44.2	42.5	37.4
LOS by Move:	D	C	B	D	C	C	D	D	D	D	D	D
HCM2kAvgQ:	7	8	2	2	12	12	5	5	2	4	7	2

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	0.605
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	32.2
Optimal Cycle:	39	Level Of Service:	C

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Ovl			Ovl			Ovl		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	707	898	228	60	209	113	133	543	131	40	638	138
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	742	943	239	63	219	119	140	570	138	42	670	145
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	742	943	239	63	219	119	140	570	138	42	670	145
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.87	0.92	0.70	0.80	0.80	0.81	0.85	0.74	0.90	0.71	0.94	0.78
PHF Volume:	853	1025	342	79	274	146	164	770	153	59	713	186
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	853	1025	342	79	274	146	164	770	153	59	713	186
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	853	1025	342	79	274	146	164	770	153	59	713	186
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.22	0.27	0.18	0.02	0.07	0.08	0.09	0.20	0.08	0.03	0.19	0.10
Crit Moves:		****		****			****				****	
Green/Cycle:	0.37	0.43	0.53	0.06	0.12	0.26	0.14	0.34	0.72	0.10	0.30	0.36
Volume/Cap:	0.60	0.62	0.34	0.36	0.60	0.30	0.62	0.59	0.11	0.32	0.62	0.27
Delay/Veh:	31.2	27.1	16.2	55.3	52.4	36.0	53.2	33.3	5.3	51.3	37.1	27.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	31.2	27.1	16.2	55.3	52.4	36.0	53.2	33.3	5.3	51.3	37.1	27.4
LOS by Move:	C	C	B	E	D	D	D	C	A	D	D	C
HCM2kAvgQ:	13	15	7	2	6	4	7	12	2	2	12	5

Note: Queue reported is the number of cars per lane.

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-------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                            2010 Base Conditions
                                   AM Peak
-------------------------------------------------------------------------------

                       Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #151 Chicago Ave at University Avenue
*******************************************************************************
Cycle (sec):          120              Critical Vol./Cap.(X):         0.520
Loss Time (sec):       12 (Y+R=4.0 sec) Average Delay (sec/veh):       33.6
Optimal Cycle:         43              Level Of Service:                  C
*******************************************************************************
Street Name:              Chicago Avenue                University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    7     7     7    7     7     7    7     7     7    7     7     7
Lanes:         2  0  2  0  1    2  0  1  1  0    2  0  2  0  1    2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      208   747   110    74   320   126   173   326    88    85   386    55
Growth Adj:   1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:   218   784   116    78   336   132   182   342    92    89   405    58
Added Vol:       0     0     0     0     0     0     0     0     0     0     0     0
PasserByVol:     0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:   218   784   116    78   336   132   182   342    92    89   405    58
User Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:      0.72  0.79  0.76  0.77  0.89  0.90  0.88  0.82  0.58  0.85  0.85  0.60
PHF Volume:    303   993   152   101   378   147   206   417   159   105   477    96
Reduct Vol:      0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   303   993   152   101   378   147   206   417   159   105   477    96
PCE Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:    303   993   152   101   378   147   206   417   159   105   477    96
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:        2.00  2.00  1.00  2.00  1.44  0.56  2.00  2.00  1.00  2.00  2.00  1.00
Final Sat.:   3800  3800  1900  3800  2735  1065  3800  3800  1900  3800  3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.08  0.26  0.08  0.03  0.14  0.14  0.05  0.11  0.08  0.03  0.13  0.05
Crit Moves:         ****        ****              ****                    ****
Green/Cycle:  0.20  0.50  0.50  0.06  0.35  0.35  0.10  0.22  0.22  0.12  0.24  0.24
Volume/Cap:   0.39  0.52  0.16  0.46  0.39  0.39  0.52  0.49  0.37  0.23  0.52  0.21
Delay/Veh:    41.6  20.7  16.5  56.1  29.3  29.3  52.3  41.0  40.0  48.2  40.2  36.8
User DelAdj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   41.6  20.7  16.5  56.1  29.3  29.3  52.3  41.0  40.0  48.2  40.2  36.8
LOS by Move:     D     C     B     E     C     C     D     D     D     D     D     D
HCM2kAvgQ:       5    12     3     2     7     7     4     7     5     2     8     3
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	0.715
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	33.9
Optimal Cycle:	50	Level Of Service:	C

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	1	1 0	1 0	2	0 1	1 0	0	1 0	1 0	1	1 0
Volume Module: Existing AM Peak												
Base Vol:	21	771	148	140	364	33	36	102	31	154	122	153
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	22	810	155	147	382	35	38	107	33	162	128	161
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	22	810	155	147	382	35	38	107	33	162	128	161
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.66	0.87	0.76	0.54	0.92	0.59	0.75	0.71	0.65	0.71	0.66	0.54
PHF Volume:	33	931	204	272	415	59	50	151	50	228	194	298
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	33	931	204	272	415	59	50	151	50	228	194	298
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	33	931	204	272	415	59	50	151	50	228	194	298
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.97	0.97	0.95	1.00	0.85	0.95	0.96	0.96	0.95	0.91	0.91
Lanes:	1.00	1.64	0.36	1.00	2.00	1.00	1.00	0.75	0.25	1.00	1.00	1.00
Final Sat.:	1805	3031	666	1805	3800	1615	1805	1374	456	1805	1727	1727
Capacity Analysis Module:												
Vol/Sat:	0.02	0.31	0.31	0.15	0.11	0.04	0.03	0.11	0.11	0.13	0.11	0.17
Crit Moves:		****		****			****					****
Green/Cycle:	0.24	0.41	0.41	0.20	0.38	0.38	0.07	0.14	0.14	0.16	0.23	0.23
Volume/Cap:	0.08	0.74	0.74	0.74	0.29	0.10	0.40	0.78	0.78	0.78	0.48	0.74
Delay/Veh:	29.4	26.7	26.7	45.2	21.9	20.2	46.6	55.7	55.7	52.9	33.6	40.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	29.4	26.7	26.7	45.2	21.9	20.2	46.6	55.7	55.7	52.9	33.6	40.1
LOS by Move:	C	C	C	D	C	C	D	E	E	D	C	D
HCM2kAvgQ:	1	16	16	9	4	1	2	8	8	9	6	10

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	0.846
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	39.3
Optimal Cycle:	78	Level Of Service:	D

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	141	641	99	121	413	225	418	410	103	108	428	130
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	148	673	104	127	434	236	439	431	108	113	449	137
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	148	673	104	127	434	236	439	431	108	113	449	137
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.78	0.93	0.85	0.72	0.69	0.84	0.89	0.75	0.89	0.93	0.88	0.79
PHF Volume:	190	724	122	176	628	281	493	574	122	122	511	173
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	190	724	122	176	628	281	493	574	122	122	511	173
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	190	724	122	176	628	281	493	574	122	122	511	173
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.38	0.62	1.00	2.00	1.00	1.00	1.49	0.51
Final Sat.:	1900	3800	1900	1900	2625	1175	1900	3800	1900	1900	2839	961
Capacity Analysis Module:												
Vol/Sat:	0.10	0.19	0.06	0.09	0.24	0.24	0.26	0.15	0.06	0.06	0.18	0.18
Crit Moves:	****				****		****				****	
Green/Cycle:	0.12	0.27	0.27	0.13	0.28	0.28	0.31	0.35	0.35	0.16	0.21	0.21
Volume/Cap:	0.85	0.71	0.24	0.71	0.85	0.85	0.85	0.43	0.18	0.39	0.85	0.85
Delay/Veh:	67.8	35.3	28.8	50.5	40.2	40.2	43.5	24.7	22.4	38.1	46.1	46.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	67.8	35.3	28.8	50.5	40.2	40.2	43.5	24.7	22.4	38.1	46.1	46.1
LOS by Move:	E	D	C	D	D	D	D	C	C	D	D	D
HCM2kAvgQ:	8	11	3	7	16	16	17	7	3	4	13	13

Note: Queue reported is the number of cars per lane.

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---------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                         2010 Base Conditions
                                AM Peak
---------------------------------------------------------------------------------
                   Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
*********************************************************************************
Intersection #207 I-215/SR-60 NB Ramp at Blain Street
*********************************************************************************
Cycle (sec):           110             Critical Vol./Cap.(X):          0.676
Loss Time (sec):         8 (Y+R=4.0 sec) Average Delay (sec/veh):       24.2
Optimal Cycle:          46             Level Of Service:                   C
*********************************************************************************
Street Name:          I-215/SR-60 NB Ramps                 Blain Street
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:    7     7     7    0     0     0    7     7     0    0     7     7
Lanes:         0  1  0  0  1    0  0  0  0  0    2  0  2  0  0    0  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:    204     5   393     0     0     0   172   645     0     0   409   499
Growth Adj: 1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse: 214     5   413     0     0     0   181   677     0     0   429   524
Added Vol:     0     0     0     0     0     0     0     0     0     0     0     0
PasserByVol:   0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut: 214     5   413     0     0     0   181   677     0     0   429   524
User Adj:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:    0.70  0.31  0.95  1.00  1.00  1.00  0.68  0.76  1.00  1.00  0.85  0.84
PHF Volume:  306    17   434     0     0     0   266   891     0     0   505   624
Reduct Vol:    0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol: 306    17   434     0     0     0   266   891     0     0   505   624
PCE Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:  306    17   434     0     0     0   266   891     0     0   505   624
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:      0.95  0.05  1.00  0.00  0.00  0.00  2.00  2.00  0.00  0.00  1.00  1.00
Final Sat.: 1800   100  1900     0     0     0  3800  3800     0     0  1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.17  0.17  0.23  0.00  0.00  0.00  0.07  0.23  0.00  0.00  0.27  0.33
Crit Moves:             ****                    ****                          ****
Green/Cycle: 0.34 0.34  0.34  0.00  0.00  0.00  0.10  0.59  0.00  0.00  0.49  0.49
Volume/Cap: 0.50  0.50  0.68  0.00  0.00  0.00  0.68  0.40  0.00  0.00  0.55  0.68
Delay/Veh:  29.7  29.7  34.1   0.0   0.0   0.0  52.2  12.3   0.0   0.0  20.1  22.8
User DelAdj: 1.00 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh: 29.7  29.7  34.1   0.0   0.0   0.0  52.2  12.3   0.0   0.0  20.1  22.8
LOS by Move:   C     C     C     A     A     A     D     B     A     A     C     C
HCM2kAvgQ:     9     9    13     0     0     0     6     8     0     0    12    17
*********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	0.558
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.5
Optimal Cycle:	36	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0 0 0 0			0 1 0 0 1			0 0 1 1 0			2 0 2 0 0		
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	369	16	251	0	486	179	110	518	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	387	17	264	0	510	188	116	544	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	387	17	264	0	510	188	116	544	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.95	0.80	0.76	1.00	0.66	0.86	0.89	0.76	1.00
PHF Volume:	0	0	0	408	21	347	0	773	219	130	716	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	408	21	347	0	773	219	130	716	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	408	21	347	0	773	219	130	716	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.95	0.05	1.00	0.00	1.56	0.44	2.00	2.00	0.00
Final Sat.:	0	0	0	1807	93	1900	0	2963	837	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.23	0.23	0.18	0.00	0.26	0.26	0.03	0.19	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.40	0.40	0.40	0.00	0.47	0.47	0.06	0.53	0.00
Volume/Cap:	0.00	0.00	0.00	0.56	0.56	0.45	0.00	0.56	0.56	0.56	0.36	0.00
Delay/Veh:	0.0	0.0	0.0	28.4	28.4	26.5	0.0	23.4	23.4	57.8	16.5	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	28.4	28.4	26.5	0.0	23.4	23.4	57.8	16.5	0.0
LOS by Move:	A	A	A	C	C	C	A	C	C	E	B	A
HCM2kAvgQ:	0	0	0	12	12	9	0	13	13	3	7	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Base Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	0.744
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	43.1
Optimal Cycle:	56	Level Of Service:	D

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	176	590	177	195	315	66	94	348	71	130	425	222
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	185	620	186	205	331	69	99	365	75	137	446	233
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	185	620	186	205	331	69	99	365	75	137	446	233
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.88	0.93	0.65	0.66	0.88	0.66	0.81	0.60	0.66	0.71	0.88	0.74
PHF Volume:	210	666	286	310	376	105	122	609	113	192	507	315
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	210	666	286	310	376	105	122	609	113	192	507	315
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	210	666	286	310	376	105	122	609	113	192	507	315
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.40	0.60	1.00	1.56	0.44	1.00	1.69	0.31	1.00	1.23	0.77
Final Sat.:	1900	2659	1141	1900	2970	830	1900	3205	595	1900	2344	1456
Capacity Analysis Module:												
Vol/Sat:	0.11	0.25	0.25	0.16	0.13	0.13	0.06	0.19	0.19	0.10	0.22	0.22
Crit Moves:		****		****			****				****	
Green/Cycle:	0.26	0.34	0.34	0.22	0.30	0.30	0.09	0.25	0.25	0.13	0.29	0.29
Volume/Cap:	0.43	0.74	0.74	0.74	0.43	0.43	0.74	0.77	0.77	0.77	0.74	0.74
Delay/Veh:	37.6	37.6	37.6	50.8	34.2	34.2	70.3	46.1	46.1	64.3	41.3	41.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	37.6	37.6	37.6	50.8	34.2	34.2	70.3	46.1	46.1	64.3	41.3	41.3
LOS by Move:	D	D	D	D	C	C	E	D	D	E	D	D
HCM2kAvgQ:	7	17	17	12	7	7	6	14	14	9	15	15

Note: Queue reported is the number of cars per lane.

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                     UCR West Campus Development Plan
                         2010 Base Conditions
                                AM Peak
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                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
*********************************************************************************
Intersection #291 I-215 SB Ramp/MLK Blvd
*********************************************************************************
Cycle (sec):          100             Critical Vol./Cap.(X):          0.388
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       17.9
Optimal Cycle:         27             Level Of Service:                  B
*********************************************************************************
Street Name:              I-215 SB Ramps                       MLK Blvd
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Permitted         Permitted         Permitted         Permitted
Rights:           Include           Include           Include           Include
Min. Green:     0     0     0     7     7     7     0     7     7     7     7     0
Lanes:        0  0  0  0  0    1  0  0  1  0    0  0  1  1  1    1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:       0     0     0    17    60   197     0   537   197    21   291     0
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:    0     0     0    18    63   207     0   564   207    22   306     0
Added Vol:      0     0     0     0     0     0     0     0     0     0     0     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:    0     0     0    18    63   207     0   564   207    22   306     0
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00  0.43  0.71  0.79  1.00  0.86  0.67  0.75  0.87  1.00
PHF Volume:     0     0     0    42    89   262     0   656   309    29   351     0
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:    0     0     0    42    89   262     0   656   309    29   351     0
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:     0     0     0    42    89   262     0   656   309    29   351     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       0.00  0.00  0.00  1.00  0.25  0.75  0.00  2.00  1.00  1.00  2.00  0.00
Final Sat.:     0     0     0  1900   481  1419     0  3800  1900  1900  3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00  0.02  0.18  0.18  0.00  0.17  0.16  0.02  0.09  0.00
Crit Moves:                          ****              ****
Green/Cycle: 0.00  0.00  0.00  0.48  0.48  0.48  0.00  0.44  0.44  0.44  0.44  0.00
Volume/Cap:  0.00  0.00  0.00  0.05  0.39  0.39  0.00  0.39  0.37  0.03  0.21  0.00
Delay/Veh:    0.0   0.0   0.0  14.1  17.1  17.1   0.0  18.7  18.5  15.7  17.1   0.0
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0  14.1  17.1  17.1   0.0  18.7  18.5  15.7  17.1   0.0
LOS by Move:    A     A     A     B     B     B     A     B     B     B     B     A
HCM2kAvgQ:      0     0     0     1     7     7     0     7     6     0     3     0
*********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Base Conditions
PM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	25.7	0.628	C	25.7	0.628	+ 0.000 D/V
# 21 I-215/SR-60 SB Ramp at Univers	B	19.7	0.554	B	19.7	0.554	+ 0.000 D/V
# 23 West Campus at University Ave	C	25.1	0.607	C	25.1	0.607	+ 0.000 D/V
# 58 Iowa Ave at University Ave	D	41.9	0.797	D	41.9	0.797	+ 0.000 D/V
# 78 Iowa Ave at MLK Blvd	C	22.2	0.737	C	22.2	0.737	+ 0.000 D/V
# 83 Lot 30/MLK BLvd	D	41.0	0.948	D	41.0	0.948	+ 0.000 D/V
# 85 Canyon Crest Dr at MLK BLvd	E	75.8	1.164	E	75.8	1.164	+ 0.000 D/V
#109 Iowa Ave at Everton Place	F	129.4	0.000	F	129.4	0.000	+ 0.000 D/V
#124 Iowa Ave at Linden St	C	25.6	0.581	C	25.7	0.581	+ 0.000 D/V
#137 Chicago Ave at MLK Blvd	E	60.4	1.061	E	60.4	1.061	+ 0.000 D/V
#151 Chicago Ave at University Aven	D	45.2	0.885	D	45.2	0.885	+ 0.000 D/V
#159 Chicago Ave at Linden Street	C	25.0	0.625	C	25.0	0.625	+ 0.000 D/V
#196 Iowa Ave at Blaine St	D	36.9	0.774	D	36.9	0.774	+ 0.000 D/V
#207 I-215/SR-60 NB Ramp at Blain S	B	18.5	0.563	B	18.5	0.563	+ 0.000 D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	32.2	0.794	C	32.2	0.794	+ 0.000 D/V
#237 Chicago Ave at 3rd Street	D	47.3	0.860	D	47.3	0.860	+ 0.000 D/V
#291 I-215 SB Ramp/MLK Blvd	B	12.7	0.498	B	12.7	0.498	+ 0.000 D/V
#292 I-215 NB Ramps/MLK Blvd	B	10.9	0.331	B	10.9	0.331	+ 0.000 V/C

UCR West Campus Development Plan
2010 Base Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #20 I-215/SR-60 NB Ramps at University

Cycle (sec):	110	Critical Vol./Cap.(X):	0.628
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.7
Optimal Cycle:	41	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	7	7	0	7	7	7	7	0	7	7
Lanes:	0 0	0 0	1	1 0	0 0	1	1 0	1 1	0	0 1	0 1	0
Volume Module: Existing PM Peak												
Base Vol:	0	0	1	70	0	273	159	408	0	0	582	182
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	1	74	0	287	167	428	0	0	611	191
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	74	0	287	167	428	0	0	611	191
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.25	0.80	1.00	0.78	0.70	0.86	1.00	1.00	0.80	0.81
PHF Volume:	0	0	4	92	0	368	239	498	0	0	764	236
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	4	92	0	368	239	498	0	0	764	236
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	4	92	0	368	238	498	0	0	764	236
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	1.00	1.00	2.00	0.00	0.00	1.53	0.47
Final Sat.:	0	0	1900	1900	0	1900	1900	3800	0	0	2903	897
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.05	0.00	0.19	0.13	0.13	0.00	0.00	0.26	0.26
Crit Moves:	****					****	****				****	
Green/Cycle:	0.00	0.00	0.01	0.30	0.00	0.31	0.20	0.62	0.00	0.00	0.42	0.42
Volume/Cap:	0.00	0.00	0.21	0.16	0.00	0.63	0.63	0.21	0.00	0.00	0.63	0.63
Delay/Veh:	0.0	0.0	59.4	28.6	0.0	34.8	43.6	9.2	0.0	0.0	26.0	26.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	59.4	28.6	0.0	34.8	43.6	9.2	0.0	0.0	26.0	26.0
LOS by Move:	A	A	E	C	A	C	D	A	A	A	C	C
HCM2kAvgQ:	0	0	0	2	0	11	8	4	0	0	14	14

Note: Queue reported is the number of cars per lane.

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                     UCR West Campus Development Plan
                          2010 Base Conditions
                                PM Peak
--------------------------------------------------------------------------------
                   Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #21 I-215/SR-60 SB Ramp at University Ave
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         0.554
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       19.7
Optimal Cycle:         35              Level Of Service:                  B
********************************************************************************
Street Name:        I-215/SR-60 SB Ramp               University Avenue
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:    0    0     0    7    0     7    0    7     7    7    7     0
Lanes:        0  0  0  0  0   0  1  0  1  0   0  0  1  1  1   1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      0    0     0   42  183    93    0  521   724  191  664     0
Growth Adj: 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05  1.05
Initial Bse:   0    0     0   44  192    98    0  547   760  201  697     0
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:   0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:   0    0     0   44  192    98    0  547   760  201  697     0
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    1.00 1.00  1.00 0.88 0.74  0.83 1.00 0.89  0.92 0.73 0.89  1.00
PHF Volume:    0    0     0   50  260   118    0  615   826  275  783     0
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:   0    0     0   50  260   118    0  615   826  275  783     0
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:    0    0     0   50  260   118    0  615   826  275  783     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:      0.00 0.00  0.00 0.23 1.22  0.55 0.00 1.28  1.72 1.00 2.00  0.00
Final Sat.:    0    0     0  446 2309  1046    0 2431  3269 1900 3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.00 0.00  0.00 0.11 0.11  0.11 0.00 0.25  0.25 0.14 0.21  0.00
Crit Moves:                 ****                  ****        ****
Green/Cycle: 0.00 0.00  0.00 0.20 0.20  0.20 0.00 0.46  0.46 0.26 0.72  0.00
Volume/Cap: 0.00 0.00  0.00 0.55 0.55  0.55 0.00 0.55  0.55 0.55 0.29  0.00
Delay/Veh:   0.0  0.0   0.0 36.7 36.7  36.7  0.0 20.1  20.1 33.3  5.1   0.0
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:  0.0  0.0   0.0 36.7 36.7  36.7  0.0 20.1  20.1 33.3  5.1   0.0
LOS by Move:   A    A     A    D    D     D    A    C     C    C    A     A
HCM2kAvgQ:     0    0     0    7    7     7    0   11    11    8    4     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
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                       UCR West Campus Development Plan
                             2010 Base Conditions
                                    PM Peak
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                      Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
7 Intersection #23 West Campus at University Ave
********************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):          0.607
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):         25.1
Optimal Cycle:         39               Level Of Service:                   C
********************************************************************************
Street Name:               West Campus                  University Avenue
Approach:       North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R   L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected         Protected         Protected
Rights:           Include          Include           Include           Include
Min. Green:    7    0    7    0    0    0     0    7    7     7    7    0
Lanes:        1  0  0  0  1   0  0  0  0  0    0  0  1  1  0    1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:     287    0   224     0    0     0      0  283   197    369  500     0
Growth Adj:  1.05 1.05  1.05  1.05 1.05  1.05   1.05 1.05  1.05   1.05 1.05  1.05
Initial Bse:  301    0   235     0    0     0      0  297   207    387  525     0
Added Vol:      0    0     0     0    0     0      0    0     0      0    0     0
PasserByVol:    0    0     0     0    0     0      0    0     0      0    0     0
Initial Fut:  301    0   235     0    0     0      0  297   207    387  525     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
PHF Adj:     0.82 1.00  0.76  1.00 1.00  1.00   1.00 0.94  0.95   0.91 0.86  1.00
PHF Volume:   368    0   309     0    0     0      0  316   218    426  610     0
Reduct Vol:     0    0     0     0    0     0      0    0     0      0    0     0
Reduced Vol:  368    0   309     0    0     0      0  316   218    426  610     0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
7 Final Vol.: 368    0   309     0    0     0      0  316   218    426  610     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900   1900 1900  1900   1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
Lanes:       1.00 0.00  1.00  0.00 0.00  0.00   0.00 1.18  0.82   1.00 2.00  0.00
Final Sat.:  1900    0  1900     0    0     0      0 2250  1550   1900 3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.19 0.00  0.16  0.00 0.00  0.00   0.00 0.14  0.14   0.22 0.16  0.00
Crit Moves:  ****                                    ****         ****
Green/Cycle: 0.32 0.00  0.32  0.00 0.00  0.00   0.00 0.23  0.23   0.37 0.60  0.00
Volume/Cap:  0.61 0.00  0.51  0.00 0.00  0.00   0.00 0.61  0.61   0.61 0.27  0.00
Delay/Veh:   30.5  0.0  28.4   0.0  0.0   0.0    0.0 35.6  35.6   27.1  9.5   0.0
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
AdjDel/Veh:  30.5  0.0  28.4   0.0  0.0   0.0    0.0 35.6  35.6   27.1  9.5   0.0
LOS by Move:    C    A     C     A    A     A      A    D     D      C    A     A
HCM2kAvgQ:     10    0     8     0    0     0      0    8     8     11    4     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Base Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.797
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	41.9
Optimal Cycle:	67	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 2 0 1			1 0 1 1 0			1 0 2 0 1			1 0 2 0 1		
Volume Module: Existing PM												
Base Vol:	93	370	129	260	800	187	217	874	152	156	374	103
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	98	389	135	273	840	196	228	918	160	164	393	108
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	98	389	135	273	840	196	228	918	160	164	393	108
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.60	0.96	0.75	0.94	0.91	0.90	0.82	0.94	0.84	0.85	0.87	0.72
PHF Volume:	163	405	181	290	923	218	278	976	190	193	451	150
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	163	405	181	290	923	218	278	976	190	193	451	150
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	163	405	181	290	923	218	278	976	190	193	451	150
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.62	0.38	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3074	726	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.09	0.11	0.10	0.15	0.30	0.30	0.15	0.26	0.10	0.10	0.12	0.08
Crit Moves:	****				****			****		****		
Green/Cycle:	0.11	0.20	0.20	0.29	0.38	0.38	0.25	0.32	0.43	0.13	0.20	0.20
Volume/Cap:	0.80	0.54	0.48	0.54	0.80	0.80	0.59	0.80	0.23	0.80	0.59	0.39
Delay/Veh:	71.7	43.9	43.5	37.2	36.6	36.6	41.7	40.9	21.8	67.6	44.6	42.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	71.7	43.9	43.5	37.2	36.6	36.6	41.7	40.9	21.8	67.6	44.6	42.2
LOS by Move:	E	D	D	D	D	D	D	D	C	E	D	D
HCM2kAvgQ:	8	7	6	9	20	20	10	18	4	9	8	5

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                            2010 Base Conditions
                                  PM Peak
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #78 Iowa Ave at MLK Blvd
********************************************************************************
Cycle (sec):          110              Critical Vol./Cap.(X):          0.737
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        22.2
Optimal Cycle:         54              Level Of Service:                  C
********************************************************************************
Street Name:               Iowa Avenue                         MLK Blvd
Approach:       North Bound       South Bound       East Bound        West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|-----------------||-----------------||-----------------||-----------------|
Control:         Protected         Protected         Protected         Protected
Rights:            Include            Ovl             Include             Ovl
Min. Green:     0     0     0     7     7     7     7     7     0     0     7     7
Lanes:        0  0  0  0  0    1  0  1! 0  1    1  0  2  0  0    0  0  2  0  1
------------|-----------------||-----------------||-----------------||-----------------|
Volume Module: Existing PM Peak
Base Vol:       0     0     0   727     0   273   170  1564     0     0   667   353
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:    0     0     0   763     0   287   179  1642     0     0   700   371
Added Vol:      0     0     0     0     0     0     0     0     0     0     0     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:    0     0     0   763     0   287   179  1642     0     0   700   371
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00  0.95  1.00  0.90  0.87  0.99  1.00  1.00  0.79  0.92
PHF Volume:     0     0     0   804     0   319   205  1659     0     0   887   403
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:    0     0     0   804     0   319   205  1659     0     0   887   403
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:     0     0     0   804     0   319   205  1659     0     0   887   403
------------|-----------------||-----------------||-----------------||-----------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       0.00  0.00  0.00  1.72  0.00  1.28  1.00  2.00  0.00  0.00  2.00  1.00
Final Sat.:     0     0     0  3261     0  2439  1900  3800     0     0  3800  1900
------------|-----------------||-----------------||-----------------||-----------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00  0.25  0.00  0.13  0.11  0.44  0.00  0.00  0.23  0.21
Crit Moves:                    ****                    ****        ****
Green/Cycle: 0.00  0.00  0.00  0.33  0.00  0.52  0.19  0.59  0.00  0.00  0.41  0.74
Volume/Cap:  0.00  0.00  0.00  0.74  0.00  0.25  0.58  0.74  0.00  0.00  0.58  0.29
Delay/Veh:    0.0   0.0   0.0  34.2   0.0  14.5  43.0  17.5   0.0   0.0  25.9   4.8
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0  34.2   0.0  14.5  43.0  17.5   0.0   0.0  25.9   4.8
LOS by Move:    A     A     A     C     A     B     D     B     A     A     C     A
HCM2kAvgQ:      0     0     0    15     0     4     7    21     0     0    12     4
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Base Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.948
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	41.0
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	0 0	0	0 1	0 1	0	0 1	1 0	1	1 0	1 0	2	0 1
Volume Module: Existing PM Peak												
Base Vol:	0	0	1	162	0	271	31	1989	0	10	926	1
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	1	170	0	285	33	2088	0	11	972	1
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	170	0	285	33	2088	0	11	972	1
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.50	1.00	0.25	0.57	1.00	0.62	0.43	0.95	1.00	0.63	0.85	1.00
PHF Volume:	0	0	4	298	0	459	76	2198	0	17	1144	1
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	4	298	0	459	76	2198	0	17	1144	1
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	4	298	0	459	76	2198	0	17	1144	1
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	0.87	0.71	1.00	0.85	0.95	1.00	1.00	0.95	1.00	0.85
Lanes:	0.00	0.00	1.00	1.00	0.00	1.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	0	0	1644	1357	0	1615	1805	3800	0	1805	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.22	0.00	0.28	0.04	0.58	0.00	0.01	0.30	0.00
Crit Moves:						****		****		****		
Green/Cycle:	0.00	0.00	0.28	0.28	0.00	0.28	0.12	0.57	0.00	0.07	0.52	0.52
Volume/Cap:	0.00	0.00	0.01	0.79	0.00	1.01	0.35	1.01	0.00	0.13	0.58	0.00
Delay/Veh:	0.0	0.0	26.0	43.6	0.0	82.1	41.3	44.6	0.0	44.1	17.0	11.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	26.0	43.6	0.0	82.1	41.3	44.6	0.0	44.1	17.0	11.6
LOS by Move:	A	A	C	D	A	F	D	D	A	D	B	B
HCM2kAvgQ:	0	0	0	11	0	21	2	43	0	1	12	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Base Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	1.164
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	75.8
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	295	186	129	125	552	189	163	1043	1058	162	254	25
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	310	195	135	131	580	198	171	1095	1111	170	267	26
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	310	195	135	131	580	198	171	1095	1111	170	267	26
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.83	0.81	0.80	0.73	0.72	0.64	0.84	0.86	0.86	0.87	0.78
PHF Volume:	402	235	167	164	794	276	267	1304	1292	198	307	34
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	402	235	167	164	794	276	267	1304	1292	198	307	34
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	402	235	167	164	794	276	267	1304	1292	198	307	34
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3420	3800	1615	3420	3800	1615	3420	3800	1615	3420	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.12	0.06	0.10	0.05	0.21	0.17	0.08	0.34	0.80	0.06	0.08	0.02
Crit Moves:	****				****				****	****		
Green/Cycle:	0.10	0.18	0.18	0.10	0.18	0.49	0.31	0.58	0.68	0.06	0.32	0.32
Volume/Cap:	1.18	0.35	0.58	0.48	1.18	0.35	0.25	0.59	1.18	0.99	0.25	0.06
Delay/Veh:	159.3	43.6	48.3	52.1	143	18.9	30.7	16.5	107.8	117.6	29.9	28.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	159.3	43.6	48.3	52.1	143	18.9	30.7	16.5	107.8	117.6	29.9	28.0
LOS by Move:	F	D	D	D	F	B	C	B	F	F	C	C
HCM2kAvgQ:	15	4	6	4	25	6	4	15	73	7	4	1

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                             2010 Base Conditions
                                   PM Peak
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #109 Iowa Ave at Everton Place
********************************************************************************
Average Delay (sec/veh):       9.4      Worst Case Level Of Service: F[129.4]
********************************************************************************
Street Name:               Iowa Avenue                       Everton Place
Approach:         North Bound       South Bound       East Bound        West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled      Uncontrolled       Stop Sign         Stop Sign
Rights:            Include           Include           Include           Include
Lanes:          0  0  1  0  1    1  0  1  0  0    0  0  0  0  0    1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:         0  503    29     36 1038     0     0    0     0    47    0    39
Growth Adj:    1.05 1.05  1.05   1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:      0  528    30     38 1090     0     0    0     0    49    0    41
Added Vol:        0    0     0      0    0     0     0    0     0     0    0     0
PasserByVol:      0    0     0      0    0     0     0    0     0     0    0     0
Initial Fut:      0  528    30     38 1090     0     0    0     0    49    0    41
User Adj:      1.00 1.00  1.00   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:       1.00 0.87  0.81   0.69 0.97  1.00  1.00 1.00  1.00  0.59 1.00  0.75
PHF Volume:       0  607    38     55 1124     0     0    0     0    84    0    55
Reduct Vol:       0    0     0      0    0     0     0    0     0     0    0     0
Final Vol.:       0  607    38     55 1124     0     0    0     0    84    0    55
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx    4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4 xxxx   6.2
FollowUpTim:xxxxx xxxx xxxxx    2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    645 xxxx xxxxx  xxxx xxxx xxxxx  1840 xxxx   607
Potent Cap.: xxxx xxxx xxxxx    950 xxxx xxxxx  xxxx xxxx xxxxx    84 xxxx   500
Move Cap.:   xxxx xxxx xxxxx    950 xxxx xxxxx  xxxx xxxx xxxxx    80 xxxx   500
Volume/Cap:  xxxx xxxx  xxxx   0.06 xxxx  xxxx  xxxx xxxx  xxxx  1.04 xxxx  0.11
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx    0.2 xxxx xxxxx  xxxx xxxx xxxxx   5.8 xxxx   0.4
Control Del:xxxxx xxxx xxxxx    9.0 xxxx xxxxx xxxxx xxxx xxxxx 205.3 xxxx  13.1
LOS by Move:    *    *     *      A    *     *     *    *     *     F    *     B
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *      *    *     *     *    *     *     *    *     *
ApproachDel:      xxxxxx            xxxxxx            xxxxxx            129.4
ApproachLOS:         *                 *                 *                 F
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Base Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #124 Iowa Ave at Linden St

Cycle (sec):	110	Critical Vol./Cap.(X):	0.581
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.7
Optimal Cycle:	37	Level Of Service:	C

Street Name:	Iowa Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	1 0	1	1 0	1 0	1
Volume Module: Existing PM Peak												
Base Vol:	46	571	140	58	1023	98	126	155	123	109	110	17
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	48	600	147	61	1074	103	132	163	129	114	116	18
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	48	600	147	61	1074	103	132	163	129	114	116	18
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.91	0.85	0.91	0.92	0.88	0.81	0.95	0.70	0.85	0.83	0.53
PHF Volume:	63	659	173	67	1168	117	163	171	185	135	139	34
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	63	659	173	67	1168	117	163	171	185	135	139	34
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	63	659	173	67	1168	117	163	171	185	135	139	34
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.82	0.18	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1900	3800	1900	1900	3454	346	1900	1900	1900	1900	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.03	0.17	0.09	0.04	0.34	0.34	0.09	0.09	0.10	0.07	0.07	0.02
Crit Moves:	****				****				****	****		
Green/Cycle:	0.06	0.47	0.47	0.17	0.58	0.58	0.15	0.17	0.17	0.12	0.13	0.13
Volume/Cap:	0.52	0.37	0.19	0.20	0.59	0.59	0.56	0.54	0.59	0.59	0.56	0.13
Delay/Veh:	53.8	18.9	17.2	39.4	15.3	15.3	45.3	44.0	45.2	49.6	47.5	42.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	53.8	18.9	17.2	39.4	15.3	15.3	45.3	44.0	45.2	49.6	47.5	42.4
LOS by Move:	D	B	B	D	B	B	D	D	D	D	D	D
HCM2kAvgQ:	3	7	3	2	14	14	6	6	7	5	5	1

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Base Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	1.061
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	60.4
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Ovl			Ovl			Ovl		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	140	287	61	366	1057	201	170	1283	792	249	514	105
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	147	301	64	384	1110	211	179	1347	832	261	540	110
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	147	301	64	384	1110	211	179	1347	832	261	540	110
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.84	0.66	0.92	0.91	0.88	0.92	0.96	0.92	0.71	0.86	0.82
PHF Volume:	155	359	97	418	1220	240	194	1403	904	368	628	134
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	155	359	97	418	1220	240	194	1403	904	368	628	134
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	155	359	97	418	1220	240	194	1403	904	368	628	134
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.04	0.09	0.05	0.11	0.32	0.13	0.10	0.37	0.48	0.19	0.17	0.07
Crit Moves:	****				****				****	****		
Green/Cycle:	0.06	0.17	0.35	0.19	0.30	0.52	0.22	0.39	0.45	0.18	0.35	0.55
Volume/Cap:	0.70	0.57	0.15	0.57	1.07	0.24	0.47	0.94	1.06	1.07	0.47	0.13
Delay/Veh:	64.9	47.3	27.0	44.9	87.8	15.9	41.6	47.4	79.9	115.9	30.2	13.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	64.9	47.3	27.0	44.9	87.8	15.9	41.6	47.4	79.9	115.9	30.2	13.2
LOS by Move:	E	D	C	D	F	B	D	D	E	F	C	B
HCM2kAvgQ:	4	7	2	8	32	5	6	30	44	21	9	2

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Base Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.885
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	45.2
Optimal Cycle:	112	Level Of Service:	D

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	1 1	0	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	237	363	126	155	956	86	182	796	463	309	385	72
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	249	381	132	163	1004	90	191	836	486	324	404	76
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	249	381	132	163	1004	90	191	836	486	324	404	76
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.92	0.73	0.84	0.89	0.77	0.81	0.90	0.87	0.87	0.92	0.82
PHF Volume:	289	414	181	194	1128	117	236	929	559	373	439	92
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	289	414	181	194	1128	117	236	929	559	373	439	92
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	289	414	181	194	1128	117	236	929	559	373	439	92
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.81	0.19	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3442	358	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.08	0.11	0.10	0.05	0.33	0.33	0.06	0.24	0.29	0.10	0.12	0.05
Crit Moves:	****				****				****	****		
Green/Cycle:	0.09	0.30	0.30	0.16	0.37	0.37	0.15	0.33	0.33	0.11	0.29	0.29
Volume/Cap:	0.88	0.37	0.32	0.32	0.88	0.88	0.40	0.73	0.88	0.88	0.40	0.17
Delay/Veh:	77.9	33.4	33.1	45.0	42.4	42.4	46.1	37.7	51.9	72.0	34.6	32.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	77.9	33.4	33.1	45.0	42.4	42.4	46.1	37.7	51.9	72.0	34.6	32.1
LOS by Move:	E	C	C	D	D	D	D	D	D	E	C	C
HCM2kAvgQ:	8	6	5	3	25	25	4	16	23	10	7	2

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Base Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	0.625
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.0
Optimal Cycle:	40	Level Of Service:	C

Street Name:	Chicago Avenue		Linden Street	
Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Protected	Protected	Protected	Protected
Rights:	Include	Include	Include	Include
Min. Green:	7 7 7	7 7 7	7 7 7	7 7 7
Lanes:	1 0 1 1 0	1 0 2 0 1	1 0 0 1 0	1 0 1 1 0

Movement:	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Volume Module: Existing PM Peak												
Base Vol:	61	432	161	172	1149	145	29	83	46	110	124	94
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	64	454	169	181	1206	152	30	87	48	116	130	99
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	64	454	169	181	1206	152	30	87	48	116	130	99
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.97	0.84	0.78	0.91	0.79	0.81	0.83	0.72	0.71	0.82	0.81
PHF Volume:	71	468	201	232	1326	193	38	105	67	163	159	122
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	71	468	201	232	1326	193	38	105	67	163	159	122
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	71	468	201	232	1326	193	38	105	67	163	159	122
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.96	0.96	0.95	1.00	0.85	0.95	0.94	0.94	0.95	0.94	0.94
Lanes:	1.00	1.40	0.60	1.00	2.00	1.00	1.00	0.61	0.39	1.00	1.13	0.87
Final Sat.:	1805	2537	1092	1805	3800	1615	1805	1092	698	1805	2010	1543
Capacity Analysis Module:												
Vol/Sat:	0.04	0.18	0.18	0.13	0.35	0.12	0.02	0.10	0.10	0.09	0.08	0.08
Crit Moves:	****				****			****		****		
Green/Cycle:	0.07	0.37	0.37	0.26	0.55	0.55	0.14	0.15	0.15	0.14	0.16	0.16
Volume/Cap:	0.56	0.50	0.50	0.50	0.63	0.22	0.15	0.63	0.63	0.63	0.50	0.50
Delay/Veh:	50.8	24.8	24.8	32.6	15.9	11.4	38.1	44.4	44.4	45.3	39.3	39.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	50.8	24.8	24.8	32.6	15.9	11.4	38.1	44.4	44.4	45.3	39.3	39.3
LOS by Move:	D	C	C	C	B	B	D	D	D	D	D	D
HCM2kAvgQ:	3	8	8	6	14	3	1	6	6	6	5	5

Note: Queue reported is the number of cars per lane.

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                     UCR West Campus Development Plan
                          2010 Base Conditions
                                PM Peak
--------------------------------------------------------------------------------
                   Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #196 Iowa Ave at Blaine St
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         0.774
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        36.9
Optimal Cycle:         60              Level Of Service:                  D
********************************************************************************
Street Name:                Iowa Avenue                     Blain Street
Approach:      North Bound     South Bound      East Bound      West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected       Protected        Protected        Protected
Rights:           Include         Include          Include          Include
Min. Green:     7    7    7    7    7    7    7    7    7    7    7    7
Lanes:        1  0  2  0  1   1  0  1  1  0   1  0  2  0  1   1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:     198  510   145   193  768   167   302  438   268   149  271   109
Growth Adj:  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:  208  536   152   203  806   175   317  460   281   156  285   114
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  208  536   152   203  806   175   317  460   281   156  285   114
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.84 0.86  0.86  0.72 0.96  0.84  0.91 0.88  0.96  0.83 0.89  0.78
PHF Volume:   248  623   177   281  840   209   348  523   293   188  320   147
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  248  623   177   281  840   209   348  523   293   188  320   147
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   248  623   177   281  840   209   348  523   293   188  320   147
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 1.60  0.40  1.00 2.00  1.00  1.00 1.37  0.63
Final Sat.:  1900 3800  1900  1900 3044   756  1900 3800  1900  1900 2605  1195
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.13 0.16  0.09  0.15 0.28  0.28  0.18 0.14  0.15  0.10 0.12  0.12
Crit Moves:  ****                   ****       ****                   ****
Green/Cycle: 0.17 0.28  0.28  0.25 0.36  0.36  0.24 0.24  0.24  0.15 0.16  0.16
Volume/Cap:  0.77 0.59  0.34  0.59 0.77  0.77  0.77 0.57  0.64  0.64 0.77  0.77
Delay/Veh:   51.0 32.3  29.3  35.1 31.5  31.5  43.8 34.3  37.2  44.4 46.6  46.6
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  51.0 32.3  29.3  35.1 31.5  31.5  43.8 34.3  37.2  44.4 46.6  46.6
LOS by Move:    D    C     C     D    C     C     D    C     D     D    D     D
HCM2kAvgQ:      9    9     4     8   16    16    12    8     9     7    9     9
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Base Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

7 Intersection #207 I-215/SR-60 NB Ramp at Blain Street

Cycle (sec):	110	Critical Vol./Cap.(X):	0.563
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	18.5
Optimal Cycle:	36	Level Of Service:	B

Street Name:	I-215/SR-60 NB Ramps						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	0	0	0	7	7	0	0	7	7
Lanes:	0 1	0	0 1	0 0	0	0 0	2 0	2	0 0	0 0	1	1 0
Volume Module: Existing PM Peak												
Base Vol:	97	1	261	0	0	0	124	779	0	0	483	494
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	102	1	274	0	0	0	130	818	0	0	507	519
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	102	1	274	0	0	0	130	818	0	0	507	519
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.25	0.88	1.00	1.00	1.00	0.84	0.95	1.00	1.00	0.91	0.86
PHF Volume:	110	4	311	0	0	0	155	861	0	0	557	603
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	110	4	311	0	0	0	155	861	0	0	557	603
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7 Final Vol.:	110	4	311	0	0	0	155	861	0	0	557	603
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.96	0.04	1.00	0.00	0.00	0.00	2.00	2.00	0.00	0.00	1.00	1.00
Final Sat.:	1830	70	1900	0	0	0	3800	3800	0	0	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.06	0.06	0.16	0.00	0.00	0.00	0.04	0.23	0.00	0.00	0.29	0.32
Crit Moves:			****				****					****
Green/Cycle:	0.29	0.29	0.29	0.00	0.00	0.00	0.07	0.64	0.00	0.00	0.56	0.56
Volume/Cap:	0.21	0.21	0.56	0.00	0.00	0.00	0.56	0.36	0.00	0.00	0.52	0.56
Delay/Veh:	29.6	29.6	34.4	0.0	0.0	0.0	52.0	9.5	0.0	0.0	15.0	15.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	29.6	29.6	34.4	0.0	0.0	0.0	52.0	9.5	0.0	0.0	15.0	15.7
LOS by Move:	C	C	C	A	A	A	D	A	A	A	B	B
HCM2kAvgQ:	3	3	9	0	0	0	3	7	0	0	12	13

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                             2010 Base Conditions
                                   PM Peak
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
              2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #209 I-215/SR-60 SB Ramp at Blain St
********************************************************************************
Cycle (sec):          120              Critical Vol./Cap.(X):          0.794
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        32.2
Optimal Cycle:         66              Level Of Service:                  C
********************************************************************************
Street Name:          I-215/SR-60 SB Ramp               Blain Street
Approach:       North Bound     South Bound      East Bound      West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected       Protected        Protected       Protected
Rights:           Include         Include          Include         Include
Min. Green:    0     0     0    7     7     7    0     7     7    7     7     0
Lanes:       0  0  0  0  0   0  1  0  0  1   0  0  1  1  0   2  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      0     0     0  276   219   192     0   631   639   220   377     0
Growth Adj: 1.05  1.05  1.05 1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:   0     0     0  290   230   202     0   663   671   231   396     0
Added Vol:     0     0     0    0     0     0     0     0     0     0     0     0
PasserByVol:   0     0     0    0     0     0     0     0     0     0     0     0
Initial Fut:   0     0     0  290   230   202     0   663   671   231   396     0
User Adj:   1.00  1.00  1.00 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:    1.00  1.00  1.00 0.93  0.84  0.92  1.00  0.95  0.95  0.92  0.89  1.00
PHF Volume:    0     0     0  312   274   219     0   697   706   251   445     0
Reduct Vol:    0     0     0    0     0     0     0     0     0     0     0     0
Reduced Vol:   0     0     0  312   274   219     0   697   706   251   445     0
PCE Adj:    1.00  1.00  1.00 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:    1.00  1.00  1.00 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:    0     0     0  312   274   219     0   697   706   251   445     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900  1900  1900 1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment: 1.00  1.00  1.00 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:      0.00  0.00  0.00 0.53  0.47  1.00  0.00  1.00  1.00  2.00  2.00  0.00
Final Sat.:    0     0     0 1011   889  1900     0  1900  1900  3800  3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.00  0.00  0.00 0.31  0.31  0.12  0.00  0.37  0.37  0.07  0.12  0.00
Crit Moves:                  ****                     ****        ****
Green/Cycle: 0.00 0.00  0.00 0.39  0.39  0.39  0.00  0.46  0.46  0.08  0.55  0.00
Volume/Cap: 0.00  0.00  0.00 0.79  0.79  0.30  0.00  0.79  0.80  0.79  0.21  0.00
Delay/Veh:   0.0   0.0   0.0 38.4  38.4  25.6   0.0  30.0  30.4  66.9  14.1   0.0
User DelAdj: 1.00 1.00  1.00 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  0.0   0.0   0.0 38.4  38.4  25.6   0.0  30.0  30.4  66.9  14.1   0.0
LOS by Move:   A     A     A    D     D     C     A     C     C     E     B     A
HCM2kAvgQ:     0     0     0   21    21     5     0    23    24     7     4     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Base Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	0.860
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	47.3
Optimal Cycle:	87	Level Of Service:	D

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module: Existing PM Peak												
Base Vol:	88	415	136	260	865	107	137	636	264	240	294	81
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	92	436	143	273	908	112	144	668	277	252	309	85
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	92	436	143	273	908	112	144	668	277	252	309	85
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.76	0.82	0.79	0.83	0.90	0.72	0.82	0.85	0.85	0.95	0.84	0.81
PHF Volume:	122	531	181	329	1009	156	175	786	326	265	368	105
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	122	531	181	329	1009	156	175	786	326	265	368	105
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	122	531	181	329	1009	156	175	786	326	265	368	105
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.49	0.51	1.00	1.73	0.27	1.00	1.41	0.59	1.00	1.56	0.44
Final Sat.:	1900	2835	965	1900	3291	509	1900	2685	1115	1900	2956	844
Capacity Analysis Module:												
Vol/Sat:	0.06	0.19	0.19	0.17	0.31	0.31	0.09	0.29	0.29	0.14	0.12	0.12
Crit Moves:	****				****			****		****		
Green/Cycle:	0.08	0.23	0.23	0.21	0.35	0.35	0.21	0.34	0.34	0.16	0.29	0.29
Volume/Cap:	0.77	0.83	0.83	0.83	0.87	0.87	0.44	0.87	0.87	0.87	0.44	0.44
Delay/Veh:	73.9	50.8	50.8	58.7	42.6	42.6	41.8	44.0	44.0	71.6	35.3	35.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	73.9	50.8	50.8	58.7	42.6	42.6	41.8	44.0	44.0	71.6	35.3	35.3
LOS by Move:	E	D	D	E	D	D	D	D	D	E	D	D
HCM2kAvgQ:	6	15	15	14	23	23	6	22	22	12	7	7

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Base Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #291 I-215 SB Ramp/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.498
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	12.7
Optimal Cycle:	32	Level Of Service:	B

Street Name:	I-215 SB Ramps						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0	0 0	1 0	0	1 0	0 0	1	1 1	1 0	2	0 0
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	3	101	106	0	186	971	5	328	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	3	106	111	0	195	1020	5	344	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	3	106	111	0	195	1020	5	344	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.75	0.70	0.80	1.00	0.74	0.88	0.63	0.87	1.00
PHF Volume:	0	0	0	4	152	139	0	264	1159	8	396	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	4	152	139	0	264	1159	8	396	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	4	152	139	0	264	1159	8	396	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.52	0.48	0.00	1.00	2.00	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	990	910	0	1900	3800	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.00	0.15	0.15	0.00	0.14	0.30	0.00	0.10	0.00
Crit Moves:					****				****			
Green/Cycle:	0.00	0.00	0.00	0.31	0.31	0.31	0.00	0.61	0.61	0.61	0.61	0.00
Volume/Cap:	0.00	0.00	0.00	0.01	0.50	0.50	0.00	0.23	0.50	0.01	0.17	0.00
Delay/Veh:	0.0	0.0	0.0	24.0	29.0	29.0	0.0	8.7	10.9	7.5	8.4	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	24.0	29.0	29.0	0.0	8.7	10.9	7.5	8.4	0.0
LOS by Move:	A	A	A	C	C	C	A	A	B	A	A	A
HCM2kAvgQ:	0	0	0	0	8	8	0	4	10	0	3	0

Note: Queue reported is the number of cars per lane.

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------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                         2010 Base Conditions
                                PM Peak
------------------------------------------------------------------------------

                  Level Of Service Computation Report
          2000 HCM 4-Way Stop Method (Future Volume Alternative)
******************************************************************************
Intersection #292 I-215 NB Ramps/MLK Blvd
******************************************************************************
Cycle (sec):         100              Critical Vol./Cap.(X):         0.331
Loss Time (sec):       0 (Y+R=4.0 sec) Average Delay (sec/veh):       10.9
Optimal Cycle:         0              Level Of Service:                 B
******************************************************************************
Street Name:               I-215 NB Ramp                       MLK BLvd
Approach:      North Bound     South Bound     East Bound      West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Stop Sign       Stop Sign       Stop Sign       Stop Sign
Rights:         Include         Include         Include         Include
Min. Green:    0    0    0    0    0    0    0    0    0    0    0    0
Lanes:        1  1  0  0  0   0  0  0  0  0   2  0  0  0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM
Base Vol:     333    1    0    0    0    0  188    0    0    0    0    0
Growth Adj:  1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05
Initial Bse:  350    1    0    0    0    0  197    0    0    0    0    0
Added Vol:      0    0    0    0    0    0    0    0    0    0    0    0
PasserByVol:    0    0    0    0    0    0    0    0    0    0    0    0
Initial Fut:  350    1    0    0    0    0  197    0    0    0    0    0
User Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:     0.87 0.25 1.00 1.00 1.00 1.00 0.73 1.00 1.00 1.00 1.00 1.00
PHF Volume:   402    4    0    0    0    0  270    0    0    0    0    0
Reduct Vol:     0    0    0    0    0    0    0    0    0    0    0    0
Reduced Vol:  402    4    0    0    0    0  270    0    0    0    0    0
PCE Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Final Vol.:   402    4    0    0    0    0  270    0    0    0    0    0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment:  1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:       1.98 0.02 0.00 0.00 0.00 0.00 2.00 0.00 0.00 0.00 0.00 0.00
Final Sat.:  1214   13    0    0    0    0 1152    0    0    0    0    0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.33 0.33 xxxx xxxx xxxx xxxx 0.23 xxxx xxxx xxxx xxxx xxxx
Crit Moves:  ****                           ****
Delay/Veh:   11.2 11.2  0.0  0.0  0.0  0.0 10.5  0.0  0.0  0.0  0.0  0.0
Delay Adj:   1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
AdjDel/Veh:  11.2 11.2  0.0  0.0  0.0  0.0 10.5  0.0  0.0  0.0  0.0  0.0
LOS by Move:    B    B    *    *    *    *    B    *    *    *    *    *
ApproachDel:       11.2          xxxxxx            10.5          xxxxxx
Delay Adj:         1.00           xxxxx            1.00           xxxxx
ApprAdjDel:        11.2          xxxxxx            10.5          xxxxxx
LOS by Appr:          B               *               B               *
AllWayAvgQ:   0.5  0.5  0.0  0.0  0.0  0.0  0.3  0.0  0.0  0.0  0.0  0.0
******************************************************************************
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2010 PHASE 1A PROJECT CONDITIONS
AM AND PM PEAK HOUR

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in	
# 20 I-215/SR-60 NB Ramps at Univer	C	24.6	0.491	C	24.9	0.513	+ 0.233	D/V
# 21 I-215/SR-60 SB Ramp at Univers	C	23.1	0.453	C	23.5	0.486	+ 0.318	D/V
# 23 West Campus at University Ave	C	28.2	0.714	C	28.4	0.725	+ 0.197	D/V
# 56 NW Mall at Iowa Avenue	A	0.0	0.000	C	22.5	0.000	+22.501	D/V
# 58 Iowa Ave at University Ave	D	35.6	0.514	D	35.8	0.528	+ 0.154	D/V
# 78 Iowa Ave at MLK Blvd	C	20.2	0.543	C	20.6	0.574	+ 0.422	D/V
# 83 Lot 30/MLK BLvd	C	22.9	0.774	C	23.1	0.792	+ 0.172	D/V
# 85 Canyon Crest Dr at MLK BLvd	C	25.1	0.614	C	28.7	0.666	+ 3.591	D/V
#109 Iowa Ave at Everton Place	C	18.1	0.000	F	79.1	0.000	+61.073	D/V
#124 Iowa Ave at Linden St	C	30.7	0.584	C	31.1	0.604	+ 0.363	D/V
#137 Chicago Ave at MLK Blvd	C	32.2	0.605	C	32.5	0.616	+ 0.296	D/V
#151 Chicago Ave at University Aven	C	33.6	0.520	C	33.7	0.525	+ 0.125	D/V
#159 Chicago Ave at Linden Street	C	33.9	0.715	C	34.7	0.768	+ 0.744	D/V
#196 Iowa Ave at Blaine St	D	39.3	0.846	D	40.5	0.863	+ 1.134	D/V
#207 I-215/SR-60 NB Ramp at Blain S	C	24.2	0.676	C	24.1	0.681	-0.112	D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	24.5	0.558	C	24.8	0.583	+ 0.389	D/V
#237 Chicago Ave at 3rd Street	D	43.1	0.744	D	44.1	0.777	+ 1.004	D/V
#291 I-215 SB Ramp/MLK Blvd	B	17.9	0.388	B	18.4	0.410	+ 0.540	D/V
#292 I-215 NB Ramps/MLK Blvd	C	15.4	0.572	C	16.7	0.597	+ 0.025	V/C

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 56 NW Mall at Iowa Avenue	??? / ???	No / No
#109 Iowa Ave at Everton Place	??? / ???	No / No
#292 I-215 NB Ramps/MLK Blvd	???	No

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	6		719		0	0		396		14	24		0		11	0		0		0
ApproachDel:	xxxxxx					xxxxxx					22.5					xxxxxx				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.2]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=35]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=1170]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	6		719		0	0		396		14	24		0		11	0		0		0

Major Street Volume: 1135
Minor Approach Volume: 35
Minor Approach Volume Threshold: 241

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	0	1	0	0	1	1	0	0	1	0	0	0	1!	0	0	1	0	0	0	1
Initial Vol:	15		720		66	47		383		32	53		0		25	13		0		27
ApproachDel:	xxxxxx					xxxxxx					79.1					24.4				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=1.7]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=78]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1381]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.3]
FAIL - Vehicle-hours less than 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=40]
FAIL - Approach volume less than 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1381]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Uncontrolled	Uncontrolled	Stop Sign	Stop Sign
Lanes:	0 1 0 0 1	1 0 0 1 0	0 0 1! 0 0	1 0 0 0 1
Initial Vol:	15 720 66	47 383 32	53 0 25	13 0 27

Major Street Volume: 1263
Minor Approach Volume: 78
Minor Approach Volume Threshold: 204

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 1 0 0 0			0 0 0 0 0			2 0 0 0 0			0 0 0 0 0		
Initial Vol:	393	13	0	0	0	0	588	0	0	0	0	0

Major Street Volume: 588
Minor Approach Volume: 405
Minor Approach Volume Threshold: 603

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                  2010 Phase 1A Conditions (Base + Project)
                                  AM Peak
--------------------------------------------------------------------------------

                     Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #20 I-215/SR-60 NB Ramps at University
********************************************************************************
Cycle (sec):          110              Critical Vol./Cap.(X):          0.513
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        24.9
Optimal Cycle:         40              Level Of Service:                   C
********************************************************************************
Street Name:          I-215/SR-60 NB Ramps               University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected         Permitted
Rights:            Include          Include          Include           Include
Min. Green:     0     0     7    7     0     7    7     7     7    0     7     7
Lanes:        0  0  0  0  1    1  0  0  0  1    1  0  1  1  0    0  1  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:       0     0     1   74     0   382   80   595     1    0   198    73
Growth Adj:  1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05
Initial Bse:    0     0     1   78     0   401   84   625     1    0   208    77
Added Vol:      0     0     0   33     0     6   16    47     0    0    24     6
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:    0     0     1  111     0   407  100   672     1    0   232    83
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     1.00  1.00  0.25 0.74  1.00  0.91 0.71  0.74  0.25 1.00  0.88  0.87
PHF Volume:     0     0     4  150     0   447  141   908     4    0   264    95
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:    0     0     4  150     0   447  141   908     4    0   264    95
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:     0     0     4  150     0   447  141   908     4    0   264    95
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.00  0.00  1.00 1.00  0.00  1.00 1.00  1.99  0.01 0.00  1.47  0.53
Final Sat.:     0     0  1900 1900     0  1900 1900  3782    18    0  2793  1007
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.08  0.00  0.24 0.07  0.24  0.24 0.00  0.09  0.09
Crit Moves:  ****                         ****       ****
Green/Cycle: 0.00  0.00  0.01 0.37  0.00  0.38 0.39  0.54  0.54 0.00  0.15  0.15
Volume/Cap:  0.00  0.00  0.21 0.21  0.00  0.61 0.19  0.44  0.44 0.00  0.61  0.61
Delay/Veh:    0.0   0.0  59.2 23.6   0.0  28.9 22.2  15.2  15.2  0.0  45.5  45.5
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0  59.2 23.6   0.0  28.9 22.2  15.2  15.2  0.0  45.5  45.5
LOS by Move:    A     A     E    C     A     C    C     B     B    A     D     D
HCM2kAvgQ:      0     0     0    3     0    13    3     9     9    0     7     7
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                   2010 Phase 1A Conditions (Base + Project)
                                   AM Peak
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #21 I-215/SR-60 SB Ramp at University Ave
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         0.486
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        23.5
Optimal Cycle:         31              Level Of Service:                 C
********************************************************************************
Street Name:        I-215/SR-60 SB Ramp               University Avenue
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:     0    0     0    7    0     7    0    7     7    7    7     0
Lanes:        0  0  0  0  0    0  1  0  1  0    0  0  1  1  1    1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:       0    0     0  351   26   186    0  305   229   43  533     0
Growth Adj:  1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05  1.05
Initial Bse:    0    0     0  369   27   195    0  320   240   45  560     0
Added Vol:      0    0     0   21    0    11    0   42     2   10   20     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:    0    0     0  390   27   206    0  362   242   55  580     0
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 0.70 0.50  0.88 1.00 0.88  0.90 0.83 0.93  1.00
PHF Volume:     0    0     0  557   55   234    0  412   269   66  623     0
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:    0    0     0  557   55   234    0  412   269   66  623     0
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:     0    0     0  557   55   234    0  412   269   66  623     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       0.00 0.00  0.00 1.00 0.19  0.81 0.00 1.81  1.19 1.00 2.00  0.00
Final Sat.:     0    0     0 1900  359  1541    0 3445  2255 1900 3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.00  0.00 0.29 0.15  0.15 0.00 0.12  0.12 0.03 0.16  0.00
Crit Moves:                  ****                  ****       ****
Green/Cycle: 0.00 0.00  0.00 0.60 0.60  0.60 0.00 0.25  0.25 0.07 0.32  0.00
Volume/Cap:  0.00 0.00  0.00 0.49 0.25  0.25 0.00 0.49  0.49 0.49 0.52  0.00
Delay/Veh:    0.0  0.0   0.0 11.4  9.4   9.4  0.0 32.6  32.6 47.3 28.2   0.0
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:   0.0  0.0   0.0 11.4  9.4   9.4  0.0 32.6  32.6 47.3 28.2   0.0
LOS by Move:    A    A     A    B    A     A    A    C     C    D    C     A
HCM2kAvgQ:      0    0     0   10    4     4    0    6     6    3    8     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #23 West Campus at University Ave

****

Cycle (sec):	100	Critical Vol./Cap.(X):	0.725
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	28.4
Optimal Cycle:	52	Level Of Service:	C

****

Street Name:	West Campus						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	0	0	0	0	7	7	7	7	0
Lanes:	1 0	0	0 1	0 0	0	0 0	0 0	1	1 0	1 0	2	0 0
Volume Module: Existing AM peak												
Base Vol:	129	0	276	0	0	0	0	285	367	203	153	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	135	0	290	0	0	0	0	299	385	213	161	0
Added Vol:	0	0	3	0	0	0	0	80	0	11	30	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	135	0	293	0	0	0	0	379	385	224	191	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.67	1.00	0.70	1.00	1.00	1.00	1.00	0.86	0.71	0.73	0.77	1.00
PHF Volume:	202	0	418	0	0	0	0	441	543	307	248	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	202	0	418	0	0	0	0	441	543	307	248	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	202	0	418	0	0	0	0	441	543	307	248	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	2.00	0.00
Final Sat.:	1900	0	1900	0	0	0	0	1900	1900	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.11	0.00	0.22	0.00	0.00	0.00	0.00	0.23	0.29	0.16	0.07	0.00
Crit Moves:			****						****	****		
Green/Cycle:	0.30	0.00	0.30	0.00	0.00	0.00	0.00	0.39	0.39	0.22	0.62	0.00
Volume/Cap:	0.35	0.00	0.73	0.00	0.00	0.00	0.00	0.59	0.73	0.73	0.11	0.00
Delay/Veh:	27.5	0.0	35.7	0.0	0.0	0.0	0.0	24.5	27.7	42.2	7.9	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	27.5	0.0	35.7	0.0	0.0	0.0	0.0	24.5	27.7	42.2	7.9	0.0
LOS by Move:	C	A	D	A	A	A	A	C	C	D	A	A
HCM2kAvgQ:	5	0	13	0	0	0	0	11	15	10	2	0

****

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                         UCR West Campus Development Plan
                    2010 Phase 1A Conditions (Base + Project)
                                     AM Peak
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Average Delay (sec/veh):        0.7      Worst Case Level Of Service: C[ 22.5]
********************************************************************************
Street Name:                  NW Mall                         Iowa Avenue
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Lanes:          1  0  1  0  1   1  0  1  0  1   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0  659    0     0  337    0     0    0    0     0    0    0
Growth Adj:   1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05
Initial Bse:     0  692    0     0  354    0     0    0    0     0    0    0
Added Vol:       6   27    0     0   42   14    24    0   11     0    0    0
PasserByVol:     0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:     6  719    0     0  396   14    24    0   11     0    0    0
User Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:      0.90 0.90 0.90  0.90 0.90 0.90  0.90 0.90 0.90  0.90 0.90 0.90
PHF Volume:      7  799    0     0  440   16    27    0   12     0    0    0
Reduct Vol:      0    0    0     0    0    0     0    0    0     0    0    0
Final Vol.:      7  799    0     0  440   16    27    0   12     0    0    0
Critical Gap Module:
Critical Gp:   4.1 xxxx xxxxx xxxxx xxxx xxxxx  6.4 xxxx  6.2 xxxxx xxxx xxxxx
FollowUpTim:   2.2 xxxx xxxxx xxxxx xxxx xxxxx  3.5 xxxx  3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   455 xxxx xxxxx  xxxx xxxx xxxxx 1252 xxxx  440  xxxx xxxx xxxxx
Potent Cap.:  1116 xxxx xxxxx  xxxx xxxx xxxxx  192 xxxx  621  xxxx xxxx xxxxx
Move Cap.:    1116 xxxx xxxxx  xxxx xxxx xxxxx  191 xxxx  621  xxxx xxxx xxxxx
Volume/Cap:   0.01 xxxx  xxxx  xxxx xxxx  xxxx 0.14 xxxx 0.02  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:     0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:   8.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     A    *    *     *    *    *     *    *    *     *    *    *
Movement:       LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.:  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  244 xxxxx  xxxx    0 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.6 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 22.5 xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    *    *     *    *    *     *    C    *     *    *    *
ApproachDel:       xxxxxx           xxxxxx             22.5           xxxxxx
ApproachLOS:          *                *                 C               *
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.528
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	35.8
Optimal Cycle:	36	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Include			Ovl			Include	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:		1 0 2 0 1			1 0 1 1 0			1 0 2 0 1			1 0 2 0 1	
Volume Module: Existing AM Peak												
Base Vol:	63	544	92	136	245	99	139	345	56	80	342	167
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	66	571	97	143	257	104	146	362	59	84	359	175
Added Vol:	14	39	32	0	36	0	0	11	14	28	3	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	80	610	129	143	293	104	146	373	73	112	362	175
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.75	0.83	0.72	0.87	0.84	0.88	0.91	0.92	0.91	0.74	0.96	0.72
PHF Volume:	107	735	179	164	349	118	160	406	80	151	377	244
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	107	735	179	164	349	118	160	406	80	151	377	244
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	107	735	179	164	349	118	160	406	80	151	377	244
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.49	0.51	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	2839	961	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.06	0.19	0.09	0.09	0.12	0.12	0.08	0.11	0.04	0.08	0.10	0.13
Crit Moves:		****		****			****					****
Green/Cycle:	0.17	0.37	0.37	0.16	0.36	0.36	0.16	0.23	0.40	0.17	0.24	0.24
Volume/Cap:	0.33	0.53	0.26	0.53	0.34	0.34	0.53	0.46	0.10	0.46	0.41	0.53
Delay/Veh:	44.3	30.2	26.8	47.6	28.2	28.2	48.0	40.1	22.5	45.7	38.5	40.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	44.3	30.2	26.8	47.6	28.2	28.2	48.0	40.1	22.5	45.7	38.5	40.6
LOS by Move:	D	C	C	D	C	C	D	D	C	D	D	D
HCM2kAvgQ:	4	11	5	6	6	6	6	7	2	5	6	8

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #78 Iowa Ave at MLK Blvd

Cycle (sec):	110	Critical Vol./Cap.(X):	0.574
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	20.6
Optimal Cycle:	37	Level Of Service:	C

Street Name:	Iowa Avenue						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Include			Ovl		
Min. Green:	0	0	0	7	7	7	7	7	0	0	7	7
Lanes:	0 0 0 0 0			1 0 1! 0 1			1 0 2 0 0			0 0 2 0 1		
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	263	0	101	267	440	0	0	785	484
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	276	0	106	280	462	0	0	824	508
Added Vol:	0	0	0	35	0	18	14	65	0	0	19	20
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	311	0	124	294	527	0	0	843	528
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.75	1.00	0.81	0.90	0.77	1.00	1.00	0.95	0.92
PHF Volume:	0	0	0	415	0	153	327	684	0	0	888	574
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	415	0	153	327	684	0	0	888	574
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	415	0	153	327	684	0	0	888	574
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.73	0.00	1.27	1.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	0	0	0	3288	0	2412	1900	3800	0	0	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.13	0.00	0.06	0.17	0.18	0.00	0.00	0.23	0.30
Crit Moves:				****			****				****	
Green/Cycle:	0.00	0.00	0.00	0.22	0.00	0.52	0.30	0.71	0.00	0.00	0.41	0.63
Volume/Cap:	0.00	0.00	0.00	0.57	0.00	0.12	0.57	0.25	0.00	0.00	0.57	0.48
Delay/Veh:	0.0	0.0	0.0	39.1	0.0	13.5	34.0	5.8	0.0	0.0	25.7	11.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	39.1	0.0	13.5	34.0	5.8	0.0	0.0	25.7	11.3
LOS by Move:	A	A	A	D	A	B	C	A	A	A	C	B
HCM2kAvgQ:	0	0	0	8	0	2	10	4	0	0	12	10

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

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Intersection #83 Lot 30/MLK BLvd

****

Cycle (sec):	100	Critical Vol./Cap.(X):	0.792
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	23.1
Optimal Cycle:	63	Level Of Service:	C

****

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	1 0	0 0	0	0 1	0 0	1	1 0	1 1	0	1 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	4	0	0	12	0	4	321	600	0	10	1276	77
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	4	0	0	13	0	4	337	630	0	11	1340	81
Added Vol:	0	0	0	0	0	2	7	93	0	0	37	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	4	0	0	13	0	6	344	723	0	11	1377	81
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.50	1.00	1.00	1.00	1.00	0.33	0.60	0.75	1.00	0.50	0.90	0.69
PHF Volume:	8	0	0	13	0	19	573	964	0	21	1530	117
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	8	0	0	13	0	19	573	964	0	21	1530	117
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	8	0	0	13	0	19	573	964	0	21	1530	117
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.81	1.00	1.00	0.76	1.00	0.85	0.95	1.00	1.00	0.95	1.00	0.85
Lanes:	1.00	0.00	0.00	1.00	0.00	1.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	1530	0	0	1440	0	1615	1805	3800	0	1805	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.01	0.00	0.00	0.01	0.00	0.01	0.32	0.25	0.00	0.01	0.40	0.07
Crit Moves:				****			****				****	
Green/Cycle:	0.07	0.00	0.00	0.07	0.00	0.07	0.37	0.67	0.00	0.18	0.48	0.48
Volume/Cap:	0.08	0.00	0.00	0.12	0.00	0.17	0.85	0.38	0.00	0.06	0.85	0.15
Delay/Veh:	43.8	0.0	0.0	44.2	0.0	44.5	38.4	7.6	0.0	33.8	27.0	14.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.8	0.0	0.0	44.2	0.0	44.5	38.4	7.6	0.0	33.8	27.0	14.9
LOS by Move:	D	A	A	D	A	D	D	A	A	C	C	B
HCM2kAvgQ:	0	0	0	0	0	1	19	7	0	1	23	2

****

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.666
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	28.7
Optimal Cycle:	51	Level Of Service:	C

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	1153	452	445	41	84	52	130	185	323	108	335	36
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	1211	475	467	43	88	55	137	194	339	113	352	38
Added Vol:	3	31	0	22	9	21	72	17	3	0	12	73
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	1214	506	467	65	97	76	209	211	342	113	364	111
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.74	0.79	0.68	0.88	0.59	0.83	0.72	0.94	0.93	0.89	0.56
PHF Volume:	1319	683	591	96	110	128	251	293	364	122	409	198
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	1319	683	591	96	110	128	251	293	364	122	409	198
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	1319	683	591	96	110	128	251	293	364	122	409	198
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3420	3800	1615	3420	3800	1615	3420	3800	1615	3420	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.39	0.18	0.37	0.03	0.03	0.08	0.07	0.08	0.23	0.04	0.11	0.12
Crit Moves:	****				****		****					****
Green/Cycle:	0.57	0.54	0.54	0.09	0.06	0.17	0.11	0.16	0.73	0.12	0.18	0.18
Volume/Cap:	0.68	0.33	0.68	0.32	0.50	0.48	0.68	0.47	0.31	0.29	0.59	0.68
Delay/Veh:	19.1	15.5	22.1	52.2	56.6	46.6	56.5	45.9	5.6	48.1	46.5	52.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	19.1	15.5	22.1	52.2	56.6	46.6	56.5	45.9	5.6	48.1	46.5	52.2
LOS by Move:	B	B	C	D	E	D	E	D	A	D	D	D
HCM2kAvgQ:	18	7	16	2	3	5	6	5	5	2	8	8

Note: Queue reported is the number of cars per lane.

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---------------------------------------------------------------------------
                       UCR West Campus Development Plan
                   2010 Phase 1A Conditions (Base + Project)
                                    AM Peak
---------------------------------------------------------------------------

                      Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
***************************************************************************
Intersection #109 Iowa Ave at Everton Place
***************************************************************************
Average Delay (sec/veh):      5.0      Worst Case Level Of Service: F[ 79.1]
***************************************************************************
Street Name:             Iowa Avenue                     Everton Place
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:          0  1  0  0  1   1  0  0  1  0   0  0  1! 0  0   1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Exsting AM Peak
Base Vol:         0  659   56    28  337    0     0    0    0    10    0   21
Growth Adj:    1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05
Initial Bse:      0  692   59    29  354    0     0    0    0    11    0   22
Added Vol:       15   28    7    18   29   32    53    0   25     2    0    5
PasserByVol:      0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:     15  720   66    47  383   32    53    0   25    13    0   27
User Adj:      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:       1.00 0.90 0.54  0.88 0.83 1.00  1.00 1.00 1.00  0.83 1.00 0.75
PHF Volume:      15  800  122    54  461   32    53    0   25    15    0   36
Reduct Vol:       0    0    0     0    0    0     0    0    0     0    0    0
Final Vol.:      15  800  122    54  461   32    53    0   25    15    0   36
Critical Gap Module:
Critical Gp:    4.1 xxxx xxxxx   4.1 xxxx xxxxx   7.1 xxxx   6.2   7.1 xxxx   6.2
FollowUpTim:    2.2 xxxx xxxxx   2.2 xxxx xxxxx   3.5 xxxx   3.3   3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:    493 xxxx xxxxx   922 xxxx xxxxx  1494 xxxx   477  1427 xxxx   800
Potent Cap.:   1081 xxxx xxxxx   749 xxxx xxxxx   102 xxxx   592   114 xxxx   388
Move Cap.:     1081 xxxx xxxxx   749 xxxx xxxxx    87 xxxx   592   102 xxxx   388
Volume/Cap:    0.01 xxxx  xxxx  0.07 xxxx  xxxx  0.61 xxxx  0.04  0.15 xxxx  0.09
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:      0.0 xxxx xxxxx   0.2 xxxx xxxxx  xxxx xxxx xxxxx   0.5 xxxx   0.3
Control Del:    8.4 xxxx xxxxx  10.2 xxxx xxxxx xxxxx xxxx xxxxx  46.3 xxxx  15.2
LOS by Move:      A    *    *     B    *    *     *    *    *     E    *     C
Movement:       LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  120 xxxxx  xxxx xxxx xxxxx
SharedQueue:    0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  3.4 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:    8.4 xxxx xxxxx xxxxx xxxx xxxxx xxxxx 79.1 xxxxx xxxxx xxxx xxxxx
Shared LOS:       A    *    *     *    *    *     *    F    *     *    *     *
ApproachDel:        xxxxxx           xxxxxx             79.1             24.4
ApproachLOS:           *                *                 F                C
***************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #124 Iowa Ave at Linden St

Cycle (sec): 110 Critical Vol./Cap.(X): 0.604
Loss Time (sec): 8 (Y+R=4.0 sec) Average Delay (sec/veh): 31.1
Optimal Cycle: 39 Level Of Service: C

Street Name:	Iowa Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	1 0	1	1 0	1 0	1
Volume Module: Existing AM Peak												
Base Vol:	118	579	92	45	403	207	113	107	47	70	137	67
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	124	608	97	47	423	217	119	112	49	74	144	70
Added Vol:	9	18	12	0	20	0	0	17	9	7	5	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	133	626	109	47	443	217	119	129	58	81	149	70
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.59	0.90	0.80	0.70	0.80	0.57	0.81	0.70	0.70	0.65	0.66	0.88
PHF Volume:	225	696	136	68	554	381	146	185	83	124	226	80
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	225	696	136	68	554	381	146	185	83	124	226	80
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	225	696	136	68	554	381	146	185	83	124	226	80
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.18	0.82	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1900	3800	1900	1900	2251	1549	1900	1900	1900	1900	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.12	0.18	0.07	0.04	0.25	0.25	0.08	0.10	0.04	0.07	0.12	0.04
Crit Moves:	****				****		****				****	
Green/Cycle:	0.20	0.45	0.45	0.16	0.41	0.41	0.13	0.19	0.19	0.13	0.20	0.20
Volume/Cap:	0.60	0.41	0.16	0.23	0.60	0.60	0.60	0.50	0.23	0.50	0.60	0.21
Delay/Veh:	43.1	20.7	18.2	41.1	26.3	26.3	49.7	40.7	37.7	46.2	43.1	37.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.1	20.7	18.2	41.1	26.3	26.3	49.7	40.7	37.7	46.2	43.1	37.4
LOS by Move:	D	C	B	D	C	C	D	D	D	D	D	D
HCM2kAvgQ:	8	8	3	2	13	13	6	6	2	4	8	2

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	0.616
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	32.5
Optimal Cycle:	40	Level Of Service:	C

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:		Ovl			Ovl			Ovl			Ovl	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 2 0 1			1 0 2 0 1			1 0 2 0 1		
Volume Module: Existing AM Peak												
Base Vol:	707	898	228	60	209	113	133	543	131	40	638	138
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	742	943	239	63	219	119	140	570	138	42	670	145
Added Vol:	0	0	19	11	0	0	0	48	0	9	24	3
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	742	943	258	74	219	119	140	618	138	51	694	148
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.87	0.92	0.70	0.80	0.80	0.81	0.85	0.74	0.90	0.71	0.94	0.78
PHF Volume:	853	1025	369	93	274	146	164	835	153	72	738	190
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	853	1025	369	93	274	146	164	835	153	72	738	190
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	853	1025	369	93	274	146	164	835	153	72	738	190
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.22	0.27	0.19	0.02	0.07	0.08	0.09	0.22	0.08	0.04	0.19	0.10
Crit Moves:		****		****			****				****	
Green/Cycle:	0.37	0.43	0.52	0.06	0.12	0.26	0.14	0.35	0.72	0.09	0.31	0.37
Volume/Cap:	0.61	0.63	0.37	0.42	0.61	0.30	0.63	0.62	0.11	0.40	0.63	0.27
Delay/Veh:	31.6	27.6	17.2	55.8	52.7	36.3	53.7	33.1	5.1	52.7	36.7	26.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	31.6	27.6	17.2	55.8	52.7	36.3	53.7	33.1	5.1	52.7	36.7	26.9
LOS by Move:	C	C	B	E	D	D	D	C	A	D	D	C
HCM2kAvgQ:	13	15	8	2	6	4	7	13	2	3	12	5

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                  2010 Phase 1A Conditions (Base + Project)
                                  AM Peak
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                      Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #151 Chicago Ave at University Avenue
********************************************************************************
Cycle (sec):          120               Critical Vol./Cap.(X):         0.525
Loss Time (sec):       12 (Y+R=4.0 sec) Average Delay (sec/veh):        33.7
Optimal Cycle:         43               Level Of Service:                  C
********************************************************************************
Street Name:                Chicago Avenue               University Avenue
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:     7    7     7    7    7     7    7    7     7    7    7     7
Lanes:         2  0  2  0  1   2  0  1  1  0   2  0  2  0  1   2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      208  747   110    74  320   126   173  326    88    85  386    55
Growth Adj:   1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:   218  784   116    78  336   132   182  342    92    89  405    58
Added Vol:       0    3     3     4   11     0     0   19     0     5    9     4
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   218  787   119    82  347   132   182  361    92    94  414    62
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.72 0.79  0.76  0.77 0.89  0.90  0.88 0.82  0.58  0.85 0.85  0.60
PHF Volume:    303  997   156   106  390   147   206  441   159   111  487   103
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   303  997   156   106  390   147   206  441   159   111  487   103
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    303  997   156   106  390   147   206  441   159   111  487   103
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:        2.00 2.00  1.00  2.00 1.45  0.55  2.00 2.00  1.00  2.00 2.00  1.00
Final Sat.:   3800 3800  1900  3800 2760  1040  3800 3800  1900  3800 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.08 0.26  0.08  0.03 0.14  0.14  0.05 0.12  0.08  0.03 0.13  0.05
Crit Moves:        ****        ****             ****                   ****
Green/Cycle:  0.20 0.50  0.50  0.06 0.35  0.35  0.10 0.23  0.23  0.12 0.24  0.24
Volume/Cap:   0.40 0.53  0.17  0.48 0.40  0.40  0.53 0.50  0.36  0.25 0.53  0.22
Delay/Veh:    42.1 20.9  16.7  56.4 29.3  29.3  52.4 40.7  39.4  48.6 40.1  36.6
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   42.1 20.9  16.7  56.4 29.3  29.3  52.4 40.7  39.4  48.6 40.1  36.6
LOS by Move:     D    C     B     E    C     C     D    D     D     D    D     D
HCM2kAvgQ:       5   12     3     3    7     7     4    7     5     2    8     3
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	0.768
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	34.7
Optimal Cycle:	59	Level Of Service:	C

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	1 1	0	1 0	2 0	1	1 0	0 1	0	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	21	771	148	140	364	33	36	102	31	154	122	153
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	22	810	155	147	382	35	38	107	33	162	128	161
Added Vol:	1	6	0	0	11	0	0	11	3	0	5	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	23	816	155	147	393	35	38	118	36	162	133	161
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.66	0.87	0.76	0.54	0.92	0.59	0.75	0.71	0.65	0.71	0.66	0.54
PHF Volume:	35	937	204	272	427	59	50	166	55	228	202	298
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	35	937	204	272	427	59	50	166	55	228	202	298
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	35	937	204	272	427	59	50	166	55	228	202	298
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.97	0.97	0.95	1.00	0.85	0.95	0.96	0.96	0.95	0.91	0.91
Lanes:	1.00	1.64	0.36	1.00	2.00	1.00	1.00	0.75	0.25	1.00	1.00	1.00
Final Sat.:	1805	3035	662	1805	3800	1615	1805	1377	453	1805	1731	1731
Capacity Analysis Module:												
Vol/Sat:	0.02	0.31	0.31	0.15	0.11	0.04	0.03	0.12	0.12	0.13	0.12	0.17
Crit Moves:		****		****				****		****		
Green/Cycle:	0.23	0.40	0.40	0.20	0.37	0.37	0.09	0.16	0.16	0.16	0.23	0.23
Volume/Cap:	0.08	0.77	0.77	0.77	0.30	0.10	0.30	0.77	0.77	0.77	0.51	0.75
Delay/Veh:	30.4	28.3	28.3	47.8	22.6	20.7	43.3	52.2	52.2	51.5	34.1	40.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	30.4	28.3	28.3	47.8	22.6	20.7	43.3	52.2	52.2	51.5	34.1	40.8
LOS by Move:	C	C	C	D	C	C	D	D	D	D	C	D
HCM2kAvgQ:	1	17	17	10	5	1	2	8	8	9	6	10

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	0.863
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	40.5
Optimal Cycle:	84	Level Of Service:	D

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	141	641	99	121	413	225	418	410	103	108	428	130
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	148	673	104	127	434	236	439	431	108	113	449	137
Added Vol:	6	8	4	20	12	0	0	45	4	4	16	6
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	154	681	108	147	446	236	439	476	112	117	465	143
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.78	0.93	0.85	0.72	0.69	0.84	0.89	0.75	0.89	0.93	0.88	0.79
PHF Volume:	198	732	127	204	646	281	493	634	126	126	529	180
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	198	732	127	204	646	281	493	634	126	126	529	180
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	198	732	127	204	646	281	493	634	126	126	529	180
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.39	0.61	1.00	2.00	1.00	1.00	1.49	0.51
Final Sat.:	1900	3800	1900	1900	2647	1153	1900	3800	1900	1900	2834	966
Capacity Analysis Module:												
Vol/Sat:	0.10	0.19	0.07	0.11	0.24	0.24	0.26	0.17	0.07	0.07	0.19	0.19
Crit Moves:	****				****		****				****	
Green/Cycle:	0.12	0.26	0.26	0.14	0.28	0.28	0.30	0.36	0.36	0.15	0.22	0.22
Volume/Cap:	0.86	0.74	0.26	0.74	0.86	0.86	0.86	0.46	0.18	0.43	0.86	0.86
Delay/Veh:	70.1	37.2	29.7	51.6	41.4	41.4	45.9	24.5	21.8	39.5	47.1	47.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	70.1	37.2	29.7	51.6	41.4	41.4	45.9	24.5	21.8	39.5	47.1	47.1
LOS by Move:	E	D	C	D	D	D	D	C	C	D	D	D
HCM2kAvgQ:	9	12	3	8	17	17	17	8	3	4	14	14

Note: Queue reported is the number of cars per lane.

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-------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                 2010 Phase 1A Conditions (Base + Project)
                                  AM Peak
-------------------------------------------------------------------------------

                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #207 I-215/SR-60 NB Ramp at Blain Street
*******************************************************************************
Cycle (sec):        110              Critical Vol./Cap.(X):         0.681
Loss Time (sec):      8 (Y+R=4.0 sec) Average Delay (sec/veh):       24.1
Optimal Cycle:       47              Level Of Service:                 C
*******************************************************************************
Street Name:        I-215/SR-60 NB Ramps                Blain Street
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:     7     7     7    0     0     0    7     7     0    0     7     7
Lanes:       0  1  0  0  1    0  0  0  0  0    2  0  2  0  0    0  0  1  1  0
------------|----------------||----------------||----------------||----------------|
Volume Module: Existing AM Peak
Base Vol:     204     5   393     0     0     0   172   645     0     0   409   499
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:  214     5   413     0     0     0   181   677     0     0   429   524
Added Vol:      0     0     1     0     0     0     0    48     0     0    15     6
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:  214     5   414     0     0     0   181   725     0     0   444   530
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.70  0.31  0.95  1.00  1.00  1.00  0.68  0.76  1.00  1.00  0.85  0.84
PHF Volume:   306    17   435     0     0     0   266   954     0     0   523   631
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  306    17   435     0     0     0   266   954     0     0   523   631
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   306    17   435     0     0     0   266   954     0     0   523   631
------------|----------------||----------------||----------------||----------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       0.95  0.05  1.00  0.00  0.00  0.00  2.00  2.00  0.00  0.00  1.00  1.00
Final Sat.:  1800   100  1900     0     0     0  3800  3800     0     0  1900  1900
------------|----------------||----------------||----------------||----------------|
Capacity Analysis Module:
Vol/Sat:     0.17  0.17  0.23  0.00  0.00  0.00  0.07  0.25  0.00  0.00  0.28  0.33
Crit Moves:              ****                    ****                          ****
Green/Cycle: 0.34  0.34  0.34  0.00  0.00  0.00  0.10  0.59  0.00  0.00  0.49  0.49
Volume/Cap:  0.50  0.50  0.68  0.00  0.00  0.00  0.68  0.43  0.00  0.00  0.56  0.68
Delay/Veh:   29.8  29.8  34.4   0.0   0.0   0.0  52.5  12.4   0.0   0.0  20.3  22.7
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  29.8  29.8  34.4   0.0   0.0   0.0  52.5  12.4   0.0   0.0  20.3  22.7
LOS by Move:    C     C     C     A     A     A     D     B     A     A     C     C
HCM2kAvgQ:      9     9    13     0     0     0     6     9     0     0    13    17
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	0.583
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.8
Optimal Cycle:	38	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0 0	0	0 1	0 0	1	0 0	1 1	0	2 0	2 0	0
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	369	16	251	0	486	179	110	518	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	387	17	264	0	510	188	116	544	0
Added Vol:	0	0	0	21	0	0	0	27	0	3	13	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	408	17	264	0	537	188	119	557	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.95	0.80	0.76	1.00	0.66	0.86	0.89	0.76	1.00
PHF Volume:	0	0	0	430	21	347	0	814	219	133	733	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	430	21	347	0	814	219	133	733	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	430	21	347	0	814	219	133	733	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.95	0.05	1.00	0.00	1.58	0.42	2.00	2.00	0.00
Final Sat.:	0	0	0	1812	88	1900	0	2996	804	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.24	0.24	0.18	0.00	0.27	0.27	0.04	0.19	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.41	0.41	0.41	0.00	0.47	0.47	0.06	0.53	0.00
Volume/Cap:	0.00	0.00	0.00	0.58	0.58	0.45	0.00	0.58	0.58	0.58	0.37	0.00
Delay/Veh:	0.0	0.0	0.0	28.8	28.8	26.2	0.0	24.0	24.0	58.7	16.8	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	28.8	28.8	26.2	0.0	24.0	24.0	58.7	16.8	0.0
LOS by Move:	A	A	A	C	C	C	A	C	C	E	B	A
HCM2kAvgQ:	0	0	0	13	13	9	0	14	14	3	8	0

Note: Queue reported is the number of cars per lane.

```
---------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                  2010 Phase 1A Conditions (Base + Project)
                                   AM Peak
---------------------------------------------------------------------------------
                       Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
*********************************************************************************
Intersection #237 Chicago Ave at 3rd Street
*********************************************************************************
Cycle (sec):           120              Critical Vol./Cap.(X):          0.777
Loss Time (sec):         8 (Y+R=4.0 sec) Average Delay (sec/veh):        44.1
Optimal Cycle:          63              Level Of Service:                  D
*********************************************************************************
Street Name:               Chicago Avenue                      3rd Street
Approach:        North Bound      South Bound       East Bound        West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected         Protected         Protected         Protected
Rights:            Include           Include           Include           Include
Min. Green:     10    10    10    10    10    10    10    10    10    10    10    10
Lanes:          1  0  1  1  0    1  0  1  1  0    1  0  1  1  0    1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      176   590   177   195   315    66    94   348    71   130   425   222
Growth Adj:   1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:   185   620   186   205   331    69    99   365    75   137   446   233
Added Vol:       1     6     0    17     9     0     0    10     2     0     7     5
PasserByVol:     0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:   186   626   186   222   340    69    99   375    77   137   453   238
User Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:      0.88  0.93  0.65  0.66  0.88  0.66  0.81  0.60  0.66  0.71  0.88  0.74
PHF Volume:    211   673   286   336   386   105   122   626   116   192   515   322
Reduct Vol:      0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   211   673   286   336   386   105   122   626   116   192   515   322
PCE Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:    211   673   286   336   386   105   122   626   116   192   515   322
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:        1.00  1.40  0.60  1.00  1.57  0.43  1.00  1.69  0.31  1.00  1.23  0.77
Final Sat.:   1900  2666  1134  1900  2988   812  1900  3206   594  1900  2339  1461
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.11  0.25  0.25  0.18  0.13  0.13  0.06  0.20  0.20  0.10  0.22  0.22
Crit Moves:         ****        ****                    ****        ****
Green/Cycle:  0.26  0.32  0.32  0.23  0.30  0.30  0.10  0.25  0.25  0.13  0.28  0.28
Volume/Cap:   0.44  0.78  0.78  0.78  0.44  0.44  0.61  0.78  0.78  0.78  0.80  0.80
Delay/Veh:    38.1  39.8  39.8  52.2  34.3  34.3  56.9  45.9  45.9  64.9  44.6  44.6
User DelAdj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   38.1  39.8  39.8  52.2  34.3  34.3  56.9  45.9  45.9  64.9  44.6  44.6
LOS by Move:     D     D     D     D     C     C     E     D     D     E     D     D
HCM2kAvgQ:       7    17    17    13     7     7     5    14    14     9    16    16
*********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #291 I-215 SB Ramp/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.410
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	18.4
Optimal Cycle:	28	Level Of Service:	B

Street Name:	I-215 SB Ramps						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0 0 0 0			1 0 0 1 0			0 0 1 1 1			1 0 2 0 0		
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	17	60	197	0	537	197	21	291	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	18	63	207	0	564	207	22	306	0
Added Vol:	0	0	0	0	0	20	0	6	33	0	66	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	18	63	227	0	570	240	22	372	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.43	0.71	0.79	1.00	0.86	0.67	0.75	0.87	1.00
PHF Volume:	0	0	0	42	89	287	0	663	358	29	427	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	42	89	287	0	663	358	29	427	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	42	89	287	0	663	358	29	427	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.24	0.76	0.00	1.95	1.05	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	449	1451	0	3701	1999	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.02	0.20	0.20	0.00	0.18	0.18	0.02	0.11	0.00
Crit Moves:					****			****				
Green/Cycle:	0.00	0.00	0.00	0.48	0.48	0.48	0.00	0.44	0.44	0.44	0.44	0.00
Volume/Cap:	0.00	0.00	0.00	0.05	0.41	0.41	0.00	0.41	0.41	0.04	0.26	0.00
Delay/Veh:	0.0	0.0	0.0	13.7	17.0	17.0	0.0	19.4	19.4	16.1	17.9	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	13.7	17.0	17.0	0.0	19.4	19.4	16.1	17.9	0.0
LOS by Move:	A	A	A	B	B	B	A	B	B	B	B	A
HCM2kAvgQ:	0	0	0	1	7	7	0	7	7	1	4	0

Note: Queue reported is the number of cars per lane.

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------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                 2010 Phase 1A Conditions (Base + Project)
                                 AM Peak
------------------------------------------------------------------------------
                    Level Of Service Computation Report
           2000 HCM 4-Way Stop Method (Future Volume Alternative)
******************************************************************************
Intersection #292 I-215 NB Ramps/MLK Blvd
******************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         0.597
Loss Time (sec):        0 (Y+R=4.0 sec) Average Delay (sec/veh):        16.7
Optimal Cycle:          0              Level Of Service:                  C
******************************************************************************
Street Name:              I-215 NB Ramp                      MLK BLvd
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Min. Green:     0     0     0    0     0     0    0     0     0    0     0     0
Lanes:        1  1  0  0  0    0  0  0  0  0    2  0  0  0  0    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: existing AM Peak
Base Vol:     311    12     0    0     0     0  554     0     0    0     0     0
Growth Adj:  1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05
Initial Bse:  327    13     0    0     0     0  582     0     0    0     0     0
Added Vol:     66     0     0    0     0     0    6     0     0    0     0     0
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:  393    13     0    0     0     0  588     0     0    0     0     0
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.84  0.60  1.00 1.00  1.00  1.00 0.89  1.00  1.00 1.00  1.00  1.00
PHF Volume:   467    21     0    0     0     0  660     0     0    0     0     0
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  467    21     0    0     0     0  660     0     0    0     0     0
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:   467    21     0    0     0     0  660     0     0    0     0     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       1.91  0.09  0.00 0.00  0.00  0.00 2.00  0.00  0.00 0.00  0.00  0.00
Final Sat.:   998    45     0    0     0     0 1106     0     0    0     0     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.47  0.47  xxxx xxxx  xxxx  xxxx 0.60  xxxx  xxxx xxxx  xxxx  xxxx
Crit Moves:  ****                              ****
Delay/Veh:   15.0  14.9   0.0  0.0   0.0   0.0 17.9   0.0   0.0  0.0   0.0   0.0
Delay Adj:   1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:  15.0  14.9   0.0  0.0   0.0   0.0 17.9   0.0   0.0  0.0   0.0   0.0
LOS by Move:    B     B     *    *     *     *    C     *     *    *     *     *
ApproachDel:       15.0             xxxxxx            17.9             xxxxxx
Delay Adj:         1.00              xxxxx            1.00              xxxxx
ApprAdjDel:        15.0             xxxxxx            17.9             xxxxxx
LOS by Appr:          B                  *               C                  *
AllWayAvgQ:   0.8   0.8   0.0  0.0   0.0   0.0  1.4   0.0   0.0  0.0   0.0   0.0
******************************************************************************
```

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/C	Future LOS	Future Del/ Veh	Future V/C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	25.7	0.628	C	26.2	0.668	+ 0.479 D/V
# 21 I-215/SR-60 SB Ramp at Univers	B	19.7	0.554	C	20.9	0.595	+ 1.143 D/V
# 23 West Campus at University Ave	C	25.1	0.607	C	25.0	0.622	-0.089 D/V
# 56 NW Mall at Iowa Avenue	A	0.0	0.000	F	59.7	0.000	+59.739 D/V
# 58 Iowa Ave at University Ave	D	41.9	0.797	D	44.6	0.850	+ 2.695 D/V
# 78 Iowa Ave at MLK Blvd	C	22.2	0.737	C	23.0	0.754	+ 0.752 D/V
# 83 Lot 30/MLK BLvd	D	41.0	0.948	D	45.0	0.969	+ 3.941 D/V
# 85 Canyon Crest Dr at MLK BLvd	E	75.8	1.164	E	77.1	1.178	+ 1.324 D/V
#109 Iowa Ave at Everton Place	F	129.4	0.000	F	544.6	0.000	+415.250 D/V
#124 Iowa Ave at Linden St	C	25.7	0.581	C	26.9	0.612	+ 1.112 D/V
#137 Chicago Ave at MLK Blvd	E	60.4	1.061	E	63.9	1.076	+ 3.529 D/V
#151 Chicago Ave at University Aven	D	45.2	0.885	D	45.4	0.887	+ 0.164 D/V
#159 Chicago Ave at Linden Street	C	25.0	0.625	C	25.3	0.634	+ 0.347 D/V
#196 Iowa Ave at Blaine St	D	36.9	0.774	D	38.0	0.801	+ 1.069 D/V
#207 I-215/SR-60 NB Ramp at Blain S	B	18.5	0.563	B	18.4	0.578	-0.083 D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	32.2	0.794	C	32.5	0.807	+ 0.292 D/V
#237 Chicago Ave at 3rd Street	D	47.3	0.860	D	48.0	0.867	+ 0.635 D/V
#291 I-215 SB Ramp/MLK Blvd	B	12.7	0.498	B	12.6	0.525	-0.026 D/V
#292 I-215 NB Ramps/MLK Blvd	B	10.9	0.331	B	11.5	0.375	+ 0.044 V/C

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 56 NW Mall at Iowa Avenue	??? / ???	No / No
#109 Iowa Ave at Everton Place	??? / ???	No / No
#292 I-215 NB Ramps/MLK Blvd	???	No

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Peak Hour Delay Signal Warrant Report

****

Intersection #56 NW Mall at Iowa Avenue

****

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	11		571		0	0		1123		24	18		0		8	0		0		0
ApproachDel:	xxxxxx					xxxxxx					59.7					xxxxxx				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.4]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=26]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=1755]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	1 0	1 0	1	1 0	1 0	1	0 0	1!	0 0	0 0	1!	0 0
Initial Vol:	11	571	0	0	1123	24	18	0	8	0	0	0

Major Street Volume: 1729
Minor Approach Volume: 26
Minor Approach Volume Threshold: 96 [less than minimum of 100]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Peak Hour Delay Signal Warrant Report

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 1	0	0 1	1 0	0	1 0	0 0	1!	0 0	1 0	0	0 1
Initial Vol:	26	560	33	46	1120	54	41	0	20	56	0	57
ApproachDel:	xxxxxx			xxxxxx			427.7			544.6		

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=7.2]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=61]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2014]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=17.1]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=113]
FAIL - Approach volume less than 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2014]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	0	1	0	0	1	1	0	0	1	0	0	0	1!	0	0	1	0	0	0	1
Initial Vol:	26		560		33	46		1120		54	41		0		20	56		0		57

Major Street Volume: 1839
Minor Approach Volume: 113
Minor Approach Volume Threshold: 112 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 1 0 0 0			0 0 0 0 0			2 0 0 0 0			0 0 0 0 0		
Initial Vol:	391	1	0	0	0	0	215	0	0	0	0	0

Major Street Volume: 392
Minor Approach Volume: 215
Minor Approach Volume Threshold: 777

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #20 I-215/SR-60 NB Ramps at University

Cycle (sec):	110	Critical Vol./Cap.(X):	0.668
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	26.2
Optimal Cycle:	45	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	7	7	0	7	7	7	7	0	7	7
Lanes:	0 0 0 0 1			1 0 0 0 1			1 0 1 1 0			0 1 0 1 0		
Volume Module: Existing PM Peak												
Base Vol:	0	0	1	70	0	273	159	408	0	0	582	182
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	1	74	0	287	167	428	0	0	611	191
Added Vol:	0	0	0	14	0	3	14	27	0	0	57	20
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	88	0	290	181	455	0	0	668	211
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.25	0.80	1.00	0.78	0.70	0.86	1.00	1.00	0.80	0.81
PHF Volume:	0	0	4	109	0	371	259	530	0	0	835	261
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	4	109	0	371	259	530	0	0	835	261
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	4	109	0	371	259	530	0	0	835	261
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	1.00	1.00	2.00	0.00	0.00	1.52	0.48
Final Sat.:	0	0	1900	1900	0	1900	1900	3800	0	0	2896	904
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.06	0.00	0.20	0.14	0.14	0.00	0.00	0.29	0.29
Crit Moves:	****					****	****				****	
Green/Cycle:	0.00	0.00	0.01	0.28	0.00	0.29	0.20	0.63	0.00	0.00	0.43	0.43
Volume/Cap:	0.00	0.00	0.23	0.20	0.00	0.67	0.67	0.22	0.00	0.00	0.67	0.67
Delay/Veh:	0.0	0.0	60.1	30.2	0.0	37.4	44.8	8.6	0.0	0.0	26.1	26.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	60.1	30.2	0.0	37.4	44.8	8.6	0.0	0.0	26.1	26.1
LOS by Move:	A	A	E	C	A	D	D	A	A	A	C	C
HCM2kAvgQ:	0	0	0	3	0	12	9	4	0	0	15	15

Note: Queue reported is the number of cars per lane.

```
-------------------------------------------------------------------------------
                    UCR West Campus Development Plan
               2010 Phase 1A Conditions (Base + Project)
                                PM Peak
-------------------------------------------------------------------------------
                    Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #21 I-215/SR-60 SB Ramp at University Ave
*******************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         0.595
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       20.9
Optimal Cycle:         38              Level Of Service:                  C
*******************************************************************************
Street Name:           I-215/SR-60 SB Ramp              University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0     0     0    7     0     7    0     7     7    7     7     0
Lanes:         0  0  0  0  0   0  1  0  1  0   0  0  1  1  1   1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      0     0     0   42   183    93    0   521   724  191   664     0
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:   0     0     0   44   192    98    0   547   760  201   697     0
Added Vol:     0     0     0    9     0    17    0    32     5   31    28     0
PasserByVol:   0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:   0     0     0   53   192   115    0   579   765  232   725     0
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00  0.88  0.74  0.83  1.00  0.89  0.92  0.73  0.89  1.00
PHF Volume:    0     0     0   60   260   138    0   651   832  317   815     0
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:   0     0     0   60   260   138    0   651   832  317   815     0
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:    0     0     0   60   260   138    0   651   832  317   815     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       0.00  0.00  0.00  0.26  1.14  0.60  0.00  1.32  1.68  1.00  2.00  0.00
Final Sat.:    0     0     0   500  2154  1146    0  2502  3198  1900  3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00  0.12  0.12  0.12  0.00  0.26  0.26  0.17  0.21  0.00
Crit Moves:                    ****                    ****        ****
Green/Cycle: 0.00  0.00  0.00  0.20  0.20  0.20  0.00  0.44  0.44  0.28  0.72  0.00
Volume/Cap:  0.00  0.00  0.00  0.60  0.60  0.60  0.00  0.60  0.60  0.60  0.30  0.00
Delay/Veh:    0.0   0.0   0.0  37.4  37.4  37.4   0.0  21.8  21.8  32.9   5.1   0.0
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0  37.4  37.4  37.4   0.0  21.8  21.8  32.9   5.1   0.0
LOS by Move:    A     A     A     D     D     D     A     C     C     C     A     A
HCM2kAvgQ:      0     0     0     7     7     7     0    12    12     9     4     0
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                  2010 Phase 1A Conditions (Base + Project)
                                   PM Peak
--------------------------------------------------------------------------------

                      Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #23 West Campus at University Ave
********************************************************************************
Cycle (sec):            100               Critical Vol./Cap.(X):          0.622
Loss Time (sec):          8 (Y+R=4.0 sec) Average Delay (sec/veh):         25.0
Optimal Cycle:           40               Level Of Service:                   C
********************************************************************************
Street Name:                West Campus                  University Avenue
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:      7    0     7    0    0     0    0    7     7    7    7     0
Lanes:          1  0  0  0  1   0  0  0  0  0   0  0  1  1  0   1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      287    0   224     0    0     0     0  283   197   369  500     0
Growth Adj:   1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:   301    0   235     0    0     0     0  297   207   387  525     0
Added Vol:       0    0    10     0    0     0     0   42     0     5   77     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   301    0   245     0    0     0     0  339   207   392  602     0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.82 1.00  0.76  1.00 1.00  1.00  1.00 0.94  0.95  0.91 0.86  1.00
PHF Volume:    368    0   323     0    0     0     0  361   218   431  700     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   368    0   323     0    0     0     0  361   218   431  700     0
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    368    0   323     0    0     0     0  361   218   431  700     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:        1.00 0.00  1.00  0.00 0.00  0.00  0.00 1.25  0.75  1.00 2.00  0.00
Final Sat.:   1900    0  1900     0    0     0     0 2370  1430  1900 3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.19 0.00  0.17  0.00 0.00  0.00  0.00 0.15  0.15  0.23 0.18  0.00
Crit Moves:   ****                                   ****        ****
Green/Cycle:  0.31 0.00  0.31  0.00 0.00  0.00  0.00 0.24  0.24  0.36 0.61  0.00
Volume/Cap:   0.62 0.00  0.55  0.00 0.00  0.00  0.00 0.62  0.62  0.62 0.30  0.00
Delay/Veh:    31.5  0.0  29.7   0.0  0.0   0.0   0.0 35.0  35.0  27.9  9.4   0.0
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   31.5  0.0  29.7   0.0  0.0   0.0   0.0 35.0  35.0  27.9  9.4   0.0
LOS by Move:     C    A     C     A    A     A     A    C     C     C    A     A
HCM2kAvgQ:      10    0     9     0    0     0     0    9     9    11    5     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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---------------------------------------------------------------------------------
                   UCR West Campus Development Plan
               2010 Phase 1A Conditions (Base + Project)
                               PM Peak
---------------------------------------------------------------------------------

                  Level Of Service Computation Report
        2000 HCM Unsignalized Method (Future Volume Alternative)
*********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
*********************************************************************************
Average Delay (sec/veh):       1.0      Worst Case Level Of Service: F[ 59.7]
*********************************************************************************
Street Name:                NW Mall                         Iowa Avenue
Approach:        North Bound       South Bound       East Bound        West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled      Uncontrolled       Stop Sign         Stop Sign
Rights:           Include           Include           Include           Include
Lanes:          1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0  503    0      0 1038    0      0    0    0      0    0    0
Growth Adj:   1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:     0  528    0      0 1090    0      0    0    0      0    0    0
Added Vol:      11   43    0      0   33   24     18    0    8      0    0    0
PasserByVol:     0    0    0      0    0    0      0    0    0      0    0    0
Initial Fut:    11  571    0      0 1123   24     18    0    8      0    0    0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.90 0.90  0.90  0.90 0.90  0.90  0.90 0.90  0.90  0.90 0.90  0.90
PHF Volume:     12  635    0      0 1248   27     20    0    9      0    0    0
Reduct Vol:      0    0    0      0    0    0      0    0    0      0    0    0
Final Vol.:     12  635    0      0 1248   27     20    0    9      0    0    0
Critical Gap Module:
Critical Gp:   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4 xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1274 xxxx xxxxx  xxxx xxxx xxxxx  1907 xxxx  1248  xxxx xxxx xxxxx
Potent Cap.:  552 xxxx xxxxx  xxxx xxxx xxxxx    76 xxxx   214  xxxx xxxx xxxxx
Move Cap.:    552 xxxx xxxxx  xxxx xxxx xxxxx    75 xxxx   214  xxxx xxxx xxxxx
Volume/Cap:  0.02 xxxx  xxxx  xxxx xxxx  xxxx  0.27 xxxx  0.04  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:     0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del: 11.7 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    B    *     *     *    *     *     *    *     *     *    *     *
Movement:       LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx   94 xxxxx  xxxx    0 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  1.2 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 59.7 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    F     *     *    *     *
ApproachDel:      xxxxxx            xxxxxx             59.7            xxxxxx
ApproachLOS:         *                 *                 F                 *
*********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.850
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	44.6
Optimal Cycle:	83	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Include			Ovl			Include	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:		1 0 2 0 1			1 0 1 1 0			1 0 2 0 1			1 0 2 0 1	
Volume Module: Existing PM												
Base Vol:	93	370	129	260	800	187	217	874	152	156	374	103
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	98	389	135	273	840	196	228	918	160	164	393	108
Added Vol:	16	42	33	0	42	0	0	5	15	35	11	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	114	431	168	273	882	196	228	923	175	199	404	108
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.60	0.96	0.75	0.94	0.91	0.90	0.82	0.94	0.84	0.85	0.87	0.72
PHF Volume:	189	448	225	290	969	218	278	982	208	234	464	150
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	189	448	225	290	969	218	278	982	208	234	464	150
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	189	448	225	290	969	218	278	982	208	234	464	150
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.63	0.37	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3102	698	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.10	0.12	0.12	0.15	0.31	0.31	0.15	0.26	0.11	0.12	0.12	0.08
Crit Moves:	****				****			****		****		
Green/Cycle:	0.12	0.21	0.21	0.27	0.37	0.37	0.24	0.30	0.42	0.14	0.20	0.20
Volume/Cap:	0.85	0.56	0.56	0.56	0.85	0.85	0.60	0.85	0.26	0.85	0.60	0.39
Delay/Veh:	77.3	43.2	44.1	38.8	40.1	40.1	42.3	45.4	22.8	71.5	44.6	41.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	77.3	43.2	44.1	38.8	40.1	40.1	42.3	45.4	22.8	71.5	44.6	41.9
LOS by Move:	E	D	D	D	D	D	D	D	C	E	D	D
HCM2kAvgQ:	9	8	8	10	22	22	10	19	5	11	8	5

Note: Queue reported is the number of cars per lane.

```
-------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                2010 Phase 1A Conditions (Base + Project)
                                PM Peak
-------------------------------------------------------------------------------

                   Level Of Service Computation Report
         2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #78 Iowa Ave at MLK Blvd
*******************************************************************************
Cycle (sec):         110              Critical Vol./Cap.(X):         0.754
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):        23.0
Optimal Cycle:        57              Level Of Service:                 C
*******************************************************************************
Street Name:              Iowa Avenue                      MLK Blvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include            Ovl            Include            Ovl
Min. Green:     0     0     0    7     7     7    7     7     0    0     7     7
Lanes:        0  0  0  0  0   1  0  1! 0  1   1  0  2  0  0   0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:       0     0     0  727     0   273   170 1564     0     0  667   353
Growth Adj:  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:    0     0     0  763     0   287   179 1642     0     0  700   371
Added Vol:      0     0     0   25     0    16    19   28     0     0   61    35
PasserByVol:    0     0     0    0     0     0     0    0     0     0    0     0
Initial Fut:    0     0     0  788     0   303   198 1670     0     0  761   406
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  0.95 1.00  0.90  0.87 0.99  1.00  1.00 0.79  0.92
PHF Volume:     0     0     0  830     0   336   227 1687     0     0  964   441
Reduct Vol:     0     0     0    0     0     0     0    0     0     0    0     0
Reduced Vol:    0     0     0  830     0   336   227 1687     0     0  964   441
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:     0     0     0  830     0   336   227 1687     0     0  964   441
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.00 0.00  0.00  1.71 0.00  1.29  1.00 2.00  0.00  0.00 2.00  1.00
Final Sat.:     0     0     0 3252     0  2448  1900 3800     0     0 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.00  0.00  0.26 0.00  0.14  0.12 0.44  0.00  0.00 0.25  0.23
Crit Moves:                   ****                   ****        ****
Green/Cycle: 0.00 0.00  0.00  0.34 0.00  0.53  0.19 0.59  0.00  0.00 0.40  0.74
Volume/Cap:  0.00 0.00  0.00  0.75 0.00  0.26  0.63 0.75  0.00  0.00 0.63  0.31
Delay/Veh:    0.0  0.0   0.0  34.5  0.0  14.3  44.8 18.2   0.0   0.0 27.4   5.0
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   0.0  0.0   0.0  34.5  0.0  14.3  44.8 18.2   0.0   0.0 27.4   5.0
LOS by Move:    A    A     A     C    A     B     D    B     A     A    C     A
HCM2kAvgQ:      0    0     0    16    0     5     8   22     0     0   13     5
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.969
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	45.0
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	0 0	0 0	1	0 1	0 0	1	1 0	1 1	0	1 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	0	0	1	162	0	271	31	1989	0	10	926	1
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	1	170	0	285	33	2088	0	11	972	1
Added Vol:	0	0	0	0	0	6	3	50	0	0	89	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	170	0	291	36	2138	0	11	1061	1
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.50	1.00	0.25	0.57	1.00	0.62	0.43	0.95	1.00	0.63	0.85	1.00
PHF Volume:	0	0	4	298	0	469	83	2251	0	17	1249	1
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	4	298	0	469	83	2251	0	17	1249	1
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	4	298	0	469	83	2251	0	17	1249	1
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	0.87	0.71	1.00	0.85	0.95	1.00	1.00	0.95	1.00	0.85
Lanes:	0.00	0.00	1.00	1.00	0.00	1.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	0	0	1644	1357	0	1615	1805	3800	0	1805	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.22	0.00	0.29	0.05	0.59	0.00	0.01	0.33	0.00
Crit Moves:						****		****		****		
Green/Cycle:	0.00	0.00	0.28	0.28	0.00	0.28	0.11	0.57	0.00	0.07	0.53	0.53
Volume/Cap:	0.00	0.00	0.01	0.79	0.00	1.04	0.41	1.04	0.00	0.13	0.62	0.00
Delay/Veh:	0.0	0.0	26.0	43.8	0.0	88.7	42.6	51.6	0.0	44.1	17.2	11.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	26.0	43.8	0.0	88.7	42.6	51.6	0.0	44.1	17.2	11.1
LOS by Move:	A	A	C	D	A	F	D	D	A	D	B	B
HCM2kAvgQ:	0	0	0	11	0	22	3	46	0	1	14	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	1.178
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	77.1
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 2 0 1			2 0 2 0 1			2 0 2 0 1		
Volume Module: Existing PM Peak												
Base Vol:	295	186	129	125	552	189	163	1043	1058	162	254	25
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	310	195	135	131	580	198	171	1095	1111	170	267	26
Added Vol:	3	13	0	69	29	68	31	15	4	0	18	31
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	313	208	135	200	609	266	202	1110	1115	170	285	57
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.83	0.81	0.80	0.73	0.72	0.64	0.84	0.86	0.86	0.87	0.78
PHF Volume:	406	251	167	250	834	370	316	1322	1296	198	327	73
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	406	251	167	250	834	370	316	1322	1296	198	327	73
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	406	251	167	250	834	370	316	1322	1296	198	327	73
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3420	3800	1615	3420	3800	1615	3420	3800	1615	3420	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.12	0.07	0.10	0.07	0.22	0.23	0.09	0.35	0.80	0.06	0.09	0.05
Crit Moves:	****				****				****	****		
Green/Cycle:	0.10	0.17	0.17	0.12	0.18	0.51	0.33	0.57	0.67	0.06	0.31	0.31
Volume/Cap:	1.19	0.40	0.62	0.62	1.19	0.45	0.28	0.61	1.19	0.99	0.28	0.15
Delay/Veh:	165.3	45.1	51.0	53.4	149	19.0	30.0	17.2	114.7	117.6	31.8	30.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	165.3	45.1	51.0	53.4	149	19.0	30.0	17.2	114.7	117.6	31.8	30.5
LOS by Move:	F	D	D	D	F	B	C	B	F	F	C	C
HCM2kAvgQ:	15	4	7	6	26	9	5	16	74	7	5	2

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                 2010 Phase 1A Conditions (Base + Project)
                                 PM Peak
--------------------------------------------------------------------------------
                   Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #109 Iowa Ave at Everton Place
********************************************************************************
Average Delay (sec/veh):     54.3     Worst Case Level Of Service: F[544.6]
********************************************************************************
Street Name:               Iowa Avenue                       Everton Place
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Lanes:        0  1  0  0  1   1  0  0  1  0   0  0  1! 0  0   1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:       0  503    29    36 1038     0     0    0     0    47    0    39
Growth Adj:  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:    0  528    30    38 1090     0     0    0     0    49    0    41
Added Vol:     26   32     3     8   30    54    41    0    20     7    0    16
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   26  560    33    46 1120    54    41    0    20    56    0    57
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 0.87  0.81  0.69 0.97  1.00  1.00 1.00  1.00  0.59 1.00  0.75
PHF Volume:    26  644    41    66 1155    54    41    0    20    96    0    76
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:    26  644    41    66 1155    54    41    0    20    96    0    76
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx   4.1 xxxx xxxxx   7.1 xxxx   6.2   7.1 xxxx   6.2
FollowUpTim:  2.2 xxxx xxxxx   2.2 xxxx xxxxx   3.5 xxxx   3.3   3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1209 xxxx xxxxx   685 xxxx xxxxx  2069 xxxx  1182  2020 xxxx   644
Potent Cap.:  584 xxxx xxxxx   918 xxxx xxxxx    40 xxxx   233    44 xxxx   477
Move Cap.:    584 xxxx xxxxx   918 xxxx xxxxx    31 xxxx   233    36 xxxx   477
Volume/Cap:  0.04 xxxx  xxxx  0.07 xxxx  xxxx  1.32 xxxx  0.09  2.62 xxxx  0.16
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.1 xxxx xxxxx   0.2 xxxx xxxxx  xxxx xxxx xxxxx  10.7 xxxx   0.6
Control Del: 11.4 xxxx xxxxx   9.2 xxxx xxxxx xxxxx xxxx xxxxx 966.5 xxxx  14.0
LOS by Move:    B    *     *     A    *     *     *    *     *     F    *     B
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx   43 xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  6.0 xxxxx xxxxx xxxx xxxxx
Shrd ConDel: 11.4 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  428 xxxxx xxxxx xxxx xxxxx
Shared LOS:     B    *     *     *    *     *     *    F     *     *    *     *
ApproachDel:      xxxxxx           xxxxxx           427.7            544.6
ApproachLOS:        *                *                F                F
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                 2010 Phase 1A Conditions (Base + Project)
                                 PM Peak
------------------------------------------------------------------------------

                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
******************************************************************************
Intersection #124 Iowa Ave at Linden St
******************************************************************************
Cycle (sec):          110             Critical Vol./Cap.(X):         0.612
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       26.9
Optimal Cycle:         40             Level Of Service:                  C
******************************************************************************
Street Name:               Iowa Avenue                   Linden Street
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:    7     7     7    7     7     7    7     7     7    7     7     7
Lanes:         1  0  2  0  1   1  0  1  1  0   1  0  1  0  1   1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      46   571   140    58  1023    98   126   155   123   109   110    17
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:   48   600   147    61  1074   103   132   163   129   114   116    18
Added Vol:     10    22    10     0    20     0     0     7    10    13    16     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:   58   622   157    61  1094   103   132   170   139   127   132    18
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.77  0.91  0.85  0.91  0.92  0.88  0.81  0.95  0.70  0.85  0.83  0.53
PHF Volume:    76   683   185    67  1189   117   163   179   199   150   158    34
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   76   683   185    67  1189   117   163   179   199   150   158    34
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:    76   683   185    67  1189   117   163   179   199   150   158    34
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  2.00  1.00  1.00  1.82  0.18  1.00  1.00  1.00  1.00  1.00  1.00
Final Sat.:  1900  3800  1900  1900  3460   340  1900  1900  1900  1900  1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.04  0.18  0.10  0.04  0.34  0.34  0.09  0.09  0.10  0.08  0.08  0.02
Crit Moves:  ****              ****                          ****  ****
Green/Cycle: 0.07  0.46  0.46  0.16  0.56  0.56  0.15  0.17  0.17  0.13  0.15  0.15
Volume/Cap:  0.61  0.39  0.21  0.21  0.61  0.61  0.56  0.55  0.61  0.61  0.56  0.12
Delay/Veh:   58.8  19.5  17.7  40.2  16.6  16.6  45.8  43.7  45.6  49.8  46.2  40.9
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  58.8  19.5  17.7  40.2  16.6  16.6  45.8  43.7  45.6  49.8  46.2  40.9
LOS by Move:    E     B     B     D     B     B     D     D     D     D     D     D
HCM2kAvgQ:      4     7     4     2    15    15     6     6     7     6     6     1
******************************************************************************
Note: Queue reported is the number of cars per lane.
```

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-------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                  2010 Phase 1A Conditions (Base + Project)
                                  PM Peak
-------------------------------------------------------------------------------
                     Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #137 Chicago Ave at MLK Blvd
*******************************************************************************
Cycle (sec):          130                 Critical Vol./Cap.(X):        1.076
Loss Time (sec):        8 (Y+R=4.0 sec)   Average Delay (sec/veh):       63.9
Optimal Cycle:        120                 Level Of Service:                 E
*******************************************************************************
Street Name:              Chicago Avenue                Martin Luther King Blvd
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R    L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected         Protected        Protected
Rights:            Ovl              Ovl               Ovl              Ovl
Min. Green:    7     7     7   7     7     7    7     7     7   7     7     7
Lanes:         2  0  2  0  1   2  0  2  0  1    1  0  2  0  1   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:     140  287    61   366 1057   201   170 1283   792   249  514   105
Growth Adj:  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:  147  301    64   384 1110   211   179 1347   832   261  540   110
Added Vol:      0    0    12     5    0     0     0   30     0    19   48    10
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  147  301    76   389 1110   211   179 1377   832   280  588   120
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.95 0.84  0.66  0.92 0.91  0.88  0.92 0.96  0.92  0.71 0.86  0.82
PHF Volume:   155  359   115   423 1220   240   194 1435   904   395  683   147
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  155  359   115   423 1220   240   194 1435   904   395  683   147
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   155  359   115   423 1220   240   194 1435   904   395  683   147
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       2.00 2.00  1.00  2.00 2.00  1.00  1.00 2.00  1.00  1.00 2.00  1.00
Final Sat.:  3800 3800  1900  3800 3800  1900  1900 3800  1900  1900 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.04 0.09  0.06  0.11 0.32  0.13  0.10 0.38  0.48  0.21 0.18  0.08
Crit Moves:  ****                  ****                   ****  ****
Green/Cycle: 0.06 0.16  0.36  0.19 0.30  0.51  0.21 0.39  0.44  0.19 0.37  0.56
Volume/Cap:  0.70 0.58  0.17  0.58 1.08  0.25  0.49 0.98  1.07  1.08 0.49  0.14
Delay/Veh:   64.9 47.8  26.7  45.2 93.9  16.9  42.7 54.8  85.0 119.1 29.4 12.6
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  64.9 47.8  26.7  45.2 93.9  16.9  42.7 54.8  85.0 119.1 29.4 12.6
LOS by Move:    E    D     C     D    F     B     D    D     F     F    C     B
HCM2kAvgQ:      4    7     3     8   32     5     7   32    45    22   10     2
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

```
--------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                2010 Phase 1A Conditions (Base + Project)
                               PM Peak
--------------------------------------------------------------------------------
                   Level Of Service Computation Report
         2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #151 Chicago Ave at University Avenue
********************************************************************************
Cycle (sec):          120              Critical Vol./Cap.(X):        0.887
Loss Time (sec):       12 (Y+R=4.0 sec) Average Delay (sec/veh):       45.4
Optimal Cycle:        113              Level Of Service:                 D
********************************************************************************
Street Name:                Chicago Avenue                University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:      7    7    7    7    7    7    7    7    7    7    7    7
Lanes:         2  0  2  0  1   2  0  1  1  0   2  0  2  0  1   2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      237  363   126   155  956    86   182  796   463   309  385    72
Growth Adj:   1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:   249  381   132   163 1004    90   191  836   486   324  404    76
Added Vol:       0   10     5     4    5     0     0   12     0     4   19     4
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   249  391   137   167 1009    90   191  848   486   328  423    80
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.86 0.92  0.73  0.84 0.89  0.77  0.81 0.90  0.87  0.87 0.92  0.82
PHF Volume:    289  425   188   199 1133   117   236  942   559   378  460    97
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   289  425   188   199 1133   117   236  942   559   378  460    97
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    289  425   188   199 1133   117   236  942   559   378  460    97
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:        2.00 2.00  1.00  2.00 1.81  0.19  2.00 2.00  1.00  2.00 2.00  1.00
Final Sat.:   3800 3800  1900  3800 3444   356  3800 3800  1900  3800 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.08 0.11  0.10  0.05 0.33  0.33  0.06 0.25  0.29  0.10 0.12  0.05
Crit Moves:   ****                   ****                   ****  ****
Green/Cycle:  0.09 0.30  0.30  0.16 0.37  0.37  0.15 0.33  0.33  0.11 0.29  0.29
Volume/Cap:   0.89 0.37  0.33  0.33 0.89  0.89  0.41 0.75  0.89  0.89 0.41  0.17
Delay/Veh:    78.4 33.3  33.0  45.4 42.6  42.6  46.7 38.2  52.4  72.2 34.4  31.8
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   78.4 33.3  33.0  45.4 42.6  42.6  46.7 38.2  52.4  72.2 34.4  31.8
LOS by Move:     E    C     C     D    D     D     D    D     D     E    C     C
HCM2kAvgQ:       8    6     5     3   25    25     4   17    23    10    7     3
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	0.634
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.3
Optimal Cycle:	41	Level Of Service:	C

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	1 1	0	1 0	2 0	1	1 0	0 1	0	1 0	1 1	0
Volume Module: Existing PM Peak												
Base Vol:	61	432	161	172	1149	145	29	83	46	110	124	94
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	64	454	169	181	1206	152	30	87	48	116	130	99
Added Vol:	3	11	0	0	7	0	0	6	1	0	10	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	67	465	169	181	1213	152	30	93	49	116	140	99
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.97	0.84	0.78	0.91	0.79	0.81	0.83	0.72	0.71	0.82	0.81
PHF Volume:	75	479	201	232	1333	193	38	112	68	163	171	122
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	75	479	201	232	1333	193	38	112	68	163	171	122
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	75	479	201	232	1333	193	38	112	68	163	171	122
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.96	0.96	0.95	1.00	0.85	0.95	0.94	0.94	0.95	0.94	0.94
Lanes:	1.00	1.41	0.59	1.00	2.00	1.00	1.00	0.62	0.38	1.00	1.17	0.83
Final Sat.:	1805	2558	1075	1805	3800	1615	1805	1113	679	1805	2081	1483
Capacity Analysis Module:												
Vol/Sat:	0.04	0.19	0.19	0.13	0.35	0.12	0.02	0.10	0.10	0.09	0.08	0.08
Crit Moves:	****				****			****		****		
Green/Cycle:	0.07	0.37	0.37	0.25	0.55	0.55	0.14	0.16	0.16	0.14	0.16	0.16
Volume/Cap:	0.59	0.51	0.51	0.51	0.64	0.22	0.15	0.64	0.64	0.64	0.51	0.51
Delay/Veh:	52.3	24.9	24.9	33.0	16.2	11.6	38.2	44.2	44.2	45.8	39.0	39.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	52.3	24.9	24.9	33.0	16.2	11.6	38.2	44.2	44.2	45.8	39.0	39.0
LOS by Move:	D	C	C	C	B	B	D	D	D	D	D	D
HCM2kAvgQ:	3	8	8	7	15	3	1	6	6	6	5	5

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	0.801
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	38.0
Optimal Cycle:	65	Level Of Service:	D

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	1 1	0
Volume Module: Existing PM Peak												
Base Vol:	198	510	145	193	768	167	302	438	268	149	271	109
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	208	536	152	203	806	175	317	460	281	156	285	114
Added Vol:	5	12	4	9	9	0	0	22	6	4	43	19
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	213	547	156	212	815	175	317	482	287	160	328	133
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.86	0.86	0.72	0.96	0.84	0.91	0.88	0.96	0.83	0.89	0.78
PHF Volume:	253	637	182	294	849	209	348	548	299	193	368	171
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	253	637	182	294	849	209	348	548	299	193	368	171
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	253	637	182	294	849	209	348	548	299	193	368	171
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.61	0.39	1.00	2.00	1.00	1.00	1.37	0.63
Final Sat.:	1900	3800	1900	1900	3050	750	1900	3800	1900	1900	2594	1206
Capacity Analysis Module:												
Vol/Sat:	0.13	0.17	0.10	0.15	0.28	0.28	0.18	0.14	0.16	0.10	0.14	0.14
Crit Moves:	****				****		****				****	
Green/Cycle:	0.17	0.27	0.27	0.25	0.35	0.35	0.23	0.25	0.25	0.16	0.18	0.18
Volume/Cap:	0.80	0.63	0.36	0.63	0.80	0.80	0.80	0.58	0.64	0.64	0.80	0.80
Delay/Veh:	53.7	33.5	30.1	36.2	33.1	33.1	46.6	34.1	36.6	43.9	46.3	46.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	53.7	33.5	30.1	36.2	33.1	33.1	46.6	34.1	36.6	43.9	46.3	46.3
LOS by Move:	D	C	C	D	C	C	D	C	D	D	D	D
HCM2kAvgQ:	10	9	5	9	17	17	12	8	9	7	10	10

Note: Queue reported is the number of cars per lane.

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                     UCR West Campus Development Plan
                 2010 Phase 1A Conditions (Base + Project)
                                 PM Peak
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                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #207 I-215/SR-60 NB Ramp at Blain Street
********************************************************************************
Cycle (sec):           110               Critical Vol./Cap.(X):         0.578
Loss Time (sec):         8 (Y+R=4.0 sec) Average Delay (sec/veh):        18.4
Optimal Cycle:          37               Level Of Service:                  B
********************************************************************************
Street Name:        I-215/SR-60 NB Ramps                  Blain Street
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    7     7     7    0     0     0    7     7     0    0     7     7
Lanes:        0  1  0  0  1    0  0  0  0  0    2  0  2  0  0    0  0  1  1  0
------------|----------------||----------------||----------------||----------------|
Volume Module: Existing PM Peak
Base Vol:      97     1   261     0     0     0   124   779     0     0   483   494
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:  102     1   274     0     0     0   130   818     0     0   507   519
Added Vol:      0     0     3     0     0     0     0    25     0     0    28    20
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:  102     1   277     0     0     0   130   843     0     0   535   539
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.93  0.25  0.88  1.00  1.00  1.00  0.84  0.95  1.00  1.00  0.91  0.86
PHF Volume:   110     4   315     0     0     0   155   887     0     0   588   626
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  110     4   315     0     0     0   155   887     0     0   588   626
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   110     4   315     0     0     0   155   887     0     0   588   626
------------|----------------||----------------||----------------||----------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       0.96  0.04  1.00  0.00  0.00  0.00  2.00  2.00  0.00  0.00  1.00  1.00
Final Sat.:  1830    70  1900     0     0     0  3800  3800     0     0  1900  1900
------------|----------------||----------------||----------------||----------------|
Capacity Analysis Module:
Vol/Sat:     0.06  0.06  0.17  0.00  0.00  0.00  0.04  0.23  0.00  0.00  0.31  0.33
Crit Moves:              ****                    ****                          ****
Green/Cycle: 0.29  0.29  0.29  0.00  0.00  0.00  0.07  0.64  0.00  0.00  0.57  0.57
Volume/Cap:  0.21  0.21  0.58  0.00  0.00  0.00  0.58  0.36  0.00  0.00  0.54  0.58
Delay/Veh:   30.0  30.0  35.1   0.0   0.0   0.0  52.7   9.4   0.0   0.0  15.0  15.6
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  30.0  30.0  35.1   0.0   0.0   0.0  52.7   9.4   0.0   0.0  15.0  15.6
LOS by Move:    C     C     D     A     A     A     D     A     A     A     B     B
HCM2kAvgQ:      3     3    10     0     0     0     3     7     0     0    12    14
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	0.807
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	32.5
Optimal Cycle:	70	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0	0 0	0 1	0	0 1	0 0	1	1 0	2 0	2	0 0
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	276	219	192	0	631	639	220	377	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	290	230	202	0	663	671	231	396	0
Added Vol:	0	0	0	9	0	0	0	16	0	1	26	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	299	230	202	0	679	671	232	422	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.93	0.84	0.92	1.00	0.95	0.95	0.92	0.89	1.00
PHF Volume:	0	0	0	321	274	219	0	714	706	252	474	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	321	274	219	0	714	706	252	474	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	321	274	219	0	714	706	252	474	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.54	0.46	1.00	0.00	1.01	0.99	2.00	2.00	0.00
Final Sat.:	0	0	0	1026	874	1900	0	1911	1889	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.31	0.31	0.12	0.00	0.37	0.37	0.07	0.12	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.39	0.39	0.39	0.00	0.46	0.46	0.08	0.55	0.00
Volume/Cap:	0.00	0.00	0.00	0.81	0.81	0.30	0.00	0.81	0.81	0.81	0.23	0.00
Delay/Veh:	0.0	0.0	0.0	39.3	39.3	25.6	0.0	30.5	30.5	68.4	14.2	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	39.3	39.3	25.6	0.0	30.5	30.5	68.4	14.2	0.0
LOS by Move:	A	A	A	D	D	C	A	C	C	E	B	A
HCM2kAvgQ:	0	0	0	21	21	5	0	24	24	7	4	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	0.867
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	48.0
Optimal Cycle:	90	Level Of Service:	D

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module: Existing PM Peak												
Base Vol:	88	415	136	260	865	107	137	636	264	240	294	81
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	92	436	143	273	908	112	144	668	277	252	309	85
Added Vol:	2	10	0	7	7	0	0	8	1	0	10	16
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	94	446	143	280	915	112	144	676	278	252	319	101
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.76	0.82	0.79	0.83	0.90	0.72	0.82	0.85	0.85	0.95	0.84	0.81
PHF Volume:	124	544	181	337	1017	156	175	795	327	265	379	125
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	124	544	181	337	1017	156	175	795	327	265	379	125
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	124	544	181	337	1017	156	175	795	327	265	379	125
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.50	0.50	1.00	1.73	0.27	1.00	1.42	0.58	1.00	1.51	0.49
Final Sat.:	1900	2852	948	1900	3294	506	1900	2692	1108	1900	2860	940
Capacity Analysis Module:												
Vol/Sat:	0.07	0.19	0.19	0.18	0.31	0.31	0.09	0.30	0.30	0.14	0.13	0.13
Crit Moves:	****				****			****		****		
Green/Cycle:	0.08	0.23	0.23	0.21	0.35	0.35	0.20	0.34	0.34	0.16	0.29	0.29
Volume/Cap:	0.78	0.84	0.84	0.84	0.87	0.87	0.45	0.87	0.87	0.87	0.45	0.45
Delay/Veh:	76.1	52.1	52.1	60.6	43.1	43.1	42.7	44.3	44.3	72.7	34.9	34.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	76.1	52.1	52.1	60.6	43.1	43.1	42.7	44.3	44.3	72.7	34.9	34.9
LOS by Move:	E	D	D	E	D	D	D	D	D	E	C	C
HCM2kAvgQ:	6	15	15	14	23	23	6	22	22	12	8	8

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                 2010 Phase 1A Conditions (Base + Project)
                                  PM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #291 I-215 SB Ramp/MLK Blvd
********************************************************************************
Cycle (sec):          100            Critical Vol./Cap.(X):          0.525
Loss Time (sec):        8 (Y+R=4.0 sec)  Average Delay (sec/veh):     12.6
Optimal Cycle:         33            Level Of Service:                  B
********************************************************************************
Street Name:               I-215 SB Ramps                     MLK Blvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted        Permitted        Permitted
Rights:          Include          Include          Include          Include
Min. Green:    0     0     0    7     7     7    0     7     7    7     7     0
Lanes:       0  0  0  0  0   1  0  0  1  0   0  0  1  1  1   1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      0     0     0    3   101   106    0   186   971    5   328     0
Growth Adj: 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05
Initial Bse:   0     0     0    3   106   111    0   195  1020    5   344     0
Added Vol:     0     0     0    0     0     8    0    18    65    0    41     0
PasserByVol:   0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:   0     0     0    3   106   119    0   213  1085    5   385     0
User Adj:   1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:    1.00  1.00  1.00 0.75  0.70  0.80 1.00  0.74  0.88 0.63  0.87  1.00
PHF Volume:    0     0     0    4   152   149    0   288  1232    8   443     0
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:   0     0     0    4   152   149    0   288  1232    8   443     0
PCE Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:    0     0     0    4   152   149    0   288  1232    8   443     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:      0.00  0.00  0.00 1.00  0.50  0.50 0.00  1.00  2.00 1.00  2.00  0.00
Final Sat.:    0     0     0 1900   958   942    0  1900  3800 1900  3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.00  0.00  0.00 0.00  0.16  0.16 0.00  0.15  0.32 0.00  0.12  0.00
Crit Moves:                        ****                     ****
Green/Cycle: 0.00 0.00  0.00 0.30  0.30  0.30 0.00  0.62  0.62 0.62  0.62  0.00
Volume/Cap: 0.00  0.00  0.00 0.01  0.52  0.52 0.00  0.25  0.52 0.01  0.19  0.00
Delay/Veh:   0.0   0.0   0.0 24.4  29.9  29.9  0.0   8.6  11.0  7.3   8.3   0.0
User DelAdj: 1.00 1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:  0.0   0.0   0.0 24.4  29.9  29.9  0.0   8.6  11.0  7.3   8.3   0.0
LOS by Move:   A     A     A    C     C     C    A     A     B    A     A     A
HCM2kAvgQ:     0     0     0    0     8     8    0     4    11    0     3     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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-------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                2010 Phase 1A Conditions (Base + Project)
                                PM Peak
-------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM 4-Way Stop Method (Future Volume Alternative)
*******************************************************************************
Intersection #292 I-215 NB Ramps/MLK Blvd
*******************************************************************************
Cycle (sec):          100             Critical Vol./Cap.(X):         0.375
Loss Time (sec):        0 (Y+R=4.0 sec) Average Delay (sec/veh):      11.5
Optimal Cycle:          0             Level Of Service:                  B
*******************************************************************************
Street Name:              I-215 NB Ramp                      MLK BLvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Min. Green:     0     0     0    0     0     0    0     0     0    0     0     0
Lanes:        1  1  0  0  0   0  0  0  0  0   2  0  0  0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM
Base Vol:      333    1     0    0     0     0  188     0     0    0     0     0
Growth Adj:   1.05 1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05
Initial Bse:   350    1     0    0     0     0  197     0     0    0     0     0
Added Vol:      41    0     0    0     0     0   18     0     0    0     0     0
PasserByVol:     0    0     0    0     0     0    0     0     0    0     0     0
Initial Fut:   391    1     0    0     0     0  215     0     0    0     0     0
User Adj:     1.00 1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:      0.87 0.25  1.00 1.00  1.00  1.00 0.73  1.00  1.00 1.00  1.00  1.00
PHF Volume:    449    4     0    0     0     0  295     0     0    0     0     0
Reduct Vol:      0    0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:   449    4     0    0     0     0  295     0     0    0     0     0
PCE Adj:      1.00 1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:      1.00 1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:    449    4     0    0     0     0  295     0     0    0     0     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment:   1.00 1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:        1.98 0.02  0.00 0.00  0.00  0.00 2.00  0.00  0.00 0.00  0.00  0.00
Final Sat.:   1198   11     0    0     0     0 1128     0     0    0     0     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.37 0.37  xxxx xxxx  xxxx  xxxx 0.26  xxxx  xxxx xxxx  xxxx  xxxx
Crit Moves:   ****                             ****
Delay/Veh:    11.9 11.9   0.0  0.0   0.0   0.0 11.0   0.0   0.0  0.0   0.0   0.0
Delay Adj:    1.00 1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   11.9 11.9   0.0  0.0   0.0   0.0 11.0   0.0   0.0  0.0   0.0   0.0
LOS by Move:     B    B     *    *     *     *    B     *     *    *     *     *
ApproachDel:        11.9            xxxxxx             11.0            xxxxxx
Delay Adj:          1.00             xxxxx             1.00             xxxxx
ApprAdjDel:         11.9            xxxxxx             11.0            xxxxxx
LOS by Appr:           B                 *                B                 *
AllWayAvgQ:    0.6  0.6   0.0  0.0   0.0   0.0  0.3   0.0   0.0  0.0   0.0   0.0
*******************************************************************************
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UCR West Campus Development Plan
2010 Phase 1A Conditions (Base + Project)
PM Peak

Note: Queue reported is the number of cars per lane.

2010 PHASE 1B PROJECT CONDITIONS
AM AND PM PEAK HOUR

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/Veh	Base V/C	Future LOS	Future Del/Veh	Future V/C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	24.6	0.491	C	24.9	0.513	+ 0.288 D/V
# 21 I-215/SR-60 SB Ramp at Univers	C	23.1	0.453	C	23.4	0.482	+ 0.294 D/V
# 23 West Campus at University Ave	C	28.2	0.714	C	28.3	0.725	+ 0.139 D/V
# 56 NW Mall at Iowa Avenue	A	0.0	0.000	C	22.8	0.000	+22.775 D/V
# 58 Iowa Ave at University Ave	D	35.6	0.514	D	35.8	0.528	+ 0.195 D/V
# 78 Iowa Ave at MLK Blvd	C	20.2	0.543	C	20.7	0.580	+ 0.474 D/V
# 83 Lot 30/MLK BLvd	C	22.9	0.774	C	23.3	0.797	+ 0.381 D/V
# 85 Canyon Crest Dr at MLK BLvd	C	25.1	0.614	C	28.5	0.659	+ 3.379 D/V
#109 Iowa Ave at Everton Place	C	18.1	0.000	F	86.7	0.000	+68.635 D/V
#124 Iowa Ave at Linden St	C	30.7	0.584	C	31.1	0.605	+ 0.307 D/V
#137 Chicago Ave at MLK Blvd	C	32.2	0.605	C	32.6	0.619	+ 0.362 D/V
#151 Chicago Ave at University Aven	C	33.6	0.520	C	33.7	0.526	+ 0.128 D/V
#159 Chicago Ave at Linden Street	C	33.9	0.715	C	34.7	0.769	+ 0.764 D/V
#196 Iowa Ave at Blaine St	D	39.3	0.846	D	40.4	0.863	+ 1.079 D/V
#207 I-215/SR-60 NB Ramp at Blain S	C	24.2	0.676	C	24.1	0.680	-0.093 D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	24.5	0.558	C	24.8	0.580	+ 0.337 D/V
#237 Chicago Ave at 3rd Street	D	43.1	0.744	D	43.9	0.775	+ 0.893 D/V
#291 I-215 SB Ramp/MLK Blvd	B	17.9	0.388	B	18.6	0.414	+ 0.686 D/V
#292 I-215 NB Ramps/MLK Blvd	C	15.4	0.572	C	16.8	0.599	+ 0.027 V/C

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 56 NW Mall at Iowa Avenue	??? / ???	No / No
#109 Iowa Ave at Everton Place	??? / ???	No / No
#292 I-215 NB Ramps/MLK Blvd	???	No

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

```
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
Initial Vol:     6  723    0      0  401   14     24    0   11      0    0    0
ApproachDel:     xxxxxx           xxxxxx             22.8            xxxxxx
------------|---------------||---------------||---------------||---------------|
```

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.2]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=35]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=1179]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	6		723		0	0		401		14	24		0		11	0		0		0

Major Street Volume: 1144
Minor Approach Volume: 35
Minor Approach Volume Threshold: 239

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Uncontrolled	Uncontrolled	Stop Sign	Stop Sign
Lanes:	0 1 0 0 1	1 0 0 1 0	0 0 1! 0 0	1 0 0 0 1
Initial Vol:	15 721 69	52 387 32	53 0 25	14 0 29
ApproachDel:	xxxxxx	xxxxxx	86.7	25.2

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=1.9]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=78]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1397]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.3]
FAIL - Vehicle-hours less than 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=43]
FAIL - Approach volume less than 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1397]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	0	1	0	0	1	1	0	0	1	0	0	0	1!	0	0	1	0	0	0	1
Initial Vol:	15		721		69	52		387		32	53		0		25	14		0		29

Major Street Volume: 1276
Minor Approach Volume: 78
Minor Approach Volume Threshold: 201

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 1 0 0 0			0 0 0 0 0			2 0 0 0 0			0 0 0 0 0		
Initial Vol:	396	13	0	0	0	0	589	0	0	0	0	0

Major Street Volume: 589
Minor Approach Volume: 408
Minor Approach Volume Threshold: 602

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #20 I-215/SR-60 NB Ramps at University

Cycle (sec):	110	Critical Vol./Cap.(X):	0.513
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.9
Optimal Cycle:	40	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	7	7	0	7	7	7	7	0	7	7
Lanes:	0 0 0 0 1			1 0 0 0 1			1 0 1 1 0			0 1 0 1 0		
Volume Module: Existing AM Peak												
Base Vol:	0	0	1	74	0	382	80	595	1	0	198	73
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	1	78	0	401	84	625	1	0	208	77
Added Vol:	0	0	0	28	0	8	17	44	0	0	27	5
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	106	0	409	101	669	1	0	235	82
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.25	0.74	1.00	0.91	0.71	0.74	0.25	1.00	0.88	0.87
PHF Volume:	0	0	4	143	0	450	142	904	4	0	267	94
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	4	143	0	450	142	904	4	0	267	94
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	4	143	0	450	142	904	4	0	267	94
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.99	0.01	0.00	1.48	0.52
Final Sat.:	0	0	1900	1900	0	1900	1900	3782	18	0	2812	988
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.08	0.00	0.24	0.07	0.24	0.24	0.00	0.09	0.09
Crit Moves:	****					****		****				
Green/Cycle:	0.00	0.00	0.01	0.37	0.00	0.38	0.39	0.54	0.54	0.00	0.15	0.15
Volume/Cap:	0.00	0.00	0.20	0.20	0.00	0.62	0.19	0.44	0.44	0.00	0.62	0.62
Delay/Veh:	0.0	0.0	58.6	23.5	0.0	28.9	22.4	15.3	15.3	0.0	45.4	45.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	58.6	23.5	0.0	28.9	22.4	15.3	15.3	0.0	45.4	45.4
LOS by Move:	A	A	E	C	A	C	C	B	B	A	D	D
HCM2kAvgQ:	0	0	0	3	0	13	3	9	9	0	7	7

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #21 I-215/SR-60 SB Ramp at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.482
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	23.4
Optimal Cycle:	31	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	0	7	0	7	7	7	7	0
Lanes:	0 0	0 0	0	0 1	0 1	0	0 0	1 1	1	1 0	2 0	0
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	351	26	186	0	305	229	43	533	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	369	27	195	0	320	240	45	560	0
Added Vol:	0	0	0	18	0	12	0	42	2	8	27	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	387	27	207	0	362	242	53	587	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.70	0.50	0.88	1.00	0.88	0.90	0.83	0.93	1.00
PHF Volume:	0	0	0	552	55	236	0	412	269	64	631	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	552	55	236	0	412	269	64	631	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	552	55	236	0	412	269	64	631	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.19	0.81	0.00	1.81	1.19	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	358	1542	0	3445	2255	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.29	0.15	0.15	0.00	0.12	0.12	0.03	0.17	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.60	0.60	0.60	0.00	0.25	0.25	0.07	0.32	0.00
Volume/Cap:	0.00	0.00	0.00	0.48	0.25	0.25	0.00	0.48	0.48	0.48	0.52	0.00
Delay/Veh:	0.0	0.0	0.0	11.4	9.4	9.4	0.0	32.4	32.4	47.5	28.3	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	11.4	9.4	9.4	0.0	32.4	32.4	47.5	28.3	0.0
LOS by Move:	A	A	A	B	A	A	A	C	C	D	C	A
HCM2kAvgQ:	0	0	0	10	4	4	0	6	6	3	8	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

7 Intersection #23 West Campus at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.725
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	28.3
Optimal Cycle:	52	Level Of Service:	C

Street Name:	West Campus						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	0	0	0	0	7	7	7	7	0
Lanes:	1 0 0 0 1			0 0 0 0 0			0 0 1 1 0			1 0 2 0 0		
Volume Module: Existing AM peak												
Base Vol:	129	0	276	0	0	0	0	285	367	203	153	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	135	0	290	0	0	0	0	299	385	213	161	0
Added Vol:	0	0	3	0	0	0	0	72	0	11	33	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	135	0	293	0	0	0	0	371	385	224	194	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.67	1.00	0.70	1.00	1.00	1.00	1.00	0.86	0.71	0.73	0.77	1.00
PHF Volume:	202	0	418	0	0	0	0	432	543	307	251	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	202	0	418	0	0	0	0	432	543	307	251	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	202	0	418	0	0	0	0	432	543	307	251	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	2.00	0.00
Final Sat.:	1900	0	1900	0	0	0	0	1900	1900	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.11	0.00	0.22	0.00	0.00	0.00	0.00	0.23	0.29	0.16	0.07	0.00
Crit Moves:			****						****	****		
Green/Cycle:	0.30	0.00	0.30	0.00	0.00	0.00	0.00	0.39	0.39	0.22	0.62	0.00
Volume/Cap:	0.35	0.00	0.73	0.00	0.00	0.00	0.00	0.58	0.73	0.73	0.11	0.00
Delay/Veh:	27.5	0.0	35.7	0.0	0.0	0.0	0.0	24.3	27.7	42.2	7.9	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	27.5	0.0	35.7	0.0	0.0	0.0	0.0	24.3	27.7	42.2	7.9	0.0
LOS by Move:	C	A	D	A	A	A	A	C	C	D	A	A
HCM2kAvgQ:	5	0	13	0	0	0	0	11	15	10	2	0

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                2010 Phase 1B Conditions (Base + Project)
                                AM Peak
--------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Average Delay (sec/veh):       0.7      Worst Case Level Of Service: C[ 22.8]
********************************************************************************
Street Name:                 NW Mall                        Iowa Avenue
Approach:          North Bound      South Bound      East Bound       West Bound
Movement:        L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:           1  0  1  0  1   1  0  1  0  1   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0  659     0     0  337     0     0     0     0     0     0     0
Growth Adj:   1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:     0  692     0     0  354     0     0     0     0     0     0     0
Added Vol:       6   31     0     0   47    14    24     0    11     0     0     0
PasserByVol:     0    0     0     0    0     0     0     0     0     0     0     0
Initial Fut:     6  723     0     0  401    14    24     0    11     0     0     0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.90 0.90  0.90  0.90 0.90  0.90  0.90 0.90  0.90  0.90 0.90  0.90
PHF Volume:      7  803     0     0  445    16    27     0    12     0     0     0
Reduct Vol:      0    0     0     0    0     0     0     0     0     0     0     0
Final Vol.:      7  803     0     0  445    16    27     0    12     0     0     0
Critical Gap Module:
Critical Gp:   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4 xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   461 xxxx xxxxx  xxxx xxxx xxxxx  1262 xxxx   445  xxxx xxxx xxxxx
Potent Cap.:  1111 xxxx xxxxx  xxxx xxxx xxxxx   189 xxxx   617  xxxx xxxx xxxxx
Move Cap.:    1111 xxxx xxxxx  xxxx xxxx xxxxx   189 xxxx   617  xxxx xxxx xxxxx
Volume/Cap:   0.01 xxxx  xxxx  xxxx xxxx  xxxx  0.14 xxxx  0.02  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:     0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:   8.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     A    *     *     *    *     *     *    *     *     *    *     *
Movement:       LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  241 xxxxx  xxxx    0 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.6 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 22.8 xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    *     *     *    *     *     *    C     *     *    *     *
ApproachDel:        xxxxxx           xxxxxx             22.8            xxxxxx
ApproachLOS:           *                *                 C                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.528
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	35.8
Optimal Cycle:	36	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	63	544	92	136	245	99	139	345	56	80	342	167
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	66	571	97	143	257	104	146	362	59	84	359	175
Added Vol:	15	41	34	0	41	0	0	11	15	32	6	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	81	612	131	143	298	104	146	373	74	116	365	175
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.75	0.83	0.72	0.87	0.84	0.88	0.91	0.92	0.91	0.74	0.96	0.72
PHF Volume:	108	738	181	164	355	118	160	406	81	157	380	244
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	108	738	181	164	355	118	160	406	81	157	380	244
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	108	738	181	164	355	118	160	406	81	157	380	244
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.50	0.50	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	2851	949	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.06	0.19	0.10	0.09	0.12	0.12	0.08	0.11	0.04	0.08	0.10	0.13
Crit Moves:		****		****			****					****
Green/Cycle:	0.17	0.37	0.37	0.16	0.36	0.36	0.16	0.23	0.40	0.18	0.24	0.24
Volume/Cap:	0.34	0.53	0.26	0.53	0.34	0.34	0.53	0.47	0.11	0.47	0.41	0.53
Delay/Veh:	44.5	30.2	26.7	47.7	28.1	28.1	48.0	40.5	22.9	45.5	38.5	40.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	44.5	30.2	26.7	47.7	28.1	28.1	48.0	40.5	22.9	45.5	38.5	40.6
LOS by Move:	D	C	C	D	C	C	D	D	C	D	D	D
HCM2kAvgQ:	4	11	5	6	6	6	6	7	2	6	6	8

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                         UCR West Campus Development Plan
                    2010 Phase 1B Conditions (Base + Project)
                                     AM Peak
--------------------------------------------------------------------------------

                        Level Of Service Computation Report
                2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #78 Iowa Ave at MLK Blvd
********************************************************************************
Cycle (sec):          110             Critical Vol./Cap.(X):         0.580
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):      20.7
Optimal Cycle:         37             Level Of Service:                  C
********************************************************************************
Street Name:               Iowa Avenue                          MLK Blvd
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include           Ovl            Include            Ovl
Min. Green:     0     0     0    7     7     7    7     7     0    0     7     7
Lanes:         0  0  0  0  0    1  0  1! 0  1    1  0  2  0  0    0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:       0     0     0  263     0   101  267   440     0    0   785   484
Growth Adj:  1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05
Initial Bse:    0     0     0  276     0   106  280   462     0    0   824   508
Added Vol:      0     0     0   35     0    22   16    63     0    0    33    21
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:    0     0     0  311     0   128  296   525     0    0   857   529
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00 0.75  1.00  0.81 0.90  0.77  1.00 1.00  0.95  0.92
PHF Volume:     0     0     0  415     0   158  329   682     0    0   902   575
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:    0     0     0  415     0   158  329   682     0    0   902   575
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:     0     0     0  415     0   158  329   682     0    0   902   575
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.00  0.00  0.00 1.72  0.00  1.28 1.00  2.00  0.00 0.00  2.00  1.00
Final Sat.:     0     0     0 3276     0  2424 1900  3800     0    0  3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.13  0.00  0.07 0.17  0.18  0.00 0.00  0.24  0.30
Crit Moves:                   ****             ****                   ****
Green/Cycle: 0.00  0.00  0.00 0.22  0.00  0.52 0.30  0.71  0.00 0.00  0.41  0.63
Volume/Cap:  0.00  0.00  0.00 0.58  0.00  0.13 0.58  0.25  0.00 0.00  0.58  0.48
Delay/Veh:    0.0   0.0   0.0 39.3   0.0  13.7 34.2   5.7   0.0  0.0  25.7  11.2
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0 39.3   0.0  13.7 34.2   5.7   0.0  0.0  25.7  11.2
LOS by Move:    A     A     A    D     A     B    C     A     A    A     C     B
HCM2kAvgQ:      0     0     0    8     0     2   10     4     0    0    12    10
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.797
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	23.3
Optimal Cycle:	65	Level Of Service:	C

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	1 0 0 0 0			0 1 0 0 1			1 0 1 1 0			1 0 2 0 1		
Volume Module: Existing AM Peak												
Base Vol:	4	0	0	12	0	4	321	600	0	10	1276	77
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	4	0	0	13	0	4	337	630	0	11	1340	81
Added Vol:	0	0	0	0	0	2	7	92	0	0	52	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	4	0	0	13	0	6	344	722	0	11	1392	81
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.50	1.00	1.00	1.00	1.00	0.33	0.60	0.75	1.00	0.50	0.90	0.69
PHF Volume:	8	0	0	13	0	19	573	963	0	21	1546	117
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	8	0	0	13	0	19	573	963	0	21	1546	117
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	8	0	0	13	0	19	573	963	0	21	1546	117
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.81	1.00	1.00	0.76	1.00	0.85	0.95	1.00	1.00	0.95	1.00	0.85
Lanes:	1.00	0.00	0.00	1.00	0.00	1.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	1530	0	0	1440	0	1615	1805	3800	0	1805	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.01	0.00	0.00	0.01	0.00	0.01	0.32	0.25	0.00	0.01	0.41	0.07
Crit Moves:				****			****				****	
Green/Cycle:	0.07	0.00	0.00	0.07	0.00	0.07	0.37	0.67	0.00	0.18	0.48	0.48
Volume/Cap:	0.08	0.00	0.00	0.12	0.00	0.17	0.85	0.38	0.00	0.06	0.85	0.15
Delay/Veh:	43.8	0.0	0.0	44.2	0.0	44.5	39.1	7.6	0.0	33.8	27.2	14.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.8	0.0	0.0	44.2	0.0	44.5	39.1	7.6	0.0	33.8	27.2	14.8
LOS by Move:	D	A	A	D	A	D	D	A	A	C	C	B
HCM2kAvgQ:	0	0	0	0	0	1	19	7	0	1	23	2

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                  2010 Phase 1B Conditions (Base + Project)
                                  AM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #85 Canyon Crest Dr at MLK BLvd
********************************************************************************
Cycle (sec):          120                Critical Vol./Cap.(X):        0.659
Loss Time (sec):       10 (Y+R=4.0 sec)  Average Delay (sec/veh):       28.5
Optimal Cycle:         51                Level Of Service:                 C
********************************************************************************
Street Name:             Canyon Crest Dr                      MLK Blvd
Approach:         North Bound      South Bound       East Bound       West Bound
Movement:        L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:          Protected         Protected         Protected         Protected
Rights:             Include            Ovl               Ovl             Include
Min. Green:       7    7    7    7    7    7    7    7    7    7    7    7
Lanes:           2  0  2  0  1   2  0  2  0  1   2  0  2  0  1   2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      1153  452  445    41   84   52   130  185  323   108  335   36
Growth Adj:    1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05
Initial Bse:   1211  475  467    43   88   55   137  194  339   113  352   38
Added Vol:        7   27    0    20    8   20    67   22    4     0   25   68
PasserByVol:      0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:   1218  502  467    63   96   75   204  216  343   113  377  106
User Adj:      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:       0.92 0.74 0.79  0.68 0.88 0.59  0.83 0.72 0.94  0.93 0.89 0.56
PHF Volume:    1324  678  591    93  109  126   245  300  365   122  423  189
Reduct Vol:       0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:   1324  678  591    93  109  126   245  300  365   122  423  189
PCE Adj:       1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:       1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:    1324  678  591    93  109  126   245  300  365   122  423  189
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:      1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
Adjustment:    0.90 1.00 0.85  0.90 1.00 0.85  0.90 1.00 0.85  0.90 1.00 0.85
Lanes:         2.00 2.00 1.00  2.00 2.00 1.00  2.00 2.00 1.00  2.00 2.00 1.00
Final Sat.:    3420 3800 1615  3420 3800 1615  3420 3800 1615  3420 3800 1615
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:       0.39 0.18 0.37  0.03 0.03 0.08  0.07 0.08 0.23  0.04 0.11 0.12
Crit Moves:    ****                  ****      ****                        ****
Green/Cycle:   0.58 0.55 0.55  0.09 0.06 0.17  0.11 0.16 0.74  0.12 0.17 0.17
Volume/Cap:    0.67 0.33 0.67  0.31 0.49 0.47  0.67 0.49 0.31  0.30 0.64 0.67
Delay/Veh:     18.4 15.0 21.3  52.0 56.5 46.7  56.3 46.4  5.4  48.7 48.1 52.5
User DelAdj:   1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:    18.4 15.0 21.3  52.0 56.5 46.7  56.3 46.4  5.4  48.7 48.1 52.5
LOS by Move:      B    B    C     D    E    D     E    D    A     D    D    D
HCM2kAvgQ:       18    7   16     2    3    5     6    5    5     2    8    8
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                 2010 Phase 1B Conditions (Base + Project)
                                 AM Peak
--------------------------------------------------------------------------------

                     Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #109 Iowa Ave at Everton Place
********************************************************************************
Average Delay (sec/veh):      5.4       Worst Case Level Of Service: F[ 86.7]
********************************************************************************
Street Name:               Iowa Avenue                    Everton Place
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:         0  1  0  0  1    1  0  0  1  0    0  0  1! 0  0    1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Exsting AM Peak
Base Vol:       0  659    56     28  337     0      0    0     0     10    0    21
Growth Adj:  1.05 1.05  1.05   1.05 1.05  1.05   1.05 1.05  1.05   1.05 1.05  1.05
Initial Bse:    0  692    59     29  354     0      0    0     0     11    0    22
Added Vol:     15   29    10     23   33    32     53    0    25      3    0     7
PasserByVol:    0    0     0      0    0     0      0    0     0      0    0     0
Initial Fut:   15  721    69     52  387    32     53    0    25     14    0    29
User Adj:    1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
PHF Adj:     1.00 0.90  0.54   0.88 0.83  1.00   1.00 1.00  1.00   0.83 1.00  0.75
PHF Volume:    15  801   127     60  466    32     53    0    25     16    0    39
Reduct Vol:     0    0     0      0    0     0      0    0     0      0    0     0
Final Vol.:    15  801   127     60  466    32     53    0    25     16    0    39
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx    4.1 xxxx xxxxx    7.1 xxxx   6.2    7.1 xxxx   6.2
FollowUpTim:  2.2 xxxx xxxxx    2.2 xxxx xxxxx    3.5 xxxx   3.3    3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  498 xxxx xxxxx    928 xxxx xxxxx   1515 xxxx   482   1445 xxxx   801
Potent Cap.: 1076 xxxx xxxxx    745 xxxx xxxxx     99 xxxx   588    111 xxxx   388
Move Cap.:   1076 xxxx xxxxx    745 xxxx xxxxx     83 xxxx   588     99 xxxx   388
Volume/Cap:  0.01 xxxx  xxxx   0.08 xxxx  xxxx   0.64 xxxx  0.04   0.16 xxxx  0.10
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.0 xxxx xxxxx    0.3 xxxx xxxxx   xxxx xxxx xxxxx    0.6 xxxx   0.3
Control Del:  8.4 xxxx xxxxx   10.3 xxxx xxxxx  xxxxx xxxx xxxxx   48.6 xxxx  15.3
LOS by Move:    A    *     *      B    *     *      *    *     *      E    *     C
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx   xxxx xxxx xxxxx   xxxx  114 xxxxx   xxxx xxxx xxxxx
SharedQueue:  0.0 xxxx xxxxx  xxxxx xxxx xxxxx  xxxxx  3.6 xxxxx  xxxxx xxxx xxxxx
Shrd ConDel:  8.4 xxxx xxxxx  xxxxx xxxx xxxxx  xxxxx 86.7 xxxxx  xxxxx xxxx xxxxx
Shared LOS:     A    *     *      *    *     *      *    F     *      *    *     *
ApproachDel:      xxxxxx           xxxxxx             86.7             25.2
ApproachLOS:        *                *                  F                D
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #124 Iowa Ave at Linden St

Cycle (sec):	110	Critical Vol./Cap.(X):	0.605
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	31.1
Optimal Cycle:	39	Level Of Service:	C

Street Name:	Iowa Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	1 0	1	1 0	1 0	1
Volume Module: Existing AM Peak												
Base Vol:	118	579	92	45	403	207	113	107	47	70	137	67
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	124	608	97	47	423	217	119	112	49	74	144	70
Added Vol:	9	19	12	0	24	0	0	15	10	7	4	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	133	627	109	47	447	217	119	127	59	81	148	70
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.59	0.90	0.80	0.70	0.80	0.57	0.81	0.70	0.70	0.65	0.66	0.88
PHF Volume:	225	697	136	68	559	381	146	182	85	124	224	80
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	225	697	136	68	559	381	146	182	85	124	224	80
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	225	697	136	68	559	381	146	182	85	124	224	80
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.19	0.81	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1900	3800	1900	1900	2259	1541	1900	1900	1900	1900	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.12	0.18	0.07	0.04	0.25	0.25	0.08	0.10	0.04	0.07	0.12	0.04
Crit Moves:	****				****		****				****	
Green/Cycle:	0.20	0.45	0.45	0.16	0.41	0.41	0.13	0.19	0.19	0.13	0.19	0.19
Volume/Cap:	0.60	0.41	0.16	0.23	0.60	0.60	0.60	0.50	0.23	0.50	0.60	0.22
Delay/Veh:	43.2	20.6	18.1	41.0	26.2	26.2	49.7	40.8	37.9	46.1	43.3	37.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.2	20.6	18.1	41.0	26.2	26.2	49.7	40.8	37.9	46.1	43.3	37.5
LOS by Move:	D	C	B	D	C	C	D	D	D	D	D	D
HCM2kAvgQ:	8	8	3	2	13	13	6	6	2	4	8	2

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                    UCR West Campus Development Plan
               2010 Phase 1B Conditions (Base + Project)
                                AM Peak
--------------------------------------------------------------------------------

                   Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #137 Chicago Ave at MLK Blvd
********************************************************************************
Cycle (sec):          130             Critical Vol./Cap.(X):         0.619
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):      32.6
Optimal Cycle:         41             Level Of Service:                  C
********************************************************************************
Street Name:             Chicago Avenue            Martin Luther King Blvd
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:            Ovl              Ovl              Ovl              Ovl
Min. Green:    7    7     7    7    7     7    7    7     7    7    7     7
Lanes:        2  0  2  0  1   2  0  2  0  1   1  0  2  0  1   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:     707  898   228    60  209   113   133  543   131    40  638   138
Growth Adj:  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:  742  943   239    63  219   119   140  570   138    42  670   145
Added Vol:      0    0    19    20    0     0     0   48     0     9   25     6
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  742  943   258    83  219   119   140  618   138    51  695   151
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.87 0.92  0.70  0.80 0.80  0.81  0.85 0.74  0.90  0.71 0.94  0.78
PHF Volume:   853 1025   369   104  274   146   164  835   153    72  739   193
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  853 1025   369   104  274   146   164  835   153    72  739   193
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   853 1025   369   104  274   146   164  835   153    72  739   193
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       2.00 2.00  1.00  2.00 2.00  1.00  1.00 2.00  1.00  1.00 2.00  1.00
Final Sat.:  3800 3800  1900  3800 3800  1900  1900 3800  1900  1900 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.22 0.27  0.19  0.03 0.07  0.08  0.09 0.22  0.08  0.04 0.19  0.10
Crit Moves:       ****        ****             ****                  ****
Green/Cycle: 0.37 0.43  0.52  0.06 0.12  0.26  0.14 0.35  0.72  0.09 0.31  0.37
Volume/Cap:  0.61 0.63  0.37  0.47 0.61  0.30  0.63 0.62  0.11  0.40 0.63  0.28
Delay/Veh:   31.7 27.6  17.2  56.3 52.7  36.4  53.7 33.1   5.1  52.7 36.7  26.9
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  31.7 27.6  17.2  56.3 52.7  36.4  53.7 33.1   5.1  52.7 36.7  26.9
LOS by Move:    C    C     B     E    D     D     D    C     A     D    D     C
HCM2kAvgQ:     13   15     8     2    6     4     7   13     2     3   12     5
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.526
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	33.7
Optimal Cycle:	43	Level Of Service:	C

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 1 1 0			2 0 2 0 1			2 0 2 0 1		
Volume Module: Existing AM Peak												
Base Vol:	208	747	110	74	320	126	173	326	88	85	386	55
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	218	784	116	78	336	132	182	342	92	89	405	58
Added Vol:	0	5	4	4	15	0	0	18	1	8	9	4
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	218	789	120	82	351	132	182	360	93	97	414	62
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.72	0.79	0.76	0.77	0.89	0.90	0.88	0.82	0.58	0.85	0.85	0.60
PHF Volume:	303	999	157	106	394	147	206	439	161	114	487	103
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	303	999	157	106	394	147	206	439	161	114	487	103
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	303	999	157	106	394	147	206	439	161	114	487	103
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.46	0.54	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	2768	1032	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.08	0.26	0.08	0.03	0.14	0.14	0.05	0.12	0.08	0.03	0.13	0.05
Crit Moves:		****		****			****				****	
Green/Cycle:	0.20	0.50	0.50	0.06	0.36	0.36	0.10	0.23	0.23	0.12	0.24	0.24
Volume/Cap:	0.40	0.53	0.17	0.48	0.40	0.40	0.53	0.50	0.37	0.26	0.53	0.22
Delay/Veh:	42.2	20.9	16.7	56.4	29.2	29.2	52.5	40.8	39.5	48.7	40.1	36.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	42.2	20.9	16.7	56.4	29.2	29.2	52.5	40.8	39.5	48.7	40.1	36.7
LOS by Move:	D	C	B	E	C	C	D	D	D	D	D	D
HCM2kAvgQ:	5	12	3	3	7	7	4	7	5	2	8	3

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	0.769
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	34.7
Optimal Cycle:	59	Level Of Service:	C

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	1 1	0	1 0	2 0	1	1 0	0 1	0	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	21	771	148	140	364	33	36	102	31	154	122	153
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	22	810	155	147	382	35	38	107	33	162	128	161
Added Vol:	1	7	0	0	15	0	0	10	4	1	5	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	23	817	155	147	397	35	38	117	37	163	133	161
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.66	0.87	0.76	0.54	0.92	0.59	0.75	0.71	0.65	0.71	0.66	0.54
PHF Volume:	35	939	204	272	432	59	50	165	56	229	202	298
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	35	939	204	272	432	59	50	165	56	229	202	298
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	35	939	204	272	432	59	50	165	56	229	202	298
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.97	0.97	0.95	1.00	0.85	0.95	0.96	0.96	0.95	0.91	0.91
Lanes:	1.00	1.64	0.36	1.00	2.00	1.00	1.00	0.75	0.25	1.00	1.00	1.00
Final Sat.:	1805	3036	661	1805	3800	1615	1805	1363	465	1805	1731	1731
Capacity Analysis Module:												
Vol/Sat:	0.02	0.31	0.31	0.15	0.11	0.04	0.03	0.12	0.12	0.13	0.12	0.17
Crit Moves:		****		****				****		****		
Green/Cycle:	0.23	0.40	0.40	0.20	0.37	0.37	0.09	0.16	0.16	0.16	0.23	0.23
Volume/Cap:	0.08	0.77	0.77	0.77	0.31	0.10	0.30	0.77	0.77	0.77	0.51	0.75
Delay/Veh:	30.5	28.4	28.4	47.9	22.5	20.7	43.3	52.3	52.3	51.5	34.1	40.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	30.5	28.4	28.4	47.9	22.5	20.7	43.3	52.3	52.3	51.5	34.1	40.7
LOS by Move:	C	C	C	D	C	C	D	D	D	D	C	D
HCM2kAvgQ:	1	17	17	10	5	1	2	8	8	9	6	10

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

7 Intersection #196 Iowa Ave at Blaine St

****

Cycle (sec):	100	Critical Vol./Cap.(X):	0.863
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	40.4
Optimal Cycle:	84	Level Of Service:	D

****

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	141	641	99	121	413	225	418	410	103	108	428	130
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	148	673	104	127	434	236	439	431	108	113	449	137
Added Vol:	6	9	4	17	15	0	0	39	4	5	14	5
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	154	682	108	144	449	236	439	470	112	118	463	142
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.78	0.93	0.85	0.72	0.69	0.84	0.89	0.75	0.89	0.93	0.88	0.79
PHF Volume:	198	733	127	200	650	281	493	626	126	127	527	179
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	198	733	127	200	650	281	493	626	126	127	527	179
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7 Final Vol.:	198	733	127	200	650	281	493	626	126	127	527	179
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.40	0.60	1.00	2.00	1.00	1.00	1.49	0.51
Final Sat.:	1900	3800	1900	1900	2653	1147	1900	3800	1900	1900	2836	964
Capacity Analysis Module:												
Vol/Sat:	0.10	0.19	0.07	0.11	0.25	0.25	0.26	0.16	0.07	0.07	0.19	0.19
Crit Moves:	****				****		****				****	
Green/Cycle:	0.12	0.26	0.26	0.14	0.28	0.28	0.30	0.36	0.36	0.15	0.22	0.22
Volume/Cap:	0.86	0.74	0.26	0.74	0.86	0.86	0.86	0.46	0.18	0.44	0.86	0.86
Delay/Veh:	70.2	36.7	29.5	51.3	41.3	41.3	45.9	24.6	21.9	39.4	47.3	47.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	70.2	36.7	29.5	51.3	41.3	41.3	45.9	24.6	21.9	39.4	47.3	47.3
LOS by Move:	E	D	C	D	D	D	D	C	C	D	D	D
HCM2kAvgQ:	9	12	3	8	17	17	17	7	3	4	13	13

****

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                2010 Phase 1B Conditions (Base + Project)
                               AM Peak
--------------------------------------------------------------------------------
                  Level Of Service Computation Report
        2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #207 I-215/SR-60 NB Ramp at Blain Street
********************************************************************************
Cycle (sec):        110              Critical Vol./Cap.(X):        0.680
Loss Time (sec):      8 (Y+R=4.0 sec) Average Delay (sec/veh):      24.1
Optimal Cycle:       47              Level Of Service:                C
********************************************************************************
Street Name:          I-215/SR-60 NB Ramps                  Blain Street
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    7    7    7    0    0    0    7    7    0    0    7    7
Lanes:        0  1  0  0  1   0  0  0  0  0   2  0  2  0  0   0  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:     204    5   393    0    0     0   172  645     0    0  409   499
Growth Adj:  1.05 1.05  1.05 1.05 1.05  1.05  1.05 1.05  1.05 1.05 1.05  1.05
Initial Bse:  214    5   413    0    0     0   181  677     0    0  429   524
Added Vol:      0    0     1    0    0     0     0   42     0    0   15     5
PasserByVol:    0    0     0    0    0     0     0    0     0    0    0     0
Initial Fut:  214    5   414    0    0     0   181  719     0    0  444   529
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.70 0.31  0.95 1.00 1.00  1.00  0.68 0.76  1.00 1.00 0.85  0.84
PHF Volume:   306   17   435    0    0     0   266  946     0    0  523   630
Reduct Vol:     0    0     0    0    0     0     0    0     0    0    0     0
Reduced Vol:  306   17   435    0    0     0   266  946     0    0  523   630
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:   306   17   435    0    0     0   266  946     0    0  523   630
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900  1900 1900  1900 1900 1900  1900
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       0.95 0.05  1.00 0.00 0.00  0.00  2.00 2.00  0.00 0.00 1.00  1.00
Final Sat.:  1800  100  1900    0    0     0  3800 3800     0    0 1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.17 0.17  0.23 0.00 0.00  0.00  0.07 0.25  0.00 0.00 0.28  0.33
Crit Moves:             ****                  ****                        ****
Green/Cycle: 0.34 0.34  0.34 0.00 0.00  0.00  0.10 0.59  0.00 0.00 0.49  0.49
Volume/Cap:  0.50 0.50  0.68 0.00 0.00  0.00  0.68 0.42  0.00 0.00 0.56  0.68
Delay/Veh:   29.8 29.8  34.3  0.0  0.0   0.0  52.4 12.4   0.0  0.0 20.3  22.7
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00  1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:  29.8 29.8  34.3  0.0  0.0   0.0  52.4 12.4   0.0  0.0 20.3  22.7
LOS by Move:    C    C     C    A    A     A     D    B     A    A    C     C
HCM2kAvgQ:      9    9    13    0    0     0     6    9     0    0   13    17
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	0.580
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.8
Optimal Cycle:	37	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0 0 0 0			0 1 0 0 1			0 0 1 1 0			2 0 2 0 0		
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	369	16	251	0	486	179	110	518	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	387	17	264	0	510	188	116	544	0
Added Vol:	0	0	0	18	0	0	0	24	0	3	12	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	405	17	264	0	534	188	119	556	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.95	0.80	0.76	1.00	0.66	0.86	0.89	0.76	1.00
PHF Volume:	0	0	0	427	21	347	0	810	219	133	731	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	427	21	347	0	810	219	133	731	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	427	21	347	0	810	219	133	731	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.95	0.05	1.00	0.00	1.57	0.43	2.00	2.00	0.00
Final Sat.:	0	0	0	1811	89	1900	0	2992	808	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.24	0.24	0.18	0.00	0.27	0.27	0.04	0.19	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.41	0.41	0.41	0.00	0.47	0.47	0.06	0.53	0.00
Volume/Cap:	0.00	0.00	0.00	0.58	0.58	0.45	0.00	0.58	0.58	0.58	0.37	0.00
Delay/Veh:	0.0	0.0	0.0	28.8	28.8	26.3	0.0	23.9	23.9	58.6	16.7	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	28.8	28.8	26.3	0.0	23.9	23.9	58.6	16.7	0.0
LOS by Move:	A	A	A	C	C	C	A	C	C	E	B	A
HCM2kAvgQ:	0	0	0	13	13	9	0	14	14	3	8	0

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                  2010 Phase 1B Conditions (Base + Project)
                                  AM Peak
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #237 Chicago Ave at 3rd Street
********************************************************************************
Cycle (sec):          120               Critical Vol./Cap.(X):         0.775
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        43.9
Optimal Cycle:         62               Level Of Service:                  D
********************************************************************************
Street Name:              Chicago Avenue                  3rd Street
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:     10    10    10   10    10    10   10    10    10   10    10    10
Lanes:          1  0  1  1  0   1  0  1  1  0   1  0  1  1  0   1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      176   590   177   195   315    66    94   348    71   130   425   222
Growth Adj:   1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:   185   620   186   205   331    69    99   365    75   137   446   233
Added Vol:       1     6     0    15    12     0     0     9     3     0     7     4
PasserByVol:     0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:   186   626   186   220   343    69    99   374    78   137   453   237
User Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:      0.88  0.93  0.65  0.66  0.88  0.66  0.81  0.60  0.66  0.71  0.88  0.74
PHF Volume:    211   673   286   333   389   105   122   624   118   192   515   320
Reduct Vol:      0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   211   673   286   333   389   105   122   624   118   192   515   320
PCE Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:    211   673   286   333   389   105   122   624   118   192   515   320
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:        1.00  1.40  0.60  1.00  1.58  0.42  1.00  1.68  0.32  1.00  1.23  0.77
Final Sat.:   1900  2666  1134  1900  2993   807  1900  3198   602  1900  2343  1457
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.11  0.25  0.25  0.18  0.13  0.13  0.06  0.20  0.20  0.10  0.22  0.22
Crit Moves:         ****        ****                    ****        ****
Green/Cycle:  0.25  0.33  0.33  0.23  0.30  0.30  0.11  0.25  0.25  0.13  0.28  0.28
Volume/Cap:   0.44  0.78  0.78  0.78  0.44  0.44  0.61  0.78  0.78  0.78  0.79  0.79
Delay/Veh:    38.2  39.7  39.7  52.2  34.3  34.3  56.8  45.8  45.8  64.7  44.4  44.4
User DelAdj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   38.2  39.7  39.7  52.2  34.3  34.3  56.8  45.8  45.8  64.7  44.4  44.4
LOS by Move:     D     D     D     D     C     C     E     D     D     E     D     D
HCM2kAvgQ:       7    17    17    13     7     7     5    14    14     9    16    16
********************************************************************************
Note: Queue reported is the number of cars per lane.
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--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                  2010 Phase 1B Conditions (Base + Project)
                                  AM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #291 I-215 SB Ramp/MLK Blvd
********************************************************************************
Cycle (sec):          100            Critical Vol./Cap.(X):         0.414
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):     18.6
Optimal Cycle:         28            Level Of Service:                 B
********************************************************************************
Street Name:                I-215 SB Ramps                    MLK Blvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Permitted        Permitted        Permitted        Permitted
Rights:           Include          Include          Include          Include
Min. Green:     0     0     0    7     7     7    0     7     7    7     7     0
Lanes:        0  0  0  0  0   1  0  0  1  0   0  0  1  1  1   1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:       0     0     0   17    60   197    0   537   197   21   291     0
Growth Adj:  1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05
Initial Bse:    0     0     0   18    63   207    0   564   207   22   306     0
Added Vol:      0     0     0    0     0    25    0     7    34    0    69     0
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:    0     0     0   18    63   232    0   571   241   22   375     0
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00 0.43  0.71  0.79 1.00  0.86  0.67 0.75  0.87  1.00
PHF Volume:     0     0     0   42    89   293    0   664   359   29   431     0
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:    0     0     0   42    89   293    0   664   359   29   431     0
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:     0     0     0   42    89   293    0   664   359   29   431     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.00  0.00  0.00 1.00  0.23  0.77 0.00  1.95  1.05 1.00  2.00  0.00
Final Sat.:     0     0     0 1900   441  1459    0  3698  2002 1900  3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.02  0.20  0.20 0.00  0.18  0.18 0.02  0.11  0.00
Crit Moves:                         ****             ****
Green/Cycle: 0.00  0.00  0.00 0.49  0.49  0.49 0.00  0.43  0.43 0.43  0.43  0.00
Volume/Cap:  0.00  0.00  0.00 0.04  0.41  0.41 0.00  0.41  0.41 0.04  0.26  0.00
Delay/Veh:    0.0   0.0   0.0 13.5  16.8  16.8  0.0  19.6  19.6 16.3  18.2   0.0
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0 13.5  16.8  16.8  0.0  19.6  19.6 16.3  18.2   0.0
LOS by Move:    A     A     A    B     B     B    A     B     B    B     B     A
HCM2kAvgQ:      0     0     0    1     8     8    0     7     7    1     4     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #292 I-215 NB Ramps/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.599
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	16.8
Optimal Cycle:	0	Level Of Service:	C

Street Name:	I-215 NB Ramp						MLK BLvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Stop Sign			Stop Sign			Stop Sign			Stop Sign	
Rights:		Include			Include			Include			Include	
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 1 0 0 0			0 0 0 0 0			2 0 0 0 0			0 0 0 0 0		
Volume Module: existing AM Peak												
Base Vol:	311	12	0	0	0	0	554	0	0	0	0	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	327	13	0	0	0	0	582	0	0	0	0	0
Added Vol:	69	0	0	0	0	0	7	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	396	13	0	0	0	0	589	0	0	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.60	1.00	1.00	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00
PHF Volume:	471	21	0	0	0	0	661	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	471	21	0	0	0	0	661	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	471	21	0	0	0	0	661	0	0	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.91	0.09	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
Final Sat.:	998	45	0	0	0	0	1105	0	0	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.47	0.47	xxxx	xxxx	xxxx	xxxx	0.60	xxxx	xxxx	xxxx	xxxx	xxxx
Crit Moves:	****						****					
Delay/Veh:	15.1	15.0	0.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	15.1	15.0	0.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	0.0	0.0
LOS by Move:	C	C	*	*	*	*	C	*	*	*	*	*
ApproachDel:		15.1			xxxxxx			18.0			xxxxxx	
Delay Adj:		1.00			xxxxx			1.00			xxxxx	
ApprAdjDel:		15.1			xxxxxx			18.0			xxxxxx	
LOS by Appr:		C			*			C			*	
AllWayAvgQ:	0.8	0.8	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	25.7	0.628	C	26.2	0.667	+ 0.478 D/V
# 21 I-215/SR-60 SB Ramp at Univers	B	19.7	0.554	C	20.7	0.592	+ 0.974 D/V
# 23 West Campus at University Ave	C	25.1	0.607	C	25.1	0.622	-0.043 D/V
# 56 NW Mall at Iowa Avenue	A	0.0	0.000	F	60.8	0.000	+60.760 D/V
# 58 Iowa Ave at University Ave	D	41.9	0.797	D	44.6	0.852	+ 2.775 D/V
# 78 Iowa Ave at MLK Blvd	C	22.2	0.737	C	23.1	0.758	+ 0.852 D/V
# 83 Lot 30/MLK BLvd	D	41.0	0.948	D	45.8	0.973	+ 4.780 D/V
# 85 Canyon Crest Dr at MLK BLvd	E	75.8	1.164	E	77.3	1.179	+ 1.523 D/V
#109 Iowa Ave at Everton Place	F	129.4	0.000	F	569.2	0.000	+439.782 D/V
#124 Iowa Ave at Linden St	C	25.7	0.581	C	26.8	0.613	+ 1.091 D/V
#137 Chicago Ave at MLK Blvd	E	60.4	1.061	E	63.8	1.076	+ 3.436 D/V
#151 Chicago Ave at University Aven	D	45.2	0.885	D	45.5	0.889	+ 0.274 D/V
#159 Chicago Ave at Linden Street	C	25.0	0.625	C	25.4	0.636	+ 0.410 D/V
#196 Iowa Ave at Blaine St	D	36.9	0.774	D	37.9	0.799	+ 0.966 D/V
#207 I-215/SR-60 NB Ramp at Blain S	B	18.5	0.563	B	18.5	0.576	-0.056 D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	32.2	0.794	C	32.5	0.806	+ 0.265 D/V
#237 Chicago Ave at 3rd Street	D	47.3	0.860	D	48.0	0.867	+ 0.644 D/V
#291 I-215 SB Ramp/MLK Blvd	B	12.7	0.498	B	12.8	0.528	+ 0.078 D/V
#292 I-215 NB Ramps/MLK Blvd	B	10.9	0.331	B	11.6	0.377	+ 0.046 V/C

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 56 NW Mall at Iowa Avenue	??? / ???	No / No
#109 Iowa Ave at Everton Place	??? / ???	No / No
#292 I-215 NB Ramps/MLK Blvd	???	No

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Peak Hour Delay Signal Warrant Report

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	1 0	1 0	1	1 0	1 0	1	0 0	1! 0	0	0 0	1! 0	0
Initial Vol:	11	576	0	0	1127	24	18	0	8	0	0	0
ApproachDel:	xxxxxx			xxxxxx			60.8			xxxxxx		

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.4]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=26]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=1764]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Uncontrolled	Uncontrolled	Stop Sign	Stop Sign
Lanes:	1 0 1 0 1	1 0 1 0 1	0 0 1! 0 0	0 0 1! 0 0
Initial Vol:	11 576 0	0 1127 24	18 0 8	0 0 0

Major Street Volume: 1738
Minor Approach Volume: 26
Minor Approach Volume Threshold: 94 [less than minimum of 100]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Peak Hour Delay Signal Warrant Report

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Uncontrolled	Uncontrolled	Stop Sign	Stop Sign
Lanes:	0 1 0 0 1	1 0 0 1 0	0 0 1! 0 0	1 0 0 0 1
Initial Vol:	26 564 34	48 1122 54	41 0 20	58 0 63
ApproachDel:	xxxxxx	xxxxxx	465.0	569.2

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=7.9]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=61]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2031]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=19.2]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=121]
FAIL - Approach volume less than 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2031]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER

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UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Uncontrolled	Uncontrolled	Stop Sign	Stop Sign
Lanes:	0 1 0 0 1	1 0 0 1 0	0 0 1! 0 0	1 0 0 0 1
Initial Vol:	26 564 34	48 1122 54	41 0 20	58 0 63

Major Street Volume: 1848
Minor Approach Volume: 121
Minor Approach Volume Threshold: 110 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Stop Sign					Stop Sign				
Lanes:	1	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Initial Vol:	392		1		0	0		0		0	221		0		0	0		0		0

Major Street Volume: 393
Minor Approach Volume: 221
Minor Approach Volume Threshold: 776

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #20 I-215/SR-60 NB Ramps at University

Cycle (sec):	110	Critical Vol./Cap.(X):	0.667
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	26.2
Optimal Cycle:	45	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	7	7	0	7	7	7	7	0	7	7
Lanes:	0 0	0 0	1	1 0	0 0	1	1 0	1 1	0	0 1	0 1	0
Volume Module: Existing PM Peak												
Base Vol:	0	0	1	70	0	273	159	408	0	0	582	182
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	1	74	0	287	167	428	0	0	611	191
Added Vol:	0	0	0	12	0	3	15	30	0	0	53	17
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	86	0	290	182	458	0	0	664	208
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.25	0.80	1.00	0.78	0.70	0.86	1.00	1.00	0.80	0.81
PHF Volume:	0	0	4	107	0	371	260	533	0	0	830	257
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	4	107	0	371	260	533	0	0	830	257
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	4	107	0	371	260	533	0	0	830	257
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	1.00	1.00	2.00	0.00	0.00	1.53	0.47
Final Sat.:	0	0	1900	1900	0	1900	1900	3800	0	0	2902	898
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.06	0.00	0.20	0.14	0.14	0.00	0.00	0.29	0.29
Crit Moves:	****					****	****				****	
Green/Cycle:	0.00	0.00	0.01	0.28	0.00	0.29	0.21	0.63	0.00	0.00	0.43	0.43
Volume/Cap:	0.00	0.00	0.22	0.20	0.00	0.67	0.67	0.22	0.00	0.00	0.67	0.67
Delay/Veh:	0.0	0.0	60.1	30.1	0.0	37.2	44.6	8.6	0.0	0.0	26.2	26.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	60.1	30.1	0.0	37.2	44.6	8.6	0.0	0.0	26.2	26.2
LOS by Move:	A	A	E	C	A	D	D	A	A	A	C	C
HCM2kAvgQ:	0	0	0	3	0	12	9	4	0	0	15	15

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #21 I-215/SR-60 SB Ramp at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.592
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	20.7
Optimal Cycle:	38	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	0	7	0	7	7	7	7	0
Lanes:	0 0	0 0	0	0 1	0 1	0	0 0	1 1	1	1 0	2 0	0
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	42	183	93	0	521	724	191	664	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	44	192	98	0	547	760	201	697	0
Added Vol:	0	0	0	8	0	17	0	37	7	26	30	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	52	192	115	0	584	767	227	727	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.88	0.74	0.83	1.00	0.89	0.92	0.73	0.89	1.00
PHF Volume:	0	0	0	59	260	138	0	656	834	310	817	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	59	260	138	0	656	834	310	817	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	59	260	138	0	656	834	310	817	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.26	1.14	0.60	0.00	1.32	1.68	1.00	2.00	0.00
Final Sat.:	0	0	0	492	2159	1149	0	2510	3190	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.12	0.12	0.12	0.00	0.26	0.26	0.16	0.22	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.20	0.20	0.20	0.00	0.44	0.44	0.28	0.72	0.00
Volume/Cap:	0.00	0.00	0.00	0.59	0.59	0.59	0.00	0.59	0.59	0.59	0.30	0.00
Delay/Veh:	0.0	0.0	0.0	37.3	37.3	37.3	0.0	21.5	21.5	33.2	5.2	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	37.3	37.3	37.3	0.0	21.5	21.5	33.2	5.2	0.0
LOS by Move:	A	A	A	D	D	D	A	C	C	C	A	A
HCM2kAvgQ:	0	0	0	7	7	7	0	12	12	9	5	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #23 West Campus at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.622
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.1
Optimal Cycle:	40	Level Of Service:	C

Street Name:	West Campus						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	0	0	0	0	7	7	7	7	0
Lanes:	1 0	0	0 1	0 0	0	0 0	0 0	1	1 0	1 0	2	0 0
Volume Module: Existing PM Peak												
Base Vol:	287	0	224	0	0	0	0	283	197	369	500	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	301	0	235	0	0	0	0	297	207	387	525	0
Added Vol:	0	0	10	0	0	0	0	42	0	5	70	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	301	0	245	0	0	0	0	339	207	392	595	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.82	1.00	0.76	1.00	1.00	1.00	1.00	0.94	0.95	0.91	0.86	1.00
PHF Volume:	368	0	323	0	0	0	0	361	218	431	692	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	368	0	323	0	0	0	0	361	218	431	692	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	368	0	323	0	0	0	0	361	218	431	692	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	1.25	0.75	1.00	2.00	0.00
Final Sat.:	1900	0	1900	0	0	0	0	2370	1430	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.19	0.00	0.17	0.00	0.00	0.00	0.00	0.15	0.15	0.23	0.18	0.00
Crit Moves:	****							****		****		
Green/Cycle:	0.31	0.00	0.31	0.00	0.00	0.00	0.00	0.24	0.24	0.36	0.61	0.00
Volume/Cap:	0.62	0.00	0.55	0.00	0.00	0.00	0.00	0.62	0.62	0.62	0.30	0.00
Delay/Veh:	31.5	0.0	29.7	0.0	0.0	0.0	0.0	35.0	35.0	27.9	9.4	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	31.5	0.0	29.7	0.0	0.0	0.0	0.0	35.0	35.0	27.9	9.4	0.0
LOS by Move:	C	A	C	A	A	A	A	C	C	C	A	A
HCM2kAvgQ:	10	0	9	0	0	0	0	9	9	11	5	0

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                         UCR West Campus Development Plan
                     2010 Phase 1B Conditions (Base + Project)
                                     PM Peak
--------------------------------------------------------------------------------
                        Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Average Delay (sec/veh):        1.0       Worst Case Level Of Service: F[ 60.8]
********************************************************************************
Street Name:                 NW Mall                         Iowa Avenue
Approach:        North Bound       South Bound       East Bound        West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled      Uncontrolled       Stop Sign         Stop Sign
Rights:            Include           Include          Include           Include
Lanes:          1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:         0  503    0      0 1038    0     0    0    0     0    0    0
Growth Adj:    1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:      0  528    0      0 1090    0     0    0    0     0    0    0
Added Vol:       11   48    0      0   37   24    18    0    8     0    0    0
PasserByVol:      0    0    0      0    0    0     0    0    0     0    0    0
Initial Fut:     11  576    0      0 1127   24    18    0    8     0    0    0
User Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:       0.90 0.90  0.90  0.90 0.90  0.90  0.90 0.90  0.90  0.90 0.90  0.90
PHF Volume:      12  640    0      0 1252   27    20    0    9     0    0    0
Reduct Vol:       0    0    0      0    0    0     0    0    0     0    0    0
Final Vol.:      12  640    0      0 1252   27    20    0    9     0    0    0
Critical Gap Module:
Critical Gp:    4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4 xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:    2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1279 xxxx xxxxx  xxxx xxxx xxxxx  1917 xxxx  1252  xxxx xxxx xxxxx
Potent Cap.:   550 xxxx xxxxx  xxxx xxxx xxxxx    75 xxxx   212  xxxx xxxx xxxxx
Move Cap.:     550 xxxx xxxxx  xxxx xxxx xxxxx    74 xxxx   212  xxxx xxxx xxxxx
Volume/Cap:   0.02 xxxx  xxxx  xxxx xxxx  xxxx  0.27 xxxx  0.04  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:      0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:   11.7 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:      B    *     *     *    *     *     *    *     *     *    *     *
Movement:        LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx   92 xxxxx  xxxx    0 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  1.2 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 60.8 xxxxx xxxxx xxxx xxxxx
Shared LOS:       *    *     *     *    *     *     *    F     *     *    *     *
ApproachDel:        xxxxxx            xxxxxx             60.8            xxxxxx
ApproachLOS:           *                 *                 F                 *
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.852
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	44.6
Optimal Cycle:	84	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing PM												
Base Vol:	93	370	129	260	800	187	217	874	152	156	374	103
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	98	389	135	273	840	196	228	918	160	164	393	108
Added Vol:	16	46	37	0	44	0	0	7	16	36	11	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	114	435	172	273	884	196	228	925	176	200	404	108
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.60	0.96	0.75	0.94	0.91	0.90	0.82	0.94	0.84	0.85	0.87	0.72
PHF Volume:	189	453	230	290	971	218	278	984	209	235	464	150
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	189	453	230	290	971	218	278	984	209	235	464	150
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	189	453	230	290	971	218	278	984	209	235	464	150
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.63	0.37	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3103	697	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.10	0.12	0.12	0.15	0.31	0.31	0.15	0.26	0.11	0.12	0.12	0.08
Crit Moves:	****				****			****		****		
Green/Cycle:	0.12	0.21	0.21	0.27	0.37	0.37	0.24	0.30	0.42	0.15	0.20	0.20
Volume/Cap:	0.85	0.56	0.57	0.57	0.85	0.85	0.60	0.85	0.26	0.85	0.60	0.39
Delay/Veh:	77.7	42.9	44.0	39.2	40.2	40.2	42.2	45.5	22.8	71.7	44.6	41.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	77.7	42.9	44.0	39.2	40.2	40.2	42.2	45.5	22.8	71.7	44.6	41.9
LOS by Move:	E	D	D	D	D	D	D	D	C	E	D	D
HCM2kAvgQ:	9	8	8	10	23	23	10	20	5	11	8	5

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #78 Iowa Ave at MLK Blvd

Cycle (sec):	110	Critical Vol./Cap.(X):	0.758
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	23.1
Optimal Cycle:	58	Level Of Service:	C

Street Name:	Iowa Avenue						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Include			Ovl		
Min. Green:	0	0	0	7	7	7	7	7	0	0	7	7
Lanes:	0 0	0 0	0	1 0	1! 0	1	1 0	2 0	0	0 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	727	0	273	170	1564	0	0	667	353
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	763	0	287	179	1642	0	0	700	371
Added Vol:	0	0	0	26	0	19	23	40	0	0	62	36
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	789	0	306	202	1682	0	0	762	407
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.95	1.00	0.90	0.87	0.99	1.00	1.00	0.79	0.92
PHF Volume:	0	0	0	831	0	340	232	1699	0	0	965	442
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	831	0	340	232	1699	0	0	965	442
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	831	0	340	232	1699	0	0	965	442
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.71	0.00	1.29	1.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	0	0	0	3249	0	2451	1900	3800	0	0	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.26	0.00	0.14	0.12	0.45	0.00	0.00	0.25	0.23
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.34	0.00	0.53	0.19	0.59	0.00	0.00	0.40	0.74
Volume/Cap:	0.00	0.00	0.00	0.76	0.00	0.26	0.64	0.76	0.00	0.00	0.64	0.32
Delay/Veh:	0.0	0.0	0.0	34.7	0.0	14.2	44.7	18.3	0.0	0.0	27.6	5.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	34.7	0.0	14.2	44.7	18.3	0.0	0.0	27.6	5.1
LOS by Move:	A	A	A	C	A	B	D	B	A	A	C	A
HCM2kAvgQ:	0	0	0	16	0	5	8	22	0	0	14	5

Note: Queue reported is the number of cars per lane.

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------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                 2010 Phase 1B Conditions (Base + Project)
                                 PM Peak
------------------------------------------------------------------------------

                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
******************************************************************************
Intersection #83 Lot 30/MLK BLvd
******************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):        0.973
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):      45.8
Optimal Cycle:        120              Level Of Service:                D
******************************************************************************
Street Name:                 Lot 30                         MLK Blvd
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    7     0     7   7     0     7   7     7     0   7     7     7
Lanes:         0  0  0  0  1   0  1  0  0  1   1  0  1  1  0   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      0     0     1  162     0   271   31  1989     0   10   926     1
Growth Adj:  1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05
Initial Bse:   0     0     1  170     0   285   33  2088     0   11   972     1
Added Vol:     0     0     0    0     0     6    3    63     0    0    91     0
PasserByVol:   0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:   0     0     1  170     0   291   36  2151     0   11  1063     1
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.50  1.00  0.25 0.57  1.00  0.62 0.43  0.95  1.00 0.63  0.85  1.00
PHF Volume:    0     0     4  298     0   469   83  2265     0   17  1251     1
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:   0     0     4  298     0   469   83  2265     0   17  1251     1
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:    0     0     4  298     0   469   83  2265     0   17  1251     1
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  0.87 0.71  1.00  0.85 0.95  1.00  1.00 0.95  1.00  0.85
Lanes:       0.00  0.00  1.00 1.00  0.00  1.00 1.00  2.00  0.00 1.00  2.00  1.00
Final Sat.:    0     0  1644 1357     0  1615 1805  3800     0 1805  3800  1615
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.22  0.00  0.29 0.05  0.60  0.00 0.01  0.33  0.00
Crit Moves:                               ****        ****       ****
Green/Cycle: 0.00  0.00  0.28 0.28  0.00  0.28 0.11  0.57  0.00 0.07  0.53  0.53
Volume/Cap:  0.00  0.00  0.01 0.79  0.00  1.04 0.41  1.04  0.00 0.13  0.62  0.00
Delay/Veh:    0.0   0.0  26.1 44.1   0.0  90.0 42.6  52.9   0.0 44.1  17.1  11.1
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0  26.1 44.1   0.0  90.0 42.6  52.9   0.0 44.1  17.1  11.1
LOS by Move:   A     A     C    D     A     F    D     D     A    D     B     B
HCM2kAvgQ:     0     0     0   11     0    22    3    47     0    1    14     0
******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	1.179
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	77.3
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 2 0 1			2 0 2 0 1			2 0 2 0 1		
Volume Module: Existing PM Peak												
Base Vol:	295	186	129	125	552	189	163	1043	1058	162	254	25
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	310	195	135	131	580	198	171	1095	1111	170	267	26
Added Vol:	5	12	0	64	26	62	29	27	7	0	24	29
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	315	207	135	195	606	260	200	1122	1118	170	291	55
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.83	0.81	0.80	0.73	0.72	0.64	0.84	0.86	0.86	0.87	0.78
PHF Volume:	409	250	167	244	830	362	313	1336	1300	198	334	71
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	409	250	167	244	830	362	313	1336	1300	198	334	71
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	409	250	167	244	830	362	313	1336	1300	198	334	71
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3420	3800	1615	3420	3800	1615	3420	3800	1615	3420	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.12	0.07	0.10	0.07	0.22	0.22	0.09	0.35	0.80	0.06	0.09	0.04
Crit Moves:	****				****				****	****		
Green/Cycle:	0.10	0.17	0.17	0.12	0.18	0.51	0.32	0.57	0.68	0.06	0.31	0.31
Volume/Cap:	1.19	0.39	0.62	0.62	1.19	0.44	0.28	0.61	1.19	0.99	0.28	0.14
Delay/Veh:	165.6	44.9	50.6	53.5	149	19.3	30.4	17.2	115.2	117.6	31.4	30.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	165.6	44.9	50.6	53.5	149	19.3	30.4	17.2	115.2	117.6	31.4	30.0
LOS by Move:	F	D	D	D	F	B	C	B	F	F	C	C
HCM2kAvgQ:	15	4	7	6	26	8	4	16	75	7	5	2

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #109 Iowa Ave at Everton Place

Average Delay (sec/veh): 59.5 Worst Case Level Of Service: F[569.2]

Street Name:	Iowa Avenue						Everton Place					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 1 0 0 1			1 0 0 1 0			0 0 1! 0 0			1 0 0 0 1		
Volume Module: Existing PM Peak												
Base Vol:	0	503	29	36	1038	0	0	0	0	47	0	39
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	528	30	38	1090	0	0	0	0	49	0	41
Added Vol:	26	36	4	10	32	54	41	0	20	9	0	22
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	26	564	34	48	1122	54	41	0	20	58	0	63
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	0.87	0.81	0.69	0.97	1.00	1.00	1.00	1.00	0.59	1.00	0.75
PHF Volume:	26	648	43	69	1157	54	41	0	20	99	0	84
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	26	648	43	69	1157	54	41	0	20	99	0	84
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx	7.1	xxxx	6.2	7.1	xxxx	6.2
FollowUpTim:	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx	3.5	xxxx	3.3	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	1211	xxxx	xxxxx	691	xxxx	xxxxx	2086	xxxx	1184	2033	xxxx	648
Potent Cap.:	583	xxxx	xxxxx	913	xxxx	xxxxx	39	xxxx	233	43	xxxx	474
Move Cap.:	583	xxxx	xxxxx	913	xxxx	xxxxx	29	xxxx	233	36	xxxx	474
Volume/Cap:	0.04	xxxx	xxxx	0.08	xxxx	xxxx	1.39	xxxx	0.09	2.78	xxxx	0.18
Level Of Service Module:												
2Way95thQ:	0.1	xxxx	xxxxx	0.2	xxxx	xxxxx	xxxx	xxxx	xxxxx	11.2	xxxx	0.6
Control Del:	11.5	xxxx	xxxxx	9.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx	1040	xxxx	14.2
LOS by Move:	B	*	*	A	*	*	*	*	*	F	*	B
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	41	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	0.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	6.2	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	11.5	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	465	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	B	*	*	*	*	*	*	F	*	*	*	*
ApproachDel:		xxxxxx			xxxxxx			465.0			569.2	
ApproachLOS:		*			*			F			F	

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                 2010 Phase 1B Conditions (Base + Project)
                                PM Peak
--------------------------------------------------------------------------------
                    Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #124 Iowa Ave at Linden St
********************************************************************************
Cycle (sec):          110             Critical Vol./Cap.(X):         0.613
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):      26.8
Optimal Cycle:         40             Level Of Service:                 C
********************************************************************************
Street Name:               Iowa Avenue                   Linden Street
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:     7     7     7    7     7     7    7     7     7    7     7     7
Lanes:        1  0  2  0  1   1  0  1  1  0   1  0  1  0  1   1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      46   571   140    58  1023    98   126   155   123   109   110    17
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:   48   600   147    61  1074   103   132   163   129   114   116    18
Added Vol:     11    26    10     0    21     0     0     6    10    13    14     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:   59   626   157    61  1095   103   132   169   139   127   130    18
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.77  0.91  0.85  0.91  0.92  0.88  0.81  0.95  0.70  0.85  0.83  0.53
PHF Volume:    77   687   185    67  1190   117   163   178   199   150   156    34
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   77   687   185    67  1190   117   163   178   199   150   156    34
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:    77   687   185    67  1190   117   163   178   199   150   156    34
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  2.00  1.00  1.00  1.82  0.18  1.00  1.00  1.00  1.00  1.00  1.00
Final Sat.:  1900  3800  1900  1900  3460   340  1900  1900  1900  1900  1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.04  0.18  0.10  0.04  0.34  0.34  0.09  0.09  0.10  0.08  0.08  0.02
Crit Moves:  ****                    ****                    ****  ****
Green/Cycle: 0.07  0.46  0.46  0.16  0.56  0.56  0.15  0.17  0.17  0.13  0.15  0.15
Volume/Cap:  0.61  0.39  0.21  0.22  0.61  0.61  0.56  0.55  0.61  0.61  0.56  0.12
Delay/Veh:   58.6  19.4  17.6  40.3  16.7  16.7  45.6  43.7  45.7  49.9  46.3  41.0
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  58.6  19.4  17.6  40.3  16.7  16.7  45.6  43.7  45.7  49.9  46.3  41.0
LOS by Move:    E     B     B     D     B     B     D     D     D     D     D     D
HCM2kAvgQ:      4     8     4     2    15    15     6     6     7     6     6     1
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	1.076
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	63.8
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Chicago Avenue		Martin Luther King Blvd	
Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Protected	Protected	Protected	Protected
Rights:	Ovl	Ovl	Ovl	Ovl
Lanes:	2 0 2 0 1	2 0 2 0 1	1 0 2 0 1	1 0 2 0 1

Movement:	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Volume Module: Existing PM Peak												
Base Vol:	140	287	61	366	1057	201	170	1283	792	249	514	105
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	147	301	64	384	1110	211	179	1347	832	261	540	110
Added Vol:	0	0	12	9	0	0	0	30	0	19	48	19
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	147	301	76	393	1110	211	179	1377	832	280	588	129
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.84	0.66	0.92	0.91	0.88	0.92	0.96	0.92	0.71	0.86	0.82
PHF Volume:	155	359	115	428	1220	240	194	1435	904	395	683	158
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	155	359	115	428	1220	240	194	1435	904	395	683	158
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	155	359	115	428	1220	240	194	1435	904	395	683	158
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.04	0.09	0.06	0.11	0.32	0.13	0.10	0.38	0.48	0.21	0.18	0.08
Crit Moves:	****				****				****	****		
Green/Cycle:	0.06	0.16	0.35	0.19	0.30	0.51	0.21	0.39	0.44	0.19	0.37	0.56
Volume/Cap:	0.70	0.58	0.17	0.58	1.08	0.25	0.49	0.98	1.07	1.08	0.49	0.15
Delay/Veh:	64.9	48.0	26.8	45.2	93.9	16.9	42.7	54.8	85.0	119.1	29.4	12.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	64.9	48.0	26.8	45.2	93.9	16.9	42.7	54.8	85.0	119.1	29.4	12.6
LOS by Move:	E	D	C	D	F	B	D	D	F	F	C	B
HCM2kAvgQ:	4	7	3	8	32	5	7	32	45	22	10	3

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                  2010 Phase 1B Conditions (Base + Project)
                                   PM Peak
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #151 Chicago Ave at University Avenue
********************************************************************************
Cycle (sec):         120              Critical Vol./Cap.(X):          0.889
Loss Time (sec):      12 (Y+R=4.0 sec) Average Delay (sec/veh):        45.5
Optimal Cycle:       114              Level Of Service:                   D
********************************************************************************
Street Name:             Chicago Avenue                University Avenue
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:     7     7     7    7     7     7    7     7     7    7     7     7
Lanes:         2  0  2  0  1   2  0  1  1  0   2  0  2  0  1   2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:     237   363   126   155   956    86   182   796   463   309   385    72
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:  249   381   132   163  1004    90   191   836   486   324   404    76
Added Vol:      1    14     8     4     7     0     0    11     1     5    18     5
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:  250   395   140   167  1011    90   191   847   487   329   422    81
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.86  0.92  0.73  0.84  0.89  0.77  0.81  0.90  0.87  0.87  0.92  0.82
PHF Volume:   291   430   192   199  1136   117   236   941   560   379   459    98
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  291   430   192   199  1136   117   236   941   560   379   459    98
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   291   430   192   199  1136   117   236   941   560   379   459    98
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       2.00  2.00  1.00  2.00  1.81  0.19  2.00  2.00  1.00  2.00  2.00  1.00
Final Sat.:  3800  3800  1900  3800  3444   356  3800  3800  1900  3800  3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.08  0.11  0.10  0.05  0.33  0.33  0.06  0.25  0.29  0.10  0.12  0.05
Crit Moves:  ****                    ****                    ****  ****
Green/Cycle: 0.09  0.30  0.30  0.16  0.37  0.37  0.15  0.33  0.33  0.11  0.29  0.29
Volume/Cap:  0.89  0.38  0.34  0.34  0.89  0.89  0.41  0.75  0.89  0.89  0.41  0.18
Delay/Veh:   78.8  33.2  32.9  45.5  42.8  42.8  46.6  38.2  52.7  72.5  34.4  31.8
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  78.8  33.2  32.9  45.5  42.8  42.8  46.6  38.2  52.7  72.5  34.4  31.8
LOS by Move:    E     C     C     D     D     D     D     D     D     E     C     C
HCM2kAvgQ:      8     6     5     3    25    25     4    17    23    10     7     3
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	0.636
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.4
Optimal Cycle:	41	Level Of Service:	C

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	1 1	0	1 0	2 0	1	1 0	0 1	0	1 0	1 1	0
Volume Module: Existing PM Peak												
Base Vol:	61	432	161	172	1149	145	29	83	46	110	124	94
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	64	454	169	181	1206	152	30	87	48	116	130	99
Added Vol:	4	14	1	0	9	0	0	6	2	0	10	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	68	468	170	181	1215	152	30	93	50	116	140	99
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.97	0.84	0.78	0.91	0.79	0.81	0.83	0.72	0.71	0.82	0.81
PHF Volume:	76	482	202	232	1336	193	38	112	70	163	171	122
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	76	482	202	232	1336	193	38	112	70	163	171	122
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	76	482	202	232	1336	193	38	112	70	163	171	122
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.96	0.96	0.95	1.00	0.85	0.95	0.94	0.94	0.95	0.94	0.94
Lanes:	1.00	1.41	0.59	1.00	2.00	1.00	1.00	0.62	0.38	1.00	1.17	0.83
Final Sat.:	1805	2558	1074	1805	3800	1615	1805	1103	687	1805	2081	1483
Capacity Analysis Module:												
Vol/Sat:	0.04	0.19	0.19	0.13	0.35	0.12	0.02	0.10	0.10	0.09	0.08	0.08
Crit Moves:	****				****			****		****		
Green/Cycle:	0.07	0.37	0.37	0.25	0.55	0.55	0.14	0.16	0.16	0.14	0.16	0.16
Volume/Cap:	0.60	0.51	0.51	0.51	0.64	0.22	0.15	0.64	0.64	0.64	0.51	0.51
Delay/Veh:	52.8	24.9	24.9	33.2	16.3	11.6	38.2	44.2	44.2	45.9	39.0	39.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	52.8	24.9	24.9	33.2	16.3	11.6	38.2	44.2	44.2	45.9	39.0	39.0
LOS by Move:	D	C	C	C	B	B	D	D	D	D	D	D
HCM2kAvgQ:	3	8	8	7	15	3	1	6	6	6	5	5

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	0.799
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	37.9
Optimal Cycle:	65	Level Of Service:	D

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	1 1	0
Volume Module: Existing PM Peak												
Base Vol:	198	510	145	193	768	167	302	438	268	149	271	109
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	208	536	152	203	806	175	317	460	281	156	285	114
Added Vol:	5	15	5	7	11	0	0	19	6	5	37	16
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	213	551	157	210	817	175	317	479	287	161	322	130
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.86	0.86	0.72	0.96	0.84	0.91	0.88	0.96	0.83	0.89	0.78
PHF Volume:	253	640	183	291	851	209	348	544	299	195	361	167
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	253	640	183	291	851	209	348	544	299	195	361	167
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	253	640	183	291	851	209	348	544	299	195	361	167
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.61	0.39	1.00	2.00	1.00	1.00	1.37	0.63
Final Sat.:	1900	3800	1900	1900	3052	748	1900	3800	1900	1900	2598	1202
Capacity Analysis Module:												
Vol/Sat:	0.13	0.17	0.10	0.15	0.28	0.28	0.18	0.14	0.16	0.10	0.14	0.14
Crit Moves:	****				****		****				****	
Green/Cycle:	0.17	0.27	0.27	0.25	0.35	0.35	0.23	0.24	0.24	0.16	0.17	0.17
Volume/Cap:	0.80	0.62	0.36	0.62	0.80	0.80	0.80	0.59	0.64	0.64	0.80	0.80
Delay/Veh:	53.4	33.2	29.9	36.2	32.9	32.9	46.3	34.3	36.9	44.1	46.4	46.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	53.4	33.2	29.9	36.2	32.9	32.9	46.3	34.3	36.9	44.1	46.4	46.4
LOS by Move:	D	C	C	D	C	C	D	C	D	D	D	D
HCM2kAvgQ:	10	9	5	9	17	17	12	8	9	7	10	10

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #207 I-215/SR-60 NB Ramp at Blain Street

Cycle (sec):	110	Critical Vol./Cap.(X):	0.576
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	18.5
Optimal Cycle:	37	Level Of Service:	B

Street Name:	I-215/SR-60 NB Ramps						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	0	0	0	7	7	0	0	7	7
Lanes:	0 1	0	0 1	0 0	0	0 0	2 0	2	0 0	0 0	1	1 0
Volume Module: Existing PM Peak												
Base Vol:	97	1	261	0	0	0	124	779	0	0	483	494
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	102	1	274	0	0	0	130	818	0	0	507	519
Added Vol:	0	0	3	0	0	0	0	22	0	0	25	17
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	102	1	277	0	0	0	130	840	0	0	532	536
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.25	0.88	1.00	1.00	1.00	0.84	0.95	1.00	1.00	0.91	0.86
PHF Volume:	110	4	315	0	0	0	155	884	0	0	585	623
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	110	4	315	0	0	0	155	884	0	0	585	623
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	110	4	315	0	0	0	155	884	0	0	585	623
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.96	0.04	1.00	0.00	0.00	0.00	2.00	2.00	0.00	0.00	1.00	1.00
Final Sat.:	1830	70	1900	0	0	0	3800	3800	0	0	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.06	0.06	0.17	0.00	0.00	0.00	0.04	0.23	0.00	0.00	0.31	0.33
Crit Moves:			****				****					****
Green/Cycle:	0.29	0.29	0.29	0.00	0.00	0.00	0.07	0.64	0.00	0.00	0.57	0.57
Volume/Cap:	0.21	0.21	0.58	0.00	0.00	0.00	0.58	0.36	0.00	0.00	0.54	0.58
Delay/Veh:	29.9	29.9	35.0	0.0	0.0	0.0	52.6	9.4	0.0	0.0	15.0	15.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	29.9	29.9	35.0	0.0	0.0	0.0	52.6	9.4	0.0	0.0	15.0	15.6
LOS by Move:	C	C	C	A	A	A	D	A	A	A	B	B
HCM2kAvgQ:	3	3	10	0	0	0	3	7	0	0	12	14

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	0.806
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	32.5
Optimal Cycle:	70	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0	0 0	0 1	0	0 1	0 0	1	1 0	2 0	2	0 0
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	276	219	192	0	631	639	220	377	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	290	230	202	0	663	671	231	396	0
Added Vol:	0	0	0	8	0	0	0	15	0	1	23	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	298	230	202	0	678	671	232	419	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.93	0.84	0.92	1.00	0.95	0.95	0.92	0.89	1.00
PHF Volume:	0	0	0	320	274	219	0	713	706	252	471	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	320	274	219	0	713	706	252	471	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	320	274	219	0	713	706	252	471	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.54	0.46	1.00	0.00	1.00	1.00	2.00	2.00	0.00
Final Sat.:	0	0	0	1024	876	1900	0	1909	1891	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.31	0.31	0.12	0.00	0.37	0.37	0.07	0.12	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.39	0.39	0.39	0.00	0.46	0.46	0.08	0.55	0.00
Volume/Cap:	0.00	0.00	0.00	0.81	0.81	0.30	0.00	0.81	0.81	0.81	0.23	0.00
Delay/Veh:	0.0	0.0	0.0	39.3	39.3	25.7	0.0	30.4	30.4	68.3	14.2	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	39.3	39.3	25.7	0.0	30.4	30.4	68.3	14.2	0.0
LOS by Move:	A	A	A	D	D	C	A	C	C	E	B	A
HCM2kAvgQ:	0	0	0	21	21	5	0	24	24	7	4	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	0.867
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	48.0
Optimal Cycle:	90	Level Of Service:	D

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Include			Include			Include	
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0 1 1 0			1 0 1 1 0			1 0 1 1 0			1 0 1 1 0		
Volume Module: Existing PM Peak												
Base Vol:	88	415	136	260	865	107	137	636	264	240	294	81
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	92	436	143	273	908	112	144	668	277	252	309	85
Added Vol:	2	12	0	6	8	0	0	8	1	0	10	14
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	94	448	143	279	916	112	144	676	278	252	319	99
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.76	0.82	0.79	0.83	0.90	0.72	0.82	0.85	0.85	0.95	0.84	0.81
PHF Volume:	124	546	181	336	1018	156	175	795	327	265	379	122
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	124	546	181	336	1018	156	175	795	327	265	379	122
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	124	546	181	336	1018	156	175	795	327	265	379	122
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.50	0.50	1.00	1.73	0.27	1.00	1.42	0.58	1.00	1.51	0.49
Final Sat.:	1900	2855	945	1900	3295	505	1900	2692	1108	1900	2874	926
Capacity Analysis Module:												
Vol/Sat:	0.07	0.19	0.19	0.18	0.31	0.31	0.09	0.30	0.30	0.14	0.13	0.13
Crit Moves:	****				****			****		****		
Green/Cycle:	0.08	0.23	0.23	0.21	0.35	0.35	0.20	0.34	0.34	0.16	0.29	0.29
Volume/Cap:	0.78	0.84	0.84	0.84	0.88	0.88	0.45	0.88	0.88	0.88	0.45	0.45
Delay/Veh:	76.1	52.0	52.0	60.6	43.1	43.1	42.7	44.4	44.4	72.8	34.9	34.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	76.1	52.0	52.0	60.6	43.1	43.1	42.7	44.4	44.4	72.8	34.9	34.9
LOS by Move:	E	D	D	E	D	D	D	D	D	E	C	C
HCM2kAvgQ:	6	15	15	14	23	23	6	22	22	12	8	8

Note: Queue reported is the number of cars per lane.

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                      UCR West Campus Development Plan
                 2010 Phase 1B Conditions (Base + Project)
                                  PM Peak
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                     Level Of Service Computation Report
         2000 HCM Operations Method (Future Volume Alternative)
*********************************************************************************
Intersection #291 I-215 SB Ramp/MLK Blvd
*********************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):         0.528
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        12.8
Optimal Cycle:         33               Level Of Service:                  B
*********************************************************************************
Street Name:              I-215 SB Ramps                        MLK Blvd
Approach:        North Bound       South Bound       East Bound        West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Permitted         Permitted         Permitted         Permitted
Rights:           Include           Include           Include           Include
Min. Green:     0     0     0    7     7     7    0     7     7    7     7     0
Lanes:          0  0  0  0  0    1  0  0  1  0    0  0  1  1  1    1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:       0     0     0    3   101   106    0   186   971    5   328     0
Growth Adj:  1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05
Initial Bse:    0     0     0    3   106   111    0   195  1020    5   344     0
Added Vol:      0     0     0    0     0    11    0    24    68    0    42     0
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:    0     0     0    3   106   122    0   219  1088    5   386     0
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00 0.75  0.70  0.80 1.00  0.74  0.88 0.63  0.87  1.00
PHF Volume:     0     0     0    4   152   153    0   296  1236    8   444     0
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:    0     0     0    4   152   153    0   296  1236    8   444     0
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:     0     0     0    4   152   153    0   296  1236    8   444     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.00  0.00  0.00 1.00  0.50  0.50 0.00  1.00  2.00 1.00  2.00  0.00
Final Sat.:     0     0     0 1900   946   954    0  1900  3800 1900  3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.00  0.16  0.16 0.00  0.16  0.33 0.00  0.12  0.00
Crit Moves:                         ****                    ****
Green/Cycle: 0.00  0.00  0.00 0.30  0.30  0.30 0.00  0.62  0.62 0.62  0.62  0.00
Volume/Cap:  0.00  0.00  0.00 0.01  0.53  0.53 0.00  0.25  0.53 0.01  0.19  0.00
Delay/Veh:    0.0   0.0   0.0 24.3  29.8  29.8  0.0   8.7  11.1  7.4   8.4   0.0
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0 24.3  29.8  29.8  0.0   8.7  11.1  7.4   8.4   0.0
LOS by Move:    A     A     A    C     C     C    A     A     B    A     A     A
HCM2kAvgQ:      0     0     0    0     8     8    0     4    11    0     3     0
*********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Phase 1B Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #292 I-215 NB Ramps/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.377
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	11.6
Optimal Cycle:	0	Level Of Service:	B

Street Name:	I-215 NB Ramp						MLK BLvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 1	0 0	0	0 0	0 0	0	2 0	0 0	0	0 0	0 0	0
Volume Module: Existing PM												
Base Vol:	333	1	0	0	0	0	188	0	0	0	0	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	350	1	0	0	0	0	197	0	0	0	0	0
Added Vol:	42	0	0	0	0	0	24	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	392	1	0	0	0	0	221	0	0	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.87	0.25	1.00	1.00	1.00	1.00	0.73	1.00	1.00	1.00	1.00	1.00
PHF Volume:	450	4	0	0	0	0	303	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	450	4	0	0	0	0	303	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	450	4	0	0	0	0	303	0	0	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.98	0.02	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
Final Sat.:	1194	11	0	0	0	0	1127	0	0	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.38	0.38	xxxx	xxxx	xxxx	xxxx	0.27	xxxx	xxxx	xxxx	xxxx	xxxx
Crit Moves:	****						****					
Delay/Veh:	12.0	11.9	0.0	0.0	0.0	0.0	11.1	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	12.0	11.9	0.0	0.0	0.0	0.0	11.1	0.0	0.0	0.0	0.0	0.0
LOS by Move:	B	B	*	*	*	*	B	*	*	*	*	*
ApproachDel:		12.0			xxxxxx			11.1			xxxxxx	
Delay Adj:		1.00			xxxxx			1.00			xxxxx	
ApprAdjDel:		12.0			xxxxxx			11.1			xxxxxx	
LOS by Appr:		B			*			B			*	
AllWayAvgQ:	0.6	0.6	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0

2010 PHASE 1 PROJECT CONDITIONS
AM AND PM PEAK HOUR

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	24.6	0.491	C	25.2	0.521	+ 0.585 D/V
# 21 I-215/SR-60 SB Ramp at Univers	C	23.1	0.453	C	23.5	0.481	+ 0.317 D/V
# 23 West Campus at University Ave	C	28.2	0.714	C	28.1	0.721	-0.071 D/V
# 56 NW Mall at Iowa Avenue	A	0.0	0.000	C	23.1	0.000	+23.137 D/V
# 58 Iowa Ave at University Ave	D	35.6	0.514	D	36.2	0.525	+ 0.542 D/V
# 78 Iowa Ave at MLK Blvd	C	20.2	0.543	C	20.9	0.578	+ 0.716 D/V
# 83 Lot 30/MLK BLvd	C	22.9	0.774	C	23.1	0.791	+ 0.180 D/V
# 85 Canyon Crest Dr at MLK BLvd	C	25.1	0.614	C	27.4	0.645	+ 2.305 D/V
#109 Iowa Ave at Everton Place	C	18.1	0.000	F	164.7	0.000	+146.623 D/V
#124 Iowa Ave at Linden St	C	30.7	0.584	C	31.1	0.607	+ 0.319 D/V
#137 Chicago Ave at MLK Blvd	C	32.2	0.605	C	32.5	0.614	+ 0.262 D/V
#151 Chicago Ave at University Aven	C	33.6	0.520	C	33.8	0.526	+ 0.172 D/V
#159 Chicago Ave at Linden Street	C	33.9	0.715	C	34.6	0.767	+ 0.695 D/V
#196 Iowa Ave at Blaine St	D	39.3	0.846	D	40.3	0.862	+ 0.953 D/V
#207 I-215/SR-60 NB Ramp at Blain S	C	24.2	0.676	C	24.1	0.680	-0.081 D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	24.5	0.558	C	24.7	0.577	+ 0.261 D/V
#237 Chicago Ave at 3rd Street	D	43.1	0.744	D	43.8	0.760	+ 0.728 D/V
#291 I-215 SB Ramp/MLK Blvd	B	17.9	0.388	B	18.4	0.407	+ 0.538 D/V
#292 I-215 NB Ramps/MLK Blvd	C	15.4	0.572	C	16.3	0.591	+ 0.019 V/C

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 56 NW Mall at Iowa Avenue	??? / ???	No / No
#109 Iowa Ave at Everton Place	??? / ???	No / No
#292 I-215 NB Ramps/MLK Blvd	???	No

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-------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                2010 Phase 1 Conditions (Base + Project)
                                AM Peak
-------------------------------------------------------------------------------
                   Peak Hour Delay Signal Warrant Report
*******************************************************************************
Intersection #56 NW Mall at Iowa Avenue
*******************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
-----------|---------------||---------------||---------------||---------------|
Approach:     North Bound      South Bound       East Bound       West Bound
Movement:    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
-----------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Lanes:       1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
Initial Vol:    6  740     0     0  397    14    24     0    11     0     0     0
ApproachDel:     xxxxxx           xxxxxx            23.1            xxxxxx
-----------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.2]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=35]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=1192]
   SUCCEED - Total volume greater than or equal to 650 for intersection
             with less than four approaches.
-------------------------------------------------------------------------------
```

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	6		740		0	0		397		14	24		0		11	0		0		0

Major Street Volume: 1157
Minor Approach Volume: 35
Minor Approach Volume Threshold: 235

SIGNAL WARRANT DISCLAIMER
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UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	0	1	0	0	1	1	0	0	1	0	0	0	1!	0	0	1	0	0	0	1
Initial Vol:	15		718		89	101		377		32	53		0		25	20		0		43
ApproachDel:	xxxxxx					xxxxxx					164.7					31.2				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=3.6]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=78]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1473]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.5]
FAIL - Vehicle-hours less than 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=63]
FAIL - Approach volume less than 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1473]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
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UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	0	1	0	0	1	1	0	0	1	0	0	0	1!	0	0	1	0	0	0	1
Initial Vol:	15		718		89	101		377		32	53		0		25	20		0		43

Major Street Volume: 1332
Minor Approach Volume: 78
Minor Approach Volume Threshold: 186

SIGNAL WARRANT DISCLAIMER
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UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Stop Sign					Stop Sign				
Lanes:	1	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Initial Vol:	375		13		0	0		0		0	587		0		0	0		0		0

Major Street Volume: 587
Minor Approach Volume: 387
Minor Approach Volume Threshold: 603

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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                      UCR West Campus Development Plan
                 2010 Phase 1 Conditions (Base + Project)
                                 AM Peak
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                     Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #20 I-215/SR-60 NB Ramps at University
********************************************************************************
Cycle (sec):          110              Critical Vol./Cap.(X):          0.521
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        25.2
Optimal Cycle:         41              Level Of Service:                  C
********************************************************************************
Street Name:         I-215/SR-60 NB Ramps                University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Permitted
Rights:           Include          Include          Include          Include
Min. Green:     0     0     7    7     0     7    7     7     7    0     7     7
Lanes:        0  0  0  0  1    1  0  0  0  1    1  0  1  1  0    0  1  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:       0     0     1    74     0   382    80   595     1     0   198    73
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:    0     0     1    78     0   401    84   625     1     0   208    77
Added Vol:      0     0     0    24     0    23    18    41     0     0    30     5
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:    0     0     1   102     0   424   102   666     1     0   238    82
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     1.00  1.00  0.25  0.74  1.00  0.91  0.71  0.74  0.25  1.00  0.88  0.87
PHF Volume:     0     0     4   137     0   466   144   900     4     0   270    94
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:    0     0     4   137     0   466   144   900     4     0   270    94
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:     0     0     4   137     0   466   144   900     4     0   270    94
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       0.00  0.00  1.00  1.00  0.00  1.00  1.00  1.99  0.01  0.00  1.48  0.52
Final Sat.:     0     0  1900  1900     0  1900  1900  3782    18     0  2821   979
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00  0.07  0.00  0.25  0.08  0.24  0.24  0.00  0.10  0.10
Crit Moves:  ****                          ****        ****
Green/Cycle: 0.00  0.00  0.01  0.38  0.00  0.39  0.38  0.53  0.53  0.00  0.15  0.15
Volume/Cap:  0.00  0.00  0.19  0.19  0.00  0.62  0.20  0.45  0.45  0.00  0.62  0.62
Delay/Veh:    0.0   0.0  58.0  22.8   0.0  28.5  22.9  15.8  15.8   0.0  45.7  45.7
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0  58.0  22.8   0.0  28.5  22.9  15.8  15.8   0.0  45.7  45.7
LOS by Move:    A     A     E     C     A     C     C     B     B     A     D     D
HCM2kAvgQ:      0     0     0     3     0    13     3     9     9     0     7     7
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

7 Intersection #21 I-215/SR-60 SB Ramp at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.481
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	23.5
Optimal Cycle:	31	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	0	7	0	7	7	7	7	0
Lanes:	0 0	0 0	0	0 1	0 1	0	0 0	1 1	1	1 0	2 0	0
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	351	26	186	0	305	229	43	533	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	369	27	195	0	320	240	45	560	0
Added Vol:	0	0	0	15	0	17	0	43	7	7	46	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	384	27	212	0	363	247	52	606	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.70	0.50	0.88	1.00	0.88	0.90	0.83	0.93	1.00
PHF Volume:	0	0	0	548	55	241	0	413	275	63	651	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	548	55	241	0	413	275	63	651	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	548	55	241	0	413	275	63	651	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.18	0.82	0.00	1.80	1.20	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	351	1549	0	3421	2279	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.29	0.16	0.16	0.00	0.12	0.12	0.03	0.17	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.60	0.60	0.60	0.00	0.25	0.25	0.07	0.32	0.00
Volume/Cap:	0.00	0.00	0.00	0.48	0.26	0.26	0.00	0.48	0.48	0.47	0.53	0.00
Delay/Veh:	0.0	0.0	0.0	11.5	9.6	9.6	0.0	32.2	32.2	47.4	28.3	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	11.5	9.6	9.6	0.0	32.2	32.2	47.4	28.3	0.0
LOS by Move:	A	A	A	B	A	A	A	C	C	D	C	A
HCM2kAvgQ:	0	0	0	9	4	4	0	6	6	2	9	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #23 West Campus at University Ave

Cycle (sec): 100 | Critical Vol./Cap.(X): 0.721
Loss Time (sec): 8 (Y+R=4.0 sec) | Average Delay (sec/veh): 28.1
Optimal Cycle: 51 | Level Of Service: C

Street Name:	West Campus						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	0	0	0	0	7	7	7	7	0
Lanes:	1 0	0	0 1	0 0	0	0 0	0 0	1	1 0	1 0	2	0 0
Volume Module: Existing AM peak												
Base Vol:	129	0	276	0	0	0	0	285	367	203	153	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	135	0	290	0	0	0	0	299	385	213	161	0
Added Vol:	0	0	2	0	0	0	0	64	0	7	34	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	135	0	292	0	0	0	0	363	385	220	195	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.67	1.00	0.70	1.00	1.00	1.00	1.00	0.86	0.71	0.73	0.77	1.00
PHF Volume:	202	0	417	0	0	0	0	422	543	302	253	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	202	0	417	0	0	0	0	422	543	302	253	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	202	0	417	0	0	0	0	422	543	302	253	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	2.00	0.00
Final Sat.:	1900	0	1900	0	0	0	0	1900	1900	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.11	0.00	0.22	0.00	0.00	0.00	0.00	0.22	0.29	0.16	0.07	0.00
Crit Moves:			****						****	****		
Green/Cycle:	0.30	0.00	0.30	0.00	0.00	0.00	0.00	0.40	0.40	0.22	0.62	0.00
Volume/Cap:	0.35	0.00	0.72	0.00	0.00	0.00	0.00	0.56	0.72	0.72	0.11	0.00
Delay/Veh:	27.5	0.0	35.5	0.0	0.0	0.0	0.0	23.9	27.5	42.2	7.9	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	27.5	0.0	35.5	0.0	0.0	0.0	0.0	23.9	27.5	42.2	7.9	0.0
LOS by Move:	C	A	D	A	A	A	A	C	C	D	A	A
HCM2kAvgQ:	5	0	13	0	0	0	0	10	15	10	2	0

Note: Queue reported is the number of cars per lane.

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                        UCR West Campus Development Plan
                   2010 Phase 1 Conditions (Base + Project)
                                   AM Peak
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
            2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Average Delay (sec/veh):       0.7       Worst Case Level Of Service: C[ 23.1]
********************************************************************************
Street Name:                 NW Mall                        Iowa Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:      Uncontrolled     Uncontrolled      Stop Sign         Stop Sign
Rights:          Include          Include          Include           Include
Lanes:        1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
------------|----------------||----------------||----------------||----------------|
Volume Module:
Base Vol:        0  659     0     0  337     0     0     0     0     0     0     0
Growth Adj:   1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:     0  692     0     0  354     0     0     0     0     0     0     0
Added Vol:       6   48     0     0   43    14    24     0    11     0     0     0
PasserByVol:     0    0     0     0    0     0     0     0     0     0     0     0
Initial Fut:     6  740     0     0  397    14    24     0    11     0     0     0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.90 0.90  0.90  0.90 0.90  0.90  0.90 0.90  0.90  0.90 0.90  0.90
PHF Volume:      7  822     0     0  441    16    27     0    12     0     0     0
Reduct Vol:      0    0     0     0    0     0     0     0     0     0     0     0
Final Vol.:      7  822     0     0  441    16    27     0    12     0     0     0
Critical Gap Module:
Critical Gp:   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4 xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3 xxxxx xxxx xxxxx
------------|----------------||----------------||----------------||----------------|
Capacity Module:
Cnflict Vol:   457 xxxx xxxxx  xxxx xxxx xxxxx  1276 xxxx   441  xxxx xxxx xxxxx
Potent Cap.:  1115 xxxx xxxxx  xxxx xxxx xxxxx   186 xxxx   621  xxxx xxxx xxxxx
Move Cap.:    1115 xxxx xxxxx  xxxx xxxx xxxxx   185 xxxx   621  xxxx xxxx xxxxx
Volume/Cap:   0.01 xxxx  xxxx  xxxx xxxx  xxxx  0.14 xxxx  0.02  xxxx xxxx  xxxx
------------|----------------||----------------||----------------||----------------|
Level Of Service Module:
2Way95thQ:     0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:   8.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     A    *     *     *    *     *     *    *     *     *    *     *
Movement:      LT - LTR - RT   LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  237 xxxxx  xxxx    0 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.6 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 23.1 xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    *     *     *    *     *     *    C     *     *    *     *
ApproachDel:       xxxxxx           xxxxxx           23.1            xxxxxx
ApproachLOS:          *                *                C                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

> Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.525
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	36.2
Optimal Cycle:	36	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 2 0 1			1 0 1 1 0			1 0 2 0 1			1 0 2 0 1		
Volume Module: Existing AM Peak												
Base Vol:	63	544	92	136	245	99	139	345	56	80	342	167
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	66	571	97	143	257	104	146	362	59	84	359	175
Added Vol:	16	42	42	0	46	0	0	8	20	61	2	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	82	613	139	143	303	104	146	370	79	145	361	175
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.75	0.83	0.72	0.87	0.84	0.88	0.91	0.92	0.91	0.74	0.96	0.72
PHF Volume:	110	739	193	164	361	118	160	402	87	196	376	244
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	110	739	193	164	361	118	160	402	87	196	376	244
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
> Final Vol.:	110	739	193	164	361	118	160	402	87	196	376	244
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.51	0.49	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	2863	937	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.06	0.19	0.10	0.09	0.13	0.13	0.08	0.11	0.05	0.10	0.10	0.13
Crit Moves:		****		****				****		****		
Green/Cycle:	0.17	0.37	0.37	0.16	0.37	0.37	0.16	0.20	0.37	0.20	0.24	0.24
Volume/Cap:	0.34	0.52	0.27	0.52	0.34	0.34	0.53	0.52	0.12	0.52	0.41	0.53
Delay/Veh:	44.6	29.9	26.7	47.5	27.8	27.8	48.3	43.4	24.9	44.6	38.8	41.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	44.6	29.9	26.7	47.5	27.8	27.8	48.3	43.4	24.9	44.6	38.8	41.0
LOS by Move:	D	C	C	D	C	C	D	D	C	D	D	D
HCM2kAvgQ:	4	11	5	6	6	6	6	7	2	7	6	8

Note: Queue reported is the number of cars per lane.

```
-------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                  2010 Phase 1 Conditions (Base + Project)
                                 AM Peak
-------------------------------------------------------------------------------

                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #78 Iowa Ave at MLK Blvd
*******************************************************************************
Cycle (sec):          110              Critical Vol./Cap.(X):          0.578
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        20.9
Optimal Cycle:         37              Level Of Service:                   C
*******************************************************************************
Street Name:                 Iowa Avenue                      MLK Blvd
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include            Ovl           Include            Ovl
Min. Green:    0     0     0    7     7     7    7     7     0    0     7     7
Lanes:        0  0  0  0  0    1  0  1! 0  1    1  0  2  0  0    0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      0     0     0  263     0   101  267   440     0    0   785   484
Growth Adj:  1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05
Initial Bse:   0     0     0  276     0   106  280   462     0    0   824   508
Added Vol:     0     0     0   33     0    21   24    44     0    0    13    30
PasserByVol:   0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:   0     0     0  309     0   127  304   506     0    0   837   538
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00 0.75  1.00  0.81 0.90  0.77  1.00 1.00  0.95  0.92
PHF Volume:    0     0     0  412     0   157  338   657     0    0   881   585
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:   0     0     0  412     0   157  338   657     0    0   881   585
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:    0     0     0  412     0   157  338   657     0    0   881   585
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.00  0.00  0.00 1.72  0.00  1.28 1.00  2.00  0.00 0.00  2.00  1.00
Final Sat.:    0     0     0 3276     0  2424 1900  3800     0    0  3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.13  0.00  0.06 0.18  0.17  0.00 0.00  0.23  0.31
Crit Moves:                   ****             ****                    ****
Green/Cycle: 0.00  0.00  0.00 0.22  0.00  0.53 0.31  0.71  0.00 0.00  0.40  0.62
Volume/Cap:  0.00  0.00  0.00 0.58  0.00  0.12 0.58  0.24  0.00 0.00  0.58  0.50
Delay/Veh:    0.0   0.0   0.0 39.4   0.0  13.2 33.5   5.7   0.0  0.0  26.2  11.9
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0 39.4   0.0  13.2 33.5   5.7   0.0  0.0  26.2  11.9
LOS by Move:   A     A     A    D     A     B    C     A     A    A     C     B
HCM2kAvgQ:     0     0     0    8     0     2   10     4     0    0    12    11
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

```
--------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                 2010 Phase 1 Conditions (Base + Project)
                                 AM Peak
--------------------------------------------------------------------------------
                    Level Of Service Computation Report
              2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #83 Lot 30/MLK BLvd
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):        0.791
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):      23.1
Optimal Cycle:         63              Level Of Service:                C
********************************************************************************
Street Name:                 Lot 30                          MLK Blvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    7    0    7     7    0    7     7    7    0     7    7    7
Lanes:        1  0  0  0  0   0  1  0  0  1   1  0  1  1  0   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:        4    0    0    12    0    4   321  600    0    10 1276   77
Growth Adj:   1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05
Initial Bse:     4    0    0    13    0    4   337  630    0    11 1340   81
Added Vol:       0    0    0     0    0    1     4   73    0     0   42    0
PasserByVol:     0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:     4    0    0    13    0    5   341  703    0    11 1382   81
User Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:      0.50 1.00 1.00  1.00 1.00 0.33  0.60 0.75 1.00  0.50 0.90 0.69
PHF Volume:      8    0    0    13    0   16   568  937    0    21 1535  117
Reduct Vol:      0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:     8    0    0    13    0   16   568  937    0    21 1535  117
PCE Adj:      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:      8    0    0    13    0   16   568  937    0    21 1535  117
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
Adjustment:   0.81 1.00 1.00  0.76 1.00 0.85  0.95 1.00 1.00  0.95 1.00 0.85
Lanes:        1.00 0.00 0.00  1.00 0.00 1.00  1.00 2.00 0.00  1.00 2.00 1.00
Final Sat.:   1530    0    0  1440    0 1615  1805 3800    0  1805 3800 1615
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.01 0.00 0.00  0.01 0.00 0.01  0.31 0.25 0.00  0.01 0.40 0.07
Crit Moves:                   ****            ****                  ****
Green/Cycle:  0.07 0.00 0.00  0.07 0.00 0.07  0.37 0.66 0.00  0.19 0.48 0.48
Volume/Cap:   0.08 0.00 0.00  0.12 0.00 0.14  0.85 0.37 0.00  0.06 0.85 0.15
Delay/Veh:    43.8  0.0  0.0  44.2  0.0 44.2  38.5  7.7  0.0  33.4 26.8 14.8
User DelAdj:  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:   43.8  0.0  0.0  44.2  0.0 44.2  38.5  7.7  0.0  33.4 26.8 14.8
LOS by Move:     D    A    A     D    A    D     D    A    A     C    C    B
HCM2kAvgQ:       0    0    0     0    0    1    19    6    0     1   23    2
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                   2010 Phase 1 Conditions (Base + Project)
                                   AM Peak
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
              2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #85 Canyon Crest Dr at MLK BLvd
********************************************************************************
Cycle (sec):          120              Critical Vol./Cap.(X):         0.645
Loss Time (sec):       10 (Y+R=4.0 sec) Average Delay (sec/veh):       27.4
Optimal Cycle:         49              Level Of Service:                 C
********************************************************************************
Street Name:           Canyon Crest Dr                       MLK Blvd
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include            Ovl              Ovl            Include
Min. Green:      7    7    7     7    7    7     7    7    7     7    7    7
Lanes:          2  0  2  0  1   2  0  2  0  1   2  0  2  0  1   2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:     1153  452  445    41   84   52   130  185  323   108  335   36
Growth Adj:   1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05
Initial Bse:  1211  475  467    43   88   55   137  194  339   113  352   38
Added Vol:      10   21    0    14    6   14    49   19    5     0   18   49
PasserByVol:     0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:  1221  496  467    57   94   69   186  213  344   113  370   87
User Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:      0.92 0.74 0.79  0.68 0.88 0.59  0.83 0.72 0.94  0.93 0.89 0.56
PHF Volume:   1327  670  591    84  107  116   223  296  366   122  415  155
Reduct Vol:      0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:  1327  670  591    84  107  116   223  296  366   122  415  155
PCE Adj:      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:   1327  670  591    84  107  116   223  296  366   122  415  155
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
Adjustment:   0.90 1.00 0.85  0.90 1.00 0.85  0.90 1.00 0.85  0.90 1.00 0.85
Lanes:        2.00 2.00 1.00  2.00 2.00 1.00  2.00 2.00 1.00  2.00 2.00 1.00
Final Sat.:   3420 3800 1615  3420 3800 1615  3420 3800 1615  3420 3800 1615
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.39 0.18 0.37  0.02 0.03 0.07  0.07 0.08 0.23  0.04 0.11 0.10
Crit Moves:   ****                  ****      ****                  ****
Green/Cycle:  0.59 0.56 0.56  0.09 0.06 0.16  0.10 0.15 0.74  0.11 0.17 0.17
Volume/Cap:   0.66 0.31 0.65  0.27 0.48 0.46  0.66 0.51 0.30  0.31 0.66 0.58
Delay/Veh:    17.1 14.1 20.0  51.5 56.4 47.1  56.6 47.5  5.2  49.3 49.3 49.1
User DelAdj:  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:   17.1 14.1 20.0  51.5 56.4 47.1  56.6 47.5  5.2  49.3 49.3 49.1
LOS by Move:     B    B    B     D    E    D     E    D    A     D    D    D
HCM2kAvgQ:      17    6   15     2    3    4     5    6    4     2    8    6
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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-------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                  2010 Phase 1 Conditions (Base + Project)
                                  AM Peak
-------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #109 Iowa Ave at Everton Place
********************************************************************************
Average Delay (sec/veh):       9.6       Worst Case Level Of Service: F[164.7]
********************************************************************************
Street Name:                Iowa Avenue                      Everton Place
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:             Include          Include          Include          Include
Lanes:          0  1  0  0  1    1  0  0  1  0    0  0  1! 0  0    1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Exsting AM Peak
Base Vol:         0  659    56     28  337     0      0    0     0     10    0    21
Growth Adj:    1.05 1.05  1.05   1.05 1.05  1.05   1.05 1.05  1.05   1.05 1.05  1.05
Initial Bse:      0  692    59     29  354     0      0    0     0     11    0    22
Added Vol:       15   26    30     72   23    32     53    0    25      9    0    21
PasserByVol:      0    0     0      0    0     0      0    0     0      0    0     0
Initial Fut:     15  718    89    101  377    32     53    0    25     20    0    43
User Adj:      1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
PHF Adj:       1.00 0.90  0.54   0.88 0.83  1.00   1.00 1.00  1.00   0.83 1.00  0.75
PHF Volume:      15  798   164    115  454    32     53    0    25     23    0    57
Reduct Vol:       0    0     0      0    0     0      0    0     0      0    0     0
Final Vol.:      15  798   164    115  454    32     53    0    25     23    0    57
Critical Gap Module:
Critical Gp:    4.1 xxxx xxxxx    4.1 xxxx xxxxx    7.1 xxxx   6.2    7.1 xxxx   6.2
FollowUpTim:    2.2 xxxx xxxxx    2.2 xxxx xxxxx    3.5 xxxx   3.3    3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:    486 xxxx xxxxx    962 xxxx xxxxx   1639 xxxx   470   1541 xxxx   798
Potent Cap.:   1087 xxxx xxxxx    723 xxxx xxxxx     81 xxxx   598     95 xxxx   389
Move Cap.:     1087 xxxx xxxxx    723 xxxx xxxxx     60 xxxx   598     79 xxxx   389
Volume/Cap:    0.01 xxxx  xxxx   0.16 xxxx  xxxx   0.88 xxxx  0.04   0.30 xxxx  0.15
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:      0.0 xxxx xxxxx    0.6 xxxx xxxxx   xxxx xxxx xxxxx    1.1 xxxx   0.5
Control Del:    8.4 xxxx xxxxx   10.9 xxxx xxxxx  xxxxx xxxx xxxxx   68.7 xxxx  15.8
LOS by Move:      A    *     *      B    *     *      *    *     *      F    *     C
Movement:       LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:   xxxx xxxx xxxxx   xxxx xxxx xxxxx   xxxx   84 xxxxx   xxxx xxxx xxxxx
SharedQueue:    0.0 xxxx xxxxx  xxxxx xxxx xxxxx  xxxxx  5.0 xxxxx  xxxxx xxxx xxxxx
Shrd ConDel:    8.4 xxxx xxxxx  xxxxx xxxx xxxxx  xxxxx  165 xxxxx  xxxxx xxxx xxxxx
Shared LOS:       A    *     *      *    *     *      *    F     *      *    *     *
ApproachDel:        xxxxxx           xxxxxx            164.7             31.2
ApproachLOS:           *                *                 F                D
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                  2010 Phase 1 Conditions (Base + Project)
                                  AM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #124 Iowa Ave at Linden St
********************************************************************************
Cycle (sec):          110              Critical Vol./Cap.(X):          0.607
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        31.1
Optimal Cycle:         39              Level Of Service:                  C
********************************************************************************
Street Name:                 Iowa Avenue                      Linden Street
Approach:        North Bound      South Bound       East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:     7     7     7   7     7     7   7     7     7   7     7     7
Lanes:          1  0  2  0  1   1  0  1  1  0   1  0  1  0  1   1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      118  579    92    45  403   207   113  107    47    70  137    67
Growth Adj:   1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:   124  608    97    47  423   217   119  112    49    74  144    70
Added Vol:      10   20    12     0   26     0     0   12    13     7    4     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   134  628   109    47  449   217   119  124    62    81  148    70
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.59 0.90  0.80  0.70 0.80  0.57  0.81 0.70  0.70  0.65 0.66  0.88
PHF Volume:    227  698   136    68  561   381   146  178    89   124  224    80
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   227  698   136    68  561   381   146  178    89   124  224    80
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    227  698   136    68  561   381   146  178    89   124  224    80
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:        1.00 2.00  1.00  1.00 1.19  0.81  1.00 1.00  1.00  1.00 1.00  1.00
Final Sat.:   1900 3800  1900  1900 2263  1537  1900 1900  1900  1900 1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.12 0.18  0.07  0.04 0.25  0.25  0.08 0.09  0.05  0.07 0.12  0.04
Crit Moves:   ****                  ****        ****                    ****
Green/Cycle:  0.20 0.45  0.45  0.16 0.41  0.41  0.13 0.19  0.19  0.13 0.19  0.19
Volume/Cap:   0.61 0.41  0.16  0.23 0.61  0.61  0.61 0.49  0.25  0.49 0.61  0.22
Delay/Veh:    43.1 20.5  18.0  41.0 26.2  26.2  49.8 40.9  38.3  45.9 43.4  37.6
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   43.1 20.5  18.0  41.0 26.2  26.2  49.8 40.9  38.3  45.9 43.4  37.6
LOS by Move:     D    C     B     D    C     C     D    D     D     D    D     D
HCM2kAvgQ:       8    8     3     2   13    13     6    6     3     4    8     2
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	0.614
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	32.5
Optimal Cycle:	40	Level Of Service:	C

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Ovl			Ovl			Ovl		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	707	898	228	60	209	113	133	543	131	40	638	138
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	742	943	239	63	219	119	140	570	138	42	670	145
Added Vol:	0	0	17	7	0	0	0	44	0	9	23	2
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	742	943	256	70	219	119	140	614	138	51	693	147
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.87	0.92	0.70	0.80	0.80	0.81	0.85	0.74	0.90	0.71	0.94	0.78
PHF Volume:	853	1025	366	88	274	146	164	830	153	72	737	188
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	853	1025	366	88	274	146	164	830	153	72	737	188
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	853	1025	366	88	274	146	164	830	153	72	737	188
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.22	0.27	0.19	0.02	0.07	0.08	0.09	0.22	0.08	0.04	0.19	0.10
Crit Moves:		****		****			****				****	
Green/Cycle:	0.37	0.43	0.52	0.06	0.12	0.26	0.14	0.35	0.72	0.09	0.31	0.37
Volume/Cap:	0.61	0.63	0.37	0.39	0.61	0.30	0.63	0.62	0.11	0.40	0.63	0.27
Delay/Veh:	31.6	27.6	17.1	55.6	52.7	36.3	53.7	33.1	5.1	52.7	36.7	26.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	31.6	27.6	17.1	55.6	52.7	36.3	53.7	33.1	5.1	52.7	36.7	26.9
LOS by Move:	C	C	B	E	D	D	D	C	A	D	D	C
HCM2kAvgQ:	13	15	8	2	6	4	7	13	2	3	12	5

Note: Queue reported is the number of cars per lane.

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-------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                 2010 Phase 1 Conditions (Base + Project)
                                 AM Peak
-------------------------------------------------------------------------------

                    Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #151 Chicago Ave at University Avenue
*******************************************************************************
Cycle (sec):          120              Critical Vol./Cap.(X):        0.526
Loss Time (sec):       12 (Y+R=4.0 sec) Average Delay (sec/veh):      33.8
Optimal Cycle:         43              Level Of Service:                C
*******************************************************************************
Street Name:              Chicago Avenue               University Avenue
Approach:        North Bound      South Bound      East Bound      West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:     7    7     7    7    7     7    7    7     7    7    7     7
Lanes:         2  0  2  0  1   2  0  1  1  0   2  0  2  0  1   2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      208  747   110    74  320   126   173  326    88    85  386    55
Growth Adj:   1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:   218  784   116    78  336   132   182  342    92    89  405    58
Added Vol:       0    2     3     8    7     0     0   17     0     5    9     5
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   218  786   119    86  343   132   182  359    92    94  414    63
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.72 0.79  0.76  0.77 0.89  0.90  0.88 0.82  0.58  0.85 0.85  0.60
PHF Volume:    303  995   156   111  385   147   206  438   159   111  487   105
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   303  995   156   111  385   147   206  438   159   111  487   105
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    303  995   156   111  385   147   206  438   159   111  487   105
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:        2.00 2.00  1.00  2.00 1.45  0.55  2.00 2.00  1.00  2.00 2.00  1.00
Final Sat.:   3800 3800  1900  3800 2751  1049  3800 3800  1900  3800 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.08 0.26  0.08  0.03 0.14  0.14  0.05 0.12  0.08  0.03 0.13  0.06
Crit Moves:        ****        ****              ****                   ****
Green/Cycle:  0.20 0.50  0.50  0.06 0.35  0.35  0.10 0.23  0.23  0.12 0.24  0.24
Volume/Cap:   0.40 0.53  0.17  0.50 0.40  0.40  0.53 0.50  0.37  0.25 0.53  0.23
Delay/Veh:    41.9 20.9  16.7  56.6 29.4  29.4  52.4 40.7  39.4  48.6 40.0  36.7
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   41.9 20.9  16.7  56.6 29.4  29.4  52.4 40.7  39.4  48.6 40.0  36.7
LOS by Move:     D    C     B     E    C     C     D    D     D     D    D     D
HCM2kAvgQ:       5   12     3     3    7     7     4    7     5     2    8     3
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	0.767
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	34.6
Optimal Cycle:	58	Level Of Service:	C

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 1 1 0			1 0 2 0 1			1 0 0 1 0			1 0 1 1 0		
Volume Module: Existing AM Peak												
Base Vol:	21	771	148	140	364	33	36	102	31	154	122	153
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	22	810	155	147	382	35	38	107	33	162	128	161
Added Vol:	1	7	0	0	13	0	0	11	2	0	5	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	23	817	155	147	395	35	38	118	35	162	133	161
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.66	0.87	0.76	0.54	0.92	0.59	0.75	0.71	0.65	0.71	0.66	0.54
PHF Volume:	35	939	204	272	430	59	50	166	53	228	202	298
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	35	939	204	272	430	59	50	166	53	228	202	298
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	35	939	204	272	430	59	50	166	53	228	202	298
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.97	0.97	0.95	1.00	0.85	0.95	0.96	0.96	0.95	0.91	0.91
Lanes:	1.00	1.64	0.36	1.00	2.00	1.00	1.00	0.76	0.24	1.00	1.00	1.00
Final Sat.:	1805	3036	661	1805	3800	1615	1805	1388	444	1805	1731	1731
Capacity Analysis Module:												
Vol/Sat:	0.02	0.31	0.31	0.15	0.11	0.04	0.03	0.12	0.12	0.13	0.12	0.17
Crit Moves:		****		****				****		****		
Green/Cycle:	0.23	0.40	0.40	0.20	0.37	0.37	0.09	0.16	0.16	0.16	0.23	0.23
Volume/Cap:	0.08	0.77	0.77	0.77	0.31	0.10	0.30	0.77	0.77	0.77	0.51	0.75
Delay/Veh:	30.4	28.3	28.3	47.7	22.5	20.7	43.3	52.3	52.3	51.4	34.2	40.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	30.4	28.3	28.3	47.7	22.5	20.7	43.3	52.3	52.3	51.4	34.2	40.9
LOS by Move:	C	C	C	D	C	C	D	D	D	D	C	D
HCM2kAvgQ:	1	17	17	10	5	1	2	8	8	9	6	10

Note: Queue reported is the number of cars per lane.

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------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                 2010 Phase 1 Conditions (Base + Project)
                                  AM Peak
------------------------------------------------------------------------------

                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
******************************************************************************
Intersection #196 Iowa Ave at Blaine St
******************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         0.862
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       40.3
Optimal Cycle:         83              Level Of Service:                  D
******************************************************************************
Street Name:              Iowa Avenue                     Blain Street
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    7     7     7    7     7     7    7     7     7    7     7     7
Lanes:        1  0  2  0  1   1  0  1  1  0   1  0  2  0  1   1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:     141  641    99   121  413   225   418  410   103   108  428   130
Growth Adj:  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:  148  673   104   127  434   236   439  431   108   113  449   137
Added Vol:      6    9     4    14   15     0     0   32     5     6   11     4
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  154  682   108   141  449   236   439  463   113   119  460   141
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.78 0.93  0.85  0.72 0.69  0.84  0.89 0.75  0.89  0.93 0.88  0.79
PHF Volume:   198  733   127   196  650   281   493  617   127   128  523   178
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  198  733   127   196  650   281   493  617   127   128  523   178
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   198  733   127   196  650   281   493  617   127   128  523   178
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 1.40  0.60  1.00 2.00  1.00  1.00 1.49  0.51
Final Sat.:  1900 3800  1900  1900 2653  1147  1900 3800  1900  1900 2836   964
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.10 0.19  0.07  0.10 0.25  0.25  0.26 0.16  0.07  0.07 0.18  0.18
Crit Moves:  ****                  ****        ****                   ****
Green/Cycle: 0.12 0.26  0.26  0.14 0.28  0.28  0.30 0.36  0.36  0.16 0.21  0.21
Volume/Cap:  0.86 0.73  0.25  0.73 0.86  0.86  0.86 0.45  0.19  0.44 0.86  0.86
Delay/Veh:   69.9 36.4  29.3  51.0 41.2  41.2  45.7 24.7  22.1  39.3 47.2  47.2
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  69.9 36.4  29.3  51.0 41.2  41.2  45.7 24.7  22.1  39.3 47.2  47.2
LOS by Move:    E    D     C     D    D     D     D    C     C     D    D     D
HCM2kAvgQ:      9   12     3     7   17    17    17    7     3     4   13    13
******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #207 I-215/SR-60 NB Ramp at Blain Street

Cycle (sec):	110	Critical Vol./Cap.(X):	0.680
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.1
Optimal Cycle:	47	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	0	0	0	7	7	0	0	7	7
Lanes:	0 1	0 0	1	0 0	0 0	0	2 0	2 0	0	0 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	204	5	393	0	0	0	172	645	0	0	409	499
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	214	5	413	0	0	0	181	677	0	0	429	524
Added Vol:	0	0	1	0	0	0	0	37	0	0	13	5
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	214	5	414	0	0	0	181	714	0	0	442	529
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.70	0.31	0.95	1.00	1.00	1.00	0.68	0.76	1.00	1.00	0.85	0.84
PHF Volume:	306	17	435	0	0	0	266	940	0	0	521	630
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	306	17	435	0	0	0	266	940	0	0	521	630
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	306	17	435	0	0	0	266	940	0	0	521	630
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.95	0.05	1.00	0.00	0.00	0.00	2.00	2.00	0.00	0.00	1.00	1.00
Final Sat.:	1800	100	1900	0	0	0	3800	3800	0	0	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.17	0.17	0.23	0.00	0.00	0.00	0.07	0.25	0.00	0.00	0.27	0.33
Crit Moves:			****				****					****
Green/Cycle:	0.34	0.34	0.34	0.00	0.00	0.00	0.10	0.59	0.00	0.00	0.49	0.49
Volume/Cap:	0.50	0.50	0.68	0.00	0.00	0.00	0.68	0.42	0.00	0.00	0.56	0.68
Delay/Veh:	29.8	29.8	34.3	0.0	0.0	0.0	52.4	12.4	0.0	0.0	20.3	22.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	29.8	29.8	34.3	0.0	0.0	0.0	52.4	12.4	0.0	0.0	20.3	22.8
LOS by Move:	C	C	C	A	A	A	D	B	A	A	C	C
HCM2kAvgQ:	9	9	13	0	0	0	6	9	0	0	12	17

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #209 I-215/SR-60 SB Ramp at Blain St

****

Cycle (sec):	120	Critical Vol./Cap.(X):	0.577
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.7
Optimal Cycle:	37	Level Of Service:	C

****

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0	0 0	0 1	0	0 1	0 0	1	1 0	2 0	2	0 0
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	369	16	251	0	486	179	110	518	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	387	17	264	0	510	188	116	544	0
Added Vol:	0	0	0	15	0	0	0	22	0	2	11	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	402	17	264	0	532	188	118	555	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.95	0.80	0.76	1.00	0.66	0.86	0.89	0.76	1.00
PHF Volume:	0	0	0	424	21	347	0	807	219	132	730	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	424	21	347	0	807	219	132	730	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	424	21	347	0	807	219	132	730	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.95	0.05	1.00	0.00	1.57	0.43	2.00	2.00	0.00
Final Sat.:	0	0	0	1810	90	1900	0	2990	810	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.23	0.23	0.18	0.00	0.27	0.27	0.03	0.19	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.41	0.41	0.41	0.00	0.47	0.47	0.06	0.53	0.00
Volume/Cap:	0.00	0.00	0.00	0.58	0.58	0.45	0.00	0.58	0.58	0.58	0.36	0.00
Delay/Veh:	0.0	0.0	0.0	28.8	28.8	26.4	0.0	23.8	23.8	58.5	16.7	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	28.8	28.8	26.4	0.0	23.8	23.8	58.5	16.7	0.0
LOS by Move:	A	A	A	C	C	C	A	C	C	E	B	A
HCM2kAvgQ:	0	0	0	13	13	9	0	14	14	3	8	0

****

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	0.760
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	43.8
Optimal Cycle:	59	Level Of Service:	D

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0 1 1 0			1 0 1 1 0			1 0 1 1 0			1 0 1 1 0		
Volume Module: Existing AM Peak												
Base Vol:	176	590	177	195	315	66	94	348	71	130	425	222
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	185	620	186	205	331	69	99	365	75	137	446	233
Added Vol:	0	6	0	12	12	0	0	10	1	0	7	4
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	185	626	186	217	343	69	99	375	76	137	453	237
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.88	0.93	0.65	0.66	0.88	0.66	0.81	0.60	0.66	0.71	0.88	0.74
PHF Volume:	210	673	286	328	389	105	122	626	114	192	515	320
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	210	673	286	328	389	105	122	626	114	192	515	320
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	210	673	286	328	389	105	122	626	114	192	515	320
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.40	0.60	1.00	1.58	0.42	1.00	1.69	0.31	1.00	1.23	0.77
Final Sat.:	1900	2666	1134	1900	2993	807	1900	3212	588	1900	2343	1457
Capacity Analysis Module:												
Vol/Sat:	0.11	0.25	0.25	0.17	0.13	0.13	0.06	0.19	0.19	0.10	0.22	0.22
Crit Moves:		****		****			****				****	
Green/Cycle:	0.26	0.33	0.33	0.23	0.30	0.30	0.08	0.25	0.25	0.13	0.29	0.29
Volume/Cap:	0.43	0.76	0.76	0.76	0.43	0.43	0.76	0.79	0.79	0.79	0.76	0.76
Delay/Veh:	37.9	38.5	38.5	51.0	33.8	33.8	72.6	47.0	47.0	66.9	42.0	42.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	37.9	38.5	38.5	51.0	33.8	33.8	72.6	47.0	47.0	66.9	42.0	42.0
LOS by Move:	D	D	D	D	C	C	E	D	D	E	D	D
HCM2kAvgQ:	7	17	17	13	7	7	6	15	15	9	15	15

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #291 I-215 SB Ramp/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.407
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	18.4
Optimal Cycle:	28	Level Of Service:	B

Street Name:	I-215 SB Ramps						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Permitted			Permitted			Permitted			Permitted	
Rights:		Include			Include			Include			Include	
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:		0 0 0 0 0			1 0 0 1 0			0 0 1 1 1			1 0 2 0 0	
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	17	60	197	0	537	197	21	291	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	18	63	207	0	564	207	22	306	0
Added Vol:	0	0	0	0	0	19	0	5	28	0	48	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	18	63	226	0	569	235	22	354	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.43	0.71	0.79	1.00	0.86	0.67	0.75	0.87	1.00
PHF Volume:	0	0	0	42	89	286	0	661	351	29	406	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	42	89	286	0	661	351	29	406	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	42	89	286	0	661	351	29	406	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.24	0.76	0.00	1.96	1.04	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	450	1450	0	3726	1974	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.02	0.20	0.20	0.00	0.18	0.18	0.02	0.11	0.00
Crit Moves:					****			****				
Green/Cycle:	0.00	0.00	0.00	0.48	0.48	0.48	0.00	0.44	0.44	0.44	0.44	0.00
Volume/Cap:	0.00	0.00	0.00	0.05	0.41	0.41	0.00	0.41	0.41	0.04	0.25	0.00
Delay/Veh:	0.0	0.0	0.0	13.6	16.9	16.9	0.0	19.5	19.5	16.2	17.9	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	13.6	16.9	16.9	0.0	19.5	19.5	16.2	17.9	0.0
LOS by Move:	A	A	A	B	B	B	A	B	B	B	B	A
HCM2kAvgQ:	0	0	0	1	7	7	0	7	7	1	4	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
AM Peak

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #292 I-215 NB Ramps/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.591
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	16.3
Optimal Cycle:	0	Level Of Service:	C

Street Name:	I-215 NB Ramp						MLK BLvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 1	0 0	0	0 0	0 0	0	2 0	0 0	0	0 0	0 0	0
Volume Module: existing AM Peak												
Base Vol:	311	12	0	0	0	0	554	0	0	0	0	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	327	13	0	0	0	0	582	0	0	0	0	0
Added Vol:	48	0	0	0	0	0	5	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	375	13	0	0	0	0	587	0	0	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.60	1.00	1.00	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00
PHF Volume:	446	21	0	0	0	0	659	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	446	21	0	0	0	0	659	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	446	21	0	0	0	0	659	0	0	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.91	0.09	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
Final Sat.:	998	47	0	0	0	0	1116	0	0	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.45	0.45	xxxx	xxxx	xxxx	xxxx	0.59	xxxx	xxxx	xxxx	xxxx	xxxx
Crit Moves:	****						****					
Delay/Veh:	14.5	14.5	0.0	0.0	0.0	0.0	17.6	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	14.5	14.5	0.0	0.0	0.0	0.0	17.6	0.0	0.0	0.0	0.0	0.0
LOS by Move:	B	B	*	*	*	*	C	*	*	*	*	*
ApproachDel:		14.5			xxxxxx			17.6			xxxxxx	
Delay Adj:		1.00			xxxxx			1.00			xxxxx	
ApprAdjDel:		14.5			xxxxxx			17.6			xxxxxx	
LOS by Appr:		B			*			C			*	
AllWayAvgQ:	0.7	0.7	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/C	Future LOS	Future Del/ Veh	Future V/C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	25.7	0.628	C	26.6	0.674	+ 0.835 D/V
# 21 I-215/SR-60 SB Ramp at Univers	B	19.7	0.554	C	20.5	0.596	+ 0.809 D/V
# 23 West Campus at University Ave	C	25.1	0.607	C	25.1	0.623	-0.033 D/V
# 56 NW Mall at Iowa Avenue	A	0.0	0.000	F	63.4	0.000	+63.375 D/V
# 58 Iowa Ave at University Ave	D	41.9	0.797	D	45.6	0.868	+ 3.714 D/V
# 78 Iowa Ave at MLK Blvd	C	22.2	0.737	C	23.2	0.760	+ 1.029 D/V
# 83 Lot 30/MLK BLvd	D	41.0	0.948	D	45.7	0.973	+ 4.648 D/V
# 85 Canyon Crest Dr at MLK BLvd	E	75.8	1.164	E	77.9	1.181	+ 2.111 D/V
#109 Iowa Ave at Everton Place	F	129.4	0.000	F	798.2	0.000	+668.783 D/V
#124 Iowa Ave at Linden St	C	25.7	0.581	C	26.9	0.617	+ 1.162 D/V
#137 Chicago Ave at MLK Blvd	E	60.4	1.061	E	63.8	1.076	+ 3.457 D/V
#151 Chicago Ave at University Aven	D	45.2	0.885	D	45.5	0.889	+ 0.266 D/V
#159 Chicago Ave at Linden Street	C	25.0	0.625	C	25.3	0.636	+ 0.380 D/V
#196 Iowa Ave at Blaine St	D	36.9	0.774	D	37.8	0.797	+ 0.896 D/V
#207 I-215/SR-60 NB Ramp at Blain S	B	18.5	0.563	B	18.4	0.574	-0.066 D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	32.2	0.794	C	32.5	0.805	+ 0.225 D/V
#237 Chicago Ave at 3rd Street	D	47.3	0.860	D	48.0	0.867	+ 0.654 D/V
#291 I-215 SB Ramp/MLK Blvd	B	12.7	0.498	B	12.8	0.524	+ 0.130 D/V
#292 I-215 NB Ramps/MLK Blvd	B	10.9	0.331	B	11.5	0.372	+ 0.041 V/C

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 56 NW Mall at Iowa Avenue	??? / ???	No / No
#109 Iowa Ave at Everton Place	??? / ???	Yes / Yes
#292 I-215 NB Ramps/MLK Blvd	???	No

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Peak Hour Delay Signal Warrant Report

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	1 0	1	0 1	1 0	1	0 1	0 0	1!	0 0	0 0	1!	0 0
Initial Vol:	11	580	0	0	1144	24	18	0	8	0	0	0
ApproachDel:	xxxxxx			xxxxxx			63.4			xxxxxx		

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.5]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=26]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=1785]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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--------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                 2010 Phase 1 Conditions (Base + Project)
                                 PM Peak
--------------------------------------------------------------------------------
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
------------|----------------||----------------||----------------||----------------|
Approach:      North Bound       South Bound        East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:       Uncontrolled      Uncontrolled        Stop Sign         Stop Sign
Lanes:        1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
Initial Vol:    11  580    0     0 1144   24    18    0    8     0    0    0
------------|----------------||----------------||----------------||----------------|
Major Street Volume:              1759
Minor Approach Volume:            26
Minor Approach Volume Threshold: 90 [less than minimum of 100]
--------------------------------------------------------------------------------
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SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Peak Hour Delay Signal Warrant Report

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	0	1	0	0	1	1	0	0	1	0	0	0	1!	0	0	1	0	0	0	1
Initial Vol:	26		560		43	69		1120		54	41		0		20	77		0		109
ApproachDel:	xxxxxx					xxxxxx					774.2					798.2				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=13.1]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=61]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2120]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=41.3]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=186]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2120]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
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UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 1	0	0 1	1 0	0	1 0	0 0	1!	0 0	1 0	0	0 1
Initial Vol:	26	560	43	69	1120	54	41	0	20	77	0	109

Major Street Volume: 1872
Minor Approach Volume: 186
Minor Approach Volume Threshold: 104 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1	1 0	0 0	0	0 0	0 0	2	0 0	0 0	0	0 0	0 0
Initial Vol:	387	1	0	0	0	0	220	0	0	0	0	0

Major Street Volume: 388
Minor Approach Volume: 220
Minor Approach Volume Threshold: 782

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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--------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                2010 Phase 1 Conditions (Base + Project)
                                PM Peak
--------------------------------------------------------------------------------

                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #20 I-215/SR-60 NB Ramps at University
********************************************************************************
Cycle (sec):          110             Critical Vol./Cap.(X):          0.674
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       26.6
Optimal Cycle:         46             Level Of Service:                  C
********************************************************************************
Street Name:           I-215/SR-60 NB Ramps             University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected         Permitted
Rights:           Include          Include          Include          Include
Min. Green:     0     0     7    7     0     7    7     7     7    0     7     7
Lanes:        0  0  0  0  1    1  0  0  0  1    1  0  1  1  0    0  1  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:       0     0     1   70     0   273  159   408     0    0   582   182
Growth Adj:  1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05
Initial Bse:    0     0     1   74     0   287  167   428     0    0   611   191
Added Vol:      0     0     0   10     0    10   20    37     0    0    51    14
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:    0     0     1   84     0   297  187   465     0    0   662   205
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     1.00  1.00  0.25 0.80  1.00  0.78 0.70  0.86  1.00 1.00  0.80  0.81
PHF Volume:     0     0     4  104     0   380  267   541     0    0   828   253
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:    0     0     4  104     0   380  267   541     0    0   828   253
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:     0     0     4  104     0   380  267   541     0    0   828   253
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.00  0.00  1.00 1.00  0.00  1.00 1.00  2.00  0.00 0.00  1.53  0.47
Final Sat.:     0     0  1900 1900     0  1900 1900  3800     0    0  2910   890
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.05  0.00  0.20 0.14  0.14  0.00 0.00  0.28  0.28
Crit Moves:  ****                         **** ****                    ****
Green/Cycle: 0.00  0.00  0.01 0.29  0.00  0.30 0.21  0.63  0.00 0.00  0.42  0.42
Volume/Cap:  0.00  0.00  0.22 0.19  0.00  0.67 0.67  0.23  0.00 0.00  0.67  0.67
Delay/Veh:    0.0   0.0  59.9 29.8   0.0  37.2 44.6   8.8   0.0  0.0  26.8  26.8
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0  59.9 29.8   0.0  37.2 44.6   8.8   0.0  0.0  26.8  26.8
LOS by Move:    A     A     E    C     A     D    D     A     A    A     C     C
HCM2kAvgQ:      0     0     0    3     0    12    9     4     0    0    15    15
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

7 Intersection #21 I-215/SR-60 SB Ramp at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.596
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	20.5
Optimal Cycle:	38	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	0	7	0	7	7	7	7	0
Lanes:	0 0	0 0	0	0 1	0 1	0	0 0	1 1	1	1 0	2 0	0
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	42	183	93	0	521	724	191	664	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	44	192	98	0	547	760	201	697	0
Added Vol:	0	0	0	7	0	19	0	50	22	22	39	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	51	192	117	0	597	782	223	736	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.88	0.74	0.83	1.00	0.89	0.92	0.73	0.89	1.00
PHF Volume:	0	0	0	58	260	141	0	671	850	305	827	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	58	260	141	0	671	850	305	827	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	58	260	141	0	671	850	305	827	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.25	1.14	0.61	0.00	1.32	1.68	1.00	2.00	0.00
Final Sat.:	0	0	0	482	2153	1165	0	2514	3186	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.12	0.12	0.12	0.00	0.27	0.27	0.16	0.22	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.20	0.20	0.20	0.00	0.45	0.45	0.27	0.72	0.00
Volume/Cap:	0.00	0.00	0.00	0.60	0.60	0.60	0.00	0.60	0.60	0.60	0.30	0.00
Delay/Veh:	0.0	0.0	0.0	37.4	37.4	37.4	0.0	21.2	21.2	33.7	5.2	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	37.4	37.4	37.4	0.0	21.2	21.2	33.7	5.2	0.0
LOS by Move:	A	A	A	D	D	D	A	C	C	C	A	A
HCM2kAvgQ:	0	0	0	7	7	7	0	12	12	9	5	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #23 West Campus at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.623
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.1
Optimal Cycle:	40	Level Of Service:	C

Street Name:	West Campus						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	0	0	0	0	7	7	7	7	0
Lanes:	1 0	0	0 1	0 0	0	0 0	0 0	1	1 0	1 0	2	0 0
Volume Module: Existing PM Peak												
Base Vol:	287	0	224	0	0	0	0	283	197	369	500	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	301	0	235	0	0	0	0	297	207	387	525	0
Added Vol:	0	0	6	0	0	0	0	47	0	3	65	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	301	0	241	0	0	0	0	344	207	390	590	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.82	1.00	0.76	1.00	1.00	1.00	1.00	0.94	0.95	0.91	0.86	1.00
PHF Volume:	368	0	317	0	0	0	0	366	218	429	686	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	368	0	317	0	0	0	0	366	218	429	686	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	368	0	317	0	0	0	0	366	218	429	686	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	1.25	0.75	1.00	2.00	0.00
Final Sat.:	1900	0	1900	0	0	0	0	2383	1417	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.19	0.00	0.17	0.00	0.00	0.00	0.00	0.15	0.15	0.23	0.18	0.00
Crit Moves:	****							****		****		
Green/Cycle:	0.31	0.00	0.31	0.00	0.00	0.00	0.00	0.25	0.25	0.36	0.61	0.00
Volume/Cap:	0.62	0.00	0.54	0.00	0.00	0.00	0.00	0.62	0.62	0.62	0.30	0.00
Delay/Veh:	31.5	0.0	29.5	0.0	0.0	0.0	0.0	34.8	34.8	28.0	9.4	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	31.5	0.0	29.5	0.0	0.0	0.0	0.0	34.8	34.8	28.0	9.4	0.0
LOS by Move:	C	A	C	A	A	A	A	C	C	C	A	A
HCM2kAvgQ:	10	0	8	0	0	0	0	9	9	11	5	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #56 NW Mall at Iowa Avenue

Average Delay (sec/veh): 1.0 Worst Case Level Of Service: F[63.4]

Street Name:	NW Mall						Iowa Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	1 0 1 0 1			1 0 1 0 1			0 0 1! 0 0			0 0 1! 0 0		
Volume Module:												
Base Vol:	0	503	0	0	1038	0	0	0	0	0	0	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	528	0	0	1090	0	0	0	0	0	0	0
Added Vol:	11	52	0	0	54	24	18	0	8	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	11	580	0	0	1144	24	18	0	8	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	12	645	0	0	1271	27	20	0	9	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	12	645	0	0	1271	27	20	0	9	0	0	0
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.4	xxxx	6.2	xxxxx	xxxx	xxxxx
FollowUpTim:	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.5	xxxx	3.3	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	1298	xxxx	xxxxx	xxxx	xxxx	xxxxx	1940	xxxx	1271	xxxx	xxxx	xxxxx
Potent Cap.:	541	xxxx	xxxxx	xxxx	xxxx	xxxxx	73	xxxx	207	xxxx	xxxx	xxxxx
Move Cap.:	541	xxxx	xxxxx	xxxx	xxxx	xxxxx	71	xxxx	207	xxxx	xxxx	xxxxx
Volume/Cap:	0.02	xxxx	xxxx	xxxx	xxxx	xxxx	0.28	xxxx	0.04	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	0.1	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	11.8	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	B	*	*	*	*	*	*	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	89	xxxxx	xxxx	0	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	1.2	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	63.4	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	F	*	*	*	*
ApproachDel:		xxxxxx			xxxxxx			63.4			xxxxxx	
ApproachLOS:		*			*			F			*	

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.868
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	45.6
Optimal Cycle:	90	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 2 0 1			1 0 1 1 0			1 0 2 0 1			1 0 2 0 1		
Volume Module: Existing PM												
Base Vol:	93	370	129	260	800	187	217	874	152	156	374	103
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	98	389	135	273	840	196	228	918	160	164	393	108
Added Vol:	22	55	64	0	48	0	0	7	18	49	9	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	120	443	199	273	888	196	228	925	178	213	402	108
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.60	0.96	0.75	0.94	0.91	0.90	0.82	0.94	0.84	0.85	0.87	0.72
PHF Volume:	199	462	266	290	976	218	278	984	211	250	462	150
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	199	462	266	290	976	218	278	984	211	250	462	150
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	199	462	266	290	976	218	278	984	211	250	462	150
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.63	0.37	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3106	694	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.10	0.12	0.14	0.15	0.31	0.31	0.15	0.26	0.11	0.13	0.12	0.08
Crit Moves:	****				****			****		****		
Green/Cycle:	0.12	0.23	0.23	0.25	0.36	0.36	0.25	0.30	0.42	0.15	0.20	0.20
Volume/Cap:	0.87	0.53	0.61	0.61	0.87	0.87	0.59	0.87	0.27	0.87	0.59	0.39
Delay/Veh:	79.4	41.0	43.7	41.8	41.7	41.7	42.0	47.2	22.9	72.9	44.5	41.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	79.4	41.0	43.7	41.8	41.7	41.7	42.0	47.2	22.9	72.9	44.5	41.9
LOS by Move:	E	D	D	D	D	D	D	D	C	E	D	D
HCM2kAvgQ:	10	8	9	10	23	23	10	20	5	12	8	5

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #78 Iowa Ave at MLK Blvd

Cycle (sec):	110	Critical Vol./Cap.(X):	0.760
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	23.2
Optimal Cycle:	58	Level Of Service:	C

Street Name:		Iowa Avenue						MLK Blvd				
Approach:		North Bound			South Bound			East Bound			West Bound	
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Ovl			Include			Ovl	
Min. Green:	0	0	0	7	7	7	7	7	0	0	7	7
Lanes:	0 0 0 0 0			1 0 1! 0 1			1 0 2 0 0			0 0 2 0 1		
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	727	0	273	170	1564	0	0	667	353
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	763	0	287	179	1642	0	0	700	371
Added Vol:	0	0	0	34	0	29	28	36	0	0	50	35
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	797	0	316	207	1678	0	0	750	406
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.95	1.00	0.90	0.87	0.99	1.00	1.00	0.79	0.92
PHF Volume:	0	0	0	839	0	351	237	1695	0	0	950	441
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	839	0	351	237	1695	0	0	950	441
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	839	0	351	237	1695	0	0	950	441
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.71	0.00	1.29	1.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	0	0	0	3240	0	2460	1900	3800	0	0	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.26	0.00	0.14	0.12	0.45	0.00	0.00	0.25	0.23
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.34	0.00	0.54	0.20	0.59	0.00	0.00	0.39	0.73
Volume/Cap:	0.00	0.00	0.00	0.76	0.00	0.27	0.64	0.76	0.00	0.00	0.64	0.32
Delay/Veh:	0.0	0.0	0.0	34.5	0.0	13.8	44.4	18.5	0.0	0.0	28.1	5.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	34.5	0.0	13.8	44.4	18.5	0.0	0.0	28.1	5.3
LOS by Move:	A	A	A	C	A	B	D	B	A	A	C	A
HCM2kAvgQ:	0	0	0	16	0	5	8	22	0	0	13	5

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                   2010 Phase 1 Conditions (Base + Project)
                                 PM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #83 Lot 30/MLK BLvd
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):          0.973
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):         45.7
Optimal Cycle:        120              Level Of Service:                   D
********************************************************************************
Street Name:                  Lot 30                       MLK Blvd
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Permitted        Permitted        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:     7     0     7     7     0     7     7     7     0     7     7     7
Lanes:         0  0  0  0  1    0  1  0  0  1    1  0  1  1  0    1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:       0     0     1   162     0   271    31  1989     0    10   926     1
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:    0     0     1   170     0   285    33  2088     0    11   972     1
Added Vol:      0     0     0     0     0     4     2    68     0     0    81     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:    0     0     1   170     0   289    35  2156     0    11  1053     1
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.50  1.00  0.25  0.57  1.00  0.62  0.43  0.95  1.00  0.63  0.85  1.00
PHF Volume:     0     0     4   298     0   465    80  2270     0    17  1239     1
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:    0     0     4   298     0   465    80  2270     0    17  1239     1
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:     0     0     4   298     0   465    80  2270     0    17  1239     1
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  0.87  0.71  1.00  0.85  0.95  1.00  1.00  0.95  1.00  0.85
Lanes:       0.00  0.00  1.00  1.00  0.00  1.00  1.00  2.00  0.00  1.00  2.00  1.00
Final Sat.:     0     0  1644  1357     0  1615  1805  3800     0  1805  3800  1615
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00  0.22  0.00  0.29  0.04  0.60  0.00  0.01  0.33  0.00
Crit Moves:                               ****        ****        ****
Green/Cycle: 0.00  0.00  0.28  0.28  0.00  0.28  0.11  0.57  0.00  0.07  0.53  0.53
Volume/Cap:  0.00  0.00  0.01  0.80  0.00  1.04  0.39  1.04  0.00  0.13  0.62  0.00
Delay/Veh:    0.0   0.0  26.2  44.7   0.0  90.0  42.3  52.5   0.0  44.1  17.0  11.1
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0  26.2  44.7   0.0  90.0  42.3  52.5   0.0  44.1  17.0  11.1
LOS by Move:    A     A     C     D     A     F     D     D     A     D     B     B
HCM2kAvgQ:      0     0     0    11     0    22     3    47     0     1    14     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120		Critical Vol./Cap.(X):	1.181
Loss Time (sec):	10	(Y+R=4.0 sec)	Average Delay (sec/veh):	77.9
Optimal Cycle:	120		Level Of Service:	E

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	295	186	129	125	552	189	163	1043	1058	162	254	25
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	310	195	135	131	580	198	171	1095	1111	170	267	26
Added Vol:	7	9	0	46	20	46	21	35	12	0	27	21
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	317	204	135	177	600	244	192	1130	1123	170	294	47
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.83	0.81	0.80	0.73	0.72	0.64	0.84	0.86	0.86	0.87	0.78
PHF Volume:	411	246	167	222	821	340	300	1345	1306	198	338	61
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	411	246	167	222	821	340	300	1345	1306	198	338	61
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	411	246	167	222	821	340	300	1345	1306	198	338	61
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3420	3800	1615	3420	3800	1615	3420	3800	1615	3420	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.12	0.06	0.10	0.06	0.22	0.21	0.09	0.35	0.81	0.06	0.09	0.04
Crit Moves:	****				****				****	****		
Green/Cycle:	0.10	0.17	0.17	0.11	0.18	0.50	0.32	0.58	0.68	0.06	0.32	0.32
Volume/Cap:	1.19	0.37	0.60	0.60	1.19	0.42	0.28	0.61	1.19	0.99	0.28	0.12
Delay/Veh:	166.1	44.2	49.2	53.7	150	19.6	31.0	17.2	115.7	117.6	30.6	29.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	166.1	44.2	49.2	53.7	150	19.6	31.0	17.2	115.7	117.6	30.6	29.0
LOS by Move:	F	D	D	D	F	B	C	B	F	F	C	C
HCM2kAvgQ:	15	4	6	5	26	8	4	16	75	7	5	2

Note: Queue reported is the number of cars per lane.

```
------------------------------------------------------------------------------
                   UCR West Campus Development Plan
               2010 Phase 1 Conditions (Base + Project)
                                PM Peak
------------------------------------------------------------------------------
                  Level Of Service Computation Report
         2000 HCM Unsignalized Method (Future Volume Alternative)
******************************************************************************
Intersection #109 Iowa Ave at Everton Place
******************************************************************************
Average Delay (sec/veh):     113.6       Worst Case Level Of Service: F[798.2]
******************************************************************************
Street Name:               Iowa Avenue                   Everton Place
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Lanes:        0  1  0  0  1   1  0  0  1  0   0  0  1! 0  0   1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:        0  503    29    36 1038     0     0    0     0    47    0    39
Growth Adj:   1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:     0  528    30    38 1090     0     0    0     0    49    0    41
Added Vol:      26   32    13    31   30    54    41    0    20    28    0    68
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    26  560    43    69 1120    54    41    0    20    77    0   109
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 0.87  0.81  0.69 0.97  1.00  1.00 1.00  1.00  0.59 1.00  0.75
PHF Volume:     26  644    54   100 1155    54    41    0    20   131    0   145
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:     26  644    54   100 1155    54    41    0    20   131    0   145
Critical Gap Module:
Critical Gp:   4.1 xxxx xxxxx   4.1 xxxx xxxxx   7.1 xxxx   6.2   7.1 xxxx   6.2
FollowUpTim:   2.2 xxxx xxxxx   2.2 xxxx xxxxx   3.5 xxxx   3.3   3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1209 xxxx xxxxx   697 xxxx xxxxx  2176 xxxx  1182  2087 xxxx   644
Potent Cap.:   584 xxxx xxxxx   908 xxxx xxxxx    34 xxxx   233    39 xxxx   477
Move Cap.:     584 xxxx xxxxx   908 xxxx xxxxx    21 xxxx   233    32 xxxx   477
Volume/Cap:   0.04 xxxx  xxxx  0.11 xxxx  xxxx  1.97 xxxx  0.09  4.13 xxxx  0.30
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:     0.1 xxxx xxxxx   0.4 xxxx xxxxx  xxxx xxxx xxxxx  15.6 xxxx   1.3
Control Del:  11.4 xxxx xxxxx   9.5 xxxx xxxxx xxxxx xxxx xxxxx  1665 xxxx  15.8
LOS by Move:     B    *     *     A    *     *     *    *     *     F    *     C
Movement:       LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx   30 xxxxx  xxxx xxxx xxxxx
SharedQueue:   0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  7.1 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:  11.4 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  774 xxxxx xxxxx xxxx xxxxx
Shared LOS:      B    *     *     *    *     *     *    F     *     *    *     *
ApproachDel:       xxxxxx           xxxxxx            774.2            798.2
ApproachLOS:          *                *                F                F
******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #124 Iowa Ave at Linden St

Cycle (sec):	110	Critical Vol./Cap.(X):	0.617
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	26.9
Optimal Cycle:	40	Level Of Service:	C

Street Name:	Iowa Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 2 0 1			1 0 1 1 0			1 0 1 0 1			1 0 1 0 1		
Volume Module: Existing PM Peak												
Base Vol:	46	571	140	58	1023	98	126	155	123	109	110	17
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	48	600	147	61	1074	103	132	163	129	114	116	18
Added Vol:	14	31	10	0	24	0	0	5	11	13	12	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	62	631	157	61	1098	103	132	168	140	127	128	18
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.91	0.85	0.91	0.92	0.88	0.81	0.95	0.70	0.85	0.83	0.53
PHF Volume:	81	693	185	67	1194	117	163	177	200	150	154	34
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	81	693	185	67	1194	117	163	177	200	150	154	34
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	81	693	185	67	1194	117	163	177	200	150	154	34
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.82	0.18	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1900	3800	1900	1900	3461	339	1900	1900	1900	1900	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.04	0.18	0.10	0.04	0.34	0.34	0.09	0.09	0.11	0.08	0.08	0.02
Crit Moves:	****				****				****	****		
Green/Cycle:	0.07	0.47	0.47	0.16	0.56	0.56	0.15	0.17	0.17	0.13	0.14	0.14
Volume/Cap:	0.62	0.39	0.21	0.22	0.62	0.62	0.56	0.54	0.62	0.62	0.56	0.12
Delay/Veh:	58.3	19.3	17.5	40.3	16.9	16.9	45.5	43.6	45.8	50.1	46.3	41.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	58.3	19.3	17.5	40.3	16.9	16.9	45.5	43.6	45.8	50.1	46.3	41.1
LOS by Move:	E	B	B	D	B	B	D	D	D	D	D	D
HCM2kAvgQ:	4	8	4	2	15	15	6	6	7	6	6	1

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	1.076
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	63.8
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Ovl			Ovl			Ovl		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	140	287	61	366	1057	201	170	1283	792	249	514	105
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	147	301	64	384	1110	211	179	1347	832	261	540	110
Added Vol:	0	0	12	8	0	0	0	30	0	19	48	17
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	147	301	76	392	1110	211	179	1377	832	280	588	127
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.84	0.66	0.92	0.91	0.88	0.92	0.96	0.92	0.71	0.86	0.82
PHF Volume:	155	359	115	426	1220	240	194	1435	904	395	683	155
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	155	359	115	426	1220	240	194	1435	904	395	683	155
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	155	359	115	426	1220	240	194	1435	904	395	683	155
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.04	0.09	0.06	0.11	0.32	0.13	0.10	0.38	0.48	0.21	0.18	0.08
Crit Moves:	****				****				****	****		
Green/Cycle:	0.06	0.16	0.35	0.19	0.30	0.51	0.21	0.39	0.44	0.19	0.37	0.56
Volume/Cap:	0.70	0.58	0.17	0.58	1.08	0.25	0.49	0.98	1.07	1.08	0.49	0.15
Delay/Veh:	64.9	47.9	26.7	45.2	93.9	16.9	42.7	54.8	85.0	119.1	29.4	12.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	64.9	47.9	26.7	45.2	93.9	16.9	42.7	54.8	85.0	119.1	29.4	12.6
LOS by Move:	E	D	C	D	F	B	D	D	F	F	C	B
HCM2kAvgQ:	4	7	3	8	32	5	7	32	45	22	10	3

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120		Critical Vol./Cap.(X):	0.889
Loss Time (sec):	12	(Y+R=4.0 sec)	Average Delay (sec/veh):	45.5
Optimal Cycle:	114		Level Of Service:	D

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	1 1	0	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	237	363	126	155	956	86	182	796	463	309	385	72
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	249	381	132	163	1004	90	191	836	486	324	404	76
Added Vol:	2	12	8	6	5	0	0	11	1	5	17	8
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	251	393	140	169	1009	90	191	847	487	329	421	84
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.92	0.73	0.84	0.89	0.77	0.81	0.90	0.87	0.87	0.92	0.82
PHF Volume:	292	427	192	201	1133	117	236	941	560	379	458	102
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	292	427	192	201	1133	117	236	941	560	379	458	102
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	292	427	192	201	1133	117	236	941	560	379	458	102
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.81	0.19	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3444	356	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.08	0.11	0.10	0.05	0.33	0.33	0.06	0.25	0.29	0.10	0.12	0.05
Crit Moves:	****				****				****	****		
Green/Cycle:	0.09	0.30	0.30	0.16	0.37	0.37	0.15	0.33	0.33	0.11	0.29	0.29
Volume/Cap:	0.89	0.37	0.34	0.34	0.89	0.89	0.41	0.75	0.89	0.89	0.41	0.18
Delay/Veh:	78.6	33.3	33.0	45.5	42.8	42.8	46.6	38.1	52.6	72.5	34.4	31.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	78.6	33.3	33.0	45.5	42.8	42.8	46.6	38.1	52.6	72.5	34.4	31.9
LOS by Move:	E	C	C	D	D	D	D	D	D	E	C	C
HCM2kAvgQ:	8	6	5	3	25	25	4	17	23	10	7	3

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	0.636
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.3
Optimal Cycle:	41	Level Of Service:	C

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 1 1 0			1 0 2 0 1			1 0 0 1 0			1 0 1 1 0		
Volume Module: Existing PM Peak												
Base Vol:	61	432	161	172	1149	145	29	83	46	110	124	94
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	64	454	169	181	1206	152	30	87	48	116	130	99
Added Vol:	3	16	1	0	10	0	0	6	1	1	10	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	67	470	170	181	1216	152	30	93	49	117	140	99
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.97	0.84	0.78	0.91	0.79	0.81	0.83	0.72	0.71	0.82	0.81
PHF Volume:	75	484	202	232	1337	193	38	112	68	164	171	122
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	75	484	202	232	1337	193	38	112	68	164	171	122
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	75	484	202	232	1337	193	38	112	68	164	171	122
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.96	0.96	0.95	1.00	0.85	0.95	0.94	0.94	0.95	0.94	0.94
Lanes:	1.00	1.41	0.59	1.00	2.00	1.00	1.00	0.62	0.38	1.00	1.17	0.83
Final Sat.:	1805	2562	1071	1805	3800	1615	1805	1113	679	1805	2081	1483
Capacity Analysis Module:												
Vol/Sat:	0.04	0.19	0.19	0.13	0.35	0.12	0.02	0.10	0.10	0.09	0.08	0.08
Crit Moves:	****				****			****		****		
Green/Cycle:	0.07	0.37	0.37	0.25	0.55	0.55	0.14	0.16	0.16	0.14	0.16	0.16
Volume/Cap:	0.59	0.51	0.51	0.51	0.64	0.22	0.15	0.64	0.64	0.64	0.51	0.51
Delay/Veh:	52.3	24.9	24.9	33.2	16.3	11.6	38.2	44.3	44.3	45.8	39.0	39.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	52.3	24.9	24.9	33.2	16.3	11.6	38.2	44.3	44.3	45.8	39.0	39.0
LOS by Move:	D	C	C	C	B	B	D	D	D	D	D	D
HCM2kAvgQ:	3	8	8	7	15	3	1	6	6	6	5	5

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	0.797
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	37.8
Optimal Cycle:	64	Level Of Service:	D

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	1 1	0
Volume Module: Existing PM Peak												
Base Vol:	198	510	145	193	768	167	302	438	268	149	271	109
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	208	536	152	203	806	175	317	460	281	156	285	114
Added Vol:	6	18	7	6	12	0	0	15	7	6	31	13
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	214	554	159	209	818	175	317	475	288	162	316	127
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.86	0.86	0.72	0.96	0.84	0.91	0.88	0.96	0.83	0.89	0.78
PHF Volume:	255	644	185	290	853	209	348	540	300	196	355	163
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	255	644	185	290	853	209	348	540	300	196	355	163
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	255	644	185	290	853	209	348	540	300	196	355	163
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.61	0.39	1.00	2.00	1.00	1.00	1.37	0.63
Final Sat.:	1900	3800	1900	1900	3053	747	1900	3800	1900	1900	2601	1199
Capacity Analysis Module:												
Vol/Sat:	0.13	0.17	0.10	0.15	0.28	0.28	0.18	0.14	0.16	0.10	0.14	0.14
Crit Moves:	****				****		****				****	
Green/Cycle:	0.17	0.27	0.27	0.25	0.35	0.35	0.23	0.24	0.24	0.16	0.17	0.17
Volume/Cap:	0.80	0.62	0.36	0.62	0.80	0.80	0.80	0.58	0.65	0.65	0.80	0.80
Delay/Veh:	53.0	33.0	29.7	36.1	32.7	32.7	46.1	34.4	37.3	44.5	46.6	46.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	53.0	33.0	29.7	36.1	32.7	32.7	46.1	34.4	37.3	44.5	46.6	46.6
LOS by Move:	D	C	C	D	C	C	D	C	D	D	D	D
HCM2kAvgQ:	10	9	5	9	17	17	12	8	9	7	10	10

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #207 I-215/SR-60 NB Ramp at Blain Street

Cycle (sec):	110	Critical Vol./Cap.(X):	0.574
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	18.4
Optimal Cycle:	37	Level Of Service:	B

Street Name:	I-215/SR-60 NB Ramps						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	0	0	0	7	7	0	0	7	7
Lanes:	0 1	0 0	1	0 0	0 0	0	2 0	2 0	0	0 0	1 1	0
Volume Module: Existing PM Peak												
Base Vol:	97	1	261	0	0	0	124	779	0	0	483	494
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	102	1	274	0	0	0	130	818	0	0	507	519
Added Vol:	0	0	2	0	0	0	0	20	0	0	22	14
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	102	1	276	0	0	0	130	838	0	0	529	533
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.25	0.88	1.00	1.00	1.00	0.84	0.95	1.00	1.00	0.91	0.86
PHF Volume:	110	4	314	0	0	0	155	882	0	0	581	619
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	110	4	314	0	0	0	155	882	0	0	581	619
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	110	4	314	0	0	0	155	882	0	0	581	619
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.96	0.04	1.00	0.00	0.00	0.00	2.00	2.00	0.00	0.00	1.00	1.00
Final Sat.:	1830	70	1900	0	0	0	3800	3800	0	0	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.06	0.06	0.17	0.00	0.00	0.00	0.04	0.23	0.00	0.00	0.31	0.33
Crit Moves:			****				****					****
Green/Cycle:	0.29	0.29	0.29	0.00	0.00	0.00	0.07	0.64	0.00	0.00	0.57	0.57
Volume/Cap:	0.21	0.21	0.57	0.00	0.00	0.00	0.57	0.36	0.00	0.00	0.54	0.57
Delay/Veh:	29.9	29.9	34.9	0.0	0.0	0.0	52.5	9.4	0.0	0.0	15.0	15.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	29.9	29.9	34.9	0.0	0.0	0.0	52.5	9.4	0.0	0.0	15.0	15.6
LOS by Move:	C	C	C	A	A	A	D	A	A	A	B	B
HCM2kAvgQ:	3	3	9	0	0	0	3	7	0	0	12	13

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	0.805
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	32.5
Optimal Cycle:	69	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0 0 0 0			0 1 0 0 1			0 0 1 1 0			2 0 2 0 0		

Volume Module: Existing PM Peak												
Base Vol:	0	0	0	276	219	192	0	631	639	220	377	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	290	230	202	0	663	671	231	396	0
Added Vol:	0	0	0	7	0	0	0	14	0	1	22	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	297	230	202	0	677	671	232	418	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.93	0.84	0.92	1.00	0.95	0.95	0.92	0.89	1.00
PHF Volume:	0	0	0	319	274	219	0	712	706	252	469	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	319	274	219	0	712	706	252	469	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	319	274	219	0	712	706	252	469	0

Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.54	0.46	1.00	0.00	1.00	1.00	2.00	2.00	0.00
Final Sat.:	0	0	0	1023	877	1900	0	1908	1892	3800	3800	0

Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.31	0.31	0.12	0.00	0.37	0.37	0.07	0.12	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.39	0.39	0.39	0.00	0.46	0.46	0.08	0.55	0.00
Volume/Cap:	0.00	0.00	0.00	0.81	0.81	0.30	0.00	0.81	0.81	0.81	0.23	0.00
Delay/Veh:	0.0	0.0	0.0	39.2	39.2	25.7	0.0	30.4	30.4	68.2	14.2	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	39.2	39.2	25.7	0.0	30.4	30.4	68.2	14.2	0.0
LOS by Move:	A	A	A	D	D	C	A	C	C	E	B	A
HCM2kAvgQ:	0	0	0	21	21	5	0	24	24	7	4	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	0.867
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	48.0
Optimal Cycle:	90	Level Of Service:	D

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module: Existing PM Peak												
Base Vol:	88	415	136	260	865	107	137	636	264	240	294	81
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	92	436	143	273	908	112	144	668	277	252	309	85
Added Vol:	2	14	0	5	9	0	0	8	1	0	10	12
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	94	450	143	278	917	112	144	676	278	252	319	97
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.76	0.82	0.79	0.83	0.90	0.72	0.82	0.85	0.85	0.95	0.84	0.81
PHF Volume:	124	548	181	335	1019	156	175	795	327	265	379	120
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	124	548	181	335	1019	156	175	795	327	265	379	120
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	124	548	181	335	1019	156	175	795	327	265	379	120
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.50	0.50	1.00	1.73	0.27	1.00	1.42	0.58	1.00	1.52	0.48
Final Sat.:	1900	2858	942	1900	3295	505	1900	2692	1108	1900	2888	912
Capacity Analysis Module:												
Vol/Sat:	0.07	0.19	0.19	0.18	0.31	0.31	0.09	0.30	0.30	0.14	0.13	0.13
Crit Moves:	****				****			****		****		
Green/Cycle:	0.08	0.23	0.23	0.21	0.35	0.35	0.21	0.34	0.34	0.16	0.29	0.29
Volume/Cap:	0.78	0.84	0.84	0.84	0.88	0.88	0.45	0.88	0.88	0.88	0.45	0.45
Delay/Veh:	76.1	51.9	51.9	60.6	43.1	43.1	42.6	44.4	44.4	72.8	34.9	34.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	76.1	51.9	51.9	60.6	43.1	43.1	42.6	44.4	44.4	72.8	34.9	34.9
LOS by Move:	E	D	D	E	D	D	D	D	D	E	C	C
HCM2kAvgQ:	6	15	15	14	23	23	6	22	22	13	8	8

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions (Base + Project)
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #291 I-215 SB Ramp/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.524
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	12.8
Optimal Cycle:	33	Level Of Service:	B

Street Name:	I-215 SB Ramps						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0 0 0 0			1 0 0 1 0			0 0 1 1 1			1 0 2 0 0		
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	3	101	106	0	186	971	5	328	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	3	106	111	0	195	1020	5	344	0
Added Vol:	0	0	0	0	0	11	0	23	57	0	37	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	3	106	122	0	218	1077	5	381	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.75	0.70	0.80	1.00	0.74	0.88	0.63	0.87	1.00
PHF Volume:	0	0	0	4	152	153	0	295	1223	8	438	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	4	152	153	0	295	1223	8	438	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	4	152	153	0	295	1223	8	438	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.50	0.50	0.00	1.00	2.00	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	946	954	0	1900	3800	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.00	0.16	0.16	0.00	0.16	0.32	0.00	0.12	0.00
Crit Moves:					****				****			
Green/Cycle:	0.00	0.00	0.00	0.31	0.31	0.31	0.00	0.61	0.61	0.61	0.61	0.00
Volume/Cap:	0.00	0.00	0.00	0.01	0.52	0.52	0.00	0.25	0.52	0.01	0.19	0.00
Delay/Veh:	0.0	0.0	0.0	24.2	29.6	29.6	0.0	8.8	11.1	7.5	8.4	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	24.2	29.6	29.6	0.0	8.8	11.1	7.5	8.4	0.0
LOS by Move:	A	A	A	C	C	C	A	A	B	A	A	A
HCM2kAvgQ:	0	0	0	0	8	8	0	4	11	0	3	0

Note: Queue reported is the number of cars per lane.

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                     UCR West Campus Development Plan
                2010 Phase 1 Conditions (Base + Project)
                                 PM Peak
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                   Level Of Service Computation Report
          2000 HCM 4-Way Stop Method (Future Volume Alternative)
********************************************************************************
Intersection #292 I-215 NB Ramps/MLK Blvd
********************************************************************************
Cycle (sec):           100              Critical Vol./Cap.(X):          0.372
Loss Time (sec):         0 (Y+R=4.0 sec) Average Delay (sec/veh):        11.5
Optimal Cycle:           0              Level Of Service:                   B
********************************************************************************
Street Name:              I-215 NB Ramp                      MLK BLvd
Approach:       North Bound      South Bound      East Bound      West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Lanes:        1  1  0  0  0   0  0  0  0  0   2  0  0  0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM
Base Vol:     333     1     0    0     0     0  188     0     0    0     0     0
Growth Adj:  1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05
Initial Bse:  350     1     0    0     0     0  197     0     0    0     0     0
Added Vol:     37     0     0    0     0     0   23     0     0    0     0     0
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:  387     1     0    0     0     0  220     0     0    0     0     0
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.87  0.25  1.00 1.00  1.00  1.00 0.73  1.00  1.00 1.00  1.00  1.00
PHF Volume:   444     4     0    0     0     0  302     0     0    0     0     0
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  444     4     0    0     0     0  302     0     0    0     0     0
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:   444     4     0    0     0     0  302     0     0    0     0     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       1.98  0.02  0.00 0.00  0.00  0.00 2.00  0.00  0.00 0.00  0.00  0.00
Final Sat.:  1195    11     0    0     0     0 1130     0     0    0     0     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.37  0.37  xxxx xxxx  xxxx  xxxx 0.27  xxxx  xxxx xxxx  xxxx  xxxx
Crit Moves:  ****                              ****
Delay/Veh:   11.9  11.9   0.0  0.0   0.0   0.0 11.0   0.0   0.0  0.0   0.0   0.0
Delay Adj:   1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:  11.9  11.9   0.0  0.0   0.0   0.0 11.0   0.0   0.0  0.0   0.0   0.0
LOS by Move:    B     B     *    *     *     *    B     *     *    *     *     *
ApproachDel:       11.9             xxxxxx             11.0             xxxxxx
Delay Adj:         1.00              xxxxx             1.00              xxxxx
ApprAdjDel:        11.9             xxxxxx             11.0             xxxxxx
LOS by Appr:          B                  *                B                  *
AllWayAvgQ:   0.6   0.6   0.0  0.0   0.0   0.0  0.3   0.0   0.0  0.0   0.0   0.0
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2015 PHASE 2 PROJECT CONDITIONS
AM AND PM PEAK HOUR

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	25.3	0.533	C	27.5	0.612	+ 2.193 D/V
# 21 I-215/SR-60 SB Ramp at Univers	C	23.6	0.491	C	24.7	0.550	+ 1.137 D/V
# 23 West Campus at University Ave	C	30.0	0.776	C	30.0	0.790	-0.038 D/V
# 56 NW Mall at Iowa Avenue	A	0.0	0.000	**F**	56.4	0.000	+56.400 D/V
# 58 Iowa Ave at University Ave	D	36.1	0.558	D	38.5	0.670	+ 2.371 D/V
# 71 SW Mall at Iowa Avenue	A	0.0	0.000	**E**	36.5	0.000	+36.471 D/V
# 78 Iowa Ave at MLK Blvd	C	20.8	0.590	C	23.1	0.720	+ 2.314 D/V
# 83 Lot 30/MLK BLvd	C	24.8	0.819	C	30.2	0.898	+ 5.321 D/V
# 85 Canyon Crest Dr at MLK BLvd	C	25.4	0.641	C	31.3	0.744	+ 5.828 D/V
#109 Iowa Ave at Everton Place	C	20.0	0.000	**F**	**OVRFL**	**0.000**	**+2594**.568 D/
#124 Iowa Ave at Linden St	C	31.4	0.634	C	32.4	0.692	+ 1.001 D/V
#134 Cranford Ave at MLK Blvd	A	0.4	0.284	B	13.0	0.422	+12.596 D/V
#137 Chicago Ave at MLK Blvd	C	33.2	0.657	D	35.1	0.708	+ 1.827 D/V
#151 Chicago Ave at University Aven	C	34.1	0.564	C	34.6	0.593	+ 0.479 D/V
#159 Chicago Ave at Linden Street	D	35.1	0.738	D	37.5	0.846	+ 2.411 D/V
#196 Iowa Ave at Blaine St	D	44.5	0.919	D	49.1	0.959	+ 4.574 D/V
#207 I-215/SR-60 NB Ramp at Blain S	C	25.4	0.734	C	25.3	0.740	-0.121 D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	25.2	0.606	C	25.9	0.645	+ 0.652 D/V
#237 Chicago Ave at 3rd Street	D	45.9	0.820	D	48.4	0.865	+ 2.538 D/V
#291 I-215 SB Ramp/MLK Blvd	B	18.2	0.421	C	20.2	0.517	+ 2.026 D/V
#292 I-215 NB Ramps/MLK Blvd	C	17.2	0.631	C	22.9	0.724	+ 0.093 V/C

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UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 56 NW Mall at Iowa Avenue	??? / ???	No / No
# 71 SW Mall at Iowa Avenue	??? / ???	No / No
#109 Iowa Ave at Everton Place	??? / ???	No / No
#292 I-215 NB Ramps/MLK Blvd	???	No

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	1 0	1 0	1	1 0	1 0	1	0 0	1!	0 0	1 0	0 0	0
Initial Vol:	6	914	3	0	514	14	24	0	11	11	0	0
ApproachDel:	xxxxxx			xxxxxx			50.8			56.4		

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.5]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=35]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1497]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.2]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=11]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1497]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	1	0	0	0	0
Initial Vol:	6		914		3	0		514		14	24		0		11	11		0		0

Major Street Volume: 1451
Minor Approach Volume: 35
Minor Approach Volume Threshold: 156

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #71 SW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	19		884		0	0		514		22	39		0		31	0		0		0
ApproachDel:	xxxxxx					xxxxxx					36.5					xxxxxx				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.7]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=70]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=1509]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #71 SW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	19		884		0	0		514		22	39		0		31	0		0		0

Major Street Volume: 1439
Minor Approach Volume: 70
Minor Approach Volume Threshold: 159

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Uncontrolled	Uncontrolled	Stop Sign	Stop Sign
Lanes:	0 1 0 0 1	1 0 0 1 0	0 0 1! 0 0	1 0 0 0 1
Initial Vol:	15 837 149	242 478 32	53 0 25	36 0 107
ApproachDel:	xxxxxx	xxxxxx	2614.6	212.0

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=56.6]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=78]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1975]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=8.4]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=143]
FAIL - Approach volume less than 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1975]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Uncontrolled	Uncontrolled	Stop Sign	Stop Sign
Lanes:	0 1 0 0 1	1 0 0 1 0	0 0 1! 0 0	1 0 0 0 1
Initial Vol:	15 837 149	242 478 32	53 0 25	36 0 107

Major Street Volume: 1753
Minor Approach Volume: 143
Minor Approach Volume Threshold: 133 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 1	0 0	0	0 0	0 0	0	2 0	0 0	0	0 0	0 0	0
Initial Vol:	511	14	0	0	0	0	674	0	0	0	0	0

Major Street Volume: 674
Minor Approach Volume: 524
Minor Approach Volume Threshold: 544

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Scenario Report

Scenario:	2015 Phase 2 Conditions
Command:	Phase 2 2015 with project AM Peak
Volume:	Phase 2 AM
Geometry:	Existing Conditions
Impact Fee:	Default Impact Fee
Trip Generation:	Phase 2 AM
Trip Distribution:	Default Trip Distribution
Paths:	with project
Routes:	Default Routes
Configuration:	Phase 2 with project AM Peak

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Trip Generation Report

Forecast for Phase 2 AM

Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total Trips	% Of Total
1	LOT 30 Parki	1.00	Parking Lot	123.00	32.00	123	32	155	8.5
	Zone 1 Subtotal					123	32	155	8.5
3	Parking Lot	1.00	Parking Lot	284.00	66.00	284	66	350	19.1
	Zone 3 Subtotal					284	66	350	19.1
5	Area Family	1.00	Area F housing	68.00	113.00	68	113	181	9.9
	Zone 5 Subtotal					68	113	181	9.9
9	Apartments A	1.00	Apartments	14.00	54.00	14	54	68	3.7
	Zone 9 Subtotal					14	54	68	3.7
10	F Block Fami	1.00	Family Apartme	60.00	101.00	60	101	161	8.8
	Zone 10 Subtotal					60	101	161	8.8
11	Phase 1 E Ca	1.00	Increase in St	410.00	110.00	410	110	520	28.4
	Zone 11 Subtotal					410	110	520	28.4
12	Lot for M4	1.00	Increase in St	72.00	19.00	72	19	91	5.0
	Zone 12 Subtotal					72	19	91	5.0
13	H2 Housing	1.00	Apartments	9.00	20.00	9	20	29	1.6
	Zone 13 Subtotal					9	20	29	1.6
14	Parking PM a	1.00	Parking Lot	179.00	96.00	179	96	275	15.0
	Zone 14 Subtotal					179	96	275	15.0
TOTAL						1219	611	1830	100.0

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

7 Intersection #20 I-215/SR-60 NB Ramps at University

Cycle (sec):	110	Critical Vol./Cap.(X):	0.612
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	27.5
Optimal Cycle:	56	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	7	7	0	7	7	7	7	0	7	7
Lanes:	0 0	0 0	1	1 0	0 0	1	1 0	1 1	0	0 1	0 1	0
Volume Module: Existing AM Peak												
Base Vol:	0	0	1	74	0	382	80	595	1	0	198	73
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	0	1	84	0	435	91	678	1	0	226	83
Added Vol:	0	0	0	47	0	65	31	99	0	0	95	8
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	131	0	500	122	777	1	0	321	91
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.25	0.74	1.00	0.91	0.71	0.74	0.25	1.00	0.88	0.87
PHF Volume:	0	0	5	178	0	550	172	1050	5	0	364	105
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	5	178	0	550	172	1050	5	0	364	105
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	5	178	0	550	172	1050	5	0	364	105
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.99	0.01	0.00	1.55	0.45
Final Sat.:	0	0	1900	1900	0	1900	1900	3784	16	0	2951	849
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.09	0.00	0.29	0.09	0.28	0.28	0.00	0.12	0.12
Crit Moves:	****					****		****				
Green/Cycle:	0.00	0.00	0.01	0.38	0.00	0.39	0.37	0.54	0.54	0.00	0.17	0.17
Volume/Cap:	0.00	0.00	0.25	0.25	0.00	0.74	0.24	0.52	0.52	0.00	0.74	0.74
Delay/Veh:	0.0	0.0	60.9	23.6	0.0	33.1	24.0	16.4	16.4	0.0	48.5	48.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	60.9	23.6	0.0	33.1	24.0	16.4	16.4	0.0	48.5	48.5
LOS by Move:	A	A	E	C	A	C	C	B	B	A	D	D
HCM2kAvgQ:	0	0	0	4	0	17	4	11	11	0	9	9

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #21 I-215/SR-60 SB Ramp at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.550
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.7
Optimal Cycle:	35	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	0	7	0	7	7	7	7	0
Lanes:	0 0	0 0	0	0 1	0 1	0	0 0	1 1	1	1 0	2 0	0
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	351	26	186	0	305	229	43	533	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	0	0	400	30	212	0	348	261	49	608	0
Added Vol:	0	0	0	31	0	34	0	99	15	13	148	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	431	30	246	0	447	276	62	756	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.70	0.50	0.88	1.00	0.88	0.90	0.83	0.93	1.00
PHF Volume:	0	0	0	616	59	280	0	508	307	75	812	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	616	59	280	0	508	307	75	812	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	616	59	280	0	508	307	75	812	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.17	0.83	0.00	1.87	1.13	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	332	1568	0	3553	2147	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.32	0.18	0.18	0.00	0.14	0.14	0.04	0.21	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.59	0.59	0.59	0.00	0.26	0.26	0.07	0.33	0.00
Volume/Cap:	0.00	0.00	0.00	0.55	0.30	0.30	0.00	0.55	0.55	0.55	0.65	0.00
Delay/Veh:	0.0	0.0	0.0	12.9	10.3	10.3	0.0	32.4	32.4	49.6	29.6	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	12.9	10.3	10.3	0.0	32.4	32.4	49.6	29.6	0.0
LOS by Move:	A	A	A	B	B	B	A	C	C	D	C	A
HCM2kAvgQ:	0	0	0	12	5	5	0	8	8	3	11	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #23 West Campus at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.790
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	30.0
Optimal Cycle:	63	Level Of Service:	C

Street Name:	West Campus						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	0	0	0	0	7	7	7	7	0
Lanes:	1 0 0 0 1			0 0 0 0 0			0 0 1 1 0			1 0 2 0 0		
Volume Module: Existing AM peak												
Base Vol:	129	0	276	0	0	0	0	285	367	203	153	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	147	0	315	0	0	0	0	325	418	231	174	0
Added Vol:	0	0	4	0	0	0	0	146	0	14	103	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	147	0	319	0	0	0	0	471	418	245	277	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.67	1.00	0.70	1.00	1.00	1.00	1.00	0.86	0.71	0.73	0.77	1.00
PHF Volume:	219	0	455	0	0	0	0	548	589	336	360	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	219	0	455	0	0	0	0	548	589	336	360	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	219	0	455	0	0	0	0	548	589	336	360	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	2.00	0.00
Final Sat.:	1900	0	1900	0	0	0	0	1900	1900	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.12	0.00	0.24	0.00	0.00	0.00	0.00	0.29	0.31	0.18	0.09	0.00
Crit Moves:			****						****	****		
Green/Cycle:	0.30	0.00	0.30	0.00	0.00	0.00	0.00	0.39	0.39	0.22	0.62	0.00
Volume/Cap:	0.38	0.00	0.79	0.00	0.00	0.00	0.00	0.73	0.79	0.79	0.15	0.00
Delay/Veh:	27.9	0.0	39.2	0.0	0.0	0.0	0.0	27.8	29.8	46.2	8.1	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	27.9	0.0	39.2	0.0	0.0	0.0	0.0	27.8	29.8	46.2	8.1	0.0
LOS by Move:	C	A	D	A	A	A	A	C	C	D	A	A
HCM2kAvgQ:	5	0	15	0	0	0	0	15	18	12	2	0

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                              Phase 2 Conditions
                                    AM Peak
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
            2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Average Delay (sec/veh):        1.6      Worst Case Level Of Service: F[ 56.4]
********************************************************************************
Street Name:                  NW Mall                        Iowa Avenue
Approach:         North Bound       South Bound       East Bound        West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:       Uncontrolled      Uncontrolled       Stop Sign         Stop Sign
Rights:           Include           Include           Include           Include
Lanes:          1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    1  0  0  0  0
------------|----------------||----------------||----------------||----------------|
Volume Module: 2010 AM Peak
Base Vol:         0  659     0     0  337     0     0     0     0     0     0     0
Growth Adj:    1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14
Initial Bse:      0  751     0     0  384     0     0     0     0     0     0     0
Added Vol:        6  163     3     0  130    14    24     0    11    11     0     0
PasserByVol:      0    0     0     0    0     0     0     0     0     0     0     0
Initial Fut:      6  914     3     0  514    14    24     0    11    11     0     0
User Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:       0.90 0.90  0.90  0.90 0.90  0.90  0.90 0.90  0.90  0.90 0.90  0.90
PHF Volume:       7 1016     3     0  571    16    27     0    12    12     0     0
Reduct Vol:       0    0     0     0    0     0     0     0     0     0     0     0
Final Vol.:       7 1016     3     0  571    16    27     0    12    12     0     0
Critical Gap Module:
Critical Gp:    4.1 xxxx xxxxx xxxxx xxxx xxxxx   7.1 xxxx   6.2   7.1 xxxx xxxxx
FollowUpTim:    2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3   3.5 xxxx xxxxx
------------|----------------||----------------||----------------||----------------|
Capacity Module:
Cnflict Vol:    587 xxxx xxxxx  xxxx xxxx xxxxx  1602 xxxx   571  1614 xxxx xxxxx
Potent Cap.:    998 xxxx xxxxx  xxxx xxxx xxxxx    86 xxxx   524    84 xxxx xxxxx
Move Cap.:      998 xxxx xxxxx  xxxx xxxx xxxxx    86 xxxx   524    82 xxxx xxxxx
Volume/Cap:    0.01 xxxx  xxxx  xxxx xxxx  xxxx  0.31 xxxx  0.02  0.15 xxxx  xxxx
------------|----------------||----------------||----------------||----------------|
Level Of Service Module:
2Way95thQ:      0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.5 xxxx xxxxx
Control Del:    8.6 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx  56.4 xxxx xxxxx
LOS by Move:      A    *     *     *    *     *     *    *     *     F    *     *
Movement:        LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  116 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  1.3 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 50.8 xxxxx xxxxx xxxx xxxxx
Shared LOS:       *    *     *     *    *     *     *    F     *     *    *     *
ApproachDel:        xxxxxx            xxxxxx             50.8              56.4
ApproachLOS:           *                 *                 F                 F
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

> Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.670
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	38.5
Optimal Cycle:	46	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	63	544	92	136	245	99	139	345	56	80	342	167
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	72	620	105	155	279	113	158	393	64	91	390	190
Added Vol:	26	100	96	0	123	0	0	18	42	170	12	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	98	720	201	155	402	113	158	411	106	261	402	190
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.75	0.83	0.72	0.87	0.84	0.88	0.91	0.92	0.91	0.74	0.96	0.72
PHF Volume:	130	868	279	178	479	128	174	447	116	353	419	264
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	130	868	279	178	479	128	174	447	116	353	419	264
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7 Final Vol.:	130	868	279	178	479	128	174	447	116	353	419	264
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.58	0.42	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	2997	803	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.07	0.23	0.15	0.09	0.16	0.16	0.09	0.12	0.06	0.19	0.11	0.14
Crit Moves:		****		****				****		****		
Green/Cycle:	0.14	0.34	0.34	0.14	0.34	0.34	0.18	0.18	0.32	0.28	0.27	0.27
Volume/Cap:	0.48	0.67	0.43	0.67	0.48	0.48	0.51	0.67	0.19	0.67	0.40	0.51
Delay/Veh:	48.5	35.2	31.0	55.5	31.7	31.7	45.7	48.9	29.7	41.8	35.9	37.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	48.5	35.2	31.0	55.5	31.7	31.7	45.7	48.9	29.7	41.8	35.9	37.7
LOS by Move:	D	D	C	E	C	C	D	D	C	D	D	D
HCM2kAvgQ:	5	14	8	7	9	9	6	9	3	12	6	8

Note: Queue reported is the number of cars per lane.

```
------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                            Phase 2 Conditions
                                 AM Peak
------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
******************************************************************************
Intersection #71 SW Mall at Iowa Avenue
******************************************************************************
Average Delay (sec/veh):        1.8       Worst Case Level Of Service: E[ 36.5]
******************************************************************************
Street Name:                  SW Mall                         Iowa Avenue
Approach:        North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:       Uncontrolled     Uncontrolled       Stop Sign         Stop Sign
Rights:            Include          Include          Include           Include
Lanes:         1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
------------|----------------||----------------||----------------||----------------|
Volume Module:
Base Vol:        0  659     0     0  337     0     0    0     0     0    0     0
Growth Adj:   1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14
Initial Bse:     0  751     0     0  384     0     0    0     0     0    0     0
Added Vol:      19  133     0     0  130    22    39    0    31     0    0     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    19  884     0     0  514    22    39    0    31     0    0     0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:     21  956     0     0  556    24    42    0    34     0    0     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:     21  956     0     0  556    24    42    0    34     0    0     0
Critical Gap Module:
Critical Gp:   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4 xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3 xxxxx xxxx xxxxx
------------|----------------||----------------||----------------||----------------|
Capacity Module:
Cnflict Vol:   580 xxxx xxxxx  xxxx xxxx xxxxx  1553 xxxx   556  xxxx xxxx xxxxx
Potent Cap.:  1004 xxxx xxxxx  xxxx xxxx xxxxx   126 xxxx   535  xxxx xxxx xxxxx
Move Cap.:    1004 xxxx xxxxx  xxxx xxxx xxxxx   124 xxxx   535  xxxx xxxx xxxxx
Volume/Cap:   0.02 xxxx  xxxx  xxxx xxxx  xxxx  0.34 xxxx  0.06  xxxx xxxx  xxxx
------------|----------------||----------------||----------------||----------------|
Level Of Service Module:
2Way95thQ:     0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:   8.7 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     A    *     *     *    *     *     *    *     *     *    *     *
Movement:       LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  188 xxxxx  xxxx    0 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  1.8 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 36.5 xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    *     *     *    *     *     *    E     *     *    *     *
ApproachDel:      xxxxxx            xxxxxx             36.5            xxxxxx
ApproachLOS:         *                 *                 E                 *
******************************************************************************
Note: Queue reported is the number of cars per lane.
```

```
--------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                            Phase 2 Conditions
                                 AM Peak
--------------------------------------------------------------------------------
                    Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #78 Iowa Ave at MLK Blvd
********************************************************************************
Cycle (sec):          110              Critical Vol./Cap.(X):         0.720
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       23.1
Optimal Cycle:         52              Level Of Service:                 C
********************************************************************************
Street Name:                 Iowa Avenue                      MLK Blvd
Approach:       North Bound     South Bound      East Bound      West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected       Protected        Protected       Protected
Rights:          Include           Ovl            Include           Ovl
Min. Green:    0     0     0    7     7     7    7     7     0    0     7     7
Lanes:         0  0  0  0  0   1  0  1! 0  1   1  0  2  0  0   0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      0     0     0  263     0   101  267   440     0    0   785   484
Growth Adj: 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14
Initial Bse:   0     0     0  300     0   115  304   502     0    0   895   552
Added Vol:     0     0     0   88     0    73   71   144     0    0   140    81
PasserByVol:   0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:   0     0     0  388     0   188  375   646     0    0  1035   633
User Adj:   1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:    1.00  1.00  1.00 0.75  1.00  0.81 0.90  0.77  1.00 1.00  0.95  0.92
PHF Volume:    0     0     0  517     0   232  417   838     0    0  1089   688
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:   0     0     0  517     0   232  417   838     0    0  1089   688
PCE Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:    0     0     0  517     0   232  417   838     0    0  1089   688
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:      0.00  0.00  0.00 1.69  0.00  1.31 1.00  2.00  0.00 0.00  2.00  1.00
Final Sat.:    0     0     0 3211     0  2489 1900  3800     0    0  3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.00  0.00  0.00 0.16  0.00  0.09 0.22  0.22  0.00 0.00  0.29  0.36
Crit Moves:                  ****             ****                    ****
Green/Cycle: 0.00 0.00  0.00 0.22  0.00  0.53 0.31  0.70  0.00 0.00  0.40  0.62
Volume/Cap: 0.00  0.00  0.00 0.72  0.00  0.18 0.72  0.31  0.00 0.00  0.72  0.58
Delay/Veh:   0.0   0.0   0.0 42.0   0.0  13.5 38.4   6.3   0.0  0.0  29.6  13.0
User DelAdj: 1.00 1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:  0.0   0.0   0.0 42.0   0.0  13.5 38.4   6.3   0.0  0.0  29.6  13.0
LOS by Move:   A     A     A    D     A     B    D     A     A    A     C     B
HCM2kAvgQ:     0     0     0   11     0     3   14     5     0    0    16    14
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

```
-------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                             Phase 2 Conditions
                                  AM Peak
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #83 Lot 30/MLK BLvd
********************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):         0.898
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        30.2
Optimal Cycle:         99               Level Of Service:                  C
********************************************************************************
Street Name:                     Lot 30                         MLK Blvd
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:     7    0    7    7    0    7    7    7    0    7    7    7
Lanes:        1  0  0  0  0   0  1  0  0  1   1  0  1  1  0   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:       4    0    0    12    0    4   321  600    0    10 1276   77
Growth Adj:  1.14 1.14 1.14  1.14 1.14 1.14  1.14 1.14 1.14  1.14 1.14 1.14
Initial Bse:    5    0    0    14    0    5   366  684    0    11 1455   88
Added Vol:      0    0    0     0    0    2     9  224    0     0  220    0
PasserByVol:    0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:    5    0    0    14    0    7   375  908    0    11 1675   88
User Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:     0.50 1.00 1.00  1.00 1.00 0.33  0.60 0.75 1.00  0.50 0.90 0.69
PHF Volume:     9    0    0    14    0   20   625 1211    0    23 1861  127
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:    9    0    0    14    0   20   625 1211    0    23 1861  127
PCE Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:     9    0    0    14    0   20   625 1211    0    23 1861  127
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
Adjustment:  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Lanes:       1.00 0.00 0.00  1.00 0.00 1.00  1.00 2.00 0.00  1.00 2.00 1.00
Final Sat.:  1900    0    0  1900    0 1900  1900 3800    0  1900 3800 1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.00 0.00  0.01 0.00 0.01  0.33 0.32 0.00  0.01 0.49 0.07
Crit Moves:                  ****            ****                  ****
Green/Cycle: 0.07 0.00 0.00  0.07 0.00 0.07  0.34 0.70 0.00  0.15 0.51 0.51
Volume/Cap:  0.07 0.00 0.00  0.10 0.00 0.15  0.96 0.46 0.00  0.08 0.96 0.13
Delay/Veh:   43.7  0.0  0.0  43.9  0.0 44.2  58.6  6.9  0.0  36.4 36.5 13.0
User DelAdj: 1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:  43.7  0.0  0.0  43.9  0.0 44.2  58.6  6.9  0.0  36.4 36.5 13.0
LOS by Move:    D    A    A     D    A    D     E    A    A     D    D    B
HCM2kAvgQ:      0    0    0     0    0    1    24    8    0     1   34    2
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.744
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	31.3
Optimal Cycle:	63	Level Of Service:	C

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Ovl			Ovl			Include	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:		2 0 2 0 1			2 0 2 0 1			2 0 2 0 1			2 0 2 0 1	
Volume Module: Existing AM Peak												
Base Vol:	1153	452	445	41	84	52	130	185	323	108	335	36
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	1314	515	507	47	96	59	148	211	368	123	382	41
Added Vol:	46	43	0	26	11	26	98	106	20	0	148	98
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	1360	558	507	73	107	85	246	317	388	123	530	139
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.74	0.79	0.68	0.88	0.59	0.83	0.72	0.94	0.93	0.89	0.56
PHF Volume:	1479	754	642	107	121	145	297	440	413	132	595	248
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	1479	754	642	107	121	145	297	440	413	132	595	248
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	1479	754	642	107	121	145	297	440	413	132	595	248
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3600	3800	1900	3600	3800	1900	3600	3800	1900	3600	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.41	0.20	0.34	0.03	0.03	0.08	0.08	0.12	0.22	0.04	0.16	0.13
Crit Moves:	****				****		****				****	
Green/Cycle:	0.54	0.51	0.51	0.09	0.06	0.17	0.11	0.21	0.75	0.11	0.21	0.21
Volume/Cap:	0.76	0.39	0.66	0.34	0.55	0.46	0.76	0.55	0.29	0.35	0.76	0.63
Delay/Veh:	23.1	17.9	23.2	52.0	57.8	46.1	60.2	43.2	4.8	50.4	49.0	46.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	23.1	17.9	23.2	52.0	57.8	46.1	60.2	43.2	4.8	50.4	49.0	46.7
LOS by Move:	C	B	C	D	E	D	E	D	A	D	D	D
HCM2kAvgQ:	23	8	18	2	3	5	7	8	5	3	12	9

Note: Queue reported is the number of cars per lane.

```
-------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                           Phase 2 Conditions
                                AM Peak
-------------------------------------------------------------------------------

                   Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #109 Iowa Ave at Everton Place
********************************************************************************
Average Delay (sec/veh):     104.8      Worst Case Level Of Service: F[2614.6]
********************************************************************************
Street Name:                 Iowa Avenue                       Everton Place
Approach:         North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:          0  1  0  0  1   1  0  0  1  0   0  0  1! 0  0   1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Exsting AM Peak
Base Vol:         0  659   56    28  337    0     0    0    0    10    0   21
Growth Adj:    1.14 1.14 1.14  1.14 1.14 1.14  1.14 1.14 1.14  1.14 1.14 1.14
Initial Bse:      0  751   64    32  384    0     0    0    0    11    0   24
Added Vol:       15   86   85   210   94   32    53    0   25    25    0   83
PasserByVol:      0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:     15  837  149   242  478   32    53    0   25    36    0  107
User Adj:      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:       1.00 0.90 0.54  0.88 0.83 1.00  1.00 1.00 1.00  0.83 1.00 0.75
PHF Volume:      15  930  276   275  576   32    53    0   25    44    0  143
Reduct Vol:       0    0    0     0    0    0     0    0    0     0    0    0
Final Vol.:      15  930  276   275  576   32    53    0   25    44    0  143
Critical Gap Module:
Critical Gp:    4.1 xxxx xxxxx  4.1 xxxx xxxxx  7.1 xxxx  6.2   7.1 xxxx  6.2
FollowUpTim:    2.2 xxxx xxxxx  2.2 xxxx xxxxx  3.5 xxxx  3.3   3.5 xxxx  3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:    608 xxxx xxxxx 1206 xxxx xxxxx 2311 xxxx  592  2115 xxxx  930
Potent Cap.:    980 xxxx xxxxx  586 xxxx xxxxx   27 xxxx  510    37 xxxx  327
Move Cap.:      980 xxxx xxxxx  586 xxxx xxxxx   10 xxxx  510    22 xxxx  327
Volume/Cap:    0.02 xxxx  xxxx 0.47 xxxx  xxxx 5.56 xxxx 0.05  1.97 xxxx 0.44
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:      0.0 xxxx xxxxx  2.5 xxxx xxxxx  xxxx xxxx xxxxx   5.6 xxxx  2.1
Control Del:    8.7 xxxx xxxxx 16.5 xxxx xxxxx xxxxx xxxx xxxxx 822.4 xxxx 24.3
LOS by Move:      A    *     *    C    *     *     *    *     *     F    *    C
Movement:       LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.:  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx   14 xxxxx  xxxx xxxx xxxxx
SharedQueue:    0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx 10.7 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:    8.7 xxxx xxxxx xxxxx xxxx xxxxx xxxxx 2615 xxxxx xxxxx xxxx xxxxx
Shared LOS:       A    *     *     *    *     *     *    F     *     *    *     *
ApproachDel:       xxxxxx           xxxxxx           2614.6            212.0
ApproachLOS:          *                *                F                 F
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

```
-------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                           Phase 2 Conditions
                                AM Peak
-------------------------------------------------------------------------------
                   Level Of Service Computation Report
         2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #124 Iowa Ave at Linden St
*******************************************************************************
Cycle (sec):         110              Critical Vol./Cap.(X):          0.692
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):        32.4
Optimal Cycle:        48              Level Of Service:                  C
*******************************************************************************
Street Name:               Iowa Avenue                      Linden Street
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:     7     7     7     7     7     7     7     7     7     7     7     7
Lanes:         1  0  2  0  1   1  0  1  1  0   1  0  1  0  1   1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      118  579    92    45  403   207   113  107    47    70  137    67
Growth Adj:   1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14
Initial Bse:   135  660   105    51  459   236   129  122    54    80  156    76
Added Vol:      17   58    25     0   84     0     0   29    26    13   13     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   152  718   130    51  543   236   129  151    80    93  169    76
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.59 0.90  0.80  0.70 0.80  0.57  0.81 0.70  0.70  0.65 0.66  0.88
PHF Volume:    257  798   162    73  679   414   159  216   114   143  256    87
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   257  798   162    73  679   414   159  216   114   143  256    87
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    257  798   162    73  679   414   159  216   114   143  256    87
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:        1.00 2.00  1.00  1.00 1.24  0.76  1.00 1.00  1.00  1.00 1.00  1.00
Final Sat.:   1900 3800  1900  1900 2361  1439  1900 1900  1900  1900 1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.14 0.21  0.09  0.04 0.29  0.29  0.08 0.11  0.06  0.08 0.13  0.05
Crit Moves:   ****                  ****        ****                   ****
Green/Cycle:  0.20 0.47  0.47  0.14 0.42  0.42  0.12 0.19  0.19  0.13 0.20  0.20
Volume/Cap:   0.69 0.45  0.18  0.27 0.69  0.69  0.69 0.60  0.31  0.60 0.69  0.23
Delay/Veh:    46.7 19.8  17.1  42.6 27.7  27.7  55.1 43.4  38.9  49.5 46.7  37.7
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   46.7 19.8  17.1  42.6 27.7  27.7  55.1 43.4  38.9  49.5 46.7  37.7
LOS by Move:     D    B     B     D    C     C     E    D     D     D    D     D
HCM2kAvgQ:       9    9     3     2   16    16     7    7     3     5    9     3
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                             Phase 2 Conditions
                                  AM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #134 Cranford Ave at MLK Blvd
********************************************************************************
Cycle (sec):         120               Critical Vol./Cap.(X):         0.422
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):        13.0
Optimal Cycle:        29               Level Of Service:                  B
********************************************************************************
Street Name:               Cranford Ave                        MLK Blvd
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:     0    0     0     7    0     7     7    7     0     0    7     7
Lanes:        0  0  0  0  0    1  0  0  0  1    1  0  2  0  0    0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0    0     0     0  375     0     0  816     0
Growth Adj:  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14
Initial Bse:    0    0     0     0    0     0     0  427     0     0  930     0
Added Vol:      0    0     0    75    0    90   123  140     0     0   58   156
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0    75    0    90   123  568     0     0  988   156
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:     0    0     0    81    0    97   133  614     0     0 1068   169
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:    0    0     0    81    0    97   133  614     0     0 1068   169
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:     0    0     0    81    0    97   133  614     0     0 1068   169
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.00 0.00  0.00  1.00 0.00  1.00  1.00 2.00  0.00  0.00 2.00  1.00
Final Sat.:     0    0     0  1900    0  1900  1900 3800     0     0 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.00  0.00  0.04 0.00  0.05  0.07 0.16  0.00  0.00 0.28  0.09
Crit Moves:                   ****             ****                  ****
Green/Cycle: 0.00 0.00  0.00  0.10 0.00  0.10  0.17 0.83  0.00  0.00 0.67  0.67
Volume/Cap:  0.00 0.00  0.00  0.42 0.00  0.51  0.42 0.19  0.00  0.00 0.42  0.13
Delay/Veh:    0.0  0.0   0.0  52.1  0.0  53.3  45.8  2.0   0.0   0.0  9.4   7.4
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   0.0  0.0   0.0  52.1  0.0  53.3  45.8  2.0   0.0   0.0  9.4   7.4
LOS by Move:    A    A     A     D    A     D     D    A     A     A    A     A
HCM2kAvgQ:      0    0     0     3    0     4     5    2     0     0    9     2
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	0.708
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	35.1
Optimal Cycle:	51	Level Of Service:	D

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Ovl			Ovl			Ovl		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	707	898	228	60	209	113	133	543	131	40	638	138
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	806	1024	260	68	238	129	152	619	149	46	727	157
Added Vol:	0	0	49	91	0	0	0	123	0	24	64	59
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	806	1024	309	159	238	129	152	742	149	70	791	216
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.87	0.92	0.70	0.80	0.80	0.81	0.85	0.74	0.90	0.71	0.94	0.78
PHF Volume:	926	1113	441	199	298	159	178	1003	166	98	842	277
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	926	1113	441	199	298	159	178	1003	166	98	842	277
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	926	1113	441	199	298	159	178	1003	166	98	842	277
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.24	0.29	0.23	0.05	0.08	0.08	0.09	0.26	0.09	0.05	0.22	0.15
Crit Moves:		****		****				****		****		
Green/Cycle:	0.37	0.41	0.49	0.07	0.12	0.25	0.13	0.37	0.74	0.07	0.31	0.39
Volume/Cap:	0.66	0.71	0.48	0.71	0.66	0.33	0.71	0.71	0.12	0.71	0.71	0.38
Delay/Veh:	32.8	30.7	21.0	62.3	54.2	37.1	58.7	33.7	4.4	69.9	38.4	26.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	32.8	30.7	21.0	62.3	54.2	37.1	58.7	33.7	4.4	69.9	38.4	26.7
LOS by Move:	C	C	C	E	D	D	E	C	A	E	D	C
HCM2kAvgQ:	15	18	11	5	6	5	8	16	2	5	15	7

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.593
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	34.6
Optimal Cycle:	49	Level Of Service:	C

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	1 1	0	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	208	747	110	74	320	126	173	326	88	85	386	55
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	237	852	125	84	365	144	197	372	100	97	440	63
Added Vol:	9	44	5	20	69	0	0	36	13	14	15	9
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	246	896	130	104	434	144	197	408	113	111	455	72
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.72	0.79	0.76	0.77	0.89	0.90	0.88	0.82	0.58	0.85	0.85	0.60
PHF Volume:	342	1134	172	136	487	160	224	497	195	130	535	120
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	342	1134	172	136	487	160	224	497	195	130	535	120
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	342	1134	172	136	487	160	224	497	195	130	535	120
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.51	0.49	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	2863	937	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.09	0.30	0.09	0.04	0.17	0.17	0.06	0.13	0.10	0.03	0.14	0.06
Crit Moves:		****		****			****				****	
Green/Cycle:	0.19	0.50	0.50	0.06	0.37	0.37	0.10	0.23	0.23	0.10	0.24	0.24
Volume/Cap:	0.46	0.59	0.18	0.59	0.46	0.46	0.59	0.56	0.44	0.33	0.59	0.26
Delay/Veh:	43.2	21.6	16.4	59.1	29.1	29.1	54.2	41.4	40.0	50.4	41.7	37.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.2	21.6	16.4	59.1	29.1	29.1	54.2	41.4	40.0	50.4	41.7	37.5
LOS by Move:	D	C	B	E	C	C	D	D	D	D	D	D
HCM2kAvgQ:	6	15	3	3	9	9	5	9	6	2	9	4

Note: Queue reported is the number of cars per lane.

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                      UCR West Campus Development Plan
                             Phase 2 Conditions
                                  AM Peak
--------------------------------------------------------------------------------

                     Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #159 Chicago Ave at Linden Street
********************************************************************************
Cycle (sec):          100                Critical Vol./Cap.(X):         0.846
Loss Time (sec):        8 (Y+R=4.0 sec)  Average Delay (sec/veh):        37.5
Optimal Cycle:         78                Level Of Service:                  D
********************************************************************************
Street Name:               Chicago Avenue                  Linden Street
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected         Protected
Rights:           Include          Include          Include           Include
Min. Green:     7     7     7    7     7     7    7     7     7    7     7     7
Lanes:         1  0  1  1  0   1  0  2  0  1   1  0  0  1  0   1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:       21  771   148  140  364    33   36  102    31  154  122   153
Growth Adj:   1.14 1.14  1.14 1.14 1.14  1.14 1.14 1.14  1.14 1.14 1.14  1.14
Initial Bse:    24  879   169  160  415    38   41  116    35  176  139   174
Added Vol:       7   32    14    0   59     0    0   22    13   17    9     0
PasserByVol:     0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:    31  911   183  160  474    38   41  138    48  193  148   174
User Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:      0.66 0.87  0.76 0.54 0.92  0.59 0.75 0.71  0.65 0.71 0.66  0.54
PHF Volume:     47 1047   240  296  515    64   55  195    74  271  224   323
Reduct Vol:      0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:    47 1047   240  296  515    64   55  195    74  271  224   323
PCE Adj:      1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:     47 1047   240  296  515    64   55  195    74  271  224   323
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:        1.00 1.63  0.37 1.00 2.00  1.00 1.00 0.72  0.28 1.00 1.00  1.00
Final Sat.:   1900 3090   710 1900 3800  1900 1900 1375   525 1900 1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.02 0.34  0.34 0.16 0.14  0.03 0.03 0.14  0.14 0.14 0.12  0.17
Crit Moves:        ****       ****                  ****       ****
Green/Cycle:  0.20 0.40  0.40 0.18 0.39  0.39 0.10 0.17  0.17 0.17 0.24  0.24
Volume/Cap:   0.12 0.85  0.85 0.85 0.35  0.09 0.29 0.85  0.85 0.85 0.50  0.71
Delay/Veh:    33.1 31.8  31.8 56.6 22.0  19.6 42.8 58.9  58.9 58.8 33.3  38.2
User DelAdj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:   33.1 31.8  31.8 56.6 22.0  19.6 42.8 58.9  58.9 58.8 33.3  38.2
LOS by Move:     C    C     C    E    C     B    D    E     E    E    C     D
HCM2kAvgQ:       1   20    20   12    6     1    2   11    11   11    6    10
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	0.959
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	49.1
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	141	641	99	121	413	225	418	410	103	108	428	130
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	161	731	113	138	471	257	477	467	117	123	488	148
Added Vol:	10	29	19	29	54	0	0	66	10	20	24	8
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	171	760	132	167	525	257	477	533	127	143	512	156
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.78	0.93	0.85	0.72	0.69	0.84	0.89	0.75	0.89	0.93	0.88	0.79
PHF Volume:	219	817	155	232	761	305	535	711	143	154	582	198
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	219	817	155	232	761	305	535	711	143	154	582	198
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	219	817	155	232	761	305	535	711	143	154	582	198
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.43	0.57	1.00	2.00	1.00	1.00	1.49	0.51
Final Sat.:	1900	3800	1900	1900	2711	1089	1900	3800	1900	1900	2836	964
Capacity Analysis Module:												
Vol/Sat:	0.12	0.21	0.08	0.12	0.28	0.28	0.28	0.19	0.08	0.08	0.21	0.21
Crit Moves:	****				****		****				****	
Green/Cycle:	0.12	0.26	0.26	0.15	0.29	0.29	0.29	0.35	0.35	0.15	0.21	0.21
Volume/Cap:	0.96	0.82	0.31	0.82	0.96	0.96	0.96	0.53	0.21	0.53	0.96	0.96
Delay/Veh:	91.8	39.9	29.9	57.9	52.8	52.8	62.8	26.0	22.7	40.8	61.0	61.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	91.8	39.9	29.9	57.9	52.8	52.8	62.8	26.0	22.7	40.8	61.0	61.0
LOS by Move:	F	D	C	E	D	D	E	C	C	D	E	E
HCM2kAvgQ:	11	14	4	9	21	21	22	9	3	5	17	17

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #207 I-215/SR-60 NB Ramp at Blain Street

Cycle (sec):	110	Critical Vol./Cap.(X):	0.740
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.3
Optimal Cycle:	55	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	0	0	0	7	7	0	0	7	7
Lanes:	0 1 0 0 1			0 0 0 0 0			2 0 2 0 0			0 0 1 1 0		
Volume Module: Existing AM Peak												
Base Vol:	204	5	393	0	0	0	172	645	0	0	409	499
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	233	6	448	0	0	0	196	735	0	0	466	569
Added Vol:	0	0	1	0	0	0	0	75	0	0	26	8
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	233	6	449	0	0	0	196	810	0	0	492	577
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.70	0.31	0.95	1.00	1.00	1.00	0.68	0.76	1.00	1.00	0.85	0.84
PHF Volume:	332	18	473	0	0	0	288	1066	0	0	579	687
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	332	18	473	0	0	0	288	1066	0	0	579	687
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	332	18	473	0	0	0	288	1066	0	0	579	687
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.95	0.05	1.00	0.00	0.00	0.00	2.00	2.00	0.00	0.00	1.00	1.00
Final Sat.:	1800	100	1900	0	0	0	3800	3800	0	0	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.18	0.18	0.25	0.00	0.00	0.00	0.08	0.28	0.00	0.00	0.30	0.36
Crit Moves:			****				****					****
Green/Cycle:	0.34	0.34	0.34	0.00	0.00	0.00	0.10	0.59	0.00	0.00	0.49	0.49
Volume/Cap:	0.55	0.55	0.74	0.00	0.00	0.00	0.74	0.47	0.00	0.00	0.62	0.74
Delay/Veh:	30.7	30.7	36.9	0.0	0.0	0.0	55.3	12.9	0.0	0.0	21.3	24.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	30.7	30.7	36.9	0.0	0.0	0.0	55.3	12.9	0.0	0.0	21.3	24.3
LOS by Move:	C	C	D	A	A	A	E	B	A	A	C	C
HCM2kAvgQ:	10	10	15	0	0	0	6	10	0	0	15	19

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	0.645
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.9
Optimal Cycle:	43	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0 0	0	0 1	0 0	1	0 0	1 1	0	2 0	2 0	0
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	369	16	251	0	486	179	110	518	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	0	0	421	18	286	0	554	204	125	591	0
Added Vol:	0	0	0	31	0	0	0	45	0	4	22	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	452	18	286	0	599	204	129	613	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.95	0.80	0.76	1.00	0.66	0.86	0.89	0.76	1.00
PHF Volume:	0	0	0	475	23	377	0	908	237	145	806	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	475	23	377	0	908	237	145	806	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	475	23	377	0	908	237	145	806	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.95	0.05	1.00	0.00	1.59	0.41	2.00	2.00	0.00
Final Sat.:	0	0	0	1813	87	1900	0	3012	788	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.26	0.26	0.20	0.00	0.30	0.30	0.04	0.21	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.41	0.41	0.41	0.00	0.47	0.47	0.06	0.53	0.00
Volume/Cap:	0.00	0.00	0.00	0.64	0.64	0.49	0.00	0.64	0.64	0.64	0.40	0.00
Delay/Veh:	0.0	0.0	0.0	30.5	30.5	26.8	0.0	25.2	25.2	61.5	17.2	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	30.5	30.5	26.8	0.0	25.2	25.2	61.5	17.2	0.0
LOS by Move:	A	A	A	C	C	C	A	C	C	E	B	A
HCM2kAvgQ:	0	0	0	15	15	10	0	16	16	4	9	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	0.865
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	48.4
Optimal Cycle:	89	Level Of Service:	D

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	176	590	177	195	315	66	94	348	71	130	425	222
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	201	673	202	222	359	75	107	397	81	148	485	253
Added Vol:	9	21	2	25	44	0	0	18	11	4	12	7
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	210	694	204	247	403	75	107	415	92	152	497	260
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.88	0.93	0.65	0.66	0.88	0.66	0.81	0.60	0.66	0.71	0.88	0.74
PHF Volume:	238	746	314	375	458	114	132	691	139	214	564	351
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	238	746	314	375	458	114	132	691	139	214	564	351
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	238	746	314	375	458	114	132	691	139	214	564	351
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.41	0.59	1.00	1.60	0.40	1.00	1.66	0.34	1.00	1.23	0.77
Final Sat.:	1900	2675	1125	1900	3043	757	1900	3163	637	1900	2341	1459
Capacity Analysis Module:												
Vol/Sat:	0.13	0.28	0.28	0.20	0.15	0.15	0.07	0.22	0.22	0.11	0.24	0.24
Crit Moves:		****		****				****		****		
Green/Cycle:	0.25	0.32	0.32	0.23	0.30	0.30	0.10	0.25	0.25	0.13	0.28	0.28
Volume/Cap:	0.50	0.87	0.87	0.87	0.50	0.50	0.71	0.87	0.87	0.87	0.85	0.85
Delay/Veh:	39.4	44.9	44.9	61.0	34.9	34.9	64.2	51.2	51.2	76.8	46.8	46.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	39.4	44.9	44.9	61.0	34.9	34.9	64.2	51.2	51.2	76.8	46.8	46.8
LOS by Move:	D	D	D	E	C	C	E	D	D	E	D	D
HCM2kAvgQ:	8	21	21	16	9	9	6	17	17	10	18	18

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #291 I-215 SB Ramp/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.517
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	20.2
Optimal Cycle:	33	Level Of Service:	C

Street Name:	I-215 SB Ramps						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0 0 0 0			1 0 0 1 0			0 0 1 1 1			1 0 2 0 0		
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	17	60	197	0	537	197	21	291	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	0	0	19	68	225	0	612	225	24	332	0
Added Vol:	0	0	0	0	0	89	0	42	90	0	156	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	19	68	314	0	654	315	24	488	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.43	0.71	0.79	1.00	0.86	0.67	0.75	0.87	1.00
PHF Volume:	0	0	0	45	96	397	0	761	470	32	561	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	45	96	397	0	761	470	32	561	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	45	96	397	0	761	470	32	561	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.20	0.80	0.00	1.86	1.14	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	371	1529	0	3525	2175	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.02	0.26	0.26	0.00	0.22	0.22	0.02	0.15	0.00
Crit Moves:					****			****				
Green/Cycle:	0.00	0.00	0.00	0.50	0.50	0.50	0.00	0.42	0.42	0.42	0.42	0.00
Volume/Cap:	0.00	0.00	0.00	0.05	0.52	0.52	0.00	0.52	0.52	0.04	0.35	0.00
Delay/Veh:	0.0	0.0	0.0	12.7	17.2	17.2	0.0	21.8	21.8	17.3	20.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	12.7	17.2	17.2	0.0	21.8	21.8	17.3	20.0	0.0
LOS by Move:	A	A	A	B	B	B	A	C	C	B	C	A
HCM2kAvgQ:	0	0	0	1	10	10	0	10	10	1	6	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #292 I-215 NB Ramps/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.724
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	22.9
Optimal Cycle:	0	Level Of Service:	C

Street Name:	I-215 NB Ramp						MLK BLvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 1 0 0 0			0 0 0 0 0			2 0 0 0 0			0 0 0 0 0		
Volume Module: existing AM Peak												
Base Vol:	311	12	0	0	0	0	554	0	0	0	0	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	355	14	0	0	0	0	632	0	0	0	0	0
Added Vol:	156	0	0	0	0	0	42	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	511	14	0	0	0	0	674	0	0	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.60	1.00	1.00	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00
PHF Volume:	608	23	0	0	0	0	757	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	608	23	0	0	0	0	757	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	608	23	0	0	0	0	757	0	0	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.93	0.07	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
Final Sat.:	972	37	0	0	0	0	1046	0	0	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.63	0.62	xxxx	xxxx	xxxx	xxxx	0.72	xxxx	xxxx	xxxx	xxxx	xxxx
Crit Moves:	****						****					
Delay/Veh:	20.4	20.3	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	20.4	20.3	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0
LOS by Move:	C	C	*	*	*	*	C	*	*	*	*	*
ApproachDel:		20.4			xxxxxx			25.0			xxxxxx	
Delay Adj:		1.00			xxxxx			1.00			xxxxx	
ApprAdjDel:		20.4			xxxxxx			25.0			xxxxxx	
LOS by Appr:		C			*			C			*	
AllWayAvgQ:	1.5	1.5	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	26.9	0.682	C	29.2	0.781	+ 2.342 D/V
# 21 I-215/SR-60 SB Ramp at Univers	C	20.3	0.602	C	22.0	0.691	+ 1.640 D/V
# 23 West Campus at University Ave	C	26.0	0.659	C	26.2	0.698	+ 0.209 D/V
# 56 NW Mall at Iowa Avenue	A	0.0	0.000	F	276.0	0.000	+276.045 D/V
# 58 Iowa Ave at University Ave	D	45.0	0.866	E	63.1	1.021	+18.093 D/V
# 71 SW Mall at Iowa Avenue	A	0.0	0.000	F	189.6	0.000	+189.641 D/V
# 78 Iowa Ave at MLK Blvd	C	23.7	0.800	C	28.0	0.878	+ 4.298 D/V
# 83 Lot 30/MLK BLvd	D	45.5	0.978	E	64.2	1.056	+18.656 D/V
# 85 Canyon Crest Dr at MLK BLvd	E	67.1	1.118	E	73.4	1.163	+ 6.314 D/V
#109 Iowa Ave at Everton Place	F	230.8	0.000	F	OVRFL	0.000	+14323.094 D
#124 Iowa Ave at Linden St	C	26.5	0.631	C	29.0	0.704	+ 2.480 D/V
#134 Cranford Ave at MLK Blvd	A	0.7	0.594	B	11.8	0.707	+11.041 D/V
#137 Chicago Ave at MLK Blvd	E	78.5	1.152	F	90.0	1.190	+11.562 D/V
#151 Chicago Ave at University Aven	D	51.8	0.960	E	55.4	0.992	+ 3.611 D/V
#159 Chicago Ave at Linden Street	C	25.2	0.664	C	26.9	0.710	+ 1.672 D/V
#196 Iowa Ave at Blaine St	D	39.7	0.841	D	42.9	0.889	+ 3.170 D/V
#207 I-215/SR-60 NB Ramp at Blain S	B	19.2	0.611	B	19.1	0.632	-0.078 D/V
#209 I-215/SR-60 SB Ramp at Blain S	D	35.9	0.862	D	36.8	0.881	+ 0.898 D/V
#237 Chicago Ave at 3rd Street	D	54.8	0.934	E	59.3	0.960	+ 4.474 D/V
#291 I-215 SB Ramp/MLK Blvd	B	13.1	0.540	B	14.5	0.628	+ 1.368 D/V
#292 I-215 NB Ramps/MLK Blvd	B	11.4	0.364	B	13.9	0.495	+ 0.131 V/C

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 56 NW Mall at Iowa Avenue	??? / ???	No / No
# 71 SW Mall at Iowa Avenue	??? / ???	No / No
#109 Iowa Ave at Everton Place	??? / ???	Yes / Yes
#292 I-215 NB Ramps/MLK Blvd	???	No

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-------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                          Phase 2 - 2015 Conditions
                                   PM Peak
-------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
*******************************************************************************
Intersection #56 NW Mall at Iowa Avenue
*******************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
-----------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
-----------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:       1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    1  0  0  0  0
Initial Vol:   11  717    11     0 1354    24    18    0     8     6    0     0
ApproachDel:     xxxxxx           xxxxxx            276.0            209.0
-----------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=2.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=26]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2150]
   SUCCEED - Total volume greater than or equal to 800 for intersection
             with four or more approaches.
-------------------------------------------------------------------------------
Approach[westbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.3]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=6]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2150]
   SUCCEED - Total volume greater than or equal to 800 for intersection
             with four or more approaches.
-------------------------------------------------------------------------------
```

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Uncontrolled	Uncontrolled	Stop Sign	Stop Sign
Lanes:	1 0 1 0 1	1 0 1 0 1	0 0 1! 0 0	1 0 0 0 0
Initial Vol:	11 717 11	0 1354 24	18 0 8	6 0 0

Major Street Volume: 2118
Minor Approach Volume: 26
Minor Approach Volume Threshold: 26 [less than minimum of 100]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Peak Hour Delay Signal Warrant Report

Intersection #71 SW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	31		710		0	0		1328		40	29		0		24	0		0		0
ApproachDel:	xxxxxx					xxxxxx					189.6					xxxxxx				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=2.8]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=53]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=2163]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #71 SW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	31		710		0	0		1328		40	29		0		24	0		0		0

Major Street Volume: 2110
Minor Approach Volume: 53
Minor Approach Volume Threshold: 28 [less than minimum of 100]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Peak Hour Delay Signal Warrant Report

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	0	1	0	0	1	1	0	0	1	0	0	0	1!	0	0	1	0	0	0	1
Initial Vol:	26		675		68	148		1278		54	41		0		20	134		0		248
ApproachDel:	xxxxxx					xxxxxx					xxxxxx					3821.1				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=246.6]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=61]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2693]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=405.5]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=382]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2693]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	0	1	0	0	1	1	0	0	1	0	0	0	1!	0	0	1	0	0	0	1
Initial Vol:	26		675		68	148		1278		54	41		0		20	134		0		248

Major Street Volume: 2250
Minor Approach Volume: 382
Minor Approach Volume Threshold: 25 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 1 0 0 0			0 0 0 0 0			2 0 0 0 0			0 0 0 0 0		
Initial Vol:	488	1	0	0	0	0	301	0	0	0	0	0

Major Street Volume: 489
Minor Approach Volume: 301
Minor Approach Volume Threshold: 682

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                            Phase 2 - 2015 Conditions
                                    PM Peak
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #20 I-215/SR-60 NB Ramps at University
********************************************************************************
Cycle (sec):          110              Critical Vol./Cap.(X):         0.781
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        29.2
Optimal Cycle:         62              Level Of Service:                  C
********************************************************************************
Street Name:         I-215/SR-60 NB Ramps             University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:         Protected        Protected        Protected         Permitted
Rights:            Include          Include          Include           Include
Min. Green:     0     0     7    7     0     7    7     7     7    0     7     7
Lanes:         0  0  0  0  1    1  0  0  0  1    1  0  1  1  0    0  1  0  1  0
------------|----------------||----------------||----------------||----------------|
Volume Module: Existing PM Peak
Base Vol:       0     0     1   70     0   273  159   408     0    0   582   182
Growth Adj:  1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14
Initial Bse:    0     0     1   80     0   311  181   465     0    0   663   207
Added Vol:      0     0     0   19     0    23   38    99     0    0   118    29
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:    0     0     1   99     0   334  219   564     0    0   781   236
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     1.00  1.00  0.25 0.80  1.00  0.78 0.70  0.86  1.00 1.00  0.80  0.81
PHF Volume:     0     0     5  124     0   428  313   656     0    0   977   292
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:    0     0     5  124     0   428  313   656     0    0   977   292
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:     0     0     5  124     0   428  313   656     0    0   977   292
------------|----------------||----------------||----------------||----------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.00  0.00  1.00 1.00  0.00  1.00 1.00  2.00  0.00 0.00  1.54  0.46
Final Sat.:     0     0  1900 1900     0  1900 1900  3800     0    0  2926   874
------------|----------------||----------------||----------------||----------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.07  0.00  0.23 0.16  0.17  0.00 0.00  0.33  0.33
Crit Moves:  ****                           ****  ****                    ****
Green/Cycle: 0.00  0.00  0.01 0.28  0.00  0.29 0.21  0.64  0.00 0.00  0.43  0.43
Volume/Cap:  0.00  0.00  0.23 0.23  0.00  0.78 0.78  0.27  0.00 0.00  0.78  0.78
Delay/Veh:    0.0   0.0  60.1 30.9   0.0  43.1 50.5   8.7   0.0  0.0  29.6  29.6
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0  60.1 30.9   0.0  43.1 50.5   8.7   0.0  0.0  29.6  29.6
LOS by Move:    A     A     E    C     A     D    D     A     A    A     C     C
HCM2kAvgQ:      0     0     0    3     0    15   12     5     0    0    20    20
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #21 I-215/SR-60 SB Ramp at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.691
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	22.0
Optimal Cycle:	47	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	0	7	0	7	7	7	7	0
Lanes:	0 0	0	0 0	0 1	0	1 0	0 0	1	1 1	1 0	2	0 0
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	42	183	93	0	521	724	191	664	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	0	0	48	209	106	0	594	825	218	757	0
Added Vol:	0	0	0	13	0	34	0	124	60	44	98	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	61	209	140	0	718	885	262	855	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.88	0.74	0.83	1.00	0.89	0.92	0.73	0.89	1.00
PHF Volume:	0	0	0	69	282	169	0	807	962	359	961	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	69	282	169	0	807	962	359	961	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	69	282	169	0	807	962	359	961	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.27	1.08	0.65	0.00	1.37	1.63	1.00	2.00	0.00
Final Sat.:	0	0	0	506	2061	1233	0	2599	3101	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.14	0.14	0.14	0.00	0.31	0.31	0.19	0.25	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.20	0.20	0.20	0.00	0.45	0.45	0.27	0.72	0.00
Volume/Cap:	0.00	0.00	0.00	0.69	0.69	0.69	0.00	0.69	0.69	0.69	0.35	0.00
Delay/Veh:	0.0	0.0	0.0	40.0	40.0	40.0	0.0	22.8	22.8	36.5	5.2	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	40.0	40.0	40.0	0.0	22.8	22.8	36.5	5.2	0.0
LOS by Move:	A	A	A	D	D	D	A	C	C	D	A	A
HCM2kAvgQ:	0	0	0	9	9	9	0	15	15	11	5	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #23 West Campus at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.698
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	26.2
Optimal Cycle:	48	Level Of Service:	C

Street Name:	West Campus						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	0	0	0	0	7	7	7	7	0
Lanes:	1 0 0 0 1			0 0 0 0 0			0 0 1 1 0			1 0 2 0 0		
Volume Module: Existing PM Peak												
Base Vol:	287	0	224	0	0	0	0	283	197	369	500	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	327	0	255	0	0	0	0	323	225	421	570	0
Added Vol:	0	0	13	0	0	0	0	119	0	6	147	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	327	0	268	0	0	0	0	442	225	427	717	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.82	1.00	0.76	1.00	1.00	1.00	1.00	0.94	0.95	0.91	0.86	1.00
PHF Volume:	399	0	353	0	0	0	0	470	236	469	834	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	399	0	353	0	0	0	0	470	236	469	834	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	399	0	353	0	0	0	0	470	236	469	834	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	1.33	0.67	1.00	2.00	0.00
Final Sat.:	1900	0	1900	0	0	0	0	2528	1272	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.21	0.00	0.19	0.00	0.00	0.00	0.00	0.19	0.19	0.25	0.22	0.00
Crit Moves:	****							****		****		
Green/Cycle:	0.30	0.00	0.30	0.00	0.00	0.00	0.00	0.27	0.27	0.35	0.62	0.00
Volume/Cap:	0.70	0.00	0.62	0.00	0.00	0.00	0.00	0.70	0.70	0.70	0.35	0.00
Delay/Veh:	34.8	0.0	32.1	0.0	0.0	0.0	0.0	35.3	35.3	31.0	9.4	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	34.8	0.0	32.1	0.0	0.0	0.0	0.0	35.3	35.3	31.0	9.4	0.0
LOS by Move:	C	A	C	A	A	A	A	D	D	C	A	A
HCM2kAvgQ:	12	0	10	0	0	0	0	11	11	13	6	0

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                           Phase 2 - 2015 Conditions
                                  PM Peak
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Average Delay (sec/veh):        4.0       Worst Case Level Of Service: F[276.0]
********************************************************************************
Street Name:                 NW Mall                         Iowa Avenue
Approach:        North Bound       South Bound       East Bound        West Bound
Movement:       L  -  T  -  R     L  -  T  -  R     L  -  T  -  R     L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled      Uncontrolled        Stop Sign         Stop Sign
Rights:           Include           Include           Include           Include
Lanes:          1  0  1  0  1     1  0  1  0  1     0  0  1! 0  0     1  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:         0  503    0     0 1038    0     0    0    0     0    0    0
Growth Adj:    1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14
Initial Bse:      0  573    0     0 1183    0     0    0    0     0    0    0
Added Vol:       11  144   11     0  171   24    18    0    8     6    0    0
PasserByVol:      0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:     11  717   11     0 1354   24    18    0    8     6    0    0
User Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:       0.90 0.90  0.90  0.90 0.90  0.90  0.90 0.90  0.90  0.90 0.90  0.90
PHF Volume:      12  797   12     0 1505   27    20    0    9     7    0    0
Reduct Vol:       0    0    0     0    0    0     0    0    0     0    0    0
Final Vol.:      12  797   12     0 1505   27    20    0    9     7    0    0
Critical Gap Module:
Critical Gp:    4.1 xxxx xxxxx xxxxx xxxx xxxxx   7.1 xxxx   6.2   7.1 xxxx xxxxx
FollowUpTim:    2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3   3.5 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1531 xxxx xxxxx  xxxx xxxx xxxxx  2332 xxxx  1505  2344 xxxx xxxxx
Potent Cap.:  440 xxxx xxxxx  xxxx xxxx xxxxx    26 xxxx   151    26 xxxx xxxxx
Move Cap.:    440 xxxx xxxxx  xxxx xxxx xxxxx    26 xxxx   151    24 xxxx xxxxx
Volume/Cap:  0.03 xxxx  xxxx  xxxx xxxx  xxxx  0.78 xxxx  0.06  0.28 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.8 xxxx xxxxx
Control Del: 13.4 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx 209.0 xxxx xxxxx
LOS by Move:    B    *     *     *    *     *     *    *     *     F    *     *
Movement:      LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx   34 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  3.0 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  276 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    F     *     *    *     *
ApproachDel:      xxxxxx            xxxxxx             276.0             209.0
ApproachLOS:         *                 *                 F                 F
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	1.021
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	63.1
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 2 0 1			1 0 1 1 0			1 0 2 0 1			1 0 2 0 1		
Volume Module: Existing PM												
Base Vol:	93	370	129	260	800	187	217	874	152	156	374	103
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	106	422	147	296	912	213	247	996	173	178	426	117
Added Vol:	44	132	171	0	111	0	0	13	30	114	18	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	150	554	318	296	1023	213	247	1009	203	292	444	117
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.60	0.96	0.75	0.94	0.91	0.90	0.82	0.94	0.84	0.85	0.87	0.72
PHF Volume:	250	577	424	315	1124	237	302	1074	242	343	511	163
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	250	577	424	315	1124	237	302	1074	242	343	511	163
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	250	577	424	315	1124	237	302	1074	242	343	511	163
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.65	0.35	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3139	661	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.13	0.15	0.22	0.17	0.36	0.36	0.16	0.28	0.13	0.18	0.13	0.09
Crit Moves:	****				****			****		****		
Green/Cycle:	0.13	0.28	0.28	0.20	0.35	0.35	0.25	0.28	0.41	0.18	0.21	0.21
Volume/Cap:	1.02	0.55	0.81	0.81	1.02	1.02	0.65	1.02	0.31	1.02	0.65	0.41
Delay/Veh:	115.3	37.8	49.9	57.7	69.1	69.1	43.7	76.6	24.5	104.0	45.3	41.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	115.3	37.8	49.9	57.7	69.1	69.1	43.7	76.6	24.5	104.0	45.3	41.9
LOS by Move:	F	D	D	E	E	E	D	E	C	F	D	D
HCM2kAvgQ:	14	9	17	13	33	33	11	27	6	18	9	5

Note: Queue reported is the number of cars per lane.

```
-------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                            Phase 2 - 2015 Conditions
                                    PM Peak
-------------------------------------------------------------------------------
                       Level Of Service Computation Report
            2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #71 SW Mall at Iowa Avenue
*******************************************************************************
Average Delay (sec/veh):        4.8      Worst Case Level Of Service: F[189.6]
*******************************************************************************
Street Name:                    SW Mall                       Iowa Avenue
Approach:         North Bound      South Bound      East Bound       West Bound
Movement:        L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:         Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:             Include          Include          Include          Include
Lanes:           1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
------------|----------------||----------------||----------------||----------------|
Volume Module: 2015 PM Peak
Base Vol:          0  503     0     0 1038     0     0    0     0     0    0     0
Growth Adj:     1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14
Initial Bse:       0  573     0     0 1183     0     0    0     0     0    0     0
Added Vol:        31  137     0     0  145    40    29    0    24     0    0     0
PasserByVol:       0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:      31  710     0     0 1328    40    29    0    24     0    0     0
User Adj:       1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:        0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:       34  768     0     0 1436    43    31    0    26     0    0     0
Reduct Vol:        0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:       34  768     0     0 1436    43    31    0    26     0    0     0
Critical Gap Module:
Critical Gp:     4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4 xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:     2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3 xxxxx xxxx xxxxx
------------|----------------||----------------||----------------||----------------|
Capacity Module:
Cnflict Vol:    1479 xxxx xxxxx  xxxx xxxx xxxxx  2271 xxxx  1436  xxxx xxxx xxxxx
Potent Cap.:     461 xxxx xxxxx  xxxx xxxx xxxxx    45 xxxx   165  xxxx xxxx xxxxx
Move Cap.:       461 xxxx xxxxx  xxxx xxxx xxxxx    43 xxxx   165  xxxx xxxx xxxxx
Volume/Cap:     0.07 xxxx  xxxx  xxxx xxxx  xxxx  0.74 xxxx  0.16  xxxx xxxx  xxxx
------------|----------------||----------------||----------------||----------------|
Level Of Service Module:
2Way95thQ:       0.2 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:    13.4 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:       B    *     *     *    *     *     *    *     *     *    *     *
Movement:         LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:    xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx   64 xxxxx  xxxx    0 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  4.2 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  190 xxxxx xxxxx xxxx xxxxx
Shared LOS:        *    *     *     *    *     *     *    F     *     *    *     *
ApproachDel:        xxxxxx           xxxxxx            189.6            xxxxxx
ApproachLOS:           *                *                F                 *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #78 Iowa Ave at MLK Blvd

Cycle (sec):	110	Critical Vol./Cap.(X):	0.878
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	28.0
Optimal Cycle:	93	Level Of Service:	C

Street Name:	Iowa Avenue						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Include			Ovl		
Min. Green:	0	0	0	7	7	7	7	7	0	0	7	7
Lanes:	0 0 0 0 0			1 0 1! 0 1			1 0 2 0 0			0 0 2 0 1		
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	727	0	273	170	1564	0	0	667	353
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	0	0	829	0	311	194	1783	0	0	760	402
Added Vol:	0	0	0	92	0	77	76	146	0	0	152	93
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	921	0	388	270	1929	0	0	912	495
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.95	1.00	0.90	0.87	0.99	1.00	1.00	0.79	0.92
PHF Volume:	0	0	0	969	0	431	310	1948	0	0	1155	538
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	969	0	431	310	1948	0	0	1155	538
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	969	0	431	310	1948	0	0	1155	539
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.69	0.00	1.31	1.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	0	0	0	3215	0	2485	1900	3800	0	0	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.30	0.00	0.17	0.16	0.51	0.00	0.00	0.30	0.28
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.34	0.00	0.55	0.20	0.58	0.00	0.00	0.38	0.72
Volume/Cap:	0.00	0.00	0.00	0.88	0.00	0.32	0.80	0.88	0.00	0.00	0.80	0.39
Delay/Veh:	0.0	0.0	0.0	39.9	0.0	13.7	52.9	23.9	0.0	0.0	33.7	6.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	39.9	0.0	13.7	52.9	23.9	0.0	0.0	33.7	6.1
LOS by Move:	A	A	A	D	A	B	D	C	A	A	C	A
HCM2kAvgQ:	0	0	0	21	0	6	12	31	0	0	19	7

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                            Phase 2 - 2015 Conditions
                                   PM Peak
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #83 Lot 30/MLK BLvd
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         1.056
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        64.2
Optimal Cycle:        120              Level Of Service:                  E
********************************************************************************
Street Name:                  Lot 30                          MLK Blvd
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted         Permitted        Protected         Protected
Rights:          Include           Include          Include           Include
Min. Green:    7    0    7    7    0    7    7    7    0    7    7    7
Lanes:        0  0  0  0  1   0  1  0  0  1   1  0  1  1  0   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:       0    0    1   162    0   271    31 1989    0    10  926    1
Growth Adj:  1.14 1.14 1.14  1.14 1.14 1.14  1.14 1.14 1.14  1.14 1.14 1.14
Initial Bse:    0    0    1   185    0   309    35 2267    0    11 1056    1
Added Vol:      0    0    0     0    0    8     4  235    0     0  236    0
PasserByVol:    0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:    0    0    1   185    0   317    39 2502    0    11 1292    1
User Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:     0.50 1.00 0.25  0.57 1.00 0.62  0.43 0.95 1.00  0.63 0.85 1.00
PHF Volume:     0    0    5   324    0   511    91 2634    0    18 1520    1
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:    0    0    5   324    0   511    91 2634    0    18 1520    1
PCE Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:     0    0    5   324    0   511    91 2634    0    18 1520    1
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
Adjustment:  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Lanes:       0.00 0.00 1.00  1.00 0.00 1.00  1.00 2.00 0.00  1.00 2.00 1.00
Final Sat.:     0    0 1900  1900    0 1900  1900 3800    0  1900 3800 1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.00 0.00  0.17 0.00 0.27  0.05 0.69 0.00  0.01 0.40 0.00
Crit Moves:                             ****        ****       ****
Green/Cycle: 0.00 0.00 0.24  0.24 0.00 0.24  0.10 0.61 0.00  0.07 0.58 0.58
Volume/Cap:  0.00 0.00 0.01  0.72 0.00 1.13  0.47 1.13 0.00  0.14 0.69 0.00
Delay/Veh:    0.0  0.0 29.1  40.5  0.0 121.8 44.2 84.8  0.0  44.1 15.6  8.8
User DelAdj: 1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:   0.0  0.0 29.1  40.5  0.0 121.8 44.2 84.8  0.0  44.1 15.6  8.8
LOS by Move:    A    A    C     D    A    F     D    F    A     D    B    A
HCM2kAvgQ:      0    0    0    11    0   27     3   62    0     1   17    0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	1.163
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	73.4
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	295	186	129	125	552	189	163	1043	1058	162	254	25
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	336	212	147	143	629	215	186	1189	1206	185	290	28
Added Vol:	25	17	0	91	40	91	40	151	44	0	120	40
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	361	229	147	234	669	306	226	1340	1250	185	410	69
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.83	0.81	0.80	0.73	0.72	0.64	0.84	0.86	0.86	0.87	0.78
PHF Volume:	469	276	182	292	917	426	353	1595	1454	215	471	88
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	469	276	182	292	917	426	353	1595	1454	215	471	88
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	469	276	182	292	917	426	353	1595	1454	215	471	88
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3600	3800	1900	3600	3800	1900	3600	3800	1900	3600	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.13	0.07	0.10	0.08	0.24	0.22	0.10	0.42	0.77	0.06	0.12	0.05
Crit Moves:	****				****				****	****		
Green/Cycle:	0.11	0.17	0.17	0.15	0.21	0.47	0.26	0.54	0.65	0.06	0.33	0.33
Volume/Cap:	1.17	0.42	0.56	0.56	1.17	0.48	0.37	0.78	1.17	1.02	0.37	0.14
Delay/Veh:	154.4	44.9	47.7	49.0	139	22.1	36.2	23.7	107.3	124.6	30.5	27.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	154.4	44.9	47.7	49.0	139	22.1	36.2	23.7	107.3	124.6	30.5	27.9
LOS by Move:	F	D	D	D	F	C	D	C	F	F	C	C
HCM2kAvgQ:	17	5	7	6	28	11	6	24	81	8	7	2

Note: Queue reported is the number of cars per lane.

```
---------------------------------------------------------------------------
                    UCR West Campus Development Plan
                      Phase 2 - 2015 Conditions
                               PM Peak
---------------------------------------------------------------------------
                   Level Of Service Computation Report
         2000 HCM Unsignalized Method (Future Volume Alternative)
***************************************************************************
Intersection #109 Iowa Ave at Everton Place
***************************************************************************
Average Delay (sec/veh):    977.4      Worst Case Level Of Service: F[14553.9]
***************************************************************************
Street Name:             Iowa Avenue                    Everton Place
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Lanes:        0  1  0  0  1   1  0  0  1  0   0  0  1! 0  0   1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:       0  503    29    36 1038     0     0    0     0    47    0    39
Growth Adj:  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14
Initial Bse:    0  573    33    41 1183     0     0    0     0    54    0    44
Added Vol:     26  102    35   107   95    54    41    0    20    80    0   204
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   26  675    68   148 1278    54    41    0    20   134    0   248
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 0.87  0.81  0.69 0.97  1.00  1.00 1.00  1.00  0.59 1.00  0.75
PHF Volume:    26  776    84   215 1318    54    41    0    20   226    0   331
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:    26  776    84   215 1318    54    41    0    20   226    0   331
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx   4.1 xxxx xxxxx   7.1 xxxx   6.2   7.1 xxxx   6.2
FollowUpTim:  2.2 xxxx xxxxx   2.2 xxxx xxxxx   3.5 xxxx   3.3   3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1372 xxxx xxxxx   860 xxxx xxxxx  2810 xxxx  1345  2612 xxxx   776
Potent Cap.:  507 xxxx xxxxx   790 xxxx xxxxx    12 xxxx   187    16 xxxx   400
Move Cap.:    507 xxxx xxxxx   790 xxxx xxxxx     2 xxxx   187    11 xxxx   400
Volume/Cap:  0.05 xxxx  xxxx  0.27 xxxx  xxxx 26.51 xxxx  0.11 20.31 xxxx  0.83
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.2 xxxx xxxxx   1.1 xxxx xxxxx  xxxx xxxx xxxxx  29.8 xxxx   7.6
Control Del: 12.5 xxxx xxxxx  11.2 xxxx xxxxx xxxxx xxxx xxxxx  9346 xxxx  44.8
LOS by Move:    B    *     *     B    *     *     *    *     *     F    *     E
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx    2 xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  9.7 xxxxx xxxxx xxxx xxxxx
Shrd ConDel: 12.5 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     B    *     *     *    *     *     *    F     *     *    *     *
ApproachDel:      xxxxxx           xxxxxx           xxxxxx           3821.1
ApproachLOS:         *                *                F                F
***************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #124 Iowa Ave at Linden St

Cycle (sec):	110	Critical Vol./Cap.(X):	0.704
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	29.0
Optimal Cycle:	50	Level Of Service:	C

Street Name:	Iowa Avenue		Linden Street	
Approach:	North Bound	South Bound	East Bound	West Bound
Control:	Protected	Protected	Protected	Protected
Rights:	Include	Include	Include	Include
Lanes:	1 0 2 0 1	1 0 1 1 0	1 0 1 0 1	1 0 1 0 1

Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Volume Module: Existing PM Peak												
Base Vol:	46	571	140	58	1023	98	126	155	123	109	110	17
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	52	651	160	66	1166	112	144	177	140	124	125	19
Added Vol:	27	87	18	0	66	0	0	16	19	26	28	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	79	738	178	66	1232	112	144	193	159	150	153	19
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.91	0.85	0.91	0.92	0.88	0.81	0.95	0.70	0.85	0.83	0.53
PHF Volume:	103	811	209	73	1339	127	177	203	227	177	185	37
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	103	811	209	73	1339	127	177	203	227	177	185	37
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	103	811	209	73	1339	127	177	203	227	177	185	37
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.83	0.17	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1900	3800	1900	1900	3471	329	1900	1900	1900	1900	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.05	0.21	0.11	0.04	0.39	0.39	0.09	0.11	0.12	0.09	0.10	0.02
Crit Moves:	****				****				****	****		
Green/Cycle:	0.08	0.48	0.48	0.14	0.55	0.55	0.15	0.17	0.17	0.13	0.15	0.15
Volume/Cap:	0.70	0.44	0.23	0.27	0.70	0.70	0.63	0.63	0.70	0.70	0.63	0.12
Delay/Veh:	63.9	19.0	16.7	42.5	19.4	19.4	48.6	46.3	49.9	54.4	48.0	40.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	63.9	19.0	16.7	42.5	19.4	19.4	48.6	46.3	49.9	54.4	48.0	40.3
LOS by Move:	E	B	B	D	B	B	D	D	D	D	D	D
HCM2kAvgQ:	5	9	4	2	19	19	7	7	9	7	7	1

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #134 Cranford Ave at MLK Blvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.707
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	11.8
Optimal Cycle:	51	Level Of Service:	B

Street Name:	Cranford Ave		MLK Blvd	
Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Protected	Protected	Protected	Protected
Rights:	Include	Include	Include	Include
Min. Green:	0 0 0	7 0 7	7 7 0	0 7 7
Lanes:	0 0 0 0 0	1 0 0 0 1	1 0 2 0 0	0 0 2 0 1

Movement:	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Volume Module: 2015 PM Peak												
Base Vol:	0	0	0	0	0	0	0	1710	0	0	868	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	0	0	0	0	0	0	1949	0	0	990	0
Added Vol:	0	0	0	147	0	125	102	75	0	0	136	92
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	147	0	125	102	2024	0	0	1126	92
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	0	159	0	135	110	2189	0	0	1217	99
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	159	0	135	110	2189	0	0	1217	99
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	159	0	135	110	2189	0	0	1217	99
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.00	1.00	1.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	0	0	0	1900	0	1900	1900	3800	0	0	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.08	0.00	0.07	0.06	0.58	0.00	0.00	0.32	0.05
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.12	0.00	0.12	0.13	0.81	0.00	0.00	0.69	0.69
Volume/Cap:	0.00	0.00	0.00	0.71	0.00	0.60	0.46	0.71	0.00	0.00	0.46	0.08
Delay/Veh:	0.0	0.0	0.0	60.8	0.0	54.7	50.1	5.6	0.0	0.0	8.6	6.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	60.8	0.0	54.7	50.1	5.6	0.0	0.0	8.6	6.1
LOS by Move:	A	A	A	E	A	D	D	A	A	A	A	A
HCM2kAvgQ:	0	0	0	7	0	6	4	18	0	0	10	1

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	1.190
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	90.0
Optimal Cycle:	120	Level Of Service:	F

Street Name:	Chicago Avenue		Martin Luther King Blvd	
Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Protected	Protected	Protected	Protected
Rights:	Ovl	Ovl	Ovl	Ovl
Min. Green:	7 7 7	7 7 7	7 7 7	7 7 7
Lanes:	2 0 2 0 1	2 0 2 0 1	1 0 2 0 1	1 0 2 0 1

Movement:	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Volume Module: Existing PM Peak												
Base Vol:	140	287	61	366	1057	201	170	1283	792	249	514	105
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	160	327	70	417	1205	229	194	1463	903	284	586	120
Added Vol:	0	0	30	69	0	0	0	78	0	48	122	91
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	160	327	100	486	1205	229	194	1541	903	332	708	211
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.84	0.66	0.92	0.91	0.88	0.92	0.96	0.92	0.71	0.86	0.82
PHF Volume:	168	389	151	529	1324	260	211	1605	981	467	823	257
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	168	389	151	529	1324	260	211	1605	981	467	823	257
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	168	390	151	529	1324	260	211	1605	981	467	823	257
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.04	0.10	0.08	0.14	0.35	0.14	0.11	0.42	0.52	0.25	0.22	0.14
Crit Moves:	****				****				****	****		
Green/Cycle:	0.06	0.15	0.35	0.20	0.29	0.49	0.20	0.38	0.44	0.20	0.39	0.59
Volume/Cap:	0.76	0.69	0.23	0.69	1.20	0.28	0.56	1.11	1.18	1.20	0.56	0.23
Delay/Veh:	69.7	52.3	27.5	47.4	143	18.4	45.3	96.6	125.3	161.2	29.3	11.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	69.7	52.3	27.5	47.4	143	18.4	45.3	96.6	125.3	161.2	29.3	11.9
LOS by Move:	E	D	C	D	F	B	D	F	F	F	C	B
HCM2kAvgQ:	5	8	4	10	41	6	8	43	56	30	12	4

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.992
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	55.4
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 1 1 0			2 0 2 0 1			2 0 2 0 1		
Volume Module: Existing PM Peak												
Base Vol:	237	363	126	155	956	86	182	796	463	309	385	72
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	270	414	144	177	1090	98	207	907	528	352	439	82
Added Vol:	13	68	13	11	51	0	0	19	11	8	35	19
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	283	482	157	188	1141	98	207	926	539	360	474	101
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.92	0.73	0.84	0.89	0.77	0.81	0.90	0.87	0.87	0.92	0.82
PHF Volume:	329	524	215	223	1282	127	256	1029	619	414	515	123
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	329	524	215	223	1282	127	256	1029	619	414	515	123
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	329	524	215	223	1282	127	256	1029	619	414	515	123
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.82	0.18	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3457	343	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.09	0.14	0.11	0.06	0.37	0.37	0.07	0.27	0.33	0.11	0.14	0.06
Crit Moves:	****				****				****	****		
Green/Cycle:	0.09	0.32	0.32	0.14	0.37	0.37	0.15	0.33	0.33	0.11	0.29	0.29
Volume/Cap:	0.99	0.43	0.35	0.43	0.99	0.99	0.46	0.82	0.99	0.99	0.46	0.22
Delay/Veh:	101.7	32.1	31.3	47.9	59.2	59.2	47.6	41.7	73.9	95.1	35.0	32.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	101.7	32.1	31.3	47.9	59.2	59.2	47.6	41.7	73.9	95.1	35.0	32.3
LOS by Move:	F	C	C	D	E	E	D	D	E	F	D	C
HCM2kAvgQ:	10	8	6	4	32	32	5	19	29	12	8	3

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

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Intersection #159 Chicago Ave at Linden Street

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Cycle (sec):	100	Critical Vol./Cap.(X):	0.710
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	26.9
Optimal Cycle:	50	Level Of Service:	C

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 1 1 0			1 0 2 0 1			1 0 0 1 0			1 0 1 1 0		
Volume Module: Existing PM Peak												
Base Vol:	61	432	161	172	1149	145	29	83	46	110	124	94
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	70	492	184	196	1310	165	33	95	52	125	141	107
Added Vol:	12	58	17	0	39	0	0	11	8	15	22	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	82	550	201	196	1349	165	33	106	60	140	163	107
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.97	0.84	0.78	0.91	0.79	0.81	0.83	0.72	0.71	0.82	0.81
PHF Volume:	91	568	239	251	1482	209	41	127	84	198	199	132
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	91	568	239	251	1482	209	41	127	84	198	199	132
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	91	568	239	251	1482	209	41	127	84	198	199	132
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.41	0.59	1.00	2.00	1.00	1.00	0.60	0.40	1.00	1.20	0.80
Final Sat.:	1900	2675	1125	1900	3800	1900	1900	1145	755	1900	2284	1516
Capacity Analysis Module:												
Vol/Sat:	0.05	0.21	0.21	0.13	0.39	0.11	0.02	0.11	0.11	0.10	0.09	0.09
Crit Moves:	****				****			****		****		
Green/Cycle:	0.07	0.38	0.38	0.24	0.55	0.55	0.13	0.16	0.16	0.15	0.17	0.17
Volume/Cap:	0.68	0.56	0.56	0.56	0.71	0.20	0.16	0.71	0.71	0.71	0.52	0.52
Delay/Veh:	58.9	24.8	24.8	35.1	17.9	11.6	38.6	47.9	47.9	49.1	38.7	38.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	58.9	24.8	24.8	35.1	17.9	11.6	38.6	47.9	47.9	49.1	38.7	38.7
LOS by Move:	E	C	C	D	B	B	D	D	D	D	D	D
HCM2kAvgQ:	4	10	10	7	18	3	1	8	8	7	5	5

***

Note: Queue reported is the number of cars per lane.

```
-------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                          Phase 2 - 2015 Conditions
                                   PM Peak
-------------------------------------------------------------------------------

                      Level Of Service Computation Report
              2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #196 Iowa Ave at Blaine St
*******************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):         0.889
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        42.9
Optimal Cycle:         94               Level Of Service:                  D
*******************************************************************************
Street Name:                Iowa Avenue                     Blain Street
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:   7     7     7   7     7     7   7     7     7   7     7     7
Lanes:        1  0  2  0  1   1  0  1  1  0   1  0  2  0  1   1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:     198   510   145  193   768   167  302   438   268  149   271   109
Growth Adj:  1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14
Initial Bse:  226   581   165  220   876   190  344   499   306  170   309   124
Added Vol:     11    53    23   12    35     0    0    33    10   21    63    27
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:  237   634   188  232   911   190  344   532   316  191   372   151
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.84  0.86  0.86 0.72  0.96  0.84 0.91  0.88  0.96 0.83  0.89  0.78
PHF Volume:   282   738   219  322   948   227  378   605   329  230   418   194
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  282   738   219  322   948   227  378   605   329  230   418   194
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:   282   738   219  322   948   227  378   605   329  230   418   194
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       1.00  2.00  1.00 1.00  1.61  0.39 1.00  2.00  1.00 1.00  1.37  0.63
Final Sat.:  1900  3800  1900 1900  3067   733 1900  3800  1900 1900  2596  1204
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.15  0.19  0.12 0.17  0.31  0.31 0.20  0.16  0.17 0.12  0.16  0.16
Crit Moves:  ****                   ****       ****                   ****
Green/Cycle: 0.17  0.27  0.27 0.24  0.35  0.35 0.22  0.24  0.24 0.17  0.18  0.18
Volume/Cap:  0.89  0.71  0.42 0.71  0.89  0.89 0.89  0.67  0.73 0.73  0.89  0.89
Delay/Veh:   65.7  34.9  30.3 39.8  38.5  38.5 57.5  36.4  40.8 47.6  53.5  53.5
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:  65.7  34.9  30.3 39.8  38.5  38.5 57.5  36.4  40.8 47.6  53.5  53.5
LOS by Move:    E     C     C    D     D     D    E     D     D    D     D     D
HCM2kAvgQ:     12    11     6   10    21    21   15     9    11    8    13    13
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

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---------------------------------------------------------------------------
                   UCR West Campus Development Plan
                       Phase 2 - 2015 Conditions
                              PM Peak
---------------------------------------------------------------------------
                  Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
***************************************************************************
Intersection #207 I-215/SR-60 NB Ramp at Blain Street
***************************************************************************
Cycle (sec):         110             Critical Vol./Cap.(X):        0.632
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):     19.1
Optimal Cycle:        42             Level Of Service:                 B
***************************************************************************
Street Name:      I-215/SR-60 NB Ramps              Blain Street
Approach:     North Bound    South Bound    East Bound     West Bound
Movement:     L - T - R      L - T - R      L - T - R      L - T - R
------------|---------------||---------------||---------------||---------------|
Control:      Protected      Protected      Protected      Protected
Rights:        Include        Include        Include        Include
Min. Green:    7   7   7     0   0   0      7   7   0      0   7   7
Lanes:       0 1 0 0 1     0 0 0 0 0      2 0 2 0 0      0 0 1 1 0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:     97   1  261     0    0    0   124  779    0     0  483  494
Growth Adj: 1.14 1.14 1.14  1.14 1.14 1.14  1.14 1.14 1.14  1.14 1.14 1.14
Initial Bse: 111   1  298     0    0    0   141  888    0     0  551  563
Added Vol:     0   0    3     0    0    0     0   40    0     0   45   29
PasserByVol:   0   0    0     0    0    0     0    0    0     0    0    0
Initial Fut: 111   1  301     0    0    0   141  928    0     0  596  592
User Adj:   1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:    0.93 0.25 0.88  1.00 1.00 1.00  0.84 0.95 1.00  1.00 0.91 0.86
PHF Volume:  119   5  342     0    0    0   168  977    0     0  655  689
Reduct Vol:    0   0    0     0    0    0     0    0    0     0    0    0
Reduced Vol: 119   5  342     0    0    0   168  977    0     0  655  689
PCE Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:  119   5  342     0    0    0   168  977    0     0  655  689
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
Adjustment: 1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Lanes:      0.96 0.04 1.00  0.00 0.00 0.00  2.00 2.00 0.00  0.00 1.00 1.00
Final Sat.: 1830   70 1900     0    0    0  3800 3800    0     0 1900 1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.06 0.06 0.18  0.00 0.00 0.00  0.04 0.26 0.00  0.00 0.34 0.36
Crit Moves:           ****                  ****                        ****
Green/Cycle: 0.28 0.28 0.28 0.00 0.00 0.00  0.07 0.64 0.00  0.00 0.57 0.57
Volume/Cap: 0.23 0.23 0.63  0.00 0.00 0.00  0.63 0.40 0.00  0.00 0.60 0.63
Delay/Veh:  30.4 30.4 36.8   0.0  0.0  0.0  54.7  9.5  0.0   0.0 15.8 16.4
User DelAdj: 1.00 1.00 1.00 1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh: 30.4 30.4 36.8   0.0  0.0  0.0  54.7  9.5  0.0   0.0 15.8 16.4
LOS by Move:   C    C    D     A    A    A     D    A    A     A    B    B
HCM2kAvgQ:     3    3   11     0    0    0     4    8    0     0   14   16
***************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	0.881
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	36.8
Optimal Cycle:	97	Level Of Service:	D

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0 0	0	0 1	0 0	1	0 0	1 1	0	2 0	2 0	0
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	276	219	192	0	631	639	220	377	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	0	0	315	250	219	0	719	728	251	430	0
Added Vol:	0	0	0	13	0	0	0	27	0	2	44	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	328	250	219	0	746	728	253	474	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.93	0.84	0.92	1.00	0.95	0.95	0.92	0.89	1.00
PHF Volume:	0	0	0	352	297	238	0	786	767	275	532	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	352	297	238	0	786	767	275	532	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	352	297	238	0	786	767	275	532	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.54	0.46	1.00	0.00	1.01	0.99	2.00	2.00	0.00
Final Sat.:	0	0	0	1031	869	1900	0	1923	1877	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.34	0.34	0.13	0.00	0.41	0.41	0.07	0.14	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.39	0.39	0.39	0.00	0.46	0.46	0.08	0.55	0.00
Volume/Cap:	0.00	0.00	0.00	0.88	0.88	0.32	0.00	0.88	0.88	0.88	0.26	0.00
Delay/Veh:	0.0	0.0	0.0	46.2	46.2	26.0	0.0	34.8	34.8	78.5	14.5	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	46.2	46.2	26.0	0.0	34.8	34.8	78.5	14.5	0.0
LOS by Move:	A	A	A	D	D	C	A	C	C	E	B	A
HCM2kAvgQ:	0	0	0	25	25	6	0	29	29	8	5	0

Note: Queue reported is the number of cars per lane.

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---------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                          Phase 2 - 2015 Conditions
                                   PM Peak
---------------------------------------------------------------------------------

                      Level Of Service Computation Report
              2000 HCM Operations Method (Future Volume Alternative)
*********************************************************************************
Intersection #237 Chicago Ave at 3rd Street
*********************************************************************************
Cycle (sec):          120              Critical Vol./Cap.(X):            0.960
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):          59.3
Optimal Cycle:        120              Level Of Service:                    E
*********************************************************************************
Street Name:             Chicago Avenue                      3rd Street
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:     10    10    10   10    10    10   10    10    10   10    10    10
Lanes:          1  0  1  1  0    1  0  1  1  0    1  0  1  1  0    1  0  1  1  0
------------|----------------||----------------||----------------||----------------|
Volume Module: Existing PM Peak
Base Vol:       88   415   136   260   865   107   137   636   264   240   294    81
Growth Adj:   1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14
Initial Bse:   100   473   155   296   986   122   156   725   301   274   335    92
Added Vol:      12    43     3    10    26     0     0    14    10     2    19    23
PasserByVol:     0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:   112   516   158   306  1012   122   156   739   311   276   354   115
User Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:      0.76  0.82  0.79  0.83  0.90  0.72  0.82  0.85  0.85  0.95  0.84  0.81
PHF Volume:    148   629   200   369  1125   169   190   869   366   290   422   142
Reduct Vol:      0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   148   629   200   369  1125   169   190   869   366   290   422   142
PCE Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:    148   629   200   369  1125   169   190   869   366   290   422   142
------------|----------------||----------------||----------------||----------------|
Saturation Flow Module:
Sat/Lane:     1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:        1.00  1.52  0.48  1.00  1.74  0.26  1.00  1.41  0.59  1.00  1.50  0.50
Final Sat.:   1900  2883   917  1900  3302   498  1900  2675  1125  1900  2841   959
------------|----------------||----------------||----------------||----------------|
Capacity Analysis Module:
Vol/Sat:      0.08  0.22  0.22  0.19  0.34  0.34  0.10  0.33  0.33  0.15  0.15  0.15
Crit Moves:   ****                    ****              ****        ****
Green/Cycle:  0.08  0.23  0.23  0.21  0.35  0.35  0.20  0.34  0.34  0.16  0.30  0.30
Volume/Cap:   0.93  0.94  0.94  0.94  0.96  0.96  0.50  0.96  0.96  0.96  0.50  0.50
Delay/Veh:   106.7  63.6  63.6  78.4  54.4  54.4  43.7  55.9  55.9  91.8  35.3  35.3
User DelAdj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  106.7  63.6  63.6  78.4  54.4  54.4  43.7  55.9  55.9  91.8  35.3  35.3
LOS by Move:     F     E     E     E     D     D     D     E     E     F     D     D
HCM2kAvgQ:       9    19    19    18    29    29     7    28    28    15     9     9
*********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #291 I-215 SB Ramp/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.628
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	14.5
Optimal Cycle:	41	Level Of Service:	B

Street Name:	I-215 SB Ramps						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0	0 0	1 0	0	1 0	0 0	1	1 1	1 0	2	0 0
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	3	101	106	0	186	971	5	328	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	0	0	3	115	121	0	212	1107	6	374	0
Added Vol:	0	0	0	0	0	52	0	87	155	0	108	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	3	115	173	0	299	1262	6	482	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.75	0.70	0.80	1.00	0.74	0.88	0.63	0.87	1.00
PHF Volume:	0	0	0	5	164	216	0	404	1434	9	554	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	5	164	216	0	404	1434	9	554	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	5	164	216	0	404	1434	9	554	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.43	0.57	0.00	1.00	2.00	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	821	1079	0	1900	3800	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.00	0.20	0.20	0.00	0.21	0.38	0.00	0.15	0.00
Crit Moves:					****				****			
Green/Cycle:	0.00	0.00	0.00	0.32	0.32	0.32	0.00	0.60	0.60	0.60	0.60	0.00
Volume/Cap:	0.00	0.00	0.00	0.01	0.63	0.63	0.00	0.35	0.63	0.01	0.24	0.00
Delay/Veh:	0.0	0.0	0.0	23.3	31.1	31.1	0.0	10.2	13.2	8.0	9.4	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	23.3	31.1	31.1	0.0	10.2	13.2	8.0	9.4	0.0
LOS by Move:	A	A	A	C	C	C	A	B	B	A	A	A
HCM2kAvgQ:	0	0	0	0	11	11	0	6	14	0	4	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 - 2015 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #292 I-215 NB Ramps/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.495
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	13.9
Optimal Cycle:	0	Level Of Service:	B

Street Name:	I-215 NB Ramp						MLK BLvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 1 0 0 0			0 0 0 0 0			2 0 0 0 0			0 0 0 0 0		
Volume Module: Existing PM												
Base Vol:	333	1	0	0	0	0	188	0	0	0	0	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	380	1	0	0	0	0	214	0	0	0	0	0
Added Vol:	108	0	0	0	0	0	87	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	488	1	0	0	0	0	301	0	0	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.87	0.25	1.00	1.00	1.00	1.00	0.73	1.00	1.00	1.00	1.00	1.00
PHF Volume:	560	5	0	0	0	0	413	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	560	5	0	0	0	0	413	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	560	5	0	0	0	0	413	0	0	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.98	0.02	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
Final Sat.:	1133	9	0	0	0	0	1078	0	0	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.49	0.49	xxxx	xxxx	xxxx	xxxx	0.38	xxxx	xxxx	xxxx	xxxx	xxxx
Crit Moves:	****						****					
Delay/Veh:	14.6	14.6	0.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	14.6	14.6	0.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0	0.0	0.0
LOS by Move:	B	B	*	*	*	*	B	*	*	*	*	*
ApproachDel:		14.6			xxxxxx			13.0			xxxxxx	
Delay Adj:		1.00			xxxxx			1.00			xxxxx	
ApprAdjDel:		14.6			xxxxxx			13.0			xxxxxx	
LOS by Appr:		B			*			B			*	
AllWayAvgQ:	0.9	0.9	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0

2020 PHASE 3 PROJECT CONDITIONS
AM AND PM PEAK HOUR

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/C	Future LOS	Future Del/ Veh	Future V/C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	26.2	0.575	C	30.2	0.675	+ 4.002 D/V
# 21 I-215/SR-60 SB Ramp at Univers	C	24.1	0.530	C	25.2	0.650	+ 1.131 D/V
# 23 West Campus at University Ave	C	32.7	0.837	C	33.1	0.848	+ 0.436 D/V
# 56 NW Mall at Iowa Avenue	A	0.0	0.000	F	127.5	0.000	+127.543 D/V
# 58 Iowa Ave at University Ave	D	36.7	0.603	D	41.2	0.776	+ 4.519 D/V
# 71 SW Mall at Iowa Avenue	A	0.0	0.000	F	119.1	0.000	+119.087 D/V
# 78 Iowa Ave at MLK Blvd	C	21.5	0.636	C	26.1	0.850	+ 4.594 D/V
# 83 Lot 30/MLK BLvd	C	33.4	0.906	E	63.1	1.061	+29.711 D/V
# 85 Canyon Crest Dr at MLK BLvd	C	26.8	0.720	D	39.3	0.900	+12.429 D/V
#109 Iowa Ave at Everton Place	C	22.3	0.000	F	OVRFL	0.000	+10830.538 D
#124 Iowa Ave at Linden St	C	32.3	0.685	C	34.6	0.774	+ 2.290 D/V
#134 Cranford Ave at MLK Blvd	A	0.4	0.306	C	21.5	0.595	+21.093 D/V
#137 Chicago Ave at MLK Blvd	C	34.4	0.708	D	39.0	0.820	+ 4.565 D/V
#151 Chicago Ave at University Aven	C	34.7	0.609	D	35.4	0.658	+ 0.756 D/V
#159 Chicago Ave at Linden Street	D	41.1	0.883	E	55.3	1.004	+14.235 D/V
#196 Iowa Ave at Blaine St	D	53.8	0.992	E	65.1	1.059	+11.339 D/V
#207 I-215/SR-60 NB Ramp at Blain S	C	26.9	0.792	C	27.1	0.806	+ 0.148 D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	26.2	0.654	C	27.2	0.706	+ 1.067 D/V
#237 Chicago Ave at 3rd Street	D	50.3	0.885	E	57.6	0.960	+ 7.288 D/V
#291 I-215 SB Ramp/MLK Blvd	B	18.5	0.455	C	22.3	0.623	+ 3.839 D/V
#292 I-215 NB Ramps/MLK Blvd	C	19.5	0.692	E	36.8	0.853	+ 0.162 V/C

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 56 NW Mall at Iowa Avenue	??? / ???	No / No
# 71 SW Mall at Iowa Avenue	??? / ???	No / No
#109 Iowa Ave at Everton Place	??? / ???	Yes / Yes
#292 I-215 NB Ramps/MLK Blvd	???	Yes

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	6		1022		3	8		629		14	24		0		11	11		0		34
ApproachDel:	xxxxxx					xxxxxx					127.5					48.9				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=1.2]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=35]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1761]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.6]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=45]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1761]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

IGNAL WARRANT DISCLAIMER
his peak hour signal warrant analysis should be considered solely as an
indicator" of the likelihood of an unsignalized intersection warranting
traffic signal in the future. Intersections that exceed this warrant
e probably more likely to meet one or more of the other volume based
gnal warrant (such as the 4-hour or 8-hour warrants).

peak hour warrant analysis in this report is not intended to replace
igorous and complete traffic signal warrant analysis by the responsible
isdiction. Consideration of the other signal warrants, which is beyond
scope of this software, may yield different results.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Uncontrolled	Uncontrolled	Stop Sign	Stop Sign
Lanes:	1 0 1 0 1	1 0 1 0 1	0 0 1! 0 0	0 0 1! 0 0
Initial Vol:	6 1022 3	8 629 14	24 0 11	11 0 34

Major Street Volume: 1681
Minor Approach Volume: 45
Minor Approach Volume Threshold: 106

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #71 SW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	- T -			R	L	- T -			R	L	- T -			R	L	- T -			R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	19		989		2	14		615		22	39		0		31	10		0		3
ApproachDel:	xxxxxx					xxxxxx					119.1					74.7				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=2.3]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=70]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1743]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.3]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=13]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1743]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
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UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #71 SW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	19		989		2	14		615		22	39		0		31	10		0		3

Major Street Volume: 1660
Minor Approach Volume: 70
Minor Approach Volume Threshold: 110

SIGNAL WARRANT DISCLAIMER
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UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Uncontrolled	Uncontrolled	Stop Sign	Stop Sign
Lanes:	0 1 0 0 1	1 0 0 1 0	0 0 1! 0 0	1 0 0 0 1
Initial Vol:	15 961 173	287 595 32	53 0 25	43 0 123
ApproachDel:	xxxxxx	xxxxxx	xxxxxx	762.1

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=235.1]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=78]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2307]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=35.2]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=166]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2307]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
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UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 1	0	0 1	1 0	0	1 0	0 0	1!	0 0	1 0	0	0 1
Initial Vol:	15	961	173	287	595	32	53	0	25	43	0	123

Major Street Volume: 2062
Minor Approach Volume: 166
Minor Approach Volume Threshold: 63 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 1	0 0	0	0 0	0 0	0	2 0	0 0	0	0 0	0 0	0
Initial Vol:	654	15	0	0	0	0	750	0	0	0	0	0

Major Street Volume: 750
Minor Approach Volume: 668
Minor Approach Volume Threshold: 498

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Scenario Report

Scenario:	2020 Conditions
Command:	Phase 3 2020 with project AM Peak
Volume:	Phase 3 AM
Geometry:	Existing Conditions
Impact Fee:	Default Impact Fee
Trip Generation:	Phase 3 AM
Trip Distribution:	Default Trip Distribution
Paths:	with project
Routes:	Default Routes
Configuration:	Phase 3 with project AM Peak

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Trip Generation Report

Forecast for Phase 3 AM

Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total Trips	% Of Total
1	LOT 30 Parki	1.00	Parking Lot	148.00	38.00	148	38	186	6.8
	Zone 1 Subtotal					148	38	186	6.8
3	Parking Lot	1.00	Parking Lot	346.00	85.00	346	85	431	15.7
	Zone 3 Subtotal					346	85	431	15.7
5	Area Family	1.00	Area F housing	68.00	113.00	68	113	181	6.6
	Zone 5 Subtotal					68	113	181	6.6
9	Apartments A	1.00	Apartments	14.00	54.00	14	54	68	2.5
	Zone 9 Subtotal					14	54	68	2.5
10	F Block Fami	1.00	Family Apartme	60.00	101.00	60	101	161	5.9
	Zone 10 Subtotal					60	101	161	5.9
11	Phase 1 E Ca	1.00	Increase in St	492.00	130.00	492	130	622	22.7
	Zone 11 Subtotal					492	130	622	22.7
12	Lot for M4	1.00	Increase in St	72.00	19.00	72	19	91	3.3
	Zone 12 Subtotal					72	19	91	3.3
13	H2 Housing	1.00	Apartments	9.00	20.00	9	20	29	1.1
	Zone 13 Subtotal					9	20	29	1.1
14	Parking PM a	1.00	Parking Lot	503.00	240.00	503	240	743	27.1
	Zone 14 Subtotal					503	240	743	27.1
15	PMOB Lot	1.00	Parking Lot	42.00	32.00	42	32	74	2.7
	Zone 15 Subtotal					42	32	74	2.7
16	Parking Lot	1.00	Parking Lot	74.00	18.00	74	18	92	3.4
	Zone 16 Subtotal					74	18	92	3.4
17	Apartment A1	1.00	Apartments	13.00	53.00	13	53	66	2.4
	Zone 17 Subtotal					13	53	66	2.4
TOTAL						1841	903	2744	100.0

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #20 I-215/SR-60 NB Ramps at University

Cycle (sec):	110	Critical Vol./Cap.(X):	0.675
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	30.2
Optimal Cycle:	75	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	7	7	0	7	7	7	7	0	7	7
Lanes:	0 0	0 0	1	1 0	0 0	1	1 0	1 1	0	0 1	0 1	0
Volume Module: Existing AM Peak												
Base Vol:	0	0	1	74	0	382	80	595	1	0	198	73
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	0	1	91	0	470	98	732	1	0	244	90
Added Vol:	0	0	0	57	0	80	33	129	0	0	146	10
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	148	0	550	131	861	1	0	390	100
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.25	0.74	1.00	0.91	0.71	0.74	0.25	1.00	0.88	0.87
PHF Volume:	0	0	5	200	0	604	185	1163	5	0	443	115
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	5	200	0	604	185	1163	5	0	443	115
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	5	200	0	604	185	1163	5	0	443	115
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.99	0.01	0.00	1.59	0.41
Final Sat.:	0	0	1900	1900	0	1900	1900	3784	16	0	3018	782
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.11	0.00	0.32	0.10	0.31	0.31	0.00	0.15	0.15
Crit Moves:	****					****		****				
Green/Cycle:	0.00	0.00	0.01	0.37	0.00	0.38	0.37	0.55	0.55	0.00	0.18	0.18
Volume/Cap:	0.00	0.00	0.28	0.28	0.00	0.83	0.26	0.56	0.56	0.00	0.83	0.83
Delay/Veh:	0.0	0.0	62.8	24.4	0.0	39.0	24.4	16.8	16.8	0.0	52.5	52.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	62.8	24.4	0.0	39.0	24.4	16.8	16.8	0.0	52.5	52.5
LOS by Move:	A	A	E	C	A	D	C	B	B	A	D	D
HCM2kAvgQ:	0	0	0	5	0	21	4	13	13	0	12	12

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #21 I-215/SR-60 SB Ramp at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.650
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	25.2
Optimal Cycle:	43	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Include			Include			Include	
Min. Green:	0	0	0	7	0	7	0	7	7	7	7	0
Lanes:	0 0 0 0 0			0 1 0 1 0			0 0 1 1 1			1 0 2 0 0		
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	351	26	186	0	305	229	43	533	0
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	0	0	432	32	229	0	375	282	53	656	0
Added Vol:	0	0	0	37	0	39	0	125	20	15	211	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	469	32	268	0	500	302	68	867	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.70	0.50	0.88	1.00	0.88	0.90	0.83	0.93	1.00
PHF Volume:	0	0	0	670	64	304	0	568	335	82	932	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	670	64	304	0	568	335	82	932	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	670	64	304	0	568	335	82	932	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.17	0.83	0.00	1.89	1.11	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	330	1570	0	3585	2115	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.35	0.19	0.19	0.00	0.16	0.16	0.04	0.25	0.00
Crit Moves:				****			****				****	
Green/Cycle:	0.00	0.00	0.00	0.54	0.54	0.54	0.00	0.26	0.26	0.12	0.38	0.00
Volume/Cap:	0.00	0.00	0.00	0.65	0.36	0.36	0.00	0.61	0.61	0.37	0.65	0.00
Delay/Veh:	0.0	0.0	0.0	17.1	13.1	13.1	0.0	33.1	33.1	41.9	26.7	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	17.1	13.1	13.1	0.0	33.1	33.1	41.9	26.7	0.0
LOS by Move:	A	A	A	B	B	B	A	C	C	D	C	A
HCM2kAvgQ:	0	0	0	15	6	6	0	9	9	3	12	0

Note: Queue reported is the number of cars per lane.

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------------------------------------------------------------------------------
                    UCR west Campus Development Plan
                       Phase 3 - 2020  Conditions
                                AM Peak
------------------------------------------------------------------------------
                   Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
******************************************************************************
Intersection #23 West Campus at University Ave
******************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):         0.848
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        33.1
Optimal Cycle:         78               Level Of Service:                  C
******************************************************************************
Street Name:                West Campus                 University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:    7    0     7    0    0     0    0    7     7    7    7     0
Lanes:        1  0  0  0  1   0  0  0  0  0   0  0  1  1  0   1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM peak
Base Vol:    129    0   276    0    0     0    0  285   367  203  153     0
Growth Adj: 1.23 1.23  1.23 1.23 1.23  1.23 1.23 1.23  1.23 1.23 1.23  1.23
Initial Bse: 159    0   339    0    0     0    0  351   451  250  188     0
Added Vol:     0    0     5    0    0     0    0  186     0   18  156     0
PasserByVol:   0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut: 159    0   344    0    0     0    0  537   451  268  344     0
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    0.67 1.00  0.70 1.00 1.00  1.00 1.00 0.86  0.71 0.73 0.77  1.00
PHF Volume:  237    0   492    0    0     0    0  624   636  367  447     0
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol: 237    0   492    0    0     0    0  624   636  367  447     0
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:  237    0   492    0    0     0    0  624   636  367  447     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:      1.00 0.00  1.00 0.00 0.00  0.00 0.00 1.00  1.00 1.00 2.00  0.00
Final Sat.: 1900    0  1900    0    0     0    0 1900  1900 1900 3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.12 0.00  0.26 0.00 0.00  0.00 0.00 0.33  0.33 0.19 0.12  0.00
Crit Moves:            ****                      ****       ****
Green/Cycle: 0.31 0.00 0.31 0.00 0.00  0.00 0.00 0.39  0.39 0.23 0.61  0.00
Volume/Cap: 0.41 0.00  0.85 0.00 0.00  0.00 0.00 0.85  0.86 0.85 0.19  0.00
Delay/Veh:  28.0  0.0  43.8  0.0  0.0   0.0  0.0 32.8  33.9 51.5  8.5   0.0
User DelAdj: 1.00 1.00 1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh: 28.0  0.0  43.8  0.0  0.0   0.0  0.0 32.8  33.9 51.5  8.5   0.0
LOS by Move:   C    A     D    A    A     A    A    C     C    D    A     A
HCM2kAvgQ:     6    0    17    0    0     0    0   20    21   14    3     0
******************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                       UCR west Campus Development Plan
                          Phase 3 - 2020  Conditions
                                   AM Peak
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Average Delay (sec/veh):       3.9      Worst Case Level Of Service: F[127.5]
********************************************************************************
Street Name:                  NW Mall                        Iowa Avenue
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:          1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: 2010 AM Peak
Base Vol:         0  659     0      0  337     0      0    0     0      0    0     0
Growth Adj:    1.23 1.23  1.23   1.23 1.23  1.23   1.23 1.23  1.23   1.23 1.23  1.23
Initial Bse:      0  811     0      0  415     0      0    0     0      0    0     0
Added Vol:        6  211     3      8  214    14     24    0    11     11    0    34
PasserByVol:      0    0     0      0    0     0      0    0     0      0    0     0
Initial Fut:      6 1022     3      8  629    14     24    0    11     11    0    34
User Adj:      1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
PHF Adj:       0.90 0.90  0.90   0.90 0.90  0.90   0.90 0.90  0.90   0.90 0.90  0.90
PHF Volume:       7 1135     3      9  698    16     27    0    12     12    0    38
Reduct Vol:       0    0     0      0    0     0      0    0     0      0    0     0
Final Vol.:       7 1135     3      9  698    16     27    0    12     12    0    38
Critical Gap Module:
Critical Gp:    4.1 xxxx xxxxx    4.1 xxxx xxxxx    7.1 xxxx   6.2    7.1 xxxx   6.2
FollowUpTim:    2.2 xxxx xxxxx    2.2 xxxx xxxxx    3.5 xxxx   3.3    3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:    714 xxxx xxxxx   1138 xxxx xxxxx   1885 xxxx   698   1878 xxxx  1135
Potent Cap.:    896 xxxx xxxxx    621 xxxx xxxxx     55 xxxx   444     55 xxxx   249
Move Cap.:      896 xxxx xxxxx    621 xxxx xxxxx     45 xxxx   444     53 xxxx   249
Volume/Cap:    0.01 xxxx  xxxx   0.01 xxxx  xxxx   0.59 xxxx  0.03   0.23 xxxx  0.15
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:      0.0 xxxx xxxxx    0.0 xxxx xxxxx   xxxx xxxx xxxxx   xxxx xxxx xxxxx
Control Del:    9.1 xxxx xxxxx   10.9 xxxx xxxxx  xxxxx xxxx xxxxx  xxxxx xxxx xxxxx
LOS by Move:      A    *     *      B    *     *      *    *     *      *    *     *
Movement:        LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx   xxxx xxxx xxxxx   xxxx   63 xxxxx   xxxx  130 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  2.6 xxxxx xxxxx  1.6 xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  128 xxxxx xxxxx 48.9 xxxxx
Shared LOS:       *    *     *      *    *     *      *    F     *      *    E     *
ApproachDel:        xxxxxx           xxxxxx            127.5             48.9
ApproachLOS:          *                *                 F                E
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.776
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	41.2
Optimal Cycle:	62	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	63	544	92	136	245	99	139	345	56	80	342	167
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	77	669	113	167	301	122	171	424	69	98	421	205
Added Vol:	35	142	123	0	175	5	4	22	54	237	12	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	112	811	236	167	476	127	175	446	123	335	433	205
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.75	0.83	0.72	0.87	0.84	0.88	0.91	0.92	0.91	0.74	0.96	0.72
PHF Volume:	150	977	328	192	567	144	192	485	135	453	451	285
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	150	977	328	192	567	144	192	485	135	453	451	285
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	150	977	328	192	567	144	192	485	135	453	451	285
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.59	0.41	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3030	770	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.08	0.26	0.17	0.10	0.19	0.19	0.10	0.13	0.07	0.24	0.12	0.15
Crit Moves:		****		****				****		****		
Green/Cycle:	0.14	0.33	0.33	0.13	0.32	0.32	0.19	0.16	0.30	0.31	0.28	0.28
Volume/Cap:	0.58	0.78	0.52	0.78	0.58	0.58	0.53	0.78	0.24	0.78	0.42	0.53
Delay/Veh:	51.7	39.2	33.2	64.8	34.3	34.3	45.3	54.1	31.7	44.3	35.4	37.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	51.7	39.2	33.2	64.8	34.3	34.3	45.3	54.1	31.7	44.3	35.4	37.5
LOS by Move:	D	D	C	E	C	C	D	D	C	D	D	D
HCM2kAvgQ:	6	18	10	9	11	11	7	10	4	17	7	9

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #71 SW Mall at Iowa Avenue

Average Delay (sec/veh): 5.5 Worst Case Level Of Service: F[119.1]

Street Name:	SW Mall						Iowa Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	1 0 1 0 1			1 0 1 0 1			0 0 1! 0 0			0 0 1! 0 0		
Volume Module:												
Base Vol:	0	659	0	0	337	0	0	0	0	0	0	0
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	811	0	0	415	0	0	0	0	0	0	0
Added Vol:	19	178	2	14	200	22	39	0	31	10	0	3
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	19	989	2	14	615	22	39	0	31	10	0	3
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	21	1069	2	15	664	24	42	0	34	11	0	3
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	21	1069	2	15	664	24	42	0	34	11	0	3
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx	7.1	xxxx	6.2	7.1	xxxx	6.2
FollowUpTim:	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx	3.5	xxxx	3.3	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	688	xxxx	xxxxx	1071	xxxx	xxxxx	1807	xxxx	664	1833	xxxx	1069
Potent Cap.:	915	xxxx	xxxxx	659	xxxx	xxxxx	62	xxxx	464	59	xxxx	272
Move Cap.:	915	xxxx	xxxxx	659	xxxx	xxxxx	59	xxxx	464	53	xxxx	272
Volume/Cap:	0.02	xxxx	xxxx	0.02	xxxx	xxxx	0.71	xxxx	0.07	0.20	xxxx	0.01
Level Of Service Module:												
2Way95thQ:	0.1	xxxx	xxxxx	0.1	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	9.0	xxxx	xxxxx	10.6	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	A	*	*	B	*	*	*	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	96	xxxxx	xxxx	65	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	4.2	xxxxx	xxxxx	0.7	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	119	xxxxx	xxxxx	74.7	xxxxx
Shared LOS:	*	*	*	*	*	*	*	F	*	*	F	*
ApproachDel:		xxxxxx			xxxxxx			119.1			74.7	
ApproachLOS:		*			*			F			F	

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #78 Iowa Ave at MLK Blvd

Cycle (sec):	110	Critical Vol./Cap.(X):	0.850
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	26.1
Optimal Cycle:	81	Level Of Service:	C

Street Name:	Iowa Avenue						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Include			Ovl		
Min. Green:	0	0	0	7	7	7	7	7	0	0	7	7
Lanes:	0 0 0 0 0			1 0 1! 0 1			1 0 2 0 0			0 0 2 0 1		
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	263	0	101	267	440	0	0	785	484
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	0	0	323	0	124	328	541	0	0	966	595
Added Vol:	0	0	0	100	0	141	106	251	0	0	305	93
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	423	0	265	434	792	0	0	1271	688
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.75	1.00	0.81	0.90	0.77	1.00	1.00	0.95	0.92
PHF Volume:	0	0	0	565	0	327	483	1029	0	0	1337	748
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	565	0	327	483	1029	0	0	1337	748
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	565	0	327	483	1029	0	0	1337	748
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.63	0.00	1.37	1.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	0	0	0	3103	0	2597	1900	3800	0	0	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.18	0.00	0.13	0.25	0.27	0.00	0.00	0.35	0.39
Crit Moves:				****			****				****	
Green/Cycle:	0.00	0.00	0.00	0.21	0.00	0.51	0.30	0.71	0.00	0.00	0.41	0.63
Volume/Cap:	0.00	0.00	0.00	0.85	0.00	0.25	0.85	0.38	0.00	0.00	0.85	0.63
Delay/Veh:	0.0	0.0	0.0	48.2	0.0	15.0	47.9	6.3	0.0	0.0	33.7	13.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	48.2	0.0	15.0	47.9	6.3	0.0	0.0	33.7	13.6
LOS by Move:	A	A	A	D	A	B	D	A	A	A	C	B
HCM2kAvgQ:	0	0	0	14	0	4	18	7	0	0	23	16

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	1.061
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	63.1
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	1 0	0	0 0	0 1	0	0 1	1 0	1	1 0	1 0	2	0 1
Volume Module: Existing AM Peak												
Base Vol:	4	0	0	12	0	4	321	600	0	10	1276	77
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	5	0	0	15	0	5	395	738	0	12	1569	95
Added Vol:	0	0	0	9	0	3	10	328	0	0	430	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	5	0	0	24	0	8	405	1066	0	12	1999	95
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.50	1.00	1.00	1.00	1.00	0.33	0.60	0.75	1.00	0.50	0.90	0.69
PHF Volume:	10	0	0	24	0	24	675	1421	0	25	2222	137
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	10	0	0	24	0	24	675	1421	0	25	2222	137
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	10	0	0	24	0	24	675	1421	0	25	2222	137
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.79	1.00	1.00	0.73	1.00	0.85	0.95	1.00	1.00	0.95	1.00	0.85
Lanes:	1.00	0.00	0.00	1.00	0.00	1.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	1505	0	0	1379	0	1615	1805	3800	0	1805	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.01	0.00	0.00	0.02	0.00	0.01	0.37	0.37	0.00	0.01	0.58	0.08
Crit Moves:				****			****				****	
Green/Cycle:	0.07	0.00	0.00	0.07	0.00	0.07	0.33	0.72	0.00	0.13	0.52	0.52
Volume/Cap:	0.09	0.00	0.00	0.25	0.00	0.21	1.13	0.52	0.00	0.10	1.13	0.16
Delay/Veh:	43.9	0.0	0.0	45.3	0.0	44.8	110.6	6.6	0.0	38.2	88.7	12.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.9	0.0	0.0	45.3	0.0	44.8	110.6	6.6	0.0	38.2	88.7	12.8
LOS by Move:	D	A	A	D	A	D	F	A	A	D	F	B
HCM2kAvgQ:	0	0	0	1	0	1	34	10	0	1	53	2

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.900
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	39.3
Optimal Cycle:	114	Level Of Service:	D

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	1153	452	445	41	84	52	130	185	323	108	335	36
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	1418	556	547	50	103	64	160	228	397	133	412	44
Added Vol:	84	51	0	31	13	32	118	182	36	0	314	117
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	1502	607	547	81	116	96	278	410	433	133	726	161
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.74	0.79	0.68	0.88	0.59	0.83	0.72	0.94	0.93	0.89	0.56
PHF Volume:	1633	820	693	120	132	163	335	569	461	143	816	288
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	1633	820	693	120	132	163	335	569	461	143	816	288
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	1633	820	693	120	132	163	335	569	461	143	816	288
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.85
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3420	3800	1615	3420	3800	1615	3420	3800	1615	3420	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.48	0.22	0.43	0.04	0.03	0.10	0.10	0.15	0.29	0.04	0.21	0.18
Crit Moves:	****				****		****				****	
Green/Cycle:	0.52	0.51	0.51	0.07	0.06	0.16	0.11	0.24	0.76	0.10	0.23	0.23
Volume/Cap:	0.92	0.42	0.84	0.51	0.60	0.61	0.92	0.61	0.37	0.44	0.92	0.76
Delay/Veh:	34.9	18.7	33.5	55.7	59.5	50.7	81.1	41.5	4.9	52.2	59.5	51.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	34.9	18.7	33.5	55.7	59.5	50.7	81.1	41.5	4.9	52.2	59.5	51.9
LOS by Move:	C	B	C	E	E	D	F	D	A	D	E	D
HCM2kAvgQ:	33	9	24	3	3	6	10	10	6	3	19	12

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #109 Iowa Ave at Everton Place

Average Delay (sec/veh): 367.8   Worst Case Level Of Service: F[10852.9]

Street Name:	Iowa Avenue						Everton Place					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 1 0 0 1			1 0 0 1 0			0 0 1! 0 0			1 0 0 0 1		
Volume Module: Exsting AM Peak												
Base Vol:	0	659	56	28	337	0	0	0	0	10	0	21
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	811	69	34	415	0	0	0	0	12	0	26
Added Vol:	15	150	104	253	180	32	53	0	25	31	0	97
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	15	961	173	287	595	32	53	0	25	43	0	123
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	0.90	0.54	0.88	0.83	1.00	1.00	1.00	1.00	0.83	1.00	0.75
PHF Volume:	15	1067	320	327	716	32	53	0	25	52	0	164
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	15	1067	320	327	716	32	53	0	25	52	0	164
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx	7.1	xxxx	6.2	7.1	xxxx	6.2
FollowUpTim:	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx	3.5	xxxx	3.3	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	748	xxxx	xxxxx	1387	xxxx	xxxxx	2725	xxxx	732	2495	xxxx	1067
Potent Cap.:	870	xxxx	xxxxx	500	xxxx	xxxxx	14	xxxx	424	20	xxxx	272
Move Cap.:	870	xxxx	xxxxx	500	xxxx	xxxxx	3	xxxx	424	9	xxxx	272
Volume/Cap:	0.02	xxxx	xxxx	0.65	xxxx	xxxx	20.86	xxxx	0.06	5.92	xxxx	0.60
Level Of Service Module:												
2Way95thQ:	0.1	xxxx	xxxxx	4.7	xxxx	xxxxx	xxxx	xxxx	xxxxx	7.9	xxxx	3.6
Control Del:	9.2	xxxx	xxxxx	24.8	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3040	xxxx	36.4
LOS by Move:	A	*	*	C	*	*	*	*	*	F	*	E
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	4	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	0.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	11.8	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	9.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	A	*	*	*	*	*	*	F	*	*	*	*
ApproachDel:		xxxxxx			xxxxxx			xxxxxx			762.1	
ApproachLOS:		*			*			F			F	

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #124 Iowa Ave at Linden St

Cycle (sec):	110	Critical Vol./Cap.(X):	0.774
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	34.6
Optimal Cycle:	61	Level Of Service:	C

Street Name:	Iowa Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	1 0	1	1 0	1 0	1
Volume Module: Existing AM Peak												
Base Vol:	118	579	92	45	403	207	113	107	47	70	137	67
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	145	712	113	55	496	255	139	132	58	86	169	82
Added Vol:	20	89	37	0	128	0	0	42	33	18	29	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	165	801	150	55	624	255	139	174	91	104	198	82
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.59	0.90	0.80	0.70	0.80	0.57	0.81	0.70	0.70	0.65	0.66	0.88
PHF Volume:	280	890	188	79	780	447	172	248	130	160	299	94
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	280	890	188	79	780	447	172	248	130	160	299	94
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	280	890	188	79	780	447	172	248	130	160	299	94
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.27	0.73	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1900	3800	1900	1900	2416	1384	1900	1900	1900	1900	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.15	0.23	0.10	0.04	0.32	0.32	0.09	0.13	0.07	0.08	0.16	0.05
Crit Moves:	****				****		****				****	
Green/Cycle:	0.19	0.48	0.48	0.13	0.42	0.42	0.12	0.19	0.19	0.13	0.20	0.20
Volume/Cap:	0.77	0.49	0.21	0.32	0.77	0.77	0.77	0.67	0.35	0.67	0.77	0.24
Delay/Veh:	52.3	19.8	16.8	44.2	30.1	30.1	62.7	45.8	38.9	53.2	50.8	37.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	52.3	19.8	16.8	44.2	30.1	30.1	62.7	45.8	38.9	53.2	50.8	37.0
LOS by Move:	D	B	B	D	C	C	E	D	D	D	D	D
HCM2kAvgQ:	11	10	4	3	19	19	8	9	4	6	11	3

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #134 Cranford Ave at MLK Blvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.595
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	21.5
Optimal Cycle:	39	Level Of Service:	C

Street Name:	Cranford Ave						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	0	7	7	7	0	0	7	7
Lanes:		0 0 0 0 0			1 0 0 0 1			1 0 2 0 0			0 0 2 0 1	
Volume Module:												
Base Vol:	0	0	0	0	0	0	0	375	0	0	816	0
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	0	0	0	0	0	0	461	0	0	1004	0
Added Vol:	0	0	0	166	0	143	243	192	0	0	86	360
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	166	0	143	243	653	0	0	1090	360
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	0	179	0	155	263	706	0	0	1178	389
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	179	0	155	263	706	0	0	1178	389
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	179	0	155	263	706	0	0	1178	389
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	0.95	1.00	0.85	0.95	1.00	1.00	1.00	1.00	0.85
Lanes:	0.00	0.00	0.00	1.00	0.00	1.00	1.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	0	0	0	1805	0	1615	1805	3800	0	0	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.10	0.00	0.10	0.15	0.19	0.00	0.00	0.31	0.24
Crit Moves:				****			****				****	
Green/Cycle:	0.00	0.00	0.00	0.17	0.00	0.17	0.24	0.77	0.00	0.00	0.52	0.52
Volume/Cap:	0.00	0.00	0.00	0.59	0.00	0.57	0.59	0.24	0.00	0.00	0.59	0.46
Delay/Veh:	0.0	0.0	0.0	49.4	0.0	49.0	42.2	4.1	0.0	0.0	20.4	18.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	49.4	0.0	49.0	42.2	4.1	0.0	0.0	20.4	18.5
LOS by Move:	A	A	A	D	A	D	D	A	A	A	C	B
HCM2kAvgQ:	0	0	0	7	0	6	9	4	0	0	15	9

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
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AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	0.820
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	39.0
Optimal Cycle:	73	Level Of Service:	D

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Ovl			Ovl			Ovl		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	707	898	228	60	209	113	133	543	131	40	638	138
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	870	1105	280	74	257	139	164	668	161	49	785	170
Added Vol:	0	2	72	181	1	4	5	182	0	35	91	104
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	870	1107	352	255	258	143	169	850	161	84	876	274
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.87	0.92	0.70	0.80	0.80	0.81	0.85	0.74	0.90	0.71	0.94	0.78
PHF Volume:	1000	1203	503	319	323	177	198	1149	179	119	932	351
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	1000	1203	503	319	323	177	198	1149	179	119	932	351
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	1000	1203	503	319	323	177	198	1149	179	119	932	351
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.26	0.32	0.26	0.08	0.08	0.09	0.10	0.30	0.09	0.06	0.25	0.18
Crit Moves:		****		****				****		****		
Green/Cycle:	0.37	0.39	0.46	0.10	0.12	0.25	0.13	0.37	0.74	0.08	0.31	0.41
Volume/Cap:	0.71	0.82	0.57	0.82	0.71	0.37	0.79	0.82	0.13	0.82	0.79	0.45
Delay/Veh:	34.1	36.9	24.5	65.7	56.1	37.5	65.3	38.2	4.6	84.1	41.2	25.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	34.1	36.9	24.5	65.7	56.1	37.5	65.3	38.2	4.6	84.1	41.2	25.6
LOS by Move:	C	D	C	E	E	D	E	D	A	F	D	C
HCM2kAvgQ:	17	22	14	8	7	5	9	21	2	6	17	9

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

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Intersection #151 Chicago Ave at University Avenue

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Cycle (sec):	120		Critical Vol./Cap.(X):	0.658
Loss Time (sec):	12	(Y+R=4.0 sec)	Average Delay (sec/veh):	35.4
Optimal Cycle:	56		Level Of Service:	D

****

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	1 1	0	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	208	747	110	74	320	126	173	326	88	85	386	55
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	256	919	135	91	394	155	213	401	108	105	475	68
Added Vol:	16	89	9	24	160	0	0	46	27	19	20	14
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	272	1008	144	115	554	155	213	447	135	124	495	82
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.72	0.79	0.76	0.77	0.89	0.90	0.88	0.82	0.58	0.85	0.85	0.60
PHF Volume:	378	1276	190	149	622	172	242	545	233	145	582	136
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	378	1276	190	149	622	172	242	545	233	145	582	136
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	378	1276	190	149	622	172	242	545	233	145	582	136
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.57	0.43	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	2976	824	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.10	0.34	0.10	0.04	0.21	0.21	0.06	0.14	0.12	0.04	0.15	0.07
Crit Moves:		****		****			****				****	
Green/Cycle:	0.18	0.51	0.51	0.06	0.39	0.39	0.10	0.23	0.23	0.10	0.23	0.23
Volume/Cap:	0.54	0.66	0.20	0.66	0.54	0.54	0.66	0.61	0.52	0.40	0.66	0.31
Delay/Veh:	45.2	22.5	16.1	62.1	29.0	29.0	56.6	42.3	41.2	51.8	43.5	38.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	45.2	22.5	16.1	62.1	29.0	29.0	56.6	42.3	41.2	51.8	43.5	38.4
LOS by Move:	D	C	B	E	C	C	E	D	D	D	D	D
HCM2kAvgQ:	7	18	4	4	11	11	5	10	8	3	11	4

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Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	1.004
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	55.3
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	1 1	0	1 0	2 0	1	1 0	0 1	0	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	21	771	148	140	364	33	36	102	31	154	122	153
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	26	948	182	172	448	41	44	125	38	189	150	188
Added Vol:	12	60	31	0	113	0	0	29	24	47	11	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	38	1008	213	172	561	41	44	154	62	236	161	188
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.66	0.87	0.76	0.54	0.92	0.59	0.75	0.71	0.65	0.71	0.66	0.54
PHF Volume:	57	1159	280	319	609	69	59	218	96	333	244	348
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	57	1159	280	319	609	69	59	218	96	333	244	348
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	57	1159	280	319	609	69	59	218	96	333	244	349
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.97	0.97	0.95	1.00	0.85	0.95	0.95	0.95	0.95	0.91	0.91
Lanes:	1.00	1.61	0.39	1.00	2.00	1.00	1.00	0.69	0.31	1.00	1.00	1.00
Final Sat.:	1805	2971	719	1805	3800	1615	1805	1259	553	1805	1733	1733
Capacity Analysis Module:												
Vol/Sat:	0.03	0.39	0.39	0.18	0.16	0.04	0.03	0.17	0.17	0.18	0.14	0.20
Crit Moves:		****		****				****		****		
Green/Cycle:	0.17	0.39	0.39	0.18	0.39	0.39	0.09	0.17	0.17	0.18	0.26	0.26
Volume/Cap:	0.19	1.00	1.00	1.00	0.41	0.11	0.36	1.00	1.00	1.00	0.53	0.76
Delay/Veh:	35.7	55.4	55.4	92.8	22.1	19.3	43.9	93.5	93.5	91.3	32.0	38.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	35.7	55.4	55.4	92.8	22.1	19.3	43.9	93.5	93.5	91.3	32.0	38.4
LOS by Move:	D	E	E	F	C	B	D	F	F	F	C	D
HCM2kAvgQ:	2	30	30	15	7	1	2	15	15	16	7	12

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	1.059
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	65.1
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	141	641	99	121	413	225	418	410	103	108	428	130
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	173	788	122	149	508	277	514	504	127	133	526	160
Added Vol:	20	47	21	34	90	0	0	85	15	23	39	9
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	193	835	143	183	598	277	514	589	142	156	565	169
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.78	0.93	0.85	0.72	0.69	0.84	0.89	0.75	0.89	0.93	0.88	0.79
PHF Volume:	248	898	168	254	867	329	578	786	159	168	643	214
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	248	898	168	254	867	329	578	786	159	168	643	214
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	248	898	168	254	867	329	578	786	159	168	643	214
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.45	0.55	1.00	2.00	1.00	1.00	1.50	0.50
Final Sat.:	1900	3800	1900	1900	2753	1047	1900	3800	1900	1900	2851	949
Capacity Analysis Module:												
Vol/Sat:	0.13	0.24	0.09	0.13	0.31	0.31	0.30	0.21	0.08	0.09	0.23	0.23
Crit Moves:	****				****		****				****	
Green/Cycle:	0.12	0.27	0.27	0.15	0.30	0.30	0.29	0.35	0.35	0.15	0.21	0.21
Volume/Cap:	1.06	0.88	0.33	0.88	1.06	1.06	1.06	0.59	0.24	0.59	1.06	1.06
Delay/Veh:	119.2	44.0	29.7	66.8	79.2	79.2	90.9	27.3	23.2	42.9	88.0	88.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	119.2	44.0	29.7	66.8	79.2	79.2	90.9	27.3	23.2	42.9	88.0	88.0
LOS by Move:	F	D	C	E	E	E	F	C	C	D	F	F
HCM2kAvgQ:	13	17	4	11	28	28	27	10	3	6	21	21

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #207 I-215/SR-60 NB Ramp at Blain Street

Cycle (sec):	110	Critical Vol./Cap.(X):	0.806
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	27.1
Optimal Cycle:	68	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	0	0	0	7	7	0	0	7	7
Lanes:	0 1	0	0 1	0 0	0	0 0	2 0	2	0 0	0 0	1	1 0
Volume Module: Existing AM Peak												
Base Vol:	204	5	393	0	0	0	172	645	0	0	409	499
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	251	6	483	0	0	0	212	793	0	0	503	614
Added Vol:	0	0	2	0	0	0	4	98	0	0	43	17
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	251	6	485	0	0	0	216	891	0	0	546	631
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.70	0.31	0.95	1.00	1.00	1.00	0.68	0.76	1.00	1.00	0.85	0.84
PHF Volume:	358	20	511	0	0	0	317	1173	0	0	642	751
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	358	20	511	0	0	0	317	1173	0	0	642	751
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	358	20	511	0	0	0	317	1173	0	0	642	751
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.95	0.05	1.00	0.00	0.00	0.00	2.00	2.00	0.00	0.00	1.00	1.00
Final Sat.:	1800	100	1900	0	0	0	3800	3800	0	0	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.20	0.20	0.27	0.00	0.00	0.00	0.08	0.31	0.00	0.00	0.34	0.40
Crit Moves:			****				****					****
Green/Cycle:	0.33	0.33	0.33	0.00	0.00	0.00	0.10	0.59	0.00	0.00	0.49	0.49
Volume/Cap:	0.60	0.60	0.81	0.00	0.00	0.00	0.81	0.52	0.00	0.00	0.69	0.81
Delay/Veh:	32.1	32.1	40.9	0.0	0.0	0.0	59.8	13.3	0.0	0.0	22.6	26.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	32.1	32.1	40.9	0.0	0.0	0.0	59.8	13.3	0.0	0.0	22.6	26.5
LOS by Move:	C	C	D	A	A	A	E	B	A	A	C	C
HCM2kAvgQ:	11	11	18	0	0	0	7	12	0	0	17	23

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120		Critical Vol./Cap.(X):	0.706
Loss Time (sec):	8	(Y+R=4.0 sec)	Average Delay (sec/veh):	27.2
Optimal Cycle:	50		Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0 0	0	0 1	0 0	1	0 0	1 1	0	2 0	2 0	0
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	369	16	251	0	486	179	110	518	0
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	0	0	454	20	309	0	598	220	135	637	0
Added Vol:	0	0	0	39	0	6	0	64	0	7	36	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	493	20	315	0	662	220	142	673	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.95	0.80	0.76	1.00	0.66	0.86	0.89	0.76	1.00
PHF Volume:	0	0	0	519	25	414	0	1003	256	160	886	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	519	25	414	0	1003	256	160	886	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	519	25	414	0	1003	256	160	886	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.95	0.05	1.00	0.00	1.59	0.41	2.00	2.00	0.00
Final Sat.:	0	0	0	1814	86	1900	0	3027	773	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.29	0.29	0.22	0.00	0.33	0.33	0.04	0.23	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.40	0.40	0.40	0.00	0.47	0.47	0.06	0.53	0.00
Volume/Cap:	0.00	0.00	0.00	0.71	0.71	0.54	0.00	0.71	0.71	0.71	0.44	0.00
Delay/Veh:	0.0	0.0	0.0	32.8	32.8	27.9	0.0	26.6	26.6	65.2	17.6	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	32.8	32.8	27.9	0.0	26.6	26.6	65.2	17.6	0.0
LOS by Move:	A	A	A	C	C	C	A	C	C	E	B	A
HCM2kAvgQ:	0	0	0	17	17	12	0	19	19	4	10	0

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	0.960
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	57.6
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	176	590	177	195	315	66	94	348	71	130	425	222
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	216	726	218	240	387	81	116	428	87	160	523	273
Added Vol:	14	35	11	30	75	0	0	23	20	18	16	8
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	230	761	229	270	462	81	116	451	107	178	539	281
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.88	0.93	0.65	0.66	0.88	0.66	0.81	0.60	0.66	0.71	0.88	0.74
PHF Volume:	262	818	352	409	526	123	143	752	163	251	612	380
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	262	818	352	409	526	123	143	752	163	251	612	380
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	262	818	352	409	526	123	143	752	163	251	612	380
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.40	0.60	1.00	1.62	0.38	1.00	1.64	0.36	1.00	1.23	0.77
Final Sat.:	1900	2657	1143	1900	3079	721	1900	3124	676	1900	2345	1455
Capacity Analysis Module:												
Vol/Sat:	0.14	0.31	0.31	0.22	0.17	0.17	0.08	0.24	0.24	0.13	0.26	0.26
Crit Moves:		****		****				****		****		
Green/Cycle:	0.24	0.32	0.32	0.22	0.30	0.30	0.09	0.25	0.25	0.14	0.29	0.29
Volume/Cap:	0.57	0.96	0.96	0.96	0.57	0.57	0.80	0.96	0.96	0.96	0.89	0.89
Delay/Veh:	41.5	56.9	56.9	79.2	36.0	36.0	75.3	64.3	64.3	95.8	49.3	49.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	41.5	56.9	56.9	79.2	36.0	36.0	75.3	64.3	64.3	95.8	49.3	49.3
LOS by Move:	D	E	E	E	D	D	E	E	E	F	D	D
HCM2kAvgQ:	9	26	26	20	10	10	7	21	21	13	21	21

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
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AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #291 I-215 SB Ramp/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.623
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	22.3
Optimal Cycle:	40	Level Of Service:	C

Street Name:	I-215 SB Ramps						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0 0	0	1 0	0 1	0	0 0	1 1	1	1 0	2 0	0
Volume Module: Existing AM Peak												
Base Vol:	0	0	0	17	60	197	0	537	197	21	291	0
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	0	0	21	74	242	0	661	242	26	358	0
Added Vol:	0	0	0	0	0	161	0	69	143	0	271	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	21	74	403	0	730	385	26	629	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.43	0.71	0.79	1.00	0.86	0.67	0.75	0.87	1.00
PHF Volume:	0	0	0	49	104	511	0	848	575	34	723	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	49	104	511	0	848	575	34	723	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	49	104	511	0	848	575	34	723	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.17	0.83	0.00	1.79	1.21	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	321	1579	0	3397	2303	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.03	0.32	0.32	0.00	0.25	0.25	0.02	0.19	0.00
Crit Moves:					****			****				
Green/Cycle:	0.00	0.00	0.00	0.52	0.52	0.52	0.00	0.40	0.40	0.40	0.40	0.00
Volume/Cap:	0.00	0.00	0.00	0.05	0.62	0.62	0.00	0.62	0.62	0.05	0.47	0.00
Delay/Veh:	0.0	0.0	0.0	11.9	18.3	18.3	0.0	24.5	24.5	18.3	22.4	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	11.9	18.3	18.3	0.0	24.5	24.5	18.3	22.4	0.0
LOS by Move:	A	A	A	B	B	B	A	C	C	B	C	A
HCM2kAvgQ:	0	0	0	1	14	14	0	12	12	1	8	0

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

Intersection #292 I-215 NB Ramps/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.853
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	36.8
Optimal Cycle:	0	Level Of Service:	E

Street Name:	I-215 NB Ramp						MLK BLvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 1	0 0	0	0 0	0 0	0	2 0	0 0	0	0 0	0 0	0
Volume Module: existing AM Peak												
Base Vol:	311	12	0	0	0	0	554	0	0	0	0	0
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	383	15	0	0	0	0	681	0	0	0	0	0
Added Vol:	271	0	0	0	0	0	69	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	654	15	0	0	0	0	750	0	0	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.60	1.00	1.00	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00
PHF Volume:	778	25	0	0	0	0	843	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	778	25	0	0	0	0	843	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	778	25	0	0	0	0	843	0	0	0	0	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.94	0.06	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
Final Sat.:	950	30	0	0	0	0	988	0	0	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.82	0.82	xxxx	xxxx	xxxx	xxxx	0.85	xxxx	xxxx	xxxx	xxxx	xxxx
Crit Moves:	****						****					
Delay/Veh:	34.8	34.5	0.0	0.0	0.0	0.0	38.7	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	34.8	34.5	0.0	0.0	0.0	0.0	38.7	0.0	0.0	0.0	0.0	0.0
LOS by Move:	D	D	*	*	*	*	E	*	*	*	*	*
ApproachDel:		34.7			xxxxxx			38.7			xxxxxx	
Delay Adj:		1.00			xxxxx			1.00			xxxxx	
ApprAdjDel:		34.7			xxxxxx			38.7			xxxxxx	
LOS by Appr:		D			*			E			*	
AllWayAvgQ:	3.3	3.3	0.0	0.0	0.0	0.0	3.9	0.0	0.0	0.0	0.0	0.0

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Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	28.3	0.735	C	32.4	0.858	+ 4.163 D/V
# 21 I-215/SR-60 SB Ramp at Univers	C	21.1	0.649	C	23.3	0.762	+ 2.218 D/V
# 23 West Campus at University Ave	C	27.2	0.710	C	28.0	0.770	+ 0.834 D/V
# 56 NW Mall at Iowa Avenue	A	0.0	0.000	F	873.5	0.000	+873.488 D/V
# 58 Iowa Ave at University Ave	D	50.2	0.934	F	88.9	1.141	+38.696 D/V
# 71 SW Mall at Iowa Avenue	A	0.0	0.000	F	913.3	0.000	+913.264 D/V
# 78 Iowa Ave at MLK Blvd	C	25.7	0.863	D	45.3	1.009	+19.575 D/V
# 83 Lot 30/MLK BLvd	E	65.6	1.055	F	107.5	1.208	+41.876 D/V
# 85 Canyon Crest Dr at MLK BLvd	F	84.7	1.206	F	96.5	1.283	+11.830 D/V
#109 Iowa Ave at Everton Place	F	381.3	0.000	F	OVRFL	0.000	+ 1.8E+0308
#124 Iowa Ave at Linden St	C	27.5	0.670	C	31.8	0.776	+ 4.276 D/V
#134 Cranford Ave at MLK Blvd	A	0.9	0.641	C	27.5	0.916	+26.660 D/V
#137 Chicago Ave at MLK Blvd	F	100.2	1.243	F	118.3	1.303	+18.100 D/V
#151 Chicago Ave at University Aven	E	62.3	1.036	E	72.8	1.100	+10.463 D/V
#159 Chicago Ave at Linden Street	C	26.3	0.716	C	30.5	0.809	+ 4.199 D/V
#196 Iowa Ave at Blaine St	D	44.1	0.907	D	51.8	0.975	+ 7.654 D/V
#207 I-215/SR-60 NB Ramp at Blain S	B	20.0	0.660	C	20.2	0.691	+ 0.232 D/V
#209 I-215/SR-60 SB Ramp at Blain S	D	42.1	0.936	D	45.8	0.963	+ 3.722 D/V
#237 Chicago Ave at 3rd Street	E	68.5	1.008	F	82.6	1.056	+14.020 D/V
#291 I-215 SB Ramp/MLK Blvd	B	13.5	0.583	B	16.4	0.741	+ 2.831 D/V
#292 I-215 NB Ramps/MLK Blvd	B	11.9	0.397	C	18.3	0.631	+ 0.233 V/C

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Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 56 NW Mall at Iowa Avenue	??? / ???	No / No
# 71 SW Mall at Iowa Avenue	??? / ???	No / No
#109 Iowa Ave at Everton Place	??? / ???	Yes / Yes
#292 I-215 NB Ramps/MLK Blvd	???	No

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Peak Hour Delay Signal Warrant Report

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	11		859		11	33		1508		24	18		0		8	6		0		18
ApproachDel:	xxxxxx					xxxxxx					873.5					191.5				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=6.3]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=26]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2495]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=1.3]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=24]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2495]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
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PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	11		859		11	33		1508		24	18		0		8	6		0		18

Major Street Volume: 2445
Minor Approach Volume: 26
Minor Approach Volume Threshold: -23 [less than minimum of 100]

SIGNAL WARRANT DISCLAIMER
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Peak Hour Delay Signal Warrant Report

Intersection #71 SW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	31		839		10	6		1476		40	29		0		24	5		0		13
ApproachDel:	xxxxxx					xxxxxx					913.3					160.5				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=13.4]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=53]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2472]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.8]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=18]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2472]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
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UCR West Campus Development Plan
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PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #71 SW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	31		839		10	6		1476		40	29		0		24	5		0		13

Major Street Volume: 2401
Minor Approach Volume: 53
Minor Approach Volume Threshold: -17 [less than minimum of 100]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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PM Peak

Peak Hour Delay Signal Warrant Report

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	0	1	0	0	1	1	0	0	1	0	0	0	1!	0	0	1	0	0	0	1
Initial Vol:	26		827		78	167		1448		54	41		0		20	155		0		293
ApproachDel:	xxxxxx					xxxxxx					xxxxxx					xxxxxx				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=OVERFLOW]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=61]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=3108]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=1255.0]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=448]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=3108]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
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Peak Hour Volume Signal Warrant Report [Urban]

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	0	1	0	0	1	1	0	0	1	0	0	0	1!	0	0	1	0	0	0	1
Initial Vol:	26		827		78	167		1448		54	41		0		20	155		0		293

Major Street Volume: 2599
Minor Approach Volume: 448
Minor Approach Volume Threshold: -37 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1 1 0 0 0			0 0 0 0 0			2 0 0 0 0			0 0 0 0 0		
Initial Vol:	589	1	0	0	0	0	398	0	0	0	0	0

Major Street Volume: 590
Minor Approach Volume: 398
Minor Approach Volume Threshold: 601

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #20 I-215/SR-60 NB Ramps at University

Cycle (sec):	110	Critical Vol./Cap.(X):	0.858
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	32.4
Optimal Cycle:	84	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	7	7	0	7	7	7	7	0	7	7
Lanes:	0 0	0 0	1	1 0	0 0	1	1 0	1 1	0	0 1	0 1	0
Volume Module: Existing PM Peak												
Base Vol:	0	0	1	70	0	273	159	408	0	0	582	182
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	0	1	86	0	336	196	502	0	0	716	224
Added Vol:	0	0	0	23	0	29	42	157	0	0	158	34
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	109	0	365	238	659	0	0	874	258
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.25	0.80	1.00	0.78	0.70	0.86	1.00	1.00	0.80	0.81
PHF Volume:	0	0	5	136	0	468	339	766	0	0	1092	318
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	5	136	0	468	339	766	0	0	1092	318
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	5	136	0	468	339	766	0	0	1092	318
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	1.00	1.00	2.00	0.00	0.00	1.55	0.45
Final Sat.:	0	0	1900	1900	0	1900	1900	3800	0	0	2942	858
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.07	0.00	0.25	0.18	0.20	0.00	0.00	0.37	0.37
Crit Moves:	****					****	****				****	
Green/Cycle:	0.00	0.00	0.01	0.28	0.00	0.29	0.21	0.64	0.00	0.00	0.43	0.43
Volume/Cap:	0.00	0.00	0.26	0.26	0.00	0.86	0.86	0.31	0.00	0.00	0.86	0.86
Delay/Veh:	0.0	0.0	61.2	31.3	0.0	50.0	58.9	9.0	0.0	0.0	33.0	33.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	61.2	31.3	0.0	50.0	58.9	9.0	0.0	0.0	33.0	33.0
LOS by Move:	A	A	E	C	A	D	E	A	A	A	C	C
DesignQueue:	0	0	0	6	0	22	17	9	0	0	27	27

Note: Queue reported is the number of cars per lane.

```
---------------------------------------------------------------------------
                     UCR West Campus Development Plan
                        Phase 3 2020 Conditions
                                PM Peak
---------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
***************************************************************************
Intersection #21 I-215/SR-60 SB Ramp at University Ave
***************************************************************************
Cycle (sec):        100              Critical Vol./Cap.(X):        0.762
Loss Time (sec):      8 (Y+R=4.0 sec) Average Delay (sec/veh):      23.3
Optimal Cycle:       57              Level Of Service:                C
***************************************************************************
Street Name:         I-215/SR-60 SB Ramp              University Avenue
Approach:       North Bound      South Bound      East Bound      West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0     0     0    7     0     7    0     7     7    7     7     0
Lanes:         0  0  0  0  0   0  1  0  1  0   0  0  1  1  1   1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      0     0     0   42   183    93    0   521   724  191   664     0
Growth Adj:  1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23  1.23
Initial Bse:   0     0     0   52   225   114    0   641   891  235   817     0
Added Vol:     0     0     0   15     0    36    0   184    73   52   134     0
PasserByVol:   0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:   0     0     0   67   225   150    0   825   964  287   951     0
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00 0.88  0.74  0.83 1.00  0.89  0.92 0.73  0.89  1.00
PHF Volume:    0     0     0   76   304   181    0   927  1047  393  1068     0
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:   0     0     0   76   304   181    0   927  1047  393  1068     0
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:    0     0     0   76   304   181    0   927  1047  393  1068     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.00  0.00  0.00 0.27  1.08  0.65 0.00  1.41  1.59 1.00  2.00  0.00
Final Sat.:    0     0     0  513  2060  1227    0  2676  3024 1900  3800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.15  0.15  0.15 0.00  0.35  0.35 0.21  0.28  0.00
Crit Moves:                   ****                    ****      ****
Green/Cycle: 0.00  0.00  0.00 0.19  0.19  0.19 0.00  0.45  0.45 0.27  0.73  0.00
Volume/Cap:  0.00  0.00  0.00 0.76  0.76  0.76 0.00  0.76  0.76 0.76  0.39  0.00
Delay/Veh:    0.0   0.0   0.0 42.8  42.8  42.8  0.0  24.1  24.1 40.0   5.3   0.0
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0 42.8  42.8  42.8  0.0  24.1  24.1 40.0   5.3   0.0
LOS by Move:   A     A     A    D     D     D    A     C     C    D     A     A
DesignQueue:   0     0     0   13    13    13    0    22    22   17     9     0
***************************************************************************
Note: Queue reported is the number of cars per lane.
```

```
-------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                         Phase 3 2020 Conditions
                                 PM Peak
-------------------------------------------------------------------------------
                     Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #23 West Campus at University Ave
*******************************************************************************
Cycle (sec):           100              Critical Vol./Cap.(X):          0.770
Loss Time (sec):         8 (Y+R=4.0 sec) Average Delay (sec/veh):        28.0
Optimal Cycle:          59              Level Of Service:                  C
*******************************************************************************
Street Name:                West Campus                  University Avenue
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:          Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:       7    0    7    0    0    0    0    7    7    7    7    0
Lanes:          1  0  0  0  1   0  0  0  0  0   0  0  1  1  0   1  0  2  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:       287    0  224     0    0    0     0  283  197   369  500    0
Growth Adj:    1.23 1.23 1.23  1.23 1.23 1.23  1.23 1.23 1.23  1.23 1.23 1.23
Initial Bse:    353    0  276     0    0    0     0  348  242   454  615    0
Added Vol:        0    0   16     0    0    0     0  180    0     7  192    0
PasserByVol:      0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:    353    0  292     0    0    0     0  528  242   461  807    0
User Adj:      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:       0.82 1.00 0.76  1.00 1.00 1.00  1.00 0.94 0.95  0.91 0.86 1.00
PHF Volume:     431    0  384     0    0    0     0  562  255   506  938    0
Reduct Vol:       0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:    431    0  384     0    0    0     0  562  255   506  938    0
PCE Adj:       1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:       1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:     431    0  384     0    0    0     0  562  255   506  938    0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:      1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
Adjustment:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Lanes:         1.00 0.00 1.00  0.00 0.00 0.00  0.00 1.38 0.62  1.00 2.00 0.00
Final Sat.:    1900    0 1900     0    0    0     0 2613 1187  1900 3800    0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:       0.23 0.00 0.20  0.00 0.00 0.00  0.00 0.21 0.21  0.27 0.25 0.00
Crit Moves:    ****                                 ****        ****
Green/Cycle:   0.29 0.00 0.29  0.00 0.00 0.00  0.00 0.28 0.28  0.35 0.63 0.00
Volume/Cap:    0.77 0.00 0.69  0.00 0.00 0.00  0.00 0.77 0.77  0.77 0.39 0.00
Delay/Veh:     38.6  0.0 34.7   0.0  0.0  0.0   0.0 36.6 36.6  34.7  9.4  0.0
User DelAdj:   1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:    38.6  0.0 34.7   0.0  0.0  0.0   0.0 36.6 36.6  34.7  9.4  0.0
LOS by Move:      D    A    C     A    A    A     A    D    D     C    A    A
DesignQueue:     18    0   16     0    0    0     0   17   17    20   10    0
*******************************************************************************
Note: Queue reported is the number of cars per lane.

    Traffix 7.8.0515 (c) 2006 Dowling Assoc. Licensed to TRANSTECH, WALNUT, CA
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UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #56 NW Mall at Iowa Avenue

Average Delay (sec/veh): 11.1 Worst Case Level Of Service: F[873.5]

Street Name:	NW Mall						Iowa Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	1 0 1 0 1			1 0 1 0 1			0 0 1! 0 0			0 0 1! 0 0		
Volume Module:												
Base Vol:	0	503	0	0	1038	0	0	0	0	0	0	0
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	619	0	0	1277	0	0	0	0	0	0	0
Added Vol:	11	240	11	33	231	24	18	0	8	6	0	18
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	11	859	11	33	1508	24	18	0	8	6	0	18
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	12	954	12	37	1675	27	20	0	9	7	0	20
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	12	954	12	37	1675	27	20	0	9	7	0	20
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx	7.1	xxxx	6.2	7.1	xxxx	6.2
FollowUpTim:	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx	3.5	xxxx	3.3	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	1702	xxxx	xxxxx	966	xxxx	xxxxx	2743	xxxx	1675	2745	xxxx	954
Potent Cap.:	379	xxxx	xxxxx	721	xxxx	xxxxx	13	xxxx	119	13	xxxx	316
Move Cap.:	379	xxxx	xxxxx	721	xxxx	xxxxx	12	xxxx	119	11	xxxx	316
Volume/Cap:	0.03	xxxx	xxxx	0.05	xxxx	xxxx	1.73	xxxx	0.07	0.58	xxxx	0.06
Level Of Service Module:												
2Way95thQ:	0.1	xxxx	xxxxx	0.2	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	14.8	xxxx	xxxxx	10.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	B	*	*	B	*	*	*	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	16	xxxxx	xxxx	41	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	4.2	xxxxx	xxxxx	2.4	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	873	xxxxx	xxxxx	191	xxxxx
Shared LOS:	*	*	*	*	*	*	*	F	*	*	F	*
ApproachDel:		xxxxxx			xxxxxx			873.5			191.5	
ApproachLOS:		*			*			F			F	

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	1.141
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	88.9
Optimal Cycle:	120	Level Of Service:	F

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing PM												
Base Vol:	93	370	129	260	800	187	217	874	152	156	374	103
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	114	455	159	320	984	230	267	1075	187	192	460	127
Added Vol:	56	194	243	0	159	4	5	15	41	149	21	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	170	649	402	320	1143	234	272	1090	228	341	481	127
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.60	0.96	0.75	0.94	0.91	0.90	0.82	0.94	0.84	0.85	0.87	0.72
PHF Volume:	284	676	536	340	1256	260	332	1160	271	401	553	176
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	284	676	536	340	1256	260	332	1160	271	401	553	176
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	284	676	536	340	1256	260	332	1160	271	401	553	176
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.66	0.34	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3148	652	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.15	0.18	0.28	0.18	0.40	0.40	0.17	0.31	0.14	0.21	0.15	0.09
Crit Moves:	****				****			****		****		
Green/Cycle:	0.13	0.29	0.29	0.19	0.35	0.35	0.25	0.27	0.40	0.19	0.21	0.21
Volume/Cap:	1.14	0.61	0.96	0.96	1.14	1.14	0.71	1.14	0.36	1.14	0.71	0.45
Delay/Veh:	152.5	37.3	69.6	85.2	112	111.9	46.2	119	25.6	140.8	47.3	42.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	152.5	37.3	69.6	85.2	112	111.9	46.2	119	25.6	140.8	47.3	42.5
LOS by Move:	F	D	E	F	F	F	D	F	C	F	D	D
DesignQueue:	17	17	27	19	37	37	17	31	11	23	15	10

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                           Phase 3 2020 Conditions
                                  PM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
> Intersection #71 SW Mall at Iowa Avenue
********************************************************************************
Average Delay (sec/veh):      21.0      Worst Case Level Of Service: F[913.3]
********************************************************************************
Street Name:                   SW Mall                      Iowa Avenue
Approach:          North Bound      South Bound      East Bound      West Bound
Movement:        L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:          Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:              Include          Include         Include          Include
Lanes:           1  0  1  0  1   1  0  1  0  1   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: 2015 PM Peak
Base Vol:          0  503     0     0 1038     0     0    0     0     0    0     0
Growth Adj:     1.23 1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23
Initial Bse:       0  619     0     0 1277     0     0    0     0     0    0     0
Added Vol:        31  220    10     6  199    40    29    0    24     5    0    13
PasserByVol:       0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:      31  839    10     6 1476    40    29    0    24     5    0    13
User Adj:       1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:        0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:       34  907    11     6 1595    43    31    0    26     5    0    14
Reduct Vol:        0    0     0     0    0     0     0    0     0     0    0     0
> Final Vol.:     34  907    11     6 1595    43    31    0    26     5    0    14
Critical Gap Module:
Critical Gp:     4.1 xxxx xxxxx   4.1 xxxx xxxxx   7.1 xxxx   6.2   7.1 xxxx   6.2
FollowUpTim:     2.2 xxxx xxxxx   2.2 xxxx xxxxx   3.5 xxxx   3.3   3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1639 xxxx xxxxx   918 xxxx xxxxx  2595 xxxx  1595  2617 xxxx   907
Potent Cap.:  401 xxxx xxxxx   752 xxxx xxxxx    17 xxxx   133    16 xxxx   337
Move Cap.:    401 xxxx xxxxx   752 xxxx xxxxx    15 xxxx   133    12 xxxx   337
Volume/Cap:  0.08 xxxx  xxxx  0.01 xxxx  xxxx  2.08 xxxx  0.19  0.44 xxxx  0.04
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.3 xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del: 14.8 xxxx xxxxx   9.8 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     B    *     *     A    *     *     *    *     *     *    *     *
Movement:      LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx   25 xxxxx  xxxx   40 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  7.1 xxxxx xxxxx  1.7 xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  913 xxxxx xxxxx  160 xxxxx
Shared LOS:      *    *     *     *    *     *     *    F     *     *    F     *
ApproachDel:        xxxxxx           xxxxxx            913.3            160.5
ApproachLOS:           *                *                F                F
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #78 Iowa Ave at MLK Blvd

Cycle (sec):	110	Critical Vol./Cap.(X):	1.009
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	45.3
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Iowa Avenue						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Include			Ovl		
Min. Green:	0	0	0	7	7	7	7	7	0	0	7	7
Lanes:	0 0	0 0	0	1 0	1! 0	1	1 0	2 0	0	0 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	727	0	273	170	1564	0	0	667	353
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	0	0	894	0	336	209	1924	0	0	820	434
Added Vol:	0	0	0	105	0	124	156	350	0	0	281	104
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	999	0	460	365	2274	0	0	1101	538
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.95	1.00	0.90	0.87	0.99	1.00	1.00	0.79	0.92
PHF Volume:	0	0	0	1052	0	511	420	2297	0	0	1394	585
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	1052	0	511	420	2297	0	0	1394	585
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	1052	0	511	420	2297	0	0	1394	585
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.67	0.00	1.33	1.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	0	0	0	3179	0	2521	1900	3800	0	0	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.33	0.00	0.20	0.22	0.60	0.00	0.00	0.37	0.31
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.33	0.00	0.55	0.23	0.60	0.00	0.00	0.37	0.70
Volume/Cap:	0.00	0.00	0.00	1.01	0.00	0.37	0.98	1.01	0.00	0.00	0.98	0.44
Delay/Veh:	0.0	0.0	0.0	61.9	0.0	13.8	80.7	43.0	0.0	0.0	53.4	7.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	61.9	0.0	13.8	80.7	43.0	0.0	0.0	53.4	7.3
LOS by Move:	A	A	A	E	A	B	F	D	A	A	D	A
DesignQueue:	0	0	0	28	0	11	21	33	0	0	30	12

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                         Phase 3 2020 Conditions
                                 PM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #83 Lot 30/MLK BLvd
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         1.208
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):      107.5
Optimal Cycle:        120              Level Of Service:                  F
********************************************************************************
Street Name:                   Lot 30                          MLK Blvd
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:        Permitted        Permitted        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:     7     0     7     7     0     7     7     7     0     7     7     7
Lanes:        0  0  0  0  1    0  1  0  0  1    1  0  1  1  0    1  0  2  0  1
------------|----------------||----------------||----------------||----------------|
Volume Module: Existing PM Peak
Base Vol:        0     0     1   162     0   271    31  1989     0    10   926     1
Growth Adj:   1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23
Initial Bse:     0     0     1   199     0   333    38  2446     0    12  1139     1
Added Vol:       0     0     0     5     0    10     4   476     0     0   378     1
PasserByVol:     0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:     0     0     1   204     0   343    42  2922     0    12  1517     2
User Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:      0.50  1.00  0.25  0.57  1.00  0.62  0.43  0.95  1.00  0.63  0.85  1.00
PHF Volume:      0     0     5   358     0   554    98  3076     0    20  1785     2
Reduct Vol:      0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:     0     0     5   358     0   554    98  3076     0    20  1785     2
PCE Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:      0     0     5   358     0   554    98  3076     0    20  1785     2
------------|----------------||----------------||----------------||----------------|
Saturation Flow Module:
Sat/Lane:     1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:        0.00  0.00  1.00  1.00  0.00  1.00  1.00  2.00  0.00  1.00  2.00  1.00
Final Sat.:      0     0  1900  1900     0  1900  1900  3800     0  1900  3800  1900
------------|----------------||----------------||----------------||----------------|
Capacity Analysis Module:
Vol/Sat:      0.00  0.00  0.00  0.19  0.00  0.29  0.05  0.81  0.00  0.01  0.47  0.00
Crit Moves:                               ****        ****        ****
Green/Cycle:  0.00  0.00  0.23  0.23  0.00  0.23  0.09  0.62  0.00  0.07  0.60  0.60
Volume/Cap:   0.00  0.00  0.01  0.84  0.00  1.30  0.57  1.30  0.00  0.15  0.78  0.00
Delay/Veh:     0.0   0.0  30.1  50.6   0.0 188.1  48.2   155   0.0  44.2  16.5   7.8
User DelAdj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:    0.0   0.0  30.1  50.6   0.0 188.1  48.2   155   0.0  44.2  16.5   7.8
LOS by Move:     A     A     C     D     A     F     D     F     A     D     B     A
DesignQueue:     0     0     0    16     0    26     5    41     0     1    22     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	1.283
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	96.5
Optimal Cycle:	120	Level Of Service:	F

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	295	186	129	125	552	189	163	1043	1058	162	254	25
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	363	229	159	154	679	232	200	1283	1301	199	312	31
Added Vol:	47	21	0	109	47	110	49	345	87	0	222	48
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	410	250	159	263	726	342	249	1628	1388	199	534	79
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.83	0.81	0.80	0.73	0.72	0.64	0.84	0.86	0.86	0.87	0.78
PHF Volume:	532	301	196	328	994	476	390	1938	1614	232	614	101
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	532	301	196	328	994	476	390	1938	1614	232	614	101
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	532	301	196	328	994	476	390	1938	1614	232	614	101
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3600	3800	1900	3600	3800	1900	3600	3800	1900	3600	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.15	0.08	0.10	0.09	0.26	0.25	0.11	0.51	0.85	0.06	0.16	0.05
Crit Moves:	****				****				****	****		
Green/Cycle:	0.11	0.17	0.17	0.15	0.20	0.44	0.24	0.54	0.66	0.06	0.36	0.36
Volume/Cap:	1.29	0.47	0.61	0.61	1.29	0.57	0.45	0.94	1.29	1.10	0.45	0.15
Delay/Veh:	202.8	45.7	49.9	50.0	190	25.7	39.2	35.0	159.3	149.0	29.6	26.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	202.8	45.7	49.9	50.0	190	25.7	39.2	35.0	159.3	149.0	29.6	26.1
LOS by Move:	F	D	D	D	F	C	D	D	F	F	C	C
DesignQueue:	17	9	11	10	28	19	11	34	48	8	14	4

Note: Queue reported is the number of cars per lane.

```
------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                          Phase 3 2020 Conditions
                                  PM Peak
------------------------------------------------------------------------------
                     Level Of Service Computation Report
         2000 HCM Unsignalized Method (Future Volume Alternative)
******************************************************************************
Intersection #109 Iowa Ave at Everton Place
******************************************************************************
Average Delay (sec/veh): OVERFLOW      Worst Case Level Of Service: F[xxxxx]
******************************************************************************
Street Name:            Iowa Avenue                      Everton Place
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  1  0  0  1    1  0  0  1  0    0  0  1! 0  0    1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:       0  503    29     36 1038     0     0    0     0     47    0    39
Growth Adj:  1.23 1.23  1.23   1.23 1.23  1.23  1.23 1.23  1.23   1.23 1.23  1.23
Initial Bse:    0  619    36     44 1277     0     0    0     0     58    0    48
Added Vol:     26  208    42    123  171    54    41    0    20     97    0   245
PasserByVol:    0    0     0      0    0     0     0    0     0      0    0     0
Initial Fut:   26  827    78    167 1448    54    41    0    20    155    0   293
User Adj:    1.00 1.00  1.00   1.00 1.00  1.00  1.00 1.00  1.00   1.00 1.00  1.00
PHF Adj:     1.00 0.87  0.81   0.69 0.97  1.00  1.00 1.00  1.00   0.59 1.00  0.75
PHF Volume:    26  950    96    242 1493    54    41    0    20    262    0   391
Reduct Vol:     0    0     0      0    0     0     0    0     0      0    0     0
Final Vol.:    26  950    96    242 1493    54    41    0    20    262    0   391
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx    4.1 xxxx xxxxx   7.1 xxxx   6.2    7.1 xxxx   6.2
FollowUpTim:  2.2 xxxx xxxxx    2.2 xxxx xxxxx   3.5 xxxx   3.3    3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1547 xxxx xxxxx   1046 xxxx xxxxx  3250 xxxx  1520   3017 xxxx   950
Potent Cap.:  435 xxxx xxxxx    673 xxxx xxxxx     6 xxxx   148      8 xxxx   318
Move Cap.:    435 xxxx xxxxx    673 xxxx xxxxx     0 xxxx   148      5 xxxx   318
Volume/Cap:  0.06 xxxx  xxxx   0.36 xxxx  xxxx  xxxx xxxx  0.14  53.04 xxxx  1.23
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.2 xxxx xxxxx    1.6 xxxx xxxxx  xxxx xxxx xxxxx   35.0 xxxx  17.5
Control Del: 13.8 xxxx xxxxx   13.3 xxxx xxxxx xxxxx xxxx xxxxx  24870 xxxx 161.9
LOS by Move:    B    *     *      B    *     *     *    *     *      F    *     F
Movement:      LT - LTR - RT     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx   xxxx xxxx xxxxx  xxxx    0 xxxxx   xxxx xxxx xxxxx
SharedQueue:  0.2 xxxx xxxxx  xxxxx xxxx xxxxx xxxxx xxxx xxxxx  xxxxx xxxx xxxxx
Shrd ConDel: 13.8 xxxx xxxxx  xxxxx xxxx xxxxx xxxxx xxxx xxxxx  xxxxx xxxx xxxxx
Shared LOS:     B    *     *      *    *     *     *    *     *      *    *     *
ApproachDel:      xxxxxx           xxxxxx           xxxxxx           xxxxxx
ApproachLOS:         *                *                F                F
******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #124 Iowa Ave at Linden St

Cycle (sec):	110	Critical Vol./Cap.(X):	0.776
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	31.8
Optimal Cycle:	61	Level Of Service:	C

Street Name:	Iowa Avenue		Linden Street	
Approach:	North Bound	South Bound	East Bound	West Bound
Control:	Protected	Protected	Protected	Protected
Rights:	Include	Include	Include	Include
Lanes:	1 0 2 0 1	1 0 1 1 0	1 0 1 0 1	1 0 1 0 1

Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Volume Module: Existing PM Peak												
Base Vol:	46	571	140	58	1023	98	126	155	123	109	110	17
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	57	702	172	71	1258	121	155	191	151	134	135	21
Added Vol:	34	139	26	0	102	0	0	36	23	38	43	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	91	841	198	71	1360	121	155	227	174	172	178	21
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.91	0.85	0.91	0.92	0.88	0.81	0.95	0.70	0.85	0.83	0.53
PHF Volume:	118	925	233	78	1479	137	191	239	249	202	215	39
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	118	925	233	78	1479	137	191	239	249	202	215	39
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	118	925	233	78	1479	137	191	239	249	202	215	39
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.83	0.17	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1900	3800	1900	1900	3478	322	1900	1900	1900	1900	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.06	0.24	0.12	0.04	0.43	0.43	0.10	0.13	0.13	0.11	0.11	0.02
Crit Moves:	****				****			****		****		
Green/Cycle:	0.08	0.50	0.50	0.13	0.55	0.55	0.14	0.16	0.16	0.14	0.16	0.16
Volume/Cap:	0.78	0.49	0.25	0.32	0.78	0.78	0.71	0.78	0.81	0.78	0.71	0.13
Delay/Veh:	71.4	18.5	15.9	44.1	21.4	21.4	53.9	55.9	59.2	59.4	51.8	40.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	71.4	18.5	15.9	44.1	21.4	21.4	53.9	55.9	59.2	59.4	51.8	40.0
LOS by Move:	E	B	B	D	C	C	D	E	E	E	D	D
DesignQueue:	7	15	7	4	25	25	10	13	13	11	11	2

Note: Queue reported is the number of cars per lane.

```
---------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                           Phase 3 2020 Conditions
                                  PM Peak
---------------------------------------------------------------------------------

                       Level Of Service Computation Report
              2000 HCM Operations Method (Future Volume Alternative)
*********************************************************************************
Intersection #134 Cranford Ave at MLK Blvd
*********************************************************************************
Cycle (sec):          120                Critical Vol./Cap.(X):          0.916
Loss Time (sec):        8 (Y+R=4.0 sec)  Average Delay (sec/veh):         27.5
Optimal Cycle:        119                Level Of Service:                   C
*********************************************************************************
Street Name:                Cranford Ave                         MLK Blvd
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:     0     0     0    7     0     7    7     7     0    0     7     7
Lanes:          0  0  0  0  0   1  0  0  0  1   1  0  2  0  0   0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: 2015 PM Peak
Base Vol:       0     0     0    0     0     0    0  1710     0    0   868     0
Growth Adj:  1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23  1.23
Initial Bse:    0     0     0    0     0     0    0  2103     0    0  1068     0
Added Vol:      0     0     0  396     0   272  176   110     0    0   187   218
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:    0     0     0  396     0   272  176  2213     0    0  1255   218
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93
PHF Volume:     0     0     0  428     0   294  190  2393     0    0  1356   236
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:    0     0     0  428     0   294  190  2393     0    0  1356   236
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:     0     0     0  428     0   294  190  2393     0    0  1356   236
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.00  0.00  0.00 1.00  0.00  1.00 1.00  2.00  0.00 0.00  2.00  1.00
Final Sat.:     0     0     0 1900     0  1900 1900  3800     0    0  3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.23  0.00  0.15 0.10  0.63  0.00 0.00  0.36  0.12
Crit Moves:                   ****                   ****       ****
Green/Cycle: 0.00  0.00  0.00 0.25  0.00  0.25 0.15  0.69  0.00 0.00  0.54  0.54
Volume/Cap:  0.00  0.00  0.00 0.92  0.00  0.63 0.66  0.92  0.00 0.00  0.66  0.23
Delay/Veh:    0.0   0.0   0.0 66.8   0.0  43.1 53.9  21.5   0.0  0.0  20.9  14.8
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0 66.8   0.0  43.1 53.9  21.5   0.0  0.0  20.9  14.8
LOS by Move:    A     A     A    E     A     D    D     C     A    A     C     B
DesignQueue:    0     0     0   23     0    15   11    30     0    0    23     8
*********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	1.303
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	118.3
Optimal Cycle:	120	Level Of Service:	F

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Ovl			Ovl			Ovl		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	1 0	2 0	1	1 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	140	287	61	366	1057	201	170	1283	792	249	514	105
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	172	353	75	450	1300	247	209	1578	974	306	632	129
Added Vol:	0	1	44	128	2	5	4	113	0	74	187	198
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	172	354	119	578	1302	252	213	1691	974	380	819	327
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.84	0.66	0.92	0.91	0.88	0.92	0.96	0.92	0.71	0.86	0.82
PHF Volume:	181	421	180	628	1431	287	232	1762	1059	536	953	399
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	181	421	180	628	1431	287	232	1762	1059	536	953	399
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	181	421	180	628	1431	287	232	1762	1059	536	953	399
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.05	0.11	0.09	0.17	0.38	0.15	0.12	0.46	0.56	0.28	0.25	0.21
Crit Moves:	****				****				****	****		
Green/Cycle:	0.06	0.14	0.35	0.21	0.28	0.48	0.19	0.38	0.44	0.21	0.40	0.60
Volume/Cap:	0.82	0.81	0.27	0.81	1.32	0.32	0.63	1.23	1.28	1.32	0.63	0.35
Delay/Veh:	76.5	59.1	28.2	51.5	195	19.5	48.0	147	168.9	208.8	30.0	12.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	76.5	59.1	28.2	51.5	195	19.5	48.0	147	168.9	208.8	30.0	12.2
LOS by Move:	E	E	C	D	F	B	D	F	F	F	C	B
DesignQueue:	6	12	8	17	38	10	13	42	47	30	20	11

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	1.100
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	72.8
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 1 1 0			2 0 2 0 1			2 0 2 0 1		
Volume Module: Existing PM Peak												
Base Vol:	237	363	126	155	956	86	182	796	463	309	385	72
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	292	446	155	191	1176	106	224	979	569	380	474	89
Added Vol:	31	175	18	17	110	0	0	25	20	12	45	25
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	323	621	173	208	1286	106	224	1004	589	392	519	114
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.92	0.73	0.84	0.89	0.77	0.81	0.90	0.87	0.87	0.92	0.82
PHF Volume:	375	676	237	247	1445	137	276	1116	678	451	564	138
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	375	676	237	247	1445	137	276	1116	678	451	564	138
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	375	676	237	247	1445	137	276	1116	678	451	564	138
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.83	0.17	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3470	330	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.10	0.18	0.12	0.07	0.42	0.42	0.07	0.29	0.36	0.12	0.15	0.07
Crit Moves:	****				****				****	****		
Green/Cycle:	0.09	0.34	0.34	0.13	0.38	0.38	0.14	0.32	0.32	0.11	0.29	0.29
Volume/Cap:	1.10	0.52	0.36	0.52	1.10	1.10	0.51	0.91	1.10	1.10	0.51	0.25
Delay/Veh:	133.1	31.9	30.0	50.1	93.5	93.5	48.5	48.5	107.4	127.9	35.9	32.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	133.1	31.9	30.0	50.1	93.5	93.5	48.5	48.5	107.4	127.9	35.9	32.9
LOS by Move:	F	C	C	D	F	F	D	D	F	F	D	C
DesignQueue:	12	16	11	7	37	37	8	27	34	14	14	7

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #159 Chicago Ave at Linden Street

****

Cycle (sec):	100	Critical Vol./Cap.(X):	0.809
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	30.5
Optimal Cycle:	67	Level Of Service:	C

****

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 1 1 0			1 0 2 0 1			1 0 0 1 0			1 0 1 1 0		
Volume Module: Existing PM Peak												
Base Vol:	61	432	161	172	1149	145	29	83	46	110	124	94
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	75	531	198	212	1413	178	36	102	57	135	153	116
Added Vol:	26	120	53	0	74	0	0	15	15	38	28	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	101	651	251	212	1487	178	36	117	72	173	181	116
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.97	0.84	0.78	0.91	0.79	0.81	0.83	0.72	0.71	0.82	0.81
PHF Volume:	112	672	299	271	1634	226	44	141	99	244	220	143
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	112	672	299	271	1634	226	44	141	99	244	220	143
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	112	672	299	271	1634	226	44	141	99	244	220	143
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.38	0.62	1.00	2.00	1.00	1.00	0.59	0.41	1.00	1.21	0.79
Final Sat.:	1900	2630	1170	1900	3800	1900	1900	1115	785	1900	2305	1495
Capacity Analysis Module:												
Vol/Sat:	0.06	0.26	0.26	0.14	0.43	0.12	0.02	0.13	0.13	0.13	0.10	0.10
Crit Moves:	****				****			****		****		
Green/Cycle:	0.07	0.39	0.39	0.22	0.53	0.53	0.13	0.16	0.16	0.16	0.18	0.18
Volume/Cap:	0.81	0.66	0.66	0.66	0.81	0.22	0.17	0.81	0.81	0.81	0.52	0.52
Delay/Veh:	74.3	26.3	26.3	39.7	21.8	12.6	38.8	55.9	55.9	55.5	37.7	37.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	74.3	26.3	26.3	39.7	21.8	12.6	38.8	55.9	55.9	55.5	37.7	37.7
LOS by Move:	E	C	C	D	C	B	D	E	E	E	D	D
DesignQueue:	6	18	18	12	24	6	2	12	12	12	8	8

****

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	0.975
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	51.8
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Iowa Avenue		Blain Street	
Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Protected	Protected	Protected	Protected
Rights:	Include	Include	Include	Include
Min. Green:	7 7 7	7 7 7	7 7 7	7 7 7
Lanes:	1 0 2 0 1	1 0 1 1 0	1 0 2 0 1	1 0 1 1 0

Movement:	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Volume Module: Existing PM Peak												
Base Vol:	198	510	145	193	768	167	302	438	268	149	271	109
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	244	627	178	237	945	205	371	539	330	183	333	134
Added Vol:	19	95	25	14	58	0	0	51	21	23	82	32
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	263	722	203	251	1003	205	371	590	351	206	415	166
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.86	0.86	0.72	0.96	0.84	0.91	0.88	0.96	0.83	0.89	0.78
PHF Volume:	313	840	236	349	1044	245	408	670	365	249	467	213
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	313	840	236	349	1044	245	408	670	365	249	467	213
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	313	840	236	349	1044	245	408	670	365	249	467	213
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.62	0.38	1.00	2.00	1.00	1.00	1.37	0.63
Final Sat.:	1900	3800	1900	1900	3079	721	1900	3800	1900	1900	2609	1191
Capacity Analysis Module:												
Vol/Sat:	0.16	0.22	0.12	0.18	0.34	0.34	0.21	0.18	0.19	0.13	0.18	0.18
Crit Moves:	****				****		****				****	
Green/Cycle:	0.17	0.28	0.28	0.23	0.35	0.35	0.22	0.24	0.24	0.16	0.18	0.18
Volume/Cap:	0.98	0.78	0.44	0.78	0.98	0.98	0.98	0.73	0.80	0.80	0.98	0.98
Delay/Veh:	84.8	36.9	30.0	44.7	51.3	51.3	76.1	38.2	45.4	54.0	68.5	68.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	84.8	36.9	30.0	44.7	51.3	51.3	76.1	38.2	45.4	54.0	68.5	68.5
LOS by Move:	F	D	C	D	D	D	E	D	D	D	E	E
DesignQueue:	15	18	10	16	26	26	19	15	16	12	16	16

Note: Queue reported is the number of cars per lane.

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------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                         Phase 3 2020 Conditions
                                PM Peak
------------------------------------------------------------------------------

                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
******************************************************************************
Intersection #207 I-215/SR-60 NB Ramp at Blain Street
******************************************************************************
Cycle (sec):          110             Critical Vol./Cap.(X):         0.691
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):      20.2
Optimal Cycle:         48             Level Of Service:                  C
******************************************************************************
Street Name:        I-215/SR-60 NB Ramps                 Blain Street
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    7     7     7    0     0     0    7     7     0    0     7     7
Lanes:        0  1  0  0  1    0  0  0  0  0    2  0  2  0  0    0  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      97     1   261    0     0     0  124   779     0    0   483   494
Growth Adj:  1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23  1.23
Initial Bse:  119     1   321    0     0     0  153   958     0    0   594   608
Added Vol:      0     0     6    0     0     0    6    66     0    0    63    38
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:  119     1   327    0     0     0  159  1024     0    0   657   646
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.93  0.25  0.88 1.00  1.00  1.00 0.84  0.95  1.00 1.00  0.91  0.86
PHF Volume:   128     5   372    0     0     0  189  1078     0    0   722   751
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  128     5   372    0     0     0  189  1078     0    0   722   751
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:   128     5   372    0     0     0  189  1078     0    0   722   751
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.96  0.04  1.00 0.00  0.00  0.00 2.00  2.00  0.00 0.00  1.00  1.00
Final Sat.:  1830    70  1900    0     0     0 3800  3800     0    0  1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.07  0.07  0.20 0.00  0.00  0.00 0.05  0.28  0.00 0.00  0.38  0.40
Crit Moves:              ****                  ****                        ****
Green/Cycle: 0.28  0.28  0.28 0.00  0.00  0.00 0.07  0.64  0.00 0.00  0.57  0.57
Volume/Cap:  0.25  0.25  0.69 0.00  0.00  0.00 0.69  0.44  0.00 0.00  0.66  0.69
Delay/Veh:   30.6  30.6  38.9  0.0   0.0   0.0 57.2   9.9   0.0  0.0  17.0  17.6
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:  30.6  30.6  38.9  0.0   0.0   0.0 57.2   9.9   0.0  0.0  17.0  17.6
LOS by Move:    C     C     D    A     A     A    E     A     A    A     B     B
DesignQueue:    6     6    17    0     0     0    5    13     0    0    21    22
******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	0.963
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	45.8
Optimal Cycle:	120	Level Of Service:	D

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0	0 0	0 1	0	0 1	0 0	1	1 0	2 0	2	0 0
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	276	219	192	0	631	639	220	377	0
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	0	0	339	269	236	0	776	786	271	464	0
Added Vol:	0	0	0	22	0	5	0	51	0	3	60	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	361	269	241	0	827	786	274	524	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.93	0.84	0.92	1.00	0.95	0.95	0.92	0.89	1.00
PHF Volume:	0	0	0	389	321	262	0	871	827	297	588	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	389	321	262	0	871	827	297	588	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	389	321	262	0	871	827	297	588	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.55	0.45	1.00	0.00	1.03	0.97	2.00	2.00	0.00
Final Sat.:	0	0	0	1041	859	1900	0	1948	1852	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.37	0.37	0.14	0.00	0.45	0.45	0.08	0.15	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.39	0.39	0.39	0.00	0.46	0.46	0.08	0.55	0.00
Volume/Cap:	0.00	0.00	0.00	0.96	0.96	0.36	0.00	0.96	0.96	0.96	0.28	0.00
Delay/Veh:	0.0	0.0	0.0	60.1	60.1	26.4	0.0	44.8	44.8	96.0	14.7	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	60.1	60.1	26.4	0.0	44.8	44.8	96.0	14.7	0.0
LOS by Move:	A	A	A	E	E	C	A	D	D	F	B	A
DesignQueue:	0	0	0	32	32	11	0	34	34	9	9	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	1.056
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	82.6
Optimal Cycle:	120	Level Of Service:	F

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module: Existing PM Peak												
Base Vol:	88	415	136	260	865	107	137	636	264	240	294	81
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	108	510	167	320	1064	132	169	782	325	295	362	100
Added Vol:	22	78	21	12	45	0	0	18	16	13	24	27
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	130	588	188	332	1109	132	169	800	341	308	386	127
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.76	0.82	0.79	0.83	0.90	0.72	0.82	0.85	0.85	0.95	0.84	0.81
PHF Volume:	171	718	238	400	1232	183	205	942	401	324	459	156
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	171	718	238	400	1232	183	205	942	401	324	459	156
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	171	718	238	400	1232	183	206	942	401	324	459	156
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.50	0.50	1.00	1.74	0.26	1.00	1.40	0.60	1.00	1.49	0.51
Final Sat.:	1900	2853	947	1900	3309	491	1900	2665	1135	1900	2835	965
Capacity Analysis Module:												
Vol/Sat:	0.09	0.25	0.25	0.21	0.37	0.37	0.11	0.35	0.35	0.17	0.16	0.16
Crit Moves:		****		****				****		****		
Green/Cycle:	0.09	0.24	0.24	0.20	0.35	0.35	0.20	0.33	0.33	0.16	0.30	0.30
Volume/Cap:	1.06	1.06	1.06	1.06	1.06	1.06	0.54	1.06	1.06	1.06	0.54	0.54
Delay/Veh:	141.7	91.7	91.7	110.0	80.3	80.3	44.9	81.5	81.5	117.3	35.9	35.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	141.7	91.7	91.7	110.0	80.3	80.3	44.9	81.5	81.5	117.3	35.9	35.9
LOS by Move:	F	F	F	F	F	F	D	F	F	F	D	D
DesignQueue:	11	26	26	23	34	34	11	33	33	19	15	15

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #291 I-215 SB Ramp/MLK Blvd

Cycle (sec): 100		Critical Vol./Cap.(X):	0.741
Loss Time (sec): 8 (Y+R=4.0 sec)		Average Delay (sec/veh):	16.4
Optimal Cycle: 54		Level Of Service:	B

Street Name:	I-215 SB Ramps						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0	0 0	1 0	0	1 0	0 0	1	1 1	1 0	2	0 0
Volume Module: Existing PM Peak												
Base Vol:	0	0	0	3	101	106	0	186	971	5	328	0
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	0	0	4	124	130	0	229	1194	6	403	0
Added Vol:	0	0	0	0	0	91	0	167	287	0	179	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	4	124	221	0	396	1481	6	582	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	0.75	0.70	0.80	1.00	0.74	0.88	0.63	0.87	1.00
PHF Volume:	0	0	0	5	177	277	0	535	1683	10	669	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	5	177	277	0	535	1683	10	669	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	5	177	277	0	535	1683	10	669	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.39	0.61	0.00	1.00	2.00	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	742	1158	0	1900	3800	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.00	0.24	0.24	0.00	0.28	0.44	0.01	0.18	0.00
Crit Moves:					****				****			
Green/Cycle:	0.00	0.00	0.00	0.32	0.32	0.32	0.00	0.60	0.60	0.60	0.60	0.00
Volume/Cap:	0.00	0.00	0.00	0.01	0.74	0.74	0.00	0.47	0.74	0.01	0.29	0.00
Delay/Veh:	0.0	0.0	0.0	23.0	35.0	35.0	0.0	11.3	15.6	8.1	9.9	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	23.0	35.0	35.0	0.0	11.3	15.6	8.1	9.9	0.0
LOS by Move:	A	A	A	C	C	C	A	B	B	A	A	A
DesignQueue:	0	0	0	0	18	18	0	13	21	0	8	0

Note: Queue reported is the number of cars per lane.

```
---------------------------------------------------------------------------
                   UCR West Campus Development Plan
                      Phase 3 2020 Conditions
                              PM Peak
---------------------------------------------------------------------------

                  Level Of Service Computation Report
         2000 HCM 4-Way Stop Method (Future Volume Alternative)
***************************************************************************
Intersection #292 I-215 NB Ramps/MLK Blvd
***************************************************************************
Cycle (sec):         100              Critical Vol./Cap.(X):         0.631
Loss Time (sec):       0 (Y+R=4.0 sec) Average Delay (sec/veh):       18.3
Optimal Cycle:         0              Level Of Service:                  C
***************************************************************************
Street Name:            I-215 NB Ramp                      MLK BLvd
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Min. Green:    0    0    0     0    0    0     0    0    0     0    0    0
Lanes:         1  1  0  0  0   0  0  0  0  0   2  0  0  0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM
Base Vol:     333    1    0     0    0    0   188    0    0     0    0    0
Growth Adj:  1.23 1.23 1.23  1.23 1.23 1.23  1.23 1.23 1.23  1.23 1.23 1.23
Initial Bse:  410    1    0     0    0    0   231    0    0     0    0    0
Added Vol:    179    0    0     0    0    0   167    0    0     0    0    0
PasserByVol:    0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:  589    1    0     0    0    0   398    0    0     0    0    0
User Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:     0.87 0.25 1.00  1.00 1.00 1.00  0.73 1.00 1.00  1.00 1.00 1.00
PHF Volume:   677    5    0     0    0    0   546    0    0     0    0    0
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:  677    5    0     0    0    0   546    0    0     0    0    0
PCE Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:   677    5    0     0    0    0   546    0    0     0    0    0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment:  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Lanes:       1.99 0.01 0.00  0.00 0.00 0.00  2.00 0.00 0.00  0.00 0.00 0.00
Final Sat.:  1073    8    0     0    0    0  1033    0    0     0    0    0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.63 0.63 xxxx  xxxx xxxx xxxx  0.53 xxxx xxxx  xxxx xxxx xxxx
Crit Moves:       ****                        ****
Delay/Veh:   19.5 19.5  0.0   0.0  0.0  0.0  16.7  0.0  0.0   0.0  0.0  0.0
Delay Adj:   1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:  19.5 19.5  0.0   0.0  0.0  0.0  16.7  0.0  0.0   0.0  0.0  0.0
LOS by Move:    C    C    *     *    *    *     C    *    *     *    *    *
ApproachDel:      19.5            xxxxxx            16.7            xxxxxx
Delay Adj:        1.00             xxxxx            1.00             xxxxx
ApprAdjDel:       19.5            xxxxxx            16.7            xxxxxx
LOS by Appr:         C                 *               C                 *
AllWayAvgQ:   1.5  1.5  0.0   0.0  0.0  0.0   1.0  0.0  0.0   0.0  0.0  0.0
***************************************************************************
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UCR West Campus Development Plan
Phase 3 2020 Conditions
PM Peak

Note: Queue reported is the number of cars per lane.

2025 PHASE 4 PROJECT CONDITIONS
AM AND PM PEAK HOUR

UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/C	Future LOS	Future Del/ Veh	Future V/C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	26.4	0.542	C	30.3	0.648	+ 3.934 D/V
# 21 I-215/SR-60 SB Ramp at Univers	C	23.2	0.460	C	23.3	0.600	+ 0.134 D/V
# 23 West Campus at University Ave	C	27.3	0.680	C	27.2	0.726	-0.102 D/V
# 56 NW Mall at Iowa Avenue	A	0.0	0.000	F	182.1	0.000	+182.088 D/V
# 58 Iowa Ave at University Ave	D	36.7	0.569	D	40.9	0.757	+ 4.164 D/V
# 71 SW Mall at Iowa Avenue	A	0.0	0.000	F	221.6	0.000	+221.566 D/V
# 78 Iowa Ave at MLK Blvd	C	21.4	0.648	C	28.9	0.911	+ 7.538 D/V
# 83 Lot 30/MLK BLvd	C	20.7	0.781	D	41.6	0.982	+20.867 D/V
# 85 Canyon Crest Dr at MLK BLvd	C	25.7	0.715	D	41.9	0.943	+16.143 D/V
#109 Iowa Ave at Everton Place	C	22.8	0.000	F	OVRFL	0.000	+16779.792 D
#124 Iowa Ave at Linden St	C	29.4	0.537	C	29.4	0.620	+ 0.033 D/V
#134 Cranford Ave at MLK Blvd	A	0.4	0.323	C	20.4	0.649	+20.008 D/V
#137 Chicago Ave at MLK Blvd	C	34.4	0.738	D	39.8	0.864	+ 5.389 D/V
#151 Chicago Ave at University Aven	C	34.2	0.567	C	34.7	0.621	+ 0.517 D/V
#159 Chicago Ave at Linden Street	C	29.8	0.713	C	33.6	0.827	+ 3.807 D/V
#196 Iowa Ave at Blaine St	D	48.1	0.930	E	58.9	1.009	+10.858 D/V
#207 I-215/SR-60 NB Ramp at Blain S	C	26.7	0.780	C	27.2	0.801	+ 0.502 D/V
#209 I-215/SR-60 SB Ramp at Blain S	C	26.9	0.612	C	27.9	0.668	+ 1.011 D/V
#237 Chicago Ave at 3rd Street	D	42.6	0.789	D	46.7	0.838	+ 4.081 D/V
#291 I-215 SB Ramp/MLK Blvd	B	17.2	0.423	C	22.2	0.575	+ 4.945 D/V
#292 I-215 NB Ramps/MLK Blvd	C	19.5	0.696	E	44.7	0.893	+ 0.196 V/C

UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 56 NW Mall at Iowa Avenue	??? / ???	No / No
# 71 SW Mall at Iowa Avenue	??? / ???	No / No
#109 Iowa Ave at Everton Place	??? / ???	Yes / Yes
#292 I-215 NB Ramps/MLK Blvd	???	Yes

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---------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                        2025 - Phase 4 Conditions
                                 AM Peak
---------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
*********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
*********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Lanes:         1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
Initial Vol:    6 1122    3      8  694    14    24     0    11    11     0    34
ApproachDel:     xxxxxx           xxxxxx            182.1             61.6
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=1.8]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=35]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1927]
   SUCCEED - Total volume greater than or equal to 800 for intersection
             with four or more approaches.
---------------------------------------------------------------------------------
Approach[westbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.8]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=45]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1927]
   SUCCEED - Total volume greater than or equal to 800 for intersection
             with four or more approaches.
---------------------------------------------------------------------------------
```

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	6		1122		3	8		694		14	24		0		11	11		0		34

Major Street Volume: 1847
Minor Approach Volume: 45
Minor Approach Volume Threshold: 73 [less than minimum of 100]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #71 SW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	1 0	1 0	1	1 0	1 0	1	0 0	1! 0	0	0 0	1! 0	0
Initial Vol:	19	1068	5	34	664	19	31	0	31	20	0	33
ApproachDel:	xxxxxx			xxxxxx			221.6			121.6		

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=3.8]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=62]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1924]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=1.8]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=53]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=1924]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER

This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #71 SW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	1 0	1 0	1	1 0	1 0	1	0 0	1! 0	0	0 0	1! 0	0
Initial Vol:	19	1068	5	34	664	19	31	0	31	20	0	33

Major Street Volume: 1809
Minor Approach Volume: 62
Minor Approach Volume Threshold: 81 [less than minimum of 100]

SIGNAL WARRANT DISCLAIMER
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UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Peak Hour Delay Signal Warrant Report

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Uncontrolled	Uncontrolled	Stop Sign	Stop Sign
Lanes:	0 1 0 0 1	1 0 0 1 0	0 0 1! 0 0	1 0 0 0 1
Initial Vol:	15 1033 205	357 653 32	53 0 25	51 0 141
ApproachDel:	xxxxxx	xxxxxx	xxxxxx	1431.4

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=364.1]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=78]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2565]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=76.5]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=192]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2565]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
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UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	0	1	0	0	1	1	0	0	1	0	0	0	1!	0	0	1	0	0	0	1
Initial Vol:	15		1033		205	357		653		32	53		0		25	51		0		141

Major Street Volume: 2295
Minor Approach Volume: 192
Minor Approach Volume Threshold: 17 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Stop Sign					Stop Sign				
Lanes:	1	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Initial Vol:	787		16		0	0		0		0	797		0		0	0		0		0

Major Street Volume: 803
Minor Approach Volume: 797
Minor Approach Volume Threshold: 468

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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-------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                           2025 - Phase 4 Conditions
                                    AM Peak
-------------------------------------------------------------------------------

                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #20 I-215/SR-60 NB Ramps at University
*******************************************************************************
Cycle (sec):          110              Critical Vol./Cap.(X):         0.648
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       30.3
Optimal Cycle:         69              Level Of Service:                 C
*******************************************************************************
Street Name:          I-215/SR-60 NB Ramps             University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected         Permitted
Rights:           Include          Include          Include           Include
Min. Green:     0    0    7    7    0    7    7    7    7    0    7    7
Lanes:         0  0  0  0  1   1  0  0  0  1   1  0  1  1  0   0  1  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:       0    0    1   74    0  382   80  595    1    0  198   73
Growth Adj:  1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30
Initial Bse:    0    0    1   96    0  497  104  774    1    0  257   95
Added Vol:      0    0    0   60    0  102   32  139    0    0  171   10
PasserByVol:    0    0    0    0    0    0    0    0    0    0    0    0
Initial Fut:    0    0    1  156    0  599  136  913    1    0  428  105
User Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:     0.93 0.93 0.93 0.93 0.93 0.93 0.93 0.93 0.93 0.93 0.93 0.93
PHF Volume:     0    0    1  169    0  647  147  986    1    0  463  113
Reduct Vol:     0    0    0    0    0    0    0    0    0    0    0    0
Reduced Vol:    0    0    1  169    0  647  147  986    1    0  463  113
PCE Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Final Vol.:     0    0    1  169    0  647  147  986    1    0  463  113
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900
Adjustment:  1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:       0.00 0.00 1.00 1.00 0.00 1.00 1.00 1.99 0.01 0.00 1.61 0.39
Final Sat.:     0    0 1900 1900    0 1900 1900 3795    5    0 3053  747
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.00 0.00 0.09 0.00 0.34 0.08 0.26 0.26 0.00 0.15 0.15
Crit Moves:  ****                     ****      ****
Green/Cycle: 0.00 0.00 0.00 0.42 0.00 0.42 0.32 0.51 0.51 0.00 0.19 0.19
Volume/Cap:  0.00 0.00 0.21 0.21 0.00 0.81 0.24 0.51 0.51 0.00 0.81 0.81
Delay/Veh:    0.0  0.0 70.3 20.7  0.0 34.4 27.7 18.3 18.3  0.0 49.9 49.9
User DelAdj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
AdjDel/Veh:   0.0  0.0 70.3 20.7  0.0 34.4 27.7 18.3 18.3  0.0 49.9 49.9
LOS by Move:    A    A    E    C    A    C    C    B    B    A    D    D
DesignQueue:    0    0    0    6    0   25    6   16   16    0   15   15
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #21 I-215/SR-60 SB Ramp at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.600
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	23.3
Optimal Cycle:	38	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	0	7	0	7	7	7	7	0
Lanes:	0 0 0 0 0			0 1 0 1 0			0 0 1 1 1			1 0 2 0 0		
Volume Module: Phase 4 AM												
Base Vol:	0	0	0	351	26	186	0	305	229	43	533	0
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	0	0	456	34	242	0	397	298	56	693	0
Added Vol:	0	0	0	39	0	45	0	131	25	16	257	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	495	34	287	0	528	323	72	950	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	0	535	37	310	0	570	349	78	1027	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	535	37	310	0	570	349	78	1027	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	535	37	310	0	570	349	78	1027	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.11	0.89	0.00	1.86	1.14	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	200	1700	0	3537	2163	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.28	0.18	0.18	0.00	0.16	0.16	0.04	0.27	0.00
Crit Moves:				****			****				****	
Green/Cycle:	0.00	0.00	0.00	0.47	0.47	0.47	0.00	0.31	0.31	0.14	0.45	0.00
Volume/Cap:	0.00	0.00	0.00	0.60	0.39	0.39	0.00	0.51	0.51	0.30	0.60	0.00
Delay/Veh:	0.0	0.0	0.0	20.3	17.3	17.3	0.0	28.3	28.3	39.5	21.3	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	20.3	17.3	17.3	0.0	28.3	28.3	39.5	21.3	0.0
LOS by Move:	A	A	A	C	B	B	A	C	C	D	C	A
DesignQueue:	0	0	0	17	11	11	0	12	12	4	17	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #23 West Campus at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.726
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	27.2
Optimal Cycle:	52	Level Of Service:	C

Street Name:	West Campus						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	0	0	0	0	7	7	7	7	0
Lanes:	1 0	0	0 1	0 0	0	0 0	0 0	1	1 0	1 0	2	0 0
Volume Module: Phase 4 AM												
Base Vol:	129	0	276	0	0	0	0	285	367	203	153	0
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	168	0	359	0	0	0	0	371	477	264	199	0
Added Vol:	0	0	6	0	0	0	0	199	0	22	181	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	168	0	365	0	0	0	0	570	477	286	380	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	181	0	394	0	0	0	0	616	516	309	411	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	181	0	394	0	0	0	0	616	516	309	411	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	181	0	394	0	0	0	0	616	516	309	411	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	1.09	0.91	1.00	2.00	0.00
Final Sat.:	1900	0	1900	0	0	0	0	2068	1732	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.10	0.00	0.21	0.00	0.00	0.00	0.00	0.30	0.30	0.16	0.11	0.00
Crit Moves:			****					****		****		
Green/Cycle:	0.29	0.00	0.29	0.00	0.00	0.00	0.00	0.41	0.41	0.22	0.63	0.00
Volume/Cap:	0.33	0.00	0.73	0.00	0.00	0.00	0.00	0.73	0.73	0.73	0.17	0.00
Delay/Veh:	28.6	0.0	37.0	0.0	0.0	0.0	0.0	26.5	26.5	42.1	7.5	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	28.6	0.0	37.0	0.0	0.0	0.0	0.0	26.5	26.5	42.1	7.5	0.0
LOS by Move:	C	A	D	A	A	A	A	C	C	D	A	A
DesignQueue:	7	0	17	0	0	0	0	20	20	14	4	0

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                          UCR West Campus Development Plan
                             2025 - Phase 4 Conditions
                                      AM Peak
--------------------------------------------------------------------------------
                         Level Of Service Computation Report
            2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Average Delay (sec/veh):       4.8      Worst Case Level Of Service: F[182.1]
********************************************************************************
Street Name:                  NW Mall                         Iowa Avenue
Approach:         North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:        Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:           Include          Include           Include          Include
Lanes:          1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
------------|----------------||----------------||----------------||----------------|
Volume Module: Phase 4 AM
Base Vol:         0  659     0     0  337     0     0     0     0     0     0     0
Growth Adj:    1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30
Initial Bse:      0  857     0     0  438     0     0     0     0     0     0     0
Added Vol:        6  265     3     8  256    14    24     0    11    11     0    34
PasserByVol:      0    0     0     0    0     0     0     0     0     0     0     0
Initial Fut:      6 1122     3     8  694    14    24     0    11    11     0    34
User Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:       0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:       6 1213     3     9  750    15    26     0    12    12     0    37
Reduct Vol:       0    0     0     0    0     0     0     0     0     0     0     0
Final Vol.:       6 1213     3     9  750    15    26     0    12    12     0    37
Critical Gap Module:
Critical Gp:    4.1 xxxx xxxxx   4.1 xxxx xxxxx   7.1 xxxx   6.2   7.1 xxxx   6.2
FollowUpTim:    2.2 xxxx xxxxx   2.2 xxxx xxxxx   3.5 xxxx   3.3   3.5 xxxx   3.3
------------|----------------||----------------||----------------||----------------|
Capacity Module:
Cnflict Vol:    766 xxxx xxxxx  1216 xxxx xxxxx  2013 xxxx   750  2007 xxxx  1213
Potent Cap.:    857 xxxx xxxxx   581 xxxx xxxxx    44 xxxx   414    45 xxxx   224
Move Cap.:      857 xxxx xxxxx   581 xxxx xxxxx    36 xxxx   414    43 xxxx   224
Volume/Cap:    0.01 xxxx  xxxx  0.01 xxxx  xxxx  0.71 xxxx  0.03  0.28 xxxx  0.16
------------|----------------||----------------||----------------||----------------|
Level Of Service Module:
2Way95thQ:      0.0 xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:    9.2 xxxx xxxxx  11.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:      A    *     *     B    *     *     *    *     *     *    *     *
Movement:       LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx   51 xxxxx  xxxx  110 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  3.0 xxxxx xxxxx  1.9 xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  182 xxxxx xxxxx 61.6 xxxxx
Shared LOS:       *    *     *     *    *     *     *    F     *     *    F     *
ApproachDel:        xxxxxx           xxxxxx            182.1             61.6
ApproachLOS:          *                *                 F                F
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

```
-------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                        2025 - Phase 4 Conditions
                                AM Peak
-------------------------------------------------------------------------------

                   Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #58 Iowa Ave at University Ave
*******************************************************************************
Cycle (sec):         120              Critical Vol./Cap.(X):         0.757
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):       40.9
Optimal Cycle:        59              Level Of Service:                 D
*******************************************************************************
Street Name:              Iowa Avenue                University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:             Include          Include           Ovl             Include
Min. Green:     7     7     7     7     7     7     7     7     7     7     7     7
Lanes:         1  0  2  0  1    1  0  1  1  0    1  0  2  0  1    1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:       63   544    92   136   245    99   139   345    56    80   342   167
Growth Adj:   1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30
Initial Bse:    82   707   120   177   319   129   181   449    73   104   445   217
Added Vol:      42   167   133     0   211    24     8    23    68   288    13     0
PasserByVol:     0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:   124   874   253   177   530   153   189   472   141   392   458   217
User Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:      0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93
PHF Volume:    134   945   273   191   572   165   204   510   152   424   495   235
Reduct Vol:      0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   134   945   273   191   572   165   204   510   152   424   495   235
PCE Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:      1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:    134   945   273   191   572   165   204   510   152   424   495   235
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:        1.00  2.00  1.00  1.00  1.55  0.45  1.00  2.00  1.00  1.00  2.00  1.00
Final Sat.:   1900  3800  1900  1900  2949   851  1900  3800  1900  1900  3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.07  0.25  0.14  0.10  0.19  0.19  0.11  0.13  0.08  0.22  0.13  0.12
Crit Moves:         ****        ****                    ****        ****
Green/Cycle:  0.12  0.33  0.33  0.13  0.34  0.34  0.21  0.18  0.30  0.29  0.26  0.26
Volume/Cap:   0.57  0.76  0.44  0.76  0.57  0.57  0.50  0.76  0.27  0.76  0.50  0.48
Delay/Veh:    53.1  38.7  32.1  62.5  33.2  33.2  42.6  51.8  32.2  44.3  38.3  38.4
User DelAdj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   53.1  38.7  32.1  62.5  33.2  33.2  42.6  51.8  32.2  44.3  38.3  38.4
LOS by Move:     D     D     C     E     C     C     D     D     C     D     D     D
DesignQueue:     8    23    13    11    17    17    11    14     7    21    13    12
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                         2025 - Phase 4 Conditions
                                  AM Peak
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #71 SW Mall at Iowa Avenue
********************************************************************************
Average Delay (sec/veh):     10.8      Worst Case Level Of Service: F[221.6]
********************************************************************************
Street Name:                 SW Mall                         Iowa Avenue
Approach:        North Bound      South Bound       East Bound       West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:          1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:         0  659    0      0  337    0      0    0    0      0    0    0
Growth Adj:    1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30
Initial Bse:      0  857    0      0  438    0      0    0    0      0    0    0
Added Vol:       19  211    5     34  226   19     31    0   31     20    0   33
PasserByVol:      0    0    0      0    0    0      0    0    0      0    0    0
Initial Fut:     19 1068    5     34  664   19     31    0   31     20    0   33
User Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:       0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:      21 1154    5     37  718   21     34    0   34     22    0   36
Reduct Vol:       0    0    0      0    0    0      0    0    0      0    0    0
Final Vol.:      21 1154    5     37  718   21     34    0   34     22    0   36
Critical Gap Module:
Critical Gp:    4.1 xxxx xxxxx   4.1 xxxx xxxxx   7.1 xxxx   6.2   7.1 xxxx   6.2
FollowUpTim:    2.2 xxxx xxxxx   2.2 xxxx xxxxx   3.5 xxxx   3.3   3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:    738 xxxx xxxxx  1160 xxxx xxxxx  2007 xxxx   718  2014 xxxx  1154
Potent Cap.:    877 xxxx xxxxx   610 xxxx xxxxx    45 xxxx   432    44 xxxx   242
Move Cap.:      877 xxxx xxxxx   610 xxxx xxxxx    36 xxxx   432    38 xxxx   242
Volume/Cap:    0.02 xxxx  xxxx  0.06 xxxx  xxxx  0.94 xxxx  0.08  0.57 xxxx  0.15
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:      0.1 xxxx xxxxx   0.2 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:    9.2 xxxx xxxxx  11.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:      A    *     *     B    *     *     *    *     *     *    *     *
Movement:        LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx   66 xxxxx  xxxx   80 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  5.1 xxxxx xxxxx  3.4 xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  222 xxxxx xxxxx  122 xxxxx
Shared LOS:       *    *     *     *    *     *     *    F     *     *    F     *
ApproachDel:        xxxxxx           xxxxxx            221.6            121.6
ApproachLOS:          *                *                 F                F
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #78 Iowa Ave at MLK Blvd

Cycle (sec):	110	Critical Vol./Cap.(X):	0.911
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	28.9
Optimal Cycle:	110	Level Of Service:	C

Street Name:	Iowa Avenue						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Ovl			Include			Ovl	
Min. Green:	0	0	0	7	7	7	7	7	0	0	7	7
Lanes:	0 0 0 0 0			1 0 1! 0 1			1 0 2 0 0			0 0 2 0 1		
Volume Module: Phase 4 AM												
Base Vol:	0	0	0	263	0	101	267	440	0	0	785	484
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	0	0	342	0	131	347	572	0	0	1021	629
Added Vol:	0	0	0	113	0	163	124	311	0	0	439	110
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	455	0	294	471	883	0	0	1460	739
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	0	492	0	318	509	955	0	0	1578	799
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	492	0	318	509	955	0	0	1578	799
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	492	0	318	509	955	0	0	1578	799
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.61	0.00	1.39	1.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	0	0	0	3054	0	2646	1900	3800	0	0	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.16	0.00	0.12	0.27	0.25	0.00	0.00	0.42	0.42
Crit Moves:				****			****				****	
Green/Cycle:	0.00	0.00	0.00	0.18	0.00	0.47	0.29	0.75	0.00	0.00	0.46	0.63
Volume/Cap:	0.00	0.00	0.00	0.91	0.00	0.26	0.91	0.33	0.00	0.00	0.91	0.66
Delay/Veh:	0.0	0.0	0.0	57.7	0.0	17.5	56.5	4.6	0.0	0.0	35.4	14.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	57.7	0.0	17.5	56.5	4.6	0.0	0.0	35.4	14.2
LOS by Move:	A	A	A	E	A	B	E	A	A	A	D	B
DesignQueue:	0	0	0	16	0	8	24	8	0	0	29	20

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec): 100 Critical Vol./Cap.(X): 0.982
Loss Time (sec): 8 (Y+R=4.0 sec) Average Delay (sec/veh): 41.6
Optimal Cycle: 120 Level Of Service: D

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	1 0	0	0 0	0 1	0	0 1	1 0	1	1 0	1 0	2	0 1
Volume Module: Phase 4 AM												
Base Vol:	4	0	0	12	0	4	321	600	0	10	1276	77
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	5	0	0	16	0	5	417	780	0	13	1659	100
Added Vol:	0	0	0	9	0	3	12	393	0	0	608	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	5	0	0	25	0	8	429	1173	0	13	2267	100
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	6	0	0	27	0	9	464	1268	0	14	2451	108
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	6	0	0	27	0	9	464	1268	0	14	2451	108
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	6	0	0	27	0	9	464	1268	0	14	2451	108
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	0.00	1.00	0.00	1.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	1900	0	0	1900	0	1900	1900	3800	0	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.01	0.00	0.00	0.24	0.33	0.00	0.01	0.64	0.06
Crit Moves:				****			****				****	
Green/Cycle:	0.07	0.00	0.00	0.07	0.00	0.07	0.23	0.70	0.00	0.15	0.62	0.62
Volume/Cap:	0.04	0.00	0.00	0.20	0.00	0.07	1.05	0.47	0.00	0.05	1.05	0.09
Delay/Veh:	43.5	0.0	0.0	44.6	0.0	43.7	93.6	6.8	0.0	36.7	51.2	7.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.5	0.0	0.0	44.6	0.0	43.7	93.6	6.8	0.0	36.7	51.2	7.8
LOS by Move:	D	A	A	D	A	D	F	A	A	D	D	A
DesignQueue:	0	0	0	1	0	0	21	11	0	1	31	2

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
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AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.943
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	41.9
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Ovl			Ovl			Include	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:		2 0 2 0 1			2 0 2 0 1			2 0 2 0 1			2 0 2 0 1	
Volume Module: Phase 4 AM												
Base Vol:	1153	452	445	41	84	52	130	185	323	108	335	36
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	1499	588	579	53	109	68	169	240	420	140	436	47
Added Vol:	128	56	0	34	14	37	132	221	50	0	444	132
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	1627	644	579	87	123	105	301	462	470	140	880	179
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	1759	696	625	94	133	113	325	499	508	152	951	193
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	1759	696	625	94	133	113	325	499	508	152	951	193
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	1759	696	625	94	133	113	325	499	508	152	951	193
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3600	3800	1900	3600	3800	1900	3600	3800	1900	3600	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.49	0.18	0.33	0.03	0.04	0.06	0.09	0.13	0.27	0.04	0.25	0.10
Crit Moves:	****				****		****				****	
Green/Cycle:	0.51	0.48	0.48	0.08	0.06	0.15	0.09	0.24	0.75	0.11	0.26	0.26
Volume/Cap:	0.97	0.38	0.69	0.31	0.60	0.39	0.97	0.54	0.36	0.39	0.97	0.39
Delay/Veh:	42.6	20.1	26.5	52.2	59.7	46.8	94.0	40.1	5.3	50.4	64.8	37.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	42.6	20.1	26.5	52.2	59.7	46.8	94.0	40.1	5.3	50.4	64.8	37.2
LOS by Move:	D	C	C	D	E	D	F	D	A	D	E	D
DesignQueue:	35	13	24	3	4	6	11	13	9	5	25	10

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #109 Iowa Ave at Everton Place

Average Delay (sec/veh): 622.3 Worst Case Level Of Service: F[16802.6]

Street Name:	Iowa Avenue						Everton Place					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 1 0 0 1			1 0 0 1 0			0 0 1! 0 0			1 0 0 0 1		
Volume Module: Phase 4 AM												
Base Vol:	0	659	56	28	337	0	0	0	0	10	0	21
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	857	73	36	438	0	0	0	0	13	0	27
Added Vol:	15	176	132	321	215	32	53	0	25	38	0	114
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	15	1033	205	357	653	32	53	0	25	51	0	141
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	16	1116	221	386	706	35	57	0	27	55	0	153
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	16	1116	221	386	706	35	57	0	27	55	0	153
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx	7.1	xxxx	6.2	7.1	xxxx	6.2
FollowUpTim:	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx	3.5	xxxx	3.3	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	741	xxxx	xxxxx	1338	xxxx	xxxxx	2832	xxxx	723	2658	xxxx	1116
Potent Cap.:	875	xxxx	xxxxx	522	xxxx	xxxxx	11	xxxx	429	15	xxxx	255
Move Cap.:	875	xxxx	xxxxx	522	xxxx	xxxxx	2	xxxx	429	6	xxxx	255
Volume/Cap:	0.02	xxxx	xxxx	0.74	xxxx	xxxx	32.30	xxxx	0.06	9.92	xxxx	0.60
Level Of Service Module:												
2Way95thQ:	0.1	xxxx	xxxxx	6.2	xxxx	xxxxx	xxxx	xxxx	xxxxx	8.6	xxxx	3.5
Control Del:	9.2	xxxx	xxxxx	29.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx	5291	xxxx	38.3
LOS by Move:	A	*	*	D	*	*	*	*	*	F	*	E
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	3	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	0.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	12.7	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	9.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	A	*	*	*	*	*	*	F	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			xxxxxx			1431.4		
ApproachLOS:	*			*			F			F		

Note: Queue reported is the number of cars per lane.

```
---------------------------------------------------------------------------
                     UCR West Campus Development Plan
                        2025 - Phase 4 Conditions
                                 AM Peak
---------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
***************************************************************************
Intersection #124 Iowa Ave at Linden St
***************************************************************************
Cycle (sec):          110              Critical Vol./Cap.(X):        0.620
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):      29.4
Optimal Cycle:         40              Level Of Service:                 C
***************************************************************************
Street Name:              Iowa Avenue                   Linden Street
Approach:       North Bound      South Bound      East Bound      West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:     7    7     7     7    7     7     7    7     7     7    7     7
Lanes:         1  0  2  0  1   1  0  1  1  0   1  0  1  0  1   1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:     118  579    92    45  403   207   113  107    47    70  137    67
Growth Adj:  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30
Initial Bse:  153  753   120    59  524   269   147  139    61    91  178    87
Added Vol:     23  110    43     0  176     0     0   39    42    17   25     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  176  863   163    59  700   269   147  178   103   108  203    87
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:   191  933   176    63  757   291   159  193   111   117  220    94
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  191  933   176    63  757   291   159  193   111   117  220    94
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   191  933   176    63  757   291   159  193   111   117  220    94
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 1.44  0.56  1.00 1.00  1.00  1.00 1.00  1.00
Final Sat.:  1900 3800  1900  1900 2745  1055  1900 1900  1900  1900 1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.10 0.25  0.09  0.03 0.28  0.28  0.08 0.10  0.06  0.06 0.12  0.05
Crit Moves:  ****                  ****        ****                  ****
Green/Cycle: 0.16 0.48  0.48  0.12 0.44  0.44  0.13 0.20  0.20  0.12 0.19  0.19
Volume/Cap:  0.62 0.51  0.19  0.27 0.62  0.62  0.62 0.51  0.30  0.50 0.62  0.27
Delay/Veh:   46.8 19.8  16.4  44.2 24.2  24.2  49.5 40.7  38.1  46.6 44.5  38.7
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  46.8 19.8  16.4  44.2 24.2  24.2  49.5 40.7  38.1  46.6 44.5  38.7
LOS by Move:    D    B     B     D    C     C     D    D     D     D    D     D
DesignQueue:   10   16     6     3   19    19     9   10     6     6   11     5
***************************************************************************
Note: Queue reported is the number of cars per lane.
```

```
------------------------------------------------------------------------------
                    UCR West Campus Development Plan
                        2025 - Phase 4 Conditions
                                AM Peak
------------------------------------------------------------------------------
                   Level Of Service Computation Report
         2000 HCM Operations Method (Future Volume Alternative)
******************************************************************************
Intersection #134 Cranford Ave at MLK Blvd
******************************************************************************
Cycle (sec):         120            Critical Vol./Cap.(X):          0.649
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):      20.4
Optimal Cycle:        44            Level Of Service:                   C
******************************************************************************
Street Name:             Cranford Ave                     MLK Blvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:     0     0     0    7     0     7    7     7     0    0     7     7
Lanes:        0  0  0  0  0   1  0  0  0  1   1  0  2  0  0   0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:       0     0     0     0     0     0     0   375     0     0   816     0
Growth Adj:  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30
Initial Bse:    0     0     0     0     0     0     0   488     0     0  1061     0
Added Vol:      0     0     0   170     0   140   260   265     0     0   209   393
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:    0     0     0   170     0   140   260   753     0     0  1270   393
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93
PHF Volume:     0     0     0   184     0   151   281   814     0     0  1373   425
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:    0     0     0   184     0   151   281   814     0     0  1373   425
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:     0     0     0   184     0   151   281   814     0     0  1373   425
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       0.00  0.00  0.00  1.00  0.00  1.00  1.00  2.00  0.00  0.00  2.00  1.00
Final Sat.:     0     0     0  1900     0  1900  1900  3800     0     0  3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00  0.10  0.00  0.08  0.15  0.21  0.00  0.00  0.36  0.22
Crit Moves:                    ****              ****                    ****
Green/Cycle: 0.00  0.00  0.00  0.15  0.00  0.15  0.23  0.78  0.00  0.00  0.56  0.56
Volume/Cap:  0.00  0.00  0.00  0.65  0.00  0.53  0.65  0.27  0.00  0.00  0.65  0.40
Delay/Veh:    0.0   0.0   0.0  53.3   0.0  49.2  45.4   3.6   0.0   0.0  19.2  15.5
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0  53.3   0.0  49.2  45.4   3.6   0.0   0.0  19.2  15.5
LOS by Move:    A     A     A     D     A     D     D     A     A     A     B     B
DesignQueue:    0     0     0    11     0     9    15     6     0     0    22    13
******************************************************************************
Note: Queue reported is the number of cars per lane.
```

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UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	0.864
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	39.8
Optimal Cycle:	89	Level Of Service:	D

Street Name:	Chicago Avenue		Martin Luther King Blvd	
Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Protected	Protected	Protected	Protected
Rights:	Ovl	Ovl	Ovl	Ovl
Min. Green:	7 7 7	7 7 7	7 7 7	7 7 7
Lanes:	2 0 2 0 1	2 0 2 0 1	1 0 2 0 1	1 0 2 0 1

Volume Module: Phase 4 AM

Movement	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Base Vol:	707	898	228	60	209	113	133	543	131	40	638	138
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	919	1167	296	78	272	147	173	706	170	52	829	179
Added Vol:	0	14	83	231	4	11	34	210	0	39	100	210
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	919	1181	379	309	276	158	207	916	170	91	929	389
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	994	1277	410	334	298	171	224	990	184	98	1005	421
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	994	1277	410	334	298	171	224	990	184	98	1005	421
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	994	1277	410	334	298	171	224	990	184	98	1005	421

Saturation Flow Module:

Movement	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	3800	1900	1900	3800	1900

Capacity Analysis Module:

Movement	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Vol/Sat:	0.26	0.34	0.22	0.09	0.08	0.09	0.12	0.26	0.10	0.05	0.26	0.22
Crit Moves:		****		****			****				****	
Green/Cycle:	0.38	0.39	0.47	0.10	0.11	0.25	0.14	0.36	0.74	0.08	0.31	0.41
Volume/Cap:	0.69	0.86	0.46	0.86	0.69	0.36	0.86	0.72	0.13	0.64	0.86	0.54
Delay/Veh:	32.9	39.3	21.9	70.9	56.0	37.6	75.3	35.0	4.6	62.2	46.2	27.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	32.9	39.3	21.9	70.9	56.0	37.6	75.3	35.0	4.6	62.2	46.2	27.8
LOS by Move:	C	D	C	E	E	D	E	C	A	E	D	C
DesignQueue:	22	29	15	10	9	9	13	23	3	6	25	18

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                           2025 - Phase 4 Conditions
                                    AM Peak
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
              2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #151 Chicago Ave at University Avenue
********************************************************************************
Cycle (sec):          120                 Critical Vol./Cap.(X):         0.621
Loss Time (sec):       12 (Y+R=4.0 sec)   Average Delay (sec/veh):        34.7
Optimal Cycle:         52                 Level Of Service:                  C
********************************************************************************
Street Name:           Chicago Avenue                  University Avenue
Approach:        North Bound      South Bound       East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:      7     7     7    7     7     7    7     7     7    7     7     7
Lanes:          2  0  2  0  1   2  0  1  1  0   2  0  2  0  1   2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:      208  747   110    74  320   126   173  326    88    85  386    55
Growth Adj:   1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30
Initial Bse:   270  971   143    96  416   164   225  424   114   111  502    72
Added Vol:      19  116    13    30  275     0     0   56    41    38   24    17
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   289 1087   156   126  691   164   225  480   155   149  526    89
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:    313 1175   169   136  747   177   243  519   168   161  568    96
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   313 1175   169   136  747   177   243  519   168   161  568    96
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    313 1175   169   136  747   177   243  519   168   161  568    96
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:        2.00 2.00  1.00  2.00 1.62  0.38  2.00 2.00  1.00  2.00 2.00  1.00
Final Sat.:   3800 3800  1900  3800 3072   728  3800 3800  1900  3800 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.08 0.31  0.09  0.04 0.24  0.24  0.06 0.14  0.09  0.04 0.15  0.05
Crit Moves:        ****        ****              ****                   ****
Green/Cycle:  0.14 0.50  0.50  0.06 0.42  0.42  0.10 0.24  0.24  0.10 0.24  0.24
Volume/Cap:   0.59 0.62  0.18  0.62 0.59  0.59  0.62 0.57  0.37  0.41 0.62  0.21
Delay/Veh:    50.0 22.5  16.7  60.3 27.7  27.7  54.6 40.9  38.4  51.1 42.0  36.6
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   50.0 22.5  16.7  60.3 27.7  27.7  54.6 40.9  38.4  51.1 42.0  36.6
LOS by Move:     D    C     B     E    C     C     D    D     D     D    D     D
DesignQueue:     9   21     6     4   19    19     7   14     9     5   15     5
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                           2025 - Phase 4 Conditions
                                   AM Peak
--------------------------------------------------------------------------------

                      Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #159 Chicago Ave at Linden Street
********************************************************************************
Cycle (sec):         100              Critical Vol./Cap.(X):         0.827
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):       33.6
Optimal Cycle:        72              Level Of Service:                 C
********************************************************************************
Street Name:           Chicago Avenue                    Linden Street
Approach:        North Bound       South Bound       East Bound        West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|-----------------||-----------------||-----------------||-----------------|
Control:         Protected         Protected         Protected         Protected
Rights:            Include           Include           Include           Include
Min. Green:     7     7     7     7     7     7     7     7     7     7     7     7
Lanes:         1  0  1  1  0    1  0  2  0  1    1  0  0  1  0    1  0  1  1  0
------------|-----------------||-----------------||-----------------||-----------------|
Volume Module: Phase 4 AM
Base Vol:      21   771   148   140   364    33    36   102    31   154   122   153
Growth Adj:  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30
Initial Bse:   27  1002   192   182   473    43    47   133    40   200   159   199
Added Vol:     15    89    30     0   216     0     0    35    36    55    14     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:   42  1091   222   182   689    43    47   168    76   255   173   199
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93
PHF Volume:    46  1180   240   197   745    46    51   181    82   276   187   215
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   46  1180   240   197   745    46    51   181    82   276   187   215
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:    46  1180   240   197   745    46    51   181    82   276   187   215
------------|-----------------||-----------------||-----------------||-----------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  1.66  0.34  1.00  2.00  1.00  1.00  0.69  0.31  1.00  1.00  1.00
Final Sat.:  1900  3157   643  1900  3800  1900  1900  1306   594  1900  1900  1900
------------|-----------------||-----------------||-----------------||-----------------|
Capacity Analysis Module:
Vol/Sat:     0.02  0.37  0.37  0.10  0.20  0.02  0.03  0.14  0.14  0.15  0.10  0.11
Crit Moves:        ****        ****                    ****        ****
Green/Cycle: 0.15  0.45  0.45  0.13  0.43  0.43  0.13  0.17  0.17  0.18  0.21  0.21
Volume/Cap:  0.16  0.83  0.83  0.83  0.46  0.06  0.20  0.83  0.83  0.83  0.46  0.53
Delay/Veh:   37.1  27.5  27.5  63.4  20.8  17.0  39.2  56.4  56.4  55.4  34.8  35.8
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  37.1  27.5  27.5  63.4  20.8  17.0  39.2  56.4  56.4  55.4  34.8  35.8
LOS by Move:    D     C     C     E     C     B     D     E     E     E     C     D
DesignQueue:    2    24    24    10    13     1     2    13    13    13     8    10
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	1.009
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	58.9
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	1 1	0
Volume Module: Phase 4 AM												
Base Vol:	141	641	99	121	413	225	418	410	103	108	428	130
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	183	833	129	157	537	293	543	533	134	140	556	169
Added Vol:	28	58	23	37	130	0	0	94	20	26	59	10
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	211	891	152	194	667	293	543	627	154	166	615	179
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	228	964	164	210	721	316	587	678	166	180	665	194
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	228	964	164	210	721	316	587	678	166	180	665	194
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	228	964	164	210	721	316	587	678	166	180	665	194
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.39	0.61	1.00	2.00	1.00	1.00	1.55	0.45
Final Sat.:	1900	3800	1900	1900	2641	1159	1900	3800	1900	1900	2944	856
Capacity Analysis Module:												
Vol/Sat:	0.12	0.25	0.09	0.11	0.27	0.27	0.31	0.18	0.09	0.09	0.23	0.23
Crit Moves:	****				****		****				****	
Green/Cycle:	0.12	0.27	0.27	0.12	0.27	0.27	0.31	0.35	0.35	0.18	0.22	0.22
Volume/Cap:	1.01	0.93	0.32	0.93	1.01	1.01	1.01	0.51	0.25	0.51	1.01	1.01
Delay/Veh:	106.2	50.4	29.4	85.8	66.8	66.8	74.3	26.3	23.6	38.1	71.9	71.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	106.2	50.4	29.4	85.8	66.8	66.8	74.3	26.3	23.6	38.1	71.9	71.9
LOS by Move:	F	D	C	F	E	E	E	C	C	D	E	E
DesignQueue:	12	21	7	11	23	23	25	13	6	8	20	20

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2025 - Phase 4 Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #207 I-215/SR-60 NB Ramp at Blain Street

Cycle (sec):	110	Critical Vol./Cap.(X):	0.801
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	27.2
Optimal Cycle:	67	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Include			Include			Include	
Min. Green:	7	7	7	0	0	0	7	7	0	0	7	7
Lanes:		0 1 0 0 1			0 0 0 0 0			2 0 2 0 0			0 0 1 1 0	
Volume Module: Phase 4 AM												
Base Vol:	204	5	393	0	0	0	172	645	0	0	409	499
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	265	7	511	0	0	0	224	839	0	0	532	649
Added Vol:	0	0	2	0	0	0	17	112	0	0	63	24
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	265	7	513	0	0	0	241	951	0	0	595	673
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	287	7	554	0	0	0	260	1028	0	0	643	727
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	287	7	554	0	0	0	260	1028	0	0	643	727
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	287	7	554	0	0	0	260	1028	0	0	643	727
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.98	0.02	1.00	0.00	0.00	0.00	2.00	2.00	0.00	0.00	1.00	1.00
Final Sat.:	1855	45	1900	0	0	0	3800	3800	0	0	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.15	0.15	0.29	0.00	0.00	0.00	0.07	0.27	0.00	0.00	0.34	0.38
Crit Moves:			****				****					****
Green/Cycle:	0.36	0.36	0.36	0.00	0.00	0.00	0.09	0.56	0.00	0.00	0.48	0.48
Volume/Cap:	0.42	0.42	0.80	0.00	0.00	0.00	0.80	0.48	0.00	0.00	0.71	0.80
Delay/Veh:	26.7	26.7	38.1	0.0	0.0	0.0	62.7	14.6	0.0	0.0	23.9	27.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	26.7	26.7	38.1	0.0	0.0	0.0	62.7	14.6	0.0	0.0	23.9	27.1
LOS by Move:	C	C	D	A	A	A	E	B	A	A	C	C
DesignQueue:	12	12	23	0	0	0	7	15	0	0	23	26

Note: Queue reported is the number of cars per lane.

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AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	0.668
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	27.9
Optimal Cycle:	46	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0 0 0 0			0 1 0 0 1			0 0 1 1 0			2 0 2 0 0		
Volume Module: Phase 4 AM												
Base Vol:	0	0	0	369	16	251	0	486	179	110	518	0
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	0	0	480	21	326	0	632	233	143	673	0
Added Vol:	0	0	0	43	0	52	0	86	0	10	53	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	523	21	378	0	718	233	153	726	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	0	565	22	409	0	776	252	165	785	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	565	22	409	0	776	252	165	785	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	565	22	409	0	776	252	165	785	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.96	0.04	1.00	0.00	1.51	0.49	2.00	2.00	0.00
Final Sat.:	0	0	0	1827	73	1900	0	2870	930	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.31	0.31	0.22	0.00	0.27	0.27	0.04	0.21	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.46	0.46	0.46	0.00	0.40	0.40	0.07	0.47	0.00
Volume/Cap:	0.00	0.00	0.00	0.67	0.67	0.46	0.00	0.67	0.67	0.67	0.44	0.00
Delay/Veh:	0.0	0.0	0.0	27.0	27.0	22.4	0.0	30.3	30.3	61.6	21.4	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	27.0	27.0	22.4	0.0	30.3	30.3	61.6	21.4	0.0
LOS by Move:	A	A	A	C	C	C	A	C	C	E	C	A
DesignQueue:	0	0	0	23	23	16	0	22	22	5	15	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
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AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	0.838
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	46.7
Optimal Cycle:	79	Level Of Service:	D

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module: Phase 4 AM												
Base Vol:	176	590	177	195	315	66	94	348	71	130	425	222
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	229	767	230	254	410	86	122	452	92	169	553	289
Added Vol:	16	45	27	31	109	0	0	27	27	80	17	8
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	245	812	257	285	518	86	122	479	119	249	570	297
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	265	878	278	308	561	93	132	518	129	269	616	321
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	265	878	278	308	561	93	132	518	129	269	616	321
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	265	878	278	308	561	93	132	518	129	269	616	321
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.52	0.48	1.00	1.72	0.28	1.00	1.60	0.40	1.00	1.32	0.68
Final Sat.:	1900	2886	914	1900	3260	540	1900	3043	757	1900	2499	1301
Capacity Analysis Module:												
Vol/Sat:	0.14	0.30	0.30	0.16	0.17	0.17	0.07	0.17	0.17	0.14	0.25	0.25
Crit Moves:		****		****			****				****	
Green/Cycle:	0.25	0.36	0.36	0.19	0.31	0.31	0.08	0.21	0.21	0.17	0.29	0.29
Volume/Cap:	0.56	0.84	0.84	0.84	0.56	0.56	0.83	0.83	0.83	0.83	0.84	0.84
Delay/Veh:	40.8	39.7	39.7	62.1	35.4	35.4	84.2	52.9	52.9	63.9	45.4	45.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	40.8	39.7	39.7	62.1	35.4	35.4	84.2	52.9	52.9	63.9	45.4	45.4
LOS by Move:	D	D	D	E	D	D	F	D	D	E	D	D
DesignQueue:	14	27	27	17	16	16	8	18	18	15	24	24

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
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AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #291 I-215 SB Ramp/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.575
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	22.2
Optimal Cycle:	37	Level Of Service:	C

Street Name:	I-215 SB Ramps						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0 0 0 0			1 0 0 1 0			0 0 1 1 1			1 0 2 0 0		
Volume Module: Phase 4 AM												
Base Vol:	0	0	0	17	60	197	0	537	197	21	291	0
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	0	0	22	78	256	0	698	256	27	378	0
Added Vol:	0	0	0	0	0	193	0	77	177	0	383	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	22	78	449	0	775	433	27	761	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	0	24	84	486	0	838	468	30	823	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	24	84	486	0	838	468	30	823	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	24	84	486	0	838	468	30	823	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.00	0.15	0.85	0.00	1.92	1.08	1.00	2.00	0.00
Final Sat.:	0	0	0	1900	281	1619	0	3657	2043	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.01	0.30	0.30	0.00	0.23	0.23	0.02	0.22	0.00
Crit Moves:					****			****				
Green/Cycle:	0.00	0.00	0.00	0.52	0.52	0.52	0.00	0.40	0.40	0.40	0.40	0.00
Volume/Cap:	0.00	0.00	0.00	0.02	0.58	0.58	0.00	0.58	0.58	0.04	0.54	0.00
Delay/Veh:	0.0	0.0	0.0	11.6	17.2	17.2	0.0	23.8	23.8	18.4	23.5	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	11.6	17.2	17.2	0.0	23.8	23.8	18.4	23.5	0.0
LOS by Move:	A	A	A	B	B	B	A	C	C	B	C	A
DesignQueue:	0	0	0	1	16	16	0	15	15	1	15	0

Note: Queue reported is the number of cars per lane.

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                     UCR West Campus Development Plan
                         2025 - Phase 4 Conditions
                                  AM Peak
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                    Level Of Service Computation Report
          2000 HCM 4-Way Stop Method (Future Volume Alternative)
******************************************************************************
Intersection #292 I-215 NB Ramps/MLK Blvd
******************************************************************************
Cycle (sec):          100             Critical Vol./Cap.(X):          0.893
Loss Time (sec):        0 (Y+R=4.0 sec) Average Delay (sec/veh):       44.7
Optimal Cycle:          0             Level Of Service:                   E
******************************************************************************
Street Name:             I-215 NB Ramp                      MLK BLvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Min. Green:     0     0     0     0     0     0     0     0     0     0     0     0
Lanes:        1  1  0  0  0   0  0  0  0  0   2  0  0  0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:     311    12     0     0     0     0   554     0     0     0     0     0
Growth Adj:  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30
Initial Bse:  404    16     0     0     0     0   720     0     0     0     0     0
Added Vol:    383     0     0     0     0     0    77     0     0     0     0     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:  787    16     0     0     0     0   797     0     0     0     0     0
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93
PHF Volume:   851    17     0     0     0     0   862     0     0     0     0     0
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  851    17     0     0     0     0   862     0     0     0     0     0
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   851    17     0     0     0     0   862     0     0     0     0     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.96  0.04  0.00  0.00  0.00  0.00  2.00  0.00  0.00  0.00  0.00  0.00
Final Sat.:   954    19     0     0     0     0   970     0     0     0     0     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.89  0.89  xxxx  xxxx  xxxx  xxxx  0.89  xxxx  xxxx  xxxx  xxxx  xxxx
Crit Moves:  ****                                ****
Delay/Veh:   45.0  44.8   0.0   0.0   0.0   0.0  44.4   0.0   0.0   0.0   0.0   0.0
Delay Adj:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  45.0  44.8   0.0   0.0   0.0   0.0  44.4   0.0   0.0   0.0   0.0   0.0
LOS by Move:    E     E     *     *     *     *     E     *     *     *     *     *
ApproachDel:       45.0            xxxxxx             44.4            xxxxxx
Delay Adj:         1.00             xxxxx             1.00             xxxxx
ApprAdjDel:        45.0            xxxxxx             44.4            xxxxxx
LOS by Appr:          E                 *                E                 *
AllWayAvgQ:   4.7   4.7   0.0   0.0   0.0   0.0   4.6   0.0   0.0   0.0   0.0   0.0
******************************************************************************
```

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/C	Future LOS	Future Del/ Veh	Future V/C	Change in
# 20 I-215/SR-60 NB Ramps at Univer	C	25.2	0.649	C	27.2	0.764	+ 1.999 D/V
# 21 I-215/SR-60 SB Ramp at Univers	B	18.9	0.615	C	20.7	0.729	+ 1.824 D/V
# 23 West Campus at University Ave	C	27.2	0.720	C	28.3	0.789	+ 1.022 D/V
# 56 NW Mall at Iowa Avenue	A	0.0	0.000	F	OVRFL	0.000	+1200.313 D/
# 58 Iowa Ave at University Ave	D	49.3	0.935	F	90.4	1.145	+41.083 D/V
# 71 SW Mall at Iowa Avenue	A	0.0	0.000	F	OVRFL	0.000	+1559.144 D/
# 78 Iowa Ave at MLK Blvd	C	31.5	0.960	E	77.3	1.172	+45.847 D/V
# 83 Lot 30/MLK BLvd	E	55.7	1.026	F	119.5	1.244	+63.785 D/V
# 85 Canyon Crest Dr at MLK BLvd	E	71.4	1.145	F	87.1	1.248	+15.703 D/V
#109 Iowa Ave at Everton Place	F	265.2	0.000	F	OVRFL	0.000	+ 1.8E+0308
#124 Iowa Ave at Linden St	C	26.5	0.694	C	30.6	0.806	+ 4.045 D/V
#134 Cranford Ave at MLK Blvd	A	1.0	0.678	D	39.4	1.020	+38.414 D/V
#137 Chicago Ave at MLK Blvd	F	104.0	1.244	F	122.5	1.301	+18.485 D/V
#151 Chicago Ave at University Aven	E	62.1	1.033	E	77.2	1.123	+15.117 D/V
#159 Chicago Ave at Linden Street	C	24.3	0.703	C	28.7	0.814	+ 4.442 D/V
#196 Iowa Ave at Blaine St	D	45.4	0.931	E	55.9	1.010	+10.539 D/V
#207 I-215/SR-60 NB Ramp at Blain S	B	19.9	0.652	C	21.3	0.711	+ 1.419 D/V
#209 I-215/SR-60 SB Ramp at Blain S	D	49.7	0.980	E	61.6	1.043	+11.827 D/V
#237 Chicago Ave at 3rd Street	E	66.7	1.002	F	91.1	1.086	+24.425 D/V
#291 I-215 SB Ramp/MLK Blvd	B	12.0	0.557	B	14.8	0.751	+ 2.839 D/V
#292 I-215 NB Ramps/MLK Blvd	B	11.5	0.382	C	18.2	0.653	+ 0.271 V/C

UCR West Campus Development Plan
Phase 4 Conditions
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Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 56 NW Mall at Iowa Avenue	??? / ???	No / No
# 71 SW Mall at Iowa Avenue	??? / ???	No / No
#109 Iowa Ave at Everton Place	??? / ???	Yes / Yes
#292 I-215 NB Ramps/MLK Blvd	???	No

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Peak Hour Delay Signal Warrant Report

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	11		943		11	33		1634		24	18		0		8	6		0		18
ApproachDel:	xxxxxx					xxxxxx					1200.3					282.7				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=8.7]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=26]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2706]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=1.9]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=24]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2706]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
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UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #56 NW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	11		943		11	33		1634		24	18		0		8	6		0		18

Major Street Volume: 2656
Minor Approach Volume: 26
Minor Approach Volume Threshold: -52 [less than minimum of 100]

SIGNAL WARRANT DISCLAIMER
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UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Peak Hour Delay Signal Warrant Report

Intersection #71 SW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	31		901		19	36		1582		31	24		0		24	11		0		39
ApproachDel:	xxxxxx					xxxxxx					1559.1					627.5				

Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=20.8]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=48]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2698]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

Approach[westbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=8.7]
SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=50]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=2698]
SUCCEED - Total volume greater than or equal to 800 for intersection with four or more approaches.

SIGNAL WARRANT DISCLAIMER
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UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #71 SW Mall at Iowa Avenue

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	1	0	1	1	0	1	0	1	0	0	1!	0	0	0	0	1!	0	0
Initial Vol:	31		901		19	36		1582		31	24		0		24	11		0		39

Major Street Volume: 2600
Minor Approach Volume: 50
Minor Approach Volume Threshold: -44 [less than minimum of 100]

SIGNAL WARRANT DISCLAIMER
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```
-------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                            Phase 4 Conditions
                                 PM Peak
-------------------------------------------------------------------------------
                  Peak Hour Delay Signal Warrant Report
*******************************************************************************
Intersection #109 Iowa Ave at Everton Place
*******************************************************************************
Future Volume Alternative: Peak Hour Warrant Met
-----------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
-----------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:       0  1  0  0  1    1  0  0  1  0    0  0  1! 0  0    1  0  0  0  1
Initial Vol:  26  900    91   197 1549    54    41    0    20   185    0   358
ApproachDel:    xxxxxx           xxxxxx           xxxxxx          8972.1
-----------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=OVERFLOW]
   SUCCEED - Vehicle-hours greater than or equal to 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=61]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=3421]
   SUCCEED - Total volume greater than or equal to 800 for intersection
             with four or more approaches.
-------------------------------------------------------------------------------
Approach[westbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=1352.8]
   SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=543]
   SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=3421]
   SUCCEED - Total volume greater than or equal to 800 for intersection
             with four or more approaches.
-------------------------------------------------------------------------------
```

SIGNAL WARRANT DISCLAIMER

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UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #109 Iowa Ave at Everton Place

Future Volume Alternative: Peak Hour Warrant Met

```
------------|---------------||---------------||---------------||---------------|
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:         0  1  0  0  1   1  0  0  1  0   0  0  1! 0  0   1  0  0  0  1
Initial Vol:    26  900    91   197 1549    54    41    0    20   185    0   358
------------|---------------||---------------||---------------||---------------|
Major Street Volume:              2817
Minor Approach Volume:            543
Minor Approach Volume Threshold: -71 [less than minimum of 150]
```

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #292 I-215 NB Ramps/MLK Blvd

Future Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1	1 0	0 0	0	0 0	0 0	2	0 0	0 0	0	0 0	0 0
Initial Vol:	668	1	0	0	0	0	441	0	0	0	0	0

Major Street Volume: 669
Minor Approach Volume: 441
Minor Approach Volume Threshold: 547

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

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UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Scenario Report

Scenario:	2025 Phase 4 Conditions
Command:	Phase 4 2025 with project PM Peak
Volume:	Phase 4 PM
Geometry:	Existing Conditions
Impact Fee:	Default Impact Fee
Trip Generation:	Phase 4 PM
Trip Distribution:	Default Trip Distribution
Paths:	with project
Routes:	Default Routes
Configuration:	Phase 4 with project PM Peak

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Trip Generation Report

Forecast for Phase 4 PM

Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total Trips	% Of Total
1	LOT 30 Parki	1.00	Parking Lot	71.00	162.00	71	162	233	5.8
	Zone 1 Subtotal					71	162	233	5.8
3	Parking Lot	1.00	Parking Lot	161.00	408.00	161	408	569	14.2
	Zone 3 Subtotal					161	408	569	14.2
5	Area Family	1.00	Area F housing	115.00	88.00	115	88	203	5.0
	Zone 5 Subtotal					115	88	203	5.0
9	Apartments A	1.00	Apartments	53.00	29.00	53	29	82	2.0
	Zone 9 Subtotal					53	29	82	2.0
10	F Block Fami	1.00	Family Apartme	101.00	79.00	101	79	180	4.5
	Zone 10 Subtotal					101	79	180	4.5
11	Phase 1 E Ca	1.00	Increase in St	212.00	484.00	212	484	696	17.3
	Zone 11 Subtotal					212	484	696	17.3
12	Lot for M4	1.00	Increase in St	30.00	66.00	30	66	96	2.4
	Zone 12 Subtotal					30	66	96	2.4
13	H2 Housing	1.00	Apartments	23.00	12.00	23	12	35	0.9
	Zone 13 Subtotal					23	12	35	0.9
14	Parking PM a	1.00	Parking Lot	333.00	616.00	333	616	949	23.6
	Zone 14 Subtotal					333	616	949	23.6
15	PMOB Lot	1.00	Parking Lot	187.00	451.00	187	451	638	15.9
	Zone 15 Subtotal					187	451	638	15.9
16	Parking Lot	1.00	Parking Lot	56.00	131.00	56	131	187	4.7
	Zone 16 Subtotal					56	131	187	4.7
17	Apartment A1	1.00	Apartments	52.00	28.00	52	28	80	2.0
	Zone 17 Subtotal					52	28	80	2.0
18	Apartment A3	1.00	Apartments	47.00	26.00	47	26	73	1.8
	Zone 18 Subtotal					47	26	73	1.8
TOTAL						1441	2580	4021	100.0

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

7 Intersection #20 I-215/SR-60 NB Ramps at University

Cycle (sec):	110	Critical Vol./Cap.(X):	0.764
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	27.2
Optimal Cycle:	59	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	7	7	0	7	7	7	7	0	7	7
Lanes:	0 0 0 0 1			1 0 0 0 1			1 0 1 1 0			0 1 0 1 0		
Volume Module: Phase 4 PM												
Base Vol:	0	0	1	70	0	273	159	408	0	0	582	182
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	0	1	91	0	355	207	530	0	0	757	237
Added Vol:	0	0	0	24	0	37	47	181	0	0	171	36
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	115	0	392	254	711	0	0	928	273
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	1	124	0	424	274	769	0	0	1003	295
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	1	124	0	424	274	769	0	0	1003	295
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	1	124	0	424	274	769	0	0	1003	295
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	1.00	1.00	2.00	0.00	0.00	1.55	0.45
Final Sat.:	0	0	1900	1900	0	1900	1900	3800	0	0	2937	863
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.07	0.00	0.22	0.14	0.20	0.00	0.00	0.34	0.34
Crit Moves:	****					****	****				****	
Green/Cycle:	0.00	0.00	0.00	0.29	0.00	0.29	0.19	0.64	0.00	0.00	0.45	0.45
Volume/Cap:	0.00	0.00	0.23	0.23	0.00	0.76	0.76	0.32	0.00	0.00	0.76	0.76
Delay/Veh:	0.0	0.0	72.5	30.0	0.0	41.8	51.7	9.2	0.0	0.0	27.7	27.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	72.5	30.0	0.0	41.8	51.7	9.2	0.0	0.0	27.7	27.7
LOS by Move:	A	A	E	C	A	D	D	A	A	A	C	C
DesignQueue:	0	0	0	6	0	19	14	9	0	0	24	24

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #21 I-215/SR-60 SB Ramp at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.729
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	20.7
Optimal Cycle:	52	Level Of Service:	C

Street Name:	I-215/SR-60 SB Ramp						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	0	7	0	7	7	7	7	0
Lanes:	0 0	0 0	0	0 1	0 1	0	0 0	1 1	1	1 0	2 0	0
Volume Module: Phase 4 PM												
Base Vol:	0	0	0	42	183	93	0	521	724	191	664	0
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	0	0	55	238	121	0	677	941	248	863	0
Added Vol:	0	0	0	16	0	36	0	212	94	56	153	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	71	238	157	0	889	1035	304	1016	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	0	76	257	170	0	961	1119	329	1099	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	76	257	170	0	961	1119	329	1099	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	76	257	170	0	961	1119	329	1099	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.30	1.03	0.67	0.00	1.39	1.61	1.00	2.00	0.00
Final Sat.:	0	0	0	576	1942	1281	0	2634	3066	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.13	0.13	0.13	0.00	0.37	0.37	0.17	0.29	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.18	0.18	0.18	0.00	0.50	0.50	0.24	0.74	0.00
Volume/Cap:	0.00	0.00	0.00	0.73	0.73	0.73	0.00	0.73	0.73	0.73	0.39	0.00
Delay/Veh:	0.0	0.0	0.0	42.5	42.5	42.5	0.0	20.6	20.6	41.1	4.9	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	42.5	42.5	42.5	0.0	20.6	20.6	41.1	4.9	0.0
LOS by Move:	A	A	A	D	D	D	A	C	C	D	A	A
DesignQueue:	0	0	0	12	12	12	0	21	21	15	9	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

7 Intersection #23 West Campus at University Ave

Cycle (sec):	100	Critical Vol./Cap.(X):	0.789
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	28.3
Optimal Cycle:	63	Level Of Service:	C

Street Name:	West Campus						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	0	0	0	0	7	7	7	7	0
Lanes:	1 0	0	0 1	0 0	0	0 0	0 0	1	1 0	1 0	2	0 0
Volume Module: Phase 4 PM												
Base Vol:	287	0	224	0	0	0	0	283	197	369	500	0
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	373	0	291	0	0	0	0	368	256	480	650	0
Added Vol:	0	0	20	0	0	0	0	205	0	9	208	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	373	0	311	0	0	0	0	573	256	489	858	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	403	0	336	0	0	0	0	619	277	528	928	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	403	0	336	0	0	0	0	619	277	528	928	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7 Final Vol.:	403	0	336	0	0	0	0	619	277	528	928	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	1.38	0.62	1.00	2.00	0.00
Final Sat.:	1900	0	1900	0	0	0	0	2626	1174	1900	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.21	0.00	0.18	0.00	0.00	0.00	0.00	0.24	0.24	0.28	0.24	0.00
Crit Moves:	****							****		****		
Green/Cycle:	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.30	0.30	0.35	0.65	0.00
Volume/Cap:	0.79	0.00	0.66	0.00	0.00	0.00	0.00	0.79	0.79	0.79	0.37	0.00
Delay/Veh:	42.0	0.0	35.6	0.0	0.0	0.0	0.0	36.0	36.0	35.3	8.1	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	42.0	0.0	35.6	0.0	0.0	0.0	0.0	36.0	36.0	35.3	8.1	0.0
LOS by Move:	D	A	D	A	A	A	A	D	D	D	A	A
DesignQueue:	17	0	14	0	0	0	0	19	19	21	10	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #56 NW Mall at Iowa Avenue

Average Delay (sec/veh): 14.2 Worst Case Level Of Service: F[1200.3]

Street Name:	NW Mall						Iowa Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	1 0	1 0	1	1 0	1 0	1	0 0	1! 0	0	0 0	1! 0	0
Volume Module: Phase 4 PM												
Base Vol:	0	503	0	0	1038	0	0	0	0	0	0	0
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	654	0	0	1349	0	0	0	0	0	0	0
Added Vol:	11	289	11	33	285	24	18	0	8	6	0	18
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	11	943	11	33	1634	24	18	0	8	6	0	18
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	12	1019	12	36	1767	26	19	0	9	6	0	19
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	12	1019	12	36	1767	26	19	0	9	6	0	19
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx	7.1	xxxx	6.2	7.1	xxxx	6.2
FollowUpTim:	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx	3.5	xxxx	3.3	3.5	xxxx	3.3
Capacity Module:												
Cnflict Vol:	1793	xxxx	xxxxx	1031	xxxx	xxxxx	2897	xxxx	1767	2899	xxxx	1019
Potent Cap.:	350	xxxx	xxxxx	682	xxxx	xxxxx	10	xxxx	105	10	xxxx	290
Move Cap.:	350	xxxx	xxxxx	682	xxxx	xxxxx	9	xxxx	105	9	xxxx	290
Volume/Cap:	0.03	xxxx	xxxx	0.05	xxxx	xxxx	2.19	xxxx	0.08	0.75	xxxx	0.07
Level Of Service Module:												
2Way95thQ:	0.1	xxxx	xxxxx	0.2	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	15.7	xxxx	xxxxx	10.6	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	C	*	*	B	*	*	*	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	12	xxxxx	xxxx	32	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	4.4	xxxxx	xxxxx	2.8	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	1200	xxxxx	xxxxx	283	xxxxx
Shared LOS:	*	*	*	*	*	*	*	F	*	*	F	*
ApproachDel:		xxxxxx			xxxxxx			1200.3			282.7	
ApproachLOS:		*			*			F			F	

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	1.145
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	90.4
Optimal Cycle:	120	Level Of Service:	F

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	2 0	1
Volume Module: Phase 4 PM												
Base Vol:	93	370	129	260	800	187	217	874	152	156	374	103
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	121	481	168	338	1040	243	282	1136	198	203	486	134
Added Vol:	71	233	291	0	188	13	32	15	49	166	22	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	192	714	459	338	1228	256	314	1151	247	369	508	134
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	207	772	496	365	1328	277	340	1245	267	399	549	145
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	207	772	496	365	1328	277	340	1245	267	399	549	145
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	207	772	496	365	1328	277	340	1245	267	399	549	145
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.65	0.35	1.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3144	656	1900	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.11	0.20	0.26	0.19	0.42	0.42	0.18	0.33	0.14	0.21	0.14	0.08
Crit Moves:	****				****			****		****		
Green/Cycle:	0.10	0.27	0.27	0.20	0.37	0.37	0.26	0.29	0.38	0.18	0.21	0.21
Volume/Cap:	1.15	0.76	0.98	0.98	1.15	1.15	0.69	1.15	0.37	1.15	0.69	0.36
Delay/Veh:	165.6	43.8	77.5	88.1	112	112.1	44.2	119	27.0	142.7	46.4	41.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	165.6	43.8	77.5	88.1	112	112.1	44.2	119	27.0	142.7	46.4	41.1
LOS by Move:	F	D	E	F	F	F	D	F	C	F	D	D
DesignQueue:	13	20	26	21	38	38	18	32	11	23	15	8

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                            Phase 4 Conditions
                                  PM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #71 SW Mall at Iowa Avenue
********************************************************************************
Average Delay (sec/veh):      39.7      Worst Case Level Of Service: F[1559.1]
********************************************************************************
Street Name:                 SW Mall                       Iowa Avenue
Approach:         North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:          1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 PM
Base Vol:         0  503    0      0 1038    0      0    0    0      0    0    0
Growth Adj:    1.30 1.30 1.30   1.30 1.30 1.30   1.30 1.30 1.30   1.30 1.30 1.30
Initial Bse:      0  654    0      0 1349    0      0    0    0      0    0    0
Added Vol:       31  247   19     36  233   31     24    0   24     11    0   39
PasserByVol:      0    0    0      0    0    0      0    0    0      0    0    0
Initial Fut:     31  901   19     36 1582   31     24    0   24     11    0   39
User Adj:      1.00 1.00 1.00   1.00 1.00 1.00   1.00 1.00 1.00   1.00 1.00 1.00
PHF Adj:       0.93 0.93 0.93   0.93 0.93 0.93   0.93 0.93 0.93   0.93 0.93 0.93
PHF Volume:      34  974   21     39 1711   34     26    0   26     12    0   42
Reduct Vol:       0    0    0      0    0    0      0    0    0      0    0    0
Final Vol.:      34  974   21     39 1711   34     26    0   26     12    0   42
Critical Gap Module:
Critical Gp:    4.1 xxxx xxxxx   4.1 xxxx xxxxx   7.1 xxxx  6.2   7.1 xxxx  6.2
FollowUpTim:    2.2 xxxx xxxxx   2.2 xxxx xxxxx   3.5 xxxx  3.3   3.5 xxxx  3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1744 xxxx xxxxx     994 xxxx xxxxx  2861 xxxx  1711  2859 xxxx   974
Potent Cap.:  365 xxxx xxxxx     704 xxxx xxxxx    11 xxxx   114    11 xxxx   308
Move Cap.:    365 xxxx xxxxx     704 xxxx xxxxx     8 xxxx   114     7 xxxx   308
Volume/Cap:  0.09 xxxx  xxxx    0.06 xxxx  xxxx  3.12 xxxx  0.23  1.60 xxxx  0.14
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:     0.3 xxxx xxxxx    0.2 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:  15.9 xxxx xxxxx   10.4 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     C    *     *      B    *     *     *    *     *     *    *     *
Movement:       LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx   xxxx xxxx xxxxx  xxxx    15 xxxxx  xxxx   31 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  7.2 xxxxx xxxxx  6.2 xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 1559 xxxxx xxxxx  627 xxxxx
Shared LOS:      *    *     *      *    *     *     *    F     *     *    F     *
ApproachDel:       xxxxxx           xxxxxx           1559.1            627.5
ApproachLOS:         *                *                F                 F
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #78 Iowa Ave at MLK Blvd

Cycle (sec):	110	Critical Vol./Cap.(X):	1.172
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	77.3
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Iowa Avenue						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Include			Ovl		
Min. Green:	0	0	0	7	7	7	7	7	0	0	7	7
Lanes:	0 0	0 0	0	1 0	1! 0	1	1 0	2 0	0	0 0	2 0	1
Volume Module: Phase 4 PM												
Base Vol:	0	0	0	727	0	273	170	1564	0	0	667	353
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	0	0	945	0	355	221	2033	0	0	867	459
Added Vol:	0	0	0	122	0	145	180	518	0	0	366	118
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	1067	0	500	401	2551	0	0	1233	577
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	0	1154	0	540	434	2758	0	0	1333	624
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	1154	0	540	434	2758	0	0	1333	624
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	1154	0	540	434	2758	0	0	1333	624
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.68	0.00	1.32	1.00	2.00	0.00	0.00	2.00	1.00
Final Sat.:	0	0	0	3194	0	2506	1900	3800	0	0	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.36	0.00	0.22	0.23	0.73	0.00	0.00	0.35	0.33
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.31	0.00	0.55	0.24	0.62	0.00	0.00	0.38	0.68
Volume/Cap:	0.00	0.00	0.00	1.17	0.00	0.39	0.94	1.17	0.00	0.00	0.94	0.48
Delay/Veh:	0.0	0.0	0.0	123.3	0.0	14.1	67.1	103	0.0	0.0	44.7	8.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	123.3	0.0	14.1	67.1	103	0.0	0.0	44.7	8.5
LOS by Move:	A	A	A	F	A	B	E	F	A	A	D	A
DesignQueue:	0	0	0	32	0	12	21	40	0	0	28	13

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	1.244
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	119.5
Optimal Cycle:	120	Level Of Service:	F

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	0 0 0 0 1			0 1 0 0 1			1 0 1 1 0			1 0 2 0 1		
Volume Module: Phase 4 PM												
Base Vol:	0	0	1	162	0	271	31	1989	0	10	926	1
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	0	1	211	0	352	40	2586	0	13	1204	1
Added Vol:	0	0	0	5	0	11	5	685	0	0	475	1
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	216	0	363	45	3271	0	13	1679	2
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	1	233	0	393	49	3536	0	14	1815	2
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	1	233	0	393	49	3536	0	14	1815	2
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	1	233	0	393	49	3536	0	14	1815	2
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	1.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	0	0	1900	1900	0	1900	1900	3800	0	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.12	0.00	0.21	0.03	0.93	0.00	0.01	0.48	0.00
Crit Moves:						****		****		****		
Green/Cycle:	0.00	0.00	0.15	0.15	0.00	0.15	0.10	0.70	0.00	0.07	0.67	0.67
Volume/Cap:	0.00	0.00	0.00	0.79	0.00	1.34	0.26	1.34	0.00	0.11	0.72	0.00
Delay/Veh:	0.0	0.0	35.8	54.6	0.0	215.6	42.5	170	0.0	43.9	11.6	5.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	35.8	54.6	0.0	215.6	42.5	170	0.0	43.9	11.6	5.5
LOS by Move:	A	A	D	D	A	F	D	F	A	D	B	A
DesignQueue:	0	0	0	11	0	20	2	40	0	1	19	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	1.248
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	87.1
Optimal Cycle:	120	Level Of Service:	F

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Phase 4 PM												
Base Vol:	295	186	129	125	552	189	163	1043	1058	162	254	25
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	384	242	168	163	718	246	212	1356	1375	211	330	33
Added Vol:	69	23	0	122	52	122	56	496	139	0	285	53
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	453	265	168	285	770	368	268	1852	1514	211	615	86
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	489	286	181	308	832	398	290	2002	1637	228	665	92
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	489	286	181	308	832	398	290	2002	1637	228	665	92
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	489	286	181	308	832	398	290	2002	1637	228	665	92
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3600	3800	1900	3600	3800	1900	3600	3800	1900	3600	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.14	0.08	0.10	0.09	0.22	0.21	0.08	0.53	0.86	0.06	0.18	0.05
Crit Moves:	****				****				****	****		
Green/Cycle:	0.11	0.15	0.15	0.13	0.17	0.37	0.20	0.58	0.68	0.06	0.43	0.43
Volume/Cap:	1.26	0.51	0.64	0.64	1.26	0.56	0.40	0.91	1.26	1.08	0.40	0.11
Delay/Veh:	189.4	47.8	53.0	52.2	178	30.8	42.1	29.2	141.9	142.8	23.4	20.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	189.4	47.8	53.0	52.2	178	30.8	42.1	29.2	141.9	142.8	23.4	20.2
LOS by Move:	F	D	D	D	F	C	D	C	F	F	C	C
DesignQueue:	16	8	11	10	24	18	8	33	45	8	13	4

Note: Queue reported is the number of cars per lane.

```
---------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                               Phase 4 Conditions
                                    PM Peak
---------------------------------------------------------------------------------
                       Level Of Service Computation Report
             2000 HCM Unsignalized Method (Future Volume Alternative)
*********************************************************************************
Intersection #109 Iowa Ave at Everton Place
*********************************************************************************
Average Delay (sec/veh): OVERFLOW      Worst Case Level Of Service: F[xxxxx]
*********************************************************************************
Street Name:               Iowa Avenue                       Everton Place
Approach:         North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:          0  1  0  0  1    1  0  0  1  0    0  0  1! 0  0    1  0  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 PM
Base Vol:          0  503   29    36 1038    0     0    0    0    47    0   39
Growth Adj:     1.30 1.30 1.30  1.30 1.30 1.30  1.30 1.30 1.30  1.30 1.30 1.30
Initial Bse:       0  654   38    47 1349    0     0    0    0    61    0   51
Added Vol:        26  246   53   150  200   54    41    0   20   124    0  307
PasserByVol:       0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:      26  900   91   197 1549   54    41    0   20   185    0  358
User Adj:       1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:        0.93 0.93 0.93  0.93 0.93 0.93  0.93 0.93 0.93  0.93 0.93 0.93
PHF Volume:       28  973   98   213 1675   58    44    0   22   200    0  387
Reduct Vol:        0    0    0     0    0    0     0    0    0     0    0    0
Final Vol.:       28  973   98   213 1675   58    44    0   22   200    0  387
Critical Gap Module:
Critical Gp:     4.1 xxxx xxxxx  4.1 xxxx xxxxx  7.1 xxxx  6.2   7.1 xxxx  6.2
FollowUpTim:     2.2 xxxx xxxxx  2.2 xxxx xxxxx  3.5 xxxx  3.3   3.5 xxxx  3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:    1733 xxxx xxxxx 1071 xxxx xxxxx 3401 xxxx  1704  3170 xxxx  973
Potent Cap.:     368 xxxx xxxxx  659 xxxx xxxxx    4 xxxx   115     6 xxxx  309
Move Cap.:       368 xxxx xxxxx  659 xxxx xxxxx    0 xxxx   115     4 xxxx  309
Volume/Cap:     0.08 xxxx  xxxx 0.32 xxxx  xxxx xxxx xxxx  0.19 54.41 xxxx 1.25
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:       0.2 xxxx xxxxx  1.4 xxxx xxxxx  xxxx xxxx xxxxx  27.3 xxxx 17.9
Control Del:    15.6 xxxx xxxxx 13.1 xxxx xxxxx xxxxx xxxx xxxxx 25977 xxxx 172.6
LOS by Move:       C    *     *    B    *     *     *    *     *     F    *    F
Movement:         LT - LTR - RT   LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:    xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx     0 xxxxx  xxxx xxxx xxxxx
SharedQueue:     0.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:    15.6 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:        C    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:         xxxxxx           xxxxxx           xxxxxx           8972.1
ApproachLOS:            *                *                F                F
*********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #124 Iowa Ave at Linden St

Cycle (sec):	110	Critical Vol./Cap.(X):	0.806
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	30.6
Optimal Cycle:	68	Level Of Service:	C

Street Name:	Iowa Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	1 0	1	1 0	1 0	1
Volume Module: Phase 4 PM												
Base Vol:	46	571	140	58	1023	98	126	155	123	109	110	17
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	60	742	182	75	1330	127	164	202	160	142	143	22
Added Vol:	43	195	27	0	131	0	0	31	27	42	39	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	103	937	209	75	1461	127	164	233	187	184	182	22
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	111	1013	226	82	1579	138	177	251	202	199	197	24
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	111	1013	226	82	1579	138	177	251	202	199	197	24
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	111	1013	226	82	1579	138	177	251	202	199	197	24
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.84	0.16	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1900	3800	1900	1900	3495	305	1900	1900	1900	1900	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.06	0.27	0.12	0.04	0.45	0.45	0.09	0.13	0.11	0.10	0.10	0.01
Crit Moves:	****				****			****		****		
Green/Cycle:	0.07	0.51	0.51	0.12	0.56	0.56	0.14	0.16	0.16	0.13	0.15	0.15
Volume/Cap:	0.81	0.52	0.23	0.35	0.81	0.81	0.67	0.81	0.65	0.81	0.67	0.08
Delay/Veh:	78.5	18.2	15.0	45.2	21.7	21.7	51.4	58.5	47.7	63.9	49.7	39.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	78.5	18.2	15.0	45.2	21.7	21.7	51.4	58.5	47.7	63.9	49.7	39.9
LOS by Move:	E	B	B	D	C	C	D	E	D	E	D	D
DesignQueue:	6	16	7	4	26	26	10	13	11	11	10	1

Note: Queue reported is the number of cars per lane.

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                    UCR West Campus Development Plan
                          Phase 4 Conditions
                               PM Peak
----------------------------------------------------------------------------------
                   Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
**********************************************************************************
Intersection #134 Cranford Ave at MLK Blvd
**********************************************************************************
Cycle (sec):          120              Critical Vol./Cap.(X):          1.020
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        39.4
Optimal Cycle:        120              Level Of Service:                  D
**********************************************************************************
Street Name:              Cranford Ave                      MLK Blvd
Approach:      North Bound      South Bound      East Bound      West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0     0     0    7     0     7    7     7     0    0     7     7
Lanes:        0  0  0  0  0   1  0  0  0  1   1  0  2  0  0   0  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 PM
Base Vol:      0     0     0    0     0     0    0  1710     0    0   868     0
Growth Adj: 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30
Initial Bse:   0     0     0    0     0     0    0  2223     0    0  1128     0
Added Vol:     0     0     0  426     0   286  174   271     0    0   284   227
PasserByVol:   0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:   0     0     0  426     0   286  174  2494     0    0  1412   227
User Adj:   1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:    0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93
PHF Volume:    0     0     0  461     0   309  188  2696     0    0  1527   245
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:   0     0     0  461     0   309  188  2696     0    0  1527   245
PCE Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:    0     0     0  461     0   309  188  2696     0    0  1527   245
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:      0.00  0.00  0.00 1.00  0.00  1.00 1.00  2.00  0.00 0.00  2.00  1.00
Final Sat.:    0     0     0 1900     0  1900 1900  3800     0    0  3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.00  0.00  0.00 0.24  0.00  0.16 0.10  0.71  0.00 0.00  0.40  0.13
Crit Moves:                  ****                   ****       ****
Green/Cycle: 0.00 0.00  0.00 0.24  0.00  0.24 0.14  0.70  0.00 0.00  0.56  0.56
Volume/Cap: 0.00  0.00  0.00 1.02  0.00  0.68 0.72  1.02  0.00 0.00  0.72  0.23
Delay/Veh:   0.0   0.0   0.0 93.2   0.0  46.0 58.9  41.0   0.0  0.0  20.8  13.6
User DelAdj: 1.00 1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:  0.0   0.0   0.0 93.2   0.0  46.0 58.9  41.0   0.0  0.0  20.8  13.6
LOS by Move:   A     A     A    F     A     D    E     D     A    A     C     B
DesignQueue:   0     0     0   25     0    16   11    34     0    0    25     7
**********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                   UCR West Campus Development Plan
                         Phase 4 Conditions
                              PM Peak
--------------------------------------------------------------------------------

                  Level Of Service Computation Report
         2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #137 Chicago Ave at MLK Blvd
********************************************************************************
Cycle (sec):          130              Critical Vol./Cap.(X):         1.301
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):      122.5
Optimal Cycle:        120              Level Of Service:                  F
********************************************************************************
Street Name:             Chicago Avenue             Martin Luther King Blvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:            Ovl              Ovl              Ovl              Ovl
Min. Green:    7     7     7    7     7     7    7     7     7    7     7     7
Lanes:        2  0  2  0  1   2  0  2  0  1   1  0  2  0  1   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 PM
Base Vol:     140  287    61   366 1057   201   170 1283   792   249  514   105
Growth Adj:  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30
Initial Bse:  182  373    79   476 1374   261   221 1668  1030   324  668   137
Added Vol:      0    7    49   270   18    45    19  127     0    85  214   271
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  182  380   128   746 1392   306   240 1795  1030   409  882   408
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:   197  411   139   806 1505   331   259 1940  1113   442  954   441
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  197  411   139   806 1505   331   259 1940  1113   442  954   441
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   197  411   139   806 1505   331   259 1940  1113   442  954   441
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       2.00 2.00  1.00  2.00 2.00  1.00  1.00 2.00  1.00  1.00 2.00  1.00
Final Sat.:  3800 3800  1900  3800 3800  1900  1900 3800  1900  1900 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.05 0.11  0.07  0.21 0.40  0.17  0.14 0.51  0.59  0.23 0.25  0.23
Crit Moves:  ****                   ****                    ****  ****
Green/Cycle: 0.06 0.12  0.30  0.24 0.30  0.50  0.20 0.40  0.46  0.18 0.37  0.61
Volume/Cap:  0.89 0.89  0.25  0.89 1.32  0.35  0.67 1.28  1.28  1.32 0.67  0.38
Delay/Veh:   88.3 71.6  32.2  55.7  193  18.2  48.8  167 167.5 213.5 32.8  12.1
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  88.3 71.6  32.2  55.7  193  18.2  48.8  167 167.5 213.5 32.8  12.1
LOS by Move:    F    E     C     E    F     B     D    F     F     F    C     B
DesignQueue:    6   12     7    22   39    12    14   45    48    26   21    12
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	1.123
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	77.2
Optimal Cycle:	120	Level Of Service:	E

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 1 1 0			2 0 2 0 1			2 0 2 0 1		
Volume Module: Phase 4 PM												
Base Vol:	237	363	126	155	956	86	182	796	463	309	385	72
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	308	472	164	202	1243	112	237	1035	602	402	501	94
Added Vol:	48	324	45	20	164	0	0	31	26	21	54	31
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	356	796	209	222	1407	112	237	1066	628	423	555	125
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	385	860	226	239	1521	121	256	1152	679	457	599	135
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	385	860	226	239	1521	121	256	1152	679	457	599	135
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	385	860	226	239	1521	121	256	1152	679	457	599	135
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.85	0.15	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3520	280	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.10	0.23	0.12	0.06	0.43	0.43	0.07	0.30	0.36	0.12	0.16	0.07
Crit Moves:	****				****				****	****		
Green/Cycle:	0.09	0.37	0.37	0.10	0.38	0.38	0.13	0.32	0.32	0.11	0.30	0.30
Volume/Cap:	1.12	0.61	0.32	0.61	1.12	1.12	0.53	0.95	1.12	1.12	0.53	0.24
Delay/Veh:	140.8	31.4	27.2	54.3	102	101.9	50.1	56.0	116.3	136.1	35.6	32.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	140.8	31.4	27.2	54.3	102	101.9	50.1	56.0	116.3	136.1	35.6	32.0
LOS by Move:	F	C	C	D	F	F	D	E	F	F	D	C
DesignQueue:	12	19	10	7	38	38	8	28	34	14	15	6

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	0.814
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	28.7
Optimal Cycle:	69	Level Of Service:	C

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 1 1 0			1 0 2 0 1			1 0 0 1 0			1 0 1 1 0		
Volume Module: Phase 4 PM												
Base Vol:	61	432	161	172	1149	145	29	83	46	110	124	94
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	79	562	209	224	1494	189	38	108	60	143	161	122
Added Vol:	40	251	63	0	125	0	0	18	21	38	34	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	119	813	272	224	1619	189	38	126	81	181	195	122
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	129	878	294	242	1750	204	41	136	87	196	211	132
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	129	878	294	242	1750	204	41	136	87	196	211	132
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	129	878	294	242	1750	204	41	136	87	196	211	132
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.50	0.50	1.00	2.00	1.00	1.00	0.61	0.39	1.00	1.23	0.77
Final Sat.:	1900	2846	954	1900	3800	1900	1900	1157	743	1900	2337	1463
Capacity Analysis Module:												
Vol/Sat:	0.07	0.31	0.31	0.13	0.46	0.11	0.02	0.12	0.12	0.10	0.09	0.09
Crit Moves:	****				****			****		****		
Green/Cycle:	0.08	0.46	0.46	0.19	0.57	0.57	0.12	0.14	0.14	0.13	0.15	0.15
Volume/Cap:	0.81	0.67	0.67	0.67	0.81	0.19	0.18	0.81	0.81	0.81	0.59	0.59
Delay/Veh:	71.6	22.2	22.2	42.5	20.0	10.7	40.1	58.3	58.3	61.3	41.1	41.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	71.6	22.2	22.2	42.5	20.0	10.7	40.1	58.3	58.3	61.3	41.1	41.1
LOS by Move:	E	C	C	D	B	B	D	E	E	E	D	D
DesignQueue:	7	19	19	11	24	5	2	11	11	10	8	8

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions
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Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec): 100 Critical Vol./Cap.(X): 1.010
Loss Time (sec): 8 (Y+R=4.0 sec) Average Delay (sec/veh): 55.9
Optimal Cycle: 120 Level Of Service: E

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	1 0	1 1	0
Volume Module: Phase 4 PM												
Base Vol:	198	510	145	193	768	167	302	438	268	149	271	109
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	257	663	189	251	998	217	393	569	348	194	352	142
Added Vol:	26	141	29	15	77	0	0	77	29	25	95	34
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	283	804	217	266	1075	217	393	646	377	219	447	176
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	306	869	235	287	1163	235	424	699	408	236	484	190
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	306	869	235	287	1163	235	424	699	408	236	484	190
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	306	869	235	287	1163	235	424	699	408	236	484	190
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.66	0.34	1.00	2.00	1.00	1.00	1.44	0.56
Final Sat.:	1900	3800	1900	1900	3162	638	1900	3800	1900	1900	2728	1072
Capacity Analysis Module:												
Vol/Sat:	0.16	0.23	0.12	0.15	0.37	0.37	0.22	0.18	0.21	0.12	0.18	0.18
Crit Moves:	****				****		****				****	
Green/Cycle:	0.16	0.32	0.32	0.21	0.36	0.36	0.22	0.25	0.25	0.15	0.18	0.18
Volume/Cap:	1.01	0.73	0.39	0.73	1.01	1.01	1.01	0.73	0.86	0.86	1.01	1.01
Delay/Veh:	96.4	32.7	27.2	43.5	58.6	58.6	85.5	37.3	49.8	63.8	78.7	78.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	96.4	32.7	27.2	43.5	58.6	58.6	85.5	37.3	49.8	63.8	78.7	78.7
LOS by Move:	F	C	C	D	E	E	F	D	D	E	E	E
DesignQueue:	15	18	9	13	27	27	20	15	18	12	16	16

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions
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Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #207 I-215/SR-60 NB Ramp at Blain Street

Cycle (sec):	110	Critical Vol./Cap.(X):	0.711
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	21.3
Optimal Cycle:	50	Level Of Service:	C

Street Name:	I-215/SR-60 NB Ramps						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Include			Include			Include	
Min. Green:	7	7	7	0	0	0	7	7	0	0	7	7
Lanes:	0 1	0	0 1	0 0	0	0 0	2 0	2	0 0	0 0	1	1 0
Volume Module: Phase 4 PM												
Base Vol:	97	1	261	0	0	0	124	779	0	0	483	494
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	126	1	339	0	0	0	161	1013	0	0	628	642
Added Vol:	0	0	9	0	0	0	68	97	0	0	77	44
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	126	1	348	0	0	0	229	1110	0	0	705	686
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	136	1	377	0	0	0	248	1200	0	0	762	742
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	136	1	377	0	0	0	248	1200	0	0	762	742
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	136	1	377	0	0	0	248	1200	0	0	762	742
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.99	0.01	1.00	0.00	0.00	0.00	2.00	2.00	0.00	0.00	1.01	0.99
Final Sat.:	1881	19	1900	0	0	0	3800	3800	0	0	1926	1874
Capacity Analysis Module:												
Vol/Sat:	0.07	0.07	0.20	0.00	0.00	0.00	0.07	0.32	0.00	0.00	0.40	0.40
Crit Moves:			****				****				****	
Green/Cycle:	0.28	0.28	0.28	0.00	0.00	0.00	0.09	0.65	0.00	0.00	0.56	0.56
Volume/Cap:	0.26	0.26	0.71	0.00	0.00	0.00	0.71	0.49	0.00	0.00	0.71	0.71
Delay/Veh:	31.1	31.1	40.2	0.0	0.0	0.0	55.2	10.1	0.0	0.0	19.0	19.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	31.1	31.1	40.2	0.0	0.0	0.0	55.2	10.1	0.0	0.0	19.0	19.0
LOS by Move:	C	C	D	A	A	A	E	B	A	A	B	B
DesignQueue:	6	6	18	0	0	0	7	14	0	0	23	23

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions
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Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #209 I-215/SR-60 SB Ramp at Blain St

Cycle (sec):	120	Critical Vol./Cap.(X):	1.043
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	61.6
Optimal Cycle:	120	Level Of Service:	E

Street Name:	I-215/SR-60 SB Ramp						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	7	7	7	0	7	7	7	7	0
Lanes:	0 0	0	0 0	0 1	0	0 1	0 0	1	1 0	2 0	2	0 0
Volume Module: Phase 4 PM												
Base Vol:	0	0	0	276	219	192	0	631	639	220	377	0
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	0	0	359	285	250	0	820	831	286	490	0
Added Vol:	0	0	0	30	0	28	0	135	0	4	73	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	389	285	278	0	955	831	290	563	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	0	420	308	300	0	1033	898	314	609	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	420	308	300	0	1033	898	314	609	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	420	308	300	0	1033	898	314	609	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	0.58	0.42	1.00	0.00	1.07	0.93	2.00	2.00	0.00
Final Sat.:	0	0	0	1097	803	1900	0	2033	1767	3800	3800	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.38	0.38	0.16	0.00	0.51	0.51	0.08	0.16	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.37	0.37	0.37	0.00	0.49	0.49	0.08	0.57	0.00
Volume/Cap:	0.00	0.00	0.00	1.04	1.04	0.43	0.00	1.04	1.04	1.04	0.28	0.00
Delay/Veh:	0.0	0.0	0.0	83.9	83.9	29.0	0.0	64.0	64.0	118.9	13.5	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	83.9	83.9	29.0	0.0	64.0	64.0	118.9	13.5	0.0
LOS by Move:	A	A	A	F	F	C	A	E	E	F	B	A
DesignQueue:	0	0	0	34	34	13	0	38	38	10	9	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions
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Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	1.086
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	91.1
Optimal Cycle:	120	Level Of Service:	F

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module: Phase 4 PM												
Base Vol:	88	415	136	260	865	107	137	636	264	240	294	81
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	114	539	177	338	1125	139	178	827	343	312	382	105
Added Vol:	31	118	103	13	61	0	0	20	20	44	28	29
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	145	658	280	351	1186	139	178	847	363	356	410	134
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	157	711	302	379	1282	150	193	915	393	385	443	145
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	157	711	302	379	1282	150	193	915	393	385	443	145
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	157	711	302	379	1282	150	193	915	393	385	443	145
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.40	0.60	1.00	1.79	0.21	1.00	1.40	0.60	1.00	1.51	0.49
Final Sat.:	1900	2666	1134	1900	3401	399	1900	2659	1141	1900	2863	937
Capacity Analysis Module:												
Vol/Sat:	0.08	0.27	0.27	0.20	0.38	0.38	0.10	0.34	0.34	0.20	0.15	0.15
Crit Moves:		****		****				****		****		
Green/Cycle:	0.08	0.25	0.25	0.18	0.35	0.35	0.20	0.32	0.32	0.19	0.30	0.30
Volume/Cap:	0.99	1.09	1.09	1.09	1.09	1.09	0.51	1.09	1.09	1.09	0.51	0.51
Delay/Veh:	124.2	101	100.7	121.9	91.7	91.7	44.0	93.4	93.4	121.4	34.7	34.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	124.2	101	100.7	121.9	91.7	91.7	44.0	93.4	93.4	121.4	34.7	34.7
LOS by Move:	F	F	F	F	F	F	D	F	F	F	C	C
DesignQueue:	10	27	27	22	35	35	11	33	33	22	14	14

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                           Phase 4 Conditions
                                PM Peak
--------------------------------------------------------------------------------

                     Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #291 I-215 SB Ramp/MLK Blvd
********************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):          0.751
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):         14.8
Optimal Cycle:         56               Level Of Service:                   B
********************************************************************************
Street Name:             I-215 SB Ramps                   MLK Blvd
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|----------------||----------------||----------------||----------------|
Control:         Permitted        Permitted        Permitted        Permitted
Rights:           Include          Include          Include          Include
Min. Green:     0     0     0    7     7     7    0     7     7    7     7     0
Lanes:         0  0  0  0  0    1  0  0  1  0    0  0  1  1  1    1  0  2  0  0
------------|----------------||----------------||----------------||----------------|
Volume Module: Phase 4 PM
Base Vol:       0     0     0    3   101   106    0   186   971    5   328     0
Growth Adj:  1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30
Initial Bse:    0     0     0    4   131   138    0   242  1262    7   426     0
Added Vol:      0     0     0    0     0   104    0   197   421    0   235     0
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:    0     0     0    4   131   242    0   439  1683    7   661     0
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93
PHF Volume:     0     0     0    4   142   261    0   474  1820    7   715     0
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:    0     0     0    4   142   261    0   474  1820    7   715     0
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:     0     0     0    4   142   261    0   474  1820    7   715     0
------------|----------------||----------------||----------------||----------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       0.00  0.00  0.00 1.00  0.35  0.65 0.00  1.00  2.00 1.00  2.00  0.00
Final Sat.:     0     0     0 1900   669  1231    0  1900  3800 1900  3800     0
------------|----------------||----------------||----------------||----------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.00  0.21  0.21 0.00  0.25  0.48 0.00  0.19  0.00
Crit Moves:                         ****                    ****
Green/Cycle: 0.00  0.00  0.00 0.28  0.28  0.28 0.00  0.64  0.64 0.64  0.64  0.00
Volume/Cap:  0.00  0.00  0.00 0.01  0.75  0.75 0.00  0.39  0.75 0.01  0.30  0.00
Delay/Veh:    0.0   0.0   0.0 25.8  38.6  38.6  0.0   8.8  13.7  6.6   8.2   0.0
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0 25.8  38.6  38.6  0.0   8.8  13.7  6.6   8.2   0.0
LOS by Move:    A     A     A    C     D     D    A     A     B    A     A     A
DesignQueue:    0     0     0    0    17    17    0    10    21    0     8     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

```
------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                            Phase 4 Conditions
                                 PM Peak
------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM 4-Way Stop Method (Future Volume Alternative)
******************************************************************************
Intersection #292 I-215 NB Ramps/MLK Blvd
******************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         0.653
Loss Time (sec):        0 (Y+R=4.0 sec) Average Delay (sec/veh):       18.2
Optimal Cycle:          0              Level Of Service:                 C
******************************************************************************
Street Name:           I-215 NB Ramp                     MLK BLvd
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Lanes:        1  1  0  0  0   0  0  0  0  0   2  0  0  0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 PM
Base Vol:     333     1     0     0     0     0   188     0     0     0     0     0
Growth Adj:  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30
Initial Bse:  433     1     0     0     0     0   244     0     0     0     0     0
Added Vol:    235     0     0     0     0     0   197     0     0     0     0     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:  668     1     0     0     0     0   441     0     0     0     0     0
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93
PHF Volume:   722     1     0     0     0     0   477     0     0     0     0     0
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  722     1     0     0     0     0   477     0     0     0     0     0
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   722     1     0     0     0     0   477     0     0     0     0     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.99  0.01  0.00  0.00  0.00  0.00  2.00  0.00  0.00  0.00  0.00  0.00
Final Sat.:  1106     2     0     0     0     0  1020     0     0     0     0     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.65  0.65  xxxx  xxxx  xxxx  xxxx  0.47  xxxx  xxxx  xxxx  xxxx  xxxx
Crit Moves:  ****                                ****
Delay/Veh:   20.1  20.1   0.0   0.0   0.0   0.0  15.3   0.0   0.0   0.0   0.0   0.0
Delay Adj:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  20.1  20.1   0.0   0.0   0.0   0.0  15.3   0.0   0.0   0.0   0.0   0.0
LOS by Move:    C     C     *     *     *     *     C     *     *     *     *     *
ApproachDel:       20.1            xxxxxx             15.3            xxxxxx
Delay Adj:         1.00             xxxxx             1.00             xxxxx
ApprAdjDel:        20.1            xxxxxx             15.3            xxxxxx
LOS by Appr:          C                 *                C                 *
AllWayAvgQ:   1.7   1.7   0.0   0.0   0.0   0.0   0.8   0.0   0.0   0.0   0.0   0.0
******************************************************************************
```

LEVEL OF SERVICE WITH MITIGATION

- **PHASE 1 WITH MITIGATION (AM and PM Peak)**
- **PHASE 2 WITH MITIGATION (AM and PM Peak)**
- **PHASE 3 WITH MITIGATION (AM and PM Peak)**
- **PHASE 4 WITH MITIGATION (AM and PM Peak)**

UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
AM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 56 NW Mall at Iowa Avenue	A	0.6	0.440	A	3.3	0.494	+ 2.636 D/V
# 58 Iowa Ave at University Ave	D	35.5	0.514	D	35.4	0.529	-0.069 D/V
# 71 SW Mall at Iowa Avenue		0.0	0.000	A	0.3	0.034	+ 0.338 D/V
# 83 Lot 30/MLK BLvd	C	22.9	0.774	C	23.3	0.797	+ 0.393 D/V
# 85 Canyon Crest Dr at MLK BLvd	C	25.0	0.614	C	27.6	0.650	+ 2.542 D/V
#109 Iowa Ave at Everton Place	A	3.1	0.457	A	5.8	0.490	+ 2.701 D/V
#137 Chicago Ave at MLK Blvd	C	31.2	0.538	C	31.5	0.549	+ 0.291 D/V
#151 Chicago Ave at University Aven	C	32.8	0.520	C	33.0	0.527	+ 0.208 D/V
#237 Chicago Ave at 3rd Street	D	41.8	0.744	D	42.4	0.760	+ 0.600 D/V

```
--------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                  2010 Phase 1 Conditions with Mitigation
                                  AM Peak
--------------------------------------------------------------------------------

                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         0.494
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        3.3
Optimal Cycle:         32              Level Of Service:                 A
********************************************************************************
Street Name:                 NW Mall                          Iowa Avenue
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:          Permitted        Permitted        Permitted        Permitted
Rights:            Include          Include          Include          Include
Min. Green:     7     7     0     0     7     7     7     0     7     0     0     0
Lanes:         1  0  1  0  0    0  0  1  0  1    0  0  1! 0  0    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0   659     0     0   337     0     0     0     0     0     0     0
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:    0   692     0     0   354     0     0     0     0     0     0     0
Added Vol:      6    50     0     0    48    14    24     0    11     0     0     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:    6   742     0     0   402    14    24     0    11     0     0     0
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.90  0.90  0.90  0.90  0.90  0.90  0.90  0.90  0.90  0.90  0.90  0.90
PHF Volume:     7   824     0     0   447    16    27     0    12     0     0     0
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:    7   824     0     0   447    16    27     0    12     0     0     0
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:     7   824     0     0   447    16    27     0    12     0     0     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  1.00  0.00  0.00  1.00  1.00  0.69  0.00  0.31  0.00  0.00  0.00
Final Sat.:  1900  1900     0     0  1900  1900  1303     0   597     0     0     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.43  0.00  0.00  0.24  0.01  0.02  0.00  0.02  0.00  0.00  0.00
Crit Moves:        ****                          ****
Green/Cycle: 0.85  0.85  0.00  0.00  0.85  0.85  0.07  0.00  0.07  0.00  0.00  0.00
Volume/Cap:  0.00  0.51  0.00  0.00  0.28  0.01  0.29  0.00  0.29  0.00  0.00  0.00
Delay/Veh:    1.1   2.3   0.0   0.0   1.6   1.1  45.4   0.0  45.4   0.0   0.0   0.0
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   1.1   2.3   0.0   0.0   1.6   1.1  45.4   0.0  45.4   0.0   0.0   0.0
LOS by Move:    A     A     A     A     A     A     D     A     D     A     A     A
HCM2kAvgQ:      0     7     0     0     3     0     1     0     1     0     0     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.529
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	35.4
Optimal Cycle:	36	Level Of Service:	D

Street Name:		Iowa Avenue						University Avenue				
Approach:		North Bound			South Bound			East Bound			West Bound	
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Include			Ovl			Include	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	2 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	63	544	92	136	245	99	139	345	56	80	342	167
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	66	571	97	143	257	104	146	362	59	84	359	175
Added Vol:	16	44	42	0	50	0	0	9	20	62	7	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	82	615	139	143	307	104	146	371	79	146	366	175
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.75	0.83	0.72	0.87	0.84	0.88	0.91	0.92	0.91	0.74	0.96	0.72
PHF Volume:	110	741	193	164	366	118	160	404	87	197	381	244
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	110	741	193	164	366	118	160	404	87	197	381	244
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	110	741	193	164	366	118	160	404	87	197	381	244
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.51	0.49	1.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	2872	928	1900	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.06	0.20	0.10	0.09	0.13	0.13	0.08	0.11	0.05	0.05	0.10	0.13
Crit Moves:		****		****			****					****
Green/Cycle:	0.17	0.37	0.37	0.16	0.36	0.36	0.16	0.26	0.43	0.14	0.24	0.24
Volume/Cap:	0.35	0.53	0.27	0.53	0.35	0.35	0.53	0.41	0.11	0.36	0.41	0.53
Delay/Veh:	44.8	30.1	26.8	47.7	27.9	27.9	48.1	37.1	20.8	47.0	38.6	40.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	44.8	30.1	26.8	47.7	27.9	27.9	48.1	37.1	20.8	47.0	38.6	40.7
LOS by Move:	D	C	C	D	C	C	D	D	C	D	D	D
HCM2kAvgQ:	4	11	5	6	6	6	6	6	2	4	6	8

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                   2010 Phase 1 Conditions with Mitigation
                                  AM Peak
--------------------------------------------------------------------------------

                     Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #71 SW Mall at Iowa Avenue
********************************************************************************
Cycle (sec):         100                Critical Vol./Cap.(X):          0.034
Loss Time (sec):       8 (Y+R=4.0 sec)  Average Delay (sec/veh):          0.3
Optimal Cycle:        18                Level Of Service:                   A
********************************************************************************
Street Name:                 SW Mall                        Iowa Avenue
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Permitted        Permitted        Permitted        Permitted
Rights:           Include          Include          Include          Include
Min. Green:     7     7     0   0     7     7   7     0     7   0     0     0
Lanes:          1  0  1  0  1   1  0  1  0  1   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0     0     0     0     0     0     0     0     0     0     0     0
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:    0     0     0     0     0     0     0     0     0     0     0     0
Added Vol:      0    56     0     0    59     0     0     0     0     0     0     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:    0    56     0     0    59     0     0     0     0     0     0     0
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Volume:     0    56     0     0    59     0     0     0     0     0     0     0
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:    0    56     0     0    59     0     0     0     0     0     0     0
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:     0    56     0     0    59     0     0     0     0     0     0     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  1.00  1.00  1.00  1.00  1.00  0.00  1.00  0.00  0.00  1.00  0.00
Final Sat.:  1900  1900  1900  1900  1900  1900     0  1900     0     0  1900     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.03  0.00  0.00  0.03  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Crit Moves:                        ****
Green/Cycle: 0.00  0.92  0.00  0.00  0.92  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Volume/Cap:  0.00  0.03  0.00  0.00  0.03  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Delay/Veh:    0.0   0.3   0.0   0.0   0.3   0.0   0.0   0.0   0.0   0.0   0.0   0.0
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   0.0   0.3   0.0   0.0   0.3   0.0   0.0   0.0   0.0   0.0   0.0   0.0
LOS by Move:    A     A     A     A     A     A     A     A     A     A     A     A
HCM2kAvgQ:      0     0     0     0     0     0     0     0     0     0     0     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.797
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	23.3
Optimal Cycle:	64	Level Of Service:	C

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	1 0 0 0 0			0 1 0 0 2			1 0 1 1 0			1 0 2 0 1		
Volume Module: Existing AM Peak												
Base Vol:	4	0	0	12	0	4	321	600	0	10	1276	77
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	4	0	0	13	0	4	337	630	0	11	1340	81
Added Vol:	0	0	0	0	0	1	4	78	0	0	61	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	4	0	0	13	0	5	341	708	0	11	1401	81
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.50	1.00	1.00	1.00	1.00	0.33	0.60	0.75	1.00	0.50	0.90	0.69
PHF Volume:	8	0	0	13	0	16	568	944	0	21	1556	117
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	8	0	0	13	0	16	568	944	0	21	1556	117
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	8	0	0	13	0	16	568	944	0	21	1556	117
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.81	1.00	1.00	0.76	1.00	0.75	0.95	1.00	1.00	0.95	1.00	0.85
Lanes:	1.00	0.00	0.00	1.00	0.00	2.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	1530	0	0	1440	0	2842	1805	3800	0	1805	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.01	0.00	0.00	0.01	0.00	0.01	0.31	0.25	0.00	0.01	0.41	0.07
Crit Moves:				****			****				****	
Green/Cycle:	0.07	0.00	0.00	0.07	0.00	0.07	0.37	0.66	0.00	0.19	0.48	0.48
Volume/Cap:	0.08	0.00	0.00	0.12	0.00	0.08	0.85	0.37	0.00	0.06	0.85	0.15
Delay/Veh:	43.8	0.0	0.0	44.2	0.0	43.7	39.3	7.6	0.0	33.5	26.9	14.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.8	0.0	0.0	44.2	0.0	43.7	39.3	7.6	0.0	33.5	26.9	14.6
LOS by Move:	D	A	A	D	A	D	D	A	A	C	C	B
HCM2kAvgQ:	0	0	0	0	0	0	19	6	0	1	24	2

Note: Queue reported is the number of cars per lane.

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                      UCR West Campus Development Plan
                 2010 Phase 1 Conditions with Mitigation
                                 AM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #85 Canyon Crest Dr at MLK BLvd
********************************************************************************
Cycle (sec):          120              Critical Vol./Cap.(X):          0.650
Loss Time (sec):       10 (Y+R=4.0 sec) Average Delay (sec/veh):        27.6
Optimal Cycle:         50              Level Of Service:                  C
********************************************************************************
Street Name:           Canyon Crest Dr                         MLK Blvd
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:           Include            Ovl              Ovl            Include
Min. Green:      7    7     7    7    7     7    7    7     7    7    7     7
Lanes:          2  0  2  0  1   2  0  2  0  1   2  0  2  0  2   2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:     1153  452   445    41   84    52   130  185   323   108  335    36
Growth Adj:   1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05  1.05 1.05  1.05
Initial Bse:  1211  475   467    43   88    55   137  194   339   113  352    38
Added Vol:      13   21     0    14    6    14    49   24     6     0   33    49
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  1224  496   467    57   94    69   186  218   345   113  385    87
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.92 0.74  0.79  0.68 0.88  0.59  0.83 0.72  0.94  0.93 0.89  0.56
PHF Volume:   1330  670   591    84  107   116   223  303   367   122  432   155
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  1330  670   591    84  107   116   223  303   367   122  432   155
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   1330  670   591    84  107   116   223  303   367   122  432   155
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   0.90 1.00  0.85  0.90 1.00  0.85  0.90 1.00  0.75  0.90 1.00  0.85
Lanes:        2.00 2.00  1.00  2.00 2.00  1.00  2.00 2.00  2.00  2.00 2.00  1.00
Final Sat.:   3420 3800  1615  3420 3800  1615  3420 3800  2842  3420 3800  1615
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.39 0.18  0.37  0.02 0.03  0.07  0.07 0.08  0.13  0.04 0.11  0.10
Crit Moves:   ****                  ****        ****                  ****
Green/Cycle:  0.59 0.56  0.56  0.09 0.06  0.16  0.10 0.16  0.74  0.11 0.17  0.17
Volume/Cap:   0.66 0.32  0.66  0.28 0.48  0.46  0.66 0.51  0.17  0.31 0.66  0.56
Delay/Veh:    17.5 14.4  20.3  51.6 56.4  47.3  57.0 47.2   4.6  49.3 49.0  48.0
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   17.5 14.4  20.3  51.6 56.4  47.3  57.0 47.2   4.6  49.3 49.0  48.0
LOS by Move:     B    B     C     D    E     D     E    D     A     D    D     D
HCM2kAvgQ:      18    6    16     2    3     4     5    6     2     2    8     6
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #109 Iowa Ave at Everton Place

Cycle (sec):	100	Critical Vol./Cap.(X):	0.490
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	5.8
Optimal Cycle:	31	Level Of Service:	A

Street Name:	Iowa Avenue						Everton Place					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	0 1	0	1 0	0 1	0
Volume Module: Exsting AM Peak												
Base Vol:	0	659	56	28	337	0	0	0	0	10	0	21
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	692	59	29	354	0	0	0	0	11	0	22
Added Vol:	15	28	30	72	28	32	53	0	25	9	0	21
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	15	720	89	101	382	32	53	0	25	20	0	43
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	0.90	0.54	0.88	0.83	1.00	1.00	1.00	1.00	0.83	1.00	0.75
PHF Volume:	15	800	164	115	460	32	53	0	25	23	0	57
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	15	800	164	115	460	32	53	0	25	23	0	57
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	15	800	164	115	460	32	53	0	25	23	0	57
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Final Sat.:	1900	1900	1900	1900	1900	1900	1900	0	1900	1900	0	1900
Capacity Analysis Module:												
Vol/Sat:	0.01	0.42	0.09	0.06	0.24	0.02	0.03	0.00	0.01	0.01	0.00	0.03
Crit Moves:		****										****
Green/Cycle:	0.85	0.85	0.85	0.85	0.85	0.85	0.07	0.00	0.07	0.07	0.00	0.07
Volume/Cap:	0.01	0.50	0.10	0.07	0.28	0.02	0.40	0.00	0.19	0.18	0.00	0.43
Delay/Veh:	1.1	2.2	1.3	1.2	1.6	1.1	46.4	0.0	44.5	44.4	0.0	46.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	1.1	2.2	1.3	1.2	1.6	1.1	46.4	0.0	44.5	44.4	0.0	46.8
LOS by Move:	A	A	A	A	A	A	D	A	D	D	A	D
HCM2kAvgQ:	0	7	1	1	3	0	2	0	1	1	0	2

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	0.549
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	31.5
Optimal Cycle:	36	Level Of Service:	C

Street Name:	Chicago Avenue		Martin Luther King Blvd	
Approach:	North Bound	South Bound	East Bound	West Bound
Control:	Protected	Protected	Protected	Protected
Rights:	Ovl	Ovl	Ovl	Ovl
Lanes:	2 0 2 0 1	2 0 2 0 1	1 0 3 0 2	1 0 3 0 1

Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Volume Module: Existing AM Peak												
Base Vol:	707	898	228	60	209	113	133	543	131	40	638	138
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	742	943	239	63	219	119	140	570	138	42	670	145
Added Vol:	0	0	19	18	0	0	0	48	0	9	24	5
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	742	943	258	81	219	119	140	618	138	51	694	150
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.87	0.92	0.70	0.80	0.80	0.81	0.85	0.74	0.90	0.71	0.94	0.78
PHF Volume:	853	1025	369	101	274	146	164	835	153	72	738	192
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	853	1025	369	101	274	146	164	835	153	72	738	192
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	853	1025	369	101	274	146	164	835	153	72	738	192
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	3.00	2.00	1.00	3.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	5700	3800	1900	5700	1900
Capacity Analysis Module:												
Vol/Sat:	0.22	0.27	0.19	0.03	0.07	0.08	0.09	0.15	0.04	0.04	0.13	0.10
Crit Moves:		****		****			****				****	
Green/Cycle:	0.41	0.49	0.60	0.06	0.13	0.29	0.16	0.28	0.69	0.11	0.23	0.29
Volume/Cap:	0.55	0.56	0.33	0.46	0.55	0.27	0.56	0.53	0.06	0.34	0.56	0.35
Delay/Veh:	27.2	22.1	12.3	56.2	49.9	33.2	49.1	36.9	6.0	50.3	41.0	33.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	27.2	22.1	12.3	56.2	49.9	33.2	49.1	36.9	6.0	50.3	41.0	33.9
LOS by Move:	C	C	B	E	D	C	D	D	A	D	D	C
HCM2kAvgQ:	12	13	7	2	5	4	6	9	1	3	8	6

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.527
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	33.0
Optimal Cycle:	43	Level Of Service:	C

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	1 1	0	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	208	747	110	74	320	126	173	326	88	85	386	55
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	218	784	116	78	336	132	182	342	92	89	405	58
Added Vol:	0	4	4	8	12	0	0	17	2	9	9	5
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	218	788	120	86	348	132	182	359	94	98	414	63
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.72	0.79	0.76	0.77	0.89	0.90	0.88	0.82	0.58	0.85	0.85	0.60
PHF Volume:	303	998	157	111	391	147	206	438	163	116	487	105
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	303	998	157	111	391	147	206	438	163	116	487	105
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	303	998	157	111	391	147	206	438	163	116	487	105
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.45	0.55	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	2762	1038	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.08	0.26	0.08	0.03	0.14	0.14	0.05	0.12	0.09	0.03	0.13	0.06
Crit Moves:		****		****			****				****	
Green/Cycle:	0.20	0.50	0.50	0.06	0.35	0.35	0.10	0.23	0.43	0.12	0.24	0.24
Volume/Cap:	0.40	0.53	0.17	0.50	0.40	0.40	0.53	0.50	0.20	0.26	0.53	0.23
Delay/Veh:	42.1	20.9	16.7	56.6	29.3	29.3	52.5	40.8	21.5	48.7	40.1	36.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	42.1	20.9	16.7	56.6	29.3	29.3	52.5	40.8	21.5	48.7	40.1	36.7
LOS by Move:	D	C	B	E	C	C	D	D	C	D	D	D
HCM2kAvgQ:	5	12	3	3	7	7	4	7	4	2	8	3

Note: Queue reported is the number of cars per lane.

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                       UCR West Campus Development Plan
                  2010 Phase 1 Conditions with Mitigation
                                  AM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #237 Chicago Ave at 3rd Street
********************************************************************************
Cycle (sec):          120              Critical Vol./Cap.(X):         0.760
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       42.4
Optimal Cycle:         59              Level Of Service:                  D
********************************************************************************
Street Name:              Chicago Avenue                    3rd Street
Approach:         North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:    10   10    10   10   10    10   10   10    10   10   10    10
Lanes:          1  0  1  1  0   1  0  1  1  0   1  0  1  1  0   2  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:     176  590   177  195  315    66   94  348    71  130  425   222
Growth Adj:  1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05  1.05
Initial Bse:  185  620   186  205  331    69   99  365    75  137  446   233
Added Vol:      1    7     0   12   14     0    0   10     2    0    7     4
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:  186  627   186  217  345    69   99  375    77  137  453   237
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.88 0.93  0.65 0.66 0.88  0.66 0.81 0.60  0.66 0.71 0.88  0.74
PHF Volume:   211  674   286  328  392   105  122  626   116  192  515   320
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:  211  674   286  328  392   105  122  626   116  192  515   320
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:   211  674   286  328  392   105  122  626   116  192  515   320
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       1.00 1.40  0.60 1.00 1.58  0.42 1.00 1.69  0.31 2.00 1.23  0.77
Final Sat.:  1900 2668  1132 1900 2997   803 1900 3206   594 3800 2343  1457
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.11 0.25  0.25 0.17 0.13  0.13 0.06 0.20  0.20 0.05 0.22  0.22
Crit Moves:       ****       ****            ****                   ****
Green/Cycle: 0.26 0.33  0.33 0.23 0.30  0.30 0.08 0.26  0.26 0.11 0.29  0.29
Volume/Cap:  0.43 0.76  0.76 0.76 0.43  0.43 0.76 0.75  0.75 0.45 0.76  0.76
Delay/Veh:   37.9 38.5  38.5 51.0 33.8  33.8 72.6 43.7  43.7 50.6 42.0  42.0
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:  37.9 38.5  38.5 51.0 33.8  33.8 72.6 43.7  43.7 50.6 42.0  42.0
LOS by Move:    D    D     D    D    C     C    E    D     D    D    D     D
HCM2kAvgQ:      7   17    17   13    7     7    6   14    14    4   15    15
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
PM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 56 NW Mall at Iowa Avenue	A	1.6	0.693	A	5.2	0.744	+ 3.555 D/V
# 58 Iowa Ave at University Ave	D	39.6	0.743	D	41.7	0.797	+ 2.048 D/V
# 71 SW Mall at Iowa Avenue		0.0	0.000	A	0.3	0.036	+ 0.339 D/V
# 83 Lot 30/MLK BLvd	C	27.7	0.878	C	29.5	0.898	+ 1.800 D/V
# 85 Canyon Crest Dr at MLK BLvd	D	35.4	0.794	D	36.2	0.816	+ 0.779 D/V
#109 Iowa Ave at Everton Place	A	6.6	0.691	B	11.4	0.744	+ 4.863 D/V
#137 Chicago Ave at MLK Blvd	D	40.9	0.859	D	41.9	0.880	+ 0.986 D/V
#151 Chicago Ave at University Aven	D	42.2	0.829	D	42.5	0.837	+ 0.245 D/V
#237 Chicago Ave at 3rd Street	D	41.9	0.785	D	42.3	0.793	+ 0.402 D/V

UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
PM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]

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-------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                   2010 Phase 1 Conditions with Mitigation
                                   PM Peak
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #56 NW Mall at Iowa Avenue
*******************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):         0.744
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):         5.2
Optimal Cycle:         54               Level Of Service:                  A
*******************************************************************************
Street Name:                 NW Mall                        Iowa Avenue
Approach:     North Bound      South Bound       East Bound       West Bound
Movement:    L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Permitted        Permitted        Permitted        Permitted
Rights:          Include          Include          Include          Include
Min. Green:    7    7    0    0    7    7    7    0    7    0    0    0
Lanes:       1  0  1  0  0   0  0  1  0  1   0  0  1! 0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      0  503    0    0 1038    0    0    0    0    0    0    0
Growth Adj:  1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05  1.05 1.05 1.05
Initial Bse:   0  528    0    0 1090    0    0    0    0    0    0    0
Added Vol:    11   52    0    0   54   24   18    0    8    0    0    0
PasserByVol:   0    0    0    0    0    0    0    0    0    0    0    0
Initial Fut:  11  580    0    0 1144   24   18    0    8    0    0    0
User Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:     0.90 0.90 0.90  0.90 0.90 0.90  0.90 0.90 0.90  0.90 0.90 0.90
PHF Volume:   12  645    0    0 1271   27   20    0    9    0    0    0
Reduct Vol:    0    0    0    0    0    0    0    0    0    0    0    0
Reduced Vol:  12  645    0    0 1271   27   20    0    9    0    0    0
PCE Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:   12  645    0    0 1271   27   20    0    9    0    0    0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
Adjustment:  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Lanes:       1.00 1.00 0.00  0.00 1.00 1.00  0.69 0.00 0.31  0.00 0.00 0.00
Final Sat.:  1900 1900    0    0 1900 1900  1315    0  585    0    0    0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01 0.34 0.00  0.00 0.67 0.01  0.02 0.00 0.02  0.00 0.00 0.00
Crit Moves:                       ****       ****
Green/Cycle: 0.85 0.85 0.00  0.00 0.85 0.85  0.07 0.00 0.07  0.00 0.00 0.00
Volume/Cap:  0.01 0.40 0.00  0.00 0.79 0.02  0.22 0.00 0.22  0.00 0.00 0.00
Delay/Veh:    1.1  1.9  0.0   0.0  6.1  1.1  44.7  0.0 44.7   0.0  0.0  0.0
User DelAdj: 1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:   1.1  1.9  0.0   0.0  6.1  1.1  44.7  0.0 44.7   0.0  0.0  0.0
LOS by Move:   A    A    A     A    A    A     D    A    D     A    A    A
HCM2kAvgQ:     0    5    0     0   19    0     1    0    1     0    0    0
*******************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.797
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	41.7
Optimal Cycle:	67	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	1 0	2 0	1	2 0	2 0	1
Volume Module: Existing PM												
Base Vol:	93	370	129	260	800	187	217	874	152	156	374	103
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	98	389	135	273	840	196	228	918	160	164	393	108
Added Vol:	22	55	64	0	48	0	0	7	18	49	9	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	120	443	199	273	888	196	228	925	178	213	402	108
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.60	0.96	0.75	0.94	0.91	0.90	0.82	0.94	0.84	0.85	0.87	0.72
PHF Volume:	199	462	266	290	976	218	278	984	211	250	462	150
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	199	462	266	290	976	218	278	984	211	250	462	150
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	199	462	266	290	976	218	278	984	211	250	462	150
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.63	0.37	1.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3106	694	1900	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.10	0.12	0.14	0.15	0.31	0.31	0.15	0.26	0.11	0.07	0.12	0.08
Crit Moves:	****				****			****		****		
Green/Cycle:	0.13	0.25	0.25	0.27	0.39	0.39	0.22	0.32	0.46	0.08	0.18	0.18
Volume/Cap:	0.80	0.48	0.56	0.56	0.80	0.80	0.66	0.80	0.24	0.80	0.66	0.43
Delay/Veh:	66.8	38.7	40.6	38.6	35.2	35.2	46.2	40.6	20.1	67.3	47.7	44.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	66.8	38.7	40.6	38.6	35.2	35.2	46.2	40.6	20.1	67.3	47.7	44.1
LOS by Move:	E	D	D	D	D	D	D	D	C	E	D	D
HCM2kAvgQ:	9	7	9	9	21	21	10	18	5	7	9	5

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #71 SW Mall at Iowa Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.036
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	0.3
Optimal Cycle:	18	Level Of Service:	A

Street Name:	SW Mall						Iowa Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	0	0	7	7	7	0	7	0	0	0
Lanes:	1 0 1 0 1			1 0 1 0 1			0 0 1! 0 0			0 0 1! 0 0		
Volume Module:												
Base Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	0	0	0	0	0	0	0	0	0	0
Added Vol:	0	63	0	0	63	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	63	0	0	63	0	0	0	0	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	0	63	0	0	63	0	0	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	63	0	0	63	0	0	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	63	0	0	63	0	0	0	0	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00
Final Sat.:	1900	1900	1900	1900	1900	1900	0	1900	0	0	1900	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crit Moves:					****							
Green/Cycle:	0.00	0.92	0.00	0.00	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Volume/Cap:	0.00	0.04	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Delay/Veh:	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOS by Move:	A	A	A	A	A	A	A	A	A	A	A	A
HCM2kAvgQ:	0	0	0	0	0	0	0	0	0	0	0	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.898
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	29.5
Optimal Cycle:	99	Level Of Service:	C

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	0 0 0 0 1			0 1 0 0 2			1 0 1 1 0			1 0 2 0 1		
Volume Module: Existing PM Peak												
Base Vol:	0	0	1	162	0	271	31	1989	0	10	926	1
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	0	1	170	0	285	33	2088	0	11	972	1
Added Vol:	0	0	0	0	0	4	2	68	0	0	81	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	170	0	289	35	2156	0	11	1053	1
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.50	1.00	0.25	0.57	1.00	0.62	0.43	0.95	1.00	0.63	0.85	1.00
PHF Volume:	0	0	4	298	0	465	80	2270	0	17	1239	1
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	4	298	0	465	80	2270	0	17	1239	1
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	4	298	0	465	80	2270	0	17	1239	1
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	0.87	0.71	1.00	0.75	0.95	1.00	1.00	0.95	1.00	0.85
Lanes:	0.00	0.00	1.00	1.00	0.00	2.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	0	0	1644	1357	0	2842	1805	3800	0	1805	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.22	0.00	0.16	0.04	0.60	0.00	0.01	0.33	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.23	0.23	0.00	0.23	0.12	0.62	0.00	0.07	0.57	0.57
Volume/Cap:	0.00	0.00	0.01	0.96	0.00	0.72	0.36	0.96	0.00	0.13	0.57	0.00
Delay/Veh:	0.0	0.0	29.8	78.8	0.0	39.4	41.4	28.8	0.0	44.1	14.2	9.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	29.8	78.8	0.0	39.4	41.4	28.8	0.0	44.1	14.2	9.3
LOS by Move:	A	A	C	E	A	D	D	C	A	D	B	A
HCM2kAvgQ:	0	0	0	14	0	9	3	39	0	1	12	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.816
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	36.2
Optimal Cycle:	79	Level Of Service:	D

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	2	2 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	295	186	129	125	552	189	163	1043	1058	162	254	25
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	310	195	135	131	580	198	171	1095	1111	170	267	26
Added Vol:	7	9	0	46	20	46	21	35	12	0	27	21
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	317	204	135	177	600	244	192	1130	1123	170	294	47
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.83	0.81	0.80	0.73	0.72	0.64	0.84	0.86	0.86	0.87	0.78
PHF Volume:	411	246	167	222	821	340	300	1345	1306	198	338	61
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	411	246	167	222	821	340	300	1345	1306	198	338	61
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	411	246	167	222	821	340	300	1345	1306	198	338	61
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.75	0.90	1.00	0.85
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00	1.00
Final Sat.:	3420	3800	1615	3420	3800	1615	3420	3800	2842	3420	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.12	0.06	0.10	0.06	0.22	0.21	0.09	0.35	0.46	0.06	0.09	0.04
Crit Moves:	****				****			****		****		
Green/Cycle:	0.15	0.25	0.25	0.16	0.26	0.52	0.25	0.43	0.58	0.07	0.25	0.25
Volume/Cap:	0.82	0.26	0.41	0.41	0.82	0.41	0.35	0.82	0.79	0.82	0.35	0.15
Delay/Veh:	59.6	35.9	38.0	45.9	46.7	18.2	37.2	33.1	22.1	73.9	36.9	34.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	59.6	35.9	38.0	45.9	46.7	18.2	37.2	33.1	22.1	73.9	36.9	34.9
LOS by Move:	E	D	D	D	D	B	D	C	C	E	D	C
HCM2kAvgQ:	10	4	5	4	16	8	5	23	22	6	5	2

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #109 Iowa Ave at Everton Place

Cycle (sec):	100	Critical Vol./Cap.(X):	0.744
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	11.4
Optimal Cycle:	54	Level Of Service:	B

Street Name:	Iowa Avenue						Everton Place					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 1 0 1			1 0 1 0 1			1 0 0 1 0			1 0 0 1 0		
Volume Module: Existing PM Peak												
Base Vol:	0	503	29	36	1038	0	0	0	0	47	0	39
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	0	528	30	38	1090	0	0	0	0	49	0	41
Added Vol:	26	32	13	31	30	54	41	0	20	28	0	68
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	26	560	43	69	1120	54	41	0	20	77	0	109
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	0.87	0.81	0.69	0.97	1.00	1.00	1.00	1.00	0.59	1.00	0.75
PHF Volume:	26	644	54	100	1155	54	41	0	20	131	0	145
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	26	644	54	100	1155	54	41	0	20	131	0	145
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	26	644	54	100	1155	54	41	0	20	131	0	145
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Final Sat.:	1900	1900	1900	1900	1900	1900	1900	0	1900	1900	0	1900
Capacity Analysis Module:												
Vol/Sat:	0.01	0.34	0.03	0.05	0.61	0.03	0.02	0.00	0.01	0.07	0.00	0.08
Crit Moves:					****							****
Green/Cycle:	0.82	0.82	0.82	0.82	0.82	0.82	0.10	0.00	0.10	0.10	0.00	0.10
Volume/Cap:	0.02	0.41	0.03	0.06	0.74	0.03	0.21	0.00	0.10	0.67	0.00	0.74
Delay/Veh:	1.7	2.7	1.7	1.8	6.2	1.7	41.7	0.0	40.9	52.0	0.0	57.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	1.7	2.7	1.7	1.8	6.2	1.7	41.7	0.0	40.9	52.0	0.0	57.9
LOS by Move:	A	A	A	A	A	A	D	A	D	D	A	E
HCM2kAvgQ:	0	6	0	1	18	0	1	0	1	5	0	6

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	0.880
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	41.9
Optimal Cycle:	96	Level Of Service:	D

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Ovl			Ovl			Ovl		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 2 0 1			1 0 3 0 2			1 0 3 0 1		
Volume Module: Existing PM Peak												
Base Vol:	140	287	61	366	1057	201	170	1283	792	249	514	105
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	147	301	64	384	1110	211	179	1347	832	261	540	110
Added Vol:	0	0	12	8	0	0	0	30	0	19	48	17
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	147	301	76	392	1110	211	179	1377	832	280	588	127
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.84	0.66	0.92	0.91	0.88	0.92	0.96	0.92	0.71	0.86	0.82
PHF Volume:	155	359	115	426	1220	240	194	1435	904	395	683	155
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	155	359	115	426	1220	240	194	1435	904	395	683	155
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	155	359	115	426	1220	240	194	1435	904	395	683	155
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	3.00	2.00	1.00	3.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	5700	3800	1900	5700	1900
Capacity Analysis Module:												
Vol/Sat:	0.04	0.09	0.06	0.11	0.32	0.13	0.10	0.25	0.24	0.21	0.12	0.08
Crit Moves:	****				****			****		****		
Green/Cycle:	0.06	0.19	0.42	0.23	0.36	0.60	0.24	0.28	0.34	0.23	0.28	0.51
Volume/Cap:	0.70	0.49	0.14	0.49	0.89	0.21	0.43	0.89	0.70	0.89	0.43	0.16
Delay/Veh:	64.9	43.9	21.3	40.8	44.0	11.3	39.6	48.0	36.0	64.3	35.7	16.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	64.9	43.9	21.3	40.8	44.0	11.3	39.6	48.0	36.0	64.3	35.7	16.1
LOS by Move:	E	D	C	D	D	B	D	D	D	E	D	B
HCM2kAvgQ:	4	6	3	7	24	4	6	20	15	17	7	3

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2010 Phase 1 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.837
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	42.5
Optimal Cycle:	92	Level Of Service:	D

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	1 1	0	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	237	363	126	155	956	86	182	796	463	309	385	72
Growth Adj:	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Initial Bse:	249	381	132	163	1004	90	191	836	486	324	404	76
Added Vol:	2	12	8	6	5	0	0	11	1	5	17	8
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	251	393	140	169	1009	90	191	847	487	329	421	84
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.92	0.73	0.84	0.89	0.77	0.81	0.90	0.87	0.87	0.92	0.82
PHF Volume:	292	427	192	201	1133	117	236	941	560	379	458	102
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	292	427	192	201	1133	117	236	941	560	379	458	102
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	292	427	192	201	1133	117	236	941	560	379	458	102
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.81	0.19	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3444	356	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.08	0.11	0.10	0.05	0.33	0.33	0.06	0.25	0.29	0.10	0.12	0.05
Crit Moves:	****				****			****		****		
Green/Cycle:	0.09	0.32	0.32	0.17	0.39	0.39	0.14	0.30	0.39	0.12	0.27	0.27
Volume/Cap:	0.84	0.35	0.32	0.32	0.84	0.84	0.44	0.84	0.76	0.84	0.44	0.20
Delay/Veh:	69.7	31.5	31.2	44.4	37.2	37.2	47.8	45.2	36.5	64.5	36.3	33.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	69.7	31.5	31.2	44.4	37.2	37.2	47.8	45.2	36.5	64.5	36.3	33.6
LOS by Move:	E	C	C	D	D	D	D	D	D	E	D	C
HCM2kAvgQ:	8	6	5	3	23	23	4	19	19	9	7	3

Note: Queue reported is the number of cars per lane.

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------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                  2010 Phase 1 Conditions with Mitigation
                                 PM Peak
------------------------------------------------------------------------------
                    Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
******************************************************************************
Intersection #237 Chicago Ave at 3rd Street
******************************************************************************
Cycle (sec):         120              Critical Vol./Cap.(X):         0.793
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):       42.3
Optimal Cycle:        66              Level Of Service:                  D
******************************************************************************
Street Name:             Chicago Avenue                      3rd Street
Approach:      North Bound       South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected         Protected         Protected         Protected
Rights:           Include           Include           Include           Include
Min. Green:   10    10    10    10    10    10    10    10    10    10    10    10
Lanes:       1  0  1  1  0    1  0  1  1  0    1  0  1  1  0    2  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      88   415   136   260   865   107   137   636   264   240   294    81
Growth Adj:  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05  1.05
Initial Bse:   92   436   143   273   908   112   144   668   277   252   309    85
Added Vol:      2    14     0     5     9     0     0     8     1     0    10    12
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:   94   450   143   278   917   112   144   676   278   252   319    97
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.76  0.82  0.79  0.83  0.90  0.72  0.82  0.85  0.85  0.95  0.84  0.81
PHF Volume:   124   548   181   335  1019   156   175   795   327   265   379   120
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  124   548   181   335  1019   156   175   795   327   265   379   120
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   124   548   181   335  1019   156   175   795   327   265   379   120
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  1.50  0.50  1.00  1.73  0.27  1.00  1.42  0.58  2.00  1.52  0.48
Final Sat.:  1900  2858   942  1900  3295   505  1900  2692  1108  3800  2888   912
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.07  0.19  0.19  0.18  0.31  0.31  0.09  0.30  0.30  0.07  0.13  0.13
Crit Moves:  ****                    ****              ****        ****
Green/Cycle: 0.08  0.25  0.25  0.23  0.39  0.39  0.19  0.37  0.37  0.09  0.27  0.27
Volume/Cap:  0.78  0.78  0.78  0.78  0.79  0.79  0.49  0.79  0.79  0.79  0.49  0.49
Delay/Veh:   76.1  46.3  46.3  52.3  35.4  35.4  44.4  36.7  36.7  65.9  37.1  37.1
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  76.1  46.3  46.3  52.3  35.4  35.4  44.4  36.7  36.7  65.9  37.1  37.1
LOS by Move:    E     D     D     D     D     D     D     D     D     E     D     D
HCM2kAvgQ:      6    14    14    13    21    21     6    20    20     7     8     8
******************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
Phase 2 Conditions wih Mitigation
AM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/Veh	Base V/C	Future LOS	Future Del/Veh	Future V/C	Change in
# 56 NW Mall at Iowa Avenue	A	0.7	0.478	A	4.0	0.600	+ 3.273 D/V
# 58 Iowa Ave at University Ave	D	35.9	0.558	D	36.5	0.591	+ 0.622 D/V
# 71 SW Mall at Iowa Avenue	A	0.7	0.465	A	4.3	0.585	+ 3.624 D/V
# 83 Lot 30/MLK BLvd	C	24.8	0.819	C	30.1	0.897	+ 5.261 D/V
# 85 Canyon Crest Dr at MLK BLvd	C	25.4	0.641	C	31.2	0.743	+ 5.796 D/V
#109 Iowa Ave at Everton Place	A	3.3	0.496	A	8.1	0.609	+ 4.824 D/V
#137 Chicago Ave at MLK Blvd	C	31.8	0.584	C	33.3	0.628	+ 1.507 D/V
#151 Chicago Ave at University Aven	C	33.3	0.564	C	33.7	0.592	+ 0.473 D/V
#237 Chicago Ave at 3rd Street	D	44.0	0.808	D	45.9	0.843	+ 1.976 D/V

UCR West Campus Development Plan
Phase 2 Conditions wih Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #56 NW Mall at Iowa Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.600
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	4.0
Optimal Cycle:	38	Level Of Service:	A

Street Name:	NW Mall						Iowa Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	0	0	7	7	7	0	7	0	0	0
Lanes:	1 0 0 1 0			0 0 1 0 1			0 0 1! 0 0			1 0 0 0 0		
Volume Module: 2010 AM Peak												
Base Vol:	0	659	0	0	337	0	0	0	0	0	0	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	751	0	0	384	0	0	0	0	0	0	0
Added Vol:	6	155	3	0	127	14	24	0	11	11	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	6	906	3	0	511	14	24	0	11	11	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	7	1007	3	0	568	16	27	0	12	12	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	7	1007	3	0	568	16	27	0	12	12	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	7	1007	3	0	568	16	27	0	12	12	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.99	0.01	0.00	1.00	1.00	0.69	0.00	0.31	1.00	0.00	0.00
Final Sat.:	1900	1894	6	0	1900	1900	1303	0	597	1900	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.53	0.53	0.00	0.30	0.01	0.02	0.00	0.02	0.01	0.00	0.00
Crit Moves:		****					****					
Green/Cycle:	0.85	0.85	0.85	0.00	0.85	0.85	0.07	0.00	0.07	0.07	0.00	0.00
Volume/Cap:	0.00	0.63	0.63	0.00	0.35	0.01	0.29	0.00	0.29	0.09	0.00	0.00
Delay/Veh:	1.1	3.2	3.2	0.0	1.7	1.1	45.4	0.0	45.4	43.8	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	1.1	3.2	3.2	0.0	1.7	1.1	45.4	0.0	45.4	43.8	0.0	0.0
LOS by Move:	A	A	A	A	A	A	D	A	D	D	A	A
HCM2kAvgQ:	0	11	11	0	4	0	1	0	1	0	0	0

Note: Queue reported is the number of cars per lane.

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                     UCR West Campus Development Plan
                     Phase 2 Conditions wih Mitigation
                                  AM Peak
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                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #58 Iowa Ave at University Ave
********************************************************************************
Cycle (sec):          120               Critical Vol./Cap.(X):        0.591
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       36.5
Optimal Cycle:         38               Level Of Service:                 D
********************************************************************************
Street Name:                 Iowa Avenue                  University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include           Ovl             Include
Min. Green:     7     7     7     7     7     7     7     7     7     7     7     7
Lanes:         1  0  2  0  1   1  0  1  1  0   1  0  2  0  1   2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:      63   544    92   136   245    99   139   345    56    80   342   167
Growth Adj:  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14
Initial Bse:   72   620   105   155   279   113   158   393    64    91   390   190
Added Vol:     26    97    92     0   122     0     0    18    42   168    12     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:   98   717   197   155   401   113   158   411   106   259   402   190
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.75  0.83  0.72  0.87  0.84  0.88  0.91  0.92  0.91  0.74  0.96  0.72
PHF Volume:   130   864   273   178   478   128   174   447   116   350   419   264
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  130   864   273   178   478   128   174   447   116   350   419   264
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   130   864   273   178   478   128   174   447   116   350   419   264
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  2.00  1.00  1.00  1.58  0.42  1.00  2.00  1.00  2.00  2.00  1.00
Final Sat.:  1900  3800  1900  1900  2996   804  1900  3800  1900  3800  3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.07  0.23  0.14  0.09  0.16  0.16  0.09  0.12  0.06  0.09  0.11  0.14
Crit Moves:        ****        ****              ****                          ****
Green/Cycle: 0.16  0.38  0.38  0.16  0.38  0.38  0.15  0.22  0.38  0.17  0.24  0.24
Volume/Cap:  0.42  0.59  0.37  0.59  0.42  0.42  0.59  0.54  0.16  0.54  0.47  0.59
Delay/Veh:   46.0  30.1  26.9  50.0  27.7  27.7  50.4  42.2  24.5  46.3  39.8  42.9
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  46.0  30.1  26.9  50.0  27.7  27.7  50.4  42.2  24.5  46.3  39.8  42.9
LOS by Move:    D     C     C     D     C     C     D     D     C     D     D     D
HCM2kAvgQ:      5    13     7     7     8     8     7     8     3     6     7     9
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
Phase 2 Conditions wih Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #71 SW Mall at Iowa Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.585
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	4.3
Optimal Cycle:	37	Level Of Service:	A

Street Name:	SW Mall						Iowa Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Permitted			Permitted			Permitted			Permitted	
Rights:		Include			Include			Include			Include	
Min. Green:	7	7	0	0	7	7	7	0	7	0	0	0
Lanes:		1 0 1 0 1			1 0 1 0 1			0 0 1! 0 0			0 0 1! 0 0	
Volume Module:												
Base Vol:	0	659	0	0	337	0	0	0	0	0	0	0
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	751	0	0	384	0	0	0	0	0	0	0
Added Vol:	19	133	0	0	130	19	31	0	31	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	19	884	0	0	514	19	31	0	31	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	21	956	0	0	556	21	34	0	34	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	21	956	0	0	556	21	34	0	34	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	21	956	0	0	556	21	34	0	34	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.00	0.50	0.00	1.00	0.00
Final Sat.:	1900	1900	1900	1900	1900	1900	950	0	950	0	1900	0
Capacity Analysis Module:												
Vol/Sat:	0.01	0.50	0.00	0.00	0.29	0.01	0.04	0.00	0.04	0.00	0.00	0.00
Crit Moves:		****					****					
Green/Cycle:	0.85	0.85	0.00	0.00	0.85	0.85	0.07	0.00	0.07	0.00	0.00	0.00
Volume/Cap:	0.01	0.59	0.00	0.00	0.34	0.01	0.50	0.00	0.50	0.00	0.00	0.00
Delay/Veh:	1.1	2.9	0.0	0.0	1.7	1.1	47.9	0.0	47.9	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	1.1	2.9	0.0	0.0	1.7	1.1	47.9	0.0	47.9	0.0	0.0	0.0
LOS by Move:	A	A	A	A	A	A	D	A	D	A	A	A
HCM2kAvgQ:	0	9	0	0	4	0	3	0	3	0	0	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions wih Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.897
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	30.1
Optimal Cycle:	98	Level Of Service:	C

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	1 0 0 0 0			0 1 0 0 2			1 0 1 1 0			1 0 2 0 1		
Volume Module: Existing AM Peak												
Base Vol:	4	0	0	12	0	4	321	600	0	10	1276	77
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	5	0	0	14	0	5	366	684	0	11	1455	88
Added Vol:	0	0	0	0	0	2	9	221	0	0	218	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	5	0	0	14	0	7	375	905	0	11	1673	88
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.50	1.00	1.00	1.00	1.00	0.33	0.60	0.75	1.00	0.50	0.90	0.69
PHF Volume:	9	0	0	14	0	20	625	1207	0	23	1858	127
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	9	0	0	14	0	20	625	1207	0	23	1858	127
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	9	0	0	14	0	20	625	1207	0	23	1858	127
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	0.00	1.00	0.00	2.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	1900	0	0	1900	0	3344	1900	3800	0	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.01	0.00	0.01	0.33	0.32	0.00	0.01	0.49	0.07
Crit Moves:				****			****				****	
Green/Cycle:	0.07	0.00	0.00	0.07	0.00	0.07	0.34	0.70	0.00	0.15	0.51	0.51
Volume/Cap:	0.07	0.00	0.00	0.10	0.00	0.08	0.96	0.46	0.00	0.08	0.96	0.13
Delay/Veh:	43.7	0.0	0.0	43.9	0.0	43.7	58.4	6.9	0.0	36.4	36.4	13.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.7	0.0	0.0	43.9	0.0	43.7	58.4	6.9	0.0	36.4	36.4	13.0
LOS by Move:	D	A	A	D	A	D	E	A	A	D	D	B
HCM2kAvgQ:	0	0	0	0	0	0	24	8	0	1	34	2

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions wih Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.743
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	31.2
Optimal Cycle:	63	Level Of Service:	C

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	2	2 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	1153	452	445	41	84	52	130	185	323	108	335	36
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	1314	515	507	47	96	59	148	211	368	123	382	41
Added Vol:	46	43	0	26	11	26	98	103	20	0	146	98
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	1360	558	507	73	107	85	246	314	388	123	528	139
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.74	0.79	0.68	0.88	0.59	0.83	0.72	0.94	0.93	0.89	0.56
PHF Volume:	1479	754	642	107	121	145	297	436	413	132	593	248
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	1479	754	642	107	121	145	297	436	413	132	593	248
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	1479	754	642	107	121	145	297	436	413	132	593	248
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.88	0.95	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00	1.00
Final Sat.:	3600	3800	1900	3600	3800	1900	3600	3800	3344	3600	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.41	0.20	0.34	0.03	0.03	0.08	0.08	0.11	0.12	0.04	0.16	0.13
Crit Moves:	****				****		****				****	
Green/Cycle:	0.54	0.51	0.51	0.09	0.06	0.17	0.11	0.21	0.75	0.11	0.21	0.21
Volume/Cap:	0.76	0.39	0.66	0.34	0.55	0.45	0.76	0.55	0.16	0.35	0.76	0.63
Delay/Veh:	23.0	17.9	23.2	52.0	57.8	46.1	60.1	43.2	4.2	50.3	49.0	46.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	23.0	17.9	23.2	52.0	57.8	46.1	60.1	43.2	4.2	50.3	49.0	46.8
LOS by Move:	C	B	C	D	E	D	E	D	A	D	D	D
HCM2kAvgQ:	23	8	18	2	3	5	7	8	2	3	12	9

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions wih Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #109 Iowa Ave at Everton Place

Cycle (sec):	100	Critical Vol./Cap.(X):	0.609
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	8.1
Optimal Cycle:	39	Level Of Service:	A

Street Name:	Iowa Avenue						Everton Place					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Permitted			Permitted			Permitted			Permitted	
Rights:		Include			Include			Include			Include	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	1 0	1	1 0	1 0	1	1 0	0 1	0	1 0	0 1	0
Volume Module: Exsting AM Peak												
Base Vol:	0	659	56	28	337	0	0	0	0	10	0	21
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	751	64	32	384	0	0	0	0	11	0	24
Added Vol:	15	78	85	210	90	32	53	0	25	25	0	83
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	15	829	149	242	474	32	53	0	25	36	0	107
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	0.90	0.54	0.88	0.83	1.00	1.00	1.00	1.00	0.83	1.00	0.75
PHF Volume:	15	921	276	275	571	32	53	0	25	44	0	143
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	15	921	276	275	571	32	53	0	25	44	0	143
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	15	921	276	275	571	32	53	0	25	44	0	143
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Final Sat.:	1900	1900	1900	1900	1900	1900	1900	0	1900	1900	0	1900
Capacity Analysis Module:												
Vol/Sat:	0.01	0.48	0.15	0.14	0.30	0.02	0.03	0.00	0.01	0.02	0.00	0.08
Crit Moves:		****										****
Green/Cycle:	0.80	0.80	0.80	0.80	0.80	0.80	0.12	0.00	0.12	0.12	0.00	0.12
Volume/Cap:	0.01	0.61	0.18	0.18	0.38	0.02	0.23	0.00	0.11	0.19	0.00	0.61
Delay/Veh:	2.1	4.7	2.5	2.5	3.1	2.1	40.0	0.0	39.1	39.7	0.0	46.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	2.1	4.7	2.5	2.5	3.1	2.1	40.0	0.0	39.1	39.7	0.0	46.1
LOS by Move:	A	A	A	A	A	A	D	A	D	D	A	D
HCM2kAvgQ:	0	12	2	2	5	0	2	0	1	1	0	5

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions wih Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	0.628
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	33.3
Optimal Cycle:	42	Level Of Service:	C

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Ovl			Ovl			Ovl		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	1 0	3 0	2	1 0	3 0	1
Volume Module: Existing AM Peak												
Base Vol:	707	898	228	60	209	113	133	543	131	40	638	138
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	806	1024	260	68	238	129	152	619	149	46	727	157
Added Vol:	0	0	48	89	0	0	0	122	0	24	62	54
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	806	1024	308	157	238	129	152	741	149	70	789	211
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.87	0.92	0.70	0.80	0.80	0.81	0.85	0.74	0.90	0.71	0.94	0.78
PHF Volume:	926	1113	440	197	298	159	178	1001	166	98	840	271
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	926	1113	440	197	298	159	178	1001	166	98	840	271
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	926	1113	440	197	298	159	178	1001	166	98	840	271
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	3.00	2.00	1.00	3.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	5700	3800	1900	5700	1900
Capacity Analysis Module:												
Vol/Sat:	0.24	0.29	0.23	0.05	0.08	0.08	0.09	0.18	0.04	0.05	0.15	0.14
Crit Moves:		****		****			****				****	
Green/Cycle:	0.42	0.47	0.56	0.08	0.13	0.28	0.15	0.29	0.70	0.10	0.23	0.32
Volume/Cap:	0.59	0.63	0.41	0.63	0.59	0.30	0.63	0.61	0.06	0.54	0.63	0.45
Delay/Veh:	27.7	24.9	15.2	57.3	50.7	34.0	52.3	37.5	5.5	54.9	42.2	33.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	27.7	24.9	15.2	57.3	50.7	34.0	52.3	37.5	5.5	54.9	42.2	33.2
LOS by Move:	C	C	B	E	D	C	D	D	A	D	D	C
HCM2kAvgQ:	13	16	9	5	6	5	7	11	1	4	10	8

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions wih Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.592
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	33.7
Optimal Cycle:	49	Level Of Service:	C

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	1 1	0	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	208	747	110	74	320	126	173	326	88	85	386	55
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	237	852	125	84	365	144	197	372	100	97	440	63
Added Vol:	9	40	5	20	67	0	0	36	12	14	15	9
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	246	892	130	104	432	144	197	408	112	111	455	72
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.72	0.79	0.76	0.77	0.89	0.90	0.88	0.82	0.58	0.85	0.85	0.60
PHF Volume:	342	1129	172	136	485	160	224	497	194	130	535	120
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	342	1129	172	136	485	160	224	497	194	130	535	120
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	342	1129	172	136	485	160	224	497	194	130	535	120
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.50	0.50	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	2859	941	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.09	0.30	0.09	0.04	0.17	0.17	0.06	0.13	0.10	0.03	0.14	0.06
Crit Moves:		****		****			****				****	
Green/Cycle:	0.19	0.50	0.50	0.06	0.37	0.37	0.10	0.23	0.43	0.10	0.24	0.24
Volume/Cap:	0.46	0.59	0.18	0.59	0.46	0.46	0.59	0.56	0.24	0.33	0.59	0.26
Delay/Veh:	43.2	21.7	16.5	59.0	29.2	29.2	54.2	41.4	22.0	50.4	41.6	37.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.2	21.7	16.5	59.0	29.2	29.2	54.2	41.4	22.0	50.4	41.6	37.5
LOS by Move:	D	C	B	E	C	C	D	D	C	D	D	D
HCM2kAvgQ:	6	15	3	3	9	9	5	9	4	2	9	4

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 Conditions wih Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

```
Cycle (sec):          120              Critical Vol./Cap.(X):        0.843
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):      45.9
Optimal Cycle:         81              Level Of Service:                D
```

```
Street Name:           Chicago Avenue                    3rd Street
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    10   10    10    10   10    10    10   10    10    10   10    10
Lanes:         1  0  1  1  0    1  0  1  1  0    1  0  1  1  0    2  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:     176  590   177   195  315    66    94  348    71   130  425   222
Growth Adj:  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14
Initial Bse:  201  673   202   222  359    75   107  397    81   148  485   253
Added Vol:      8   21     2    25   44     0     0   18    10     4   12     7
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  209  694   204   247  403    75   107  415    91   152  497   260
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.88 0.93  0.65  0.66 0.88  0.66  0.81 0.60  0.66  0.71 0.88  0.74
PHF Volume:   237  746   314   375  458   114   132  691   138   214  564   351
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  237  746   314   375  458   114   132  691   138   214  564   351
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   237  746   314   375  458   114   132  691   138   214  564   351
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 1.41  0.59  1.00 1.60  0.40  1.00 1.67  0.33  2.00 1.23  0.77
Final Sat.:  1900 2675  1125  1900 3043   757  1900 3168   632  3800 2341  1459
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.12 0.28  0.28  0.20 0.15  0.15  0.07 0.22  0.22  0.06 0.24  0.24
Crit Moves:       ****        ****              ****                   ****
Green/Cycle: 0.26 0.33  0.33  0.23 0.31  0.31  0.08 0.27  0.27  0.10 0.29  0.29
Volume/Cap:  0.49 0.84  0.84  0.84 0.49  0.49  0.84 0.82  0.82  0.55 0.84  0.84
Delay/Veh:   38.7 42.7  42.7  57.6 34.1  34.1  84.4 46.5  46.5  53.0 46.5  46.5
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  38.7 42.7  42.7  57.6 34.1  34.1  84.4 46.5  46.5  53.0 46.5  46.5
LOS by Move:    D    D     D     E    C     C     F    D     D     D    D     D
HCM2kAvgQ:      8   20    20    16    9     9     7   16    16     5   18    18
```

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 - 2015 Conditions with Mitigation
PM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 56 NW Mall at Iowa Avenue	A	2.2	0.752	B	10.7	0.872	+ 8.570 D/V
# 58 Iowa Ave at University Ave	D	41.8	0.807	D	49.0	0.921	+ 7.218 D/V
# 71 SW Mall at Iowa Avenue	A	1.9	0.732	A	8.6	0.851	+ 6.690 D/V
# 83 Lot 30/MLK BLvd	C	26.4	0.878	D	35.8	0.949	+ 9.405 D/V
# 85 Canyon Crest Dr at MLK BLvd	D	36.6	0.851	D	40.7	0.928	+ 4.050 D/V
#109 Iowa Ave at Everton Place	A	7.5	0.750	C	23.7	0.938	+16.191 D/V
#137 Chicago Ave at MLK Blvd	D	45.7	0.933	D	51.4	0.986	+ 5.765 D/V
#151 Chicago Ave at University Aven	D	46.4	0.900	D	48.5	0.929	+ 2.082 D/V
#237 Chicago Ave at 3rd Street	D	45.5	0.853	D	47.8	0.877	+ 2.210 D/V

```
--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                   Phase 2 - 2015 Conditions with Mitigation
                                    PM Peak
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                      Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Cycle (sec):           100                Critical Vol./Cap.(X):          0.872
Loss Time (sec):         8 (Y+R=4.0 sec)  Average Delay (sec/veh):         10.7
Optimal Cycle:          87                Level Of Service:                   B
********************************************************************************
Street Name:                     NW Mall                      Iowa Avenue
Approach:        North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Permitted        Permitted        Permitted        Permitted
Rights:           Include          Include          Include          Include
Min. Green:     7     7     0     0     7     7     7     0     7     0     0     0
Lanes:         1  0  0  1  0    0  0  1  0  1    0  0  1! 0  0    1  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0   503     0     0  1038     0     0     0     0     0     0     0
Growth Adj:  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14  1.14
Initial Bse:    0   573     0     0  1183     0     0     0     0     0     0     0
Added Vol:     11   140    11     0   162    24    18     0     8     6     0     0
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:   11   713    11     0  1345    24    18     0     8     6     0     0
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.90  0.90  0.90  0.90  0.90  0.90  0.90  0.90  0.90  0.90  0.90  0.90
PHF Volume:    12   793    12     0  1495    27    20     0     9     7     0     0
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   12   793    12     0  1495    27    20     0     9     7     0     0
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:    12   793    12     0  1495    27    20     0     9     7     0     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  0.98  0.02  0.00  1.00  1.00  0.69  0.00  0.31  1.00  0.00  0.00
Final Sat.:  1900  1871    29     0  1900  1900  1315     0   585  1900     0     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01  0.42  0.42  0.00  0.79  0.01  0.02  0.00  0.02  0.00  0.00  0.00
Crit Moves:                         ****        ****
Green/Cycle: 0.85  0.85  0.85  0.00  0.85  0.85  0.07  0.00  0.07  0.07  0.00  0.00
Volume/Cap:  0.01  0.50  0.50  0.00  0.93  0.02  0.22  0.00  0.22  0.05  0.00  0.00
Delay/Veh:    1.1   2.2   2.2   0.0  14.8   1.1  44.7   0.0  44.7  43.6   0.0   0.0
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   1.1   2.2   2.2   0.0  14.8   1.1  44.7   0.0  44.7  43.6   0.0   0.0
LOS by Move:    A     A     A     A     B     A     D     A     D     D     A     A
HCM2kAvgQ:      0     7     7     0    37     0     1     0     1     0     0     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                    Phase 2 - 2015 Conditions with Mitigation
                                   PM Peak
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #58 Iowa Ave at University Ave
********************************************************************************
Cycle (sec):          120             Critical Vol./Cap.(X):        0.921
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):     49.0
Optimal Cycle:        120             Level Of Service:                D
********************************************************************************
Street Name:                Iowa Avenue                  University Avenue
Approach:        North Bound      South Bound       East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:            Include          Include           Ovl             Include
Min. Green:     7    7    7     7    7    7     7    7    7     7    7    7
Lanes:          1  0  2  0  1   1  0  1  1  0   1  0  2  0  1   2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM
Base Vol:        93  370   129   260  800   187   217  874   152   156  374   103
Growth Adj:    1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14
Initial Bse:    106  422   147   296  912   213   247  996   173   178  426   117
Added Vol:       44  130   169     0  107     0     0   13    30   109   18     0
PasserByVol:      0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    150  552   316   296 1019   213   247 1009   203   287  444   117
User Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:       0.60 0.96  0.75  0.94 0.91  0.90  0.82 0.94  0.84  0.85 0.87  0.72
PHF Volume:     250  575   421   315 1120   237   302 1074   242   337  511   163
Reduct Vol:       0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:    250  575   421   315 1120   237   302 1074   242   337  511   163
PCE Adj:       1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:       1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:     250  575   421   315 1120   237   302 1074   242   337  511   163
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:      1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:         1.00 2.00  1.00  1.00 1.65  0.35  1.00 2.00  1.00  2.00 2.00  1.00
Final Sat.:    1900 3800  1900  1900 3137   663  1900 3800  1900  3800 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:       0.13 0.15  0.22  0.17 0.36  0.36  0.16 0.28  0.13  0.09 0.13  0.09
Crit Moves:    ****                  ****             ****        ****
Green/Cycle:   0.14 0.30  0.30  0.23 0.39  0.39  0.22 0.31  0.45  0.10 0.18  0.18
Volume/Cap:    0.92 0.50  0.73  0.73 0.92  0.92  0.73 0.92  0.28  0.92 0.73  0.46
Delay/Veh:     85.2 34.7  42.2  49.3 44.8  44.8  50.0 52.1  21.0  81.8 49.9  44.6
User DelAdj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:    85.2 34.7  42.2  49.3 44.8  44.8  50.0 52.1  21.0  81.8 49.9  44.6
LOS by Move:      F    C     D     D    D     D     D    D     C     F    D     D
HCM2kAvgQ:       13    9    15    12   28    28    12   23     5     9   10     6
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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-------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                  Phase 2 - 2015 Conditions with Mitigation
                                 PM Peak
-------------------------------------------------------------------------------

                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #71 SW Mall at Iowa Avenue
*******************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):          0.851
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):          8.6
Optimal Cycle:         79              Level Of Service:                  A
*******************************************************************************
Street Name:                 SW Mall                       Iowa Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted        Permitted        Permitted
Rights:          Include          Include          Include          Include
Min. Green:    7     7     0    0     7     7    7     0     7    0     0     0
Lanes:        1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: 2015 PM Peak
Base Vol:      0   503     0    0  1038     0    0     0     0    0     0     0
Growth Adj:  1.14 1.14  1.14 1.14 1.14  1.14 1.14 1.14  1.14 1.14 1.14  1.14
Initial Bse:   0   573     0    0  1183     0    0     0     0    0     0     0
Added Vol:    31   137     0    0   145    31   24     0    24    0     0     0
PasserByVol:   0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:  31   710     0    0  1328    31   24     0    24    0     0     0
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.93 0.93  0.93 0.93 0.93  0.93 0.93 0.93  0.93 0.93 0.93  0.93
PHF Volume:   34   768     0    0  1436    34   26     0    26    0     0     0
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  34   768     0    0  1436    34   26     0    26    0     0     0
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:   34   768     0    0  1436    34   26     0    26    0     0     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       1.00 1.00  1.00 1.00 1.00  1.00 0.50 0.00  0.50 0.00 1.00  0.00
Final Sat.:  1900 1900  1900 1900 1900  1900  950    0   950    0 1900     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.02 0.40  0.00 0.00 0.76  0.02 0.03 0.00  0.03 0.00 0.00  0.00
Crit Moves:                       ****        ****
Green/Cycle: 0.85 0.85  0.00 0.00 0.85  0.85 0.07 0.00  0.07 0.00 0.00  0.00
Volume/Cap:  0.02 0.48  0.00 0.00 0.89  0.02 0.39 0.00  0.39 0.00 0.00  0.00
Delay/Veh:    1.2  2.1   0.0  0.0 11.1   1.2 46.4  0.0  46.4  0.0  0.0   0.0
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:   1.2  2.1   0.0  0.0 11.1   1.2 46.4  0.0  46.4  0.0  0.0   0.0
LOS by Move:    A    A     A    A    B     A    D    A     D    A    A     A
HCM2kAvgQ:      0    6     0    0   31     0    2    0     2    0    0     0
*******************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
Phase 2 - 2015 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.949
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	35.8
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	0 0	0	0 1	0 1	0	0 2	1 0	1	1 0	1 0	2	0 1
Volume Module: Existing PM Peak												
Base Vol:	0	0	1	162	0	271	31	1989	0	10	926	1
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	0	0	1	185	0	309	35	2267	0	11	1056	1
Added Vol:	0	0	0	0	0	8	4	233	0	0	232	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	185	0	317	39	2500	0	11	1288	1
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.50	1.00	0.25	0.57	1.00	0.62	0.43	0.95	1.00	0.63	0.85	1.00
PHF Volume:	0	0	5	324	0	511	91	2632	0	18	1515	1
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	5	324	0	511	91	2632	0	18	1515	1
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	5	324	0	511	91	2632	0	18	1515	1
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	2.00	1.00	2.00	0.00	1.00	2.00	1.00
Final Sat.:	0	0	1900	1900	0	3344	1900	3800	0	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.17	0.00	0.15	0.05	0.69	0.00	0.01	0.40	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.17	0.17	0.00	0.17	0.11	0.68	0.00	0.07	0.64	0.64
Volume/Cap:	0.00	0.00	0.01	1.02	0.00	0.91	0.43	1.02	0.00	0.14	0.62	0.00
Delay/Veh:	0.0	0.0	34.7	96.0	0.0	59.8	42.8	37.5	0.0	44.1	11.3	6.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	34.7	96.0	0.0	59.8	42.8	37.5	0.0	44.1	11.3	6.5
LOS by Move:	A	A	C	F	A	E	D	D	A	D	B	A
HCM2kAvgQ:	0	0	0	16	0	12	3	51	0	1	14	0

Note: Queue reported is the number of cars per lane.

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                   UCR West Campus Development Plan
                Phase 2 - 2015 Conditions with Mitigation
                                PM Peak
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                  Level Of Service Computation Report
         2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #85 Canyon Crest Dr at MLK BLvd
********************************************************************************
Cycle (sec):          120                Critical Vol./Cap.(X):         0.928
Loss Time (sec):       10 (Y+R=4.0 sec)  Average Delay (sec/veh):        40.7
Optimal Cycle:        120                Level Of Service:                  D
********************************************************************************
Street Name:              Canyon Crest Dr                      MLK Blvd
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected         Protected         Protected         Protected
Rights:            Include            Ovl               Ovl              Include
Min. Green:      7     7     7     7     7     7     7     7     7     7     7     7
Lanes:         2  0  2  0  1    2  0  2  0  1    2  0  2  0  2    2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      295  186   129   125  552   189   163 1043  1058   162  254    25
Growth Adj:   1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14
Initial Bse:   336  212   147   143  629   215   186 1189  1206   185  290    28
Added Vol:      25   17     0    91   40    91    40  149    44     0  116    40
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   361  229   147   234  669   306   226 1338  1250   185  406    69
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.77 0.83  0.81  0.80 0.73  0.72  0.64 0.84  0.86  0.86 0.87  0.78
PHF Volume:    469  276   182   292  917   426   353 1593  1454   215  466    88
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   469  276   182   292  917   426   353 1593  1454   215  466    88
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    469  276   182   292  917   426   353 1593  1454   215  466    88
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   0.95 1.00  1.00  0.95 1.00  1.00  0.95 1.00  0.88  0.95 1.00  1.00
Lanes:        2.00 2.00  1.00  2.00 2.00  1.00  2.00 2.00  2.00  2.00 2.00  1.00
Final Sat.:   3600 3800  1900  3600 3800  1900  3600 3800  3344  3600 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.13 0.07  0.10  0.08 0.24  0.22  0.10 0.42  0.43  0.06 0.12  0.05
Crit Moves:   ****                  ****              ****        ****
Green/Cycle:  0.14 0.22  0.22  0.18 0.26  0.49  0.23 0.45  0.59  0.06 0.29  0.29
Volume/Cap:   0.93 0.34  0.44  0.44 0.93  0.46  0.43 0.93  0.73  0.93 0.43  0.16
Delay/Veh:    74.4 39.9  41.5  44.0 57.6  20.5  39.9 40.3  19.1  95.6 35.0  32.1
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   74.4 39.9  41.5  44.0 57.6  20.5  39.9 40.3  19.1  95.6 35.0  32.1
LOS by Move:     E    D     D     D    E     C     D    D     B     F    D     C
HCM2kAvgQ:      13    4     6     5   21    10     6   32    22     7    7     2
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                   Phase 2 - 2015 Conditions with Mitigation
                                   PM Peak
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
         2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #109 Iowa Ave at Everton Place
********************************************************************************
Cycle (sec):          100             Critical Vol./Cap.(X):         0.938
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       23.7
Optimal Cycle:        120             Level Of Service:                 C
********************************************************************************
Street Name:                Iowa Avenue                      Everton Place
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted        Permitted        Permitted
Rights:          Include          Include          Include          Include
Min. Green:    7     7     7    7     7     7    7     7     7    7     7     7
Lanes:        1  0  1  0  1   1  0  1  0  1   1  0  0  1  0   1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      0   503    29    36 1038     0     0     0     0    47     0    39
Growth Adj:  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14
Initial Bse:   0   573    33    41 1183     0     0     0     0    54     0    44
Added Vol:    26    97    35   107   86    54    41     0    20    80     0   204
PasserByVol:   0     0     0     0    0     0     0     0     0     0     0     0
Initial Fut:  26   670    68   148 1269    54    41     0    20   134     0   248
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 0.87  0.81  0.69 0.97  1.00  1.00 1.00  1.00  0.59 1.00  0.75
PHF Volume:   26   771    84   215 1309    54    41     0    20   226     0   331
Reduct Vol:    0     0     0     0    0     0     0     0     0     0     0     0
Reduced Vol:  26   771    84   215 1309    54    41     0    20   226     0   331
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   26   771    84   215 1309    54    41     0    20   226     0   331
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 1.00  1.00  1.00 1.00  1.00  1.00 0.00  1.00  1.00 0.00  1.00
Final Sat.:  1900 1900  1900  1900 1900  1900  1900    0  1900  1900    0  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01 0.41  0.04  0.11 0.69  0.03  0.02 0.00  0.01  0.12 0.00  0.17
Crit Moves:                        ****                                     ****
Green/Cycle: 0.73 0.73  0.73  0.73 0.73  0.73  0.19 0.00  0.19  0.19 0.00  0.19
Volume/Cap:  0.02 0.55  0.06  0.15 0.94  0.04  0.12 0.00  0.06  0.64 0.00  0.94
Delay/Veh:    3.6  6.4   3.7   4.0 23.6   3.6  34.0  0.0  33.6  41.6  0.0  72.4
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   3.6  6.4   3.7   4.0 23.6   3.6  34.0  0.0  33.6  41.6  0.0  72.4
LOS by Move:   A    A     A     A    C     A     C    A     C     D    A     E
HCM2kAvgQ:     0   11     1     2   40     0     1    0     1     7    0    14
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
Phase 2 - 2015 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #137 Chicago Ave at MLK Blvd

****

Cycle (sec): 130   Critical Vol./Cap.(X): 0.986
Loss Time (sec): 8 (Y+R=4.0 sec)   Average Delay (sec/veh): 51.4
Optimal Cycle: 120   Level Of Service: D

****

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Ovl			Ovl			Ovl			Ovl	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	1 0	3 0	2	1 0	3 0	1
Volume Module: Existing PM Peak												
Base Vol:	140	287	61	366	1057	201	170	1283	792	249	514	105
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	160	327	70	417	1205	229	194	1463	903	284	586	120
Added Vol:	0	0	29	63	0	0	0	76	0	48	121	88
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	160	327	99	480	1205	229	194	1539	903	332	707	208
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.84	0.66	0.92	0.91	0.88	0.92	0.96	0.92	0.71	0.86	0.82
PHF Volume:	168	389	149	522	1324	260	211	1603	981	467	822	253
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	168	389	149	522	1324	260	211	1603	981	467	822	253
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	168	390	149	522	1324	260	211	1603	981	467	822	253
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	3.00	2.00	1.00	3.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	5700	3800	1900	5700	1900
Capacity Analysis Module:												
Vol/Sat:	0.04	0.10	0.08	0.14	0.35	0.14	0.11	0.28	0.26	0.25	0.14	0.13
Crit Moves:	****				****			****		****		
Green/Cycle:	0.06	0.17	0.42	0.23	0.35	0.58	0.23	0.28	0.34	0.25	0.30	0.53
Volume/Cap:	0.76	0.59	0.19	0.59	1.00	0.24	0.48	1.00	0.76	1.00	0.48	0.25
Delay/Veh:	69.7	47.1	22.1	42.0	64.0	12.5	41.0	65.8	38.0	87.1	34.8	15.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	69.7	47.1	22.1	42.0	64.0	12.5	41.0	65.8	38.0	87.1	34.8	15.4
LOS by Move:	E	D	C	D	E	B	D	E	D	F	C	B
HCM2kAvgQ:	5	7	3	9	31	5	7	26	17	23	8	5

****

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 2 - 2015 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.929
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	48.5
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Chicago Avenue		University Avenue	
Approach:	North Bound	South Bound	East Bound	West Bound
Control:	Protected	Protected	Protected	Protected
Rights:	Include	Include	Ovl	Include
Lanes:	2 0 2 0 1	2 0 1 1 0	2 0 2 0 1	2 0 2 0 1

Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Volume Module: Existing PM Peak												
Base Vol:	237	363	126	155	956	86	182	796	463	309	385	72
Growth Adj:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Initial Bse:	270	414	144	177	1090	98	207	907	528	352	439	82
Added Vol:	13	66	13	11	46	0	0	19	10	8	35	19
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	283	480	157	188	1136	98	207	926	538	360	474	101
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.92	0.73	0.84	0.89	0.77	0.81	0.90	0.87	0.87	0.92	0.82
PHF Volume:	329	522	215	223	1276	127	256	1029	618	414	515	123
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	329	522	215	223	1276	127	256	1029	618	414	515	123
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	329	522	215	223	1276	127	256	1029	618	414	515	123
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	1.82	0.18	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3455	345	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.09	0.14	0.11	0.06	0.37	0.37	0.07	0.27	0.33	0.11	0.14	0.06
Crit Moves:	****				****			****		****		
Green/Cycle:	0.09	0.34	0.34	0.15	0.40	0.40	0.14	0.29	0.38	0.12	0.27	0.27
Volume/Cap:	0.93	0.40	0.33	0.40	0.93	0.93	0.50	0.93	0.85	0.93	0.50	0.24
Delay/Veh:	84.2	30.2	29.4	46.8	44.9	44.9	48.8	54.6	42.6	78.3	37.0	34.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	84.2	30.2	29.4	46.8	44.9	44.9	48.8	54.6	42.6	78.3	37.0	34.1
LOS by Move:	F	C	C	D	D	D	D	D	D	E	D	C
HCM2kAvgQ:	9	7	6	4	29	29	5	23	23	11	8	4

Note: Queue reported is the number of cars per lane.

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-------------------------------------------------------------------------------
                  UCR West Campus Development Plan
              Phase 2 - 2015 Conditions with Mitigation
                               PM Peak
-------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #237 Chicago Ave at 3rd Street
*******************************************************************************
Cycle (sec):          120                Critical Vol./Cap.(X):        0.877
Loss Time (sec):        8 (Y+R=4.0 sec)  Average Delay (sec/veh):       47.8
Optimal Cycle:         95                Level Of Service:                 D
*******************************************************************************
Street Name:            Chicago Avenue                     3rd Street
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected         Protected        Protected
Rights:           Include          Include           Include          Include
Min. Green:   10    10    10    10    10    10    10    10    10    10    10    10
Lanes:        1  0  1  1  0    1  0  1  1  0    1  0  1  1  0    2  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      88  415   136   260  865   107   137  636   264   240  294    81
Growth Adj:  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14  1.14 1.14  1.14
Initial Bse:  100  473   155   296  986   122   156  725   301   274  335    92
Added Vol:     11   43     3    10   26     0     0   14     9     2   19    23
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  111  516   158   306 1012   122   156  739   310   276  354   115
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.76 0.82  0.79  0.83 0.90  0.72  0.82 0.85  0.85  0.95 0.84  0.81
PHF Volume:   146  629   200   369 1125   169   190  869   365   290  422   142
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  146  629   200   369 1125   169   190  869   365   290  422   142
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   146  629   200   369 1125   169   190  869   365   290  422   142
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 1.52  0.48  1.00 1.74  0.26  1.00 1.41  0.59  2.00 1.50  0.50
Final Sat.:  1900 2883   917  1900 3302   498  1900 2677  1123  3800 2841   959
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.08 0.22  0.22  0.19 0.34  0.34  0.10 0.32  0.32  0.08 0.15  0.15
Crit Moves:  ****                  ****              ****       ****
Green/Cycle: 0.09 0.25  0.25  0.22 0.39  0.39  0.18 0.37  0.37  0.09 0.27  0.27
Volume/Cap:  0.88 0.87  0.87  0.87 0.88  0.88  0.54 0.88  0.88  0.88 0.54  0.54
Delay/Veh:   91.1 51.4  51.4  61.7 40.3  40.3  46.1 41.8  41.8  76.4 37.8  37.8
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  91.1 51.4  51.4  61.7 40.3  40.3  46.1 41.8  41.8  76.4 37.8  37.8
LOS by Move:    F    D     D     E    D     D     D    D     D     E    D     D
HCM2kAvgQ:      8   17    17    16   25    25     7   24    24     8    9     9
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR west Campus Development Plan
Phase 3 - 2020 Conditions with Mitigation
AM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 56 NW Mall at Iowa Avenue	A	0.7	0.515	A	5.0	0.675	+ 4.251 D/V
# 58 Iowa Ave at University Ave	D	36.5	0.603	D	37.7	0.646	+ 1.188 D/V
# 71 SW Mall at Iowa Avenue	A	0.7	0.501	A	5.2	0.661	+ 4.520 D/V
# 83 Lot 30/MLK BLvd	B	18.8	0.719	C	22.6	0.870	+ 3.812 D/V
# 85 Canyon Crest Dr at MLK BLvd	C	26.7	0.720	D	39.3	0.901	+12.525 D/V
#109 Iowa Ave at Everton Place	A	3.4	0.535	A	8.8	0.699	+ 5.387 D/V
#137 Chicago Ave at MLK Blvd	C	32.5	0.630	D	35.5	0.715	+ 3.012 D/V
#151 Chicago Ave at University Aven	C	33.6	0.609	C	34.2	0.654	+ 0.596 D/V
#159 Chicago Ave at Linden Street	D	41.1	0.883	D	53.4	0.994	+12.355 D/V
#196 Iowa Ave at Blaine St	D	35.4	0.768	D	38.4	0.833	+ 3.053 D/V
#237 Chicago Ave at 3rd Street	D	43.0	0.777	D	45.1	0.822	+ 2.104 D/V
#292 I-215 NB Ramps/MLK Blvd	B	16.5	0.395	B	19.0	0.526	+ 2.521 D/V

UCR west Campus Development Plan
Phase 3 - 2020 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #56 NW Mall at Iowa Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.675
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	5.0
Optimal Cycle:	45	Level Of Service:	A

Street Name:	NW Mall		Iowa Avenue	
Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Permitted	Permitted	Permitted	Permitted
Rights:	Include	Include	Include	Include
Lanes:	1 0 0 1 0	0 1 0 0 1	0 0 1! 0 0	0 0 1! 0 0

Movement:	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Min. Green:	7	7	0	0	7	7	7	0	7	0	0	0
Volume Module: 2010 AM Peak												
Base Vol:	0	659	0	0	337	0	0	0	0	0	0	0
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	811	0	0	415	0	0	0	0	0	0	0
Added Vol:	6	204	3	8	211	14	24	0	11	11	0	34
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	6	1015	3	8	626	14	24	0	11	11	0	34
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	7	1127	3	9	695	16	27	0	12	12	0	38
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	7	1127	3	9	695	16	27	0	12	12	0	38
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	7	1127	3	9	695	16	27	0	12	12	0	38
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.99	0.01	0.01	0.99	1.00	0.69	0.00	0.31	0.24	0.00	0.76
Final Sat.:	1900	1894	6	24	1876	1900	1303	0	597	464	0	1436
Capacity Analysis Module:												
Vol/Sat:	0.00	0.60	0.60	0.37	0.37	0.01	0.02	0.00	0.02	0.03	0.00	0.03
Crit Moves:		****								****		
Green/Cycle:	0.88	0.88	0.88	0.88	0.88	0.88	0.04	0.00	0.04	0.04	0.00	0.04
Volume/Cap:	0.00	0.68	0.68	0.42	0.42	0.01	0.53	0.00	0.53	0.68	0.00	0.68
Delay/Veh:	0.7	2.9	2.9	1.3	1.3	0.7	53.9	0.0	53.9	69.4	0.0	69.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.7	2.9	2.9	1.3	1.3	0.7	53.9	0.0	53.9	69.4	0.0	69.4
LOS by Move:	A	A	A	A	A	A	D	A	D	E	A	E
HCM2kAvgQ:	0	11	11	4	4	0	2	0	2	3	0	3

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.646
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	37.7
Optimal Cycle:	43	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	2 0	1	1 0	2 0	1	2 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	63	544	92	136	245	99	139	345	56	80	342	167
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	77	669	113	167	301	122	171	424	69	98	421	205
Added Vol:	35	138	118	0	173	3	2	22	54	235	12	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	112	807	231	167	474	125	173	446	123	333	433	205
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.75	0.83	0.72	0.87	0.84	0.88	0.91	0.92	0.91	0.74	0.96	0.72
PHF Volume:	150	972	321	192	565	142	190	485	135	451	451	285
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	150	972	321	192	565	142	190	485	135	451	451	285
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	150	972	321	192	565	142	190	485	135	451	451	285
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3800	1900	1900	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.08	0.26	0.17	0.10	0.15	0.07	0.10	0.13	0.07	0.12	0.12	0.15
Crit Moves:		****		****				****		****		
Green/Cycle:	0.19	0.40	0.40	0.16	0.36	0.36	0.15	0.20	0.39	0.18	0.23	0.23
Volume/Cap:	0.41	0.65	0.43	0.65	0.41	0.21	0.66	0.65	0.18	0.65	0.52	0.66
Delay/Veh:	43.3	30.4	26.7	52.4	29.0	26.6	53.3	46.3	24.2	47.5	41.1	45.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.3	30.4	26.7	52.4	29.0	26.6	53.3	46.3	24.2	47.5	41.1	45.7
LOS by Move:	D	C	C	D	C	C	D	D	C	D	D	D
HCM2kAvgQ:	5	15	9	8	8	4	8	9	3	9	8	10

Note: Queue reported is the number of cars per lane.

```
----------------------------------------------------------------------------
                    UCR west Campus Development Plan
               Phase 3 - 2020  Conditions with Mitigation
                                AM Peak
----------------------------------------------------------------------------
                   Level Of Service Computation Report
         2000 HCM Operations Method (Future Volume Alternative)
****************************************************************************
Intersection #71 SW Mall at Iowa Avenue
****************************************************************************
Cycle (sec):        100                 Critical Vol./Cap.(X):         0.661
Loss Time (sec):      8 (Y+R=4.0 sec)  Average Delay (sec/veh):         5.2
Optimal Cycle:       44                 Level Of Service:                  A
****************************************************************************
Street Name:                 SW Mall                      Iowa Avenue
Approach:       North Bound      South Bound      East Bound      West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Permitted        Permitted        Permitted        Permitted
Rights:           Include          Include          Include          Include
Min. Green:     7    7    0     0    7    7     7    0    7     0    0    0
Lanes:         1  0  1  0  1   1  0  1  0  1   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  659    0     0  337    0     0    0    0     0    0    0
Growth Adj:  1.23 1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23
Initial Bse:    0  811    0     0  415    0     0    0    0     0    0    0
Added Vol:     19  178    2    14  200   19    31    0   31    10    0    3
PasserByVol:    0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:   19  989    2    14  615   19    31    0   31    10    0    3
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:    21 1069    2    15  664   21    34    0   34    11    0    3
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:   21 1069    2    15  664   21    34    0   34    11    0    3
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    21 1069    2    15  664   21    34    0   34    11    0    3
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  0.38 1.00  0.85  0.22 1.00  0.85  0.77 1.00  0.77  0.78 1.00  0.78
Lanes:       1.00 1.00  1.00  1.00 1.00  1.00  0.50 0.00  0.50  0.77 0.00  0.23
Final Sat.:   730 1900  1615   424 1900  1615   732    0   732  1137    0   341
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.03 0.56  0.00  0.04 0.35  0.01  0.05 0.00  0.05  0.01 0.00  0.01
Crit Moves:       ****                         ****
Green/Cycle: 0.85 0.85  0.85  0.85 0.85  0.85  0.07 0.00  0.07  0.07 0.00  0.07
Volume/Cap:  0.03 0.66  0.00  0.04 0.41  0.01  0.65 0.00  0.65  0.14 0.00  0.14
Delay/Veh:    1.2  3.6   1.1   1.2  1.9   1.1  59.5  0.0  59.5  44.3  0.0  44.3
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   1.2  3.6   1.1   1.2  1.9   1.1  59.5  0.0  59.5  44.3  0.0  44.3
LOS by Move:    A    A     A     A    A     A     E    A     E     D    A     D
HCM2kAvgQ:      0   12     0     0    5     0     3    0     3     1    0     1
****************************************************************************
Note: Queue reported is the number of cars per lane.
```

```
--------------------------------------------------------------------------------
                      UCR west Campus Development Plan
                  Phase 3 - 2020  Conditions with Mitigation
                                  AM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #83 Lot 30/MLK BLvd
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         0.870
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):       22.6
Optimal Cycle:         86              Level Of Service:                  C
********************************************************************************
Street Name:                  Lot 30                          MLK Blvd
Approach:     North Bound      South Bound       East Bound        West Bound
Movement:    L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Permitted         Permitted         Protected         Protected
Rights:         Include           Include           Include           Include
Min. Green:    7    0    7    7    0    7    7    7    0    7    7    7
Lanes:       1  0  0  0  0   0  1  0  0  2   2  0  2  1  0   1  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:       4    0    0   12    0    4  321  600    0   10 1276   77
Growth Adj:  1.23 1.23 1.23 1.23 1.23 1.23 1.23 1.23 1.23 1.23 1.23 1.23
Initial Bse:    5    0    0   15    0    5  395  738    0   12 1569   95
Added Vol:      0    0    0    9    0    3   10  329    0    0  434    0
PasserByVol:    0    0    0    0    0    0    0    0    0    0    0    0
Initial Fut:    5    0    0   24    0    8  405 1067    0   12 2003   95
User Adj:    1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:     0.50 1.00 1.00 1.00 1.00 0.33 0.60 0.75 1.00 0.50 0.90 0.69
PHF Volume:    10    0    0   24    0   24  675 1423    0   25 2226  137
Reduct Vol:     0    0    0    0    0    0    0    0    0    0    0    0
Reduced Vol:   10    0    0   24    0   24  675 1423    0   25 2226  137
PCE Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Final Vol.:    10    0    0   24    0   24  675 1423    0   25 2226  137
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900
Adjustment:  0.79 1.00 1.00 0.73 1.00 0.75 0.90 1.00 1.00 0.95 1.00 0.85
Lanes:       1.00 0.00 0.00 1.00 0.00 2.00 2.00 3.00 0.00 1.00 2.00 1.00
Final Sat.:  1505    0    0 1379    0 2842 3420 5700    0 1805 3800 1615
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01 0.00 0.00 0.02 0.00 0.01 0.20 0.25 0.00 0.01 0.59 0.08
Crit Moves:                 ****           ****                     ****
Green/Cycle: 0.07 0.00 0.00 0.07 0.00 0.07 0.21 0.66 0.00 0.19 0.64 0.64
Volume/Cap:  0.09 0.00 0.00 0.25 0.00 0.12 0.92 0.38 0.00 0.07 0.92 0.13
Delay/Veh:   43.9  0.0  0.0 45.3  0.0 43.9 55.5  7.6  0.0 33.7 22.5  7.3
User DelAdj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
AdjDel/Veh:  43.9  0.0  0.0 45.3  0.0 43.9 55.5  7.6  0.0 33.7 22.5  7.3
LOS by Move:    D    A    A    D    A    D    E    A    A    C    C    A
HCM2kAvgQ:      0    0    0    1    0    0   15    7    0    1   34    2
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR west Campus Development Plan
Phase 3 - 2020 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #85 Canyon Crest Dr at MLK BLvd

****

Cycle (sec):	120	Critical Vol./Cap.(X):	0.901
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	39.3
Optimal Cycle:	115	Level Of Service:	D

****

Street Name:		Canyon Crest Dr						MLK Blvd				
Approach:		North Bound			South Bound			East Bound			West Bound	
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Ovl			Ovl			Include	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 2 0 1			2 0 3 0 2			2 0 2 0 1		
Volume Module: Existing AM Peak												
Base Vol:	1153	452	445	41	84	52	130	185	323	108	335	36
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	1418	556	547	50	103	64	160	228	397	133	412	44
Added Vol:	86	51	0	31	13	32	118	182	38	0	316	117
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	1504	607	547	81	116	96	278	410	435	133	728	161
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.74	0.79	0.68	0.88	0.59	0.83	0.72	0.94	0.93	0.89	0.56
PHF Volume:	1635	820	693	120	132	163	335	569	463	143	818	288
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	1635	820	693	120	132	163	335	569	463	143	818	288
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	1635	820	693	120	132	163	335	569	463	143	818	288
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	1.00	0.85	0.90	1.00	0.85	0.90	1.00	0.75	0.90	1.00	0.85
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	3.00	2.00	2.00	2.00	1.00
Final Sat.:	3420	3800	1615	3420	3800	1615	3420	5700	2842	3420	3800	1615
Capacity Analysis Module:												
Vol/Sat:	0.48	0.22	0.43	0.04	0.03	0.10	0.10	0.10	0.16	0.04	0.22	0.18
Crit Moves:	****				****		****				****	
Green/Cycle:	0.52	0.51	0.51	0.07	0.06	0.16	0.11	0.21	0.73	0.13	0.23	0.23
Volume/Cap:	0.92	0.42	0.84	0.51	0.60	0.61	0.92	0.47	0.22	0.33	0.92	0.76
Delay/Veh:	35.1	18.7	33.5	55.7	59.5	50.7	81.5	41.4	5.2	48.4	59.7	51.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	35.1	18.7	33.5	55.7	59.5	50.7	81.5	41.4	5.2	48.4	59.7	51.8
LOS by Move:	D	B	C	E	E	D	F	D	A	D	E	D
HCM2kAvgQ:	33	9	24	3	3	6	10	6	3	3	19	12

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Note: Queue reported is the number of cars per lane.

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                     UCR west Campus Development Plan
                Phase 3 - 2020  Conditions with Mitigation
                                AM Peak
--------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #109 Iowa Ave at Everton Place
********************************************************************************
Cycle (sec):         100              Critical Vol./Cap.(X):          0.699
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):         8.8
Optimal Cycle:        48              Level Of Service:                  A
********************************************************************************
Street Name:              Iowa Avenue                       Everton Place
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted        Permitted        Permitted
Rights:          Include          Include          Include          Include
Min. Green:     7    7     7    7    7     7    7    7     7    7    7     7
Lanes:        1  0  1  0  1   1  0  1  0  1   1  0  0  1  0   1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Exsting AM Peak
Base Vol:       0  659    56   28  337     0    0    0     0   10    0    21
Growth Adj:  1.23 1.23  1.23 1.23 1.23  1.23 1.23 1.23  1.23 1.23 1.23  1.23
Initial Bse:    0  811    69   34  415     0    0    0     0   12    0    26
Added Vol:     15  142   104  253  177    32   53    0    25   31    0    97
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:   15  953   173  287  592    32   53    0    25   43    0   123
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 0.90  0.54 0.88 0.83  1.00 1.00 1.00  1.00 0.83 1.00  0.75
PHF Volume:    15 1058   320  327  713    32   53    0    25   52    0   164
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:   15 1058   320  327  713    32   53    0    25   52    0   164
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:    15 1058   320  327  713    32   53    0    25   52    0   164
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       1.00 1.00  1.00 1.00 1.00  1.00 1.00 0.00  1.00 1.00 0.00  1.00
Final Sat.:  1900 1900  1900 1900 1900  1900 1900    0  1900 1900    0  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01 0.56  0.17 0.17 0.38  0.02 0.03 0.00  0.01 0.03 0.00  0.09
Crit Moves:       ****                                                    ****
Green/Cycle: 0.80 0.80  0.80 0.80 0.80  0.80 0.12 0.00  0.12 0.12 0.00  0.12
Volume/Cap:  0.01 0.70  0.21 0.22 0.47  0.02 0.23 0.00  0.11 0.22 0.00  0.70
Delay/Veh:    2.1  6.1   2.6  2.6  3.5   2.1 40.0  0.0  39.1 40.0  0.0  51.1
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:   2.1  6.1   2.6  2.6  3.5   2.1 40.0  0.0  39.1 40.0  0.0  51.1
LOS by Move:    A    A     A    A    A     A    D    A     D    D    A     D
HCM2kAvgQ:      0   16     2    3    7     0    2    0     1    2    0     6
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR west Campus Development Plan
Phase 3 - 2020 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	0.715
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	35.5
Optimal Cycle:	52	Level Of Service:	D

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:		Ovl			Ovl			Ovl			Ovl	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 2 0 1			1 0 3 0 2			2 0 3 0 1		
Volume Module: Existing AM Peak												
Base Vol:	707	898	228	60	209	113	133	543	131	40	638	138
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	870	1105	280	74	257	139	164	668	161	49	785	170
Added Vol:	0	2	72	183	1	3	4	181	0	34	88	105
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	870	1107	352	257	258	142	168	849	161	83	873	275
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.87	0.92	0.70	0.80	0.80	0.81	0.85	0.74	0.90	0.71	0.94	0.78
PHF Volume:	1000	1203	503	321	323	175	197	1147	179	117	928	352
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	1000	1203	503	321	323	175	197	1147	179	117	928	352
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	1000	1203	503	321	323	175	197	1147	179	117	928	352
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	3.00	2.00	2.00	3.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	5700	3800	3800	5700	1900
Capacity Analysis Module:												
Vol/Sat:	0.26	0.32	0.26	0.08	0.08	0.09	0.10	0.20	0.05	0.03	0.16	0.19
Crit Moves:		****		****			****				****	
Green/Cycle:	0.42	0.44	0.53	0.12	0.14	0.28	0.15	0.29	0.71	0.08	0.23	0.35
Volume/Cap:	0.62	0.72	0.50	0.72	0.62	0.33	0.72	0.70	0.07	0.37	0.72	0.54
Delay/Veh:	27.8	28.8	18.7	56.4	51.2	34.5	57.6	39.3	5.2	52.7	44.7	32.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	27.8	28.8	18.7	56.4	51.2	34.5	57.6	39.3	5.2	52.7	44.7	32.4
LOS by Move:	C	C	B	E	D	C	E	D	A	D	D	C
HCM2kAvgQ:	15	19	12	7	7	5	8	13	1	2	12	11

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.654
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	34.2
Optimal Cycle:	55	Level Of Service:	C

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	208	747	110	74	320	126	173	326	88	85	386	55
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	256	919	135	91	394	155	213	401	108	105	475	68
Added Vol:	16	80	7	24	152	0	0	46	27	17	20	14
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	272	999	142	115	546	155	213	447	135	122	495	82
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.72	0.79	0.76	0.77	0.89	0.90	0.88	0.82	0.58	0.85	0.85	0.60
PHF Volume:	378	1264	187	149	613	172	242	545	233	143	582	136
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	378	1264	187	149	613	172	242	545	233	143	582	136
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	378	1264	187	149	613	172	242	545	233	143	582	136
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.10	0.33	0.10	0.04	0.16	0.09	0.06	0.14	0.12	0.04	0.15	0.07
Crit Moves:		****		****			****				****	
Green/Cycle:	0.22	0.51	0.51	0.06	0.35	0.35	0.10	0.24	0.45	0.10	0.23	0.23
Volume/Cap:	0.46	0.65	0.19	0.65	0.46	0.26	0.65	0.61	0.27	0.39	0.65	0.31
Delay/Veh:	41.3	22.5	16.2	61.9	30.3	27.9	56.4	42.2	20.7	51.7	43.3	38.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	41.3	22.5	16.2	61.9	30.3	27.9	56.4	42.2	20.7	51.7	43.3	38.3
LOS by Move:	D	C	B	E	C	C	E	D	C	D	D	D
HCM2kAvgQ:	6	17	4	4	9	4	5	10	5	3	11	4

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100		Critical Vol./Cap.(X):	0.994
Loss Time (sec):	8	(Y+R=4.0 sec)	Average Delay (sec/veh):	53.4
Optimal Cycle:	120		Level Of Service:	D

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	1 1	0	1 0	2 0	1	1 0	0 1	0	1 0	1 1	0
Volume Module: Existing AM Peak												
Base Vol:	21	771	148	140	364	33	36	102	31	154	122	153
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	26	948	182	172	448	41	44	125	38	189	150	188
Added Vol:	12	58	24	0	113	0	0	29	24	39	11	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	38	1006	206	172	561	41	44	154	62	228	161	188
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.66	0.87	0.76	0.54	0.92	0.59	0.75	0.71	0.65	0.71	0.66	0.54
PHF Volume:	57	1157	271	319	609	69	59	218	96	322	244	348
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	57	1157	271	319	609	69	59	218	96	322	244	348
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	57	1157	271	319	609	69	59	218	96	322	244	349
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.97	0.97	0.95	1.00	0.85	0.95	0.95	0.95	0.95	0.91	0.91
Lanes:	1.00	1.62	0.38	1.00	2.00	1.00	1.00	0.69	0.31	1.00	1.00	1.00
Final Sat.:	1805	2992	701	1805	3800	1615	1805	1259	553	1805	1733	1733
Capacity Analysis Module:												
Vol/Sat:	0.03	0.39	0.39	0.18	0.16	0.04	0.03	0.17	0.17	0.18	0.14	0.20
Crit Moves:		****		****				****		****		
Green/Cycle:	0.17	0.39	0.39	0.18	0.39	0.39	0.09	0.17	0.17	0.18	0.26	0.26
Volume/Cap:	0.18	0.99	0.99	0.99	0.41	0.11	0.36	0.99	0.99	0.99	0.54	0.77
Delay/Veh:	35.7	52.6	52.6	89.5	22.0	19.2	44.0	90.1	90.1	89.2	32.2	38.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	35.7	52.6	52.6	89.5	22.0	19.2	44.0	90.1	90.1	89.2	32.2	38.8
LOS by Move:	D	D	D	F	C	B	D	F	F	F	C	D
HCM2kAvgQ:	2	29	29	15	7	1	2	15	15	15	7	12

Note: Queue reported is the number of cars per lane.

UCR west Campus Development Plan
Phase 3 - 2020 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	0.833
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	38.4
Optimal Cycle:	74	Level Of Service:	D

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	2 0	2 0	1	1 0	2 0	1
Volume Module: Existing AM Peak												
Base Vol:	141	641	99	121	413	225	418	410	103	108	428	130
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	173	788	122	149	508	277	514	504	127	133	526	160
Added Vol:	20	46	21	34	91	0	0	84	15	22	39	9
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	193	834	143	183	599	277	514	588	142	155	565	169
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.78	0.93	0.85	0.72	0.69	0.84	0.89	0.75	0.89	0.93	0.88	0.79
PHF Volume:	248	897	168	254	868	329	578	784	159	166	643	214
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	248	897	168	254	868	329	578	784	159	166	643	214
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	248	897	168	254	868	329	578	784	159	166	643	214
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.45	0.55	2.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	2755	1045	3800	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.13	0.24	0.09	0.13	0.32	0.32	0.15	0.21	0.08	0.09	0.17	0.11
Crit Moves:	****				****		****				****	
Green/Cycle:	0.16	0.34	0.34	0.19	0.38	0.38	0.18	0.27	0.27	0.11	0.20	0.20
Volume/Cap:	0.83	0.69	0.26	0.69	0.83	0.83	0.83	0.76	0.31	0.76	0.83	0.55
Delay/Veh:	58.8	30.0	24.0	43.1	32.6	32.6	48.0	37.0	29.4	57.6	46.0	37.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	58.8	30.0	24.0	43.1	32.6	32.6	48.0	37.0	29.4	57.6	46.0	37.6
LOS by Move:	E	C	C	D	C	C	D	D	C	E	D	D
HCM2kAvgQ:	10	13	4	9	19	19	11	13	4	7	12	7

Note: Queue reported is the number of cars per lane.

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------------------------------------------------------------------------------
                    UCR west Campus Development Plan
               Phase 3 - 2020  Conditions with Mitigation
                                AM Peak
------------------------------------------------------------------------------
                    Level Of Service Computation Report
         2000 HCM Operations Method (Future Volume Alternative)
******************************************************************************
Intersection #237 Chicago Ave at 3rd Street
******************************************************************************
Cycle (sec):        120               Critical Vol./Cap.(X):         0.822
Loss Time (sec):      8 (Y+R=4.0 sec) Average Delay (sec/veh):        45.1
Optimal Cycle:       74               Level Of Service:                  D
******************************************************************************
Street Name:              Chicago Avenue                   3rd Street
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:   10    10    10    10    10    10    10    10    10    10    10    10
Lanes:        1  0  2  0  1    1  0  2  0  1    1  0  1  1  0    2  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing AM Peak
Base Vol:     176   590   177   195   315    66    94   348    71   130   425   222
Growth Adj:  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23
Initial Bse:  216   726   218   240   387    81   116   428    87   160   523   273
Added Vol:     12    36    11    30    76     0     0    23    18    18    16     8
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:  228   762   229   270   463    81   116   451   105   178   539   281
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.88  0.93  0.65  0.66  0.88  0.66  0.81  0.60  0.66  0.71  0.88  0.74
PHF Volume:   260   819   352   409   527   123   143   752   160   251   612   380
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  260   819   352   409   527   123   143   752   160   251   612   380
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   260   819   352   409   527   123   143   752   160   251   612   380
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  2.00  1.00  1.00  2.00  1.00  1.00  1.65  0.35  2.00  1.23  0.77
Final Sat.:  1900  3800  1900  1900  3800  1900  1900  3135   665  3800  2345  1455
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.14  0.22  0.19  0.22  0.14  0.06  0.08  0.24  0.24  0.07  0.26  0.26
Crit Moves:        ****        ****              ****                    ****
Green/Cycle: 0.26  0.26  0.26  0.26  0.26  0.26  0.09  0.30  0.30  0.11  0.32  0.32
Volume/Cap:  0.53  0.82  0.71  0.82  0.53  0.25  0.82  0.79  0.79  0.62  0.82  0.82
Delay/Veh:   39.1  47.2  44.7  52.2  38.3  35.0  79.4  42.0  42.0  54.5  42.4  42.4
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  39.1  47.2  44.7  52.2  38.3  35.0  79.4  42.0  42.0  54.5  42.4  42.4
LOS by Move:    D     D     D     D     D     D     E     D     D     D     D     D
HCM2kAvgQ:      8    16    13    16     9     4     7    17    17     5    19    19
******************************************************************************
Note: Queue reported is the number of cars per lane.
```

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--------------------------------------------------------------------------------
                      UCR west Campus Development Plan
                  Phase 3 - 2020  Conditions with Mitigation
                                  AM Peak
--------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #292 I-215 NB Ramps/MLK Blvd
********************************************************************************
Cycle (sec):         100              Critical Vol./Cap.(X):         0.526
Loss Time (sec):       6 (Y+R=4.0 sec) Average Delay (sec/veh):       19.0
Optimal Cycle:        28              Level Of Service:                  B
********************************************************************************
Street Name:           I-215 NB Ramp                      MLK BLvd
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted        Protected         Protected
Rights:           Include          Include          Include           Include
Min. Green:     7    7    0    0    0    0    7    0    0    0    0    0
Lanes:        1  1  0  0  0   0  0  0  0  0   2  0  0  0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: existing AM Peak
Base Vol:     311   12    0     0    0    0   554    0    0     0    0    0
Growth Adj:  1.23 1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23
Initial Bse:  383   15    0     0    0    0   681    0    0     0    0    0
Added Vol:    273    0    0     0    0    0    69    0    0     0    0    0
PasserByVol:    0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:  656   15    0     0    0    0   750    0    0     0    0    0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.84 0.60  1.00  1.00 1.00  1.00  0.89 1.00  1.00  1.00 1.00  1.00
PHF Volume:   780   25    0     0    0    0   843    0    0     0    0    0
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:  780   25    0     0    0    0   843    0    0     0    0    0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   780   25    0     0    0    0   843    0    0     0    0    0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  0.86 0.86  1.00  1.00 1.00  1.00  0.90 1.00  1.00  1.00 1.00  1.00
Lanes:       1.94 0.06  0.00  0.00 0.00  0.00  2.00 0.00  0.00  0.00 0.00  0.00
Final Sat.:  3150   99    0     0    0    0  3420    0    0     0    0    0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.25 0.25  0.00  0.00 0.00  0.00  0.25 0.00  0.00  0.00 0.00  0.00
Crit Moves:       ****                         ****
Green/Cycle: 0.47 0.47  0.00  0.00 0.00  0.00  0.47 0.00  0.00  0.00 0.00  0.00
Volume/Cap:  0.53 0.53  0.00  0.00 0.00  0.00  0.53 0.00  0.00  0.00 0.00  0.00
Delay/Veh:   18.9 18.9   0.0   0.0  0.0   0.0  19.0  0.0   0.0   0.0  0.0   0.0
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  18.9 18.9   0.0   0.0  0.0   0.0  19.0  0.0   0.0   0.0  0.0   0.0
LOS by Move:    B    B     A     A    A     A     B    A     A     A    A     A
HCM2kAvgQ:      9    9     0     0    0     0    10    0     0     0    0     0
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 3 2020 Conditions with Mitigation
PM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/C	Future LOS	Future Del/ Veh	Future V/C	Change in
# 56 NW Mall at Iowa Avenue	A	3.1	0.812	C	30.1	0.990	+26.989 D/V
# 58 Iowa Ave at University Ave	D	41.5	0.798	D	53.6	0.951	+12.105 D/V
# 71 SW Mall at Iowa Avenue	A	2.7	0.790	B	18.1	0.942	+15.376 D/V
# 83 Lot 30/MLK BLvd	B	20.0	0.702	C	21.8	0.804	+ 1.806 D/V
# 85 Canyon Crest Dr at MLK BLvd	D	36.4	0.831	D	40.7	0.889	+ 4.300 D/V
#109 Iowa Ave at Everton Place	A	8.8	0.809	D	43.4	1.072	+34.613 D/V
#137 Chicago Ave at MLK Blvd	D	40.7	0.885	D	43.4	0.936	+ 2.791 D/V
#151 Chicago Ave at University Aven	D	48.6	0.931	D	54.7	0.986	+ 6.028 D/V
#159 Chicago Ave at Linden Street	C	26.3	0.716	C	30.1	0.801	+ 3.707 D/V
#196 Iowa Ave at Blaine St	D	38.8	0.840	D	42.5	0.898	+ 3.674 D/V
#237 Chicago Ave at 3rd Street	D	46.0	0.868	D	50.1	0.912	+ 4.083 D/V
#292 I-215 NB Ramps/MLK Blvd	B	15.2	0.227	B	16.8	0.352	+ 1.602 D/V

UCR West Campus Development Plan
Phase 3 2020 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #56 NW Mall at Iowa Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.990
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	30.1
Optimal Cycle:	120	Level Of Service:	C

Street Name:	NW Mall						Iowa Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	0	0	7	7	7	0	7	0	0	0
Lanes:	1 0 0 1 0			0 1 0 0 1			0 0 1! 0 0			0 0 1! 0 0		
Volume Module:												
Base Vol:	0	503	0	0	1038	0	0	0	0	0	0	0
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	619	0	0	1277	0	0	0	0	0	0	0
Added Vol:	11	235	11	33	222	24	18	0	8	6	0	18
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	11	854	11	33	1499	24	18	0	8	6	0	18
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	12	949	12	37	1665	27	20	0	9	7	0	20
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	12	949	12	37	1665	27	20	0	9	7	0	20
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	12	949	12	37	1665	27	20	0	9	7	0	20
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.99	0.01	0.02	0.98	1.00	0.69	0.00	0.31	0.25	0.00	0.75
Final Sat.:	1900	1876	24	41	1859	1900	1315	0	585	475	0	1425
Capacity Analysis Module:												
Vol/Sat:	0.01	0.51	0.51	0.90	0.90	0.01	0.02	0.00	0.02	0.01	0.00	0.01
Crit Moves:					****		****					
Green/Cycle:	0.85	0.85	0.85	0.85	0.85	0.85	0.07	0.00	0.07	0.07	0.00	0.07
Volume/Cap:	0.01	0.59	0.59	1.05	1.05	0.02	0.22	0.00	0.22	0.20	0.00	0.20
Delay/Veh:	1.1	2.9	2.9	45.6	45.6	1.1	44.7	0.0	44.7	44.6	0.0	44.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	1.1	2.9	2.9	45.6	45.6	1.1	44.7	0.0	44.7	44.6	0.0	44.6
LOS by Move:	A	A	A	D	D	A	D	A	D	D	A	D
DesignQueue:	0	9	9	19	19	0	1	0	1	1	0	1

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #58 Iowa Ave at University Ave

Cycle (sec):	120	Critical Vol./Cap.(X):	0.951
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	53.6
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Include			Ovl			Include	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	2 0	1	1 0	2 0	1	2 0	2 0	1
Volume Module: Existing PM												
Base Vol:	93	370	129	260	800	187	217	874	152	156	374	103
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	114	455	159	320	984	230	267	1075	187	192	460	127
Added Vol:	56	192	240	0	155	3	3	15	41	144	21	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	170	647	399	320	1139	233	270	1090	228	336	481	127
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.60	0.96	0.75	0.94	0.91	0.90	0.82	0.94	0.84	0.85	0.87	0.72
PHF Volume:	284	674	532	340	1252	259	329	1160	271	395	553	176
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	284	674	532	340	1252	259	329	1160	271	395	553	176
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	284	674	532	340	1252	259	329	1160	271	395	553	176
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3800	1900	1900	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.15	0.18	0.28	0.18	0.33	0.14	0.17	0.31	0.14	0.10	0.15	0.09
Crit Moves:	****				****			****		****		
Green/Cycle:	0.16	0.31	0.31	0.20	0.35	0.35	0.23	0.32	0.48	0.11	0.20	0.20
Volume/Cap:	0.95	0.58	0.91	0.91	0.95	0.39	0.74	0.95	0.30	0.95	0.74	0.47
Delay/Veh:	89.2	35.8	58.6	73.1	53.0	30.1	49.2	55.4	19.3	85.0	49.3	43.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	89.2	35.8	58.6	73.1	53.0	30.1	49.2	55.4	19.3	85.0	49.3	43.7
LOS by Move:	F	D	E	E	D	C	D	E	B	F	D	D
DesignQueue:	17	16	27	19	30	12	18	29	10	12	15	10

Note: Queue reported is the number of cars per lane.

```
--------------------------------------------------------------------------------
                     UCR West Campus Development Plan
                 Phase 3 2020 Conditions with Mitigation
                                 PM Peak
--------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #71 SW Mall at Iowa Avenue
********************************************************************************
Cycle (sec):         100              Critical Vol./Cap.(X):         0.942
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):       18.1
Optimal Cycle:       120              Level Of Service:                  B
********************************************************************************
Street Name:                 SW Mall                          Iowa Avenue
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Permitted        Permitted        Permitted        Permitted
Rights:           Include          Include          Include          Include
Min. Green:     7     7     0    0     7     7    7     0     7    0     0     0
Lanes:         1  0  1  0  1   1  0  1  0  1   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: 2015 PM Peak
Base Vol:       0   503     0    0  1038     0    0     0     0    0     0     0
Growth Adj:  1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23  1.23 1.23  1.23  1.23
Initial Bse:    0   619     0    0  1277     0    0     0     0    0     0     0
Added Vol:     31   220    10    6   199    31   24     0    24    5     0    13
PasserByVol:    0     0     0    0     0     0    0     0     0    0     0     0
Initial Fut:   31   839    10    6  1476    31   24     0    24    5     0    13
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93
PHF Volume:    34   907    11    6  1595    34   26     0    26    5     0    14
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:   34   907    11    6  1595    34   26     0    26    5     0    14
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:    34   907    11    6  1595    34   26     0    26    5     0    14
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       1.00  1.00  1.00 1.00  1.00  1.00 0.50  0.00  0.50 0.28  0.00  0.72
Final Sat.:  1900  1900  1900 1900  1900  1900  950     0   950  528     0  1372
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.02  0.48  0.01 0.00  0.84  0.02 0.03  0.00  0.03 0.01  0.00  0.01
Crit Moves:                         ****       ****
Green/Cycle: 0.85  0.85  0.85 0.85  0.85  0.85 0.07  0.00  0.07 0.07  0.00  0.07
Volume/Cap:  0.02  0.56  0.01 0.00  0.99  0.02 0.39  0.00  0.39 0.15  0.00  0.15
Delay/Veh:    1.2   2.6   1.1  1.1  26.5   1.2 46.4   0.0  46.4 44.2   0.0  44.2
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   1.2   2.6   1.1  1.1  26.5   1.2 46.4   0.0  46.4 44.2   0.0  44.2
LOS by Move:    A     A     A    A     C     A    D     A     D    D     A     D
DesignQueue:    0     9     0    0    17     0    3     0     3    1     0     1
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
Phase 3 2020 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.804
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	21.8
Optimal Cycle:	66	Level Of Service:	C

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	0 0 0 0 1			0 1 0 0 2			2 0 2 1 0			1 0 2 0 1		
Volume Module: Existing PM Peak												
Base Vol:	0	0	1	162	0	271	31	1989	0	10	926	1
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	0	1	199	0	333	38	2446	0	12	1139	1
Added Vol:	0	0	0	5	0	10	4	481	0	0	379	1
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	204	0	343	42	2927	0	12	1518	2
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.50	1.00	0.25	0.57	1.00	0.62	0.43	0.95	1.00	0.63	0.85	1.00
PHF Volume:	0	0	5	358	0	554	98	3082	0	20	1786	2
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	5	358	0	554	98	3082	0	20	1786	2
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	5	358	0	554	98	3082	0	20	1786	2
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	0.88	0.95	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	2.00	2.00	3.00	0.00	1.00	2.00	1.00
Final Sat.:	0	0	1900	1900	0	3344	3600	5700	0	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.19	0.00	0.17	0.03	0.54	0.00	0.01	0.47	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.22	0.22	0.00	0.22	0.09	0.63	0.00	0.07	0.61	0.61
Volume/Cap:	0.00	0.00	0.01	0.86	0.00	0.75	0.30	0.86	0.00	0.15	0.77	0.00
Delay/Veh:	0.0	0.0	30.5	53.6	0.0	40.9	43.0	17.1	0.0	44.2	16.0	7.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	30.5	53.6	0.0	40.9	43.0	17.1	0.0	44.2	16.0	7.6
LOS by Move:	A	A	C	D	A	D	D	B	A	D	B	A
DesignQueue:	0	0	0	16	0	14	3	25	0	1	22	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.889
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	40.7
Optimal Cycle:	108	Level Of Service:	D

Street Name:	Canyon Crest Dr						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Ovl			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	3 0	2	2 0	2 0	1

Volume Module: Existing PM Peak												
Base Vol:	295	186	129	125	552	189	163	1043	1058	162	254	25
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	363	229	159	154	679	232	200	1283	1301	199	312	31
Added Vol:	49	21	0	109	47	110	49	347	90	0	222	48
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	412	250	159	263	726	342	249	1630	1391	199	534	79
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.77	0.83	0.81	0.80	0.73	0.72	0.64	0.84	0.86	0.86	0.87	0.78
PHF Volume:	535	301	196	328	994	476	390	1940	1618	232	614	101
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	535	301	196	328	994	476	390	1940	1618	232	614	101
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	535	301	196	328	994	476	390	1940	1618	232	614	101
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.88	0.95	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	3.00	2.00	2.00	2.00	1.00
Final Sat.:	3600	3800	1900	3600	3800	1900	3600	5700	3344	3600	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.15	0.08	0.10	0.09	0.26	0.25	0.11	0.34	0.48	0.06	0.16	0.05
Crit Moves:	****				****			****		****		
Green/Cycle:	0.17	0.24	0.24	0.22	0.29	0.48	0.18	0.38	0.55	0.07	0.27	0.27
Volume/Cap:	0.89	0.32	0.42	0.42	0.89	0.52	0.59	0.89	0.88	0.89	0.59	0.19
Delay/Veh:	64.0	37.4	38.8	40.9	49.5	22.5	46.4	39.6	28.8	84.0	38.8	33.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	64.0	37.4	38.8	40.9	49.5	22.5	46.4	39.6	28.8	84.0	38.8	33.7
LOS by Move:	E	D	D	D	D	C	D	D	C	F	D	C
DesignQueue:	16	8	10	9	25	18	12	29	32	8	16	5

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #109 Iowa Ave at Everton Place

Cycle (sec):	100	Critical Vol./Cap.(X):	1.072
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	43.4
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Iowa Avenue						Everton Place					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Permitted			Permitted			Permitted			Permitted	
Rights:		Include			Include			Include			Include	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:		1 0 1 0 1			1 0 1 0 1			1 0 0 1 0			1 0 0 1 0	
Volume Module: Existing PM Peak												
Base Vol:	0	503	29	36	1038	0	0	0	0	47	0	39
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	0	619	36	44	1277	0	0	0	0	58	0	48
Added Vol:	26	203	42	123	162	54	41	0	20	97	0	245
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	26	822	78	167	1439	54	41	0	20	155	0	293
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	0.87	0.81	0.69	0.97	1.00	1.00	1.00	1.00	0.59	1.00	0.75
PHF Volume:	26	944	96	242	1483	54	41	0	20	262	0	391
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	26	944	96	242	1483	54	41	0	20	262	0	391
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	26	944	96	242	1483	54	41	0	20	262	0	391
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Final Sat.:	1900	1900	1900	1900	1900	1900	1900	0	1900	1900	0	1900
Capacity Analysis Module:												
Vol/Sat:	0.01	0.50	0.05	0.13	0.78	0.03	0.02	0.00	0.01	0.14	0.00	0.21
Crit Moves:					****							****
Green/Cycle:	0.73	0.73	0.73	0.73	0.73	0.73	0.19	0.00	0.19	0.19	0.00	0.19
Volume/Cap:	0.02	0.68	0.07	0.18	1.07	0.04	0.11	0.00	0.05	0.72	0.00	1.07
Delay/Veh:	3.8	8.8	3.9	4.3	59.6	3.8	33.5	0.0	33.1	44.7	0.0	108.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	3.8	8.8	3.9	4.3	59.6	3.8	33.5	0.0	33.1	44.7	0.0	108.0
LOS by Move:	A	A	A	A	E	A	C	A	C	D	A	F
DesignQueue:	0	16	1	4	28	1	2	0	1	12	0	19

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	0.936
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	43.4
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Chicago Avenue		Martin Luther King Blvd	
Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Protected	Protected	Protected	Protected
Rights:	Ovl	Ovl	Ovl	Ovl
Lanes:	2 0 2 0 1	2 0 2 0 1	1 0 3 0 2	2 0 3 0 1

	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Volume Module: Existing PM Peak												
Base Vol:	140	287	61	366	1057	201	170	1283	792	249	514	105
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	172	353	75	450	1300	247	209	1578	974	306	632	129
Added Vol:	0	1	43	129	2	5	4	111	0	73	186	200
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	172	354	118	579	1302	252	213	1689	974	379	818	329
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.84	0.66	0.92	0.91	0.88	0.92	0.96	0.92	0.71	0.86	0.82
PHF Volume:	181	421	179	630	1431	287	232	1759	1059	534	951	401
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	181	421	179	630	1431	287	232	1759	1059	534	951	401
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	181	421	179	630	1431	287	232	1759	1059	534	951	401
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	3.00	2.00	2.00	3.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	5700	3800	3800	5700	1900
Capacity Analysis Module:												
Vol/Sat:	0.05	0.11	0.09	0.17	0.38	0.15	0.12	0.31	0.28	0.14	0.17	0.21
Crit Moves:	****				****			****		****		
Green/Cycle:	0.06	0.18	0.33	0.27	0.40	0.60	0.20	0.33	0.39	0.15	0.28	0.55
Volume/Cap:	0.82	0.60	0.28	0.60	0.94	0.25	0.61	0.94	0.72	0.94	0.61	0.38
Delay/Veh:	76.5	46.5	29.8	38.9	47.0	11.4	46.4	49.7	33.2	75.2	38.5	15.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	76.5	46.5	29.8	38.9	47.0	11.4	46.4	49.7	33.2	75.2	38.5	15.7
LOS by Move:	E	D	C	D	D	B	D	D	C	E	D	B
DesignQueue:	6	12	8	16	32	8	13	29	23	16	16	13

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.986
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	54.7
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	237	363	126	155	956	86	182	796	463	309	385	72
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	292	446	155	191	1176	106	224	979	569	380	474	89
Added Vol:	30	165	17	17	100	0	0	25	19	10	45	25
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	322	611	172	208	1276	106	224	1004	588	390	519	114
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.86	0.92	0.73	0.84	0.89	0.77	0.81	0.90	0.87	0.87	0.92	0.82
PHF Volume:	374	665	236	247	1434	137	276	1116	676	448	564	138
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	374	665	236	247	1434	137	276	1116	676	448	564	138
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	374	665	236	247	1434	137	276	1116	676	448	564	138
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.10	0.17	0.12	0.07	0.38	0.07	0.07	0.29	0.36	0.12	0.15	0.07
Crit Moves:	****				****			****		****		
Green/Cycle:	0.10	0.35	0.35	0.13	0.38	0.38	0.14	0.30	0.40	0.12	0.28	0.28
Volume/Cap:	0.99	0.50	0.35	0.50	0.99	0.19	0.53	0.99	0.90	0.99	0.53	0.26
Delay/Veh:	96.2	30.9	29.1	49.3	56.9	24.8	49.2	65.1	47.1	91.1	37.0	33.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	96.2	30.9	29.1	49.3	56.9	24.8	49.2	65.1	47.1	91.1	37.0	33.8
LOS by Move:	F	C	C	D	E	C	D	E	D	F	D	C
DesignQueue:	12	15	11	7	33	6	8	28	30	14	14	7

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #159 Chicago Ave at Linden Street

Cycle (sec):	100	Critical Vol./Cap.(X):	0.801
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	30.1
Optimal Cycle:	65	Level Of Service:	C

Street Name:	Chicago Avenue						Linden Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Include			Include			Include	
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0 1 1 0			1 0 2 0 1			1 0 0 1 0			1 0 1 1 0		
Volume Module: Existing PM Peak												
Base Vol:	61	432	161	172	1149	145	29	83	46	110	124	94
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	75	531	198	212	1413	178	36	102	57	135	153	116
Added Vol:	26	120	45	0	72	0	0	15	15	29	28	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	101	651	243	212	1485	178	36	117	72	164	181	116
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.97	0.84	0.78	0.91	0.79	0.81	0.83	0.72	0.71	0.82	0.81
PHF Volume:	112	672	289	271	1632	226	44	141	99	231	220	143
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	112	672	289	271	1632	226	44	141	99	231	220	143
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	112	672	289	271	1632	226	44	141	99	231	220	143
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.40	0.60	1.00	2.00	1.00	1.00	0.59	0.41	1.00	1.21	0.79
Final Sat.:	1900	2656	1144	1900	3800	1900	1900	1115	785	1900	2305	1495
Capacity Analysis Module:												
Vol/Sat:	0.06	0.25	0.25	0.14	0.43	0.12	0.02	0.13	0.13	0.12	0.10	0.10
Crit Moves:	****				****			****		****		
Green/Cycle:	0.07	0.39	0.39	0.22	0.54	0.54	0.13	0.16	0.16	0.15	0.18	0.18
Volume/Cap:	0.80	0.65	0.65	0.65	0.80	0.22	0.18	0.80	0.80	0.80	0.53	0.53
Delay/Veh:	72.7	25.9	25.9	39.0	21.2	12.3	39.0	54.8	54.8	55.6	38.1	38.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	72.7	25.9	25.9	39.0	21.2	12.3	39.0	54.8	54.8	55.6	38.1	38.1
LOS by Move:	E	C	C	D	C	B	D	D	D	E	D	D
DesignQueue:	6	17	17	12	24	6	2	12	12	11	8	8

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 3 2020 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	0.898
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	42.5
Optimal Cycle:	99	Level Of Service:	D

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	2 0	2 0	1	1 0	2 0	1
Volume Module: Existing PM Peak												
Base Vol:	198	510	145	193	768	167	302	438	268	149	271	109
Growth Adj:	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Initial Bse:	244	627	178	237	945	205	371	539	330	183	333	134
Added Vol:	19	95	25	14	57	0	0	51	21	23	81	32
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	263	722	203	251	1002	205	371	590	351	206	414	166
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.86	0.86	0.72	0.96	0.84	0.91	0.88	0.96	0.83	0.89	0.78
PHF Volume:	313	840	236	349	1043	245	408	670	365	249	466	213
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	313	840	236	349	1043	245	408	670	365	249	466	213
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	313	840	236	349	1043	245	408	670	365	249	466	213
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.62	0.38	2.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3078	722	3800	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.16	0.22	0.12	0.18	0.34	0.34	0.11	0.18	0.19	0.13	0.12	0.11
Crit Moves:	****				****				****	****		
Green/Cycle:	0.18	0.31	0.31	0.25	0.38	0.38	0.17	0.21	0.21	0.15	0.19	0.19
Volume/Cap:	0.90	0.72	0.41	0.72	0.90	0.90	0.64	0.82	0.90	0.90	0.64	0.58
Delay/Veh:	64.7	33.2	28.0	39.4	37.2	37.2	41.0	44.4	60.3	71.3	39.2	39.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	64.7	33.2	28.0	39.4	37.2	37.2	41.0	44.4	60.3	71.3	39.2	39.2
LOS by Move:	E	C	C	D	D	D	D	D	E	E	D	D
DesignQueue:	15	17	9	15	24	24	10	15	17	12	11	10

Note: Queue reported is the number of cars per lane.

```
-------------------------------------------------------------------------------
                      UCR West Campus Development Plan
                  Phase 3 2020 Conditions with Mitigation
                                 PM Peak
-------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #237 Chicago Ave at 3rd Street
*******************************************************************************
Cycle (sec):        120              Critical Vol./Cap.(X):         0.912
Loss Time (sec):      8 (Y+R=4.0 sec) Average Delay (sec/veh):       50.1
Optimal Cycle:      115              Level Of Service:                 D
*******************************************************************************
Street Name:          Chicago Avenue                    3rd Street
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:   10    10    10   10    10    10   10    10    10   10    10    10
Lanes:        1  0  2  0  1    1  0  2  0  1    1  0  1  1  0    2  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM Peak
Base Vol:      88   415   136   260   865   107   137   636   264   240   294    81
Growth Adj:  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23  1.23
Initial Bse:  108   510   167   320  1064   132   169   782   325   295   362   100
Added Vol:     20    79    21    12    45     0     0    18    14    13    24    27
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:  128   589   188   332  1109   132   169   800   339   308   386   127
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.76  0.82  0.79  0.83  0.90  0.72  0.82  0.85  0.85  0.95  0.84  0.81
PHF Volume:   169   719   238   400  1232   183   205   942   398   324   459   156
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  169   719   238   400  1232   183   205   942   398   324   459   156
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   169   719   238   400  1232   183   206   942   398   324   459   156
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  2.00  1.00  1.00  2.00  1.00  1.00  1.41  0.59  2.00  1.49  0.51
Final Sat.:  1900  3800  1900  1900  3800  1900  1900  2670  1130  3800  2835   965
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.09  0.19  0.13  0.21  0.32  0.10  0.11  0.35  0.35  0.09  0.16  0.16
Crit Moves:  ****                    ****              ****        ****
Green/Cycle: 0.10  0.21  0.21  0.24  0.36  0.36  0.19  0.39  0.39  0.09  0.29  0.29
Volume/Cap:  0.91  0.88  0.58  0.88  0.91  0.27  0.56  0.91  0.91  0.91  0.56  0.56
Delay/Veh:   95.6  56.7  44.5  62.1  46.4  27.8  45.9  43.8  43.8  80.7  37.0  37.0
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  95.6  56.7  44.5  62.1  46.4  27.8  45.9  43.8  43.8  80.7  37.0  37.0
LOS by Move:    F     E     D     E     D     C     D     D     D     F     D     D
DesignQueue:   10    20    13    21    29     8    11    30    30    10    15    15
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

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-----------------------------------------------------------------------------
                   UCR West Campus Development Plan
               Phase 3 2020 Conditions with Mitigation
                              PM Peak
-----------------------------------------------------------------------------

                  Level Of Service Computation Report
         2000 HCM Operations Method (Future Volume Alternative)
*****************************************************************************
Intersection #292 I-215 NB Ramps/MLK Blvd
*****************************************************************************
Cycle (sec):         100               Critical Vol./Cap.(X):         0.352
Loss Time (sec):       6 (Y+R=4.0 sec) Average Delay (sec/veh):        16.8
Optimal Cycle:        22               Level Of Service:                  B
*****************************************************************************
Street Name:               I-215 NB Ramp                      MLK BLvd
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:          Permitted        Permitted        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:     7    7    0     0    0    0     7    0    0     0    0    0
Lanes:          1  1  0  0  0   0  0  0  0  0   2  0  0  0  0   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Existing PM
Base Vol:     333    1    0     0    0    0   188    0    0     0    0    0
Growth Adj:  1.23 1.23 1.23  1.23 1.23 1.23  1.23 1.23 1.23  1.23 1.23 1.23
Initial Bse:  410    1    0     0    0    0   231    0    0     0    0    0
Added Vol:    179    0    0     0    0    0   167    0    0     0    0    0
PasserByVol:    0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:  589    1    0     0    0    0   398    0    0     0    0    0
User Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:     0.87 0.25 1.00  1.00 1.00 1.00  0.73 1.00 1.00  1.00 1.00 1.00
PHF Volume:   677    5    0     0    0    0   546    0    0     0    0    0
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:  677    5    0     0    0    0   546    0    0     0    0    0
PCE Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:   677    5    0     0    0    0   546    0    0     0    0    0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
Adjustment:  1.00 1.00 1.00  1.00 1.00 1.00  0.95 1.00 1.00  1.00 1.00 1.00
Lanes:       1.99 0.01 0.00  0.00 0.00 0.00  2.00 0.00 0.00  0.00 0.00 0.00
Final Sat.:  3773   27    0     0    0    0  3600    0    0     0    0    0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.18 0.18 0.00  0.00 0.00 0.00  0.15 0.00 0.00  0.00 0.00 0.00
Crit Moves:       ****                       ****
Green/Cycle: 0.51 0.51 0.00  0.00 0.00 0.00  0.43 0.00 0.00  0.00 0.00 0.00
Volume/Cap:  0.35 0.35 0.00  0.00 0.00 0.00  0.35 0.00 0.00  0.00 0.00 0.00
Delay/Veh:   14.8 14.8  0.0   0.0  0.0  0.0  19.3  0.0  0.0   0.0  0.0  0.0
User DelAdj: 1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:  14.8 14.8  0.0   0.0  0.0  0.0  19.3  0.0  0.0   0.0  0.0  0.0
LOS by Move:    B    B    A     A    A    A     B    A    A     A    A    A
DesignQueue:   10   10    0     0    0    0     9    0    0     0    0    0
*****************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2025 - Phase 4 Conditions with Mitigation
AM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/ Veh	Base V/ C	Future LOS	Future Del/ Veh	Future V/ C	Change in
# 56 NW Mall at Iowa Avenue	A	0.8	0.530	A	5.4	0.723	+ 4.608 D/V
# 58 Iowa Ave at University Ave	D	36.7	0.569	D	37.7	0.629	+ 0.944 D/V
# 71 SW Mall at Iowa Avenue	A	0.8	0.530	A	6.0	0.699	+ 5.229 D/V
# 78 Iowa Ave at MLK Blvd	C	20.9	0.599	C	25.0	0.761	+ 4.107 D/V
# 83 Lot 30/MLK BLvd	B	15.5	0.659	B	19.3	0.856	+ 3.898 D/V
# 85 Canyon Crest Dr at MLK BLvd	C	25.6	0.715	D	41.9	0.943	+16.283 D/V
#109 Iowa Ave at Everton Place	A	3.3	0.547	A	8.7	0.726	+ 5.366 D/V
#137 Chicago Ave at MLK Blvd	C	32.4	0.654	D	36.4	0.769	+ 4.081 D/V
#151 Chicago Ave at University Aven	C	33.6	0.567	C	33.8	0.621	+ 0.255 D/V
#159 Chicago Ave at Linden Street	C	29.8	0.713	C	33.6	0.827	+ 3.807 D/V
#196 Iowa Ave at Blaine St	C	34.2	0.710	D	36.5	0.786	+ 2.330 D/V
#237 Chicago Ave at 3rd Street	D	40.2	0.719	D	41.5	0.759	+ 1.331 D/V
#292 I-215 NB Ramps/MLK Blvd	B	15.7	0.357	B	18.6	0.498	+ 2.903 D/V

UCR West Campus Development Plan
2025 - Phase 4 Conditions with Mitigation
AM Peak

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]

```
--------------------------------------------------------------------------------
                        UCR West Campus Development Plan
                    2025 - Phase 4 Conditions with Mitigation
                                    AM Peak
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
             2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):          0.723
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):         5.4
Optimal Cycle:         51              Level Of Service:                  A
********************************************************************************
Street Name:                  NW Mall                       Iowa Avenue
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted        Permitted        Permitted
Rights:          Include          Include          Include          Include
Min. Green:     7     7     0    0     7     7    7     0     7    0     0     0
Lanes:        1  0  0  1  0   0  1  0  0  1   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:       0   659     0     0   337     0     0     0     0     0     0     0
Growth Adj:  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30
Initial Bse:    0   857     0     0   438     0     0     0     0     0     0     0
Added Vol:      6   265     3     8   256    14    24     0    11    11     0    34
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:    6  1122     3     8   694    14    24     0    11    11     0    34
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93
PHF Volume:     6  1213     3     9   750    15    26     0    12    12     0    37
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:    6  1213     3     9   750    15    26     0    12    12     0    37
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:     6  1213     3     9   750    15    26     0    12    12     0    37
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       1.00  0.99  0.01  0.01  0.99  1.00  0.69  0.00  0.31  0.24  0.00  0.76
Final Sat.:  1900  1895     5    22  1878  1900  1303     0   597   464     0  1436
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.64  0.64  0.40  0.40  0.01  0.02  0.00  0.02  0.03  0.00  0.03
Crit Moves:        ****                                             ****
Green/Cycle: 0.88  0.88  0.88  0.88  0.88  0.88  0.04  0.00  0.04  0.04  0.00  0.04
Volume/Cap:  0.00  0.72  0.72  0.45  0.45  0.01  0.56  0.00  0.56  0.72  0.00  0.72
Delay/Veh:    0.7   3.4   3.4   1.3   1.3   0.7  57.9   0.0  57.9  79.7   0.0  79.7
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   0.7   3.4   3.4   1.3   1.3   0.7  57.9   0.0  57.9  79.7   0.0  79.7
LOS by Move:    A     A     A     A     A     A     E     A     E     E     A     E
DesignQueue:    0     9     9     5     5     0     2     0     2     3     0     3
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2025 - Phase 4 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #58 Iowa Ave at University Ave

****

Cycle (sec):	120		Critical Vol./Cap.(X):	0.629
Loss Time (sec):	8	(Y+R=4.0 sec)	Average Delay (sec/veh):	37.7
Optimal Cycle:	42		Level Of Service:	D

****

Street Name:	Iowa Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	2 0	1	1 0	2 0	1	2 0	2 0	1
Volume Module: Phase 4 AM												
Base Vol:	63	544	92	136	245	99	139	345	56	80	342	167
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	82	707	120	177	319	129	181	449	73	104	445	217
Added Vol:	42	167	133	0	211	24	8	23	68	288	13	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	124	874	253	177	530	153	189	472	141	392	458	217
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	134	945	273	191	572	165	204	510	152	424	495	235
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	134	945	273	191	572	165	204	510	152	424	495	235
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	134	945	273	191	572	165	204	510	152	424	495	235
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3800	1900	1900	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.07	0.25	0.14	0.10	0.15	0.09	0.11	0.13	0.08	0.11	0.13	0.12
Crit Moves:		****		****			****				****	
Green/Cycle:	0.18	0.40	0.40	0.16	0.38	0.38	0.17	0.21	0.38	0.17	0.21	0.21
Volume/Cap:	0.40	0.63	0.36	0.63	0.40	0.23	0.63	0.65	0.21	0.65	0.63	0.60
Delay/Veh:	44.5	30.0	25.9	51.2	27.5	25.6	50.1	45.6	24.9	48.7	45.0	45.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	44.5	30.0	25.9	51.2	27.5	25.6	50.1	45.6	24.9	48.7	45.0	45.5
LOS by Move:	D	C	C	D	C	C	D	D	C	D	D	D
DesignQueue:	7	20	11	11	12	7	12	14	6	12	14	13

****

Note: Queue reported is the number of cars per lane.

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                       UCR West Campus Development Plan
                   2025 - Phase 4 Conditions with Mitigation
                                  AM Peak
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #71 SW Mall at Iowa Avenue
********************************************************************************
Cycle (sec):         100                Critical Vol./Cap.(X):         0.699
Loss Time (sec):       8 (Y+R=4.0 sec)  Average Delay (sec/veh):         6.0
Optimal Cycle:        48                Level Of Service:                  A
********************************************************************************
Street Name:                  SW Mall                         Iowa Avenue
Approach:       North Bound       South Bound        East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Permitted         Permitted         Permitted         Permitted
Rights:            Include           Include           Include           Include
Min. Green:     7    7     0     0    7     7     7    0     7     0    0     0
Lanes:        1  0  1  0  1    1  0  1  0  1    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:       0  659     0     0  337     0     0    0     0     0    0     0
Growth Adj:  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30
Initial Bse:    0  857     0     0  438     0     0    0     0     0    0     0
Added Vol:     19  211     5    34  226    19    31    0    31    20    0    33
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   19 1068     5    34  664    19    31    0    31    20    0    33
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:    21 1154     5    37  718    21    34    0    34    22    0    36
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   21 1154     5    37  718    21    34    0    34    22    0    36
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    21 1154     5    37  718    21    34    0    34    22    0    36
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 1.00  1.00  1.00 1.00  1.00  0.50 0.00  0.50  0.38 0.00  0.62
Final Sat.:  1900 1900  1900  1900 1900  1900   950    0   950   717    0  1183
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01 0.61  0.00  0.02 0.38  0.01  0.04 0.00  0.04  0.03 0.00  0.03
Crit Moves:       ****                         ****
Green/Cycle: 0.85 0.85  0.85  0.85 0.85  0.85  0.07 0.00  0.07  0.07 0.00  0.07
Volume/Cap:  0.01 0.71  0.00  0.02 0.44  0.01  0.50 0.00  0.50  0.43 0.00  0.43
Delay/Veh:    1.1  4.4   1.1   1.2  2.0   1.1  47.9  0.0  47.9  46.8  0.0  46.8
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   1.1  4.4   1.1   1.2  2.0   1.1  47.9  0.0  47.9  46.8  0.0  46.8
LOS by Move:    A    A     A     A    A     A     D    A     D     D    A     D
DesignQueue:    0   11     0     0    7     0     3    0     3     3    0     3
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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                      UCR West Campus Development Plan
                  2025 - Phase 4 Conditions with Mitigation
                                  AM Peak
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #78 Iowa Ave at MLK Blvd
********************************************************************************
Cycle (sec):          110              Critical Vol./Cap.(X):          0.761
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        25.0
Optimal Cycle:         58              Level Of Service:                  C
********************************************************************************
Street Name:                Iowa Avenue                       MLK Blvd
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:          Protected        Protected        Protected        Protected
Rights:            Include            Ovl             Include            Ovl
Min. Green:     0     0     0    7     7     7    7     7     0    0     7     7
Lanes:         0  0  0  0  0   1  0  1! 0  1   1  0  3  0  0   0  0  3  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:       0     0     0   263     0   101   267   440     0     0   785   484
Growth Adj:  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30  1.30
Initial Bse:    0     0     0   342     0   131   347   572     0     0  1021   629
Added Vol:      0     0     0   113     0   163   124   311     0     0   439   110
PasserByVol:    0     0     0     0     0     0     0     0     0     0     0     0
Initial Fut:    0     0     0   455     0   294   471   883     0     0  1460   739
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93  0.93
PHF Volume:     0     0     0   492     0   318   509   955     0     0  1578   799
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:    0     0     0   492     0   318   509   955     0     0  1578   799
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:     0     0     0   492     0   318   509   955     0     0  1578   799
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       0.00  0.00  0.00  1.61  0.00  1.39  1.00  3.00  0.00  0.00  3.00  1.00
Final Sat.:     0     0     0  3054     0  2646  1900  5700     0     0  5700  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00  0.16  0.00  0.12  0.27  0.17  0.00  0.00  0.28  0.42
Crit Moves:                    ****              ****                    ****
Green/Cycle: 0.00  0.00  0.00  0.21  0.00  0.56  0.35  0.72  0.00  0.00  0.36  0.58
Volume/Cap:  0.00  0.00  0.00  0.76  0.00  0.21  0.76  0.23  0.00  0.00  0.76  0.73
Delay/Veh:    0.0   0.0   0.0  44.0   0.0  11.9  36.7   5.4   0.0   0.0  32.5  19.7
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0  44.0   0.0  11.9  36.7   5.4   0.0   0.0  32.5  19.7
LOS by Move:    A     A     A     D     A     B     D     A     A     A     C     B
DesignQueue:    0     0     0    15     0     6    22     6     0     0    22    23
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
2025 - Phase 4 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.856
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	19.3
Optimal Cycle:	81	Level Of Service:	B

Street Name: Lot 30 / MLK Blvd

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	1 0 0 0 0			0 1 0 0 2			2 0 2 1 0			1 0 2 0 1		
Volume Module: Phase 4 AM												
Base Vol:	4	0	0	12	0	4	321	600	0	10	1276	77
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	5	0	0	16	0	5	417	780	0	13	1659	100
Added Vol:	0	0	0	9	0	3	12	393	0	0	608	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	5	0	0	25	0	8	429	1173	0	13	2267	100
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	6	0	0	27	0	9	464	1268	0	14	2451	108
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	6	0	0	27	0	9	464	1268	0	14	2451	108
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	6	0	0	27	0	9	464	1268	0	14	2451	108
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	0.88	0.95	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	0.00	1.00	0.00	2.00	2.00	3.00	0.00	1.00	2.00	1.00
Final Sat.:	1900	0	0	1900	0	3344	3600	5700	0	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.01	0.00	0.00	0.13	0.22	0.00	0.01	0.64	0.06
Crit Moves:				****			****				****	
Green/Cycle:	0.07	0.00	0.00	0.07	0.00	0.07	0.14	0.65	0.00	0.20	0.71	0.71
Volume/Cap:	0.04	0.00	0.00	0.20	0.00	0.04	0.91	0.34	0.00	0.04	0.91	0.08
Delay/Veh:	43.5	0.0	0.0	44.6	0.0	43.4	62.7	8.1	0.0	32.0	17.1	4.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.5	0.0	0.0	44.6	0.0	43.4	62.7	8.1	0.0	32.0	17.1	4.5
LOS by Move:	D	A	A	D	A	D	E	A	A	C	B	A
DesignQueue:	0	0	0	1	0	0	12	9	0	1	24	2

Note: Queue reported is the number of cars per lane.

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                     UCR West Campus Development Plan
                 2025 - Phase 4 Conditions with Mitigation
                                  AM Peak
--------------------------------------------------------------------------------
                   Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #85 Canyon Crest Dr at MLK BLvd
********************************************************************************
Cycle (sec):          120              Critical Vol./Cap.(X):          0.943
Loss Time (sec):       10 (Y+R=4.0 sec) Average Delay (sec/veh):         41.9
Optimal Cycle:        120              Level Of Service:                  D
********************************************************************************
Street Name:              Canyon Crest Dr                      MLK Blvd
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected         Protected         Protected         Protected
Rights:            Include            Ovl               Ovl             Include
Min. Green:     7     7     7    7     7     7    7     7     7    7     7     7
Lanes:        2  0  2  0  1    2  0  2  0  1    2  0  3  0  2    2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:     1153  452   445    41   84    52   130  185   323   108  335    36
Growth Adj:   1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30
Initial Bse:  1499  588   579    53  109    68   169  240   420   140  436    47
Added Vol:     128   56     0    34   14    37   132  221    50     0  444   132
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  1627  644   579    87  123   105   301  462   470   140  880   179
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:   1759  696   625    94  133   113   325  499   508   152  951   193
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  1759  696   625    94  133   113   325  499   508   152  951   193
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   1759  696   625    94  133   113   325  499   508   152  951   193
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   0.95 1.00  1.00  0.95 1.00  1.00  0.95 1.00  0.88  0.95 1.00  1.00
Lanes:        2.00 2.00  1.00  2.00 2.00  1.00  2.00 3.00  2.00  2.00 2.00  1.00
Final Sat.:   3600 3800  1900  3600 3800  1900  3600 5700  3344  3600 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.49 0.18  0.33  0.03 0.04  0.06  0.09 0.09  0.15  0.04 0.25  0.10
Crit Moves:   ****                  ****        ****                  ****
Green/Cycle:  0.51 0.48  0.48  0.08 0.06  0.15  0.09 0.21  0.72  0.14 0.26  0.26
Volume/Cap:   0.97 0.38  0.69  0.31 0.60  0.39  0.97 0.41  0.21  0.30 0.97  0.39
Delay/Veh:    42.6 20.1  26.5  52.2 59.7  46.8  94.0 41.1   5.7  46.6 64.8  37.2
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   42.6 20.1  26.5  52.2 59.7  46.8  94.0 41.1   5.7  46.6 64.8  37.2
LOS by Move:     D    C     C     D    E     D     F    D     A     D    E     D
DesignQueue:    35   13    24     3    4     6    11    9     6     5   25    10
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2025 - Phase 4 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #109 Iowa Ave at Everton Place

Cycle (sec): 100 Critical Vol./Cap.(X): 0.726
Loss Time (sec): 8 (Y+R=4.0 sec) Average Delay (sec/veh): 8.7
Optimal Cycle: 52 Level Of Service: A

Street Name:	Iowa Avenue						Everton Place					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	1 0	1	1 0	2 0	1	1 0	0 1	0	1 0	0 1	0
Volume Module: Phase 4 AM												
Base Vol:	0	659	56	28	337	0	0	0	0	10	0	21
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	857	73	36	438	0	0	0	0	13	0	27
Added Vol:	15	176	132	321	215	32	53	0	25	38	0	114
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	15	1033	205	357	653	32	53	0	25	51	0	141
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	16	1116	221	386	706	35	57	0	27	55	0	153
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	16	1116	221	386	706	35	57	0	27	55	0	153
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	16	1116	221	386	706	35	57	0	27	55	0	153
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	2.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Final Sat.:	1900	1900	1900	1900	3800	1900	1900	0	1900	1900	0	1900
Capacity Analysis Module:												
Vol/Sat:	0.01	0.59	0.12	0.20	0.19	0.02	0.03	0.00	0.01	0.03	0.00	0.08
Crit Moves:		****										****
Green/Cycle:	0.81	0.81	0.81	0.81	0.81	0.81	0.11	0.00	0.11	0.11	0.00	0.11
Volume/Cap:	0.01	0.73	0.14	0.25	0.23	0.02	0.27	0.00	0.13	0.26	0.00	0.73
Delay/Veh:	1.8	6.2	2.1	2.4	2.3	1.9	41.5	0.0	40.4	41.4	0.0	54.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	1.8	6.2	2.1	2.4	2.3	1.9	41.5	0.0	40.4	41.4	0.0	54.9
LOS by Move:	A	A	A	A	A	A	D	A	D	D	A	D
DesignQueue:	0	14	2	4	4	0	3	0	1	3	0	8

Note: Queue reported is the number of cars per lane.

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                    UCR West Campus Development Plan
                 2025 - Phase 4 Conditions with Mitigation
                                 AM Peak
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                    Level Of Service Computation Report
         2000 HCM Operations Method (Future Volume Alternative)
*********************************************************************************
Intersection #137 Chicago Ave at MLK Blvd
*********************************************************************************
Cycle (sec):          130              Critical Vol./Cap.(X):          0.769
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):         36.4
Optimal Cycle:         61              Level Of Service:                   D
*********************************************************************************
Street Name:               Chicago Avenue             Martin Luther King Blvd
Approach:        North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:          Protected        Protected        Protected        Protected
Rights:              Ovl              Ovl              Ovl              Ovl
Min. Green:     7    7     7    7    7     7    7    7     7    7    7     7
Lanes:          2  0  2  0  1   2  0  2  0  1   1  0  3  0  2   2  0  3  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:     707  898   228    60  209   113   133  543   131    40  638   138
Growth Adj:  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30
Initial Bse:  919 1167   296    78  272   147   173  706   170    52  829   179
Added Vol:      0   14    83   231    4    11    34  210     0    39  100   210
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  919 1181   379   309  276   158   207  916   170    91  929   389
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:   994 1277   410   334  298   171   224  990   184    98 1005   421
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  994 1277   410   334  298   171   224  990   184    98 1005   421
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   994 1277   410   334  298   171   224  990   184    98 1005   421
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       2.00 2.00  1.00  2.00 2.00  1.00  1.00 3.00  2.00  2.00 3.00  1.00
Final Sat.:  3800 3800  1900  3800 3800  1900  1900 5700  3800  3800 5700  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.26 0.34  0.22  0.09 0.08  0.09  0.12 0.17  0.05  0.03 0.18  0.22
Crit Moves:       ****        ****             ****                  ****
Green/Cycle: 0.42 0.44  0.53  0.11 0.13  0.28  0.15 0.29  0.71  0.10 0.23  0.34
Volume/Cap:  0.62 0.77  0.41  0.77 0.62  0.32  0.77 0.61  0.07  0.27 0.77  0.65
Delay/Veh:   27.7 30.9  17.0  59.8 52.0  34.5  60.6 37.7   5.3  50.7 46.1  35.5
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  27.7 30.9  17.0  59.8 52.0  34.5  60.6 37.7   5.3  50.7 46.1  35.5
LOS by Move:    C    C     B     E    D     C     E    D     A     D    D     D
DesignQueue:   20   26    14    10    9     8    13   16     2     3   18    20
*********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2025 - Phase 4 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.621
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	33.8
Optimal Cycle:	52	Level Of Service:	C

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	3 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Phase 4 AM												
Base Vol:	208	747	110	74	320	126	173	326	88	85	386	55
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	270	971	143	96	416	164	225	424	114	111	502	72
Added Vol:	19	116	13	30	275	0	0	56	41	38	24	17
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	289	1087	156	126	691	164	225	480	155	149	526	89
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	313	1175	169	136	747	177	243	519	168	161	568	96
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	313	1175	169	136	747	177	243	519	168	161	568	96
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	313	1175	169	136	747	177	243	519	168	161	568	96
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	3.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	5700	1900	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.08	0.31	0.09	0.04	0.13	0.09	0.06	0.14	0.09	0.04	0.15	0.05
Crit Moves:		****		****			****				****	
Green/Cycle:	0.21	0.50	0.50	0.06	0.34	0.34	0.10	0.24	0.46	0.10	0.24	0.24
Volume/Cap:	0.38	0.62	0.18	0.62	0.38	0.27	0.62	0.57	0.19	0.41	0.62	0.21
Delay/Veh:	40.6	22.5	16.7	60.3	30.1	28.9	54.6	40.9	19.6	51.1	42.0	36.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	40.6	22.5	16.7	60.3	30.1	28.9	54.6	40.9	19.6	51.1	42.0	36.6
LOS by Move:	D	C	B	E	C	C	D	D	B	D	D	D
DesignQueue:	8	21	6	4	11	8	7	14	6	5	15	5

Note: Queue reported is the number of cars per lane.

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                     UCR West Campus Development Plan
                   2025 - Phase 4 Conditions with Mitigation
                                 AM Peak
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                     Level Of Service Computation Report
           2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #159 Chicago Ave at Linden Street
********************************************************************************
Cycle (sec):         100                Critical Vol./Cap.(X):        0.827
Loss Time (sec):       8 (Y+R=4.0 sec)  Average Delay (sec/veh):       33.6
Optimal Cycle:        72                Level Of Service:                 C
********************************************************************************
Street Name:            Chicago Avenue                  Linden Street
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    7    7     7    7    7     7    7    7     7    7    7     7
Lanes:       1  0  1  1  0    1  0  2  0  1    1  0  0  1  0    1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 AM
Base Vol:      21  771   148   140  364    33    36  102    31   154  122   153
Growth Adj:  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30
Initial Bse:   27 1002   192   182  473    43    47  133    40   200  159   199
Added Vol:     15   89    30     0  216     0     0   35    36    55   14     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   42 1091   222   182  689    43    47  168    76   255  173   199
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:    46 1180   240   197  745    46    51  181    82   276  187   215
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   46 1180   240   197  745    46    51  181    82   276  187   215
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    46 1180   240   197  745    46    51  181    82   276  187   215
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 1.66  0.34  1.00 2.00  1.00  1.00 0.69  0.31  1.00 1.00  1.00
Final Sat.:  1900 3157   643  1900 3800  1900  1900 1306   594  1900 1900  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.02 0.37  0.37  0.10 0.20  0.02  0.03 0.14  0.14  0.15 0.10  0.11
Crit Moves:       ****        ****                  ****        ****
Green/Cycle: 0.15 0.45  0.45  0.13 0.43  0.43  0.13 0.17  0.17  0.18 0.21  0.21
Volume/Cap:  0.16 0.83  0.83  0.83 0.46  0.06  0.20 0.83  0.83  0.83 0.46  0.53
Delay/Veh:   37.1 27.5  27.5  63.4 20.8  17.0  39.2 56.4  56.4  55.4 34.8  35.8
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  37.1 27.5  27.5  63.4 20.8  17.0  39.2 56.4  56.4  55.4 34.8  35.8
LOS by Move:    D    C     C     E    C     B     D    E     E     E    C     D
DesignQueue:    2   24    24    10   13     1     2   13    13    13    8    10
********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
2025 - Phase 4 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	0.786
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	36.5
Optimal Cycle:	62	Level Of Service:	D

Street Name:	Iowa Avenue						Blain Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	2 0	1	1 0	1 1	0	2 0	2 0	1	1 0	2 0	1
Volume Module: Phase 4 AM												
Base Vol:	141	641	99	121	413	225	418	410	103	108	428	130
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	183	833	129	157	537	293	543	533	134	140	556	169
Added Vol:	28	58	23	37	130	0	0	94	20	26	59	10
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	211	891	152	194	667	293	543	627	154	166	615	179
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	228	964	164	210	721	316	587	678	166	180	665	194
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	228	964	164	210	721	316	587	678	166	180	665	194
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	228	964	164	210	721	316	587	678	166	180	665	194
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.39	0.61	2.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	2641	1159	3800	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.12	0.25	0.09	0.11	0.27	0.27	0.15	0.18	0.09	0.09	0.18	0.10
Crit Moves:	****				****		****				****	
Green/Cycle:	0.15	0.35	0.35	0.15	0.35	0.35	0.20	0.27	0.27	0.15	0.22	0.22
Volume/Cap:	0.79	0.73	0.25	0.73	0.79	0.79	0.79	0.65	0.32	0.65	0.79	0.46
Delay/Veh:	54.0	30.5	23.4	49.4	32.5	32.5	43.7	33.5	29.2	45.7	41.5	34.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	54.0	30.5	23.4	49.4	32.5	32.5	43.7	33.5	29.2	45.7	41.5	34.4
LOS by Move:	D	C	C	D	C	C	D	C	C	D	D	C
DesignQueue:	11	19	6	10	20	20	14	14	7	9	15	9

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2025 - Phase 4 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	0.759
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	41.5
Optimal Cycle:	59	Level Of Service:	D

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	2 0	1	1 0	2 0	1	1 0	1 1	0	2 0	1 1	0
Volume Module: Phase 4 AM												
Base Vol:	176	590	177	195	315	66	94	348	71	130	425	222
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	229	767	230	254	410	86	122	452	92	169	553	289
Added Vol:	16	45	27	31	109	0	0	27	27	80	17	8
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	245	812	257	285	518	86	122	479	119	249	570	297
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	265	878	278	308	561	93	132	518	129	269	616	321
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	265	878	278	308	561	93	132	518	129	269	616	321
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	265	878	278	308	561	93	132	518	129	269	616	321
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	2.00	1.00	1.00	1.60	0.40	2.00	1.32	0.68
Final Sat.:	1900	3800	1900	1900	3800	1900	1900	3043	757	3800	2499	1301
Capacity Analysis Module:												
Vol/Sat:	0.14	0.23	0.15	0.16	0.15	0.05	0.07	0.17	0.17	0.07	0.25	0.25
Crit Moves:		****		****			****				****	
Green/Cycle:	0.25	0.30	0.30	0.21	0.27	0.27	0.09	0.28	0.28	0.14	0.32	0.32
Volume/Cap:	0.55	0.76	0.48	0.76	0.55	0.18	0.76	0.61	0.61	0.52	0.76	0.76
Delay/Veh:	40.5	40.8	34.7	52.5	38.6	34.2	70.7	38.6	38.6	49.1	39.1	39.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	40.5	40.8	34.7	52.5	38.6	34.2	70.7	38.6	38.6	49.1	39.1	39.1
LOS by Move:	D	D	C	D	D	C	E	D	D	D	D	D
DesignQueue:	14	22	13	17	14	5	8	16	16	8	23	23

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
2025 - Phase 4 Conditions with Mitigation
AM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #292 I-215 NB Ramps/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.498
Loss Time (sec):	6 (Y+R=4.0 sec)	Average Delay (sec/veh):	18.6
Optimal Cycle:	27	Level Of Service:	B

Street Name:	I-215 NB Ramp						MLK BLvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	0	0	0	0	7	0	0	0	0	0
Lanes:	1 1 0	0 0		0 0 0	0 0		2 0 0	0 0		0 0 0	0 0	
Volume Module: Phase 4 AM												
Base Vol:	311	12	0	0	0	0	554	0	0	0	0	0
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	404	16	0	0	0	0	720	0	0	0	0	0
Added Vol:	383	0	0	0	0	0	77	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	787	16	0	0	0	0	797	0	0	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	851	17	0	0	0	0	862	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	851	17	0	0	0	0	862	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	851	17	0	0	0	0	862	0	0	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00
Lanes:	1.96	0.04	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
Final Sat.:	3726	74	0	0	0	0	3600	0	0	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.23	0.23	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00
Crit Moves:		****					****					
Green/Cycle:	0.46	0.46	0.00	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.00	0.00
Volume/Cap:	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00
Delay/Veh:	19.2	19.2	0.0	0.0	0.0	0.0	17.9	0.0	0.0	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	19.2	19.2	0.0	0.0	0.0	0.0	17.9	0.0	0.0	0.0	0.0	0.0
LOS by Move:	B	B	A	A	A	A	B	A	A	A	A	A
DesignQueue:	14	14	0	0	0	0	14	0	0	0	0	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions with Mitigation
PM Peak

Impact Analysis Report
Level Of Service

Intersection	Base LOS	Base Del/Veh	Base V/C	Future LOS	Future Del/Veh	Future V/C	Change in
# 56 NW Mall at Iowa Avenue	A	3.6	0.835	D	44.5	1.047	+40.858 D/V
# 58 Iowa Ave at University Ave	D	40.7	0.799	D	54.4	0.955	+13.700 D/V
# 71 SW Mall at Iowa Avenue	A	3.6	0.835	C	24.0	1.010	+20.449 D/V
# 78 Iowa Ave at MLK Blvd	C	24.0	0.752	C	31.4	0.911	+ 7.389 D/V
# 83 Lot 30/MLK BLvd	B	15.3	0.671	B	17.7	0.816	+ 2.374 D/V
# 85 Canyon Crest Dr at MLK BLvd	C	33.5	0.777	D	37.0	0.839	+ 3.480 D/V
#109 Iowa Ave at Everton Place	A	4.3	0.455	B	16.3	0.778	+11.963 D/V
#137 Chicago Ave at MLK Blvd	D	41.5	0.912	D	45.8	0.969	+ 4.214 D/V
#151 Chicago Ave at University Aven	D	40.8	0.813	D	43.8	0.880	+ 2.939 D/V
#159 Chicago Ave at Linden Street	C	24.3	0.703	C	28.7	0.814	+ 4.442 D/V
#196 Iowa Ave at Blaine St	D	39.1	0.870	D	44.5	0.944	+ 5.378 D/V
#237 Chicago Ave at 3rd Street	D	45.0	0.864	D	51.1	0.927	+ 6.125 D/V
#292 I-215 NB Ramps/MLK Blvd	B	14.4	0.209	B	16.2	0.344	+ 1.748 D/V

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                       UCR West Campus Development Plan
                      Phase 4 Conditions with Mitigation
                                   PM Peak
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                      Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #56 NW Mall at Iowa Avenue
********************************************************************************
Cycle (sec):         100              Critical Vol./Cap.(X):         1.047
Loss Time (sec):       8 (Y+R=4.0 sec) Average Delay (sec/veh):        44.5
Optimal Cycle:       120              Level Of Service:                  D
********************************************************************************
Street Name:                 NW Mall                        Iowa Avenue
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted        Permitted        Permitted
Rights:          Include          Include          Include          Include
Min. Green:     7    7    0     0    7    7     7    0    7     0    0    0
Lanes:        1  0  0  1  0   0  1  0  0  1   0  0  1! 0  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 PM
Base Vol:       0  503    0     0 1038    0     0    0    0     0    0    0
Growth Adj:  1.30 1.30 1.30  1.30 1.30 1.30  1.30 1.30 1.30  1.30 1.30 1.30
Initial Bse:    0  654    0     0 1349    0     0    0    0     0    0    0
Added Vol:     11  289   11    33  285   24    18    0    8     6    0   18
PasserByVol:    0    0    0     0    0    0     0    0    0     0    0    0
Initial Fut:   11  943   11    33 1634   24    18    0    8     6    0   18
User Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:     0.93 0.93 0.93  0.93 0.93 0.93  0.93 0.93 0.93  0.93 0.93 0.93
PHF Volume:    12 1019   12    36 1767   26    19    0    9     6    0   19
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:   12 1019   12    36 1767   26    19    0    9     6    0   19
PCE Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:    12 1019   12    36 1767   26    19    0    9     6    0   19
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
Adjustment:  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Lanes:       1.00 0.99 0.01  0.02 0.98 1.00  0.69 0.00 0.31  0.25 0.00 0.75
Final Sat.:  1900 1878   22    38 1862 1900  1315    0  585   475    0 1425
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01 0.54 0.54  0.95 0.95 0.01  0.01 0.00 0.01  0.01 0.00 0.01
Crit Moves:                       ****       ****
Green/Cycle: 0.85 0.85 0.85  0.85 0.85 0.85  0.07 0.00 0.07  0.07 0.00 0.07
Volume/Cap:  0.01 0.64 0.64  1.12 1.12 0.02  0.21 0.00 0.21  0.20 0.00 0.20
Delay/Veh:    1.1  3.3  3.3  68.9 68.9  1.1  44.7  0.0 44.7  44.6  0.0 44.6
User DelAdj: 1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:   1.1  3.3  3.3  68.9 68.9  1.1  44.7  0.0 44.7  44.6  0.0 44.6
LOS by Move:    A    A    A     E    E    A     D    A    D     D    A    D
DesignQueue:    0   10   10    20   20    0     1    0    1     1    0    1
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

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-------------------------------------------------------------------------------
                       UCR West Campus Development Plan
                      Phase 4 Conditions with Mitigation
                                    PM Peak
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
              2000 HCM Operations Method (Future Volume Alternative)
*******************************************************************************
Intersection #58 Iowa Ave at University Ave
*******************************************************************************
Cycle (sec):          120              Critical Vol./Cap.(X):         0.955
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):        54.4
Optimal Cycle:        120              Level Of Service:                  D
*******************************************************************************
Street Name:                Iowa Avenue                 University Avenue
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include           Ovl            Include
Min. Green:      7     7     7     7     7     7     7     7     7     7     7     7
Lanes:         1  0  2  0  1   1  0  2  0  1   1  0  2  0  1   2  0  2  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 PM
Base Vol:       93  370   129   260  800   187   217  874   152   156  374   103
Growth Adj:   1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30
Initial Bse:   121  481   168   338 1040   243   282 1136   198   203  486   134
Added Vol:      71  233   291     0  188    13    32   15    49   166   22     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   192  714   459   338 1228   256   314 1151   247   369  508   134
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:    207  772   496   365 1328   277   340 1245   267   399  549   145
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   207  772   496   365 1328   277   340 1245   267   399  549   145
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    207  772   496   365 1328   277   340 1245   267   399  549   145
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:        1.00 2.00  1.00  1.00 2.00  1.00  1.00 2.00  1.00  2.00 2.00  1.00
Final Sat.:   1900 3800  1900  1900 3800  1900  1900 3800  1900  3800 3800  1900
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.11 0.20  0.26  0.19 0.35  0.15  0.18 0.33  0.14  0.10 0.14  0.08
Crit Moves:   ****                  ****             ****        ****
Green/Cycle:  0.11 0.28  0.28  0.20 0.37  0.37  0.25 0.34  0.46  0.11 0.20  0.20
Volume/Cap:   0.95 0.73  0.94  0.94 0.95  0.40  0.71 0.95  0.31  0.95 0.71  0.38
Delay/Veh:   101.0 42.1  68.4  78.7 51.8  28.6  46.1 53.9  20.7  85.6 47.8  41.9
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  101.0 42.1  68.4  78.7 51.8  28.6  46.1 53.9  20.7  85.6 47.8  41.9
LOS by Move:     F    D     E     E    D     C     D    D     C     F    D     D
DesignQueue:    13   20    26    20   31    12    18   30    10    12   15     8
*******************************************************************************
Note: Queue reported is the number of cars per lane.
```

UCR West Campus Development Plan
Phase 4 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #71 SW Mall at Iowa Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	1.010
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	24.0
Optimal Cycle:	120	Level Of Service:	C

Street Name:	SW Mall						Iowa Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	0	0	7	7	7	0	7	0	0	0
Lanes:	1 0	1 0	1	1 0	1 0	1	0 0	1! 0	0	0 0	1! 0	0
Volume Module: Phase 4 PM												
Base Vol:	0	503	0	0	1038	0	0	0	0	0	0	0
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	654	0	0	1349	0	0	0	0	0	0	0
Added Vol:	31	247	19	36	233	31	24	0	24	11	0	39
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	31	901	19	36	1582	31	24	0	24	11	0	39
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	34	974	21	39	1711	34	26	0	26	12	0	42
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	34	974	21	39	1711	34	26	0	26	12	0	42
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	34	974	21	39	1711	34	26	0	26	12	0	42
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.00	0.50	0.22	0.00	0.78
Final Sat.:	1900	1900	1900	1900	1900	1900	950	0	950	418	0	1482
Capacity Analysis Module:												
Vol/Sat:	0.02	0.51	0.01	0.02	0.90	0.02	0.03	0.00	0.03	0.03	0.00	0.03
Crit Moves:					****					****		
Green/Cycle:	0.89	0.89	0.89	0.89	0.89	0.89	0.03	0.00	0.03	0.03	0.00	0.03
Volume/Cap:	0.02	0.57	0.01	0.02	1.01	0.02	0.97	0.00	0.97	1.01	0.00	1.01
Delay/Veh:	0.6	1.7	0.6	0.6	29.6	0.6	159.9	0.0	159.9	174.4	0.0	174.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.6	1.7	0.6	0.6	29.6	0.6	159.9	0.0	159.9	174.4	0.0	174.4
LOS by Move:	A	A	A	A	C	A	F	A	F	F	A	F
DesignQueue:	0	7	0	0	13	0	3	0	3	3	0	3

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #78 Iowa Ave at MLK Blvd

Cycle (sec):	110	Critical Vol./Cap.(X):	0.911
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	31.4
Optimal Cycle:	111	Level Of Service:	C

Street Name:	Iowa Avenue						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Include			Ovl			Include			Ovl	
Min. Green:	0	0	0	7	7	7	7	7	0	0	7	7
Lanes:	0 0 0 0 0			1 0 1! 0 1			1 0 3 0 0			0 0 3 0 1		
Volume Module: Phase 4 PM												
Base Vol:	0	0	0	727	0	273	170	1564	0	0	667	353
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	0	0	945	0	355	221	2033	0	0	867	459
Added Vol:	0	0	0	122	0	145	180	518	0	0	366	118
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	1067	0	500	401	2551	0	0	1233	577
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	0	1154	0	540	434	2758	0	0	1333	624
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	1154	0	540	434	2758	0	0	1333	624
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	1154	0	540	434	2758	0	0	1333	624
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	0.00	1.68	0.00	1.32	1.00	3.00	0.00	0.00	3.00	1.00
Final Sat.:	0	0	0	3194	0	2506	1900	5700	0	0	5700	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.36	0.00	0.22	0.23	0.48	0.00	0.00	0.23	0.33
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.00	0.40	0.00	0.66	0.26	0.53	0.00	0.00	0.27	0.67
Volume/Cap:	0.00	0.00	0.00	0.91	0.00	0.33	0.87	0.91	0.00	0.00	0.87	0.49
Delay/Veh:	0.0	0.0	0.0	38.6	0.0	8.2	54.0	28.1	0.0	0.0	44.1	9.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	38.6	0.0	8.2	54.0	28.1	0.0	0.0	44.1	9.5
LOS by Move:	A	A	A	D	A	A	D	C	A	A	D	A
DesignQueue:	0	0	0	28	0	9	21	30	0	0	21	14

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #83 Lot 30/MLK BLvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.816
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	17.7
Optimal Cycle:	69	Level Of Service:	B

Street Name:	Lot 30						MLK Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	0	7	7	0	7	7	7	0	7	7	7
Lanes:	0 0 0 0 1			0 1 0 0 2			2 0 2 1 0			1 0 2 0 1		
Volume Module: Phase 4 PM												
Base Vol:	0	0	1	162	0	271	31	1989	0	10	926	1
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	0	1	211	0	352	40	2586	0	13	1204	1
Added Vol:	0	0	0	5	0	11	5	685	0	0	475	1
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	1	216	0	363	45	3271	0	13	1679	2
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	0	0	1	233	0	393	49	3536	0	14	1815	2
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	1	233	0	393	49	3536	0	14	1815	2
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	1	233	0	393	49	3536	0	14	1815	2
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	0.88	0.95	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.00	1.00	1.00	0.00	2.00	2.00	3.00	0.00	1.00	2.00	1.00
Final Sat.:	0	0	1900	1900	0	3344	3600	5700	0	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.12	0.00	0.12	0.01	0.62	0.00	0.01	0.48	0.00
Crit Moves:				****				****		****		
Green/Cycle:	0.00	0.00	0.14	0.14	0.00	0.14	0.10	0.71	0.00	0.07	0.68	0.68
Volume/Cap:	0.00	0.00	0.01	0.87	0.00	0.84	0.14	0.87	0.00	0.11	0.70	0.00
Delay/Veh:	0.0	0.0	37.0	67.9	0.0	54.3	41.3	13.5	0.0	43.9	10.7	5.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	37.0	67.9	0.0	54.3	41.3	13.5	0.0	43.9	10.7	5.1
LOS by Move:	A	A	D	E	A	D	D	B	A	D	B	A
DesignQueue:	0	0	0	12	0	11	1	23	0	1	18	0

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #85 Canyon Crest Dr at MLK BLvd

Cycle (sec):	120	Critical Vol./Cap.(X):	0.839
Loss Time (sec):	10 (Y+R=4.0 sec)	Average Delay (sec/veh):	37.0
Optimal Cycle:	87	Level Of Service:	D

Street Name:	Canyon Crest Dr		MLK Blvd	
Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Protected	Protected	Protected	Protected
Rights:	Include	Ovl	Ovl	Include
Min. Green:	7 7 7	7 7 7	7 7 7	7 7 7
Lanes:	2 0 2 0 1	2 0 2 0 1	2 0 3 0 2	2 0 2 0 1

Movement:	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Volume Module: Phase 4 PM												
Base Vol:	295	186	129	125	552	189	163	1043	1058	162	254	25
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	384	242	168	163	718	246	212	1356	1375	211	330	33
Added Vol:	69	23	0	122	52	122	56	496	139	0	285	53
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	453	265	168	285	770	368	268	1852	1514	211	615	86
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	489	286	181	308	832	398	290	2002	1637	228	665	92
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	489	286	181	308	832	398	290	2002	1637	228	665	92
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	489	286	181	308	832	398	290	2002	1637	228	665	92
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.88	0.95	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	2.00	3.00	2.00	2.00	2.00	1.00
Final Sat.:	3600	3800	1900	3600	3800	1900	3600	5700	3344	3600	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.14	0.08	0.10	0.09	0.22	0.21	0.08	0.35	0.49	0.06	0.18	0.05
Crit Moves:	****				****			****		****		
Green/Cycle:	0.16	0.22	0.22	0.20	0.26	0.42	0.16	0.42	0.58	0.08	0.34	0.34
Volume/Cap:	0.84	0.34	0.43	0.43	0.84	0.50	0.52	0.84	0.84	0.84	0.52	0.14
Delay/Veh:	59.2	39.4	40.7	42.4	48.4	26.4	47.4	34.1	24.3	74.9	32.2	27.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	59.2	39.4	40.7	42.4	48.4	26.4	47.4	34.1	24.3	74.9	32.2	27.7
LOS by Move:	E	D	D	D	D	C	D	C	C	E	C	C
DesignQueue:	15	8	10	9	22	16	9	29	30	8	15	4

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #109 Iowa Ave at Everton Place

Cycle (sec):	100	Critical Vol./Cap.(X):	0.778
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	16.3
Optimal Cycle:	60	Level Of Service:	B

Street Name:	Iowa Avenue						Everton Place					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	1 0	1 0	1	1 0	2 0	1	1 0	0 1	0	1 0	0 1	0
Volume Module: Phase 4 PM												
Base Vol:	0	503	29	36	1038	0	0	0	0	47	0	39
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	0	654	38	47	1349	0	0	0	0	61	0	51
Added Vol:	26	246	53	150	200	54	41	0	20	124	0	307
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	26	900	91	197	1549	54	41	0	20	185	0	358
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	28	973	98	213	1675	58	44	0	22	200	0	387
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	28	973	98	213	1675	58	44	0	22	200	0	387
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	28	973	98	213	1675	58	44	0	22	200	0	387
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	1.00	1.00	1.00	2.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Final Sat.:	1900	1900	1900	1900	3800	1900	1900	0	1900	1900	0	1900
Capacity Analysis Module:												
Vol/Sat:	0.01	0.51	0.05	0.11	0.44	0.03	0.02	0.00	0.01	0.11	0.00	0.20
Crit Moves:		****										****
Green/Cycle:	0.66	0.66	0.66	0.66	0.66	0.66	0.26	0.00	0.26	0.26	0.00	0.26
Volume/Cap:	0.02	0.78	0.08	0.17	0.67	0.05	0.09	0.00	0.04	0.40	0.00	0.78
Delay/Veh:	5.9	15.1	6.2	6.6	11.2	6.0	28.0	0.0	27.6	31.0	0.0	41.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	5.9	15.1	6.2	6.6	11.2	6.0	28.0	0.0	27.6	31.0	0.0	41.9
LOS by Move:	A	B	A	A	B	A	C	A	C	C	A	D
DesignQueue:	1	21	2	4	18	1	2	0	1	8	0	17

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #137 Chicago Ave at MLK Blvd

Cycle (sec):	130	Critical Vol./Cap.(X):	0.969
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	45.8
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Chicago Avenue						Martin Luther King Blvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Ovl			Ovl			Ovl		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0 2 0 1			2 0 2 0 1			1 0 3 0 2			2 0 3 0 1		
Volume Module: Phase 4 PM												
Base Vol:	140	287	61	366	1057	201	170	1283	792	249	514	105
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	182	373	79	476	1374	261	221	1668	1030	324	668	137
Added Vol:	0	7	49	270	18	45	19	127	0	85	214	271
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	182	380	128	746	1392	306	240	1795	1030	409	882	408
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	197	411	139	806	1505	331	259	1940	1113	442	954	441
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	197	411	139	806	1505	331	259	1940	1113	442	954	441
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	197	411	139	806	1505	331	259	1940	1113	442	954	441
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	2.00	1.00	1.00	3.00	2.00	2.00	3.00	1.00
Final Sat.:	3800	3800	1900	3800	3800	1900	1900	5700	3800	3800	5700	1900
Capacity Analysis Module:												
Vol/Sat:	0.05	0.11	0.07	0.21	0.40	0.17	0.14	0.34	0.29	0.12	0.17	0.23
Crit Moves:	****				****			****		****		
Green/Cycle:	0.06	0.16	0.28	0.31	0.41	0.62	0.21	0.35	0.41	0.12	0.26	0.57
Volume/Cap:	0.89	0.69	0.26	0.69	0.97	0.28	0.65	0.97	0.72	0.97	0.65	0.41
Delay/Veh:	88.3	51.2	34.2	38.3	52.2	10.8	47.0	53.1	31.4	88.2	40.7	15.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	88.3	51.2	34.2	38.3	52.2	10.8	47.0	53.1	31.4	88.2	40.7	15.0
LOS by Move:	F	D	C	D	D	B	D	D	C	F	D	B
DesignQueue:	6	12	7	20	33	9	14	31	24	13	16	14

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #151 Chicago Ave at University Avenue

Cycle (sec):	120	Critical Vol./Cap.(X):	0.880
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	43.8
Optimal Cycle:	109	Level Of Service:	D

Street Name:	Chicago Avenue						University Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	7	7	7	7	7	7	7	7	7	7	7	7
Lanes:	2 0	2 0	1	2 0	3 0	1	2 0	2 0	1	2 0	2 0	1
Volume Module: Phase 4 PM												
Base Vol:	237	363	126	155	956	86	182	796	463	309	385	72
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	308	472	164	202	1243	112	237	1035	602	402	501	94
Added Vol:	48	324	45	20	164	0	0	31	26	21	54	31
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	356	796	209	222	1407	112	237	1066	628	423	555	125
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	385	860	226	239	1521	121	256	1152	679	457	599	135
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	385	860	226	239	1521	121	256	1152	679	457	599	135
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	385	860	226	239	1521	121	256	1152	679	457	599	135
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	2.00	1.00	2.00	3.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Final Sat.:	3800	3800	1900	3800	5700	1900	3800	3800	1900	3800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.10	0.23	0.12	0.06	0.27	0.06	0.07	0.30	0.36	0.12	0.16	0.07
Crit Moves:	****				****			****		****		
Green/Cycle:	0.12	0.33	0.33	0.09	0.30	0.30	0.14	0.34	0.46	0.14	0.34	0.34
Volume/Cap:	0.88	0.69	0.36	0.69	0.88	0.21	0.47	0.88	0.78	0.88	0.47	0.21
Delay/Veh:	70.4	36.8	31.2	58.8	45.3	31.3	47.8	44.1	31.7	66.6	31.5	28.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	70.4	36.8	31.2	58.8	45.3	31.3	47.8	44.1	31.7	66.6	31.5	28.5
LOS by Move:	E	D	C	E	D	C	D	D	C	E	C	C
DesignQueue:	12	21	10	7	25	6	7	27	27	14	14	6

Note: Queue reported is the number of cars per lane.

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                       UCR West Campus Development Plan
                      Phase 4 Conditions with Mitigation
                                    PM Peak
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                      Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
*********************************************************************************
Intersection #159 Chicago Ave at Linden Street
*********************************************************************************
Cycle (sec):          100             Critical Vol./Cap.(X):        0.814
Loss Time (sec):        8 (Y+R=4.0 sec) Average Delay (sec/veh):     28.7
Optimal Cycle:         69             Level Of Service:                 C
*********************************************************************************
Street Name:           Chicago Avenue                   Linden Street
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:     7    7     7    7    7     7    7    7     7    7    7     7
Lanes:        1  0  1  1  0   1  0  2  0  1   1  0  0  1  0   1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module: Phase 4 PM
Base Vol:      61  432   161   172 1149   145    29   83    46   110  124    94
Growth Adj:  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30  1.30 1.30  1.30
Initial Bse:   79  562   209   224 1494   189    38  108    60   143  161   122
Added Vol:     40  251    63     0  125     0     0   18    21    38   34     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  119  813   272   224 1619   189    38  126    81   181  195   122
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93  0.93 0.93  0.93
PHF Volume:   129  878   294   242 1750   204    41  136    87   196  211   132
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  129  878   294   242 1750   204    41  136    87   196  211   132
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   129  878   294   242 1750   204    41  136    87   196  211   132
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 1.50  0.50  1.00 2.00  1.00  1.00 0.61  0.39  1.00 1.23  0.77
Final Sat.:  1900 2846   954  1900 3800  1900  1900 1157   743  1900 2337  1463
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.07 0.31  0.31  0.13 0.46  0.11  0.02 0.12  0.12  0.10 0.09  0.09
Crit Moves:  ****                  ****             ****        ****
Green/Cycle: 0.08 0.46  0.46  0.19 0.57  0.57  0.12 0.14  0.14  0.13 0.15  0.15
Volume/Cap:  0.81 0.67  0.67  0.67 0.81  0.19  0.18 0.81  0.81  0.81 0.59  0.59
Delay/Veh:   71.6 22.2  22.2  42.5 20.0  10.7  40.1 58.3  58.3  61.3 41.1  41.1
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  71.6 22.2  22.2  42.5 20.0  10.7  40.1 58.3  58.3  61.3 41.1  41.1
LOS by Move:    E    C     C     D    B     B     D    E     E     E    D     D
DesignQueue:    7   19    19    11   24     5     2   11    11    10    8     8
*********************************************************************************
Note: Queue reported is the number of cars per lane.
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UCR West Campus Development Plan
Phase 4 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #196 Iowa Ave at Blaine St

Cycle (sec):	100	Critical Vol./Cap.(X):	0.944
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	44.5
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Iowa Avenue		Blain Street	
Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Protected	Protected	Protected	Protected
Rights:	Include	Include	Include	Include
Min. Green:	7 7 7	7 7 7	7 7 7	7 7 7
Lanes:	1 0 2 0 1	1 0 1 1 0	2 0 2 0 1	1 0 2 0 1

	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R
Volume Module: Phase 4 PM												
Base Vol:	198	510	145	193	768	167	302	438	268	149	271	109
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	257	663	189	251	998	217	393	569	348	194	352	142
Added Vol:	26	141	29	15	77	0	0	77	29	25	95	34
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	283	804	217	266	1075	217	393	646	377	219	447	176
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	306	869	235	287	1163	235	424	699	408	236	484	190
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	306	869	235	287	1163	235	424	699	408	236	484	190
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	306	869	235	287	1163	235	424	699	408	236	484	190
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	1.66	0.34	2.00	2.00	1.00	1.00	2.00	1.00
Final Sat.:	1900	3800	1900	1900	3162	638	3800	3800	1900	1900	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.16	0.23	0.12	0.15	0.37	0.37	0.11	0.18	0.21	0.12	0.13	0.10
Crit Moves:	****				****				****	****		
Green/Cycle:	0.17	0.34	0.34	0.22	0.39	0.39	0.17	0.23	0.23	0.13	0.19	0.19
Volume/Cap:	0.94	0.68	0.37	0.68	0.94	0.94	0.66	0.81	0.94	0.94	0.66	0.52
Delay/Veh:	76.3	29.9	25.4	39.9	41.9	41.9	41.6	42.3	67.4	84.5	39.8	37.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	76.3	29.9	25.4	39.9	41.9	41.9	41.6	42.3	67.4	84.5	39.8	37.7
LOS by Move:	E	C	C	D	D	D	D	D	E	F	D	D
DesignQueue:	15	17	9	13	26	26	10	16	19	12	11	9

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #237 Chicago Ave at 3rd Street

Cycle (sec):	120	Critical Vol./Cap.(X):	0.927
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	51.1
Optimal Cycle:	120	Level Of Service:	D

Street Name:	Chicago Avenue						3rd Street					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	10	10	10	10	10	10	10	10	10	10	10
Lanes:	1 0	2 0	1	1 0	2 0	1	1 0	1 1	0	2 0	1 1	0
Volume Module: Phase 4 PM												
Base Vol:	88	415	136	260	865	107	137	636	264	240	294	81
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	114	539	177	338	1125	139	178	827	343	312	382	105
Added Vol:	31	118	103	13	61	0	0	20	20	44	28	29
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	145	658	280	351	1186	139	178	847	363	356	410	134
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	157	711	302	379	1282	150	193	915	393	385	443	145
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	157	711	302	379	1282	150	193	915	393	385	443	145
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	157	711	302	379	1282	150	193	915	393	385	443	145
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.00	1.00	1.00	2.00	1.00	1.00	1.40	0.60	2.00	1.51	0.49
Final Sat.:	1900	3800	1900	1900	3800	1900	1900	2659	1141	3800	2863	937
Capacity Analysis Module:												
Vol/Sat:	0.08	0.19	0.16	0.20	0.34	0.08	0.10	0.34	0.34	0.10	0.15	0.15
Crit Moves:	****				****			****		****		
Green/Cycle:	0.09	0.22	0.22	0.23	0.36	0.36	0.19	0.37	0.37	0.11	0.29	0.29
Volume/Cap:	0.93	0.85	0.73	0.85	0.93	0.22	0.53	0.93	0.93	0.93	0.53	0.53
Delay/Veh:	102.6	53.6	49.8	58.8	47.6	26.5	45.4	47.0	47.0	79.8	36.3	36.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	102.6	53.6	49.8	58.8	47.6	26.5	45.4	47.0	47.0	79.8	36.3	36.3
LOS by Move:	F	D	D	E	D	C	D	D	D	E	D	D
DesignQueue:	10	19	16	20	30	7	11	30	30	12	15	15

Note: Queue reported is the number of cars per lane.

UCR West Campus Development Plan
Phase 4 Conditions with Mitigation
PM Peak

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #292 I-215 NB Ramps/MLK Blvd

Cycle (sec):	100	Critical Vol./Cap.(X):	0.344
Loss Time (sec):	6 (Y+R=4.0 sec)	Average Delay (sec/veh):	16.2
Optimal Cycle:	21	Level Of Service:	B

Street Name:	I-215 NB Ramp						MLK BLvd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	7	7	0	0	0	0	7	0	0	0	0	0
Lanes:	1 1 0 0 0			0 0 0 0 0			2 0 0 0 0			0 0 0 0 0		
Volume Module: Phase 4 PM												
Base Vol:	333	1	0	0	0	0	188	0	0	0	0	0
Growth Adj:	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Initial Bse:	433	1	0	0	0	0	244	0	0	0	0	0
Added Vol:	235	0	0	0	0	0	197	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	668	1	0	0	0	0	441	0	0	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	722	1	0	0	0	0	477	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	722	1	0	0	0	0	477	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	722	1	0	0	0	0	477	0	0	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00
Lanes:	1.99	0.01	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
Final Sat.:	3793	7	0	0	0	0	3600	0	0	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.19	0.19	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00
Crit Moves:		****					****					
Green/Cycle:	0.55	0.55	0.00	0.00	0.00	0.00	0.39	0.00	0.00	0.00	0.00	0.00
Volume/Cap:	0.34	0.34	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.00
Delay/Veh:	12.4	12.4	0.0	0.0	0.0	0.0	21.9	0.0	0.0	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	12.4	12.4	0.0	0.0	0.0	0.0	21.9	0.0	0.0	0.0	0.0	0.0
LOS by Move:	B	B	A	A	A	A	C	A	A	A	A	A
DesignQueue:	9	9	0	0	0	0	9	0	0	0	0	0

Note: Queue reported is the number of cars per lane.

UNIVERSITY ZIP CODES
EMPLOYEES AND STUDENTS

2/7/08

University of California, Riverside
October 2007 Employees by Local Address Zip Codes

RECEIVED
FEB - 7 2008

TITLEGRP	CATEGORY	ZIP	Count
Full Professors	1-FAC	10012	1
Full Professors	1-FAC	59870	1
Full Professors	1-FAC	90004	1
Full Professors	1-FAC	90026	1
Full Professors	1-FAC	90027	2
Full Professors	1-FAC	90035	1
Full Professors	1-FAC	90036	1
Full Professors	1-FAC	90039	2
Full Professors	1-FAC	90049	1
Full Professors	1-FAC	90066	1
Full Professors	1-FAC	90211	1
Full Professors	1-FAC	90290	1
Full Professors	1-FAC	90291	2
Full Professors	1-FAC	90402	2
Full Professors	1-FAC	90403	4
Full Professors	1-FAC	90405	2
Full Professors	1-FAC	90602	1
Full Professors	1-FAC	90732	1
Full Professors	1-FAC	90807	1
Full Professors	1-FAC	91030	1
Full Professors	1-FAC	91101	1
Full Professors	1-FAC	91103	1
Full Professors	1-FAC	91104	1
Full Professors	1-FAC	91105	2
Full Professors	1-FAC	91108	1
Full Professors	1-FAC	91711	9
Full Professors	1-FAC	91739	1
Full Professors	1-FAC	91745	1
Full Professors	1-FAC	91748	1
Full Professors	1-FAC	91759	2
Full Professors	1-FAC	91780	1
Full Professors	1-FAC	92008	1
Full Professors	1-FAC	92014	1
Full Professors	1-FAC	92028	1
Full Professors	1-FAC	92064	1
Full Professors	1-FAC	92260	1
Full Professors	1-FAC	92262	1
Full Professors	1-FAC	92282	1
Full Professors	1-FAC	92346	1
Full Professors	1-FAC	92373	3
Full Professors	1-FAC	92374	1
Full Professors	1-FAC	92382	1
Full Professors	1-FAC	92399	1
Full Professors	1-FAC	92407	1
Full Professors	1-FAC	92501	3
Full Professors	1-FAC	92503	3
Full Professors	1-FAC	92504	7
Full Professors	1-FAC	92506	130

Full Professors	1-FAC	92507	70
Full Professors	1-FAC	92508	21
Full Professors	1-FAC	92513	1
Full Professors	1-FAC	92521	3
Full Professors	1-FAC	92544	1
Full Professors	1-FAC	92549	1
Full Professors	1-FAC	92555	2
Full Professors	1-FAC	92557	4
Full Professors	1-FAC	92561	1
Full Professors	1-FAC	92562	3
Full Professors	1-FAC	92563	2
Full Professors	1-FAC	92583	1
Full Professors	1-FAC	92602	1
Full Professors	1-FAC	92603	1
Full Professors	1-FAC	92604	1
Full Professors	1-FAC	92612	1
Full Professors	1-FAC	92617	2
Full Professors	1-FAC	92620	2
Full Professors	1-FAC	92626	1
Full Professors	1-FAC	92630	1
Full Professors	1-FAC	92648	2
Full Professors	1-FAC	92651	3
Full Professors	1-FAC	92691	1
Full Professors	1-FAC	92706	1
Full Professors	1-FAC	92782	2
Full Professors	1-FAC	92807	2
Full Professors	1-FAC	92808	1
Full Professors	1-FAC	92880	1
Full Professors	1-FAC	92887	4
Full Professors	1-FAC	93436	1
Full Professors	1-FAC	94025	1
Full Professors	1-FAC	95126	1
Associate Professors	1-FAC		1
Associate Professors	1-FAC	08854	1
Associate Professors	1-FAC	90025	1
Associate Professors	1-FAC	90026	3
Associate Professors	1-FAC	90034	1
Associate Professors	1-FAC	90039	3
Associate Professors	1-FAC	90065	2
Associate Professors	1-FAC	90066	1
Associate Professors	1-FAC	90230	1
Associate Professors	1-FAC	90232	1
Associate Professors	1-FAC	90266	1
Associate Professors	1-FAC	90631	1
Associate Professors	1-FAC	90804	1
Associate Professors	1-FAC	91104	1
Associate Professors	1-FAC	91106	1
Associate Professors	1-FAC	91107	2
Associate Professors	1-FAC	91202	1
Associate Professors	1-FAC	91377	1
Associate Professors	1-FAC	91709	2
Associate Professors	1-FAC	92014	1

Associate Professors	1-FAC	92118	1
Associate Professors	1-FAC	92128	1
Associate Professors	1-FAC	92339	1
Associate Professors	1-FAC	92501	6
Associate Professors	1-FAC	92503	1
Associate Professors	1-FAC	92504	2
Associate Professors	1-FAC	92505	1
Associate Professors	1-FAC	92506	25
Associate Professors	1-FAC	92507	26
Associate Professors	1-FAC	92508	12
Associate Professors	1-FAC	92521	1
Associate Professors	1-FAC	92557	2
Associate Professors	1-FAC	92592	1
Associate Professors	1-FAC	92606	1
Associate Professors	1-FAC	92612	1
Associate Professors	1-FAC	92617	2
Associate Professors	1-FAC	92833	1
Associate Professors	1-FAC	92881	2
Associate Professors	1-FAC	92883	1
Associate Professors	1-FAC	92886	1
Associate Professors	1-FAC	93103	1
Associate Professors	1-FAC	94539	1
Associate Professors	1-FAC	94611	1
Associate Professors	1-FAC	94941	1
Assistant Professors	1-FAC	08542	1
Assistant Professors	1-FAC	10012	1
Assistant Professors	1-FAC	20057	1
Assistant Professors	1-FAC	32780	1
Assistant Professors	1-FAC	90004	1
Assistant Professors	1-FAC	90012	2
Assistant Professors	1-FAC	90016	1
Assistant Professors	1-FAC	90021	1
Assistant Professors	1-FAC	90026	2
Assistant Professors	1-FAC	90027	1
Assistant Professors	1-FAC	90029	1
Assistant Professors	1-FAC	90031	1
Assistant Professors	1-FAC	90041	1
Assistant Professors	1-FAC	90049	1
Assistant Professors	1-FAC	90069	1
Assistant Professors	1-FAC	90212	1
Assistant Professors	1-FAC	90278	1
Assistant Professors	1-FAC	90291	1
Assistant Professors	1-FAC	90402	1
Assistant Professors	1-FAC	91001	1
Assistant Professors	1-FAC	91030	2
Assistant Professors	1-FAC	91103	1
Assistant Professors	1-FAC	91104	1
Assistant Professors	1-FAC	91105	1
Assistant Professors	1-FAC	91106	2
Assistant Professors	1-FAC	91505	1
Assistant Professors	1-FAC	91710	1
Assistant Professors	1-FAC	91711	5

Assistant Professors	1-FAC	91732	1
Assistant Professors	1-FAC	91754	1
Assistant Professors	1-FAC	91765	1
Assistant Professors	1-FAC	91786	1
Assistant Professors	1-FAC	91811	1
Assistant Professors	1-FAC	92008	1
Assistant Professors	1-FAC	92037	1
Assistant Professors	1-FAC	92128	1
Assistant Professors	1-FAC	92260	1
Assistant Professors	1-FAC	92354	1
Assistant Professors	1-FAC	92501	8
Assistant Professors	1-FAC	92503	1
Assistant Professors	1-FAC	92504	2
Assistant Professors	1-FAC	92505	1
Assistant Professors	1-FAC	92506	33
Assistant Professors	1-FAC	92507	52
Assistant Professors	1-FAC	92508	19
Assistant Professors	1-FAC	92521	3
Assistant Professors	1-FAC	92553	1
Assistant Professors	1-FAC	92592	1
Assistant Professors	1-FAC	92602	1
Assistant Professors	1-FAC	92604	1
Assistant Professors	1-FAC	92620	1
Assistant Professors	1-FAC	92646	1
Assistant Professors	1-FAC	92649	1
Assistant Professors	1-FAC	92651	1
Assistant Professors	1-FAC	92657	1
Assistant Professors	1-FAC	92672	1
Assistant Professors	1-FAC	92679	1
Assistant Professors	1-FAC	92883	2
Assistant Professors	1-FAC	94118	1
Visiting & Adjunct Professor	1-FAC	90012	1
Visiting & Adjunct Professor	1-FAC	90028	1
Visiting & Adjunct Professor	1-FAC	90041	1
Visiting & Adjunct Professor	1-FAC	91103	1
Visiting & Adjunct Professor	1-FAC	92109	1
Visiting & Adjunct Professor	1-FAC	92373	1
Visiting & Adjunct Professor	1-FAC	92506	2
Visiting & Adjunct Professor	1-FAC	92507	13
Visiting & Adjunct Professor	1-FAC	92508	1
Visiting & Adjunct Professor	1-FAC	92521	1
Visiting & Adjunct Professor	1-FAC	92807	1
Visiting & Adjunct Professor	1-FAC	93030	1
Faculty Researchers	1-FAC	91730	1
Faculty Researchers	1-FAC	92325	1
Faculty Researchers	1-FAC	92504	1
Faculty Researchers	1-FAC	92506	5
Faculty Researchers	1-FAC	92507	5
Faculty Researchers	1-FAC	92508	1
Faculty Researchers	1-FAC	93291	1
Faculty Researchers	1-FAC	93292	1
Faculty Researchers	1-FAC	93611	1

Faculty Researchers	1-FAC	93662	1
Faculty Researchers	1-FAC	93711	1
Lecturers	1-FAC	90013	1
Lecturers	1-FAC	90025	1
Lecturers	1-FAC	90026	3
Lecturers	1-FAC	90027	1
Lecturers	1-FAC	90028	1
Lecturers	1-FAC	90041	1
Lecturers	1-FAC	90042	2
Lecturers	1-FAC	90065	1
Lecturers	1-FAC	90066	1
Lecturers	1-FAC	90210	1
Lecturers	1-FAC	90266	1
Lecturers	1-FAC	90405	1
Lecturers	1-FAC	90505	1
Lecturers	1-FAC	90601	1
Lecturers	1-FAC	90603	1
Lecturers	1-FAC	90630	1
Lecturers	1-FAC	90814	1
Lecturers	1-FAC	90823	1
Lecturers	1-FAC	91010	1
Lecturers	1-FAC	91030	1
Lecturers	1-FAC	91104	1
Lecturers	1-FAC	91105	1
Lecturers	1-FAC	91106	2
Lecturers	1-FAC	91214	1
Lecturers	1-FAC	91308	1
Lecturers	1-FAC	91504	1
Lecturers	1-FAC	91505	1
Lecturers	1-FAC	91701	1
Lecturers	1-FAC	91709	5
Lecturers	1-FAC	91710	1
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Professional/Support Staff	5-SUPP	91711	1
Professional/Support Staff	5-SUPP	91724	1
Professional/Support Staff	5-SUPP	91730	11
Professional/Support Staff	5-SUPP	91732	2
Professional/Support Staff	5-SUPP	91737	6
Professional/Support Staff	5-SUPP	91739	3
Professional/Support Staff	5-SUPP	91744	1
Professional/Support Staff	5-SUPP	91745	1
Professional/Support Staff	5-SUPP	91750	1
Professional/Support Staff	5-SUPP	91752	5
Professional/Support Staff	5-SUPP	91760	3
Professional/Support Staff	5-SUPP	91761	7
Professional/Support Staff	5-SUPP	91762	1
Professional/Support Staff	5-SUPP	91764	6
Professional/Support Staff	5-SUPP	91765	2
Professional/Support Staff	5-SUPP	91766	7
Professional/Support Staff	5-SUPP	91767	2
Professional/Support Staff	5-SUPP	91784	1
Professional/Support Staff	5-SUPP	91786	3
Professional/Support Staff	5-SUPP	91789	5
Professional/Support Staff	5-SUPP	91790	1
Professional/Support Staff	5-SUPP	91798	1
Professional/Support Staff	5-SUPP	91801	1
Professional/Support Staff	5-SUPP	92020	1
Professional/Support Staff	5-SUPP	92029	1
Professional/Support Staff	5-SUPP	92054	1

Professional/Support Staff	5-SUPP	92082	1
Professional/Support Staff	5-SUPP	92110	1
Professional/Support Staff	5-SUPP	92122	1
Professional/Support Staff	5-SUPP	92201	5
Professional/Support Staff	5-SUPP	92220	3
Professional/Support Staff	5-SUPP	92223	11
Professional/Support Staff	5-SUPP	92236	5
Professional/Support Staff	5-SUPP	92241	1
Professional/Support Staff	5-SUPP	92247	1
Professional/Support Staff	5-SUPP	92253	2
Professional/Support Staff	5-SUPP	92254	1
Professional/Support Staff	5-SUPP	92255	1
Professional/Support Staff	5-SUPP	92270	1
Professional/Support Staff	5-SUPP	92274	1
Professional/Support Staff	5-SUPP	92276	1
Professional/Support Staff	5-SUPP	92284	1
Professional/Support Staff	5-SUPP	92301	2
Professional/Support Staff	5-SUPP	92307	1
Professional/Support Staff	5-SUPP	92308	2
Professional/Support Staff	5-SUPP	92313	21
Professional/Support Staff	5-SUPP	92316	6
Professional/Support Staff	5-SUPP	92320	5
Professional/Support Staff	5-SUPP	92324	32
Professional/Support Staff	5-SUPP	92325	3
Professional/Support Staff	5-SUPP	92329	1
Professional/Support Staff	5-SUPP	92334	1
Professional/Support Staff	5-SUPP	92335	13
Professional/Support Staff	5-SUPP	92336	9
Professional/Support Staff	5-SUPP	92337	7
Professional/Support Staff	5-SUPP	92342	1
Professional/Support Staff	5-SUPP	92345	6
Professional/Support Staff	5-SUPP	92346	15
Professional/Support Staff	5-SUPP	92351	1
Professional/Support Staff	5-SUPP	92352	1
Professional/Support Staff	5-SUPP	92354	4
Professional/Support Staff	5-SUPP	92355	1
Professional/Support Staff	5-SUPP	92359	2
Professional/Support Staff	5-SUPP	92370	1
Professional/Support Staff	5-SUPP	92371	1
Professional/Support Staff	5-SUPP	92372	3
Professional/Support Staff	5-SUPP	92373	20
Professional/Support Staff	5-SUPP	92374	16
Professional/Support Staff	5-SUPP	92376	21
Professional/Support Staff	5-SUPP	92377	6
Professional/Support Staff	5-SUPP	92378	1
Professional/Support Staff	5-SUPP	92388	1
Professional/Support Staff	5-SUPP	92392	2
Professional/Support Staff	5-SUPP	92394	1
Professional/Support Staff	5-SUPP	92395	1
Professional/Support Staff	5-SUPP	92397	1
Professional/Support Staff	5-SUPP	92399	17
Professional/Support Staff	5-SUPP	92404	16

Professional/Support Staff	5-SUPP	92405	8
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Professional/Support Staff	5-SUPP	92408	4
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Professional/Support Staff	5-SUPP	92411	4
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Professional/Support Staff	5-SUPP	92427	1
Professional/Support Staff	5-SUPP	92498	1
Professional/Support Staff	5-SUPP	92501	57
Professional/Support Staff	5-SUPP	92502	3
Professional/Support Staff	5-SUPP	92503	64
Professional/Support Staff	5-SUPP	92504	78
Professional/Support Staff	5-SUPP	92505	28
Professional/Support Staff	5-SUPP	92506	126
Professional/Support Staff	5-SUPP	92507	269
Professional/Support Staff	5-SUPP	92508	63
Professional/Support Staff	5-SUPP	92509	56
Professional/Support Staff	5-SUPP	92513	4
Professional/Support Staff	5-SUPP	92514	1
Professional/Support Staff	5-SUPP	92516	1
Professional/Support Staff	5-SUPP	92517	23
Professional/Support Staff	5-SUPP	92518	1
Professional/Support Staff	5-SUPP	92521	5
Professional/Support Staff	5-SUPP	92530	4
Professional/Support Staff	5-SUPP	92532	1
Professional/Support Staff	5-SUPP	92539	1
Professional/Support Staff	5-SUPP	92543	6
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Professional/Support Staff	5-SUPP	92545	9
Professional/Support Staff	5-SUPP	92548	2
Professional/Support Staff	5-SUPP	92549	2
Professional/Support Staff	5-SUPP	92551	21
Professional/Support Staff	5-SUPP	92552	3
Professional/Support Staff	5-SUPP	92553	63
Professional/Support Staff	5-SUPP	92555	39
Professional/Support Staff	5-SUPP	92557	85
Professional/Support Staff	5-SUPP	92562	9
Professional/Support Staff	5-SUPP	92563	11
Professional/Support Staff	5-SUPP	92567	5
Professional/Support Staff	5-SUPP	92570	27
Professional/Support Staff	5-SUPP	92571	24
Professional/Support Staff	5-SUPP	92572	2
Professional/Support Staff	5-SUPP	92581	1
Professional/Support Staff	5-SUPP	92582	3
Professional/Support Staff	5-SUPP	92583	4
Professional/Support Staff	5-SUPP	92584	14
Professional/Support Staff	5-SUPP	92585	8
Professional/Support Staff	5-SUPP	92586	9
Professional/Support Staff	5-SUPP	92587	8
Professional/Support Staff	5-SUPP	92590	1
Professional/Support Staff	5-SUPP	92591	4
Professional/Support Staff	5-SUPP	92592	10

Professional/Support Staff	5-SUPP	92595	1
Professional/Support Staff	5-SUPP	92596	4
Professional/Support Staff	5-SUPP	92602	1
Professional/Support Staff	5-SUPP	92604	1
Professional/Support Staff	5-SUPP	92606	1
Professional/Support Staff	5-SUPP	92612	1
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Professional/Support Staff	5-SUPP	92630	1
Professional/Support Staff	5-SUPP	92637	1
Professional/Support Staff	5-SUPP	92647	1
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Professional/Support Staff	5-SUPP	92706	1
Professional/Support Staff	5-SUPP	92707	1
Professional/Support Staff	5-SUPP	92780	1
Professional/Support Staff	5-SUPP	92782	1
Professional/Support Staff	5-SUPP	92802	1
Professional/Support Staff	5-SUPP	92806	1
Professional/Support Staff	5-SUPP	92807	1
Professional/Support Staff	5-SUPP	92808	1
Professional/Support Staff	5-SUPP	92821	1
Professional/Support Staff	5-SUPP	92831	1
Professional/Support Staff	5-SUPP	92833	1
Professional/Support Staff	5-SUPP	92860	7
Professional/Support Staff	5-SUPP	92867	1
Professional/Support Staff	5-SUPP	92868	1
Professional/Support Staff	5-SUPP	92869	2
Professional/Support Staff	5-SUPP	92870	1
Professional/Support Staff	5-SUPP	92879	11
Professional/Support Staff	5-SUPP	92880	11
Professional/Support Staff	5-SUPP	92881	6
Professional/Support Staff	5-SUPP	92882	13
Professional/Support Staff	5-SUPP	92883	4
Professional/Support Staff	5-SUPP	92887	1
Professional/Support Staff	5-SUPP	93221	1
Professional/Support Staff	5-SUPP	93277	4
Professional/Support Staff	5-SUPP	93312	1
Professional/Support Staff	5-SUPP	93534	1
Professional/Support Staff	5-SUPP	93611	1
Professional/Support Staff	5-SUPP	93631	1
Professional/Support Staff	5-SUPP	93654	4
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Professional/Support Staff	5-SUPP	93726	1
Professional/Support Staff	5-SUPP	94043	1
Professional/Support Staff	5-SUPP	94121	1
Professional/Support Staff	5-SUPP	94558	1
Professional/Support Staff	5-SUPP	94602	1
Professional/Support Staff	5-SUPP	94610	1
Professional/Support Staff	5-SUPP	94709	1
Professional/Support Staff	5-SUPP	95008	1
Professional/Support Staff	5-SUPP	95014	1
Professional/Support Staff	5-SUPP	95973	1

University of California, Riverside
Fall 2007 Enrollment by Local Address Zip Codes

Level	AREA	ZIP5	Count
1-U	1-RV CITY	92501	101
1-U	1-RV CITY	92503	172
1-U	1-RV CITY	92504	124
1-U	1-RV CITY	92505	85
1-U	1-RV CITY	92506	232
1-U	1-RV CITY	92507	6040
1-U	1-RV CITY	92508	195
1-U	1-RV CITY	92509	158
1-U	1-RV CITY	92521	16
1-U	2-RV CNTY	91709	132
1-U	2-RV CNTY	91710	72
1-U	2-RV CNTY	91752	44
1-U	2-RV CNTY	91761	51
1-U	2-RV CNTY	92028	8
1-U	2-RV CNTY	92059	1
1-U	2-RV CNTY	92201	12
1-U	2-RV CNTY	92203	4
1-U	2-RV CNTY	92210	3
1-U	2-RV CNTY	92211	6
1-U	2-RV CNTY	92220	21
1-U	2-RV CNTY	92223	28
1-U	2-RV CNTY	92225	1
1-U	2-RV CNTY	92230	2
1-U	2-RV CNTY	92234	9
1-U	2-RV CNTY	92236	5
1-U	2-RV CNTY	92240	3
1-U	2-RV CNTY	92252	1
1-U	2-RV CNTY	92253	4
1-U	2-RV CNTY	92254	2
1-U	2-RV CNTY	92256	1
1-U	2-RV CNTY	92257	1
1-U	2-RV CNTY	92260	1
1-U	2-RV CNTY	92262	5
1-U	2-RV CNTY	92264	3
1-U	2-RV CNTY	92270	2
1-U	2-RV CNTY	92274	2
1-U	2-RV CNTY	92276	1
1-U	2-RV CNTY	92277	1
1-U	2-RV CNTY	92282	2
1-U	2-RV CNTY	92284	5
1-U	2-RV CNTY	92313	38
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1-U	2-RV CNTY	92324	82
1-U	2-RV CNTY	92337	49
1-U	2-RV CNTY	92373	57
1-U	2-RV CNTY	92399	38
1-U	2-RV CNTY	92518	1

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1-U	2-RV CNTY	92539	2
1-U	2-RV CNTY	92543	15
1-U	2-RV CNTY	92544	19
1-U	2-RV CNTY	92545	17
1-U	2-RV CNTY	92548	3
1-U	2-RV CNTY	92549	2
1-U	2-RV CNTY	92551	57
1-U	2-RV CNTY	92553	163
1-U	2-RV CNTY	92555	94
1-U	2-RV CNTY	92557	222
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1-U	2-RV CNTY	92562	50
1-U	2-RV CNTY	92563	27
1-U	2-RV CNTY	92567	8
1-U	2-RV CNTY	92570	44
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1-U	2-RV CNTY	92583	18
1-U	2-RV CNTY	92584	36
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1-U	2-RV CNTY	92586	12
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1-U	2-RV CNTY	92590	1
1-U	2-RV CNTY	92591	29
1-U	2-RV CNTY	92592	47
1-U	2-RV CNTY	92595	20
1-U	2-RV CNTY	92596	17
1-U	2-RV CNTY	92675	1
1-U	2-RV CNTY	92679	3
1-U	2-RV CNTY	92860	34
1-U	2-RV CNTY	92879	58
1-U	2-RV CNTY	92880	67
1-U	2-RV CNTY	92881	64
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1-U	3-OTH IE	91711	30
1-U	3-OTH IE	91730	53
1-U	3-OTH IE	91737	43
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1-U	3-OTH IE	92376	68
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1-U	3-OTH IE	92392	25
1-U	3-OTH IE	92394	7
1-U	3-OTH IE	92395	4
1-U	3-OTH IE	92397	3
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2-G	6-FOREIGN		17

APPENDIX A-8

MEETING MINUTES

UC RIVERSIDE
WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

WORKING GROUP MEETING MINUTES, MEETING NO. 1

WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

UNIVERSITY OF CALIFORNIA, RIVERSIDE

Meeting Date: **September 25, 2007**

Meeting Time: **9:00 a.m. to 3:00 p.m.**

Meeting Location: **Surge Building, Room 333, UC Riverside**

Meeting Attendees:

Name	Department	Phone
UCR Working Group		
Jon Harvey	Capital and Physical Planning	(951) 827-6952
Kieron Brunelle	Capital and Physical Planning	(951) 827-2788
Nita Bullock	Capital and Physical Planning	(951) 827-7376
Jerry Higgins	Physical Plant	(951) 827-7696
Pat Simone	Physical Plant	(951) 827-6464
Susan Marshburn	Housing Services	(951) 827-7711
George MacMullin	ODC	(951) 827-1397
UCR Invitees		
Scott Corrin	Campus Fire Marshal	(951) 827-6309
Dan Martin	Telecommunications	(951) 827-2149
Jill Hishmeh	Telecommunications	(951) 827-6484
Karen Jordan	Capital and Physical Planning	(951) 827-2787
Berent Pippert	Capital and Physical Planning	(951) 827-2431
Earl LeVoss	Physical Plant	(951) 827-2094
Consultants		
Michael Ackerman	Transtech Engineers - Civil	(909) 263-1734
Jana Robbins	Transtech Engineers – Civil/Traffic	(909) 595-8599
Sabry S. Abdelmalik	Transtech Engineers – Civil/Utilities	(909) 263-1734
Ken Pirie	Walker Macy – Facilities Planning	(503) 425-1112
Richard Henrikson	Henrikson Owen - Mechanical	(949) 860-4900
Aaron Poon	Henrikson Owen – Electrical	(949) 860-4900

Meeting Content:

1. The meeting was convened at 9:00 a.m.

2. Introductions were made of all meeting participants.

3. Richard Henrikson presented an overview of the West Campus Infrastructure Development Study (WCIDS) project. This was a discussion of the project background as well as the general scope of the project as it is to be developed.

4. Available documentation was discussed in various parts of the meeting. This included:

   a. Use CAMPS plan for future phasing.

   b. Download LRDP 2005 from www.lrdp.ucr.edu.

   c. Additional available documentation is available at ucrapb.ucr.edu, then click on Available Docs.

   d. Documents and information posted to the UCR ftp site.

   e. The future buildings table, identifying planned building sizes, types, and locations, is still being finalized by Walker Macy as part of the CAMPS project. UCR stated that this needs to be reviewed and approved by UCR before it is used. Richard Henrikson stated that this finalized and approved future buildings table is critical for the WCIDS work effort and that it needs to be submitted to the consultant team quickly to maintain the project schedule. **Action Item: UCR will finalize and approve this the future buildings table and distribute it to the consultant team by Friday, October 5, 2007.**

5. Ken Pirie presented the facilities planning scope of the WCIDS, including background on the CAMPS plan that has been completed. The basic elements of his presentation included:

   a. Overview of West Campus Planning.

   b. West Campus Program and Capacity.
      i. capacity spreadsheet
      ii. future buildings list

   c. Phasing Plan. Northeast part of West Campus will be developed first along with Family Housing Phase 1. Generally speaking, campus development will proceed mostly east to west and north to south.

   d. The Northwest Mall and Southwest Mall are key east-west campus connectors.

   e. Key Open Spaces, including the Gage Canal ‘Arboretum’ space.

   f. Concepts for innovative stormwater treatment along NW and SW Mall as well as MLK Jr. Blvd.

   g. Circulation System (bikes, pedestrians, vehicular, service, parking), including critical intersections, pedestrian crossings, and parking on the campus perimeter.

6. Mike Ackerman did an overview presentation of the civil utilities and traffic scope of the WCIDS. Sabry Abdelmalik presented on domestic water/fire water, sanitary sewer, storm sewer, and irrigation. Jana Robbins presented on traffic modeling. Key points included:

a. Fire water requirements will need to be examined to determine how and where to obtain sufficient water pressure. **Action Item: Sabry Abdelmalik will determine how and where to obtain sufficient water pressure and include this in the Phase 1 Implementation Plan Report by October 31, 2007.**

b. Water distribution system will be a loop. Two water connections are proposed from the City of Riverside.

c. Include a water connection from the existing pipe that is already piped across the freeway and ties into the large water tank on the hill at East Campus. **Action Item: Sabry Abdelmalik will include this in the Phase 1 Implementation Plan Report by October 31, 2007.**

d. Irrigation needs to be supplied to agricultural areas as West Campus is developed. **Action Item: Sabry Abdelmalik will include this in the Phase 1 Implementation Plan Report by October 31, 2007.**

e. Irrigation also needs to be supplied to open spaces on the developing West Campus. **Action Item: Sabry Abdelmalik will include this in the Phase 1 Implementation Plan Report by October 31, 2007.**

f. Assume that a storm drain is required in Iowa Street, and will be installed as part of the widening project.

g. Water for the irrigation system may come from a well, existing university system, or the Gage Canal. These options will be considered in the WCIDS. **Action Item: Sabry Abdelmalik will include this in the Phase 1 Implementation Plan Report by October 31, 2007.**

h. UCR has water shares in the Gage Canal.

i. The MLK Jr. Blvd./I-215 (60) interchange is closed while under construction. It is anticipated that the interchange would open in January. (Called Caltrans later and they indicated late November.)

j. Traffic studies – Check peak hours and campus hours. Consider Level of Service (LOS) acceptability by the City of Riverside. City accepts C or D LOS. **Action Item: Jana Robbins will include this in the Phase 1 Implementation Plan Report by October 31, 2007.**

k. Perform traffic counts in mid-October or later. **Action Item: Jana Robbins will incorporate this activity after October 15, 2007.**

7. Aaron Poon did a presentation on the electrical, telecommunications, fire alarm system, and cable TV utilities scope of the WCIDS. **Action Item: Aaron Poon will include action items from #7 a through k below in the Phase 1 Implementation Plan Report by October 31, 2007.**

   Key points included:

a. Double-ended 12 kV switchgear with tie-breaker is proposed to serve the West Campus electrical grid. Loop-feed electrical backbone system is recommended for flexibility and reliability.

b. Initial load calculation is based on 5 VA/sq. ft., which equates to approximately 39 MVA (7,800,000 sq. ft. x 5 VA/sq. ft.). Two 40 MVA 69-12 kV primary substations (by Utility Company) are recommended for dual feed configuration.

c. A detailed demand load analysis will be conducted, including the consideration of potential peak load shaving systems like fuel cells, photovoltaic and thermal storage.

d. All future secondary substations shall have provisions for dual circuit feed.

e. Dedicated 12 kV circuits shall be used to support future Medical School.

f. The Working Group stated that an existing telecommunications manhole by Human Resources is located on the northeast area of West Campus. The conclusion of the discussion was that the WCIDS would not relocate this manhole. Manhole relocation, if required, will be done by a future building project. Connections to the manhole will be located so as to avoid future conflicts.

g. A main data/communication hub shall be supported by and uninterruptible power system and diesel generator. An area of 4,000 to 8,000 sq. ft. will be required based on initial evaluation. Several potential locations have been considered, including an area near the existing power substation, as part of the central plant building, and appended to the recreation center. A second hub may be required at the Medical School area. A site analysis will be done to identify the preferred location from a campus planning and utility standpoint. System criteria will be developed as part of the analysis.

h. If the main data/communication hub is located in the central plant, then a separate telecommunication room will be required for Family Housing Phase 1, since it will predate the central plant.

i. Voice-over-IP option will be evaluated to minimize copper trunk cable requirement.

j. The fire alarm system for the West Campus shall be by Simplex to match existing Campus Standard.

k. A fire sprinkler system will be required in the utility tunnel if that option is applicable.

8. Richard Henrikson did a presentation on the central plant(s) and mechanical utilities scope of the WCIDS. **Action Item: Richard Henrikson will include action items from #8 a through n below in the Phase 1 Implementation Plan Report by October 31, 2007.**

   Key points included:

a. Site Requirements and Location. Richard Henrikson presented a few central plant location options. The most likely location would be near the existing electrical substation on the east end of West Campus. A second central plant may be used in the service area near the future Medical School location on the west end of West Campus. Central plant location criteria will be developed so that a site analysis can be done to identify preferred locations.

b. Piping Distribution. Richard Henrikson presented a few piping distribution scenarios. The most likely scenario would be as follows: Chilled Water (CHW) and Heating Hot Water (HHW) pipes would likely be looped around the academic core and apartments section of West Campus. The Family Housing section of West Campus would be served by local unitary type HVAC equipment since they will likely be third party-developed facilities and there is a desire for the occupants of those housing units to be separately-metered. The Medical School section of West Campus would be served by a second central plant, which would also include utilities specific to it, such as medical gases, vacuum, and possibly steam. Consideration will be given to the prospect of providing a piping interconnection between the two piping distribution systems. This will add cross-connect reliability, but will also add cost.

c. Configuration and Type. The central plant would likely include chillers (electrical centrifugal and/or absorption), heating hot water boilers, and thermal energy storage. Various central plant configurations will be evaluated during the WCIDS effort.

d. Size. Size of the central plant(s) and the distribution piping will be developed from the buildings loads analysis and phasing plans as part of the WCIDS effort.

e. Thermal Energy Storage (TES). Chilled water and ice TES will be considered as part of the WCIDS.

f. Cogeneration. It was generally believed that cogeneration was not a feasible component of a West Campus central plant. Cogeneration is especially problematic because UCR enjoys low electricity rates, largely due to its use of TES, and its non-use of cogeneration. If cogeneration were implemented on West Campus, this could jeopardize UCR's favorable electricity rates.

g. Chilled Water (CHW). High delta T CHW would be used for energy efficiency (e.g. 40°F CHWS/64°F CHWR). It is imperative that mechanical engineering consultants on all UCR West Campus building projects use a cooling coil design criteria of about 42°F CHWS and 66°F CHWR to be compatible with this. This includes a safety factor for some pipe losses.

h. Heating Hot Water (HHW), High Temperature Hot Water, or Steam. There was general concurrence that, for heating, high delta T HHW (e.g. 190°F HHWS/130°F HHWR) was preferable and more appropriate that high temperature water (350°F) or steam. High delta T HHW would be used for energy efficiency. It is imperative that mechanical engineering consultants on all UCR West Campus building projects use a high delta T heating coil design criteria (e.g. 180°F HHWS/120°F HHWR) to be compatible with this. This includes a safety factor for some pipe losses.

i. Pat Simone requested that all piping junctions have isolation valves on all three legs such that any single main piping segment or any pipe branch to a building could be isolated in such a way that only one building was affected by such isolation. Richard Henrikson concurred with this strategy.

j. Utility Tunnels, Utilidors, and Direct-Buried Pipes. All three types of piping distribution systems will be evaluated in the WCIDS. Utility tunnels would be either an underground concrete conduit or a pre-fab circular pipe type of conduit. A utilidor would be a concrete trench with a removable top that is flush with the ground surface. Direct-buried CHW and HHW piping would be the pre-fabricated, pre-insulated type. The advantage of tunnels and utilidors is that they facilitate location and repair of leaks. The main disadvantage is high relative cost. Also, Scott Corrin stated that a utility tunnel would need a fire sprinkler piping system. Pat Simone mentioned that UC Merced has some recently-implemented utility tunnels. (Subsequent to the meeting, Richard Henrikson looked into this. UC Merced does indeed have some utility tunnels. It has about 150 feet of tunnel out from its central plant into the main building core. This main tunnel can be extended. Branch piping to buildings is direct-buried.)

k. All buildings will be individually-metered for CHW (Btu meter), HHW (Btu meter), electricity, and gas.

l. Energy Management System (EMS). An EMS will be used for the West Campus, and will be presented in the WCIDS. It is intended to provide centralized and automatic monitoring and control of HVAC systems campus-wide.

   i. The UCR East Campus has an EMS made up of three manufacturers' systems, although it is mostly a Johnson Controls Metasys EMS. There was general concurrence that other appropriate EMS manufacturers' systems could be considered for West Campus.

   ii. The EMS will consist of PC-based workstations and microcomputer controllers of modular design providing distributed processing capability, and allowing future expansion of both input/output points and processing/control functions.

   iii. The EMS will consist of a high-speed, peer-to-peer network of direct digital controls (DDC) controllers and a web-based operator interface.

   iv. The EMS will directly control HVAC equipment in campus buildings based on the established sequences of operation. It will monitor and control down to the thermostat level.

   v. The EMS will be designed for future system expansion to include monitoring of occupant card access, fire alarm, and lighting control systems.

   vi. The EMS will use the BACnet protocol for communication to the operator workstation or web server and for communication between control modules. Schedules, setpoints, trends, and alarms will be BACnet objects.

vii. Family Housing will not be on the campus EMS.

m. The mechanical systems will be evaluated for sustainability; specifically for energy efficiency.

n. Pat Simone will provide the draft building standards to the consultant team for consideration on the WCIDS.

9. Richard Henrikson did a presentation on the project schedule. Key points included:

a. Richard distributed the current project schedule to all meeting participants, and then proceeded to describe the various tasks and milestones.

b. Richard pointed out the three Working Group Sessions meeting dates, which are:
   i. Tuesday, September 25, 2007
   ii. Wednesday, November 14, 2007
   iii. Wednesday, January 9, 2008

c. Richard identified the key project milestones, which are:
   i. Phase I Implementation Plan Report due Wednesday, October 31, 2007
   ii. Administrative Draft Report due Tuesday, January 8, 2008
   iii. Final Report due Tuesday, February 26, 2008

d. **Action Item: Richard will update the project schedule periodically to reflect the latest schedule.**

10. Other key people would be invited to Working Group meetings or other meetings in the future. Campus representatives may include police, disabled student services, Campus Fire Marshal, telecommunications, etc.

11. Action Item: UCR will coordinate all requests to meet with City, Utility, and Gage Canal representatives. The consultant team will identify the schedule and timeframe for when these meetings will need to occur. Advance materials will be provided to these representatives at least one week in advance of the meeting to maximize usefulness.

12. Richard Henrikson discussed the deliverables that can be expected as part of the WCIDS effort. This includes the three reports as listed above. The Administrative Draft and Final Report will include narrative on methodology, analyses, findings, conclusions, cost plans, implementation schedule, and recommendations. It will also include West Campus Maps, showing the overlay of various utilities and their recommended development as the West Campus is developed in phases. Finally, a series of Infrastructure Projects will be recommended that supports the phased West Campus development plan. These discrete projects will include scope description, associated cost estimates, and implementation schedule. The idea is that these will form the basis of proposed major capital projects.

13. Richard Henrikson recapped the meeting and identified the next steps. **Action Item: The consultant team will work towards the next milestone of the submittal of the Phase I Implementation Plan Report by Wednesday, October 31, 2007.**

14. The meeting was adjourned at 3:00 p.m.

Recorder: Richard Henrikson
Note: Items shown in bold are action items requiring resolution and completion.

This concludes the record of the meeting. Any party wishing to file an amendment shall do so in writing to Henrikson Owen & Associates within seven calendar days. Subject to any written amendments, the contents herein are accepted as an accurate record of the meeting by all parties.

WORKING GROUP MEETING MINUTES, MEETING NO. 2

WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

UNIVERSITY OF CALIFORNIA, RIVERSIDE

Meeting Date: **November 14, 2007**

Meeting Time: **9:00 a.m. to 4:00 p.m.**

Meeting Location: **Surge Building, Room 333, UC Riverside**

Meeting Attendees:

Name	Department	Phone
UCR Working Group		
Jon Harvey	Capital and Physical Planning	(951) 827-6952
Kieron Brunelle	Capital and Physical Planning	(951) 827-2788
Nita Bullock	Capital and Physical Planning	(951) 827-7376
Jerry Higgins	Physical Plant	(951) 827-7696
Pat Simone	Physical Plant	(951) 827-6464
Susan Marshburn	Housing Services	(951) 827-7711
George MacMullin	ODC	(951) 827-1397
UCR Invitees		
Scott Corrin	Campus Fire Marshal	(951) 827-6309
Dan Martin	Telecommunications	(951) 827-2149
Karen Jordan	Capital and Physical Planning	(951) 827-2787
Andy Steward	Transportation & Parking	(951) 827-2557
Consultants		
Michael Ackerman	Transtech Engineers - Civil	(909) 263-1734
Jana Robbins	Transtech Engineers – Civil/Traffic	(909) 595-8599
Sabry S. Abdelmalik	Transtech Engineers – Civil/Utilities	(909) 263-1734
Ken Pirie	Walker Macy – Facilities Planning	(503) 425-1112
Richard Henrikson	Henrikson Owen - Mechanical	(949) 860-4900
Aaron Poon	Henrikson Owen – Electrical	(949) 860-4900

Meeting Content:

1. The meeting was convened at 9:00 a.m.

2. Pat Simone suggested that implementation of aggressive sustainable design criteria, a requirement that will become imperative in the near future, will have a substantial effect on downsizing many of the utilities and central plant systems. Richard Henrikson agreed, but stated that, for the purpose of utilities infrastructure master planning, a conservative approach might be prudent in case sustainable design is not rigorously enforced, and to be sure to allocate sufficient land resources for the central plant and other infrastructure facilities. Also, Richard mentioned that the UCR WCIDS should be revisited periodically to revise recommendations and sizing recommendations in accordance with the changing master plan and actual implementation experienced to date.

ACTION ITEM: It was decided that a second load/capacity analysis should be conducted by the consultant team, showing the effect of aggressive implementation of sustainable design criteria in the future building projects. In addition to ongoing utilities savings, this will also have the effect of downsizing ("right-sizing") the mechanical, electrical, and civil infrastructures. Thus, a key selling point is that conducting sustainable design need not incur significant additional costs as is "conventional wisdom". Rather conducting sustainable design can translate into significant infrastructure first cost savings. This will be presented in the UCR WCIDS. This will affect the sizing of the central plant, chilled water system, heating hot water system, power distribution system, lighting, domestic water, irrigation water, and possibly sanitary sewer and storm water systems. The various disciplines of the consultant team will incorporate this into the UCR WCIDS.

3. Kieron Brunelle mentioned that the very first facilities to be constructed would be Family Housing Phase 1 and Building W4. Subsequent facilities might lag up to 5 years from these first two facilities. These first two facilities will be called Phase 1A, a pre-phase of Phase 1. Kieron mentioned that it was important to develop a realistic Phase 1A implementation strategy even if it differed from the published CAMPS Phasing Plan. It was decided to do a Phase 1A, which is a pre-Phase 1 phase that is just Building W4. Family Housing Phase 1 will be done in Phase 1A, but its electrical power, water, and sewer will be connected to City systems, and will be completely stand-alone for HVAC. The Phase 1A infrastructure budget is $14,000,000.

   ACTION ITEM: The various disciplines of the consultant team will include a Phase 1A in their respective portions of the UCR WCIDS.

4. Richard recommended that, for Phase 1A, Building W4 should have its own small chiller and boiler plant, with air handling units using CHW cooling coils and HHW heating coils. This will allow W4's mechanical systems to be retained and connected into the future Main Campus Central Plant systems. When the Main Campus Central Plant is implemented, W4's chiller and boiler will be retained as standby, thereby allowing the other Main Campus Central Plant standby capacity to be reduced.

5. Ken Pirie and Richard Henrikson presented the sustainability issues as they impact the utilities infrastructure plan development. Richard mentioned that sustainability features are presented in Chapter 16 in the format of the LEED scoring system for ease of reference. Most importantly, sustainability features will be actively incorporated into the sizing of the various infrastructure elements as described in meeting minutes item #2 above.

6. Richard mentioned that electricity generation from wind is not a feasible alternative because there is not enough sustained wind to warrant feasible electricity generation. However, Richard mentioned that photovoltaic solar power is worth considering as an alternative energy source.

7. UCR stated that their needs to be a domestic cold water (DCW) option of connecting to and using UCR's DCW system since this will be a significant piece of West Campus development. Currently, there is one 12" irrigation pipe, one 6" DCW pipe, and one 8" DCW pipe that cross the I-215 freeway from East Campus to West Campus.

   ACTION ITEM: Transtech will include in their portion of the UCR WCIDS, a DCW option of connecting to and using UCR's DCW system.

8. **ACTION ITEM:** Transtech will include in their portion of the UCR WCIDS, options for different DCW piping materials. (e.g. UCR has been using C900 pipe for 15 years).

9. **ACTION ITEM:** Transtech will provide the basis of how the 70 gallons per day and 20 gallons per day water consumption figures were derived, where they came from, and what they are comprised of.

10. It was mentioned that every building will have a fire sprinkler system, which should figure into the domestic water capacity analysis.

11. It was mentioned that housing counts presented in the water analysis are fine for planning purposes. However, a distinction needs to be made between the proposed housing counts and the official numbers provided.

12. **ACTION ITEM:** Transtech will verify if the reclaimed water pipe in Iowa Avenue is really reclaimed water. Transtech will also verify if the reclaimed water pipe is under Chicago Avenue.

13. Transtech asked if planning should assume if the City or the Campus owns the water and sewer distribution piping. The report will include an evaluation of both options and recommendations.

14. Transtech presented the utilities infrastructure plan development to date on the stormwater analysis. The general idea is that stormwater will flow southeast towards MLK Jr. Blvd. The detailed stormwater analysis is being done and is anticipated to be complete about early February for inclusion in the Administrative Draft.

15. **ACTION ITEM:** The consultant team will do all cost estimates in current dollars and then include escalation rates so that UCR can escalate figures to future construction costs. Figures will be presented in both current and future dollars.

16. **ACTION ITEM:** The cost consultant will use information provided by Walker Macy for the construction cost estimates for streets and associated hardscaping such as curbs and gutters. Richard and Jon will discuss the scope of work for the landscaping analysis after the meeting.

17. **ACTION ITEM:** Transtech will change all McKinley Avenue references in the report to Cranford Avenue South. However, "McKinley Avenue" should appear in brackets after "Cranford Avenue" in order to maintain a reference point to easement documentation.

18. **ACTION ITEM:** Transtech will meet with UCR staff to discuss existing conditions mapping of infrastructure to make sure it's correct.

19. Jana Robbins presented the traffic impact analysis that has been conducted and developed to date. This included analysis of traffic trip generation figures for existing and future developments and Level of Service (LOS) considerations. The main item that is impeding further development of the traffic impact analysis is the need to do traffic counts. It was agreed that it would be pointless to do the traffic counts until the MLK Jr./I-215 interchange was complete in early December. Then end-of-school and Christmas shopping issues would skew traffic counts. As such, it was decided to postpone traffic counts until early- to mid-January (see next item).

20. **ACTION ITEM:** Transtech will conduct traffic counts between Tuesday, January 8th to Wednesday January 9th, and/or Tuesday, January 15th to Wednesday, January 16th. Some flexibility must be observed (e.g. cannot count in rain)

21. **ACTION ITEM:** Walker Macy will itemize hardscape improvements, with associated costs.

22. For Family Housing Phase 1, the electrical will be connected to City electrical utility, not University electrical system.

    ACTION ITEM: Aaron Poon will change this in the report and will consider the electrical load characteristics used in the Housing DPP.

23. Aaron Poon presented the utilities infrastructure plan development to date on electrical power distribution, emergency power distribution, lighting, data/telecommunications, and fire alarm system.

    ACTION ITEM: Aaron Poon will further develop the emergency power options such as centralized emergency generators, emergency generators for building clusters, and individual building emergency generators.

    ACTION ITEM: Aaron Poon will further develop the substation options as part of the utilities infrastructure plan. It is not known at this time whether additional land will be needed for the substation or what the appropriate building and open space setbacks are from the substation. However, Aaron will determine these items in the near future in meetings with the City of Riverside electrical utility.

24. Aaron reviewed the electrical loads analysis done to date on the utilities infrastructure plan development. This included watts per square foot figures without use of photovoltaic solar. Other watts per square foot figures will be developed as well considering aggressive implementation of photovoltaic solar.

25. Aaron reviewed the data/telecommunications analysis done to date on the utilities infrastructure plan development. Aaron mentioned that the telecommunication hub will be installed in Phase 1, and requires a dedicated emergency generator. Furthermore, it is assumed that power for the hub will come from the substation. Dan Martin concurred with this.

26. **ACTION ITEM:** Jon Harvey will provide Aaron Poon with UCR's recreation field lighting standards.

27. Aaron reviewed the fire alarm system analysis done to date on the utilities infrastructure plan development. He mentioned that a separate West Campus fire alarm communications loop is necessary. Scott Corrin concurred with this.

    ACTION ITEM: Aaron Poon will include this in the report.

28. Scott Corrin mentioned that the existing East Campus fire alarm system is Simplex 4190, not Simplex 4120. He also mentioned that the West Campus fire alarm system need not be standardized around Simplex.

    ACTION ITEM: Aaron Poon will change this in the report.

29. Richard presented the utilities infrastructure plan development to date on the central plants, CHW/HHW piping distribution, and energy management system (EMS).

30. Richard presented a discussion on the two proposed central plant locations (i.e. just west of the existing electrical substation for Main Campus, and in the service yard just north of the Medical School for the Medical School). Richard's discussion went into the fact that there were really no other feasible central plant locations given the criteria presented in the Phase 1 Implementation Plan Report. The two proposed central plant locations were supported by the Working Group.

31. Jon Harvey suggested revising the main CHW/HHW loop up around Everton Place with one that is located in the NW Mall. This will shorten the main loop and will also avoid the near-term conflict with Cal Trans ownership to the south of Everton Place. The proposed loop could be viewed as being primarily necessary to serve the apartments, thus would require funding from another source. Further examination from an engineering perspective on the proposed revision is needed to evaluate the benefits and alternatives to meet service requirements.

    ACTION ITEM: Richard will analyze this further and, if appropriate and feasible, he will show the route of the main CHW/HHW loop down NW Mall and use pipe spurs to serve Buildings W1, W2, and W3.

32. Pat Simone and Jon Harvey requested that a pipe connection be provided between the two central plant distribution systems. Richard said that this interconnection could reduce some of the standby capacity in the central plant systems.

ACTION ITEM: Richard will analyze the costs and benefits of providing the interconnection versus not providing the interconnection. He will determine whether such interconnection is economically feasible.

33. Pat Simone suggested that each building should have CHW and HHW circulation pumps. Richard stated that the secondary CHW pumps, if properly designed, should be able to pump the chilled water to the buildings, through the coils, and back to the central plant without building tertiary pumps. However, Richard suggested that building CHW and HHW pumps could be provided in a back-up configuration in case they were need for boosting. He mentioned that he had provided building pump designs like this for Cal State San Bernardino and Cal Poly Pomona, and their campus Physical Plant staffs had agreed with this approach. Pat Simone agreed this approach was workable.

    ACTION ITEM: Richard will include in the WCIDS that building CHW and HHW pumps should be provided in a back-up configuration in case they were need for boosting.

34. **ACTION ITEM:** Richard will analyze the relative feasibility of ice thermal energy storage vs. chilled water thermal energy storage.

35. Pat Simone requested that, for EMS, use Johnson Controls, Siemens, or equal. See UCR's EMS standards. George MacMullin requested that any named manufacturer be followed by "or equal"

    ACTION ITEM: Richard will incorporate these comments into the report.

36. The decision was made to defer the submittal of the Administrative Draft report and the next Working Group meeting until the traffic analysis is completed. A revised schedule will be developed by the consultant team for review. **ACTION ITEM:** Richard will suggest a date in early- to mid-February 2008 for submittal of the Administrative Draft Report. This is delayed from the original January 8, 2008 date, because of the need to accommodate the new traffic counts dates of January 8/9 and 15/16.

37. The meeting was adjourned at 4:00 p.m.

Recorder: Richard Henrikson
Note: Items shown in bold are action items requiring resolution and completion.

This concludes the record of the meeting. Any party wishing to file an amendment shall do so in writing to Henrikson Owen & Associates within seven calendar days. Subject to any written amendments, the contents herein are accepted as an accurate record of the meeting by all parties.

WORKING GROUP MEETING MINUTES, MEETING NO. 3

WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

UNIVERSITY OF CALIFORNIA, RIVERSIDE

Meeting Date: **January 17, 2008**

Meeting Time: **8:30 a.m. to 12:30 p.m.**

Meeting Location: **Surge Building, Room 333, UC Riverside**

Meeting Attendees:

Name	Department	Phone
UCR Working Group		
Jon Harvey	Capital and Physical Planning	(951) 827-6952
Kieron Brunelle	Capital and Physical Planning	(951) 827-2788
Nita Bullock	Capital and Physical Planning	(951) 827-7376
Jerry Higgins	Physical Plant	(951) 827-7696
Pat Simone	Physical Plant	(951) 827-6464
Susan Marshburn	Housing Services	(951) 827-7711
George MacMullin	ODC	(951) 827-1397
UCR Invitees		
Scott Corrin	Campus Fire Marshal	(951) 827-6309
Dan Martin	Communications	(951) 827-2149
Jill Hishmeh	Communications	(951) 827-6484
Karen Jordan	Capital and Physical Planning	(951) 827-2787
Andy Steward	Transportation & Parking	(951) 827-2557
Consultants		
Michael Ackerman	Transtech Engineers - Civil	(909) 263-1734
Dave Ragland	Transtech Engineers – Civil/Traffic	(909) 595-8599
Sabry S. Abdelmalik	Transtech Engineers – Civil/Utilities	(909) 263-1734
Ken Pirie	Walker Macy – Facilities Planning	(503) 425-1112
Richard Henrikson	Henrikson Owen - Mechanical	(949) 860-4900
Aaron Poon	Henrikson Owen – Electrical	(949) 860-4900

Meeting Content:

1. The meeting was convened at 8:30 a.m.

2. Richard opened the meeting by discussing four meeting objectives. These were:

   a. Review development concepts for the various utilities (except traffic)
   b. Review sustainability implications
   c. Review comment incorporation into the WCIDS report (except traffic)
   d. Communicate the content of the developing Administrative Draft Report (except traffic)

3. Richard mentioned that comments had been received from various UCR people on the Phase 1 Implementation Plan Report. Most of these comments have been addressed and incorporated into the developing Administrative Draft Report. Richard passed around the comments showing the comments highlighted in yellow, indicating that the comments had been addressed and incorporated.

4. Richard mentioned that utility loads and resultant planning capacities had been developed based on implementation of aggressive sustainable design criteria, as directed in the previous Working Group meeting (No. 2). This is in addition to planning based on more conventional loads figures and resulting planning capacities. This parallel approach gives the University the option of planning for both paths – a conservative approach and an approach based on aggressive sustainability implementation.

5. Richard mentioned that the effect of aggressive sustainability implementation is that, in addition to ongoing utilities savings, there will be significant downsizing (or “right-sizing”) of the mechanical, electrical, and civil infrastructures. Thus, a key selling point is that conducting sustainable design need not incur significant additional costs as is “conventional wisdom”. Rather conducting sustainable design can translate into significant infrastructure first cost savings.

6. UC has a policy that new buildings achieve and energy efficiency performance of at least 20% better than Title 24. Richard mentioned that from the standpoint of energy efficiency, the conservative planning approach was based on an energy efficiency performance of roughly 20% better than Title 24, but also incorporates a margin of safety upon that for the purpose of utilities infrastructure planning. Richard mentioned that the aggressive sustainability approach was based on a performance of roughly 30% to 35% better than Title 24. Richard said that the individual sustainability measures are presented in Chapter 16, but that the impacts of those measures and the details of the sustainability planning effort would be more fully described in the meeting by the representatives of the various planning disciplines.

7. Richard mentioned that Phase 1A had been incorporated into the WCIDS, as directed in the previous Working Group meeting (No. 2). This involves an early pre-Phase 1 implementation of Building W4 and Family Housing Phase 1. Richard said that the details of Phase 1A would be more fully described in the meeting by the representatives of the various planning disciplines.

8. Richard mentioned that the three Apartments phases, which were originally set at Phase 1, Phase 2, and Phase 3; had been reset at Phase 2, Phase 3, and Phase 4. This was as directed in the previous Working Group meeting (No. 2).

9. Richard requested UCR clarification of the Phasing dates, because Phase 1 cannot possibly come on-line by the Year 2010, nor can Phase 1A for that matter. UCR directed that the Phasing dates shall remain the same for consistency with the other West Campus planning reports, and that it was understood that the 2010 timeframe was not attainable.

ACTION ITEM: The various disciplines of the consultant team will use the original dates for the four phases (Phase 1 – 2010, Phase 2 – 2015, Phase 3 – 2020, and Phase 4 - 2025) in their respective portions of the UCR WCIDS. The WCIDS report will note that Phase 1A will be completed by the Year 2010 as a subset of Phase 1 for reporting purposes. These dates represent a sequencing plan where the phase is more important than the date.

10. Ken Pirie presented the hardscape and landscape concepts that will be part of the Administrative Draft Report. He also described sustainability measures associated with these aspects of the planning effort.

11. **ACTION ITEM:** Ken Pirie will send Jon Harvey an Adobe Acrobat PDF copy of his PowerPoint presentation.

12. **ACTION ITEM:** Mike Ackerman will send Jon Harvey an Adobe Acrobat PDF copy of his PowerPoint presentation, sewer plans, stormwater plans, and mark-ups.

13. **ACTION ITEM:** Mike Ackerman will review all old and current campus development plans including DPP, LDRP, WCAP, and CAMPS. The purpose of this examination is to review previous concepts that connected water and sewer to Family Housing Phase 1. The DPP had a different connection plan.

14. Mike Ackerman presented the sewer and stormwater concepts that will be part of the Administrative Draft Report. He also described sustainability measures associated with these aspects of the planning effort. The general idea is that stormwater will flow southeast towards MLK Jr. Blvd. Ken Pirie stated that the WCAP should be used to model the drainage swales that connect to the stormwater system.

15. **ACTION ITEM:** As directed in the meeting, Mike Ackerman will incorporate the following into the WCIDS:

    a. Connect Family Housing Phase 1A to the sewer in University Avenue if capacity allows. Further examination of the proposed Family Housing sewer connection points is necessary. This is related to item 13 above. The committee was surprised with the proposed sewer plan since it was different from previous plans presented in the DPP.
    b. Change the sewer line in Chicago Avenue from a City-owned sewer line to a UCR-owned sewer line. The reference is to the existing UCR line that runs along Chicago on UCR land. Any City sewer lines in Chicago should be shown as City lines.
    c. The proposed plans connect some West Campus academic buildings to the UCR line in Martin Luther King Jr. Boulevard. The Working Group asked if additional connections to the line were considered.
    d. Use drainage swales for easterly surface water conveyance through West Campus per the Campus Aggregate Master Plan (CAMPS).

16. Sabry Abdelmalik presented the stormwater and hydrology concepts that will be part of the Administrative Draft Report.

17. Dave Ragland presented the domestic water, fire water, irrigation and reclaimed water concepts that will be part of the Administrative Draft Report. He also described sustainability measures associated with these aspects of the planning effort.

18. **ACTION ITEM:** Transtech will incorporate a looped water system that is connected to the east campus with City backup connections.

19. **ACTION ITEM:** Dave Ragland will incorporate the following into the WCIDS:

    a. If feasible, reclaimed water or the agricultural irrigation system will be used for irrigation of West Campus landscaping. Transtech will verify if reclaimed water is available in the area.
    b. Transtech will provide domestic water and irrigation plans no later than January 28th.

20. Aaron presented the electrical power and data/telecommunications concepts that will be part of the Administrative Draft Report. He also described sustainability measures associated with these aspects of the planning effort.

21. Pat Simone mentioned that the calculated electrical demand load for the West Campus appears to be higher than the historic value from the East Campus. Aaron Poon stated that a more conservative demand factor is used to anticipate higher power consumption from data communication equipment. The actual demand load is expected to be lower. A safety factor shall be included for sizing electrical equipment to avoid unnecessary power blackouts.

22. Aaron mentioned that the electrical load calculation has been revised to show separate demand loads on the utility power grid as well as the campus grid. Additional data are included to identify electrical loads for different building types (i.e. housing, academic, medical, etc) at different phases.

23. Aaron mentioned that the solar power contribution from photovoltaic cell is estimated to be around 0.6 to 0.9 watt per building gross square foot, depending on the building configuration and surface area available for solar cell installation. A separated electrical load analysis is included to show demand load calculation using an aggressive sustainable design approach.

24. Aaron mentioned that each critical building shall be served by two 12 kV circuits with double-ended (dual transformers) unit substation to enhance the reliability of the electrical system. Other buildings shall also be served with two 12 kV circuits, but with a single transformer substation and selector switch.

25. Aaron mentioned that the main data-communication node shall be established next to the Recreation building during Phase 2 development. A temporary communication node will be required to support the Phase 1 Family Housing and Academic Buildings.

26. **ACTION ITEM:** The WCIDS will identify approximate the required widths of utilities "corridors", either tunnels or direct-buried/duct banks, at certain locations such as Everton Place.

27. **ACTION ITEM:** Further investigation is required to confirm conduit quantity and pathway location for the main data-communication backbone network, and to develop strategy to develop connectivity to the East Campus. Jon Harvey will arrange an additional meeting on January 23, 2008, between Henrikson Owen & Associates and UCR Communications Services.

28. Richard presented the central plants and CHW/HHW piping distribution concepts that will be part of the Administrative Draft Report. He also described sustainability measures associated with these aspects of the planning effort.

29. **ACTION ITEM:** Richard and Aaron will review the mechanical and electrical utilities distribution to identify common pathways for routing savings.

30. Richard mentioned that he had done an analysis on the relative feasibility of ice TES versus chilled water TES for the UCR West Campus. Chilled water TES was considered superior to ice TES in the UCR West Campus application for many reasons, including energy efficiency, energy savings, lower first cost, lower cooling production cost, and UCR experience with chilled water TES. Richard explained these reasons more fully and mentioned that they are written up in Chapter 8 of the WCIDS. Pat Simone agreed that chilled water TES was more appropriate than ice TES, and that chilled water TES should be pursued for any TES options in the WCIDS.

31. Richard described the cooling loads and heating loads associated with a 10% better than Title 24 scenario (Chapters 8 and 9) and an aggressive sustainability implementation scenario (Chapters 8A and 9A). He presented figures and tables showing the difference in central plant and infrastructure sizes associated with the two approaches. As previously mentioned, UC has a policy that new buildings achieve at least 20% better than Title 24. This 20% better than Title 24 figure is bracketed within the "conservative" approach and the "aggressive sustainability" approach, so it is covered in the planning process.

32. Richard mentioned that he had developed two separate versions of Chapter 8 (Chapter 8 and 8A) and Chapter 9 (Chapters 9 and 9A). One version of each chapter presents a more conservative approach, which is a 10% better than Title 24 scenario (Chapters 8 and 9). The other version presents an aggressive sustainability implementation scenario (Chapters 8A and 9A). Chapters 8 and 9 are fully interchangeable with Chapters 8A and 9A, depending upon which approach UC Riverside wishes to take.

33. Richard presented conceptual design “build-out” layouts for the Main Central Plant and the Medical School Central Plant. This shows the “footprint” of these two central plants at “build-out” on the selected sites. Generally, the two central plants fit on the selected sites, however, it was decided that Building W6 would be moved west and/or narrowed to allow for more access space around the Main Campus Central Plant. Ken Pirie did not see any problem in doing this since W6’s width can be easily narrowed and there is plenty of room to the west to move Building W6.

    ACTION ITEM: Ken Pirie will revise the UC Riverside CAMPS Key Plan to show Building W6 moved west and/or narrowed to allow for more access space around the Main Campus Central Plant.

34. Richard mentioned that the proposed distribution main along Everton is recommended because it parallels the electrical distribution path. Also, if the distribution main is routed south of Building W5, as was discussed, it would not be as cost feasible, given the length and number of pipe branches required to reach Buildings W1, W2, W3, and W4.

35. Pat Simone asked if propane storage would be required for boiler fuel back-up. Richard said that he had not encountered this requirement on UC or CSU campuses, although it is possible. Pat requested that the WCIDS report state that “if propane storage is required, this is how it will be incorporated…”

    ACTION ITEM: Richard Henrikson will show in the WCIDS how propane storage could be accommodated in the central plant layouts.

36. The draft Administrative Draft Report (without the completion of the traffic section) is scheduled to be submitted February 4, 2008.

37. The next Working Group meeting is scheduled for February 8, 2008.

38. The Final Report is currently scheduled for submittal on February 26, 2008.

39. Now that utilities and systems concepts have been presented in the meeting, UC Riverside will review these concepts with their executives. Any meetings with City agencies will occur only after UCR executives approve of the concepts.

40. The consultant team mentioned that cost estimates could not be comprehensive without City connection and capacity costs included. UC Riverside directed the consultant team to develop conceptual cost estimates, except for these cost items.

41. The meeting was adjourned at 12:30 p.m.

42. Immediately following the meeting, the Project Management Team and Richard Henrikson discussed the cost plan model that will be part of the WCIDS. The following items were discussed and agreed to:

a. Create a cost plan model that uses a Microsoft Excel spreadsheet format that can be easily updated over time. This will help form the basis of this being a "living document".
b. Costs should be presented in this Microsoft Excel format such that UC Riverside can link those costs to GIS.
c. Costs should be furnished in sufficient detail to understand how they are derived (e.g. costs per linear foot for each utility system; trenching, materials, cover; etc.)
d. Identify the escalation assumptions for Phase 1A components, and for the development timeframes.
e. Identify the cost in tabular format to complete each development phase by system and by phase.
f. Provide a summary table in the Executive Summary that shows costs by system by phase.
g. Consider the format used in the East Campus Infrastructure Report.
h. Set up tables to allow automatic cost updates throughout the report when costs are updated.

Recorder: Richard Henrikson
Note: Items shown in bold are action items requiring resolution and completion.

This concludes the record of the meeting. Any party wishing to file an amendment shall do so in writing to Henrikson Owen & Associates within seven calendar days. Subject to any written amendments, the contents herein are accepted as an accurate record of the meeting by all parties.

MEETING SESSION FOR TRAFFIC IMPACT ANALYSIS

WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

UNIVERSITY OF CALIFORNIA, RIVERSIDE

Meeting Date: January 30, 2008

Meeting Time: 2:00 p.m.

Meeting Location: Capital Planning Building, UC Riverside

Meeting Attendees:

Name	Department	Phone
UCR		
Jon Harvey	Capital and Physical Planning	(951) 827-6952
Kieron Brunelle	Capital and Physical Planning	(951) 827-2788
Nita Bullock	Capital and Physical Planning	(951) 827-7376
Pat Simone	Physical Plant	(951) 827-6464
George MacMullin	ODC	(951) 827-1397
Mike Delco	TAPS, ODC	(951) 827-1393
Andrew Stewart	TAPS	(951) 827-2457
Consultants		
Michael Ackerman	Transtech Engineers - Civil	(909) 263-1734
Jana Robbins	Transtech Engineers – Traffic	(909) 595-8599 x133

Meeting Content:

1. The meeting was convened at 2:00 p.m.

2. Transtech presented the Traffic information that has been gathered to date. This included existing traffic counts at 18 intersections, existing field measurements, base figures showing AM and PM peak volumes, etc., for each intersection.

3. Existing Conditions level of service at each intersection was provided to the UCR meeting attendees. A discussion about 2 intersections operating at LOS E and F, or deficiently under existing conditions, ensued. The two intersections were:

    a. Canyon Crest at MLK Jr. Blvd.

    b. Iowa Avenue at Everton Pl

4. Traffic Phasing – Went over each phase (Phases 1A thru 4). UCR meeting attendees indicated that there would now be an additional Phase 1B which will only encompass Building M4.

5. There was a discussion about the merits of tying in traffic with exact phasing dates. UCR meeting attendees felt that realistically, no buildings would happen by the 2010 date. Transtech indicated that Traffic analysis must be tied to a date, since future conditions are calculated based on increasing existing traffic volumes with an ambient growth rate up to a specific year. It was agreed that the original dates 2010, 2015, 2020 and 2025 would remain as the study dates regardless of how realistic the assumptions.

6. Ambient growth rate will be taken from the LRDP traffic report (1.7%).

7. Student and Staffing Assumptions:

Phases 1A and 1

a. The existing enrollment figure is 17,100 students

b. By 2010, an increase to 20,000 students is expected (2,900 new students), 75% of which would occur on the East Campus.

c. In Phase 1A, it will be assumed that at least 1 family member in Family Housing would drive off campus for work.

d. There will be parking for Building W4 by Highlander Hall and in lot 30.

e. Parking for new students and for Building W4 would be in lot 30 and by Highlander Hall.

f. Building W1 (Conference) will be implemented after the Human Resource Building and Highlander Hall are gone, so no additional traffic is considered.

g. A road connection from Everton Place will need to be provided to Building W4.

Phase 1B

a. Part of Cranford Avenue to MLK Jr. Blvd. will need to be built for Building M4, going from MLK Jr. Blvd. to Southwest Mall.

Phase 4

a. Medical office buildings (MOB) are envisioned as commercial medical support facilities associated with the medical school and may be standard offices.

b. There will not be a hospital; just a clinic.

8. Trip Generation of University Traffic by Phase

   a. Methodology – The ITE trip Generation Manual will be used for generating the amount of vehicle trips for each phase. The trips generated will then be reduced with a 50% internal capture rate.

9. Trip Distribution of University Traffic by Phase

   a. University staff will get Transtech zip codes of commuter students and staff, as well as the percentages of students living on-campus and the percentage of students using a car to get from housing to UCR.

   b. The ground level and structure parking phases will be emailed by Jon Harvey.

10. University indicated that they have not been required in the past to participate in traffic congestion fees or improvements as city, county, state, and federal facilities are exempt under the City of Riverside's development code. The campus has, however paid for traffic signals that are specific to the campus. Case in point – entrance to Lot 30 from the west that only services Ag Ops and the Parking Lot. However, the traffic study will provide an indication of future improvements that will be needed with future growth and West Campus Infrastructure development.

11. Transtech indicated that they would need two weeks to prepare the traffic study.

12. Phasing line types should be distinguishable in black and white.

13.

Phase	Year	Number of Students
1A, 1B, 1	2010	20,000
2	2015	25,000
3	2020	28,350
4	2025	31,700

Note that the 2020 and 2025 dates and student enrollment numbers are beyond the LRDP threshold.

14. Add scale bars to all diagrams, plats, plans.

Recorder: Jana Robbins
Note: Items shown in bold are action items requiring resolution and completion.

This concludes the record of the meeting. Any party wishing to file an amendment shall do so in writing to Transtech within seven calendar days. Subject to any written amendments, all parties herein accept the contents as an accurate record of the meeting.

WORKING GROUP MEETING MINUTES, MEETING NO. 4

WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

UNIVERSITY OF CALIFORNIA, RIVERSIDE

Meeting Date: February 22, 2008

Meeting Time: 8:30 a.m. to 2:00 p.m.

Meeting Location: Surge Building, Room 333, UC Riverside

Meeting Attendees:

Name	**Department**	**Phone**
UCR Working Group		
Jon Harvey	Capital and Physical Planning	(951) 827-6952
Kieron Brunelle	Capital and Physical Planning	(951) 827-2788
Nita Bullock	Capital and Physical Planning	(951) 827-7376
Pat Simone	Physical Plant	(951) 827-6464
Susan Marshburn	Housing Services	(951) 827-7711
George MacMullin	ODC	(951) 827-1397
UCR Invitees		
Dan Martin	Communications	(951) 827-2149
Karen Jordan	Capital and Physical Planning	(951) 827-2787
Consultants		
Michael Ackerman	Transtech Engineers - Civil	(909) 263-1734
Sabry S. Abdelmalik	Transtech Engineers – Civil/Utilities	(909) 263-1734
Ken Pirie	Walker Macy – Facilities Planning	(503) 425-1112
Richard Henrikson	Henrikson Owen - Mechanical	(949) 860-4900
Aaron Poon	Henrikson Owen – Electrical	(949) 860-4900

Meeting Content:

1. The meeting was convened at 8:30 a.m.

2. Richard opened the meeting by discussing three meeting objectives. These were:

   a. Review the Administrative Draft Report
   b. Review Phased Development Plans
   c. Review Cost Information

3. Is there room for Everton half-street improvements on UCR property? It appears that there is sufficient ROW if on-street parking is removed from the south side.

4. **ACTION ITEM:** Ken will remove interim Gage Canal and interim Gage Canal path line items from the landscape/hardscape cost summary — no point in doing things twice. Insert final cost figure, which will reflect the final landscape.

5. Surface parking will be funded through TAPS using a different funding source. **ACTION ITEM:** Ken will remove parking from the in the landscape/hardscape cost summary, but keep it as a category ‘below the line’. This does not apply to Family Student Housing surface parking

6. **ACTION ITEM:** Ken will consider site clearing as part of costs in the landscape/hardscape cost summary.

7. **ACTION ITEM:** Ken will add a figure in the landscape/hardscape cost summary for hydroseeding of construction lay-down areas associated with Phase 1A and 1B, to avoid wind erosion of open agricultural field areas.

8. **ACTION ITEM:** Ken will move Child Development Center line items in the landscape/hardscape cost summary from the 'Campus' column into the 'Family Housing' column.

9. **ACTION ITEM:** Ken will put all of Gage Canal piping costs into the Phase 1A landscape/hardscape cost summary, but separate costs for piping on UCR property and Caltrans property.

10. Cost figures for landscape and paths seem OK. A wider path for fire lanes would be $12/sf, which would support the necessary weight for vehicle traffic.

11. Cost figures for trees may be low.

12. **ACTION ITEM:** Ken will remove street lighting from landscape/hardscape/roads cost summaries. These are covered under the electrical cost summaries.

13. **ACTION ITEM:** Ken will consider stormwater treatment for Phase 1A. A bioswale could be included in landscape costs. The existing unit cost figure is high enough to incorporate bioswale landscape if it is located there. Transtech should include cost of building bioswale.

14. UCR asked that all utilities be metered, by building and by zone.

15. When discussing family student housing, do not mention whether or not it will be a private or UCR project.

16. **ACTION ITEM:** On the storm drain system, Phase 1A, Transtech will remove the storm drain south of building W4 for this phase. Storm water will sheet flow. Possible bioswale then back to sheet flow.

17. **ACTION ITEM:** On the sewer system, Phase 1A, Transtech will include the sewer for building W5. Transtech will also mention in the WCIDS an alternative sewer location on the east side of buildings W3, W4, and W5.

18. **ACTION ITEM:** On the domestic water and fire water distribution system, Transtech will state in the WCIDS that the 12-inch water line crossing the freeway at the pedestrian bridge may be relocated without having a major effect on the domestic water and fire water distribution system.

19. **ACTION ITEM:** On the domestic water and fire water distribution system, Transtech will include a unit cost on East Campus for the replacement of existing landscaping.

20. **ACTION ITEM:** On the irrigation water distribution system, Transtech will include Gage Canal as a source of irrigation water. Family Housing irrigation will be metered. Irrigation will be metered by zone. Clarify in the WCIDS that the existing agricultural irrigation system and drainage system is to remain functional as the various phases are installed. Show existing irrigation system and irrigation by phases.

21. **ACTION ITEM:** On the traffic impact analysis, Transtech will clarify in the WCIDS that the analysis covers staff and faculty, as well as students.

22. Any CHW/HHW main branches, serving multiple buildings will be considered utilities infrastructure project pipes. Pipe branches to individual buildings will be covered under building projects. **ACTION ITEM:** Richard will make these changes accordingly in the WCIDS.

23. **ACTION ITEM:** Richard will include a figure in the WCIDS, showing a typical cross section of the utilities tunnel.

24. If a utility tunnel can be incorporated into a building (i.e. the tunnel becomes the building basement/mechanical room), then tunnel first costs can be reduced. However, because of the difficulties coordinating separate utilities infrastructure projects and building projects, as well as the different timing of them, it was decided that all utilities tunnel projects would be shown as utilities infrastructure projects. **ACTION ITEM:** Richard will include a statement in the WCIDS stating that if a utility tunnel can be incorporated into a building basement, then tunnel first costs can be reduced.

25. **ACTION ITEM:** Richard will check to see if there is sufficient gas pipe capacity to International Village, or Highlander Hall, to tap Building W4's gas pipe off that gas pipe. In this way, the 6" HPG gas pipe along Everton Place could be deferred to Phase 1, when the tunnel goes in.

26. UCR mentioned that there is an existing gas pipe running north-south along the east side of Iowa Avenue. **ACTION ITEM:** Richard will show this on the phased gas distribution piping figures and consider if it is useful as a point of connection.

27. **ACTION ITEM:** Richard will place Family Housing Phases 1 and 2 on a separate SCG-piped gas distribution system. The housing units will be individually metered. Richard will revise the six-phased gas distribution piping development plans to account for this and other gas comments.

28. **ACTION ITEM:** Richard will size the campus gas pipe distribution system so that perhaps later the campus gas distribution can serve Family Housing, Phases 1 and 2.

29. **ACTION ITEM:** Jon will transmit the UCR LEED baseline to Richard.

30. Pat stated that he would like Section 16.4.1.8 changed from "heat recovery for wet labs" to "heat recovery for 100% OSA systems." **ACTION ITEM:** Richard will make this change.

31. UCR will send written comments on the Administrative Draft Report by 02/28/08.

32. **ACTION ITEM:** With regard to the cost summary tables:

    - Delete the subcontractor's mark-up (10%) line item.
    - Use 15% for general contractor's markup.
    - Use 10% for design contingency.
    - Delete the construction contingency line item.
    - In the central plant cost summary tables, make a separate line item for commissioning. Put commissioning at top of the cost estimate. Mention that it is from concept through start-up.
    - In the central plant cost summary tables, include an air emissions control figure of $700,000 for an 80 MMBtuh boiler. Prorate accordingly for other sized boilers.
    - Parking and Data/Telecom cost figures shall be "below-the-line" items. They are paid from other funding sources.

33. **ACTION ITEM:** Aaron will show the electrical duct bank routed around major mechanical equipment in the central plant area.

34. Conduit with concrete encasement will be used to feed Building W4 in Phase 1A before the utility tunnel is constructed. **ACTION ITEM:** Aaron will show this in the WCIDS.

35. Six new 4" conduits will be installed between existing communication manhole near University Extension Center and new manhole adjacent to new Building W4.

36. Spare conduit will not be provided inside the utilities tunnel. **ACTION ITEM:** Aaron will revise the electrical cost summary tables accordingly.

37. Three levels of cable tray will be provided inside the utilities tunnel for data/communication cables. **ACTION ITEM:** Aaron will incorporate this comment into the WCIDS.

38. It was decided that underground vault-mounted high voltage switches will be used in place of above-ground pad-mounted switches for the West Campus. **ACTION ITEM:** Aaron will incorporate this comment into the WCIDS.

39. The quantity of high voltage switches will be revised in the Phase 1A electrical cost estimate to support Building W4 only (one switch per building site). **ACTION ITEM:** Aaron will incorporate this comment into the WCIDS.

40. Emergency stand-by power shall be provided by a generator at each building during the building development phase. Small generation plants serving clusters of buildings will only be considered when buildings' locations, phasing implementation, and cost analysis can justify the approach. The emergency power system will not be included in the utilities infrastructure cost estimates, except the units required for the data/communication nodes. **ACTION ITEM:** Aaron will incorporate this comment into the WCIDS.

41. The electrical cost estimate will cover major roadway lighting only. Landscape lighting will be covered under landscape development. **ACTION ITEM:** Aaron and Ken will coordinate to incorporate this comment accordingly into the WCIDS.

42. Jon requested that AutoCAD drawings for Phase 1A be e-mailed to him. **ACTION ITEM:** The consultant team members will e-mail their respective Phase 1A AutoCAD drawings to Jon.

43. Jon reviewed with the team the text and graphical standards that UCR would like to see incorporated into the final report. Some, but not all, include the following:

    - Schematics shall have consistent, legends, line weights, north arrows, etc.
    - Transtech will remove light green from the schematics and replace it with a darker color.
    - When the entire West Campus is not shown on a single figure, choose appropriate places to break up the utility line schematics (such as Cranford, Iowa, etc.).

44. Project Schedule:

    - **ACTION ITEM:** Richard will submit all updated Phase 1A cost information to Jon by end-of-day, Friday morning, February 29, 2008.
    - The final report is due March 14, 2008.

45. The meeting was adjourned at 2:00 p.m.

Recorder: Richard Henrikson
Note: Items shown in bold are action items requiring resolution and completion.

This concludes the record of the meeting. Any party wishing to file an amendment shall do so in writing to Henrikson Owen & Associates within seven calendar days. Subject to any written amendments, all parties herein accept the contents as an accurate record of the meeting.

APPENDIX A-9

COST ESTIMATES

UC RIVERSIDE
WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

Summary of the Costs of the West Campus Utilities Infrastructure Projects[a]

Utilities Traffic Hardscape Landscape	Phase 1A Housing, dollars	Phase 1A Campus[c], dollars	Phase 1B, dollars	Phase 1, dollars	Phase 2 Housing, dollars	Phase 2 Campus, dollars	Phase 3, dollars	Phase 4, dollars	Total, dollars
Landscape Hardscape	9,962,000	6,524,000	2,476,000	5,932,000	8,891,000	25,651,000	18,978,000	20,308,000	98,722,000
Domestic Water and Fire Water	128,000	98,000	167,000	448,000	271,000	569,000	2,886,000	583,000	5,150,000
Irrigation Water	197,000	32,000	80,000	70,000	196,000	236,000	387,000	433,000	1,631,000
Sanitary Sewer	583,000	87,000	57,000	5,000	556,000	346,000	483,000	361,000	2,478,000
Storm Drain	253,000	1,000	0	169,000	541,000	254,000	27,000	0	1,245,000
Traffic	625,000	208,000	345,000	0	208,000	208,000	0	0	1,594,000
Central Plants	0	0	0	12,122,000	0	10,443,000	8,026,000	3,037,000	33,628,000
Chilled Water and Heating Hot Water	0	0	0	3,006,000	0	4,521,000	1,908,000	5,489,000	14,924,000
Energy Management System[b]	0	0	0	150,000	0	175,000	90,000	125,000	540,000
Natural Gas	0	11,000	109,000	367,000	0	298,000	82,000	401,000	1,268,000
Electrical Power Distribution	0	2,306,000	2,812,000	3,320,000	0	9,892,000	7,825,000	5,299,000	31,454,000
Data Telecom-munications	880,000	1,164,000	7,675,000	757,000	0	13,504,000	2,425,000	1,951,000	28,356,000
Fire Alarm System	0	364,000	161,000	231,000	0	459,000	295,000	332,000	1,842,000
Totals	12,628,000	10,795,000[c]	13,882,000	26,577,000	10,663,000	66,556,000	43,412,000	38,319,000	222,832,000

a All dollars are in 2008 dollars. Installed unit costs in the cost summary tables include material, sales tax, installation, equipment, programming, subcontractor's mark-up, and design contingency. Costs do not include soft costs, permitting, design fees, and management fees.

b It is important to recognize that only the costs of the EMS front end, the central plants' EMS points, and the EMS backbone around campus are included here. Only these EMS costs are related to utilities infrastructure projects. The vast majority of EMS costs (not included here) will not be part of the utilities infrastructure projects, but rather will be part of the individual building projects.

c The Phase 1A Campus total cost includes the covering (piping) and landscaping of Gage Canal over its entire length on West Campus, including on the CalTrans property.

Summary of the Costs of the Central Plants with Aggressive Sustainability Implementation

Utilities Traffic Hardscape Landscape	Phase 1A, dollars	Phase 1B, dollars	Phase 1, dollars	Phase 2, dollars	Phase 3, dollars	Phase 4, dollars	Total, dollars
Central Plants	0	0	10,319,000	9,340,000	6,320,000	2,281,000	28,260,000
Chilled Water and Heating Hot Water	0	0	2,924,000	4,452,000	1,859,000	5,346,000	14,581,000

Opinion of Probable Construction Cost - Conceptual Leve
Landscape-Hardscape

Phase 1A
West Campus Infrastructure Development Stud
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Site Improvements						
Landscape-W4	44,675	sf	$9.20		$411,010	$411,010
Site Clearing	44,675	sf	$1.00		$44,675	$44,675
Site Grading and Preparation	44,675	sf	$2.00		$89,350	$89,350
Trees-W4	45	ea	$280.00		$12,509	$12,509
Landscape Lighting-W4	44,675	sf	$2.50		$111,688	$111,688
Plazas-W4	5,000	sf	$40.00		$200,000	$200,000
Paths (10' concrete)-W4	850	lf	$115.00		$97,750	$97,750
Hydroseed for laydown area	60,000	sf	$0.50		$30,000	$30,000
Landscape-Family Student Housing North	197,560	sf	$7.00	$1,382,920		$1,382,920
Site Clearing	197,560	sf	$1.00	$197,560		$197,560
Site Grading and Preparation	197,560	sf	$2.00	$395,120		$395,120
Trees-Family Student Housing North	198	ea	$280.00	$55,317		$55,317
Landscape Lighting-Family Student Housing North	197,560	sf	$2.50	$493,900		$493,900
Paths (6' concrete)-Family Student Housing North	7,200	lf	$70.00	$504,000		$504,000
Surface Parking-North Family Housing	171	Stall	$3,500.00	$598,500		$598,500
Landscape-CDC North	15,000	sf	$7.00	$105,000		$105,000
CDC Site Clearing	15,000	sf	$1.00	$15,000		$15,000
CDC Site Grading and Preparation	15,000	sf	$2.00	$30,000		$30,000
Trees-CDC North	15	ea	$280.00	$4,200		$4,200
Landscape Lighting-CDC North	15,000	sf	$2.50	$37,500		$37,500
Paths (6' concrete)-CDC North	200	lf	$70.00	$14,000		$14,000
Gage Canal Piping	1,722	lf	$620.00		$1,067,640	$1,067,640
Gage Canal Piping on Caltrans Property	365	lf	$620.00		$226,300	$226,300
Gage Landscape Site Clearing	94,000	sf	$1.00		$94,000	$94,000
Gage Landscape Site Grading and Preparation	94,000	sf	$2.00		$188,000	$188,000
Gage Canal Landscape	94,000	sf	$11.50		$1,081,000	$1,081,000
Gage Canal Trees	157	ea	$280.00		$43,867	$43,867
Gage Canal Landscape Lighting	94,000	sf	$2.50		$235,000	$235,000
Gage Canal Paths (10' concrete)	1,200	lf	$115.00		$138,000	$138,000
Temp. 8' Asphalt Path to Lot 30	850	lf	$50.00		$42,500	$42,500
Type 2 Roads (Half-Street Improve Everton Place--Iowa to Caltrans)	1,100	lf	$300.00		$330,000	$330,000
Type 2 Roads (Everton Place through Caltrans to circle east of W4)	890	lf	$600.00		$534,000	$534,000
Traffic Circle/Turnaround east of W4	12,000	sf	$15.00		$180,000	$180,000
Type 2 Roads - NW Mall W of Iowa (both sides, incl median)	2,484	lf	$750.00	$1,863,000		$1,863,000
Type 2 Roads-Family Student Housing North	3,632	lf	$600.00	$2,179,200		$2,179,200
Subtotal				**$7,875,217**	**$5,157,288**	**$13,032,505**
General Contractor's Mark-Up (15%)				**$1,181,283**	**$773,593**	**$1,954,876**
Subtotal				**$9,056,499**	**$5,930,881**	**$14,987,381**
Design Contingency (10%)				**$905,650**	**$593,088**	**$1,498,738**
Total				**$9,962,149**	**$6,523,970**	**$16,486,119**
Surface Parking (funded separately)						
Surface Parking-CDC North	64	Stall	$3,500		$224,000	$224,000
Surface Parking P2	250	Stall	$3,500		$875,000	$875,000
Surface Parking Highlander Footprint (additional to existing lot)	*160*	*Stall*	*$3,500*		*$560,000*	*$560,000*

Opinion of Probable Construction Cost - Conceptual Level
Landscape-Hardscape

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Site Improvements				
Landscape	23,823	sf	$9.20	$219,172
Site Clearing	23,823	sf	$1.00	$23,823
Site Grading and Preparation	23,823	sf	$2.00	$47,646
Trees	24	ea	$280.00	$6,670
Landscape Lighting	23,823	sf	$2.50	$59,558
Plazas	6,000	sf	$40.00	$240,000
Paths (10' concrete)	1,220	lf	$115.00	$140,300
Hydroseed for laydown area	60,000	sf	$0.50	$30,000
Type 2 Roads: Cranford to NW Mall (48' paved	1,700	lf	$700.00	$1,190,000
Subtotal				**$1,957,169**
General Contractor's Mark-Up (15%)				**$293,575**
Subtotal				**$2,250,744**
Design Contingency (10%)				**$225,074**
Total				**$2,475,818**
Surface Parking (funded separately)				
Surface Parking PM	156	Stall	$3,500	$546,000

NOTES:

All Costs in 2008 dollars

Landscape costs allow for bioswale landscape

Does not include Soft Costs, Permitting, Design or Management Fees (typically 30-45%)

Sales Tax on materials is incorporated into unit costs

Drainage and Utilities costs are covered elsewhere in the West Campus Infrastructure Development Study

Does not include any costs within a 10' offset of each master plan footprint. Such costs assumed to be within building budgets.

Opinion of Probable Construction Cost - Conceptual Level
Landscape-Hardscape

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Site Improvements				
Landscape	70,283	sf	$9.20	$646,604
Site Clearing	70,283	sf	$1.00	$70,283
Site Grading and Preparation	70,283	sf	$2.00	$140,566
Trees	70	ea	$280.00	$19,679
Landscape Lighting	70,283	sf	$2.50	$175,708
Paths (10' concrete)	2,310	lf	$115.00	$265,650
Type 1 Roads (Vehicular Malls)--NW Mall E of Iowa, both sides	1,100	lf	$750.00	$825,000
Type 2 Roads--West UNEX half-street	600	lf	$300.00	$180,000
Plazas	4,224	sf	$40.00	$168,960
NW Pedestrian Walk	1,000	lf	$500.00	$500,000
UNEX/Conf Center Landscape	47,159	sf	$9.20	$433,863
UNEX/Conf Center Site Clearing	47,159	sf	$1.00	$47,159
UNEX/Conf Center Site Grading and Preparation	47,159	sf	$2.00	$94,318
North Gage Canal Landscape	55,000	sf	$11.50	$632,500
North Gage Canal Site Clearing	55,000	sf	$1.00	$55,000
North Gage Canal Site Grading and Preparation	55,000	sf	$2.00	$110,000
North Gage Canal Landscape Trees	92	ea	$280.00	$25,667
North Gage Canal Landscape Lighting	55,000	sf	$2.50	$137,500
North Gage Canal Landscape Paths	1,400	lf	$115.00	$161,000
Subtotal				**$4,689,456**
General Contractor's Mark-Up (15%)				**$703,418**
Subtotal				**$5,392,874**
Design Contingency (10%)				**$539,287**
Total				**$5,932,162**

NOTES:
All Costs in 2008 dollars
Does not include Soft Costs, Permitting, Design or Management Fees (typically 30-45%)
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Does not include any costs within a 10' offset of each master plan footprint. Such costs assumed to be within building budgets.

Opinion of Probable Construction Cost - Conceptual Leve
Landscape-Hardscape

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Site Improvements						
Landscape--Academic Core	276,786	sf	$9.20		$2,546,431	$2,546,431
Site Clearing	276,786	sf	$1.00	$276,786.0		$276,786
Site Grading and Preparation	276,786	sf	$2.00	$553,572.0		$553,572
Landscape-Conf Ctr	65,417	sf	$9.20		$601,836	$601,836
Site Clearing	65,417	sf	$1.00	$65,417.0		$65,417
Site Grading and Preparation	65,417	sf	$2.00	$130,834.0		$130,834
Trees	342	ea	$280.00		$95,817	$95,817
Landscape Lighting	342,203	sf	$2.50		$855,508	$855,508
Plazas	34,520	sf	$40.00		$1,380,800	$1,380,800
Paths	2,000	lf	$115.00		$230,000	$230,000
Landscape-Family Housing South	106,810	sf	$7.00	$747,670		$747,670
Fam Housing South Site Clearing	106,810	sf	$1.00	$106,810		$106,810
Fam Housing South Site Grading and Preparation	106,810	sf	$2.00	$213,620		$213,620
Trees-Family Housing South	107	ea	$280.00	$29,907		$29,907
Landscape Lighting-Family Housing South	106,810	sf	$2.50	$267,025		$267,025
Paths (6' concrete)-Family Housing South	6,180	lf	$70.00	$432,600		$432,600
Landscape-CDC South	15,000	sf	$7.00	$105,000		$105,000
CDC Site Clearing	15,000	sf	$1.00	$15,000		$15,000
CDC Site Grading and Preparation	15,000	sf	$2.00	$30,000		$30,000
Trees-CDC South	15	ea	$280.00	$4,200		$4,200
Landscape Lighting-CDC South	15,000	sf	$2.50	$37,500		$37,500
Paths (6' concrete)-CDC South	200	lf	$70.00	$14,000		$14,000
Landscape-Apartments	115,100	sf	$7.00	$805,700		$805,700
Apartments Site Clearing	115,100	sf	$1.00	$115,100		$115,100
Apartments Site Grading and Preparation	115,100	sf	$2.00	$230,200		$230,200
Trees-Apartments	115	ea	$280.00	$32,228		$32,228
Landscape Lighting-Apartments	115,100	sf	$2.50	$287,750		$287,750
Paths (10' concrete)-Apartments	1,740	lf	$115.00	$200,100		$200,100
SW Pedestrian Walk First Segment	300	lf	$500.00		$150,000	$150,000
Type 1 Roads (Vehicular Malls)--SW Mall, both sides	5,200	lf	$750.00		$3,900,000	$3,900,000
Type 2 Roads	2,926	lf	$600.00		$1,755,600	$1,755,600
Type 2 Roads-Family Housing South	2,409	lf	$600.00	$1,445,400		$1,445,400
MLK Stormwater Landscape (Site Clear, Prep and Grade part of civil	158,450	sf	$4.60		$728,870	$728,870
Rec Fields	257,400	sf	$17.25		$4,440,150	$4,440,150
Landscape around Rec Fields	275,569	sf	$7.00		$1,928,983	$1,928,983
Rec Fields Site Clearing	532,969	sf	$1.00		$532,969	$532,969
Fed Fields Site Grading and Preparation	532,969	sf	$2.00		$1,065,938	$1,065,938
Rec Fields area Trees	230	ea	$280.00		$64,299	$64,299
Surface Parking Family Housing South	188	Stalls	$3,500.00	$658,000		$658,000
Surface Parking CDC South	64	Stalls	$3,500.00	$224,000		$224,000
Subtotal				**$7,028,419**	**$20,277,201**	**$27,305,620**
General Contractor's Mark-Up (15%)				**$1,054,263**	**$3,041,580**	**$4,095,843**
Subtotal				**$8,082,682**	**$23,318,782**	**$31,401,463**
Design Contingency (10%)				**$808,268**	**$2,331,878**	**$3,140,146**
Total				**$8,890,950**	**$25,650,660**	**$34,541,610**
Surface Parking (funded separately)						
Rec Fields Surface Parking	440	Stalls	$3,500.00		$1,540,000	$1,540,000
Surface Parking P4	286	Stalls	$3,500.00		$1,001,000	$1,001,000

NOTES:

All Costs in 2008 dollars

Does not include Soft Costs, Permitting, Design or Management Fees (typically 30-45%)

Sales Tax on materials is incorporated into unit costs

Drainage and Utilities costs are covered elsewhere in the West Campus Infrastructure Development Study

Does not include any costs within a 10' offset of each master plan footprint. Such costs assumed to be within building budgets.

Opinion of Probable Construction Cost - Conceptual Level
Landscape-Hardscape

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Site Improvements				
Landscape--Academic Core	211,251	sf	$9.20	$1,943,509
Landscape--School of Meds (incl med housing)	222,388	sf	$9.20	$2,045,970
Site Clearing	433,639	sf	$1.00	$433,639
Site Grading and Preparation	433,639	sf	$2.00	$867,278
Trees	723	ea	$280.00	$202,365
Landscape Lighting	433,639	sf	$2.50	$1,084,098
Plazas	13,600	sf	$40.00	$544,000
Paths	5,190	lf	$115.00	$596,850
Landscape-Apartments	100,400	sf	$7.00	$702,800
Apartments Site Clearing	100,400	sf	$1.00	$100,400
Apartments Site Grading and Preparation	100,400	sf	$2.00	$200,800
Trees-Apartments	167	ea	$280.00	$46,853
Landscape Lighting-Apartments	100,400	sf	$2.50	$251,000
Paths (10' concrete)-Apartments	2,100	lf	$115.00	$241,500
Pedestrian Bridge Across Freeway	600	lf		$1,500,000
MLK Stormwater Landscape (Site Clear, Prep and Grade part of civ	113,378	sf	$4.60	$521,539
Type 2 Roads	6,200	lf	$600.00	$3,720,000
Subtotal				**$15,002,600**
General Contractor's Mark-Up (15%)				**$2,250,390**
Subtotal				**$17,252,990**
Design Contingency (10%)				**$1,725,299**
Total				**$18,978,289**
Surface Parking (funded separately)				
Surface Parking P3	160	Stalls	$3,500.00	$560,000
Surface Parking PMOB	170	Stalls	$3,500.00	$595,000

NOTES:

All Costs in 2008 dollars

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Does not include any costs within a 10' offset of each master plan footprint. Such costs assumed to be within building budgets.

Opinion of Probable Construction Cost - Conceptual Level
Landscape-Hardscape

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Site Improvements				
Landscape--Academic Core	480,088	sf	$9.20	$4,416,810
Landscape--Medical Offices	198,899	sf	$9.20	$1,829,871
Site Clearing	678,987	sf	$1.00	$678,987
Site Grading and Preparation	678,987	sf	$2.00	$1,357,974
Trees	679	ea	$280.00	$190,116
Landscape Lighting	678,987	sf	$2.50	$1,697,468
Plazas	27,000	sf	$40.00	$1,080,000
Paths	7,430	lf	$115.00	$854,450
Landscape-Apartments	110,000	sf	$7.00	$770,000
Site Clearing	110,000	sf	$1.00	$110,000
Site Grading and Preparation	110,000	sf	$2.00	$220,000
Trees-Apartments	110	ea	$280.00	$30,800
Landscape Lighting-Apartments	110,000	sf	$2.50	$275,000
Paths (10' concrete)-Apartments	2,040	lf	$115.00	$234,600
Final Segment of SW Pedestrian Walk	1,150	lf	$500.00	$575,000
Type 2 Roads	2,475	lf	$600.00	$1,485,000
MLK Stormwater Landscape (Site Clear, Prep and Grade part of civil costs)	53,823	sf	$4.60	$247,586
Subtotal				**$16,053,661**
General Contractor's Mark-Up (15%)				**$2,408,049**
Subtotal				**$18,461,710**
Design Contingency (10%)				**$1,846,171**
Total				**$20,307,881**

NOTES:

All Costs in 2008 dollars

Does not include Soft Costs, Permitting, Design or Management Fees (typically 30-45%)

Sales Tax on materials is incorporated into unit costs

Drainage and Utilities costs are covered elsewhere in the West Campus Infrastructure Development Study

Does not include any costs within a 10' offset of each master plan footprint. Such costs assumed to be within building budge

Opinion of Probable Construction Cost - Conceptual Level
Total Landscape-Hardscape

West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Site Improvements				
Phase 1A				
Housing Subtotal after Mark-ups				**$9,962,149**
Campus Subtotal after Mark-ups				**$6,523,970**
Subtotal after Mark-ups				**$16,486,119**
Phase 1B				
Subtotal after Mark-ups				**$2,475,818**
Phase 1				
Subtotal after Mark-ups				**$5,932,162**
Phase 2				
Housing Subtotal after Mark-ups				**$8,890,950**
Campus Subtotal after Mark-ups				**$25,650,660**
Subtotal after Mark-ups				**$34,541,610**
Phase 3				
Subtotal after Mark-ups				**$18,978,289**
Phase 4				
Subtotal after Mark-ups				**$20,307,881**
Grand Total				**$98,721,879**

NOTES:
All Costs in 2008 dollars
Does not include Soft Costs, Permitting, Design or Management Fees (typically 30-45%)
Sales Tax on materials is incorporated into unit costs
Drainage and Utilities costs are covered elsewhere in the West Campus Infrastructure Development Study
Does not include any costs within a 10' offset of each master plan footprint. Such costs assumed to be within building b

Opinion of Probable Construction Cost - Conceptual Level
Domestic Water and Fire Water Distribution System

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Domestic Water and Fire Water Distribution System						
12" PVC waterline including fittings, valves, connections and appurtenances - W4	470	lf	$64		$30,080	$30,080
10" PVC waterline including fittings, valves connections and appurtenances - W4	630	lf	$57		$35,910	$35,910
Fire hydrants - W4	2	lf	$3,400		$6,800	$6,800
Water services to sprinkled building - W4	1	ea	$5,000		$5,000	$5,000
8" PVC waterline including fittings, valves, connections and appurtenances - Family Housing	1,620	ea	$50	$81,000		$81,000
Fire hydrants - Family Housing	6	ea	$3,400	$20,400		$20,400
			Subtotal	$101,400	$77,790	$179,190
General Contractor's Mark-Up (15%)				$15,210	$11,669	$26,879
			Subtotal	$116,610	$89,459	$206,069
Design Contingency (10%)				$11,661	$8,946	$20,607
			Total	$128,271	$98,404	$226,675

Opinion of Probable Construction Cost - Conceptual Level
Domestic Water and Fire Water Distribution System

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Domestic Water and Fire Water Distribution System				
8" PVC waterline including fittings, valves, connections and appurtenances to Building M4	340	lf	$50	$17,000
10" PVC waterline including fittings, valves, connections and appurtenances to Building M4	700	lf	$50	$35,000
Fire hydrants - M4	2	lf	$3,400	$6,800
Water services to sprinkled Building M4	1	ea	$5,000	$5,000
8" PVC waterline including fittings, valves, connections and appurtenances - Family Housing	1,020	ea	$50	$51,000
Fire hydrants - Family Housing	5	ea	$3,400	$17,000
			Subtotal	$131,800
General Contractor's Mark-Up (15%)				$19,770
			Subtotal	$151,570
Design Contingency (10%)				$15,157
			Total	$166,727

Opinion of Probable Construction Cost - Conceptual Level
Domestic Water and Fire Water Distribution System

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Domestic Water and Fire Water Distribution System				
12" PVC waterline including valves, fittings, connections and appurtenances-W3, W5	480	lf	64	$30,720
12" PVC waterline including valves, fittings, connections and appurtenances-East Campus, incl. pavement, landscaping and irrigation replacement	610	lf	$99	$60,390
10" PVC waterline including fittings, valves, connections and appurtenances - W1	1,100	lf	$57	$62,700
Bore and Jack Under Freeway	340	lf	500	$170,000
Fire hydrants	3	ea	$3,400	$10,200
Water services to sprinkled buildings	4	ea	$5,000	$20,000
			Subtotal	$354,010
General Contractor's Mark-Up (15%)				$53,102
			Subtotal	$407,112
Design Contingency (10%)				$40,711
			Total	$447,823

Opinion of Probable Construction Cost - Conceptual Level
Domestic Water and Fire Water Distribution System

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING TOTAL	CAMPUS TOTAL	TOTAL
Domestic Water and Fire Water Distribution System						
12" PVC waterline including fittings, valves, connections and appurtenances	975	lf	$64		$62,400	$62,400
10" PVC waterline including fittings, valves, connections and appurtenances	4,175	lf	$57		$237,975	$237,975
8" PVC waterline including fittings, valves, connections and appurtenances	935	lf	$50		$46,750	$46,750
Fire hydrants	14	ea	$3,400		$47,600	$47,600
10" PVC waterline including fittings, valves, connections and appurtenances - Family Housing	3,278	lf	$57	$186,846		$186,846
Fire hydrants - Family Housing	8	ea	$3,400	$27,200		$27,200
Water services to sprinkled buildings	11	ea	$5,000		$55,000	$55,000
			Subtotal	$214,046	$449,725	$663,771
General Contractor's Mark-Up (15%)				$32,107	$67,459	$99,566
			Subtotal	$246,153	$517,184	$763,337
Design Contingency (10%)				$24,615	$51,718	$76,334
			Total	$270,768	$568,902	$839,670

Opinion of Probable Construction Cost - Conceptual Level
Domestic Water and Fire Water Distribution System

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Domestic Water and Fire Water Distribution System				
12" PVC waterline including fittings, valves, connections and appurtenances	450	lf	$64	$28,800
10" PVC waterline including fittings, valves, connections and appurtenances	2,570	lf	$57	$146,490
8" PVC waterline including fittings, valves, connections and appurtenances	2,440	lf	$50	$122,000
2.5 million gallon reservoir	2,500,000	gallons	$0.75	$1,875,000
Fire hydrants	10	ea	$3,400	$34,000
Water services to sprinkled buildings	15	ea	$5,000	$75,000
			Subtotal	$2,281,290
General Contractor's Mark-Up (15%)				$342,194
			Subtotal	$2,623,484
Design Contingency (10%)				$262,348
			Total	$2,885,832

Opinion of Probable Construction Cost - Conceptual Level
Domestic Water and Fire Water Distribution System

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Domestic Water and Fire Water Distribution System				
12" PVC waterline including fittings, Valves, connections and appurtenances	420	lf	$64	$26,880
10" PVC waterline including fittings, valves, connections and appurtenances	1,450	lf	$57	$82,650
8" PVC waterline including fittings, valves, connections and appurtenances	2,840	lf	$50	$142,000
8" PVC waterline including fittings, valves, connections and appurtenances in pavement area	1,230	lf	$86	$105,780
Fire hydrants	7	ea	$3,400	$23,800
Water services to sprinkled buildings	16	ea	$5,000	$80,000
			Subtotal	$461,110
General Contractor's Mark-Up (15%)				$69,167
			Subtotal	$530,277
Design Contingency (10%)				$53,028
			Total	$583,304

Material Units Costs* - Conceptual Level
Domestic Water and Fire Water Distribution System

West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	MATERIAL UNIT COST	TOTAL
Water				
Water Under Existing Pavement				
AC Demolition	6	sf	$1	$7
Dispose of AC	0.07	cy	$178	$12
Trench Excavation	0.72	cy	$4	$3
Shoring	1	lf	$10	$10
Install Bedding	0.06	cy	$31	$2
12-Inch PVC C900 Pipe	1	lf	$30	$30
Install Backfill	0.72	cy	$6	$5
Replace AC	6	sf	$2	$14
20 Percent for connections, appurtances, valves, etc.	1	ls	$17	$17
			Subtotal	$99
			Total	$99

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
Water				
Water Under Existing Pavement				
AC Demolition	6	sf	$1	$7
Dispose of AC	0.07	cy	$178	$12
Trench Excavation	0.72	cy	$4	$3
Shoring	1	lf	$10	$10
Install Bedding	0.06	cy	$31	$2
10-Inch PVC C900 Pipe	1	lf	$25	$25
Install Backfill	0.72	cy	$6	$5
Replace AC	6	sf	$2	$14
20 Percent for connections, appurtances, valves, etc.	1	ls	$16	$16
			Subtotal	$93
			Total	$93

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
Water				
Water Under Existing Pavement				
AC Demolition	6	sf	$1	$7
Dispose of AC	0.07	cy	$178	$12
Trench Excavation	0.72	cy	$4	$3
Shoring	1	lf	$10	$10
Install Bedding	0.06	cy	$31	$2
8-Inch PVC C900 Pipe	1	lf	$19	$19
Install Backfill	0.72	cy	$6	$5
Replace AC	6	sf	$2	$14
20 Percent for connections, appurtances, valves, etc.	1	ls	$14	$14
			Subtotal	$86
			Total	$86

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
Water				
AC Demolition		sf	$1	$0
Dispose of AC		cy	$178	$0
Trench Excavation	0.72	cy	$4	$3
Shoring	1	lf	$10	$10
Install Bedding	0.06	cy	$31	$2
12-Inch PVC C900 Pipe	1	lf	$30	$30
Install Backfill	0.72	cy	$6	$5
Replace AC		sf	$2	$0
30 Percent for connections, appurtances, valves, etc.	1	ls	$15	$15
			Subtotal	$64
			Total	$64

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
Water				
AC Demolition		sf	$1	$0
Dispose of AC		cy	$178	$0
Trench Excavation	0.72	cy	$4	$3
Shoring	1	lf	$10	$10
Install Bedding	0.06	cy	$31	$2
10-Inch PVC C900 Pipe	1	lf	$25	$25
Install Backfill	0.72	cy	$6	$5
Replace AC		sf	$2	$0
30 Percent for connections, appurtances, valves, etc.	1	ls	$13	$13
			Subtotal	$57
			Total	$57

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL

Water				
AC Demolition		sf	$1	$0
Dispose of AC		cy	$178	$0
Trench Excavation	0.72	cy	$4	$3
Shoring	1	lf	$10	$10
Install Bedding	0.06	cy	$31	$2
8-Inch PVC C900 Pipe	1	lf	$19	$19
Install Backfill	0.72	cy	$6	$5
Replace AC		sf	$2	$0
30 Percent for connections, appurtances, valves, etc.	1	ls	$11	$11
			Subtotal	$50
			Total	$50

* Material Unit Prices derived from www.get-a-quote.net. Material Costs for each item are listed in the column headed "Material." These are neither retail nor wholesale prices. They are estimates of what most contractors who buy in moderate volume will pay suppliers as of early 2008.

Opinion of Probable Construction Cost - Conceptual Level
Irrigation System

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Irrigation						
6" PVC Pipe - Family Housing	1,323	lf	$44	$58,212		$58,212
8" PVC Pipe - Family Housing	1,957	lf	$50	$97,850		$97,850
8" PVC Pipe - W4	511	lf	$50		$25,550	$25,550
			Subtotal	**$156,062**	**$25,550**	**$181,612**
General Contractor's Mark-Up (15%)				**$23,409**	**$3,833**	**$27,242**
			Subtotal	**$179,471**	**$29,383**	**$208,854**
Design Contingency (10%)				**$17,947**	**$2,938**	**$20,885**
			Total	**$197,418**	**$32,321**	**$229,739**

Opinion of Probable Construction Cost - Conceptual Level
Irrigation System

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Irrigation				
6" PVC Pipe	633	lf	$44	$27,852
8" PVC Pipe	702	lf	$50	$35,100
			Subtotal	**$62,952**
General Contractor's Mark-Up (15%)				**$9,443**
			Subtotal	**$72,395**
Design Contingency (10%)				**$7,239**
			Total	**$79,634**

Opinion of Probable Construction Cost - Conceptual Level
Irrigation System

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Irrigation				
6" PVC Pipe	1,074	lf	$44	$47,256
8" PVC Pipe	154	lf	$50	$7,700
			Subtotal	**$54,956**
General Contractor's Mark-Up (15%)				**$8,243**
			Subtotal	**$63,199**
Design Contingency (10%)				**$6,320**
			Total	**$69,519**

Opinion of Probable Construction Cost - Conceptual Level
Irrigation System

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	HOUSING QUANTITY	CAMPUS QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING TOTAL	CAMPUS TOTAL	TOTAL
Irrigation							
8" PVC Pipe	1341	3,018	lf	$50	$67,050	$150,900	$217,950
10" PVC Pipe	1544	624	lf	$57	$88,008	$35,568	$123,576
				Subtotal	**$155,058**	**$186,468**	**$341,526**
General Contractor's Mark-Up (15%)					**$23,259**	**$27,970**	**$51,229**
				Subtotal	**$178,317**	**$214,438**	**$392,755**
Design Contingency (10%)					**$17,832**	**$21,444**	**$39,275**
				Total	**$196,148**	**$235,882**	**$432,030**

Opinion of Probable Construction Cost - Conceptual Level
Irrigation System

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Irrigation				
6" PVC Pipe	631	lf	$44	$27,764
8" PVC Pipe	4,156	lf	$50	$207,800
10" PVC Pipe	1,240	lf	$57	$70,680
			Subtotal	**$306,244**
General Contractor's Mark-Up (15%)				**$45,937**
			Subtotal	**$352,181**
Design Contingency (10%)				**$35,218**
			Total	**$387,399**

Opinion of Probable Construction Cost - Conceptual Level
Irrigation System

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Irrigation				
6" PVC Pipe	613	lf	$44	$26,972
8" PVC Pipe	2,954	lf	$50	$147,700
10" PVC Pipe	2,195	lf	$57	$125,115
12" PVC Pipe	660	lf	$64	$42,240
			Subtotal	**$342,027**
General Contractor's Mark-Up (15%)				**$51,304**
			Subtotal	**$393,331**
Design Contingency (10%)				**$39,333**
			Total	**$432,664**

Material Unit Costs
Conceptual Level

Irrigation System

West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	MATERIAL UNIT COST	TOTAL
Irrigation 12-inch				
AC Demolition		sf	$ 1.12	$ -
Dispose of AC		cy	$ 178.34	$ -
Trench Excavation	0.72	cy	$ 3.72	$ 2.68
Shoring	1	lf	$ 10.00	$ 10.00
Install Bedding	0.06	cy	$ 30.65	$ 1.84
12-Inch PVC Pipe	1	lf	$ 30.00	$ 30.00
Install Backfill	0.72	cy	$ 6.44	$ 4.64
Replace AC		sf	$ 2.40	$ -
30 Percent for connections, appurtances, valves, etc.	1	ls	$ 14.75	$ 14.75
			Subtotal	$ 63.90
			Total	$ 63.90

ITEM	QUANTITY	UNIT	MATERIAL UNIT COST	TOTAL
Irrigation 10-inch				
AC Demolition		sf	$ 1.12	$ -
Dispose of AC		cy	$ 178.34	$ -
Trench Excavation	0.72	cy	$ 3.72	$ 2.68
Shoring	1	lf	$ 10.00	$ 10.00
Install Bedding	0.06	cy	$ 30.65	$ 1.84
10-Inch PVC Pipe	1	lf	$ 25.00	$ 25.00
Install Backfill	0.72	cy	$ 6.44	$ 4.64
Replace AC		sf	$ 2.40	$ -
30 Percent for connections, appurtances, valves, etc.	1	ls	$ 13.25	$ 13.25
			Subtotal	$ 57.40
			Total	$ 57.40

ITEM	QUANTITY	UNIT	MATERIAL UNIT COST	TOTAL
Irrigation 8-inch				
AC Demolition		sf	$ 1.12	$ -
Dispose of AC		cy	$ 178.34	$ -
Trench Excavation	0.72	cy	$ 3.72	$ 2.68
Shoring	1	lf	$ 10.00	$ 10.00
Install Bedding	0.06	cy	$ 30.65	$ 1.84
8-Inch PVC Pipe	1	lf	$ 19.00	$ 19.00
Install Backfill	0.72	cy	$ 6.44	$ 4.64
Replace AC		sf	$ 2.40	$ -
30 Percent for connections, appurtances, valves, etc.	1	ls	$ 11.45	$ 11.45
			Subtotal	$ 49.60
			Total	$ 49.60

ITEM	QUANTITY	UNIT	MATERIAL UNIT COST	TOTAL
Irrigation 6-inch				
AC Demolition		sf	$ 1.12	$ -
Dispose of AC		cy	$ 178.34	$ -
Trench Excavation	0.72	cy	$ 3.72	$ 2.68
Shoring	1	lf	$ 10.00	$ 10.00
Install Bedding	0.06	cy	$ 30.65	$ 1.84
6-Inch PVC Pipe	1	lf	$ 15.00	$ 15.00
Install Backfill	0.72	cy	$ 6.44	$ 4.64
Replace AC		sf	$ 2.40	$ -
30 Percent for connections, appurtances, valves, etc.	1	ls	$ 10.25	$ 10.25
			Subtotal	$ 44.40
			Total	$ 44.40

Opinion of Probable Construction Cost - Conceptual Leve
Sanitary Sewer System

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	HOUSING QUANTITY	CAMPUS QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Sanitary Sewer System							
Proposed 8" PVC sewer main - Family Housing North	6,943	1,220	lf	$40	$277,720	$48,800	$326,520
Proposed 6" PVC sewer lateral - Family Housing North	2,097	96	lf	$35	$73,395	$3,360	$76,755
Proposed 48" sewer manhole - Family Housing North	22	3	ea	$5,000	$110,000	$15,000	$125,000
Proposed sewer clean out		1	ea	$2,000		$2,000	$2,000
				Subtotal	**$461,115**	**$69,160**	**$530,275**
General Contractor's Mark-Up (15%)					**$69,167**	**$10,374**	**$79,541**
				Subtotal	**$530,282**	**$79,534**	**$609,816**
Design Contingency (10%)					**$53,028**	**$7,953**	**$60,982**
				Total	**$583,310**	**$87,487**	**$670,798**

Opinion of Probable Construction Cost - Conceptual Level
Sanitary Sewer System

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Sanitary Sewer System				
Proposed 8" PVC sewer main	650	lf	$40	$26,000
Proposed 6" PVC sewer lateral	263	lf	$35	$9,205
Proposed 48" sewer manhole	2	ea	$5,000	$10,000
			Subtotal	**$45,205**
General Contractor's Mark-Up (15%)				**$6,781**
			Subtotal	**$51,986**
Design Contingency (10%)				**$5,199**
			Total	**$57,184**

Opinion of Probable Construction Cost - Conceptual Level
Sanitary Sewer System

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Sanitary Sewer System				
Proposed 6" PVC sewer lateral	115	lf	$35	$4,025
			Subtotal	**$4,025**
General Contractor's Mark-Up (15%)				**$604**
			Subtotal	**$4,629**
Design Contingency (10%)				**$463**
			Total	**$5,092**

Opinion of Probable Construction Cost - Conceptual Leve
Sanitary Sewer System

Phase 2
West Campus Infrastructure Development Stud
University of California, Riversid

March 14, 2008

ITEM	HOUSING QUANTITY	CAMPUS QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING TOTAL	CAMPUS TOTAL	TOTAL
Sanitary Sewer System							
Proposed 8" PVC sewer main	7,409	3,602	lf	$40	$296,360	$144,080	$440,440
Proposed 6" PVC sewer lateral	1,654	1,851	lf	$35	$57,890	$64,785	$122,675
Proposed 48" sewer manhole	17	13	ea	$5,000	$85,000	$65,000	$150,000
				Subtotal	**$439,250**	**$273,865**	**$713,115**
General Contractor's Mark-Up (15%)					**$65,888**	**$41,080**	**$106,967**
				Subtotal	**$505,138**	**$314,945**	**$820,082**
Design Contingency (10%)					**$50,514**	**$31,494**	**$82,008**
				Total	**$555,651**	**$346,439**	**$902,090**

Opinion of Probable Construction Cost - Conceptual Level
Sanitary Sewer System

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Sanitary Sewer System				
Proposed 8" PVC sewer main	4,635	lf	$40	$185,400
Proposed 6" PVC sewer lateral	3,616	lf	$35	$126,560
Proposed 48" sewer manhole	14	ea	$5,000	$70,000
			Subtotal	**$381,960**
General Contractor's Mark-Up (15%)				**$57,294**
			Subtotal	**$439,254**
Design Contingency (10%)				**$43,925**
			Total	**$483,179**

Opinion of Probable Construction Cost - Conceptual Level
Sanitary Sewer System

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Sanitary Sewer System				
Proposed 8" PVC sewer main	3,800	lf	$40	$152,000
Proposed 6" PVC sewer lateral	1,808	lf	$35	$63,280
Proposed 48" sewer manhole	14	ea	$5,000	$70,000
			Subtotal	**$285,280**
General Contractor's Mark-Up (15%)				**$42,792**
			Subtotal	**$328,072**
Design Contingency (10%)				**$32,807**
			Total	**$360,879**

BREAK DOWN OF UNIT COST ESTIMATE
Conceptual Level
Sanitary Sewer System

West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

Reference: 2008 California Heavy Construction Costs

ITEM	UNIT	MATERIAL	LABOR	EQUIP	EARTH WORK	TOTAL
Sanitary Sewer System						
Proposed 8" PVC main line (max. 10' depth)	lf	$15.96	$24.50	$0.20	$2.90	$44
Proposed 6" PVC lateral	lf	$13.30	$20.50	$0.20	$2.90	$37
Proposed 48" precast man hole	ea	$612.00	$624.00	$1,220.00	$8.40	$2,464
Proposed man hole cover and frame	ea					$1,500

Opinion of Probable Construction Cost - Conceptual Level
Storm Drain System

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Storm Drain System						
Proposed 18" RCP storm drain - Family Housing	262	lf	44	$11,528		$11,528
Proposed 24" RCP storm drain - Family Housing	245	lf	53	$12,985		$12,985
Proposed 36" RCP storm drain - Family Housing	671	lf	84	$56,364		$56,364
Proposed 42" RCP storm drain - Family Housing	570	lf	100	$57,000		$57,000
Proposed 48" RCP storm drain - Family Housing	28	lf	118	$3,304		$3,304
Proposed curb inlet - Family Housing	8	ea	4,000	$32,000		$32,000
Proposed storm drain manhole - Family Housing	3	ea	4,000	$12,000		$12,000
Proposed concrete V- ditch - Family Housing	689	lf	10	$6,890		$6,890
Proposed junction structure - Family Housing	1	ea	8,000	$8,000		$8,000
Proposed Bioswale - W4	1,000	lf	0.85		$849	$849
			Subtotal	**$200,071**	**$849**	**$200,920**
General Contractor's Mark-Up (15%)				**$30,011**	**$127**	**$30,138**
			Subtotal	**$230,082**	**$976**	**$231,058**
Design Contingency (10%)				**$23,008**	**$98**	**$23,106**
			Total	**$253,090**	**$1,074**	**$254,163**

Opinion of Probable Construction Cost - Conceptual Level
Storm Drain System

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Storm Drain System				
Proposed 18" RCP storm drain	80	lf	$44	$3,520
Proposed 24" RCP storm drain	1,015	lf	$53	$53,795
Proposed 30" RCP storm drain	728	lf	$66	$48,048
Proposed curb inlet catch basin	3	ea	$4,000	$12,000
Proposed storm drain manhole	4	ea	$4,000	$16,000
			Subtotal	**$133,363**
General Contractor's Mark-Up (15%)				**$20,004**
			Subtotal	**$153,367**
Design Contingency (10%)				**$15,337**
			Total	**$168,704**

Opinion of Probable Construction Cost - Conceptual Leve
Storm Drain System

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	HOUSING QUANTITY	CAMPUS QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Storm Drain System							
Proposed 18" RCP storm drain	339	229	lf	$ 44	$14,916	$10,076	$24,992
Proposed 24" RCP storm drain	398		lf	$ 53	$21,094	$0	$21,094
Proposed 30" RCP storm drain	45	1,067	lf	$ 66	$2,970	$70,422	$73,392
Proposed 36" RCP storm drain	660	693	lf	$ 84	$55,440	$58,212	$113,652
Proposed 42" RCP storm drain	714		lf	$ 100	$71,400	$0	$71,400
Proposed 48" RCP storm drain	608		lf	$ 118	$71,744	$0	$71,744
Proposed curb inlet	8	3	ea	$ 4,000	$32,000	$12,000	$44,000
Proposed storm drain manhole	6	4	ea	$ 4,000	$24,000	$16,000	$40,000
Proposed junction structure	2		ea	$ 8,000	$16,000	$0	$16,000
Proposed trapezoidal swale	3,994	1,133	lf	$ 25	$99,850	$28,325	$128,175
Proposed grate inlet	9	3	ea	$ 2,000	$18,000	$6,000	$24,000
				Subtotal	**$427,414**	**$201,035**	**$628,449**
General Contractor's Mark-Up (15%)					**$64,112**	**$30,155**	**$94,267**
				Subtotal	**$491,526**	**$231,190**	**$722,716**
Design Contingency (10%)					**$49,153**	**$23,119**	**$72,272**
				Total	**$540,679**	**$254,309**	**$794,988**

Opinion of Probable Construction Cost - Conceptual Level
Storm Drain System

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Storm Drain System				
Proposed trapezoidal swale	863	lf	$25	$21,575
			Subtotal	**$21,575**
General Contractor's Mark-Up (15%)				**$3,236**
			Subtotal	**$24,811**
Design Contingency (10%)				**$2,481**
			Total	**$27,292**

BREAK DOWN OF UNIT COST ESTIMATE

Conceptual Level

Storm Drain System

West Campus Infrastructure Development Study

University of California, Riverside

March 14, 2008

Reference: 2008 California Heavy Construction Costs

ITEM	UNIT	MATERIAL	LABOR	EQUIP	EARTH WORK	TOTAL
Storm Drain System						
Proposed 18" RCP storm drain	lf	$15.43	$13.42	$1.12	$8.40	$38.37
Proposed 24" RCP storm drain	lf	$22.14	$16.83	$1.40	$8.40	$48.77
Proposed 30" RCP storm drain	lf	$33.13	$17.71	$3.17	$8.40	$62.41
Proposed 36" RCP storm drain	lf	$48.50	$19.80	$3.55	$8.40	$80.25
Proposed 42" RCP storm drain	lf	$61.00	$23.21	$4.12	$8.40	$96.73
Proposed 48" RCP storm drain	lf	$73.50	$27.39	$4.91	$8.40	$114.20
Proposed curb inlet catch basin	ea	$926.00	$1,220.00	$21.20	$1,147.27	$3,314.47
Proposed grate inlet catch basin	ea	$919.00	$1,120.00	$19.40	$400.00	$2,458.40
Proposed storm drain manhole	ea	$612.00	$624.00	$111.50	$804.84	$2,152.34
Proposed manhole cover and frame	ea					$1,500.00
Proposed trapezoidal swale	lf					$25.00
Bioswale (sodding, placement by hand)	sf	$0.63	$0.21	$0.02		$0.85

Opinion of Probable Construction Cost - Conceptual Level
Traffic Signal - Iowa Avenue at Everton Place

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Traffic Signal						
Major Intersection	1	ls	$ 300,000	$ 150,000	$ 150,000	$ 300,000
Minor Intersection		ls	$ 160,000	$ -	$ -	$ -
Add Phase to Existing Signal (One Direction		ls	$ 56,000	$ -	$ -	$ -
Add Phase to Existing Signal (Both Directions		ls	$ 100,000	$ -	$ -	$ -
Traffic Signal Relocation Per Pole, 1A (10') Pole		ea	$ 5,000	$ -	$ -	$ -
Traffic Signal Relocation Per Pole, Pole with Signal Mastarm		ea	$ 10,000	$ -	$ -	$ -
Relocate PB or Adj. Grade		ea	$ 100	$ -	$ -	$ -
Traffic Signal Loops	60	ea	$ 375	$ 11,250	$ 11,250	$ 22,500
Striping	10,000	lf	$ 0.45	$ 2,250	$ 2,250	$ 4,500
Pedestrian Crosswalk Striping	3,750	lf	$ 0.60	$ 1,125	$ 1,125	$ 2,250
Pavement Marker		lf	$ 3.00	$ -	$ -	$ -
						$ -
			Subtotal	$ 164,625	$ 164,625	$ 329,250
General Contractor's Mark-Up (15%)				$ 24,694	$ 24,694	$ 49,388
			Subtotal	$ 189,319	$ 189,319	$ 378,638
Design Contingency (10%)				$ 18,932	$ 18,932	$ 37,864
			Total	$ 208,251	$ 208,251	$ 416,501

Opinion of Probable Construction Cost - Conceptual Level
Traffic Signal - Iowa Avenue at NW Mall

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Traffic Signal						
Major Intersection	1	ls	$ 300,000	$ 300,000	$ -	$ 300,000
Minor Intersection		ls	$ 160,000	$ -	$ -	$ -
Add Phase to Existing Signal (One Direction		ls	$ 56,000	$ -	$ -	$ -
Add Phase to Existing Signal (Both Directions		ls	$ 100,000	$ -	$ -	$ -
Traffic Signal Relocation Per Pole, 1A (10') Pole		ea	$ 5,000	$ -	$ -	$ -
Traffic Signal Relocation Per Pole, Pole with Signal Mastarm		ea	$ 10,000	$ -	$ -	$ -
Relocate PB or Adj. Grade		ea	$ 100	$ -	$ -	$ -
Traffic Signal Loops	60	ea	$ 375	$ 22,500	$ -	$ 22,500
Striping	10,000	lf	$ 0.45	$ 4,500	$ -	$ 4,500
Pedestrian Crosswalk Striping	3,750	lf	$ 0.60	$ 2,250	$ -	$ 2,250
Pavement Marker		lf	$ 3.00	$ -	$ -	$ -
						$ -
			Subtotal	$ 329,250	$ -	$ 329,250
General Contractor's Mark-Up (15%)				$ 49,388	$ -	$ 49,388
			Subtotal	$ 378,638	$ -	$ 378,638
Design Contingency (10%)				$ 37,864	$ -	$ 37,864
			Total	$ 416,501	$ -	$ 416,501

Opinion of Probable Construction Cost - Conceptual Level
Traffic Signal - Cranford Avenue at MLK Jr. Boulevard

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Traffic Signal				
Major Intersection	1	ls	$ 250,000	$ 250,000
Minor Intersection		ls	$ 160,000	$ -
Add Phase to Existing Signal (One Direction)		ls	$ 56,000	$ -
Add Phase to Existing Signal (Both Directions)		ls	$ 100,000	$ -
Traffic Signal Relocation Per Pole, 1A (10') Pole		ea	$ 5,000	$ -
Mastarm		ea	$ 10,000	$ -
Relocate PB or Adj. Grade		ea	$ 100	$ -
Traffic Signal Loops	48	ea	$ 375	$ 18,000
Striping	7,000	lf	$ 0.45	$ 3,150
Pedestrian Crosswalk Striping	2,800	lf	$ 0.60	$ 1,680
Pavement Marker		lf	$ 3.00	$ -
				$ -
			Subtotal	$ 272,830
General Contractor's Mark-Up (15%)				$ 40,925
			Subtotal	$ 313,755
Design Contingency (10%)				$ 31,375
			Total	$ 345,130

Opinion of Probable Construction Cost - Conceptual Level
Traffic Signal - Iowa Avenue at SW Mall

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Traffic Signal						
Major Intersection	1	ls	$ 300,000	150,000	150,000	$ 300,000
Minor Intersection		ls	$ 160,000	-	-	$ -
Add Phase to Existing Signal (One Direction		ls	$ 56,000	-	-	$ -
Add Phase to Existing Signal (Both Directions		ls	$ 100,000	-	-	$ -
Traffic Signal Relocation Per Pole, 1A (10') Pol		ea	$ 5,000	-	-	$ -
Traffic Signal Relocation Per Pole, Pole with Signal Mastarm		ea	$ 10,000	-	-	$ -
Relocate PB or Adj. Grade		ea	$ 100	-	-	$ -
Traffic Signal Loops	60	ea	$ 375	11,250	11,250	$ 22,500
Striping	10,000	lf	$ 0.45	2,250	2,250	$ 4,500
Pedestrian Crosswalk Striping	3,750	lf	$ 0.60	1,125	1,125	$ 2,250
Pavement Marker		lf	$ 3.00	-	-	$ -
						$ -
			Subtotal	$ 164,625	$ 164,625	$ 329,250
General Contractor's Mark-Up (15%)				$ 24,694	$ 24,694	$ 49,388
			Subtotal	$ 189,319	$ 189,319	$ 378,638
Design Contingency (10%)				$ 18,932	$ 18,932	$ 37,864
			Total	$ 208,251	$ 208,251	$ 416,501

Opinion of Probable Construction Cost - Conceptual Level
Central Plants

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
No central plant work during this phase						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
			Subtotal			$ -
General Contractor's Mark-Up (15%)						$ -
			Subtotal			$ -
Design Contingency (10%)						$ -
			Total			$ -

Opinion of Probable Construction Cost - Conceptual Level
Central Plants

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
No central plant work during this phase				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ -
General Contractor's Mark-Up (15%)				$ -
			Subtotal	$ -
Design Contingency (10%)				$ -
			Total	$ -

Opinion of Probable Construction Cost - Conceptual Level
Central Plants

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Main Central Plant				
Commissioning (from schematic design through warranty)	1	ls	$ 200,000	$ 200,000
Sitework	1	ls	$ 600,000	$ 600,000
Building	10,000	sf	$ 250	$ 2,500,000
Water-cooled, electrical centrifugal chiller, 800-ton	2	ea	$ 320,000	$ 640,000
Cooling tower, 1,900-ton, with VFD	2	ea	$ 260,000	$ 520,000
Cooling tower sand filters	2	ea	$ 17,000	$ 34,000
Above-ground, welded-steel, insulated CHW TES tank	2,000,000	gallons	$ 0.90	$ 1,800,000
Primary chilled water pumps, 1,280 gpm	2	ea	$ 11,000	$ 22,000
Secondary chilled water pumps, 2,000 gpm, with VFD	2	ea	$ 14,000	$ 28,000
Condenser water pumps, 2,240 gpm	2	ea	$ 17,000	$ 34,000
Gas-fired, HHW boiler, 10 MMBtuh	2	ea	$ 170,000	$ 340,000
Boiler air emissions control	2	ea	$ 100,000	$ 200,000
Primary heating hot water pumps, 340 gpm	2	ea	$ 5,000	$ 10,000
Secondary heating hot water pumps, 1,000 gpm, with VFD	2	ea	$ 10,000	$ 20,000
Compression tank	1	ea	$ 10,000	$ 10,000
Expansion tank	1	ea	$ 8,000	$ 8,000
Air separator, CHW	1	ea	$ 7,000	$ 7,000
Air separator, HHW	1	ea	$ 5,000	$ 5,000
Chemical treatment system	1	ls	$ 55,000	$ 55,000
Plant piping; CHW, HHW, and CDW, 6,400 tons total future	1	ls	$ 1,300,000	$ 1,300,000
Insulatior	1	ls	$ 180,000	$ 180,000
Other piping	1	ls	$ 50,000	$ 50,000
Miscellaneous equipment, appurtenances, valving, metering	1	ls	$ 250,000	$ 250,000
Plumbing	1	ls	$ 300,000	$ 300,000
HVAC	1	ls	$ 110,000	$ 110,000
Fire protection	1	ls	$ 60,000	$ 60,000
Controls (see EMS costs)				$ -
Electrical and lighting (see Electrical costs)				$ -
Miscellaneous systems	1	ls	$ 200,000	$ 200,000
Start-up, test and balance	1	ls	$ 100,000	$ 100,000
			Subtotal	$ 9,583,000
General Contractor's Mark-Up (15%)				$ 1,437,450
			Subtotal	$ 11,020,450
Design Contingency (10%)				$ 1,102,045
			Total	$ 12,122,495

Opinion of Probable Construction Cost - Conceptual Leve
Central Plants

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Main Central Plant						
Commissioning (from schematic design through warranty)	1	ls	$ 100,000		$ 100,000	$ 100,000
Water-cooled, electrical centrifugal chiller, 1,600-ton	1	ea	$ 420,000		$ 420,000	$ 420,000
Cooling tower, 1,900-ton, with VFD	1	ea	$ 260,000		$ 260,000	$ 260,000
Cooling tower sand filters	1	ea	$ 17,000		$ 17,000	$ 17,000
Primary chilled water pumps, 2,560 gpm	1	ea	$ 19,000		$ 19,000	$ 19,000
Secondary chilled water pumps, 2,000 gpm, with VFD	1	ea	$ 14,000		$ 14,000	$ 14,000
Condenser water pumps, 4,480 gpm	1	ea	$ 24,000		$ 24,000	$ 24,000
Gas-fired, HHW boiler, 20 MMBtuh	2	ea	$ 250,000		$ 500,000	$ 500,000
Boiler air emissions control	2	ea	$ 180,000		$ 360,000	$ 360,000
Primary heating hot water pumps, 670 gpm	2	ea	$ 8,000		$ 16,000	$ 16,000
Secondary heating hot water pumps, 1,000 gpm, with VFD	1	ea	$ 10,000		$ 10,000	$ 10,000
Plant piping; CHW, HHW, and CDW, 6,400 tons total future	1	ls	$ 250,000		$ 250,000	$ 250,000
Insulation	1	ls	$ 50,000		$ 50,000	$ 50,000
Other piping	1	ls	$ 20,000		$ 20,000	$ 20,000
Miscellaneous equipment, appurtenances, valving, metering	1	ls	$ 60,000		$ 60,000	$ 60,000
Plumbing	1	ls	$ 30,000		$ 30,000	$ 30,000
Controls (see EMS costs)					$ -	$ -
Electrical and lighting (see Electrical costs)					$ -	$ -
Miscellaneous systems	1	ls	$ 100,000		$ 100,000	$ 100,000
Start-up, test and balance	1	ls	$ 50,000		$ 50,000	$ 50,000
Medical School Central Plant						
Commissioning (from schematic design through warranty)	1	ls	$ 160,000		$ 160,000	$ 160,000
Sitework	1	ls	$ 400,000		$ 400,000	$ 400,000
Building	7,000	sf	$ 250		$ 1,750,000	$ 1,750,000
Water-cooled, electrical centrifugal chiller, 800-ton	2	ea	$ 320,000		$ 640,000	$ 640,000
Cooling tower, 1,000-ton, with VFD	2	ea	$ 160,000		$ 320,000	$ 320,000
Cooling tower sand filters	2	ea	$ 12,000		$ 24,000	$ 24,000
Primary chilled water pumps, 1,280 gpm	2	ea	$ 11,000		$ 22,000	$ 22,000
Secondary chilled water pumps, 1,300 gpm, with VFD	2	ea	$ 12,000		$ 24,000	$ 24,000
Condenser water pumps, 2,240 gpm	2	ea	$ 17,000		$ 34,000	$ 34,000
Gas-fired, HHW boiler, 10 MMBtuh	1	ea	$ 170,000		$ 170,000	$ 170,000
Boiler air emissions control	1	ea	$ 100,000		$ 100,000	$ 100,000
Gas-fired, HHW boiler, 5 MMBtuh	2	ea	$ 125,000		$ 250,000	$ 250,000
Boiler air emissions control	2	ea	$ 60,000		$ 120,000	$ 120,000
Primary heating hot water pumps, 340 gpm	1	ea	$ 5,000		$ 5,000	$ 5,000
Primary heating hot water pumps, 170 gpm	2	ea	$ 3,000		$ 6,000	$ 6,000
Secondary heating hot water pumps, 500 gpm, with VFD	2	ea	$ 7,000		$ 14,000	$ 14,000
Compression tank	1	ea	$ 7,000		$ 7,000	$ 7,000
Expansion tank	1	ea	$ 6,000		$ 6,000	$ 6,000
Air separator, CHW	1	ea	$ 5,000		$ 5,000	$ 5,000
Air separator, HHW	1	ea	$ 4,000		$ 4,000	$ 4,000
Chemical treatment system	1	ls	$ 40,000		$ 40,000	$ 40,000
Plant piping; CHW, HHW, and CDW, 3,200 tons total future	1	ls	$ 850,000		$ 850,000	$ 850,000
Insulation	1	ls	$ 150,000		$ 150,000	$ 150,000
Other piping	1	ls	$ 30,000		$ 30,000	$ 30,000
Miscellaneous equipment, appurtenances, valving, metering	1	ls	$ 180,000		$ 180,000	$ 180,000
Plumbing	1	ls	$ 250,000		$ 250,000	$ 250,000
HVAC	1	ls	$ 85,000		$ 85,000	$ 85,000
Fire protection	1	ls	$ 50,000		$ 50,000	$ 50,000
Controls (see EMS costs)					$ -	$ -
Electrical and lighting (see Electrical costs)					$ -	$ -
Miscellaneous systems	1	ls	$ 180,000		$ 180,000	$ 180,000
Start-up, test and balance	1	ls	$ 80,000		$ 80,000	$ 80,000
			Subtotal		$ 8,256,000	$ 8,256,000
General Contractor's Mark-Up (15%)					$ 1,238,400	$ 1,238,400
			Subtotal		$ 9,494,400	$ 9,494,400
Design Contingency (10%)					$ 949,440	$ 949,440
			Total		$ 10,443,840	$ 10,443,840

Opinion of Probable Construction Cost - Conceptual Level
Central Plants

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Main Central Plant				
Commissioning (from schematic design through warranty)	1	ls	$ 80,000	$ 80,000
Water-cooled, electrical centrifugal chiller, 1,600-ton	1	ea	$ 420,000	$ 420,000
Cooling tower, 1,900-ton, with VFD	1	ea	$ 260,000	$ 260,000
Cooling tower sand filters	1	ea	$ 17,000	$ 17,000
Above-ground, welded-steel, insulated CHW TES tank	2,000,000	gallons	$ 0.90	$ 1,800,000
Primary chilled water pumps, 2,560 gpm	1	ea	$ 19,000	$ 19,000
Secondary chilled water pumps, 2,000 gpm, with VFD	1	ea	$ 14,000	$ 14,000
Condenser water pumps, 4,480 gpm	1	ea	$ 24,000	$ 24,000
Gas-fired, HHW boiler, 20 MMBtuh	1	ea	$ 250,000	$ 250,000
Boiler air emissions control	1	ea	$ 180,000	$ 180,000
Primary heating hot water pumps, 670 gpm	1	ea	$ 8,000	$ 8,000
Secondary heating hot water pumps, 1,000 gpm, with VFD	1	ea	$ 10,000	$ 10,000
future	1	ls	$ 150,000	$ 150,000
Insulation	1	ls	$ 40,000	$ 40,000
Other piping	1	ls	$ 20,000	$ 20,000
Miscellaneous equipment, appurtenances, valving, metering	1	ls	$ 60,000	$ 60,000
Plumbing	1	ls	$ 25,000	$ 25,000
Controls (see EMS costs)				$ -
Electrical and lighting (see Electrical costs)				$ -
Miscellaneous systems	1	ls	$ 100,000	$ 100,000
Start-up, test and balance	1	ls	$ 40,000	$ 40,000
Medical School Central Plant				
Commissioning (from schematic design through warranty)	1	ls	$ 70,000	$ 70,000
Water-cooled, electrical centrifugal chiller, 800-ton	1	ea	$ 320,000	$ 320,000
Cooling tower, 1,000-ton, with VFD	2	ea	$ 160,000	$ 320,000
Cooling tower sand filters	2	ea	$ 12,000	$ 24,000
Above-ground, welded-steel, insulated CHW TES tank	1,600,000	gallons	$ 0.90	$ 1,440,000
Primary chilled water pumps, 1,280 gpm	1	ea	$ 11,000	$ 11,000
Secondary chilled water pumps, 1,300 gpm, with VFD	1	ea	$ 12,000	$ 12,000
Condenser water pumps, 2,240 gpm	1	ea	$ 17,000	$ 17,000
Gas-fired, HHW boiler, 10 MMBtuh	1	ea	$ 170,000	$ 170,000
Boiler air emissions control	1	ea	$ 100,000	$ 100,000
Primary heating hot water pumps, 340 gpm	1	ea	$ 5,000	$ 5,000
Secondary heating hot water pumps, 500 gpm, with VFD	2	ea	$ 7,000	$ 14,000
future	1	ls	$ 120,000	$ 120,000
Insulation	1	ls	$ 30,000	$ 30,000
Other piping	1	ls	$ 10,000	$ 10,000
Miscellaneous equipment, appurtenances, valving, metering	1	ls	$ 50,000	$ 50,000
Plumbing	1	ls	$ 15,000	$ 15,000
Controls (see EMS costs)				$ -
Electrical and lighting (see Electrical costs)				$ -
Miscellaneous systems	1	ls	$ 70,000	$ 70,000
Start-up, test and balance	1	ls	$ 30,000	$ 30,000
			Subtotal	$ 6,345,000
General Contractor's Mark-Up (15%)				$ 951,750
			Subtotal	$ 7,296,750
Design Contingency (10%)				$ 729,675
			Total	$ 8,026,425

Opinion of Probable Construction Cost - Conceptual Level
Central Plant

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

February 11, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Main Central Plant				
Commissioning (from schematic design through warranty)	1	ls	$ 70,000	$ 70,000
Water-cooled, electrical centrifugal chiller, 1,600-ton	1	ea	$ 420,000	$ 420,000
Primary chilled water pumps, 2,560 gpm	1	ea	$ 19,000	$ 19,000
Secondary chilled water pumps, 2,000 gpm, with VFD	2	ea	$ 14,000	$ 28,000
Condenser water pumps, 4,480 gpm	1	ea	$ 24,000	$ 24,000
Gas-fired, HHW boiler, 20 MMBtuh	1	ea	$ 250,000	$ 250,000
Boiler air emissions control	1	ea	$ 180,000	$ 180,000
Primary heating hot water pumps, 670 gpm	1	ea	$ 8,000	$ 8,000
Secondary heating hot water pumps, 1,000 gpm, with VFD	1	ea	$ 10,000	$ 10,000
Plant piping, CHW, HHW, and CDW, [illegible] tons total future	1	ls	$ 150,000	$ 150,000
Insulation	1	ls	$ 40,000	$ 40,000
Other piping	1	ls	$ 20,000	$ 20,000
Miscellaneous equipment, appurtenances, valving, meteri	1	ls	$ 60,000	$ 60,000
Plumbing	1	ls	$ 25,000	$ 25,000
Controls (see EMS costs)				$ -
Electrical and lighting (see Electrical costs)				$ -
Miscellaneous systems	1	ls	$ 80,000	$ 80,000
Start-up, test and balance	1	ls	$ 30,000	$ 30,000
Medical School Central Plant				
Commissioning (from schematic design through warranty)	1	ls	$ 60,000	$ 60,000
Water-cooled, electrical centrifugal chiller, 800-ton	1	ea	$ 320,000	$ 320,000
Primary chilled water pumps, 1,280 gpm	1	ea	$ 11,000	$ 11,000
Secondary chilled water pumps, 1,300 gpm, with VFD	1	ea	$ 12,000	$ 12,000
Condenser water pumps, 2,240 gpm	1	ea	$ 17,000	$ 17,000
Gas-fired, HHW boiler, 10 MMBtuh	1	ea	$ 170,000	$ 170,000
Boiler air emissions control	1	ea	$ 100,000	$ 100,000
Primary heating hot water pumps, 340 gpm	1	ea	$ 5,000	$ 5,000
Secondary heating hot water pumps, 500 gpm, with VFD	1	ea	$ 7,000	$ 7,000
Plant piping, CHW, HHW, and CDW, [illegible] tons total future	1	ls	$ 100,000	$ 100,000
Insulation	1	ls	$ 30,000	$ 30,000
Other piping	1	ls	$ 10,000	$ 10,000
Miscellaneous equipment, appurtenances, valving, meteri	1	ls	$ 50,000	$ 50,000
Plumbing	1	ls	$ 15,000	$ 15,000
Controls (see EMS costs)				$ -
Electrical and lighting (see Electrical costs)				$ -
Miscellaneous systems	1	ls	$ 60,000	$ 60,000
Start-up, test and balance	1	ls	$ 20,000	$ 20,000
			Subtotal	$ 2,401,000
General Contractor's Mark-Up (15%)				$ 360,150
			Subtotal	$ 2,761,150
Design Contingency (10%)				$ 276,115
			Total	$ 3,037,265

Opinion of Probable Construction Cost - Conceptual Level
Central Plants with Aggressive Sustainability Implementation

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
No central plant work during this phase						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
			Subtotal			$ -
General Contractor's Mark-Up (15%)						$ -
			Subtotal			$ -
Design Contingency (10%)						$ -
			Total			$ -

Opinion of Probable Construction Cost - Conceptual Level
Central Plants with Aggressive Sustainability Implementation

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
No central plant work during this phase				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ -
General Contractor's Mark-Up (15%)				$ -
			Subtotal	$ -
Design Contingency (10%)				$ -
			Total	$ -

Opinion of Probable Construction Cost - Conceptual Leve
Central Plants with Aggressive Sustainability Implementatior

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Main Central Plant				
Commissioning (from schematic design through warranty)	1	ls	$ 180,000	$ 180,000
Sitework	1	ls	$ 550,000	$ 550,000
Building	9,000	sf	$ 250	$ 2,250,000
Water-cooled, electrical centrifugal chiller, 800-ton	2	ea	$ 320,000	$ 640,000
Cooling tower, 1,500-ton, with VFD	2	ea	$ 210,000	$ 420,000
Cooling tower sand filters	2	ea	$ 14,000	$ 28,000
Above-ground, welded-steel, insulated CHW TES tank	1,400,000	gallons	$ 0.90	$ 1,260,000
Primary chilled water pumps, 1,280 gpm	2	ea	$ 11,000	$ 22,000
Secondary chilled water pumps, 1,500 gpm, with VFD	2	ea	$ 12,000	$ 24,000
Condenser water pumps, 2,240 gpm	2	ea	$ 17,000	$ 34,000
Gas-fired, HHW boiler, 8 MMBtuh	2	ea	$ 140,000	$ 280,000
Boiler air emissions control	2	ea	$ 80,000	$ 160,000
Primary heating hot water pumps, 280 gpm	2	ea	$ 4,000	$ 8,000
Secondary heating hot water pumps, 800 gpm, with VFD	2	ea	$ 8,000	$ 16,000
Compression tank	1	ea	$ 8,000	$ 8,000
Expansion tank	1	ea	$ 7,000	$ 7,000
Air separator, CHW	1	ea	$ 6,000	$ 6,000
Air separator, HHW	1	ea	$ 4,000	$ 4,000
Chemical treatment system	1	ls	$ 50,000	$ 50,000
Plant piping; CHW, HHW, and CDW, 4,800 tons total future	1	ls	$ 1,100,000	$ 1,100,000
Insulation	1	ls	$ 150,000	$ 150,000
Other piping	1	ls	$ 40,000	$ 40,000
Miscellaneous equipment, appurtenances, valving, metering	1	ls	$ 200,000	$ 200,000
Plumbing	1	ls	$ 270,000	$ 270,000
HVAC	1	ls	$ 100,000	$ 100,000
Fire protection	1	ls	$ 50,000	$ 50,000
Controls (see EMS costs)				$ -
Electrical and lighting (see Electrical costs)				$ -
Miscellaneous systems	1	ls	$ 200,000	$ 200,000
Start-up, test and balance	1	ls	$ 100,000	$ 100,000
			Subtotal	$ 8,157,000
General Contractor's Mark-Up (15%)				$ 1,223,550
			Subtotal	$ 9,380,550
Design Contingency (10%)				$ 938,055
			Total	$ 10,318,605

Opinion of Probable Construction Cost - Conceptual Level
Central Plants with Aggressive Sustainability Implementation

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Main Central Plant						
Commissioning (from schematic design through warranty)	1	ls	$ 90,000		$ 90,000	$ 90,000
Water-cooled, electrical centrifugal chiller, 1,600-ton	1	ea	$ 420,000		$ 420,000	$ 420,000
Cooling tower, 1,500-ton, with VFD	1	ea	$ 210,000		$ 210,000	$ 210,000
Cooling tower sand filters	1	ea	$ 14,000		$ 14,000	$ 14,000
Primary chilled water pumps, 2,560 gpm	1	ea	$ 19,000		$ 19,000	$ 19,000
Secondary chilled water pumps, 1,500 gpm, with VFD	1	ea	$ 12,000		$ 12,000	$ 12,000
Condenser water pumps, 4,480 gpm	1	ea	$ 24,000		$ 24,000	$ 24,000
Gas-fired, HHW boiler, 16 MMBtuh	2	ea	$ 220,000		$ 440,000	$ 440,000
Boiler air emissions control	2	ea	$ 140,000		$ 280,000	$ 280,000
Primary heating hot water pumps, 560 gpm	2	ea	$ 7,000		$ 14,000	$ 14,000
Secondary heating hot water pumps, 800 gpm, with VFD	1	ea	$ 8,000		$ 8,000	$ 8,000
Plant piping; CHW, HHW, and CDW, 4,800 tons total future	1	ls	$ 200,000		$ 200,000	$ 200,000
Insulation	1	ls	$ 40,000		$ 40,000	$ 40,000
Other piping	1	ls	$ 15,000		$ 15,000	$ 15,000
Miscellaneous equipment, appurtenances, valving, metering	1	ls	$ 50,000		$ 50,000	$ 50,000
Plumbing	1	ls	$ 30,000		$ 30,000	$ 30,000
Controls (see EMS costs)					$ -	$ -
Electrical and lighting (see Electrical costs)					$ -	$ -
Miscellaneous systems	1	ls	$ 100,000		$ 100,000	$ 100,000
Start-up, test and balance	1	ls	$ 50,000		$ 50,000	$ 50,000
Medical School Central Plant						
Commissioning (from schematic design through warranty)	1	ls	$ 160,000		$ 160,000	$ 160,000
Sitework	1	ls	$ 400,000		$ 400,000	$ 400,000
Building	6,200	sf	$ 250		$ 1,550,000	$ 1,550,000
Water-cooled, electrical centrifugal chiller, 800-ton	2	ea	$ 320,000		$ 640,000	$ 640,000
Cooling tower, 1,000-ton, with VFD	2	ea	$ 160,000		$ 320,000	$ 320,000
Cooling tower sand filters	2	ea	$ 12,000		$ 24,000	$ 24,000
Primary chilled water pumps, 1,280 gpm	2	ea	$ 11,000		$ 22,000	$ 22,000
Secondary chilled water pumps, 1,100 gpm, with VFD	2	ea	$ 11,000		$ 22,000	$ 22,000
Condenser water pumps, 2,240 gpm	2	ea	$ 17,000		$ 34,000	$ 34,000
Gas-fired, HHW boiler, 8 MMBtuh	2	ea	$ 140,000		$ 280,000	$ 280,000
Boiler air emissions control	2	ea	$ 80,000		$ 160,000	$ 160,000
Primary heating hot water pumps, 280 gpm	1	ea	$ 4,000		$ 4,000	$ 4,000
Primary heating hot water pumps, 170 gpm	2	ea	$ 3,000		$ 6,000	$ 6,000
Secondary heating hot water pumps, 450 gpm, with VFD	2	ea	$ 6,000		$ 12,000	$ 12,000
Compression tank	1	ea	$ 6,000		$ 6,000	$ 6,000
Expansion tank	1	ea	$ 5,000		$ 5,000	$ 5,000
Air separator, CHW	1	ea	$ 4,000		$ 4,000	$ 4,000
Air separator, HHW	1	ea	$ 3,500		$ 3,500	$ 3,500
Chemical treatment system	1	ls	$ 40,000		$ 40,000	$ 40,000
Plant piping; CHW, HHW, and CDW, 2,400 tons total future	1	ls	$ 700,000		$ 700,000	$ 700,000
Insulation	1	ls	$ 120,000		$ 120,000	$ 120,000
Other piping	1	ls	$ 30,000		$ 30,000	$ 30,000
Miscellaneous equipment, appurtenances, valving, metering	1	ls	$ 180,000		$ 180,000	$ 180,000
Plumbing	1	ls	$ 250,000		$ 250,000	$ 250,000
HVAC	1	ls	$ 85,000		$ 85,000	$ 85,000
Fire protection	1	ls	$ 50,000		$ 50,000	$ 50,000
Controls (see EMS costs)					$ -	$ -
Electrical and lighting (see Electrical costs)					$ -	$ -
Miscellaneous systems	1	ls	$ 180,000		$ 180,000	$ 180,000
Start-up, test and balance	1	ls	$ 80,000		$ 80,000	$ 80,000
			Subtotal		$ 7,383,500	$ 7,383,500
General Contractor's Mark-Up (15%)					$ 1,107,525	$ 1,107,525
			Subtotal		$ 8,491,025	$ 8,491,025
Design Contingency (10%)					$ 849,103	$ 849,103
			Total		$ 9,340,128	$ 9,340,128

Opinion of Probable Construction Cost - Conceptual Level
Central Plants with Aggressive Sustainability Implementation

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Main Central Plant				
Commissioning (from schematic design through warranty)	1	ls	$ 70,000	$ 70,000
Water-cooled, electrical centrifugal chiller, 1,600-ton	1	ea	$ 420,000	$ 420,000
Cooling tower, 1,500-ton, with VFD	1	ea	$ 210,000	$ 210,000
Cooling tower sand filters	1	ea	$ 14,000	$ 14,000
Above-ground, welded-steel, insulated CHW TES tank	1,400,000	gallons	$ 0.90	$ 1,260,000
Primary chilled water pumps, 2,560 gpm	1	ea	$ 19,000	$ 19,000
Secondary chilled water pumps, 1,500 gpm, with VFD	1	ea	$ 12,000	$ 12,000
Condenser water pumps, 4,480 gpm	1	ea	$ 24,000	$ 24,000
Gas-fired, HHW boiler, 16 MMBtuh	1	ea	$ 220,000	$ 220,000
Boiler air emissions control	1	ea	$ 140,000	$ 140,000
Primary heating hot water pumps, 560 gpm	1	ea	$ 7,000	$ 7,000
Secondary heating hot water pumps, 800 gpm, with VFD	1	ea	$ 8,000	$ 8,000
[illegible] future	1	ls	$ 160,000	$ 160,000
Insulation	1	ls	$ 30,000	$ 30,000
Other piping	1	ls	$ 15,000	$ 15,000
Miscellaneous equipment, appurtenances, valving, metering	1	ls	$ 50,000	$ 50,000
Plumbing	1	ls	$ 25,000	$ 25,000
Controls (see EMS costs)				$ -
Electrical and lighting (see Electrical costs)				$ -
Miscellaneous systems	1	ls	$ 80,000	$ 80,000
Start-up, test and balance	1	ls	$ 40,000	$ 40,000
				$ -
Medical School Central Plant				$ -
				$ -
Commissioning (from schematic design through warranty)	1	ls	$ 60,000	$ 60,000
Water-cooled, electrical centrifugal chiller, 800-ton	1	ea	$ 320,000	$ 320,000
Cooling tower, 1,000-ton, with VFD	1	ea	$ 160,000	$ 160,000
Cooling tower sand filters	1	ea	$ 12,000	$ 12,000
Above-ground, welded-steel, insulated CHW TES tank	1,200,000	gallons	$ 0.90	$ 1,080,000
Primary chilled water pumps, 1,280 gpm	1	ea	$ 11,000	$ 11,000
Secondary chilled water pumps, 1,100 gpm, with VFD	1	ea	$ 11,000	$ 11,000
Condenser water pumps, 2,240 gpm	1	ea	$ 17,000	$ 17,000
Gas-fired, HHW boiler, 8 MMBtuh	1	ea	$ 140,000	$ 140,000
Boiler air emissions control	1	ea	$ 80,000	$ 80,000
Primary heating hot water pumps, 280 gpm	1	ea	$ 4,000	$ 4,000
Secondary heating hot water pumps, 450 gpm, with VFD	2	ea	$ 6,000	$ 12,000
[illegible] future	1	ls	$ 100,000	$ 100,000
Insulation	1	ls	$ 25,000	$ 25,000
Other piping	1	ls	$ 10,000	$ 10,000
Miscellaneous equipment, appurtenances, valving, metering	1	ls	$ 40,000	$ 40,000
Plumbing	1	ls	$ 20,000	$ 20,000
Controls (see EMS costs)				$ -
Electrical and lighting (see Electrical costs)				$ -
Miscellaneous systems	1	ls	$ 60,000	$ 60,000
Start-up, test and balance	1	ls	$ 30,000	$ 30,000
				$ -
			Subtotal	$ 4,996,000
General Contractor's Mark-Up (15%)				$ 749,400
			Subtotal	$ 5,745,400
Design Contingency (10%)				$ 574,540
			Total	$ 6,319,940

Opinion of Probable Construction Cost - Conceptual Level
Central Plants with Aggressive Sustainability Implementation

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Main Central Plant				
Commissioning (from schematic design through warranty)	1	ls	$ 60,000	$ 60,000
Water-cooled, electrical centrifugal chiller, 1,600-ton	1	ea	$ 420,000	$ 420,000
Primary chilled water pumps, 2,560 gpm	1	ea	$ 19,000	$ 19,000
Secondary chilled water pumps, 1,500 gpm, with VFD	2	ea	$ 12,000	$ 24,000
Condenser water pumps, 4,480 gpm	1	ea	$ 24,000	$ 24,000
Gas-fired, HHW boiler, 16 MMBtuh	1	ea	$ 220,000	$ 220,000
Boiler air emissions control	1	ea	$ 140,000	$ 140,000
Primary heating hot water pumps, 560 gpm	1	ea	$ 7,000	$ 7,000
Secondary heating hot water pumps, 800 gpm, with VFD	1	ea	$ 8,000	$ 8,000
Plant piping; CHW, HHW, and CDW, 4,800 tons total future	1	ls	$ 120,000	$ 120,000
Insulation	1	ls	$ 30,000	$ 30,000
Other piping	1	ls	$ 15,000	$ 15,000
Miscellaneous equipment, appurtenances, valving, metering	1	ls	$ 50,000	$ 50,000
Plumbing	1	ls	$ 25,000	$ 25,000
Controls (see EMS costs)				$ -
Electrical and lighting (see Electrical costs)				$ -
Miscellaneous systems	1	ls	$ 70,000	$ 70,000
Start-up, test and balance	1	ls	$ 30,000	$ 30,000
Medical School Central Plant				
Commissioning (from schematic design through warranty)	1	ls	$ 50,000	$ 50,000
Secondary chilled water pumps, 1,100 gpm, with VFD	1	ea	$ 11,000	$ 11,000
Gas-fired, HHW boiler, 8 MMBtuh	1	ea	$ 140,000	$ 140,000
Boiler air emissions control	1	ea	$ 80,000	$ 80,000
Primary heating hot water pumps, 280 gpm	1	ea	$ 4,000	$ 4,000
Secondary heating hot water pumps, 450 gpm, with VFD	1	ea	$ 6,000	$ 6,000
Plant piping; CHW, HHW, and CDW, 3,200 tons total future	1	ls	$ 90,000	$ 90,000
Insulation	1	ls	$ 25,000	$ 25,000
Other piping	1	ls	$ 10,000	$ 10,000
Miscellaneous equipment, appurtenances, valving, metering	1	ls	$ 40,000	$ 40,000
Plumbing	1	ls	$ 10,000	$ 10,000
Controls (see EMS costs)				$ -
Electrical and lighting (see Electrical costs)				$ -
Miscellaneous systems	1	ls	$ 50,000	$ 50,000
Start-up, test and balance	1	ls	$ 25,000	$ 25,000
			Subtotal	$ 1,803,000
General Contractor's Mark-Up (15%)				$ 270,450
			Subtotal	$ 2,073,450
Design Contingency (10%)				$ 207,345
			Total	$ 2,280,795

Mechanical Material Costs
Conceptual Level

West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	RATING	QUANTITY	UNIT	MATERIAL UNIT COST	TOTAL
Central Plant					
Water-cooled, electrical centrifugal chiller (Lead)	500 tons		ea	$ 140,960	$ -
Water-cooled, electrical centrifugal chiller (Lag)	500 tons		ea	$ 188,155	$ -
Water-cooled, electrical centrifugal chiller (Lead)	800 Tons		ea	$ 210,000	$ -
Water-cooled, electrical centrifugal chiller (Lag)	800 Tons		ea	$ 270,000	$ -
Water-cooled, electrical centrifugal chiller (Lead)	1,500 tons		ea	$ 291,400	$ -
Water-cooled, electrical centrifugal chiller (Lag)	1,500 tons		ea	$ 329,500	$ -
Gas-fired, HHW boiler	5 MMBtuh		ea	$ 83,000	$ -
Gas-fired, HHW boiler	8 MMBtuh		ea	$ 92,000	$ -
Gas-fired, HHW boiler	10 MMBtuh		ea	$ 115,000	$ -
Gas-fired, HHW boiler	20 MMBtuh		ea	$ 177,000	$ -
Above-ground, welded-steel, insulated CHW TES Tank	1.2 million gallons		ea	$ 1,319,000	$ -
Above-ground, welded-steel, insulated CHW TES Tank	1.4 million gallons		ea	$ 1,438,000	$ -
Above-ground, welded-steel, insulated CHW TES Tank	1.6 million gallons		ea	$ 1,557,000	$ -
Above-ground, welded-steel, insulated CHW TES Tank	2.0 million gallons		ea	$ 1,800,000	$ -
Cooling tower	600 tons		ea		$ -
Cooling tower	1,700 tons		ea		$ -
Cooling tower	1,150 tons		ea	$ 122,100	$ -
Cooling tower sand filters			ea	$ 11,500	$ -
Primary chilled water pumps			ea		$ -
Secondary chilled water pumps			ea		$ -
Primary heating hot water pumps			ea		$ -
Chilled water piping, insulated black steel	8"	1600	lf	$ 28	$ 44,464
Chilled water piping, insulated black steel	10"	2600	lf	$ 40	$ 103,688
Chilled water piping, insulated black steel	12"	4800	lf	$ 48	$ 230,352
Chilled water piping, insulated black steel	14"	2000	lf	$ 55	$ 110,480
Chilled water piping, insulated black steel	16"	2600	lf	$ 63	$ 162,786
Chilled water piping, insulated black steel	18"	1600	lf	$ 75	$ 120,048
Chilled water piping, direct-buried, pre-fab, pre-insulated, PVC	8"	1600	lf	$ 21	$ 33,264
Chilled water piping, direct-buried, pre-fab, pre-insulated, PVC	10"	2600	lf	$ 28	$ 71,630
Chilled water piping, direct-buried, pre-fab, pre-insulated, PVC	12"	4800	lf	$ 34	$ 163,392
Chilled water piping, direct-buried, pre-fab, pre-insulated, PVC	14"	2000	lf	$ 42	$ 84,340
Chilled water piping, direct-buried, pre-fab, pre-insulated, PVC	16"	2600	lf	$ 51	$ 133,744
Chilled water piping, direct-buried, pre-fab, pre-insulated, PVC	18"	1600	lf	$ 65	$ 103,872
Heating hot water piping, insulated black steel	6"	3800	lf	$ 23	$ 88,350
Heating hot water piping, insulated black steel	8"	7000	lf	$ 30	$ 210,000
Heating hot water piping, insulated black steel	10"	3000	lf	$ 43	$ 128,250
Heating hot water piping, insulated black steel	12"	3400	lf	$ 50	$ 168,300
Pre-cast tunnel sections	96" square	8000	lf	$ 435	$ 3,480,000
					$ -

Opinion of Probable Construction Cost - Conceptual Level
CHW and HHW Distribution Systems

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
No CHW and HHW piping distribution work during this phase						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
			Subtotal			$ -
General Contractor's Mark-Up (15%)						$ -
			Subtotal			$ -
Design Contingency (10%)						$ -
			Total			$ -

Opinion of Probable Construction Cost - Conceptual Level
CHW and HHW Distribution Systems

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
No CHW and HHW piping distribution work during this phase				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ -
General Contractor's Mark-Up (15%)				$ -
			Subtotal	$ -
Design Contingency (10%)				$ -
			Total	$ -

Opinion of Probable Construction Cost - Conceptual Level
CHW and HHW Distribution Systems

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Main Central Plant				
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	1,900	lf	$ 950	$ 1,805,000
CHW piping, 18", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	800	lf	$ 100	$ 80,000
CHW piping, 16", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	2,400	lf	$ 84	$ 201,600
CHW piping, 14", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	600	lf	$ 74	$ 44,400
HHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	3,200	lf	$ 66	$ 211,200
HHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	600	lf	$ 57	$ 34,200
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 2,376,400
General Contractor's Mark-Up (15%)				$ 356,460
			Subtotal	$ 2,732,860
Design Contingency (10%)				$ 273,286
			Total	$ 3,006,146

Opinion of Probable Construction Cost - Conceptual Level
CHW and HHW Distribution Systems

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Main Central Plant						
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	2,000	lf	$ 950		$ 1,900,000	$ 1,900,000
CHW piping, 14", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	900	lf	$ 74		$ 66,600	$ 66,600
CHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,800	lf	$ 64		$ 115,200	$ 115,200
CHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,300	lf	$ 53		$ 68,900	$ 68,900
HHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,600	lf	$ 57		$ 91,200	$ 91,200
HHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	2,400	lf	$ 40		$ 96,000	$ 96,000
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
Medical School Central Plant						
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	1,100	lf	$ 950		$ 1,045,000	$ 1,045,000
CHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	800	lf	$ 64		$ 51,200	$ 51,200
CHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	800	lf	$ 53		$ 42,400	$ 42,400
CHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	600	lf	$ 37		$ 22,200	$ 22,200
HHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	800	lf	$ 40		$ 32,000	$ 32,000
HHW piping, 6", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,400	lf	$ 31		$ 43,400	$ 43,400
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
			Subtotal			$ 3,574,100
General Contractor's Mark-Up (15%)						$ 536,115
			Subtotal			$ 4,110,215
Design Contingency (10%)						$ 411,022
			Total			$ 4,521,237

Opinion of Probable Construction Cost - Conceptual Level
CHW and HHW Distribution Systems

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Main Central Plant				
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	850	lf	$ 950	$ 807,500
CHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,700	lf	$ 53	$ 90,100
HHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,700	lf	$ 40	$ 68,000
				$ -
				$ -
				$ -
				$ -
				$ -
Medical School Central Plant				
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	500	lf	$ 950	$ 475,000
CHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,000	lf	$ 37	$ 37,000
HHW piping, 6", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,000	lf	$ 31	$ 31,000
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 1,508,600
General Contractor's Mark-Up (15%)				$ 226,290
			Subtotal	$ 1,734,890
Design Contingency (10%)				$ 173,489
			Total	$ 1,908,379

Opinion of Probable Construction Cost - Conceptual Level
CHW and HHW Distribution Systems

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Main Central Plant				
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	2,250	lf	$ 950	$ 2,137,500
CHW piping, 18", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	800	lf	$ 100	$ 80,000
CHW piping, 16", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	200	lf	$ 84	$ 16,800
CHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	200	lf	$ 64	$ 12,800
CHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	3,300	lf	$ 53	$ 174,900
HHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	800	lf	$ 66	$ 52,800
HHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	200	lf	$ 57	$ 11,400
HHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	3,500	lf	$ 40	$ 140,000
				$ -
				$ -
				$ -
				$ -
				$ -
Medical School Central Plant				
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	1,500	lf	$ 950	$ 1,425,000
CHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,800	lf	$ 64	$ 115,200
CHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,200	lf	$ 53	$ 63,600
HHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,800	lf	$ 40	$ 72,000
HHW piping, 6", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,200	lf	$ 31	$ 37,200
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 4,339,200
General Contractor's Mark-Up (15%)				$ 650,880
			Subtotal	$ 4,990,080
Design Contingency (10%)				$ 499,008
			Total	$ 5,489,088

Opinion of Probable Construction Cost - Conceptual Level
CHW and HHW Distribution Systems with Aggressive Sustainability Implementation

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
No CHW and HHW piping distribution work during this phase						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
			Subtotal			$ -
General Contractor's Mark-Up (15%)						$ -
			Subtotal			$ -
Design Contingency (10%)						$ -
			Total			$ -

Opinion of Probable Construction Cost - Conceptual Level
CHW and HHW Distribution Systems with Aggressive Sustainability Implementation

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
No CHW and HHW piping distribution work during this phase				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ -
General Contractor's Mark-Up (15%)				$ -
			Subtotal	$ -
Design Contingency (10%)				$ -
			Total	$ -

Opinion of Probable Construction Cost - Conceptual Level
CHW and HHW Distribution Systems with Aggressive Sustainability Implementation

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Main Central Plant				
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	1,900	lf	$ 950	$ 1,805,000
CHW piping, 18", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	-	lf	$ 100	$ -
CHW piping, 16", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	800	lf	$ 84	$ 67,200
CHW piping, 14", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	2,400	lf	$ 74	$ 177,600
CHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	600	lf	$ 64	$ 38,400
HHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	700	lf	$ 66	$ 46,200
HHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	3,100	lf	$ 57	$ 176,700
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 2,311,100
General Contractor's Mark-Up (15%)				$ 346,665
			Subtotal	$ 2,657,765
Design Contingency (10%)				$ 265,777
			Total	$ 2,923,542

Opinion of Probable Construction Cost - Conceptual Level
CHW and HHW Distribution Systems with Aggressive Sustainability Implementation

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Main Central Plant						
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	2,000	lf	$ 950		$ 1,900,000	$ 1,900,000
CHW piping, 14", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	-	lf	$ 74		$ -	$ -
CHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,600	lf	$ 64		$ 102,400	$ 102,400
CHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	2,400	lf	$ 53		$ 127,200	$ 127,200
HHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,600	lf	$ 57		$ 91,200	$ 91,200
HHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,100	lf	$ 40		$ 44,000	$ 44,000
HHW piping, 6", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,300	lf	$ 31		$ 40,300	$ 40,300
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
Medical School Central Plant						
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	1,100	lf	$ 950		$ 1,045,000	$ 1,045,000
CHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	-	lf	$ 64		$ -	$ -
CHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	800	lf	$ 53		$ 42,400	$ 42,400
CHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,400	lf	$ 37		$ 51,800	$ 51,800
HHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	800	lf	$ 40		$ 32,000	$ 32,000
HHW piping, 6", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,400	lf	$ 31		$ 43,400	$ 43,400
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
			Subtotal			$ 3,519,700
General Contractor's Mark-Up (15%)						$ 527,955
			Subtotal			$ 4,047,655
Design Contingency (10%)						$ 404,766
			Total			$ 4,452,421

Opinion of Probable Construction Cost - Conceptual Level
CHW and HHW Distribution Systems with Aggressive Sustainability Implementation

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Main Central Plant				
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	850	lf	$ 950	$ 807,500
CHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,700	lf	$ 37	$ 62,900
HHW piping, 6", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,700	lf	$ 31	$ 52,700
				$ -
				$ -
				$ -
				$ -
				$ -
Medical School Central Plant				
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	500	lf	$ 950	$ 475,000
CHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	600	lf	$ 37	$ 22,200
CHW piping, 6", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	600	lf	$ 31	$ 18,600
HHW piping, 6", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,000	lf	$ 31	$ 31,000
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 1,469,900
General Contractor's Mark-Up (15%)				$ 220,485
			Subtotal	$ 1,690,385
Design Contingency (10%)				$ 169,039
			Total	$ 1,859,424

Opinion of Probable Construction Cost - Conceptual Level
CHW and HHW Distribution Systems with Aggressive Sustainability Implementation

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Main Central Plant				
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	2,250	lf	$ 950	$ 2,137,500
CHW piping, 18", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	-	lf	$ 100	$ -
CHW piping, 16", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	800	lf	$ 84	$ 67,200
CHW piping, 14", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	200	lf	$ 74	$ 14,800
CHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	-	lf	$ 64	$ -
CHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,800	lf	$ 53	$ 95,400
CHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,700	lf	$ 37	$ 62,900
HHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	800	lf	$ 66	$ 52,800
HHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	200	lf	$ 57	$ 11,400
HHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	200	lf	$ 40	$ 8,000
HHW piping, 6", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	3,300	lf	$ 31	$ 102,300
				$ -
				$ -
				$ -
				$ -
Medical School Central Plant				
Precast tunnel sections, 8' x 8', with pipe racks, electrical, plumbing, ventilation	1,500	lf	$ 950	$ 1,425,000
CHW piping, 12", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	-	lf	$ 64	$ -
CHW piping, 10", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,800	lf	$ 53	$ 95,400
CHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,200	lf	$ 37	$ 44,400
HHW piping, 8", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,800	lf	$ 40	$ 72,000
HHW piping, 6", insulated Sch. 40 steel, on pipe racks, with valves and appurtenances	1,200	lf	$ 31	$ 37,200
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 4,226,300
General Contractor's Mark-Up (15%)				$ 633,945
			Subtotal	$ 4,860,245
Design Contingency (10%)				$ 486,025
			Total	$ 5,346,270

CHW and HHW Piping and Tunnel Lengths - Phase by Phase

Main Campus

PHASE 1							
Item	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**
Basic	**Basic**	**Basic**	**Basic**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**
Tunnel	1,900				1,900		
CHW Piping	CHW Piping	HHW Piping	HHW Piping	CHW Piping	CHW Piping	HHW Piping	HHW Piping
18"	800	12"	3,200	18"	-	12"	700
16"	2,400	10"	600	16"	800	10"	3,100
14"	600			14"	2,400		
12"	-			12"	600		
Subtotal	3,800		3,800		3,800		3,800
PHASE 2							
Item	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**
Basic	**Basic**	**Basic**	**Basic**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**
Tunnel	2,000				2,000		
CHW Piping	CHW Piping	HHW Piping	HHW Piping	CHW Piping	CHW Piping	HHW Piping	HHW Piping
14"	900	10"	1,600	14"	-	10"	1,600
12"	1,800	8"	2,400	12"	1,600	8"	1,100
10"	1,300	6"	-	10"	2,400	6"	1,300
Subtotal	4,000		4,000		4,000		4,000
PHASE 3							
Item	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**
Basic	**Basic**	**Basic**	**Basic**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**
Tunnel	850				850		
CHW Piping	CHW Piping	HHW Piping	HHW Piping	CHW Piping	CHW Piping	HHW Piping	HHW Piping
10"	1,700	10"	-	10"	-	10"	-
8"	-	8"	1,700	8"	1,700	8"	-
6"	-	6"	-	6"	-	6"	1,700
Subtotal	1,700		1,700		1,700		1,700
PHASE 4							
Item	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**
Basic	**Basic**	**Basic**	**Basic**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**
Tunnel	2,250				2,250		
CHW Piping	CHW Piping	HHW Piping	HHW Piping	CHW Piping	CHW Piping	HHW Piping	HHW Piping
18"	800	16"	-	18"	-	16"	
16"	200	14"	-	16"	800	14"	
14"	-	12"	800	14"	200	12"	800

12"	200	10"	200	12"	-	10"	200
10"	3,300	8"	3,500	10"	1,800	8"	200
8"	-	6"	-	8"	1,700	6"	3,300
Subtotal	4,500		4,500		4,500		4,500

Medical School

PHASE 2							
Item	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**
Basic	**Basic**	**Basic**	**Basic**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**
Tunnel	1,100				1,100		
CHW Piping	CHW Piping	HHW Piping	HHW Piping	CHW Piping	CHW Piping	HHW Piping	HHW Piping
12"	800	10"	-	12"	-	10"	-
10"	800	8"	800	10"	800	8"	800
8"	600	6"	1,400	8"	1,400	6"	1,400
Subtotal	2,200		2,200		2,200		2,200
PHASE 3							
Item	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**
Basic	**Basic**	**Basic**	**Basic**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**
Tunnel	500				500		
CHW Piping	CHW Piping	HHW Piping	HHW Piping	CHW Piping	CHW Piping	HHW Piping	HHW Piping
8"	1,000	8"	-	8"	600	8"	-
6"	-	6"	1,000	6"	400	6"	1,000
Subtotal	1,000		1,000		1,000		1,000
PHASE 4							
Item	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**	**Item**	**Length, feet**
Basic	**Basic**	**Basic**	**Basic**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**	**Aggressive Sustainability**
Tunnel	1,500				1,500		
CHW Piping	CHW Piping	HHW Piping	HHW Piping	CHW Piping	CHW Piping	HHW Piping	HHW Piping
12"	1,800	10"	-	12"	-	10"	-
10"	1,200	8"	1,800	10"	1,800	8"	1,800
8"	-	6"	1,200	8"	1,200	6"	1,200
Subtotal	3,000		3,000		3,000		3,000

Opinion of Probable Construction Cost - Conceptual Level
Energy Management System for Central Plants and Backbone

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
EMS						
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
			Subtotal		$ -	$ -
General Contractor's Mark-Up (15%)					$ -	$ -
			Subtotal		$ -	$ -
Design Contingency (10%)					$ -	$ -
			Total		$ -	$ -

Opinion of Probable Construction Cost - Conceptual Level
Energy Management System for Central Plants and Backbone

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
EMS				
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ -
General Contractor's Mark-Up (15%)				$ -
			Subtotal	$ -
Design Contingency (10%)				$ -
			Total	$ -

Opinion of Probable Construction Cost - Conceptual Level
Energy Management System for Central Plants and Backbone

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
EMS				
EMS points, panels, and wiring				
				$ -
Main Central Plant	100	points	$ 370	$ 37,000
				$ -
EMS front end at Main Central Plant	1	ls	$ 22,000	$ 22,000
				$ -
EMS Backbone Allowance	1	ls	$ 60,000	$ 60,000
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 119,000
General Contractor's Mark-Up (15%)				$ 17,850
			Subtotal	$ 136,850
Design Contingency (10%)				$ 13,685
			Total	$ 150,535

Opinion of Probable Construction Cost - Conceptual Level
Energy Management System for Central Plants and Backbone

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
EMS						
EMS points, panels, and wiring						
					$ -	$ -
Main Central Plant	50	points	$ 370		$ 18,500	$ 18,500
					$ -	$ -
Medical School Central Plant	100	points	$ 370		$ 37,000	$ 37,000
					$ -	$ -
EMS front end at Medical School Central Plant	1	ls	$ 23,000		$ 23,000	$ 23,000
					$ -	$ -
EMS Backbone Allowance	1	ls	$ 60,000		$ 60,000	$ 60,000
					$ -	$ -
			Subtotal		$ 138,500	$ 138,500
General Contractor's Mark-Up (15%)					$ 20,775	$ 20,775
			Subtotal		$ 159,275	$ 159,275
Design Contingency (10%)					$ 15,928	$ 15,928
			Total		$ 175,203	$ 175,203

Opinion of Probable Construction Cost - Conceptual Level
Energy Management System for Central Plants and Backbone

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
EMS				
EMS points, panels, and wiring				
				$ -
Main Central Plant	50	points	$ 370	$ 18,500
				$ -
Medical School Central Plant	60	points	$ 370	$ 22,200
				$ -
EMS Backbone Allowance	1	ls	$ 30,000	$ 30,000
				$ -
			Subtotal	$ 70,700
General Contractor's Mark-Up (15%)				$ 10,605
			Subtotal	$ 81,305
Design Contingency (10%)				$ 8,131
			Total	$ 89,436

Opinion of Probable Construction Cost - Conceptual Level
Energy Management System for Central Plants and Backbone

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
EMS				
EMS points, panels, and wiring				
				$ -
Main Central Plant	55	points	$ 370	$ 20,350
				$ -
Medical School Central Plant	50	points	$ 370	$ 18,500
				$ -
EMS Backbone Allowance	1	ls	$ 60,000	$ 60,000
				$ -
			Subtotal	$ 98,850
General Contractor's Mark-Up (15%)				$ 14,828
			Subtotal	$ 113,678
Design Contingency (10%)				$ 11,368
			Total	$ 125,045

Opinion of Probable Construction Cost - Conceptual Level
Energy Management System for Buildings

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
EMS						
EMS points, panels, and wiring						
Building W4 (144,000 sf x 10 points/1,000 sf)	1,440	points	$ 370		$ 532,800	$ 532,800
					$ -	$ -
EMS front end in Building W4	1	ls	$ 5,000		$ 5,000	$ 5,000
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
			Subtotal		$ 537,800	$ 537,800
General Contractor's Mark-Up (15%)					$ 80,670	$ 80,670
			Subtotal		$ 618,470	$ 618,470
Design Contingency (10%)					$ 61,847	$ 61,847
			Total		$ 680,317	$ 680,317

Opinion of Probable Construction Cost - Conceptual Level
Energy Management System for Buildings

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
EMS				
EMS points, panels, and wiring				
Building M4 (224,000 sf x 10 points/1,000 sf)	2,240	points	$ 370	$ 828,800
				$ -
EMS front end in Building M4	1	ls	$ 5,000	$ 5,000
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 833,800
General Contractor's Mark-Up (15%)				$ 125,070
			Subtotal	$ 958,870
Design Contingency (10%)				$ 95,887
			Total	$ 1,054,757

Opinion of Probable Construction Cost - Conceptual Level
Energy Management System for Buildings

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
EMS				
EMS points, panels, and wiring				
Building W1 (270,000 sf x 10 points/1,000 sf)	2,700	points	$ 370	$ 999,000
Building W3 (120,000 sf x 10 points/1,000 sf)	1,200	points	$ 370	$ 444,000
Building W5 (175,000 sf x 10 points/1,000 sf)	1,750	points	$ 370	$ 647,500
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 2,090,500
General Contractor's Mark-Up (15%)				$ 313,575
			Subtotal	$ 2,404,075
Design Contingency (10%)				$ 240,408
			Total	$ 2,644,483

Opinion of Probable Construction Cost - Conceptual Level
Energy Management System for Buildings

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
EMS						
EMS points, panels, and wiring						
Building W2 (120,000 sf x 10 points/1,000 sf)	1,200	points	$ 370		$ 444,000	$ 444,000
Building W6 (182,500 sf x 10 points/1,000 sf)	1,825	points	$ 370		$ 675,250	$ 675,250
Building W7 (195,000 sf x 10 points/1,000 sf)	1,950	points	$ 370		$ 721,500	$ 721,500
Building W8 (220,000 sf x 10 points/1,000 sf)	2,200	points	$ 370		$ 814,000	$ 814,000
Building W14 (98,000 sf x 10 points/1,000 sf)	980	points	$ 370		$ 362,600	$ 362,600
Building W15 (170,000 sf x 10 points/1,000 sf)	1,700	points	$ 370		$ 629,000	$ 629,000
Building M3 (100,000 sf x 10 points/1,000 sf)	1,000	points	$ 370		$ 370,000	$ 370,000
Building M6 (100,000 sf x 10 points/1,000 sf)	1,000	points	$ 370		$ 370,000	$ 370,000
Building MV (23,000 sf x 10 points/1,000 sf)	230	points	$ 370		$ 85,100	$ 85,100
Building H2 (125,000 sf x 10 points/1,000 sf)	1,250	points	$ 370		$ 462,500	$ 462,500
Building R (65,000 sf x 10 points/1,000 sf)	650	points	$ 370		$ 240,500	$ 240,500
Apartments A1 (30,000 sf x 10 points/1,000 sf)	300	points	$ 370		$ 111,000	$ 111,000
Apartments A2 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370		$ 88,800	$ 88,800
Apartments A3 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370		$ 49,950	$ 49,950
Apartments A4 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370		$ 49,950	$ 49,950
Apartments A5 (30,000 sf x 10 points/1,000 sf)	300	points	$ 370		$ 111,000	$ 111,000
Apartments A6 (30,000 sf x 10 points/1,000 sf)	300	points	$ 370		$ 111,000	$ 111,000
Apartments A7 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370		$ 49,950	$ 49,950
Apartments A8 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370		$ 49,950	$ 49,950
Apartments A9 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370		$ 88,800	$ 88,800
Apartments A10 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370		$ 88,800	$ 88,800
Apartments A11 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370		$ 49,950	$ 49,950
Apartments A12 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370		$ 49,950	$ 49,950
Apartments A13 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370		$ 49,950	$ 49,950
Apartments A14 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370		$ 49,950	$ 49,950
Apartments A15 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370		$ 88,800	$ 88,800
					$ -	$ -
			Subtotal		$ 6,262,250	$ 6,262,250
General Contractor's Mark-Up (15%)					$ 939,338	$ 939,338
			Subtotal		$ 7,201,588	$ 7,201,588
Design Contingency (10%)					$ 720,159	$ 720,159
			Total		$ 7,921,746	$ 7,921,746

Opinion of Probable Construction Cost - Conceptual Level
Energy Management System for Buildings

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
EMS				
EMS points, panels, and wiring				
Building W16 (155,000 sf x 10 points/1,000 sf)	1,550	points	$ 370	$ 573,500
Building W17 (165,000 sf x 10 points/1,000 sf)	1,650	points	$ 370	$ 610,500
Building W18 (98,400 sf x 10 points/1,000 sf)	984	points	$ 370	$ 364,080
Building W19 (115,000 sf x 10 points/1,000 sf)	1,150	points	$ 370	$ 425,500
Building W20 (104,000 sf x 10 points/1,000 sf)	1,040	points	$ 370	$ 384,800
Building W21 (112,500 sf x 10 points/1,000 sf)	1,125	points	$ 370	$ 416,250
Building W22 (100,000 sf x 10 points/1,000 sf)	1,000	points	$ 370	$ 370,000
Building M2 (128,000 sf x 10 points/1,000 sf)	1,280	points	$ 370	$ 473,600
Building M5 (120,000 sf x 10 points/1,000 sf)	1,200	points	$ 370	$ 444,000
Building M7 (124,000 sf x 10 points/1,000 sf)	1,240	points	$ 370	$ 458,800
Building H1 (125,000 sf x 10 points/1,000 sf)	1,250	points	$ 370	$ 462,500
Building MOB5 (70,000 sf x 10 points/1,000 sf)	700	points	$ 370	$ 259,000
Building MOB6 (82,000 sf x 10 points/1,000 sf)	820	points	$ 370	$ 303,400
Building MOB7 (78,000 sf x 10 points/1,000 sf)	780	points	$ 370	$ 288,600
Apartments A16 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370	$ 88,800
Apartments A17 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A18 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A19 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370	$ 88,800
Apartments A20 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370	$ 88,800
Apartments A21 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A22 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A23 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370	$ 88,800
Apartments A24 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370	$ 88,800
Apartments A25 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A26 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A27 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370	$ 88,800
Apartments A28 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370	$ 88,800
Apartments A29 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A30 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A31 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370	$ 88,800
				$ -
			Subtotal	$ 6,944,530
General Contractor's Mark-Up (15%)				$ 1,041,680
			Subtotal	$ 7,986,210
Design Contingency (10%)				$ 798,621
			Total	$ 8,784,830

Opinion of Probable Construction Cost - Conceptual Level
Energy Management System for Buildings

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
EMS				
EMS points, panels, and wiring				
Building W9 (97,600 sf x 10 points/1,000 sf)	976	points	$ 370	$ 361,120
Building W10 (115,000 sf x 10 points/1,000 sf)	1,150	points	$ 370	$ 425,500
Building W11 (275,000 sf x 10 points/1,000 sf)	2,750	points	$ 370	$ 1,017,500
Building W12 (92,000 sf x 10 points/1,000 sf)	920	points	$ 370	$ 340,400
Building W13 (98,000 sf x 10 points/1,000 sf)	980	points	$ 370	$ 362,600
Building W23 (164,000 sf x 10 points/1,000 sf)	1,640	points	$ 370	$ 606,800
Building W24 (110,000 sf x 10 points/1,000 sf)	1,100	points	$ 370	$ 407,000
Building W25 (80,000 sf x 10 points/1,000 sf)	800	points	$ 370	$ 296,000
Building W26 (100,000 sf x 10 points/1,000 sf)	1,000	points	$ 370	$ 370,000
Building W27 (185,000 sf x 10 points/1,000 sf)	1,850	points	$ 370	$ 684,500
Building M1 (120,000 sf x 10 points/1,000 sf)	1,200	points	$ 370	$ 444,000
Building MOB1 (72,000 sf x 10 points/1,000 sf)	720	points	$ 370	$ 266,400
Building MOB2 (124,000 sf x 10 points/1,000 sf)	1,240	points	$ 370	$ 458,800
Building MOB3 (120,000 sf x 10 points/1,000 sf)	1,200	points	$ 370	$ 444,000
Building MOB4 (150,000 sf x 10 points/1,000 sf)	1,500	points	$ 370	$ 555,000
Apartments A32 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370	$ 88,800
Apartments A33 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A34 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A35 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A36 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A37 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370	$ 88,800
Apartments A38 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370	$ 88,800
Apartments A39 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A40 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A41 (30,000 sf x 10 points/1,000 sf)	300	points	$ 370	$ 111,000
Apartments A42 (30,000 sf x 10 points/1,000 sf)	300	points	$ 370	$ 111,000
Apartments A43 (30,000 sf x 10 points/1,000 sf)	300	points	$ 370	$ 111,000
Apartments A44 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A45 (13,500 sf x 10 points/1,000 sf)	135	points	$ 370	$ 49,950
Apartments A46 (24,000 sf x 10 points/1,000 sf)	240	points	$ 370	$ 88,800
				$ -
			Subtotal	$ 8,127,420
General Contractor's Mark-Up (15%)				$ 1,219,113
			Subtotal	$ 9,346,533
Design Contingency (10%)				$ 934,653
			Total	$ 10,281,186

Opinion of Probable Construction Cost - Conceptual Level
Natural Gas Distribution System

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Gas						
HDPE pipe, 2", direct-buried, with valves and appurtenances (Building W4)	600	lf	$ 14		$ 8,400	$ 8,400
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
					$ -	$ -
			Subtotal	$ -	$ 8,400	$ 8,400
General Contractor's Mark-Up (15%)				$ -	$ 1,260	$ 1,260
			Subtotal	$ -	$ 9,660	$ 9,660
Design Contingency (10%)				$ -	$ 966	$ 966
			Total	$ -	$ 10,626	$ 10,626

Opinion of Probable Construction Cost - Conceptual Level
Natural Gas Distribution System

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Gas				
HDPE pipe, 6", direct-buried, with valves and appurtenance	900	lf	$ 92	$ 82,800
HDPE pipe, 1", direct-buried, with valves and appurtenance	300	lf	$ 12	$ 3,600
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 86,400
General Contractor's Mark-Up (15%)				$ 12,960
			Subtotal	$ 99,360
Design Contingency (10%)				$ 9,936
			Total	$ 109,296

Opinion of Probable Construction Cost - Conceptual Level
Natural Gas Distribution System

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Gas				
Schedule 40, welded, black steel pipe, 6", installed in tunnel, with valves and appurtenances	1,600	lf	$ 118	$ 188,800
HDPE pipe, 6", direct-buried, with valves and appurtenances	1,100	lf	$ 92	$ 101,200
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 290,000
General Contractor's Mark-Up (15%)				$ 43,500
			Subtotal	$ 333,500
Design Contingency (10%)				$ 33,350
			Total	$ 366,850

Opinion of Probable Construction Cost - Conceptual Level
Natural Gas Distribution System

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Gas						
Schedule 40, welded, black steel pipe, 6", installed in tunnel, with valves and appurtenances	1,200	lf	$ 118		$ 141,600	$ 141,600
						$ -
Schedule 40, welded, black steel pipe, 2", installed in tunnel, with valves and appurtenances	2,600	lf	$ 36		$ 93,600	$ 93,600
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
			Subtotal	$ -	$ 235,200	$ 235,200
General Contractor's Mark-Up (15%)				$ -	$ 35,280	$ 35,280
			Subtotal	$ -	$ 270,480	$ 270,480
Design Contingency (10%)				$ -	$ 27,048	$ 27,048
			Total	$ -	$ 297,528	$ 297,528

Opinion of Probable Construction Cost - Conceptual Level
Natural Gas Distribution System

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Gas				
				$ -
Schedule 40, welded, black steel pipe, 2", installed in tunnel, with valves and appurtenances	1,800	lf	$ 36	$ 64,800
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 64,800
General Contractor's Mark-Up (15%)				$ 9,720
			Subtotal	$ 74,520
Design Contingency (10%)				$ 7,452
			Total	$ 81,972

Opinion of Probable Construction Cost - Conceptual Level
Natural Gas Distribution System

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Gas				
Schedule 40, welded, black steel pipe, 3", installed in tunnel, with valves and appurtenances	4,400	lf	$ 72	$ 316,800
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Subtotal	$ 316,800
General Contractor's Mark-Up (15%)				$ 47,520
			Subtotal	$ 364,320
Design Contingency (10%)				$ 36,432
			Total	$ 400,752

Opinion of Probable Construction Cost - Conceptual Level
Electrical Distribution System

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Electrical Power Distribution						
12 kV Switchgear with Main and Tie Breakers	1	ea	$ 780,000		780,000	780,000
Feeder Breaker - 12 kV	2	ea	$ 68,000		136,000	136,000
Electrical Duct Bank - (24) 5"C	660	lf	$ 580		382,800	382,800
Electrical Duct Bank - (16) 5"C	-	lf	$ 420		-	-
Electrical Duct Bank - (12) 5"C	-	lf	$ 320		-	-
Electrical Duct Bank - (9) 5"C	-	lf	$ 220		-	-
Electrical Duct Bank - (4) 5"C	420	lf	$ 96		40,320	40,320
Pull Boxes	3	ea	$ 7,200		21,600	21,600
15 kV Cable (3 - 500MCM + #2G)	1,600	lf	$ 78		124,800	124,800
High Voltage Switch	1	ea	$ 38,400		38,400	38,400
Cable Slicing and Termination	4	ea	$ 4,800		19,200	19,200
Secondary Unit Substation - Main Central Plant	-	ea			-	-
Secondary Unit Substation - Medical School Central Pl	-	ea	-		-	-
Main Central Plant Building Electrical Equipment	-	ls	-		-	-
Medical School Central Plant Building Electrical	-	ls	-		-	-
Site Lighting - Common Roadway	5,600	lf	50		280,000	280,000
			Subtotal		1,823,120	1,823,120
General Contractor's Mark-Up (15%)					273,468	273,468
			Subtotal		$ 2,096,588	$ 2,096,588
Design Contingency (10%)					209,659	209,659
			Total		$ 2,306,247	$ 2,306,247

Opinion of Probable Construction Cost - Conceptual Level
Electrical Distribution System

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Electrical Power Distribution						
12 kV Switchgear with Main and Tie Breakers	-	ea	$ 780,000		$ -	$ -
Feeder Breaker - 12 kV	2	ea	$ 68,000		$ 136,000	$ 136,000
Electrical Duct Bank - (24) 5"C	-	lf	$ 580		$ -	$ -
Electrical Duct Bank - (16) 5"C	1,600	lf	$ 420		$ 672,000	$ 672,000
Electrical Duct Bank - (12) 5"C	1,440	lf	$ 320		$ 460,800	$ 460,800
Electrical Duct Bank - (9) 5"C	-	lf	$ 220		$ -	$ -
Electrical Duct Bank - (4) 5"C	400	lf	$ 96		$ 38,400	$ 38,400
Pull Boxes	6	ea	$ 7,200		$ 43,200	$ 43,200
15 kV Cable (3 - 500MCM + #2G)	6,880	lf	$ 78		$ 536,640	$ 536,640
High Voltage Switch	1	ea	$ 38,400		$ 38,400	$ 38,400
Cable Slicing and Termination	12	ea	$ 4,800		$ 57,600	$ 57,600
Secondary Unit Substation - Main Central Plant	-	ea			$ -	$ -
Secondary Unit Substation - Medical School Central Pl	-	ea			$ -	$ -
Main Central Plant Building Electrical	-	ls			$ -	$ -
Medical School Central Plant Building Electrical	-	ls			$ -	$ -
Site Lighting - Common Roadway	4,800	lf	$ 50		$ 240,000	$ 240,000
			Subtotal		$ 2,223,040	$ 2,223,040
General Contractor's Mark-Up (15%)					$ 333,456	$ 333,456
			Subtotal		$ 2,556,496	$ 2,556,496
Design Contingency (10%)					$ 255,650	$ 255,650
			Total		$ 2,812,146	$ 2,812,146

Opinion of Probable Construction Cost - Conceptual Level
Electrical Distribution System

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Electrical Power Distribution						
12 kV Switchgear with Main and Tie Breakers	-	ea	$ 780,000		$ -	$ -
Feeder Breaker - 12 kV	2	ea	$ 68,000		$ 136,000	$ 136,000
(2) 5" RGS in Tunnel	1,800	lf	$ 320		$ 576,000	$ 576,000
Electrical Duct Bank - (16) 5"C	-	lf	$ 420		$ -	$ -
Electrical Duct Bank - (12) 5"C	-	lf	$ 320		$ -	$ -
Electrical Duct Bank - (9) 5"C	-	lf	$ 220		$ -	$ -
Electrical Duct Bank - (4) 5"C	400	lf	$ 96		$ 38,400	$ 38,400
Pull Boxes	4	ea	$ 7,200		$ 28,800	$ 28,800
15 kV Cable (3 - 500MCM + #2G)	4,400	lf	$ 78		$ 343,200	$ 343,200
High Voltage Switch	3	ea	$ 38,400		$ 115,200	$ 115,200
Cable Slicing and Termination	6	ea	$ 4,800		$ 28,800	$ 28,800
Secondary Unit Substation - Main Central Plant	1	ea	$ 468,000		$ 468,000	$ 468,000
Secondary Unit Substation - Medical School Central Pl	-	ea			$ -	$ -
Main Central Plant Building Electrical Equipment	1	ls	$ 650,000		$ 650,000	$ 650,000
Medical School Central Plant Building Electrical	-	ls			$ -	$ -
Site Lighting - Common Roadway	4,800	lf	$ 50		$ 240,000	$ 240,000
			Subtotal		$ 2,624,400	$ 2,624,400
General Contractor's Mark-Up (15%)					$ 393,660	$ 393,660
			Subtotal		$ 3,018,060	$ 3,018,060
Design Contingency (10%)					$ 301,806	$ 301,806
			Total		$ 3,319,866	$ 3,319,866

Opinion of Probable Construction Cost - Conceptual Level
Electrical Distribution System

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Electrical Power Distribution						
12 kV Switchgear with Main and Tie Breakers	-	ea	$ 780,000		$ -	$ -
Feeder Breaker - 12 kV	6	ea	$ 68,000		$ 408,000	$ 408,000
(2) 5" RGS in Tunnel	2,480	lf	$ 320		$ 793,600	$ 793,600
Electrical Duct Bank - (16) 5"C	2,200	lf	$ 420		$ 924,000	$ 924,000
Electrical Duct Bank - (12) 5"C	-	lf	$ 320		$ -	$ -
Electrical Duct Bank - (9) 5"C	-	lf	$ 220		$ -	$ -
Electrical Duct Bank - (4) 5"C	800	lf	$ 96		$ 76,800	$ 76,800
Pull Boxes	12	ea	$ 7,200		$ 86,400	$ 86,400
15 kV Cable (3 - 500MCM + #2G)	35,600	lf	$ 78		$ 2,776,800	$ 2,776,800
High Voltage Switch	8	ea	$ 38,400		$ 307,200	$ 307,200
Cable Slicing and Termination	16	ea	$ 4,800		$ 76,800	$ 76,800
Secondary Unit Substation - Main Central Plant	1	ea	$ 468,000		$ 468,000	$ 468,000
Secondary Unit Substation - Medical School Central Pl	1	ea	$ 332,000		$ 332,000	$ 332,000
Main Central Plant Building Electrical Improvements	1	ls	$ 320,000		$ 320,000	$ 320,000
Medical School Central Plant Building Electrical	1	ls	$ 540,000		$ 540,000	$ 540,000
Site Lighting - Common Roadway	14,200	lf	$ 50		$ 710,000	$ 710,000
			Subtotal		$ 7,819,600	$ 7,819,600
General Contractor's Mark-Up (15%)					$ 1,172,940	$ 1,172,940
			Subtotal		$ 8,992,540	$ 8,992,540
Design Contingency (10%)					$ 899,254	$ 899,254
			Total		$ 9,891,794	$ 9,891,794

Opinion of Probable Construction Cost - Conceptual Level
Electrical Distribution System

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Electrical Power Distribution						
12 kV Switchgear with Main and Tie Breakers	-	ea	$ 780,000		$ -	$ -
Feeder Breaker - 12 kV	4	ea	$ 68,000		$ 272,000	$ 272,000
(2) 5" RGS in Tunnel	4,200	lf	$ 320		$ 1,344,000	$ 1,344,000
Electrical Duct Bank - (16) 5"C	-	lf	$ 420		$ -	$ -
Electrical Duct Bank - (12) 5"C	-	lf	$ 320		$ -	$ -
Electrical Duct Bank - (9) 5"C	600	lf	$ 220		$ 132,000	$ 132,000
Electrical Duct Bank - (4) 5"C	600	lf	$ 96		$ 57,600	$ 57,600
Pull Boxes	6	ea	$ 7,200		$ 43,200	$ 43,200
15 kV Cable (3 - 500MCM + #2G)	28,400	lf	$ 78		$ 2,215,200	$ 2,215,200
High Voltage Switch	4	ea	$ 38,400		$ 153,600	$ 153,600
Cable Slicing and Termination	8	ea	$ 4,800		$ 38,400	$ 38,400
Secondary Unit Substation - Main Central Plant	1	ea	$ 468,000		$ 468,000	$ 468,000
Secondary Unit Substation - Medical School Central Pl	1	ea	$ 332,000		$ 332,000	$ 332,000
Main Central Plant Building Electrical Improvements	1	ls	$ 320,000		$ 320,000	$ 320,000
Med School Central Plant Building Elect Improvements	1	ls	$ 250,000		$ 250,000	$ 250,000
Site Lighting - Common Roadway	11,200	lf	$ 50		$ 560,000	$ 560,000
			Subtotal		$ 6,186,000	$ 6,186,000
General Contractor's Mark-Up (15%)					$ 927,900	$ 927,900
			Subtotal		$ 7,113,900	$ 7,113,900
Design Contingency (10%)					$ 711,390	$ 711,390
			Total		$ 7,825,290	$ 7,825,290

Opinion of Probable Construction Cost - Conceptual Level
Electrical Distribution System

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Electrical Power Distribution						
12 kV Switchgear with Main and Tie Breakers	-	ea	$ 780,000		$ -	$ -
Feeder Breaker - 12 kV	-	ea	$ 68,000		$ -	$ -
(2) 5" RGS in Tunnel	3,200	lf	$ 320		$ 1,024,000	$ 1,024,000
Electrical Duct Bank - (16) 5"C	-	lf	$ 420		$ -	$ -
Electrical Duct Bank - (12) 5"C	-	lf	$ 320		$ -	$ -
Electrical Duct Bank - (9) 5"C	500	lf	$ 220		$ 110,000	$ 110,000
Electrical Duct Bank - (4) 5"C	1,200	lf	$ 96		$ 115,200	$ 115,200
Pull Boxes	8	ea	$ 7,200		$ 57,600	$ 57,600
15 kV Cable (3 - 500MCM + #2G)	11,200	lf	$ 78		$ 873,600	$ 873,600
High Voltage Switch	8	ea	$ 38,400		$ 307,200	$ 307,200
Cable Slicing and Termination	16	ea	$ 4,800		$ 76,800	$ 76,800
Secondary Unit Substation - Main Central Plant	1	ea	$ 468,000		$ 468,000	$ 468,000
Secondary Unit Substation - Medical School Central Pl	1	ea	$ 332,000		$ 332,000	$ 332,000
Main Central Plant Building Electrical Improvements	1	ls	$ 320,000		$ 320,000	$ 320,000
Med School Central Plant Building Elect Improvements	1	ls	$ 250,000		$ 250,000	$ 250,000
Site Lighting - Common Roadway	5,100	lf	$ 50		$ 255,000	$ 255,000
			Subtotal		$ 4,189,400	$ 4,189,400
General Contractor's Mark-Up (15%)					$ 628,410	$ 628,410
			Subtotal		$ 4,817,810	$ 4,817,810
Design Contingency (10%)					$ 481,781	$ 481,781
			Total		$ 5,299,591	$ 5,299,591

Opinion of Probable Construction Cost - Conceptual Level
Data Communication System

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Data Communication						
Commmunication Duct Bank - (24) 4"C	-	lf	$ 540		$ -	$ -
Commmunication Duct Bank - (16) 4"C	640	lf	$ 360		$ 230,400	$ 230,400
Commmunication Duct Bank - (16) 4"C (Housing Proje	300	lf	$ 360	$ 108,000		$ 108,000
Commmunication Duct Bank - (8) 4"C	-	lf	$ 180		$ -	$ -
Commmunication Duct Bank - (6) 4"C	2,200	lf	$ 120		$ 264,000	$ 264,000
Commmunication Duct Bank - (4) 4"C	1,720	lf	$ 90		$ 154,800	$ 154,800
Pull Boxes	6	ea	$ 7,200		$ 43,200	$ 43,200
Communication Cables	3,800	lf	$ 60		$ 228,000	$ 228,000
Communication Cables (Housing Project)	1,860	lf	$ 60	$ 111,600		$ 111,600
Data/Comm Node Facility (Housing Project)	600	sf	$ 500	$ 300,000		$ 300,000
Data/Comm Node Facility - Medical Center	-	sf	$ 500		$ -	$ -
Electronic Equipment Allowance	-	ls			$ -	$ -
Secondary Unit Substation - Communication Node	-	ea			$ -	$ -
Generator	-	ea			$ -	$ -
Uninterruptible Power System - 75 kVA (Housing Proje	1	ea	$ 176,000	$ 176,000		$ 176,000
			Subtotal	$ 695,600	$ 920,400	$ 1,616,000
General Contractor's Mark-Up (15%)				$ 104,340	$ 138,060	$ 242,400
			Subtotal	$ 799,940	$ 1,058,460	$ 1,858,400
Design Contingency (10%)				$ 79,994	$ 105,846	$ 185,840
			Total	$ 879,934	$ 1,164,306	$ 2,044,240

Opinion of Probable Construction Cost - Conceptual Level
Data Communication System

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Data Communication						
Commmunication Duct Bank - (24) 4"C	-	lf	$ 540		$ -	$ -
Commmunication Duct Bank - (16) 4"C	2,400	lf	$ 360		$ 864,000	$ 864,000
Commmunication Duct Bank - (8) 4"C	400	lf	$ 180		$ 72,000	$ 72,000
Commmunication Duct Bank - (6) 4"C	1,400	lf	$ 120		$ 168,000	$ 168,000
Commmunication Duct Bank - (4) 4"C		lf	$ 90		$ -	$ -
Pull Box	6	ea	$ 7,200		$ 43,200	$ 43,200
Communication Cable	6,400	lf	$ 60		$ 384,000	$ 384,000
Data/Comm Node Facility - Medical Center	3,800	sf	$ 500		$ 1,900,000	$ 1,900,000
Data/Comm Node Facility (Housing Project)	-	sf	$ 500		$ -	$ -
Electronic Equipment Allowance	1	sf	$ 1,600,000		$ 1,600,000	$ 1,600,000
Generator-250 kW	2	ea	$ 194,000		$ 388,000	$ 388,000
Uninterruptible Power System-225 kVA	2	ea	$ 324,000		$ 648,000	$ 648,000
Uninterruptible Power System - 75 kVA (Housing Proje	-	ea	$ 176,000		$ -	$ -
			Subtotal		$ 6,067,200	$ 6,067,200
General Contractor's Mark-Up (15%)					$ 910,080	$ 910,080
			Subtotal		$ 6,977,280	$ 6,977,280
Design Contingency (10%)					$ 697,728	$ 697,728
			Total		$ 7,675,008	$ 7,675,008

Opinion of Probable Construction Cost - Conceptual Level
Data Communication System

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Data Communication						
3-tier Cable Tray in Utility Tunnel	1,800	lf	$ 150		$ 270,000	$ 270,000
Commmunication Duct Bank - (24) 4"C	-	lf	$ 540		$ -	$ -
Commmunication Duct Bank - (16) 4"C	-	lf	$ 360		$ -	$ -
Commmunication Duct Bank - (8) 4"C	-	lf	$ 180		$ -	$ -
Commmunication Duct Bank - (6) 4"C	-	lf	$ 120		$ -	$ -
Commmunication Duct Bank - (4) 4"C	400	lf	$ 90		$ 36,000	$ 36,000
Pull Box	4	ea	$ 7,200		$ 28,800	$ 28,800
Communication Cables	4,400	lf	$ 60		$ 264,000	$ 264,000
Data/Comm Hub Facility	-	sf	$ 500		$ -	$ -
Data/Comm Node Facility (Housing Project)	-	sf			$ -	$ -
Electronic Equipment Allowance	-	LS			$ -	$ -
Generator	-	ea			$ -	$ -
Uninterruptible Power System	-	ea			$ -	$ -
Uninterruptible Power System - 75 kVA (Housing Proje	-	ea			$ -	$ -
			Subtotal		$598,800	$ 598,800
General Contractor's Mark-Up (15%)					$89,820	$ 89,820
			Subtotal		$688,620	$ 688,620
Design Contingency (10%)					$68,862	$ 68,862
			Total		$757,482	$ 757,482

Opinion of Probable Construction Cost - Conceptual Level
Data Communication System

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Data Communication						
3-tier Cable Tray in Utility Tunnel	2,480	lf	$ 150		$ 372,000	$ 372,000
Commmunication Duct Bank - (24) 4"C	720	lf	$ 540		$ 388,800	$ 388,800
Commmunication Duct Bank - (16) 4"C	2,200	lf	$ 360		$ 792,000	$ 792,000
Commmunication Duct Bank - (8) 4"C	-	lf	$ 180		$ -	$ -
Commmunication Duct Bank - (6) 4"C	-	lf	$ 120		$ -	$ -
Commmunication Duct Bank - (4) 4"C	-	lf	$ 90		$ -	$ -
Pull Box	12	ea	$ 7,200		$ 86,400	$ 86,400
Communication Cable	10,800	lf	$ 60		$ 648,000	$ 648,000
Data/Comm Node Facility - Main Node Bldg	10,000	sf	$ 500		$ 5,000,000	$ 5,000,000
Data/Comm Node Facility (Housing Project)	-	sf	$ 500		$ -	$ -
Electronic Equipment Allowance	1	sf	$ 1,500,000		$ 1,500,000	$ 1,500,000
Generator	2	ea	$ 296,000		$ 592,000	$ 592,000
Uninterruptible Power System	4	ea	$ 324,000		$ 1,296,000	$ 1,296,000
			Subtotal		$10,675,200	#########
General Contractor's Mark-Up (15%)					$1,601,280	$ 1,601,280
			Subtotal		$12,276,480	#########
Design Contingency (10%)					$1,227,648	$ 1,227,648
			Total		$13,504,128	#########

Opinion of Probable Construction Cost - Conceptual Level
Data Communication System

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Data Communication						
3-tier Cable Tray in Utility Tunnel	4,200	lf	$ 150		$ 630,000	$ 630,000
Commmunication Duct Bank - (24) 4"C	-	lf	$ 540		$ -	$ -
Commmunication Duct Bank - (16) 4"C	-	lf	$ 360		$ -	$ -
Commmunication Duct Bank - (8) 4"C	-	lf	$ 180		$ -	$ -
Commmunication Duct Bank - (6) 4"C	640	lf	$ 120		$ 76,800	$ 76,800
Commmunication Duct Bank - (4) 4"C	1,600	lf	$ 90		$ 144,000	$ 144,000
Pull Box	6	ea	$ 7,200		$ 43,200	$ 43,200
Communication Cable	12,880	ea	$ 60		$ 772,800	$ 772,800
Data/Comm Node Facility - Main Node	-	sf	$ 500		$ -	$ -
Data/Comm Node Facility (Housing Project)	-	sf	$ 500		$ -	$ -
Electronic Equipment Allowance	1	sf	$ 250,000		$ 250,000	$ 250,000
Generator	-	ea			$ -	$ -
Uninterruptible Power System	-	ea			$ -	$ -
Uninterruptible Power System - 75 kVA (Housing Proje	-	ea			$ -	$ -
			Subtotal		$1,916,800	$ 1,916,800
General Contractor's Mark-Up (15%)					$287,520	$ 287,520
			Subtotal		$2,204,320	$ 2,204,320
Design Contingency (10%)					$220,432	$ 220,432
			Total		$2,424,752	$ 2,424,752

Opinion of Probable Construction Cost - Conceptual Level
Data Communication System

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	HOUSING SUBTOTAL	CAMPUS SUBTOTAL	TOTAL
Data Communication						
3-tier Cable Tray in Utility Tunnel	3,200	lf	$ 150		$ 480,000	$ 480,000
Commmunication Duct Bank - (24) 4"C	-	lf	$ 540		$ -	$ -
Commmunication Duct Bank - (16) 4"C	-	lf	$ 360		$ -	$ -
Commmunication Duct Bank - (8) 4"C	820	lf	$ 180		$ 147,600	$ 147,600
Commmunication Duct Bank - (6) 4"C	-	lf	$ 120		$ -	$ -
Commmunication Duct Bank - (4) 4"C	1,200	lf	$ 90		$ 108,000	$ 108,000
Pull Box	6	ea	$ 7,200		$ 43,200	$ 43,200
Communication Cable	7,720	lf	$ 60		$ 463,200	$ 463,200
Data/Comm Hub Facility	-	sf	$ 500		$ -	$ -
Data/Comm Node Facility (Housing Project)	-	sf	$ 500		$ -	$ -
Electronic Equipment Allowance	1	sf	$ 300,000		$ 300,000	$ 300,000
Generator	-	ea	$ 250,000		$ -	$ -
Uninterruptible Power System	-	ea	$ 346,000		$ -	$ -
			Subtotal		$1,542,000	$ 1,542,000
General Contractor's Mark-Up (15%)					$231,300	$ 231,300
			Subtotal		$1,773,300	$ 1,773,300
Design Contingency (10%)					$177,330	$ 177,330
			Total		$1,950,630	$ 1,950,630

Opinion of Probable Construction Cost - Conceptual Level
Fire Alarm Network System

Phase 1A
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Fire Alarm				
Fire Alarm Network Node	3	ls	$ 8,000	$ 24,000
Communication Cable/Raceway	4,520	lf	$ 55	$ 248,600
Hardware/Software Upgrade and Programming	3	ea	$ 5,000	$ 15,000
			Subtotal	$ 287,600
General Contractor's Mark-Up (15%)				$ 43,140
			Subtotal	$ 330,740
Design Contingency (10%)				$ 33,074
			Total	$ 363,814

Opinion of Probable Construction Cost - Conceptual Level
Fire Alarm Network System

Phase 1B
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Fire Alarm				
Fire Alarm Network Node	2	ls	$ 8,000	$ 16,000
Communication Cable/Raceway	1,840	lf	$ 55	$ 101,200
Hardware/Software Upgrade and Programming	2	ea	$ 5,000	$ 10,000
			Subtotal	$ 127,200
General Contractor's Mark-Up (15%)				$ 19,080
			Subtotal	$ 146,280
Design Contingency (10%)				$ 14,628
			Total	$ 160,908

Opinion of Probable Construction Cost - Conceptual Level
Fire Alarm Network System

Phase 1
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Fire Alarm				
Fire Alarm Network Node	4	ls	$ 8,000	$ 32,000
Communication Cable/Raceway	2,380	lf	$ 55	$ 130,900
Hardware/Software Upgrade and Programming	4	ea	$ 5,000	$ 20,000
			Subtotal	$ 182,900
General Contractor's Mark-Up (15%)				$ 27,435
			Subtotal	$ 210,335
Design Contingency (10%)				$ 21,034
			Total	$ 231,369

Opinion of Probable Construction Cost - Conceptual Level
Fire Alarm Network System

Phase 2
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Fire Alarm				
Fire Alarm Network Node	6	ls	$ 8,000	$ 48,000
Communication Cable/Raceway	5,180	lf	$ 55	$ 284,900
Hardware/Software Upgrade and Programming	6	ea	$ 5,000	$ 30,000
			Subtotal	$ 362,900
General Contractor's Mark-Up (15%)				$ 54,435
			Subtotal	$ 417,335
Design Contingency (10%)				$ 41,734
			Total	$ 459,069

Opinion of Probable Construction Cost - Conceptual Level
Fire Alarm Network System

Phase 3
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Fire Alarm				
Fire Alarm Network Node	6	ls	$ 8,000	$ 48,000
Communication Cable/Raceway	2,820	lf	$ 55	$ 155,100
Hardware/Software Upgrade and Programming	6	ea	$ 5,000	$ 30,000
			Subtotal	$ 233,100
General Contractor's Mark-Up (15%)				$ 34,965
			Subtotal	$ 268,065
Design Contingency (10%)				$ 26,807
			Total	$ 294,872

Opinion of Probable Construction Cost - Conceptual Level
Fire Alarm Network System

Phase 4
West Campus Infrastructure Development Study
University of California, Riverside

March 14, 2008

ITEM	QUANTITY	UNIT	INSTALLED UNIT COST	TOTAL
Fire Alarm				
Fire Alarm Network Node	4	ls	$ 8,000	$ 32,000
Communication Cable/Raceway	3,820	lf	$ 55	$ 210,100
Hardware/Software Upgrade and Programming	4	ea	$ 5,000	$ 20,000
			Subtotal	$ 262,100
General Contractor's Mark-Up (15%)				$ 39,315
			Subtotal	$ 301,415
Design Contingency (10%)				$ 30,142
			Total	$ 331,557

APPENDIX A-10

WATER TABLES

UC RIVERSIDE
WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

Table 1
Domestic Water Demand by Node

JUNCTION NO.	AVERAGE DAILY DEMAND (GPM)	MAXIMUM DAILY DEMAND (GPM)	PEAK HOUR DEMAND (GPM)
J10	34.7	59.03	118.07
J11	347.3	590.33	1180.65
J20	34.7	59.03	118.07
J200	11.3	19.21	38.42
J22	104.2	177.09	354.18
J23	69.5	118.07	236.13
J25	34.7	59.03	118.07
J26	69.5	118.07	236.13
J28	7.0	11.82	23.63
J29	7.0	11.82	23.63
J30	10.4	17.65	35.30
J302	0.0	0.00	0.00
J32	7.0	11.90	23.80
J34	38.5	65.41	130.82
J36	27.0	45.85	91.70
J38	26.2	44.52	89.05
J40	25.7	43.65	87.30
J42	22.0	37.40	74.80
J44	26.2	44.52	89.05
J46	26.6	45.15	90.30
J48	16.9	28.70	57.40
J50	26.6	45.15	90.30
J52	38.2	65.00	130.00
J54	18.3	31.15	62.30
J56	12.6	21.35	42.70
J58	19.4	32.90	65.80
J60	14.6	24.80	49.61
J61	0.0	0.00	0.00
J62	8.7	14.80	29.60
J63	8.4	14.35	28.70
J66	7.7	13.05	26.10
J68	14.2	24.20	48.40
J70	18.8	31.95	63.91
J72	27.8	47.26	94.52
J74	45.6	77.52	155.04
J80	28.1	47.70	95.40
J82	34.4	58.55	117.10
J84	8.5	14.40	28.80
J86	23.7	40.29	80.58
J88	16.1	27.45	54.90
J90	7.6	12.92	25.84

J92	14.9	25.25	50.50
J94	42.0	71.43	142.87
J96	0.0	0.00	0.00
J98	0.0	0.00	0.00
	1382.6	2349.72	4699.43

Table 2
Summary of Domestic Water Modeling
Peak Hour Study

ID	Peak Hour Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J10	118.07	1036	1,231.94	84.9
J11	1,180.65	1031	1,230.76	86.55
J20	118.07	1047	1,214.01	72.37
J200	38.42	972	1,197.59	97.75
J22	354.18	1048	1,211.29	70.75
J23	236.13	1074	1,208.90	58.45
J25	118.07	1116	1,208.47	40.28
J26	236.13	1103	1,208.38	45.88
J28	23.63	1117	1,201.63	36.89
J29	23.63	1097	1,201.08	45.1
J30	35.3	1030	1,203.16	75.03
J302	0	1044	1,271.12	98.41
J32	23.8	1031	1,202.95	74.5
J34	130.82	1014	1,199.60	80.42
J36	91.7	1003	1,199.07	84.96
J38	89.05	992	1,198.20	89.35
J40	87.3	982	1,197.77	93.49
J42	74.8	980	1,197.68	94.32
J44	89.05	991	1,197.77	89.59
J46	90.3	1013	1,199.37	80.75
J48	57.4	1032	1,200.87	73.17
J50	90.3	1013	1,199.38	80.76
J52	130	1004	1,199.20	84.58
J54	62.3	1004	1,199.08	84.53
J56	42.7	1015	1,199.55	79.97
J58	65.8	1022	1,199.98	77.12
J60	49.61	1037	1,199.98	70.62
J61	0	1050	1,200.41	65.17
J62	29.6	1040	1,199.89	69.28
J63	28.7	1023	1,199.62	76.53
J66	26.1	1011	1,199.41	81.64
J68	48.4	985	1,197.80	92.21
J70	63.91	978	1,197.80	95.24
J72	94.52	986	1,198.12	91.91
J74	155.04	994	1,198.13	88.45
J80	95.4	980	1,197.68	94.32
J82	117.1	969	1,197.42	99.19
J84	28.8	963	1,197.40	101.57
J86	80.58	973	1,197.43	97.24
J88	54.9	978	1,197.59	95.15

J90	25.84	1046	1,200.15	67.01
J92	50.5	1028	1,200.58	74.78
J94	142.87	1004	1,198.15	84.13
J96	0	1114	1,202.30	38.26
J98	0	995	1,198.68	88.26

Table 3
Summary of Domestic Water Modeling
Peak Hour Study

ID	From Node	To Node	Length (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	HL/1000 (ft/kft)
P100	J72	J70	684	10	248.66	1.02	0.47
P101	J80	J42	36	10	-66.95	0.27	0.04
P102	J70	J80	666	10	152.36	0.62	0.19
P103	J80	J82	677	8	123.91	0.79	0.38
P104	J82	J84	613	8	28.8	0.18	0.03
P106	J70	J68	589	10	32.39	0.13	0.01
P108	J68	J88	672	10	195.89	0.8	0.3
P11	J10	J11	295	12	1,180.65	3.35	4
P110	J88	J86	621	8	102.57	0.65	0.27
P112	J86	J82	563	8	21.99	0.14	0.02
P114	J88	J200	631	10	38.42	0.16	0.01
P130	J62	J61	672	8	-180.69	1.15	0.77
P132	J61	J29	870	8	-180.69	1.15	0.77
P15	J10	J20	632	12	3,400.74	9.65	28.36
P17	J20	J22	690	12	1,172.46	3.33	3.95
P19	J22	J23	1176	12	818.28	2.32	2.03
P209	J302	J10	759	12	4,699.46	13.33	51.63
P21	J23	J25	1008	12	354.19	1	0.43
P211	RES5002	J302	327	12	4,699.46	13.33	51.63
P213	J90	J60	512	8	116.29	0.74	0.34
P23	J25	T100	1521	12	0.00	0	0
P25	J25	J26	455	12	236.13	0.67	0.2
P26	J23	J96	1187	6	227.95	2.59	5.56
P28	J96	J28	490	8	227.95	1.45	1.37
P29	J28	J29	493	8	204.32	1.3	1.12
P40	J20	J30	1074	12	2,110.22	5.99	10.11
P42	J30	J32	154	12	715.71	2.03	1.36
P44	J32	J34	1074	10	691.91	2.83	3.11
P46	J34	J36	633	10	341.19	1.39	0.84
P48	J36	J38	623	8	249.49	1.59	1.4
P50	J38	J40	700	8	160.44	1.02	0.62
P52	J40	J42	620	8	73.14	0.47	0.14
P54	J42	J44	690	8	-68.6	0.44	0.13
P56	J44	J94	647	8	-157.65	1.01	0.6
P58	J94	J46	617	8	-300.52	1.92	1.97
P60	J46	J34	624	10	-219.89	0.9	0.37
P62	J46	J50	38	10	-170.93	0.7	0.23
P64	J50	J48	1074	10	-447.45	1.83	1.39
P66	J48	J30	511	12	-1,359.21	3.86	4.47
P68	J48	J92	153	12	854.36	2.42	1.89

P70	J92	J90	873	8	142.13	0.91	0.49
P72	J92	J58	511	12	661.74	1.88	1.18
P74	J58	J60	905	10	8.99	0.04	0
P76	J60	J62	557	8	75.67	0.48	0.15
P78	J62	J63	689	10	226.76	0.93	0.39
P80	J63	J66	667	10	198.06	0.81	0.31
P82	J66	J54	624	10	268.92	1.1	0.54
P84	J54	J74	985	10	366.95	1.5	0.96
P86	J74	J68	955	10	211.91	0.87	0.35
P88	J66	J56	568	8	-96.96	0.62	0.24
P90	J56	J58	450	12	-586.95	1.67	0.94
P92	J56	J52	624	12	447.29	1.27	0.57
P94	J52	J54	573	10	160.33	0.65	0.21
P96	J52	J50	665	10	-186.22	0.76	0.27
P97	J52	J98	605	10	343.18	1.4	0.85
P99	J98	J72	657	10	343.18	1.4	0.85

Table 4
Summary of Domestic Water Modeling
MDD + FF Without City Backup Water Source

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J10	59.03	1036	1,254.90	94.85
J11	590.33	1031	1,254.57	96.87
J20	59.03	1047	1,238.88	83.14
J200	19.21	972	1,210.89	103.51
J201	0.00	972	1,087.00	49.83
J22	177.09	1048	1,237.64	82.17
J23	118.07	1074	1,236.34	70.34
J25	59.03	1116	1,236.22	52.31
J26	118.07	1103	1,236.20	57.93
J28	11.82	1117	1,224.73	46.89
J29	11.82	1097	1,223.73	54.91
J30	17.65	1030	1,225.36	84.65
J302	0.00	1044	1,282.02	103.13
J32	11.90	1031	1,225.09	84.1
J34	65.41	1014	1,220.69	89.56
J36	45.85	1003	1,219.84	93.95
J38	44.52	992	1,217.80	97.84
J40	43.65	982	1,215.96	101.38
J42	37.40	980	1,214.69	101.69
J44	44.52	991	1,216.16	97.56
J46	45.15	1013	1,220.29	89.82
J48	28.70	1032	1,222.46	82.53
J50	45.15	1013	1,220.30	89.82
J52	65.00	1004	1,219.79	93.5
J54	31.15	1004	1,219.47	93.36
J56	21.35	1015	1,220.51	89.05
J58	32.90	1022	1,221.27	86.35
J60	24.80	1037	1,221.30	79.86
J61	0.00	1050	1,222.32	74.67
J62	14.80	1040	1,221.24	78.53
J63	14.50	1023	1,220.72	85.67
J66	13.05	1011	1,220.26	90.67
J68	24.20	985	1,214.36	99.38
J70	31.95	978	1,214.85	102.63
J72	47.26	986	1,216.43	99.85
J74	77.52	994	1,216.58	96.45
J80	47.7	980	1,214.61	101.66
J82	58.55	969	1,207.32	103.48
J84	14.4	963	1,207.31	105.86
J86	1,540.29	973	1,202.29	99.35

J88	27.45	978	1,210.90	100.91
J90	12.92	1046	1,221.57	76.29
J92	25.25	1028	1,222.10	84.1
J94	71.43	1004	1,217.93	92.7
J96	0.00	1114	1,225.80	48.44
J98	0	995	1,218.18	96.7

Table 5
Summary of Domestic Water Modeling
MDD + FF Without City Backup Water Source

ID	From Node	To Node	Length (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	HL/1000 (ft/kft)
P100	J72	J70	684	10	588.67	2.4	2.31
P101	J80	J42	36	10	-583.26	2.38	2.27
P102	J70	J80	666	10	216.42	0.88	0.36
P103	J80	J82	677	8	751.98	4.8	10.77
P104	J82	J84	613	8	14.4	0.09	0.01
P106	J70	J68	589	10	340.3	1.39	0.84
P108	J68	J88	672	10	907.92	3.71	5.15
P11	J10	J11	295	12	590.33	1.67	1.11
P110	J88	J86	621	8	861.26	5.5	13.85
P112	J86	J82	563	8	-679.03	4.33	8.92
P114	J88	J200	631	10	19.21	0.08	0
P130	J62	J61	672	8	-269.86	1.72	1.61
P132	J61	J29	870	8	-269.86	1.72	1.61
P15	J10	J20	632	12	3,200.50	9.08	25.35
P17	J20	J22	690	12	765.75	2.17	1.79
P19	J22	J23	1176	12	588.66	1.67	1.1
P209	J302	J10	760	12	3,849.86	10.92	35.69
P21	J23	J25	1008	12	177.09	0.5	0.12
P211	RES5002	J302	168	12	3,849.86	10.92	35.69
P213	J90	J60	512	8	146.36	0.93	0.52
P23	J25	T100	1521	12	0	0	0
P25	J25	J26	455	12	118.07	0.33	0.06
P26	J23	J96	1187	6	293.5	3.33	8.88
P28	J96	J28	490	8	293.5	1.87	2.19
P29	J28	J29	493	8	281.68	1.8	2.03
P300	RES5004	J201	81	10	0	0	0
P314	J201	J200	128	10	0	0	0
P40	J20	J30	1074	12	2,375.73	6.74	12.59
P42	J30	J32	154	12	814.25	2.31	1.73
P44	J32	J34	1074	10	802.35	3.28	4.1
P46	J34	J36	633	10	440.94	1.8	1.35
P48	J36	J38	623	8	395.09	2.52	3.27
P50	J38	J40	700	8	350.57	2.24	2.62
P52	J40	J42	620	8	306.92	1.96	2.05
P54	J42	J44	690	8	-313.74	2	2.13
P56	J44	J94	647	8	-358.26	2.29	2.73
P58	J94	J46	617	8	-429.69	2.74	3.82
P60	J46	J34	624	10	-296	1.21	0.65
P62	J46	J50	38	10	-178.84	0.73	0.25
P64	J50	J48	1074	10	-547.2	2.24	2.02

P66	J48	J30	511	12	-1,543.82	4.38	5.66
P68	J48	J92	153	12	967.92	2.75	2.39
P70	J92	J90	873	8	159.28	1.02	0.61
P72	J92	J58	511	12	783.39	2.22	1.61
P74	J58	J60	905	10	-56.06	0.23	0.03
P76	J60	J62	557	8	65.5	0.42	0.12
P78	J62	J63	689	10	320.56	1.31	0.75
P80	J63	J66	667	10	306.06	1.25	0.69
P82	J66	J54	624	10	425.99	1.74	1.27
P84	J54	J74	985	10	669.34	2.73	2.93
P86	J74	J68	955	10	591.82	2.42	2.33
P88	J66	J56	568	8	-132.98	0.85	0.44
P90	J56	J58	450	12	-806.54	2.29	1.7
P92	J56	J52	624	12	652.22	1.85	1.15
P94	J52	J54	573	10	274.5	1.12	0.56
P96	J52	J50	665	10	-323.21	1.32	0.76
P97	J52	J98	605	10	635.93	2.6	2.66
P99	J98	J72	657	10	635.93	2.6	2.66

Table 6
Summary of Domestic Water Modeling
MDD + FF at Building A 42

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J10	59.03	1036	1,254.90	94.85
J11	590.33	1031	1,254.57	96.87
J20	59.03	1047	1,238.88	83.14
J200	19.21	972	1,215.44	105.48
J201	0.00	972	1,087.00	49.83
J22	177.09	1048	1,237.63	82.17
J23	118.07	1074	1,236.33	70.34
J25	59.03	1116	1,236.21	52.3
J26	118.07	1103	1,236.18	57.92
J28	11.82	1117	1,224.54	46.81
J29	11.82	1097	1,223.52	54.82
J30	17.65	1030	1,225.38	84.66
J302	0.00	1044	1,282.02	103.13
J32	11.90	1031	1,225.13	84.12
J34	65.41	1014	1,220.97	89.68
J36	45.85	1003	1,220.34	94.17
J38	44.52	992	1,218.90	98.32
J40	43.65	982	1,217.66	102.11
J42	37.40	980	1,216.86	102.63
J44	44.52	991	1,217.72	98.24
J46	45.15	1013	1,220.45	89.89
J48	28.70	1032	1,222.41	82.51
J50	45.15	1013	1,220.45	89.89
J52	65.00	1004	1,219.65	93.44
J54	31.15	1004	1,218.72	93.04
J56	21.35	1015	1,220.30	88.96
J58	32.90	1022	1,221.10	86.27
J60	24.80	1037	1,221.12	79.78
J61	0.00	1050	1,222.09	74.57
J62	14.80	1040	1,220.99	78.42
J63	14.50	1023	1,220.38	85.52
J66	13.05	1011	1,219.83	90.49
J68	24.2	985	1,215.41	99.84
J70	31.95	978	1,216.68	103.42
J72	47.26	986	1,217.60	100.35
J74	1,577.52	994	1,213.04	94.91
J80	47.7	980	1,216.81	102.61
J82	58.55	969	1,216.00	107.24
J84	14.4	963	1,215.99	109.62
J86	40.29	973	1,215.66	105.14

J88	27.45	978	1,215.45	102.88
J90	12.92	1046	1,221.42	76.23
J92	25.25	1028	1,222.01	84.06
J94	71.43	1004	1,218.83	93.09
J96	0.00	1114	1,225.62	48.37
J98	0	995	1,218.66	96.91

Table 7
Summary of Domestic Water Modeling
MDD + FF at Building A 42

ID	From Node	To Node	Length (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	HL/1000 (ft/kft)
P100	J72	J70	684	10	439.4	1.79	1.34
P101	J80	J42	36	10	-436.86	1.78	1.33
P102	J70	J80	666	10	-158.47	0.65	0.2
P103	J80	J82	677	8	230.69	1.47	1.21
P104	J82	J84	613	8	14.4	0.09	0.01
P106	J70	J68	589	10	565.92	2.31	2.15
P108	J68	J88	672	10	-70.79	0.29	0.05
P11	J10	J11	295	12	590.33	1.67	1.11
P110	J88	J86	621	8	-117.45	0.75	0.35
P112	J86	J82	563	8	-157.74	1.01	0.6
P114	J88	J200	631	10	19.21	0.08	0
P130	J62	J61	672	8	-272.21	1.74	1.64
P132	J61	J29	870	8	-272.21	1.74	1.64
P15	J10	J20	632	12	3,200.50	9.08	25.35
P17	J20	J22	690	12	768.1	2.18	1.8
P19	J22	J23	1176	12	591.01	1.68	1.11
P209	J302	J10	760	12	3,849.86	10.92	35.69
P21	J23	J25	1008	12	177.09	0.5	0.12
P211	RES5002	J302	168	12	3,849.86	10.92	35.69
P213	J90	J60	512	8	156.15	1	0.59
P23	J25	T100	1521	12	0	0	0
P25	J25	J26	455	12	118.07	0.33	0.06
P26	J23	J96	1187	6	295.85	3.36	9.02
P28	J96	J28	490	8	295.85	1.89	2.22
P29	J28	J29	493	8	284.03	1.81	2.06
P300	RES5004	J201	81	10	0	0	0
P314	J201	J200	128	10	0	0	0
P40	J20	J30	1074	12	2,373.37	6.73	12.56
P42	J30	J32	154	12	790.11	2.24	1.64
P44	J32	J34	1074	10	778.21	3.18	3.87
P46	J34	J36	633	10	373.58	1.53	0.99
P48	J36	J38	623	8	327.73	2.09	2.31
P50	J38	J40	700	8	283.21	1.81	1.77
P52	J40	J42	620	8	239.56	1.53	1.3
P54	J42	J44	690	8	-234.7	1.5	1.25
P56	J44	J94	647	8	-279.22	1.78	1.72
P58	J94	J46	617	8	-350.65	2.24	2.62
P60	J46	J34	624	10	-339.21	1.39	0.83
P62	J46	J50	38	10	-56.58	0.23	0.03
P64	J50	J48	1074	10	-518.12	2.12	1.82

P66	J48	J30	511	12	-1,565.61	4.44	5.81
P68	J48	J92	153	12	1,018.79	2.89	2.62
P70	J92	J90	873	8	169.07	1.08	0.68
P72	J92	J58	511	12	824.47	2.34	1.77
P74	J58	J60	905	10	-37.49	0.15	0.01
P76	J60	J62	557	8	93.86	0.6	0.23
P78	J62	J63	689	10	351.27	1.43	0.89
P80	J63	J66	667	10	336.77	1.38	0.82
P82	J66	J54	624	10	511.23	2.09	1.78
P84	J54	J74	985	10	965.01	3.94	5.77
P86	J74	J68	955	10	-612.51	2.5	2.48
P88	J66	J56	568	8	-187.51	1.2	0.82
P90	J56	J58	450	12	-829.06	2.35	1.79
P92	J56	J52	624	12	620.2	1.76	1.05
P94	J52	J54	573	10	484.94	1.98	1.61
P96	J52	J50	665	10	-416.39	1.7	1.22
P97	J52	J98	605	10	486.66	1.99	1.62
P99	J98	J72	657	10	486.66	1.99	1.62

Table 8
Summary of Domestic Water Modeling
MDD + FF at Building F1

ID	Max. Daily Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J10	59.03	1036	1,254.90	94.85
J11	590.33	1031	1,254.57	96.87
J20	59.03	1047	1,238.88	83.14
J200	19.21	972	1,216.64	106.00
J201	0	972	1,087.00	49.83
J22	177.09	1048	1,237.65	82.17
J23	118.07	1074	1,236.36	70.35
J25	59.03	1116	1,236.24	52.32
J26	118.07	1103	1,236.22	57.94
J28	11.82	1117	1,224.95	46.99
J29	11.82	1097	1,223.97	55.01
J30	17.65	1030	1,225.33	84.64
J302	0	1044	1,282.02	103.13
J32	11.90	1031	1,225.04	84.08
J34	65.41	1014	1,220.19	89.34
J36	45.85	1003	1,217.92	93.13
J38	44.52	992	1,212.04	95.35
J40	1,543.65	982	1,206.20	97.14
J42	37.4	980	1,215.29	101.95
J44	44.52	991	1,216.54	97.73
J46	45.15	1013	1,220.18	89.77
J48	28.7	1032	1,222.57	82.57
J50	45.15	1013	1,220.23	89.79
J52	65	1004	1,220.16	93.66
J54	31.15	1004	1,220.03	93.61
J56	21.35	1015	1,220.84	89.19
J58	32.9	1022	1,221.52	86.45
J60	24.8	1037	1,221.56	79.97
J61	0	1050	1,222.59	74.78
J62	14.8	1040	1,221.52	78.65
J63	14.5	1023	1,221.07	85.82
J66	13.05	1011	1,220.67	90.85
J68	24.2	985	1,217.00	100.52
J70	31.95	978	1,216.89	103.51
J72	47.26	986	1,217.91	100.49
J74	77.52	994	1,218.26	97.17
J80	47.7	980	1,215.38	101.99
J82	58.55	969	1,215.57	107.05
J84	14.4	963	1,215.56	109.44
J86	40.29	973	1,215.98	105.28

J88	27.45	978	1,216.65	103.41
J90	12.92	1046	1,221.79	76.39
J92	25.25	1028	1,222.25	84.17
J94	71.43	1004	1,218.08	92.76
J96	0	1114	1,226.00	48.53
J98	0	995	1,219.08	97.09

Table 9
Summary of Domestic Water Modeling
MDD + FF at Building F1

ID	From Node	To Node	Length (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P100	J72	J70	684	10	464.82	1.9	1.49
P101	J80	J42	36	10	637.57	2.6	2.68
P102	J70	J80	666	10	582.05	2.38	2.26
P103	J80	J82	677	8	-103.22	0.66	0.27
P104	J82	J84	613	8	14.4	0.09	0.01
P106	J70	J68	589	10	-149.18	0.61	0.18
P108	J68	J88	672	10	263.12	1.07	0.52
P11	J10	J11	295	12	590.33	1.67	1.11
P110	J88	J86	621	8	216.46	1.38	1.07
P112	J86	J82	563	8	176.17	1.12	0.73
P114	J88	J200	631	10	19.21	0.08	0
P130	J62	J61	672	8	-267.08	1.7	1.58
P132	J61	J29	870	8	-267.08	1.7	1.58
P15	J10	J20	632	12	3,200.50	9.08	25.35
P17	J20	J22	690	12	762.97	2.16	1.78
P19	J22	J23	1,176.00	12	585.88	1.66	1.09
P209	J302	J10	760	12	3,849.86	10.92	35.69
P21	J23	J25	1,008.00	12	177.09	0.5	0.12
P211	RES5002	J302	167.6	12	3,849.86	10.92	35.69
P213	J90	J60	512.00	8	134.9	0.86	0.45
P23	J25	T100	1,521.00	12	0	0	0
P25	J25	J26	455.00	12	118.07	0.33	0.06
P26	J23	J96	1,187.00	6	290.72	3.3	8.73
P28	J96	J28	490	8	290.72	1.86	2.15
P29	J28	J29	493.00	8	278.9	1.78	1.99
P300	RES5004	J201	80.92	10	0	0	0
P314	J201	J200	127.56	10	0	0	0
P40	J20	J30	1,074.00	12	2,378.50	6.75	12.61
P42	J30	J32	154	12	857.11	2.43	1.9
P44	J32	J34	1,074.00	10	845.21	3.45	4.51
P46	J34	J36	633	10	745.91	3.05	3.58
P48	J36	J38	623	8	700.06	4.47	9.44
P50	J38	J40	700	8	655.54	4.18	8.36
P52	J40	J42	620	8	-888.11	5.67	14.66
P54	J42	J44	690	8	-287.94	1.84	1.82
P56	J44	J94	647	8	-332.46	2.12	2.38
P58	J94	J46	617.00	8	-403.89	2.58	3.41
P60	J46	J34	624	10	-33.89	0.14	0.01
P62	J46	J50	38	10	-415.15	1.7	1.21
P64	J50	J48	1,074.00	10	-570.94	2.33	2.18

P66	J48	J30	511	12	#######	4.27	5.4
P68	J48	J92	153	12	904.1	2.56	2.1
P70	J92	J90	873	8	147.82	0.94	0.53
P72	J92	J58	511	12	731.03	2.07	1.42
P74	J58	J60	905	10	-63.37	0.26	0.04
P76	J60	J62	557	8	46.73	0.3	0.06
P78	J62	J63	689	10	299	1.22	0.66
P80	J63	J66	667	10	284.5	1.16	0.6
P82	J66	J54	624	10	379.01	1.55	1.02
P84	J54	J74	985	10	514.02	2.1	1.8
P86	J74	J68	955	10	436.5	1.78	1.33
P88	J66	J56	568	8	-107.56	0.69	0.29
P90	J56	J58	450	12	-761.5	2.16	1.53
P92	J56	J52	624	12	632.6	1.79	1.09
P94	J52	J54	573	10	166.16	0.68	0.22
P96	J52	J50	665	10	-110.64	0.45	0.1
P97	J52	J98	605	10	512.08	2.09	1.78
P99	J98	J72	657	10	512.08	2.09	1.78

Table 10
Summary of Domestic Water Modeling
MDD + FF at Building W 11

ID	Max. Daily Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J10	59.03	1036	1,254.90	94.85
J11	590.33	1031	1,254.57	96.87
J20	59.03	1047	1,238.88	83.14
J200	19.21	972	1,220.55	107.7
J201	0.00	972	1,087.00	49.83
J22	177.09	1048	1,237.62	82.16
J23	118.07	1074	1,236.31	70.33
J25	59.03	1116	1,236.19	52.29
J26	118.07	1103	1,236.16	57.91
J28	11.82	1117	1,224.27	46.69
J29	11.82	1097	1,223.23	54.69
J30	17.65	1030	1,225.42	84.68
J302	0.00	1044	1,282.02	103.13
J32	11.90	1031	1,225.23	84.16
J34	65.41	1014	1,222.06	90.15
J36	45.85	1003	1,221.77	94.79
J38	44.52	992	1,221.21	99.32
J40	43.65	982	1,220.82	103.48
J42	37.40	980	1,220.63	104.26
J44	44.52	991	1,220.73	99.54
J46	45.15	1013	1,221.47	90.33
J48	28.70	1032	1,222.08	82.36
J50	45.15	1013	1,221.46	90.33
J52	65.00	1004	1,220.83	93.95
J54	31.15	1004	1,220.72	93.9
J56	21.35	1015	1,220.83	89.19
J58	32.90	1022	1,220.85	86.16
J60	24.80	1037	1,219.31	79
J61	0.00	1050	1,221.77	74.43
J62	14.80	1040	1,220.64	78.27
J63	14.35	1023	1,220.67	85.65
J66	13.05	1011	1,220.72	90.87
J68	24.2	985	1,220.59	102.08
J70	31.95	978	1,220.62	105.13
J72	47.26	986	1,220.66	101.68
J74	77.52	994	1,220.61	98.19
J80	47.7	980	1,220.62	104.26
J82	58.55	969	1,220.52	109.2
J84	14.4	963	1,220.52	111.58
J86	40.29	973	1,220.52	107.25

J88	27.45	978	1,220.55	105.1
J90	1,512.92	1046	1,213.03	72.59
J92	25.25	1028	1,221.40	83.8
J94	71.43	1004	1,220.95	94.01
J96	0.00	1114	1,225.38	48.26
J98	0	995	1,220.75	97.82

Table 11
Summary of Domestic Water Modeling
MDD + FF at Building W 11

ID	From Node	To Node	Length (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P100	J72	J70	684	10	81.05	0.33	0.06
P101	J80	J42	36	10	-144.69	0.59	0.17
P102	J70	J80	666	10	-22.27	0.09	0.01
P103	J80	J82	677	8	74.71	0.48	0.15
P104	J82	J84	613	8	14.4	0.09	0.01
P106	J70	J68	589	10	71.38	0.29	0.05
P108	J68	J88	672	10	85.19	0.35	0.06
P11	J10	J11	295	12	590.33	1.67	1.11
P110	J88	J86	621	8	38.53	0.25	0.04
P112	J86	J82	563	8	-1.76	0.01	0
P114	J88	J200	631	10	19.21	0.08	0
P130	J62	J61	672	8	-275.57	1.76	1.68
P132	J61	J29	870	8	-275.57	1.76	1.68
P15	J10	J20	632	12	3,200.35	9.08	25.35
P17	J20	J22	690	12	771.47	2.19	1.82
P19	J22	J23	1176	12	594.38	1.69	1.12
P209	J302	J10	760	12	3,849.71	10.92	35.69
P21	J23	J25	1008	12	177.09	0.5	0.12
P211	RES5002	J302	168	12	3,849.71	10.92	35.69
P213	J90	J60	512	8	-806.84	5.15	12.27
P23	J25	T100	1521	12	0.00	0	0
P25	J25	J26	455	12	118.07	0.33	0.06
P26	J23	J96	1187	6	299.21	3.4	9.21
P28	J96	J28	490	8	299.21	1.91	2.27
P29	J28	J29	493	8	287.39	1.83	2.1
P300	RES5004	J201	81	10	0.00	0	0
P314	J201	J200	128	10	0.00	0	0
P40	J20	J30	1074	12	2,369.86	6.72	12.53
P42	J30	J32	154	12	684.28	1.94	1.26
P44	J32	J34	1074	10	672.38	2.75	2.95
P46	J34	J36	633	10	243.14	0.99	0.45
P48	J36	J38	623	8	197.29	1.26	0.9
P50	J38	J40	700	8	152.77	0.98	0.56
P52	J40	J42	620	8	109.12	0.7	0.3
P54	J42	J44	690	8	-72.97	0.47	0.14
P56	J44	J94	647	8	-117.49	0.75	0.35
P58	J94	J46	617	8	-188.92	1.21	0.83
P60	J46	J34	624	10	-363.83	1.49	0.95
P62	J46	J50	38	10	129.76	0.53	0.14
P64	J50	J48	1074	10	-278.79	1.14	0.58

P66	J48	J30	511	12	-1,667.93	4.73	6.54
P68	J48	J92	153	12	1,360.44	3.86	4.48
P70	J92	J90	873	8	706.08	4.51	9.59
P72	J92	J58	511	12	629.12	1.78	1.07
P74	J58	J60	905	10	498.61	2.04	1.7
P76	J60	J62	557	8	-333.04	2.13	2.38
P78	J62	J63	689	10	-72.27	0.3	0.05
P80	J63	J66	667	10	-86.62	0.35	0.07
P82	J66	J54	624	10	-11.24	0.05	0
P84	J54	J74	985	10	115.53	0.47	0.11
P86	J74	J68	955	10	38.01	0.16	0.01
P88	J66	J56	568	8	-88.43	0.56	0.2
P90	J56	J58	450	12	-97.61	0.28	0.03
P92	J56	J52	624	12	-12.17	0.03	0
P94	J52	J54	573	10	157.92	0.65	0.2
P96	J52	J50	665	10	-363.4	1.48	0.94
P97	J52	J98	605	10	128.31	0.52	0.14

Table 12
Summary of Domestic Water Modeling
MDD + FF at Building M4

ID	Max. Daily Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J10	59.03	1036	1,254.90	94.85
J11	590.33	1031	1,254.57	96.87
J20	59.03	1047	1,238.88	83.14
J200	19.21	972	1,210.90	103.52
J201	0	972	1,087.00	49.83
J22	177.09	1048	1,237.64	82.17
J23	118.07	1074	1,236.35	70.34
J25	59.03	1116	1,236.23	52.31
J26	118.07	1103	1,236.20	57.93
J28	11.82	1117	1,224.73	46.90
J29	11.82	1097	1,223.73	54.91
J30	17.65	1030	1,225.36	84.65
J302	0	1044	1,282.02	103.13
J32	11.90	1031	1,225.10	84.10
J34	65.41	1014	1,220.70	89.56
J36	45.85	1003	1,219.84	93.96
J38	44.52	992	1,217.80	97.84
J40	43.65	982	1,215.97	101.38
J42	37.4	980	1,214.70	101.69
J44	44.52	991	1,216.17	97.57
J46	45.15	1013	1,220.29	89.82
J48	28.7	1032	1,222.47	82.53
J50	45.15	1013	1,220.30	89.82
J52	65	1004	1,219.80	93.50
J54	31.15	1004	1,219.48	93.37
J56	21.35	1015	1,220.51	89.05
J58	32.9	1022	1,221.28	86.35
J60	24.8	1037	1,221.31	79.86
J61	0	1050	1,222.33	74.67
J62	14.8	1040	1,221.24	78.53
J63	14.35	1023	1,220.73	85.67
J66	13.05	1011	1,220.27	90.68
J68	24.2	985	1,214.36	99.38
J70	31.95	978	1,214.86	102.63
J72	47.26	986	1,216.44	99.85
J74	77.52	994	1,216.59	96.45
J80	47.7	980	1,214.62	101.66
J82	58.55	969	1,207.32	103.48
J84	14.4	963	1,207.32	105.86
J86	1,540.29	973	1,202.30	99.36

J88	27.45	978	1,210.90	100.92
J90	12.92	1046	1,221.57	76.29
J92	25.25	1028	1,222.10	84.11
J94	71.43	1004	1,217.94	92.70
J96	0	1114	1,225.80	48.44
J98	0	995	1,218.19	96.71

Table 13
Summary of Domestic Water Modeling
MDD + FF at Building M4

ID	From Node	To Node	Length (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	HL/1000 (ft/kft)
P100	J72	J70	684	10	588.67	2.4	2.31
P101	J80	J42	36	10	-583.26	2.38	2.27
P102	J70	J80	666	10	216.43	0.88	0.36
P103	J80	J82	677	8	751.98	4.8	10.77
P104	J82	J84	613	8	14.4	0.09	0.01
P106	J70	J68	589	10	340.29	1.39	0.84
P108	J68	J88	672	10	907.92	3.71	5.15
P11	J10	J11	295	12	590.33	1.67	1.11
P110	J88	J86	621	8	861.26	5.5	13.85
P112	J86	J82	563	8	-679.03	4.33	8.92
P114	J88	J200	631	10	19.21	0.08	0
P130	J62	J61	672	8	-269.84	1.72	1.61
P132	J61	J29	870	8	-269.84	1.72	1.61
P15	J10	J20	632	12	3,200.35	9.08	25.35
P17	J20	J22	690	12	765.73	2.17	1.79
P19	J22	J23	1,176.00	12	588.64	1.67	1.1
P209	J302	J10	760	12	3,849.71	10.92	35.69
P21	J23	J25	1,008.00	12	177.09	0.5	0.12
P211	RES5002	J302	167.6	12	3,849.71	10.92	35.69
P213	J90	J60	512.00	8	146.35	0.93	0.52
P23	J25	T100	1,521.00	12	0.00	0	0
P25	J25	J26	455.00	12	118.07	0.33	0.06
P26	J23	J96	1,187.00	6	293.48	3.33	8.88
P28	J96	J28	490	8	293.48	1.87	2.19
P29	J28	J29	493.00	8	281.66	1.8	2.03
P300	RES5004	J201	80.92	10	0.00	0	0
P314	J201	J200	127.56	10	0.00	0	0
P40	J20	J30	1,074.00	12	2,375.59	6.74	12.58
P42	J30	J32	154	12	814.22	2.31	1.73
P44	J32	J34	1,074.00	10	802.32	3.28	4.1
P46	J34	J36	633	10	440.94	1.8	1.35
P48	J36	J38	623	8	395.09	2.52	3.27
P50	J38	J40	700	8	350.57	2.24	2.62
P52	J40	J42	620	8	306.92	1.96	2.05
P54	J42	J44	690	8	-313.74	2	2.13
P56	J44	J94	647	8	-358.26	2.29	2.73
P58	J94	J46	617.00	8	-429.69	2.74	3.82
P60	J46	J34	624	10	-295.97	1.21	0.65
P62	J46	J50	38	10	-178.87	0.73	0.25
P64	J50	J48	1,074.00	10	-547.19	2.24	2.02

P66	J48	J30	511	12	-1,543.73	4.38	5.66
P68	J48	J92	153	12	967.84	2.75	2.39
P70	J92	J90	873	8	159.27	1.02	0.61
P72	J92	J58	511	12	783.32	2.22	1.61
P74	J58	J60	905	10	-56.10	0.23	0.03
P76	J60	J62	557	8	65.45	0.42	0.12
P78	J62	J63	689	10	320.48	1.31	0.75
P80	J63	J66	667	10	306.13	1.25	0.69
P82	J66	J54	624	10	426.02	1.74	1.27
P84	J54	J74	985	10	669.35	2.73	2.93
P86	J74	J68	955	10	591.83	2.42	2.33
P88	J66	J56	568	8	-132.94	0.85	0.44
P90	J56	J58	450	12	-806.52	2.29	1.7
P92	J56	J52	624	12	652.23	1.85	1.15
P94	J52	J54	573	10	274.47	1.12	0.56
P96	J52	J50	665	10	-323.17	1.32	0.76
P97	J52	J98	605	10	635.93	2.6	2.66

Table 14
Summary of Domestic Water Modeling
MDD + FF at Building A1

ID	Max. Daily Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J10	59.03	1036	1,254.90	94.85
J11	590.33	1031	1,254.57	96.87
J20	59.03	1047	1,238.88	83.14
J200	19.21	972	1,218.98	107.02
J201	0.00	972	1,087.00	49.83
J22	177.09	1048	1,237.65	82.18
J23	118.07	1074	1,236.38	70.36
J25	59.03	1116	1,236.26	52.33
J26	118.07	1103	1,236.24	57.95
J28	11.82	1117	1,225.17	47.09
J29	11.82	1097	1,224.21	55.12
J30	17.65	1030	1,225.30	84.62
J302	0.00	1044	1,282.02	103.13
J32	11.90	1031	1,224.97	84.05
J34	65.41	1014	1,219.51	89.05
J36	1,545.85	1003	1,213.64	91.27
J38	44.52	992	1,214.86	96.57
J40	43.65	982	1,216.63	101.67
J42	37.40	980	1,218.59	103.38
J44	44.52	991	1,218.89	98.75
J46	45.15	1013	1,220.24	89.8
J48	28.70	1032	1,222.72	82.64
J50	45.15	1013	1,220.37	89.85
J52	65.00	1004	1,220.53	93.82
J54	31.15	1004	1,220.53	93.82
J56	21.35	1015	1,221.17	89.33
J58	32.90	1022	1,221.79	86.57
J60	24.80	1037	1,221.83	80.09
J61	0.00	1050	1,222.86	74.9
J62	14.80	1040	1,221.81	78.78
J63	14.50	1023	1,221.41	85.97
J66	13.05	1011	1,221.05	91.02
J68	24.2	985	1,219.14	101.45
J70	31.95	978	1,219.12	104.48
J72	47.26	986	1,219.53	101.19
J74	77.52	994	1,219.67	97.78
J80	47.7	980	1,218.61	103.39
J82	58.55	969	1,218.61	108.37
J84	14.4	963	1,218.61	110.76
J86	40.29	973	1,218.73	106.47

J88	27.45	978	1,218.98	104.42
J90	12.92	1046	1,222.03	76.49
J92	25.25	1028	1,222.44	84.25
J94	71.43	1004	1,219.38	93.32
J96	0.00	1114	1,226.21	48.62
J98	0	995	1,220.05	97.51

Table 15
Summary of Domestic Water Modeling
MDD + FF at Building A1

ID	From Node	To Node	Length (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	HL/1000 (ft/kft)
P100	J72	J70	684	10	284.21	1.16	0.6
P101	J80	J42	36	10	290.85	1.19	0.62
P102	J70	J80	666	10	323.64	1.32	0.76
P103	J80	J82	677	8	-14.91	0.1	0.01
P104	J82	J84	613	8	14.4	0.09	0.01
P106	J70	J68	589	10	-71.38	0.29	0.05
P108	J68	J88	672	10	174.81	0.71	0.24
P11	J10	J11	295	12	590.33	1.67	1.11
P110	J88	J86	621	8	128.15	0.82	0.41
P112	J86	J82	563	8	87.86	0.56	0.2
P114	J88	J200	631	10	19.21	0.08	0
P130	J62	J61	672	8	-264.26	1.69	1.55
P132	J61	J29	870	8	-264.26	1.69	1.55
P15	J10	J20	632	12	3,200.50	9.08	25.35
P17	J20	J22	690	12	760.15	2.16	1.77
P19	J22	J23	1176	12	583.06	1.65	1.08
P209	J302	J10	760	12	3,849.86	10.92	35.69
P21	J23	J25	1008	12	177.09	0.5	0.12
P211	RES5002	J302	168	12	3,849.86	10.92	35.69
P213	J90	J60	512	8	124.95	0.8	0.39
P23	J25	T100	1521	12	0	0	0
P25	J25	J26	455	12	118.07	0.33	0.06
P26	J23	J96	1187	6	287.9	3.27	8.57
P28	J96	J28	490	8	287.9	1.84	2.11
P29	J28	J29	493	8	276.08	1.76	1.95
P300	RES5004	J201	81	10	0	0	0
P314	J201	J200	128	10	0	0	0
P40	J20	J30	1074	12	2,381.32	6.76	12.64
P42	J30	J32	154	12	913.68	2.59	2.14
P44	J32	J34	1074	10	901.78	3.68	5.09
P46	J34	J36	633	10	1,246.51	5.09	9.26
P48	J36	J38	623	8	-299.34	1.91	1.96
P50	J38	J40	700	8	-343.86	2.19	2.53
P52	J40	J42	620	8	-387.51	2.47	3.16
P54	J42	J44	690	8	-134.06	0.86	0.44
P56	J44	J94	647	8	-178.58	1.14	0.75
P58	J94	J46	617	8	-250.01	1.6	1.4
P60	J46	J34	624	10	410.15	1.68	1.18
P62	J46	J50	38	10	-705.31	2.88	3.23
P64	J50	J48	1074	10	-572.57	2.34	2.19

P66	J48	J30	511	12	-1,450.00	4.11	5.04
P68	J48	J92	153	12	848.73	2.41	1.87
P70	J92	J90	873	8	137.87	0.88	0.47
P72	J92	J58	511	12	685.62	1.94	1.26
P74	J58	J60	905	10	-68.39	0.28	0.04
P76	J60	J62	557	8	31.75	0.2	0.03
P78	J62	J63	689	10	281.21	1.15	0.59
P80	J63	J66	667	10	266.71	1.09	0.53
P82	J66	J54	624	10	342.11	1.4	0.85
P84	J54	J74	985	10	347.91	1.42	0.87
P86	J74	J68	955	10	270.39	1.1	0.55
P88	J66	J56	568	8	-88.45	0.56	0.2
P90	J56	J58	450	12	-721.11	2.05	1.38
P92	J56	J52	624	12	611.31	1.73	1.02
P94	J52	J54	573	10	36.95	0.15	0.01
P96	J52	J50	665	10	177.89	0.73	0.25
P97	J52	J98	605	10	331.47	1.35	0.8

Table 16
Summary of Domestic Water Modeling
MDD + FF at Building A1
Sustainable Use Factors

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J10	43.23	1036	1,264.21	98.88
J11	432.29	1031	1,264.03	100.97
J20	43.23	1047	1,252.15	88.89
J200	14.07	972	1,236.53	114.62
J201	0.00	972	1,087.00	49.83
J22	129.68	1048	1,251.36	88.12
J23	86.46	1074	1,250.50	76.48
J25	43.23	1116	1,250.43	58.47
J26	86.46	1103	1,250.42	64.09
J28	8.65	1117	1,241.50	54.16
J29	8.65	1097	1,240.71	62.27
J30	12.93	1030	1,241.39	91.6
J302	0.00	1044	1,283.70	103.86
J32	8.71	1031	1,241.11	91.04
J34	47.90	1014	1,236.54	96.43
J36	1,533.58	1003	1,230.97	98.78
J38	32.6	992	1,232.36	104.15
J40	31.96	982	1,234.23	109.29
J42	27.39	980	1,236.17	111
J44	32.60	991	1,236.42	106.34
J46	33.06	1013	1,237.38	97.22
J48	21.20	1032	1,239.41	89.87
J50	33.06	1013	1,237.49	97.27
J52	47.60	1004	1,237.70	101.26
J54	22.81	1004	1,237.70	101.26
J56	15.63	1015	1,238.21	96.72
J58	24.09	1022	1,238.70	93.9
J60	18.16	1037	1,238.74	87.41
J61	0.00	1050	1,239.60	82.15
J62	10.84	1040	1,238.73	86.11
J63	10.51	1023	1,238.41	93.34
J66	9.56	1011	1,238.12	98.41
J68	17.72	985	1,236.65	109.04
J70	23.4	978	1,236.63	112.06
J72	34.61	986	1,236.95	108.74
J74	56.77	994	1,237.07	105.32
J80	34.93	980	1,236.19	111.01
J82	42.88	969	1,236.22	116
J84	10.54	963	1,236.21	118.38
J86	29.50	973	1,236.32	114.1

J88	20.1	978	1,236.53	112.02
J90	9.46	1046	1,238.89	83.8
J92	18.49	1028	1,239.19	91.51
J94	52.31	1004	1,236.78	100.86
J96	0.00	1114	1,242.33	55.6
J98	0	995	1,237.34	105.01

Table 17
Summary of Domestic Water Modeling
MDD + FF at Building A1
Sustainable Use Factors

ID	From Node	To Node	Length (ft)	Diameter (in)	Flow (gpm)	Velocity (ft/s)	HL/1000 (ft/kft)
P100	J72	J70	684	10	248.75	1.02	0.47
P101	J80	J42	36	10	293.69	1.2	0.63
P102	J70	J80	666	10	296.45	1.21	0.65
P103	J80	J82	677	8	-32.17	0.21	0.03
P104	J82	J84	613	8	10.54	0.07	0
P106	J70	J68	589	10	-71.1	0.29	0.05
P108	J68	J88	672	10	149.26	0.61	0.18
P11	J10	J11	295	12	432.29	1.23	0.62
P110	J88	J86	621	8	115.09	0.73	0.33
P112	J86	J82	563	8	85.59	0.55	0.19
P114	J88	J200	631	10	14.07	0.06	0
P130	J62	J61	672	8	-238.45	1.52	1.28
P132	J61	J29	870	8	-238.45	1.52	1.28
P15	J10	J20	632	12	2,745.32	7.79	19.08
P17	J20	J22	690	12	601.57	1.71	1.15
P19	J22	J23	1176	12	471.89	1.34	0.73
P209	J302	J10	760	12	3,220.84	9.14	25.65
P21	J23	J25	1008	12	129.68	0.37	0.07
P211	RES5002	J302	168	12	3,220.84	9.14	25.65
P213	J90	J60	512	8	107.5	0.69	0.29
P23	J25	T100	1521	12	0	0	0
P25	J25	J26	455	12	86.46	0.25	0.03
P26	J23	J96	1187	6	255.75	2.9	6.88
P28	J96	J28	490	8	255.75	1.63	1.7
P29	J28	J29	493	8	247.1	1.58	1.59
P300	RES5004	J201	81	10	0	0	0
P314	J201	J200	128	10	0	0	0
P40	J20	J30	1074	12	2,100.53	5.96	10.02
P42	J30	J32	154	12	828.39	2.35	1.79
P44	J32	J34	1074	10	819.68	3.35	4.26
P46	J34	J36	633	10	1,212.11	4.95	8.8
P48	J36	J38	623	8	-321.47	2.05	2.23
P50	J38	J40	700	8	-354.07	2.26	2.67
P52	J40	J42	620	8	-386.03	2.46	3.13
P54	J42	J44	690	8	-119.73	0.76	0.36
P56	J44	J94	647	8	-152.33	0.97	0.56
P58	J94	J46	617	8	-204.64	1.31	0.97
P60	J46	J34	624	10	440.33	1.8	1.35
P62	J46	J50	38	10	-678.03	2.77	3
P64	J50	J48	1074	10	-511.74	2.09	1.78

P66	J48	J30	511	12	-1,259.20	3.57	3.88
P68	J48	J92	153	12	726.27	2.06	1.4
P70	J92	J90	873	8	116.96	0.75	0.34
P72	J92	J58	511	12	590.82	1.68	0.96
P74	J58	J60	905	10	-68.34	0.28	0.04
P76	J60	J62	557	8	21	0.13	0.01
P78	J62	J63	689	10	248.6	1.02	0.47
P80	J63	J66	667	10	238.09	0.97	0.43
P82	J66	J54	624	10	304.46	1.24	0.68
P84	J54	J74	985	10	294.85	1.2	0.64
P86	J74	J68	955	10	238.08	0.97	0.43
P88	J66	J56	568	8	-75.93	0.48	0.15
P90	J56	J58	450	12	-635.07	1.8	1.09
P92	J56	J52	624	12	543.51	1.54	0.82
P94	J52	J54	573	10	13.2	0.05	0
P96	J52	J50	665	10	199.35	0.81	0.31
P97	J52	J98	605	10	283.36	1.16	0.6
P99	J98	J72	657	10	283.36	1.16	0.6

APPENDIX A-11

ACRONYMS

UC RIVERSIDE
WEST CAMPUS INFRASTRUCTURE DEVELOPMENT STUDY

AAC	Advanced Application Controller
AC	Acre
ACUPCC	American College & University Presidents Climate Commitment
ADA	American Disabilities Act
AFF	Above Finished Floor
AGSM	Anderson Graduate School of Management
ANSI	American National Standards Institute
ASC	Application Specific Controller
ASTM	American Society of Testing Materials
AWG	American Wire Gauge
BC	Building Controller
BDF	Building Distribution Frame
BICSI	Building Industry Consulting Services International
BIL	Basic Impulse Insulation Level
Btuh/sf	British Thermal Units per Hour per Square Foot
CalTrans	State of California Department of Transportation
CAMPS	Campus Aggregate Master Planning Study
CBC	California Building Code
CBE	College of Business and Economics
CC	Community Center
CDC	Child Development Center
CDW	Condenser Water
CDWR	Condenser Water Return
CDWS	Condenser Water Supply
CEC	California Electrical Code
CFC	California Fire Code
cf	Cubic Feet
cfh	Cubic Feet per Hour
CFS	Cubic Feet per Second
CFS/AC	Cubic Feet per Second per Acre
CHW	Chilled Water
CHWR	Chilled Water Return
CHWS	Chilled Water Supply
City	City of Riverside
CMP	Congestion Management Plan
CNAS	College of Natural and Agricultural Sciences
CO	Central Office
CO_2	Carbon Dioxide
CSFM	California State Fire Marshal

CSU	California State University
DCV	Demand Control Ventilation
DDC	Direct Digital Controls
DHW	Domestic Hot Water
DIP	Ductile Iron Pipe
DW	Domestic Water
EB	Eastbound
EIA	Electronic Industry Association
EMS	Energy Management System
EPR	Ethylene Propylene Rubber
ERW	Electric Resistance Welded
EWT	Entering Water Temperature
FAU	Forced Air Unit
fc	foot candles
FPS, fps	Feet per Second
FW	Fire Water
GCC	Gage Canal Company
GIS	Geographic Information System
GPD	Gallons per Day
GPM, gpm	Gallons per Minute
GSF	Gross Square Foot
GSOE	Graduate School of Education
HCM	Highway Capacity Manual
HDPE	High Density Polyethylene
HHW	Heating Hot Water
HHWR	Heating Hot Water Return
HHWS	Heating Hot Water Supply
HID	High Intensity Discharge
HTW	High Temperature Water
HVAC	Heating, Ventilating, and Air Conditioning
IEEE	Institute of Electrical and Electronic Engineers
IESNA	Illuminating Engineering Society of North America
I/O	Input/Output
IT	Information Technology
IW	Irrigation Water
km	Kilometer
kV	Kilovolts
kVA	Kilovolt-Amperes
kW, kw	Kilowatts
kwh	Kilowatt-Hours
LACS	Laboratory Airflow Control System
LED	Light Emitting Diodes
LEED	Leadership in Environmental and Energy Design
LOS	Level of Service
LRDP	Long Range Development Plan
LWT	Leaving Water Temperature
MDD+FF	Maximum Day Demand plus Fire Flow
MGD	Millions of Gallons per Day

MLK	Martin Luther King Jr. Boulevard
MMBtuh	Million British Thermal Units per Hour
MMTMS	Multi-Modal Transportation Management Study
MVA	Million Volt-Amperes, Mega-Volt-Amperes
NANP	North American Numbering Plan Administration
NB	Northbound
NC	Network Controllers
ND	Neighborhood Development
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NEPAct	National Energy Policy Act's
NFPA	National Fire Protection Association
NO_x	Nitrogen Oxides
NW	Northwest
ODF	Ozone Depletion Factor
OSA	Outside Air
O&M	Operation and Maintenance
PC	Personal Computer
PCE	Passenger Car Equivalency
PHD	Peak Hour Demand
PHF	Peak Hour Factor
PIC	Plastic-Insulated Conductor
PID	Proportional Integral Derivative
POP, PoP	Point of Presence
PSI, psi	Pounds per Square Inch
psig	Pounds per Square Inch Gauge
PVC	Polyvinyl Chloride
RCP	Reinforced Concrete Pipe
SA	Smart Actuator
SB	Southbound
SCG	Southern California Gas Company
SD	Storm Drain
sf	square foot, square feet
SS	Sanitary Sewer
SS	Smart Sensor
SW	Southwest
TAPS	Traffic and Parking Service
Tc	Time of Concentration
TDM	Time Division Multiplexing
TES	Thermal Energy Storage
TIA	Telecommunications Industry Association
UC	University of California
UCR	University of California Riverside
UL	Underwriters Laboratories, Inc.
UNEX	University Extension
U of A	University of Arizona
UPS	Uninterruptible Power System
USDA	United States Department of Agriculture

USGBC	United States Green Building Council
VAV	Variable Air Volume
V/C	Volume to Capacity Ratio
VCP	Vitrified Clay Pipe
VFD	Variable Frequency Drive
VoIP	Voice Over Internet Protocol
WB	Westbound
WCIDS	West Campus Infrastructure Development Study
w/lf	watts per linear foot
WUCOLS	Water Use Classification of Landscape Species
XLP	Cross-Link-Polyethylene
ΔT	Delta Temperature