University of California
Riverside

College of Natural and Agricultural Sciences

Biological Sciences Building

JOHNSON FAIN PARTNERS

APRIL 7, 2000

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PROJECT BACKGROUND

The Biological Sciences Building is proposed as a new multi-disciplinary research facility to supplement existing laboratory and support functions currently housed in Spieth Hall/Life Sciences and proposed uses in the Life Sciences/Psychology wing. The Biological Sciences Building DPP is an outgrowth of the College of Natural and Agricultural Science's (CNAS) comprehensive space planning process begun in the fall of 1998. In the context of the CNAS academic plan, the comprehensive space plan proposes multi-phased development to address growth projections through 2010-11. The DPP is also consistent with the campus's Long Range Development Plan (LRDP) and the CNAS Precinct Plan which was completed in 1995.

PROGRAM OBJECTIVES

The Biological Sciences Building is planned as a research facility of high caliber that takes advantage of the most current technologies, which will help CNAS to achieve some of its most basic goals. Goals and objectives to be met through the development of the Biological Sciences Building include the following:

To enhance and maintain a "culture of excellence" in a climate of expansion and growth. The Biological Sciences Building and its program respond to the University's recent and future growth trends, which project a 50 percent increase in enrollment by 2005-06. As a consequence of the projected enrollment growth, there will need to be a significant increase in the number of faculty positions to face the increased teaching load. In the context of UCR's commitment to research, the high level research faculty the University seeks will best be attracted to high quality research facilities.

To support first-quality research with first-quality facilities. The current biological sciences laboratories at UCR are in older structures that cannot support the goals of the College. These substandard laboratories must be replaced with new facilities in order to sustain a leading research program.

To encourage the highest quality scholarship in fundamental and applied science. CNAS seeks to be at the forefront of research in such areas as biotechnology, which requires state-of-the-art research facilities.

To eliminate institutional barriers and provide incentives for productive collaboration in science. The new building should be designed to facilitate interdisciplinary and cooperative research.

To provide an environment that will attract and retain the highest quality faculty, graduate students and staff. The Biological Sciences Building should support the College's continuing efforts to attract and retain high caliber faculty. A state-of-the-art laboratory facility designed to encourage collaboration will directly support this established initiative.

To implement the recommendations of the Master Space Plan to meet the College's program needs over the next decade. The 1998 CNAS Master Space Plan update (as well as subsequent plans that derive from it) outlines goals for the provision of facilities for the Biology Department. Among these goals, the Biological Sciences Building is intended to address the improvement of building security by separating teaching functions from high-tech research areas; improvement of opportunities for interaction among faculty, post-docs, graduate, and undergraduate researchers; and the retention of proximity to faculties of other life science departments.

Courtyard looking southeast

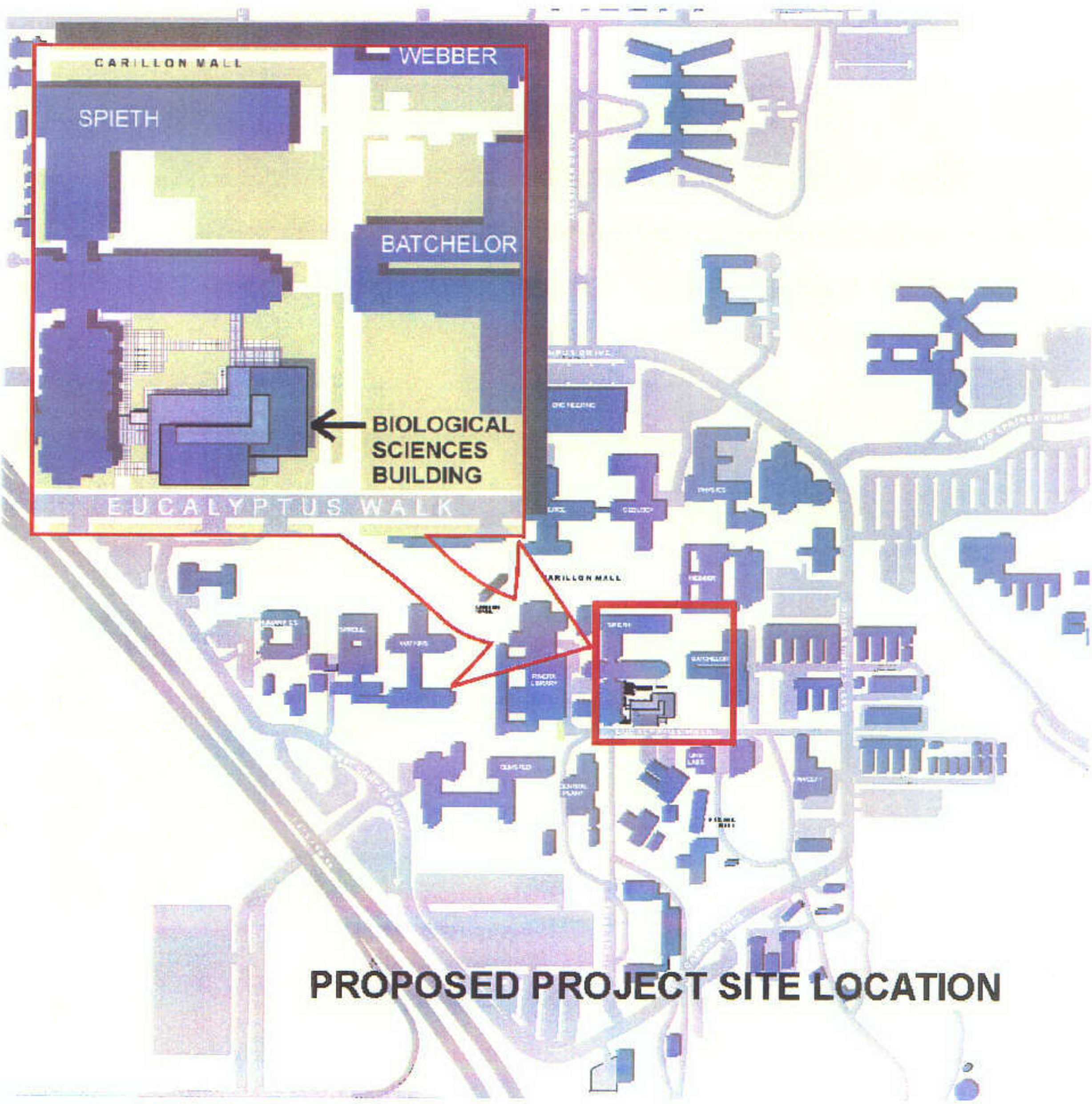
Courtyard looking northwest

View of site with Spieth Hall / Life Sciences Wing

EXISTING CONDITIONS

The proposed building is anticipated as an extension of existing facility resources in the CNAS precinct, and is proposed for location in the approximate center of the sciences area, between Spieth and Batchelor Halls. The proposed building will extend the existing UCR campus fabric of pathways and courtyards, and help to connect the campus core, centered around the Carillon Mall, with the CNAS South Precinct, where significant future expansion is planned to occur.

The proposed site comprises an area of approximately 1.1 acre, and is currently undeveloped except for a landscaped courtyard and lawn area that is integral to the extended Spieth Hall site.



It is bounded on the east by a sidewalk that, in the future, will be a major pedestrian connector between the North and the South Precincts. It is bounded on the south by Eucalyptus Drive, which is also designated for future conversion to a mainly pedestrian connector. A utility tunnel lies under Eucalyptus Drive, and utility access for the new building is good.

The topography of the site trends generally higher toward the southeast; thus the Biological Sciences Building site has a grade difference of approximately 12 ft. from its lowest point in the northwest to its highest point in the southeast. The building will need to be designed with regard to the slope, and allowances made for access, light, and ventilation.

Additional information regarding the site and overall campus planning considerations may be found in Chapter 4.

SITE AND BUILDING CONCEPT

The new Biological Sciences Building requires approximately 54,500 gross sq. ft. to accommodate approximately 31,666 asf of program area. The new building will provide research facilities for up to 24 faculty investigators, with laboratory, laboratory support, and research office and office support functions. Planning for the new building has been done in careful consideration of the existing and planned uses in Spieth Hall/Life Sciences and in the Life Sciences/Psychology Wing, whose future functions are expected to be closely integrated with the new research facilities. Thus, while wet labs and lab support areas are to be planned in the new building, many other support functions such as computational laboratories and post-doctoral researcher offices, and instructional functions, including class labs, will be located in the adjoining Life Sciences/Psychology Wing.

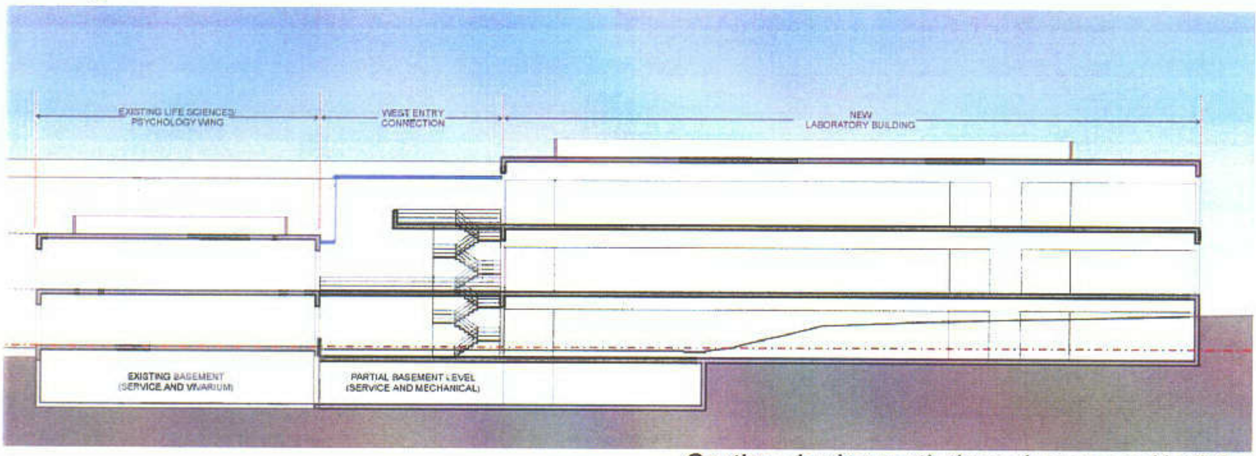
Space requirements for the major program areas proposed for the Biological Sciences Building are summarized in the table below.

Table 2-1: Summary of Building Areas

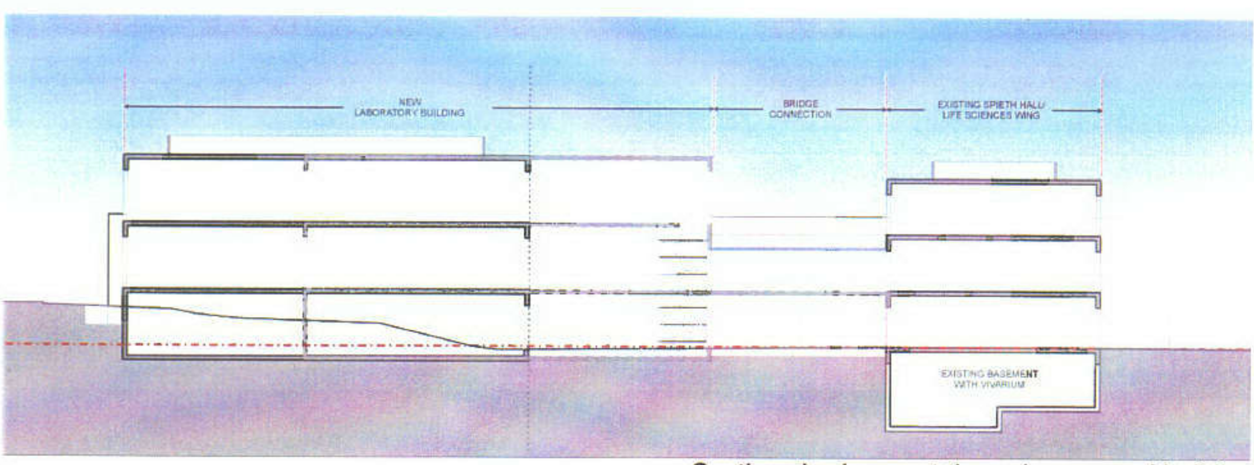
	Basement	First Floor	Second Floor	Third Floor	Total
OGSF	**4,385**	**16,667**	**17,117**	**16,331**	**54,500 gsf**
Program areas	**-**	**10,512**	**10,642**	**10,512**	**31,666 asf**
Laboratory		6,575	6,575	6,575	19,725 asf
Shared laboratory support		2,392	2,392	2,392	7,176 asf
Office and office support		1,545	1,675	1,545	4,765 asf
Building Support	**4,385**	**6,155**	**6,475**	**5,819**	**22,834 sf**
Mechanical, etc.	2,600	2,120	2,120	2,120	8,960 sf
Circulation	1,785	4,035	4,355	3,699	13,874 sf

Building Design Concepts

The design approach that best suits the requirements of CNAS as well as best accommodates the constraints of the surrounding campus area, is one that stacks the laboratory functions into a three story L-shaped structure, connected at its second level with the Life Sciences / Psychology wing to the west and Spieth Hall / Life Sciences to the north. Because the floor-to-floor height in the existing buildings is 12' - 6" and the required floor-to-floor height in the new Biological Sciences Building is 15' - 0" there is a misfit among levels in effecting that connection. To permit the connection, the first floor level will be 2' - 6" below the level of the first floor of the existing buildings and their courtyard. Owing to the fact that the site slopes upward toward the southeast corner of the site, the first level of the building will be depressed as much as 12' – 0" below grade at its southeast corner.



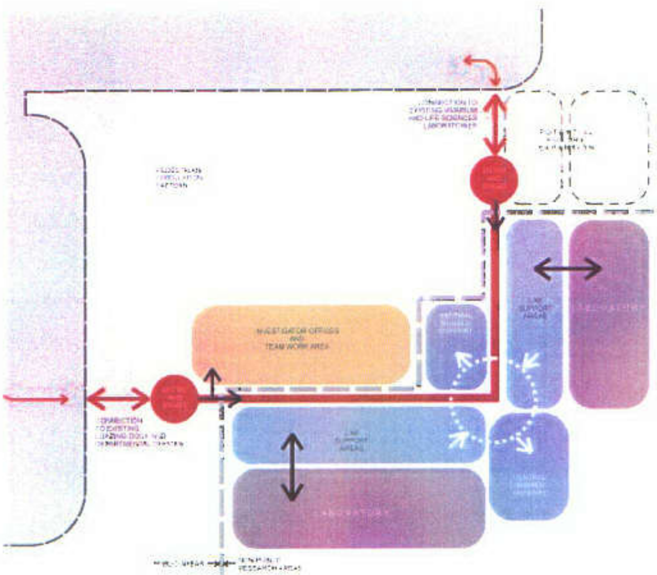
Section viewing north through proposed building



Section viewing west through proposed building

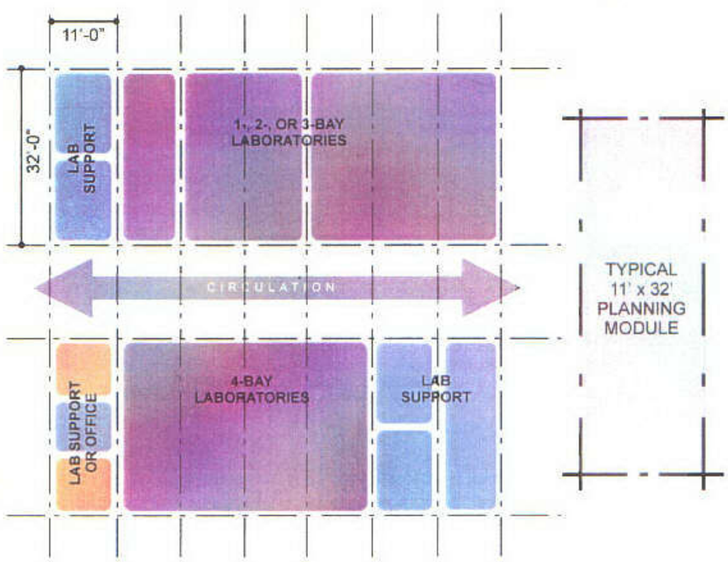
Plan Conditions

In plan, the design concept for the Biological Sciences Building provides laboratory space in large bays on the outermost ring of rooms on the south and the east, oriented toward Eucalyptus Drive and the sidewalk between Spieth and Batchelor.



Functional Organization

Between the laboratories and the circulation spine there is a band of laboratory support spaces, organized in such a way that both the labs and the support spaces can be configured in a variety of combinations. This can allow, for example, some of the lab support spaces to connect directly to the laboratory suites and others to be entered directly from the corridor, as appropriate.

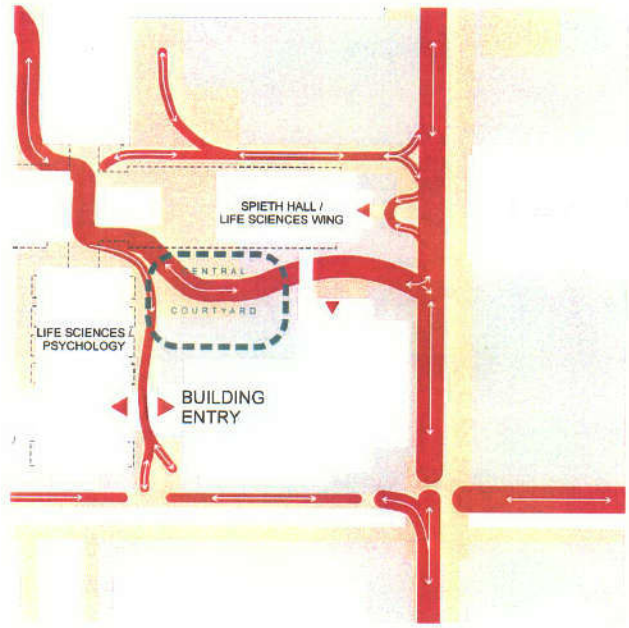


Modular Planning Concept

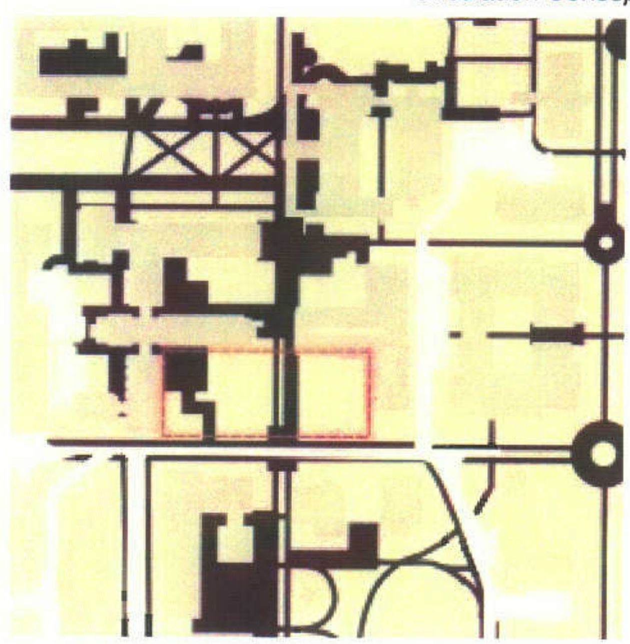
Offices and other shared support spaces are located on the in-board side of the corridor, facing a courtyard defined by the Biological Sciences building and the existing Life Sciences and Psychology wings. With vertical access within the building located at either end of the "L" the entry to the office area can be controlled separately from the entry to the laboratory area.

Site Conditions

The courtyard defined by the new building and the existing buildings will be an integral part of the functional activities of the Biological Sciences Building. Besides allowing for a physical transition from the courtyard elevation to the lower elevation of the Biological Sciences Building's first level, the courtyard will also allow for use as informal meeting space, and tie the new and the old buildings into the pedestrian circulation network for this vicinity of the CNAS campus precinct.



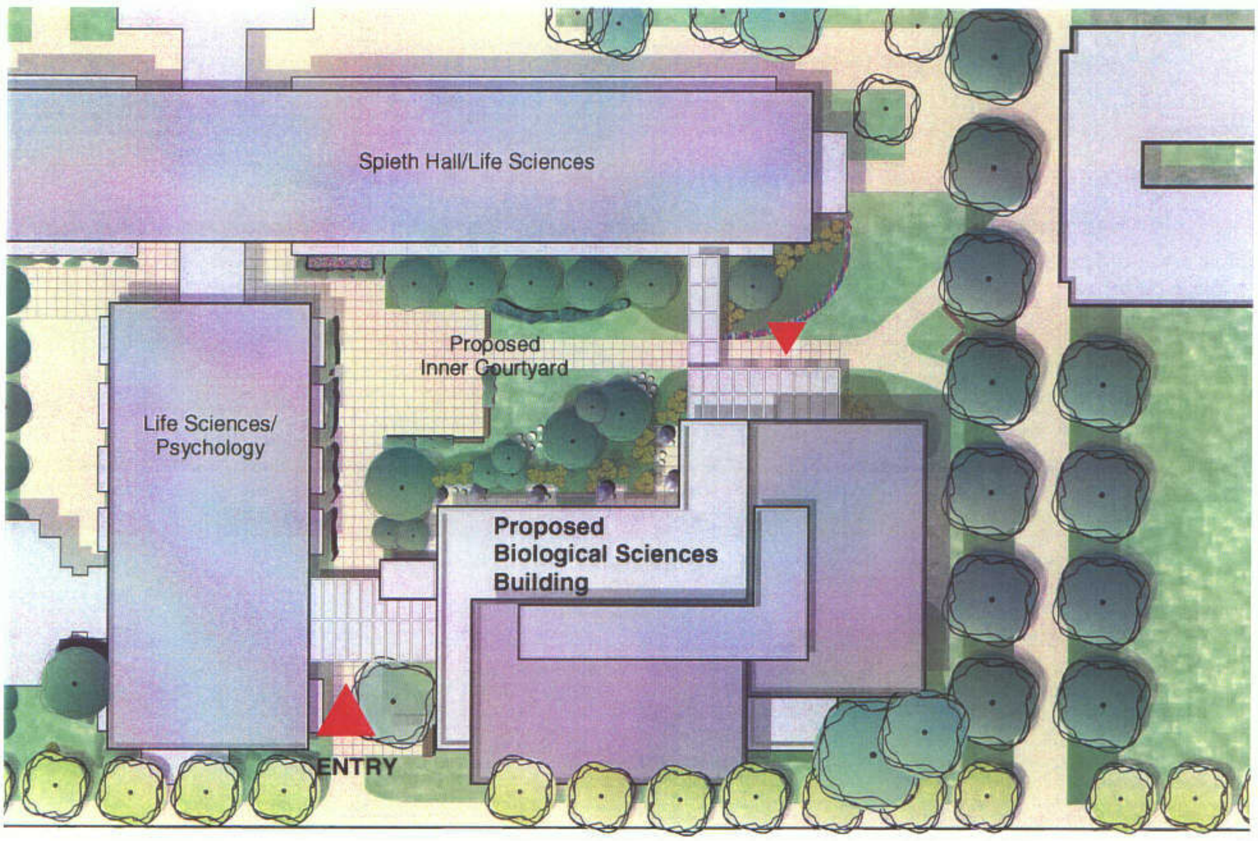
Circulation Concept



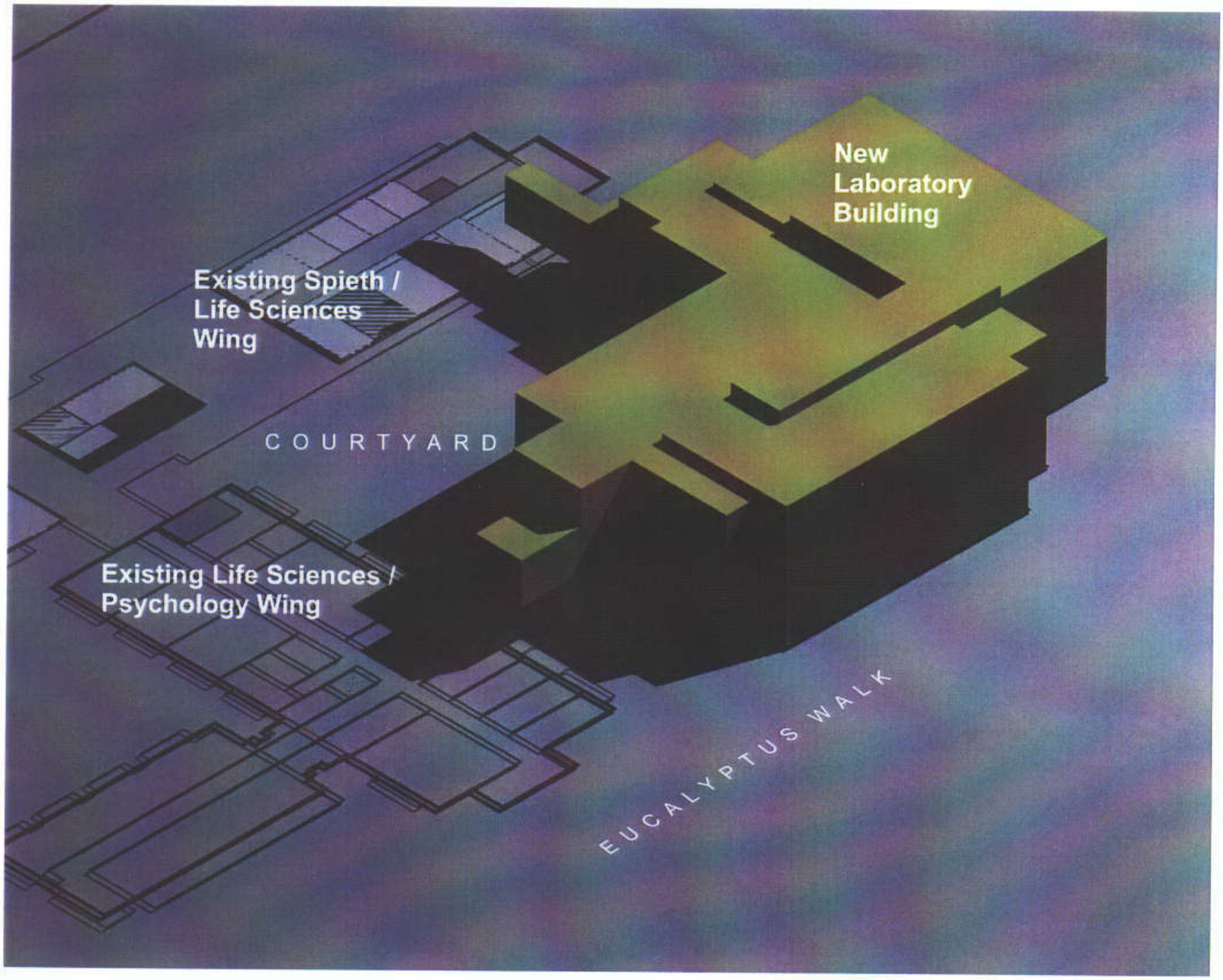
Campus Vicinity Circulation Plan

Budget and Schedule

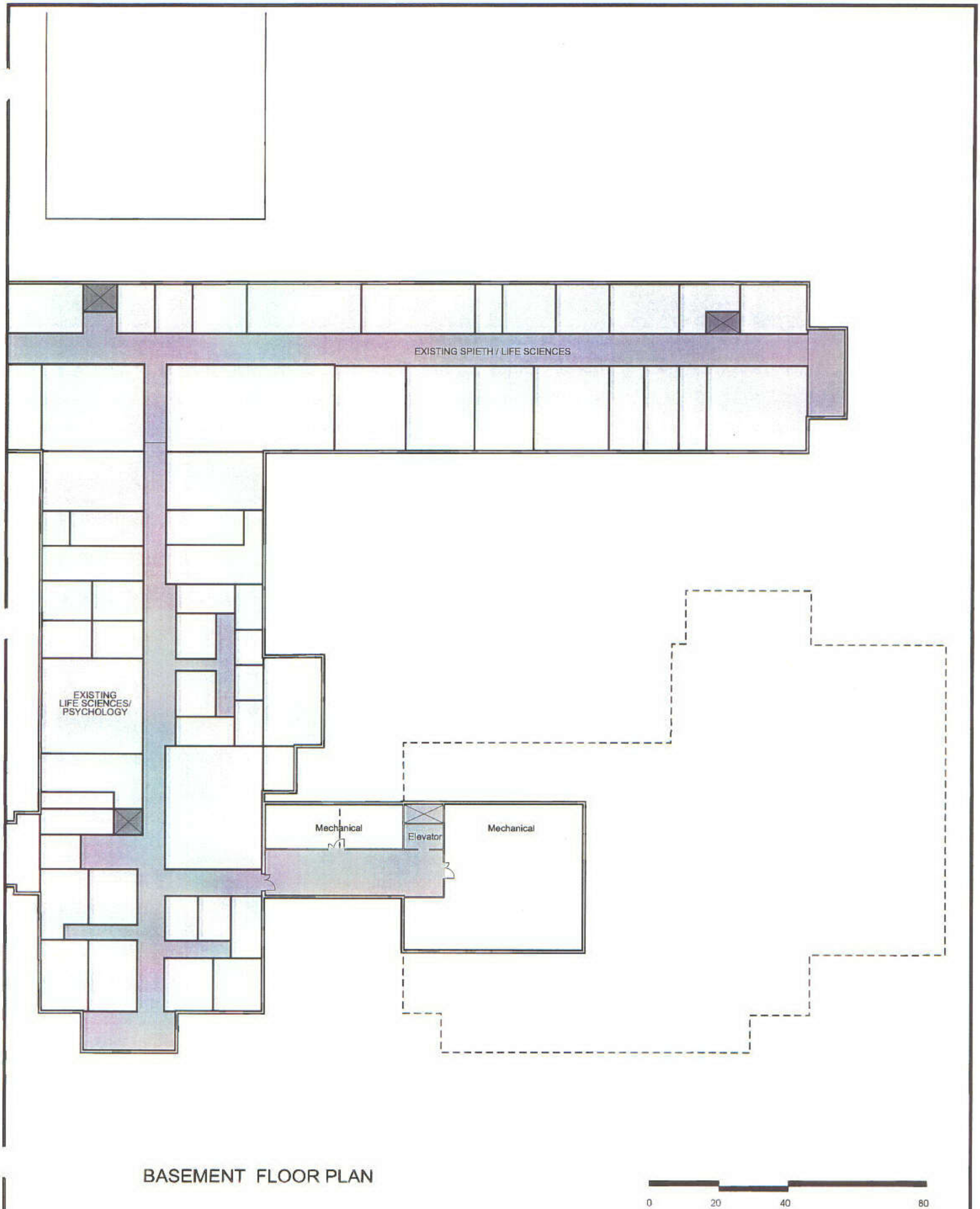
The Biological Sciences Building is anticipated to be built for occupancy in the 2005-06 academic year, with an 18 month construction schedule. Initial planning and design for the project should commence in mid-2001 in order to meet this schedule. The overall construction cost is anticipated to be approximately $16.5 million, inclusive of site preparation and relevant escalation.



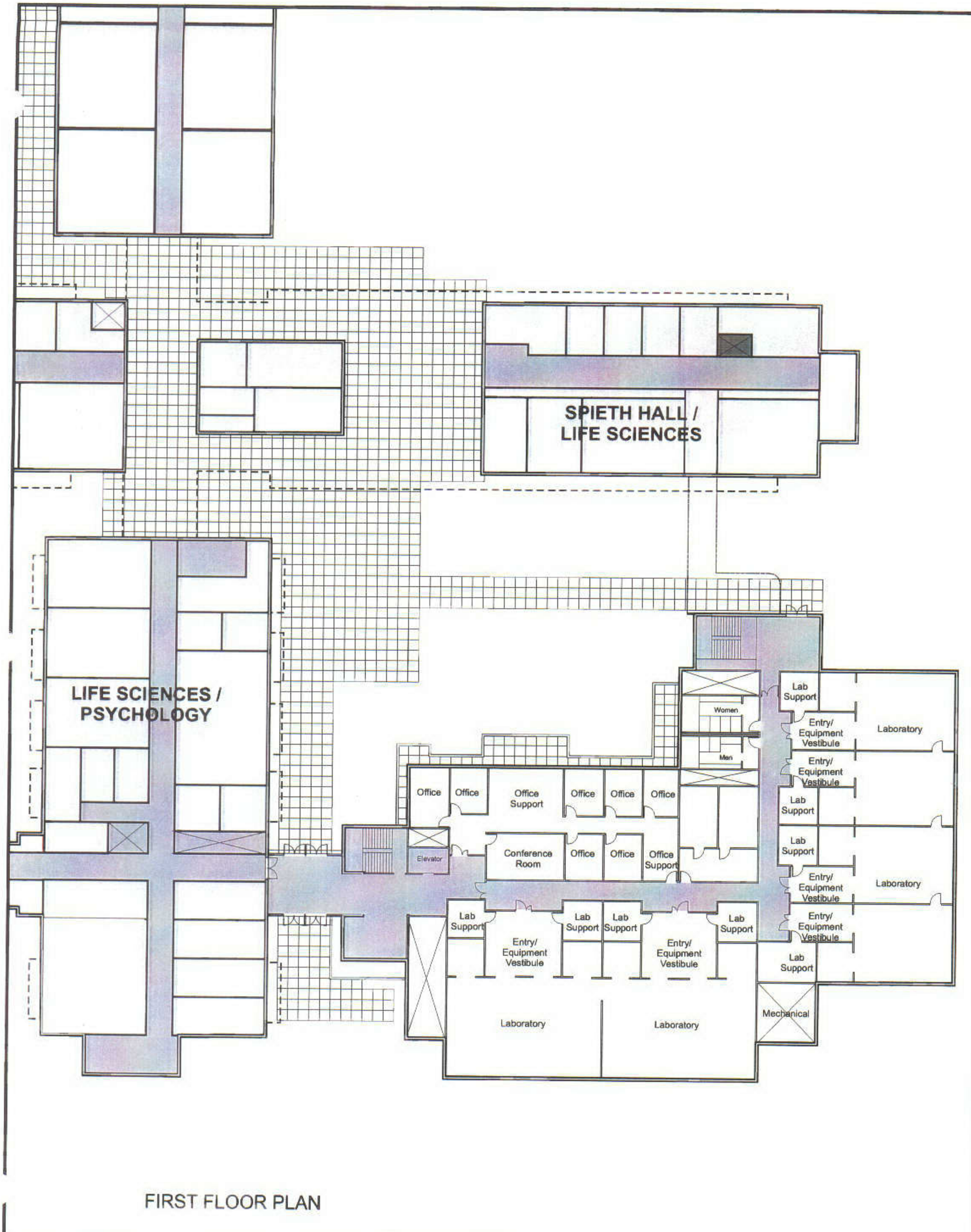
Biological Sciences Courtyard



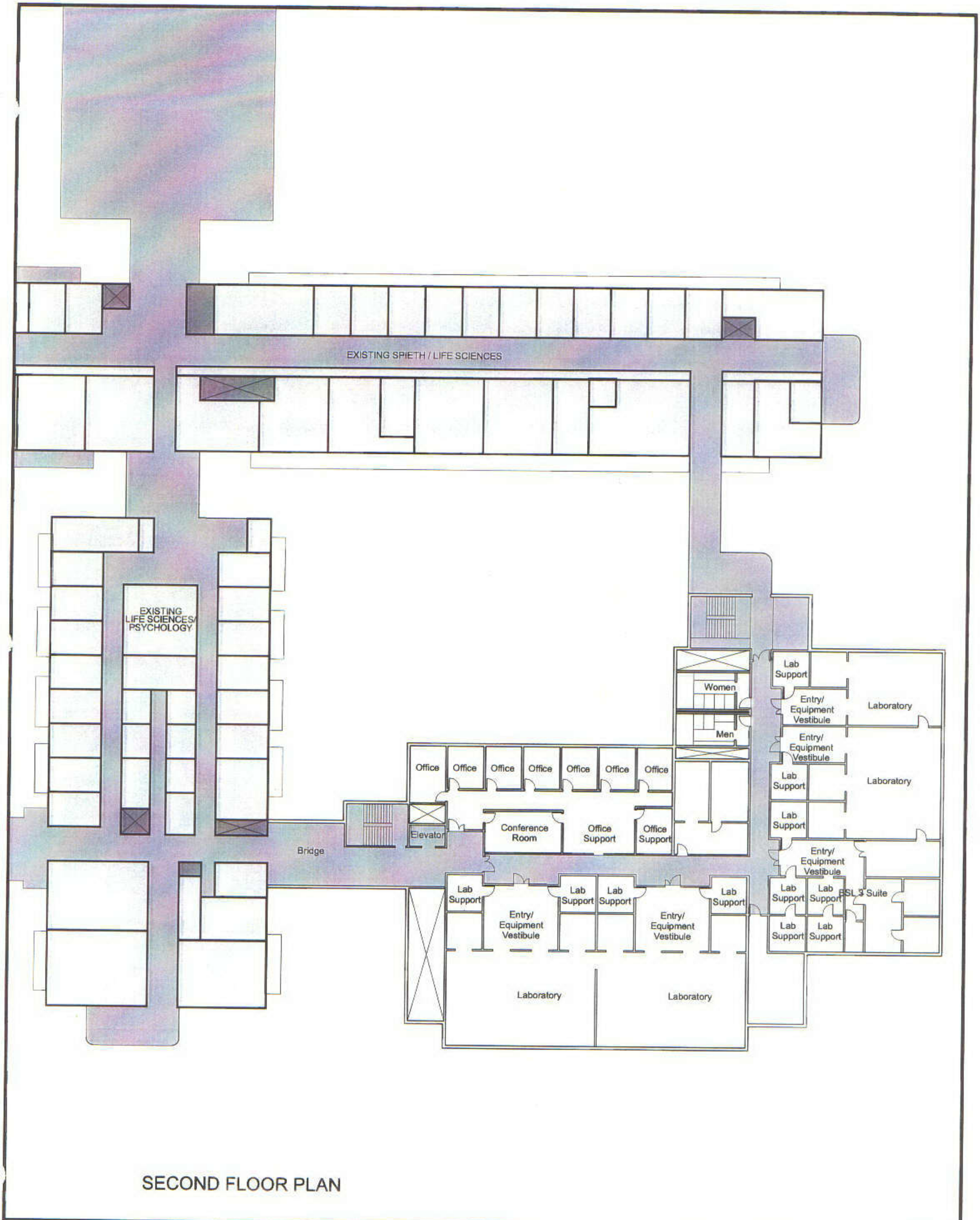
Massing Analysis of Proposed Building (as viewed from the southwest)



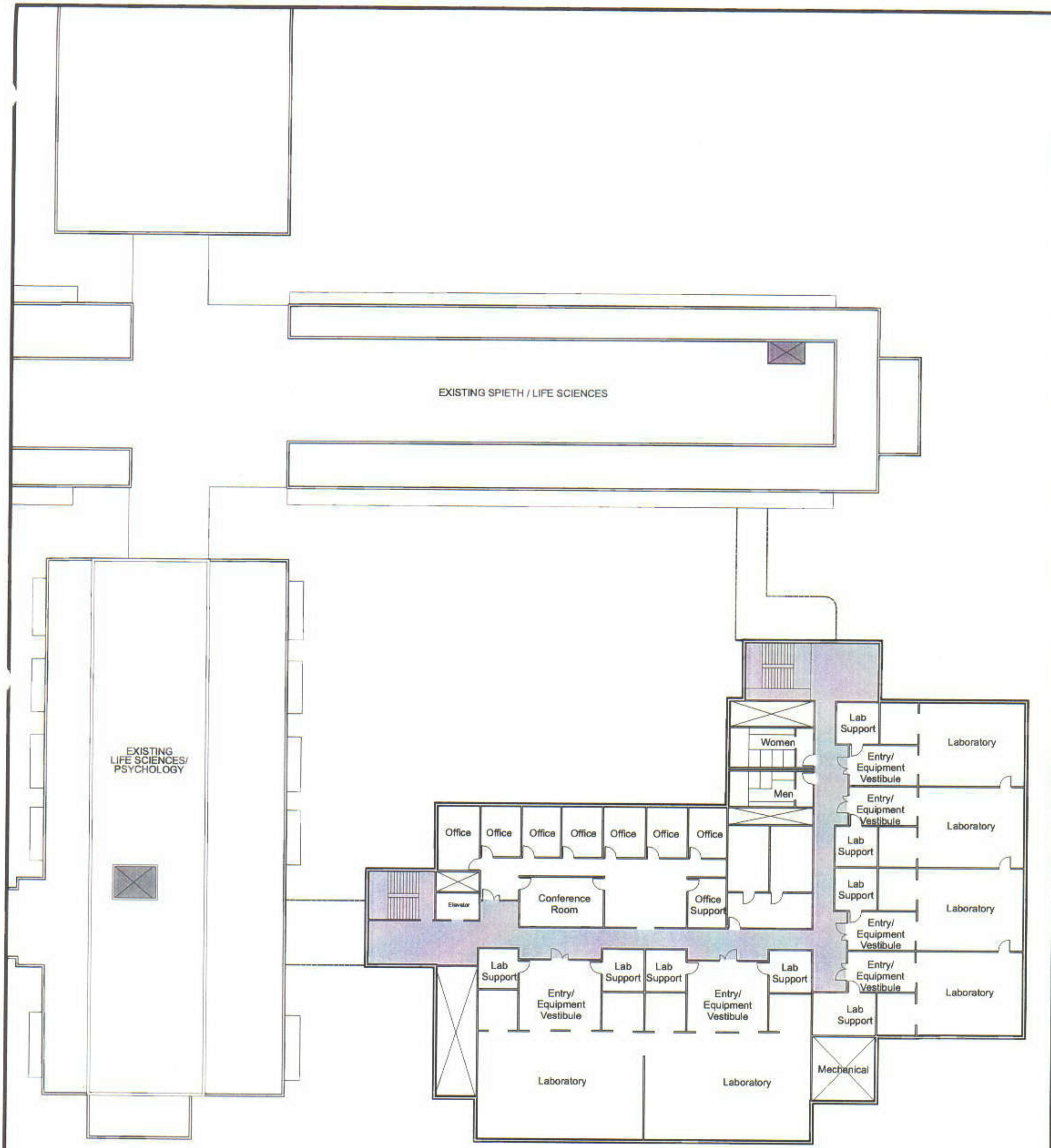
BASEMENT FLOOR PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN

BASIS FOR DPP

The Biological Sciences Building is proposed as a new multi-disciplinary research facility to supplement existing laboratory and support functions currently housed in Spieth Hall/Life Sciences and proposed uses in the Life Sciences/Psychology wing. The Biological Sciences Building DPP is an outgrowth of the College of Natural and Agricultural Science's (CNAS) comprehensive space planning process begun in the fall of 1998. In the context of the CNAS academic plan, the comprehensive space plan proposes multi-phased development to address growth projections through 2010-11. The DPP is also consistent with the campus's Long Range Development Plan (LRDP) and the CNAS Precinct Plan which was completed in 1995.

The feasibility studies conducted to date for this project have identified the need for a facility that focuses on research, with provisions for faculty, post-doctoral, graduate, and advanced undergraduate research. The building must provide flexible and adaptable laboratory facilities and the most current laboratory support facilities and equipment. To this end, a building that accommodates approximately 20 to 25 principal investigators and their work is required, totaling to approximately 30,000 asf.

FACILITY GOALS AND OBJECTIVES

Development of the Biological Sciences Building is an integral part of the CNAS strategic plan for academic improvement in the sciences. As a research facility of high caliber that takes advantage of the most current technologies, the Biological Sciences Building will help CNAS to achieve some of its most basic goals. The College seeks as its overriding objective to maintain and enhance a strong foundation in the fundamental sciences and in mathematics. CNAS academic planning has been based on the assertion that "fundamental science creates new knowledge and is the wellspring for innovative applications of science-based knowledge to the solution of societal problems. Without a sound basic foundation we cannot achieve our aspirations."

CNAS aspires to maintain UCR's position in the front rank of research universities by emphasizing academic excellence and by investing in areas where it is thought to have a comparative advantage relative to other competing institutions, while also delivering the highest quality undergraduate and graduate education. The areas of science application where UCR considers itself to be well-positioned to reach the highest of levels of national prominence are in the fields of the environmental sciences, pest and disease sciences, biotechnology, conservation biology, and the molecular structure of materials.

Goals and objectives to be met through the development of the Biological Sciences Building include the following:

To enhance and maintain a "culture of excellence" in a climate of expansion and growth. The Biological Sciences Building and its program respond to the University's recent and future growth trends, which project a 50 percent increase in enrollment by 2005-06. UCR—and CNAS in particular—will be a primary recipient of this growth, anticipating enrollment increases of up to

9 percent per annum. This projected growth results in a need for additional facilities to support teaching and research programs.

UCR has undertaken numerous initiatives and instituted programs and policies to support its areas of strength in the biological sciences. While many of these directions have direct bearing on development of the Biological Sciences Building, perhaps the most salient is the need to support first-quality research with first-quality facilities. As a consequence of the projected enrollment growth, there will need to be a significant increase in the number of faculty positions to face the increased teaching load. In the context of UCR's commitment to research, the high level research faculty the University seeks will best be attracted to high quality research facilities.

The current biological sciences laboratories at UCR are in older structures that cannot support the goals of the College.

- The existing buildings do not have appropriate service, communication, and laboratory systems infrastructure to support the process and equipment requirements of current research.
- The systems are old, serviced by aging or antiquated equipment, and not easily replaced or updated to meet current standards.
- The laboratory facilities in Spieth Hall and its various wings, for example, are at least 35 years old, and were built to structural standards that do not meet today's demanding criteria for vibrational stability.
- The floor-to-floor heights in the existing buildings is 12'–6" while laboratory buildings today should have at least 15'-0" available floor-to-floor in order to accommodate lab utilities in flexible interstitial space that can grow with evolving technologies.

Clearly, these substandard laboratories must be replaced with new facilities in order to sustain a leading research program.

To encourage the highest quality scholarship in fundamental and applied science. CNAS seeks to be at the forefront of research in such areas as biotechnology, which requires state-of-the-art research facilities. CNAS has a cohort of outstanding faculty in Biochemistry, Biology, Botany and Plant Sciences, Environmental Toxicology, and Neuroscience who are investigating the basic cellular and molecular mechanisms underlying various physiological processes in plants and animals, focused around themes of signal transduction and structural biology. CNAS's investments in the biological and agricultural sciences and in chemistry are intended to build on these fundamental areas in order to participate in the biotechnological opportunities of the future.

To eliminate institutional barriers and provide incentives for productive collaboration in science. The new building should be designed to facilitate interdisciplinary and cooperative research. Toward this objective, the College has created new interdepartmental graduate programs in Microbiology, Cell and Molecular Biology, Neuroscience and Environmental Science, and has also created and supported "Graduate Research Umbrellas" in Biochemistry and Molecular Biology and in Ecology and Evolution. In each case, the intention is to bring faculty together to pursue common research and education objectives beyond the confines of single departments.

To provide an environment that will attract and retain the highest quality faculty, graduate students and staff. The Biological Sciences Building should support the College's continuing efforts to attract and retain high caliber faculty. For example, in its 1996 reorganization of the life and agricultural sciences, CNAS developed the concept of Graduate

Research Umbrellas (GRUs)—a tool for creating interaction and connections across departments by pulling together faculty members along broad programmatic themes. The GRUs were intended as a mechanism for better packaging UCR's strengths for the more vigorous recruitment of faculty and graduate students. A state-of-the-art laboratory facility designed to encourage collaboration will directly support this established initiative.

To implement the recommendations of the Master Space Plan to meet the College's program needs over the next decade. Finally, the 1998 CNAS Master Space Plan update (as well as subsequent plans that derive from it) outlines goals for the provision of facilities for the Biology Department. The Biological Sciences Building is intended to address these goals. directly:

- improving building security by separating teaching functions from high-tech research areas;
- improving opportunities for interaction among faculty, post-docs, graduate, and undergraduate researchers;
- and retaining proximity to faculties of other life science departments.

Indirectly, the Biological Sciences Building will also help CNAS meet the Master Space Plan's objective to continue to develop nationally prominent research programs in Biotechnology, Cell and Molecular Biology, Organismal Biology, Neuroscience, and Evolutionary Biology and Ecology.

APPLICABLE CODES, REGULATIONS AND GUIDELINES

The codes and standards listed are minimum requirements. Nothing is to prevent the architect, engineer, or consultant from exceeding the applicable requirements. The listed codes may be revised prior to construction. The applicable editions should be reviewed with the authority having jurisdiction during the design phases. In the case of laboratory related research buildings, the recommendations of the guidelines below and the standards and requirements suggested by the design team will often address issues not sufficiently covered in local building codes.

Applicable Codes, Standards and Guidelines

- AIHA Guidelines and Standards
- American National Standards Institute (ANSI)
- Americans with Disabilities Act Accessibility Guidelines (ADAAG), U. S. Architectural and Transportation Barriers Compliance Board
- ANSI Z358.1. Emergency Eyewash and Shower Equipment, 1998
- ANSI/AIHA Z9.5. American National Standard for Laboratory Ventilation, 1992
- ANSI/CABO A117.1. Access and Usable Buildings and Facilities, 1992
- ASHRAE Design Guides
- ASME Guidelines and Standards
- California Building Code (Title 24, Part 2), 1998
- California Electric Code (Title 24, Part 3), 1998
- California Elevator Safety Construction Code (Title 24, Part 7), 1998
- California Energy Code (Title 24, Part 6), 1998

- California Environmental Quality Act (CEQA). Public Resource Code 21000 et seq. Guidelines (14 Cal. Code Reg. 15000 et seq).
- California Fire Code (Title 24, Part 9), 1998
- California Mechanical Code (Title 24, Part 4), 1998
- California Occupational Safety Hazard Authority (CAL/OSHA)
- California Plumbing Code (Title 24, Part 5), 1998
- California State and Local Fire Marshal
- California State Building Code, 1998
- California State Energy Code, Title 24, 1998
- California State Fire Code, 1998
- California State Mechanical Code, 1998
- California State Plumbing Code, 1995
- California State Referenced Standards Code (Title 24, Part 12), 1998
- CFR 1910.1450. Occupational exposures to hazardous chemicals in laboratories (OSHA Standard 29).
- Guide for the Care and Use of Laboratory Animals, Institute of Laboratory Animal Resources, National Research Council, 1996
- Institute of Electrical and Electronics Engineers (IEEE)
- National Electrical Code with California Amendments, Latest edition
- National Electrical Manufacturers Association (NEMA)
- National Electrical Safety Code (NESC)
- National Institutes of Health Design Policy and Guidelines, Bethesda, MD, Feb 1996
- National Fire Protection Association: NFPA 30, Flammable and Combustible Liquids Code, 1996; NFPA 45, Fire Protection for Laboratories using Chemicals, 1996; NFPA 90, 90A and 91 (1995); and NFPA 10, 12, 13, 54, 70, and 72 (1997); and NFPA 101, Safety to Life from Fire in Buildings and Structures, 1997
- SMACNA Design Guides
- U. S. Department of Health and Human Services (HHS) CDC 93-8395. Biosafety in Microbiological and Biomedical Laboratories, 4th edition, 1999
- Underwriters' Laboratories, Inc. or equivalent testing lab approved by UC Riverside
- Uniform Building Code, Latest edition with Amendments
- Uniform Plumbing Code, 1994

University of California Plans and Policies

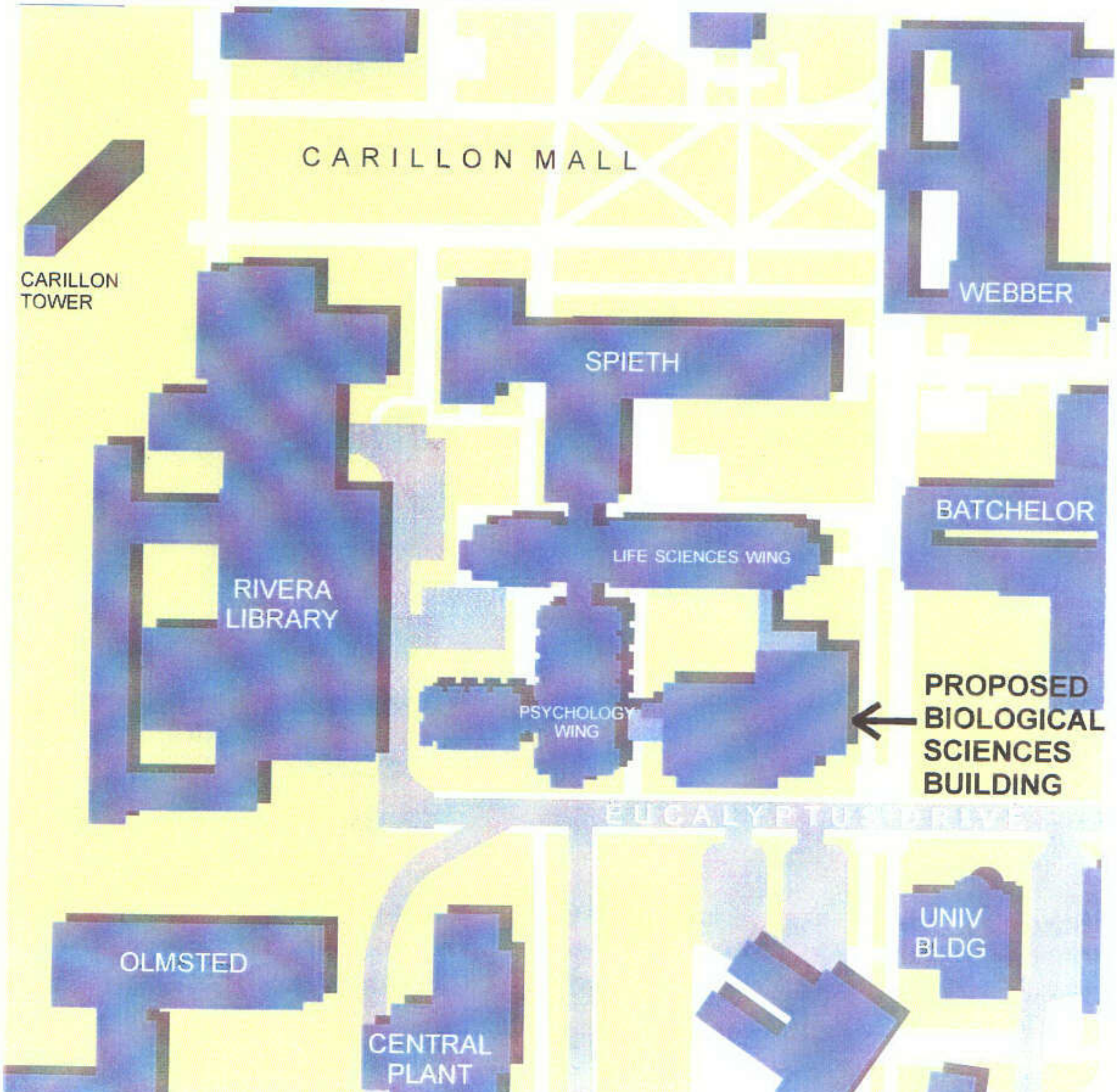
In addition to the above standards it will be necessary during the design phases of the project to work closely with University representatives. The project team may need to incorporate additional requirements as laboratory and support spaces are more definitively outlined.

- University of California, Riverside Campus Design Guidelines
- University of California, Riverside Environmental Health & Safety Laboratory Safety Design Guide
- University of California, Riverside Long Range Development Plan, 1991
- University of California, Riverside LRDP Planning Guidelines, 1991
- University of California, Riverside Campus Design Guidelines, 1996
- University of California, Riverside College of Natural and Agricultural Sciences Master Space Plan, 1995
- University of California, Riverside College of Natural and Agricultural Sciences, Rolling Five Year Academic Plan, February 2000

Site Description

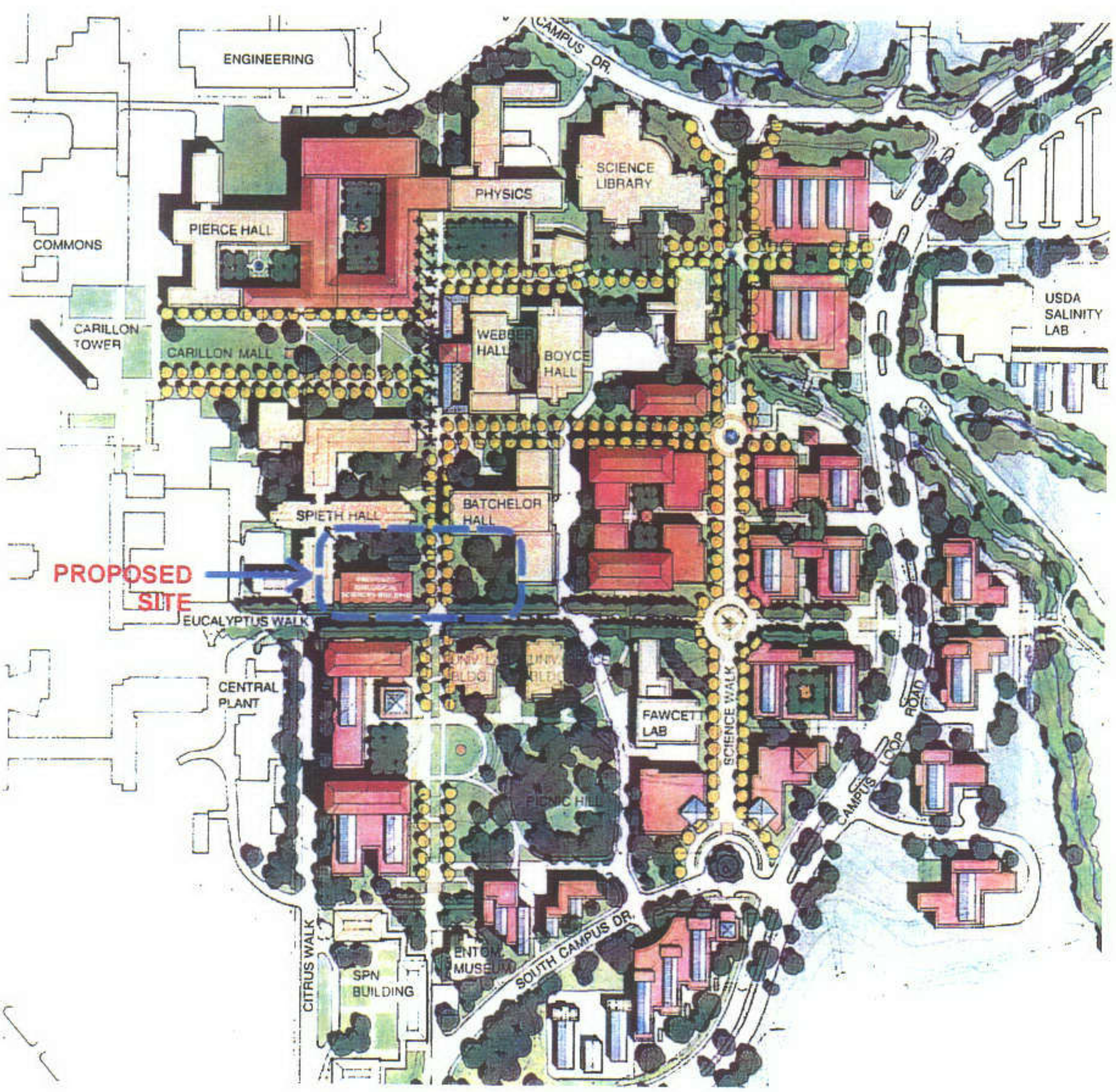
Campus Context

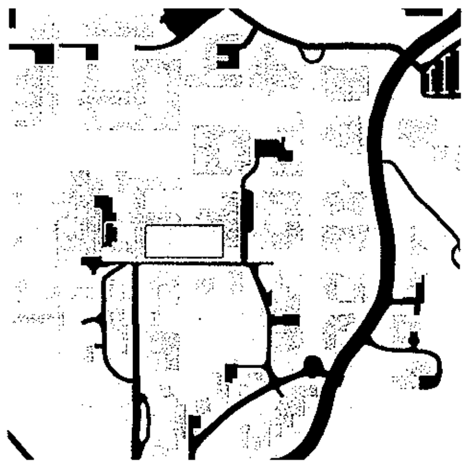
The proposed site for the Biological Sciences Laboratories lies roughly at the center of the CNAS precinct on the UCR campus, adjacent to existing instructional and research facilities in the Spieth Hall Life Sciences wing and the Life Sciences/Psychology wing. The south campus area is currently crossed by several service roads that are accessible to private vehicles; however, the planned site organization calls for limited service access within the campus core with peripheral parking areas collecting private vehicles and making the center of campus vehicle-free.



The CNAS Precinct Master Plan

A Master Space Plan for the College of Natural and Agricultural Sciences was prepared by UCR in 1995, and updated with a revised academic plan in 1998. While there have been a number of important changes in the direction and magnitude of academic growth within the College since it was prepared, the plan's documented building needs through 2005/06 still hold in large part, including the identification in the development schedule of the Biological Sciences Building. Proposed for the site currently under consideration, the plan suggests a connection of the building to the Life Sciences / Psychology wing of Spieth, although in the illustrative plan prepared for the Master Space Plan, the building appears to have a smaller footprint than that which is currently under consideration.

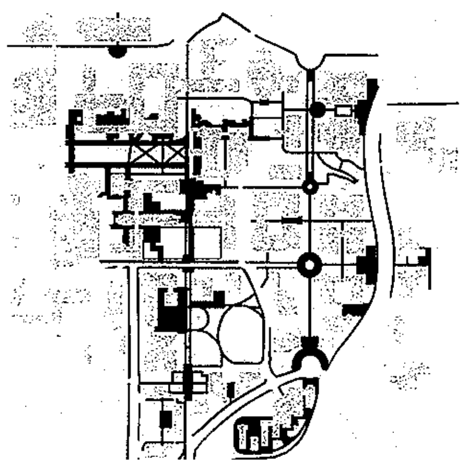




Vehicular Circulation and Parking

In addition to identifying the array of development projects, the Plan illustrates certain of the general principles of campus organization and spatial character that are also embodied in the 1991 UCR Long Range Development Plan and its Campus Design Guidelines.

The plan seeks to eliminate vehicular traffic from the central core of campus as much as possible, limiting access to service and emergency vehicles and utilizing existing internal roads as dual-use pedestrian ways that allow occasional vehicular use.



Network of Pedestrian Paths

In 'pedestrianizing' the center of campus, greater emphasis will be placed on the pedestrian circulation network. This network is comprised of a web of paths and walkways that interconnect through a series of courtyards and small open spaces. One pedestrian linkage that will play a more prominent role in the future than it does currently is the north-south connection from Carillon Mall south to the lower CNAS campus buildings, which runs immediately to the east of the proposed Biological Sciences Building site.

Organized Open Space Armature

An open space armature is further defined by the two principal open spaces that will form the symbolic visual connections between the north and the south CNAS campus—the Carillon Mall on the north, and Picnic Hill on the south.

Site Characteristics

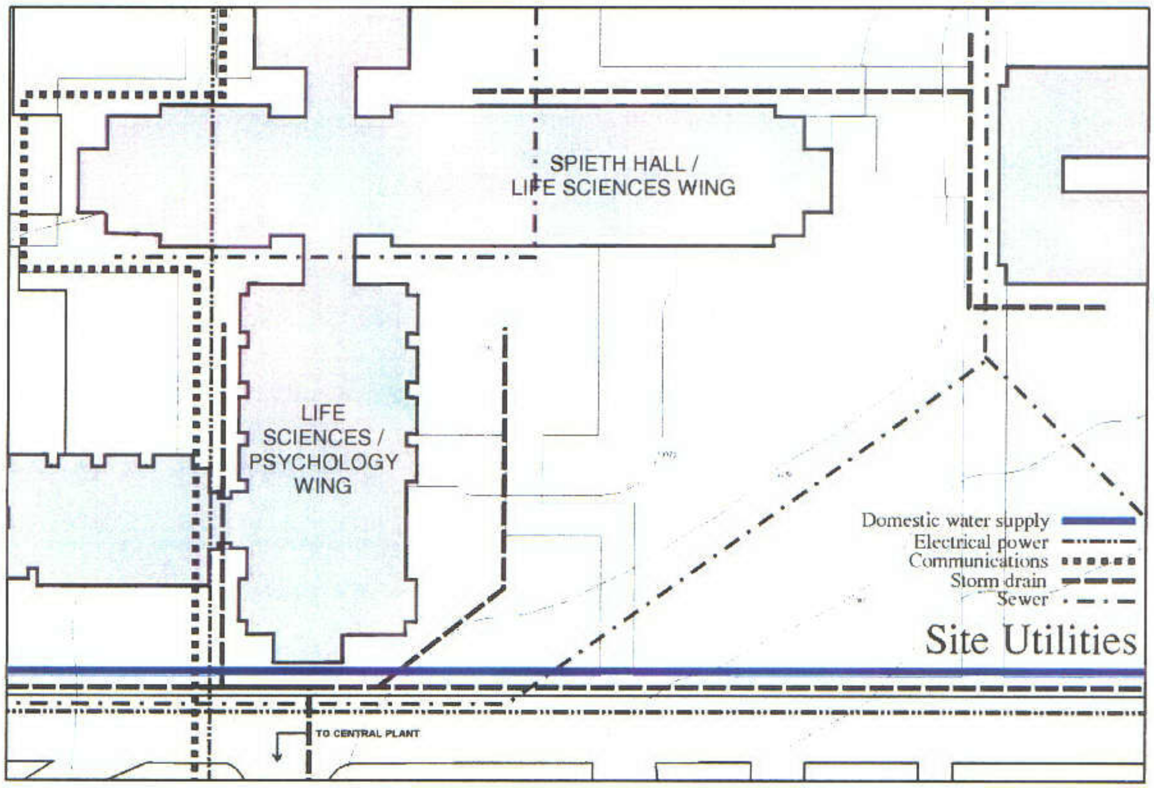
The proposed site is presently an open area in the southeast quadrant of the Spieth Hall site, between Spieth and Batchelor Hall to the east. It is bounded to the north by the Spieth Hall Life Sciences wing; to the west by the Life Sciences/Psychology wing, to the east by a pedestrian walk, and to the south by Eucalyptus Walk (currently still known as Eucalyptus Road). The rectangular site area comprises approximately 1.1 acres, and is currently occupied by mature landscape and a sunken courtyard that extends under Spieth Hall as part of the campus pedestrian path network.

There are two wings of building between the site and the Carillon Mall, the principal formal organizing open space on campus. All of the buildings in the general vicinity are two to three stories tall, consistent with the campus plan's intent to maintain a low profile around Carillon Mall.

Many of the existing buildings in the CNAS precinct are from 30 to 40 years old, designed with low horizontal wings in brick and concrete, and horizontal band windows with *brises soleils* in cantilevered metal louvers or concrete panels. Within the vicinity of the site, buildings are generally organized with instructional spaces and other spaces accessed by undergraduates on the ground level or lower levels, although there are numerous exceptions to the pattern. Faculty offices, laboratories, and other less frequently student-accessed spaces are typically on the upper levels. This vertically delineated layering of uses, as well as the stepping down in building height with proximity to the Carillon Mall, is a principle outlined in the 1996 Campus Design Guidelines, and reflected in the development plan set forth in the 1995 CNAS Master Space Plan.

The topography of the site trends generally higher toward the southeast; thus the Biological Sciences Building site has a grade difference of approximately 12 ft. from its lowest point in the northwest to its highest point in the southeast. The building will need to be designed with regard to the slope, and allowances made for access, light, and ventilation.

The site is well-served by campus utilities, with a major utility tunnel located under Eucalyptus Drive to the south of the site, connecting to the campus central plant immediately to the south on Citrus Street. Other utilities, including telecommunications and power, are in a north-south corridor immediately to the west of the Life Sciences / Psychology wing. Utilities under the site include storm drain and sewer lines that serve the buildings in the immediate vicinity; these will require relocation for the construction of the Biological Sciences Building.



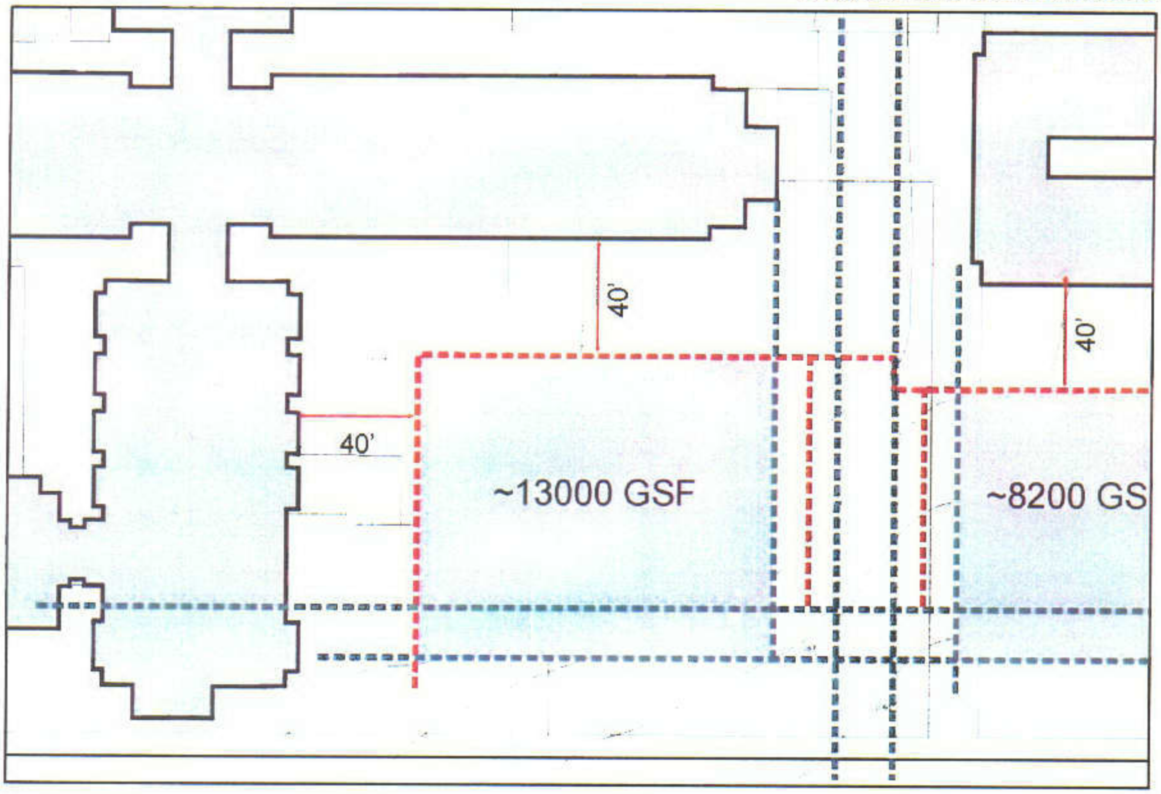
Site Utilities

Development Opportunities and Constraints

Spieth Hall is one of the eight original buildings in the CNAS campus precinct and was built in two phases, the last of which was built in 1966. The various wings of Spieth are designed within a similar format and material vocabulary as one another, but are readily distinguishable as having been built at different times. The new building should reflect the use of materials in the existing wings, but the existing diversity of architectural styles does not require that the building blend identically with the existing ones. The east-west wings of Spieth, as well as of several other buildings in the vicinity of the site, form small courtyards, somewhat sheltered from sun and wind. This pattern of intimate open spaces should be respected in the design of the new building.

Planning and specific siting of the Biological Sciences Building was pursued in response to the various campus spatial organizing systems and to the force lines represented by the overlay pedestrian circulation system. Planned campus pedestrian circulation patterns will give increased prominence to the proposed Eucalyptus Walk and to the north-south pedestrian path that lies between Spieth and Batchelor Halls. With other new buildings anticipated to the south, opposite the present site across Eucalyptus Drive, the Biological Sciences Building should observe setbacks from the circulation spines to maintain a comfortable campus scale.

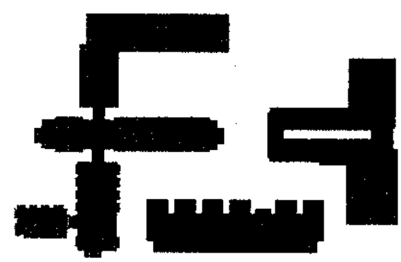
Setbacks and Site Constraints



Analysis of the particular conditions in the vicinity of the site produced a series of setback and build-to lines that define the developable area of the site. A comparative height analysis that took into account the height of future potential planned buildings on the south side of Eucalyptus Drive determined that a three-level Biological Sciences Building would be most advantageous, serving as an intermediate stair-step from the lower buildings to the north around Carillon Mall, and to the proposed taller buildings (potentially as high as five stories with interstitial utilities). Moreover, in the interest of public pedestrian flow and segregation of public and private activity areas, the connections to the existing building should be elevated at the second level, in order to maintain circulation continuity but also to shelter an outdoor courtyard for use by the occupants of both the new and the old buildings.

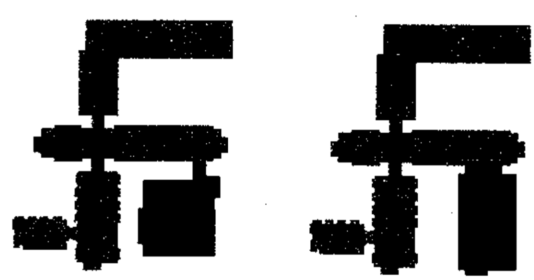
Stand-Alone Options

In applying the specific site constraints and working within the framework of the overall campus plan and character, a large number of configurations and orientations was considered for the Biological Sciences Building. Explorations of building footprints that would stand alone, unconnected from the existing buildings, showed that the required square footage could not be accommodated in a building of less than four stories in height.



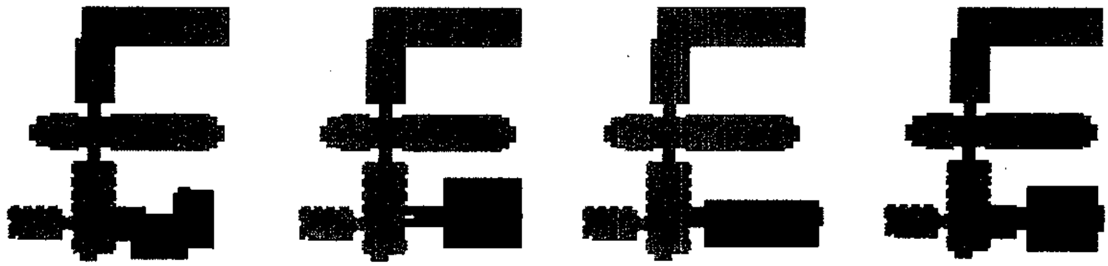
Low Density Option

Enlarging the footprint to span across the pedestrian walk between Spieth and Batchelor had the desirable effect of lowering the building's profile (to two stories, in the option illustrated above). This solution precluded any future development in this vicinity, was considered to be too low-density to be a prudent use of the site, and presented serious challenges to the campus pedestrian circulation system that could not be readily resolved. Disconnection from the existing biological sciences facilities and functions in Spieth / Life Sciences / Psychology was also viewed as a flaw of this option.



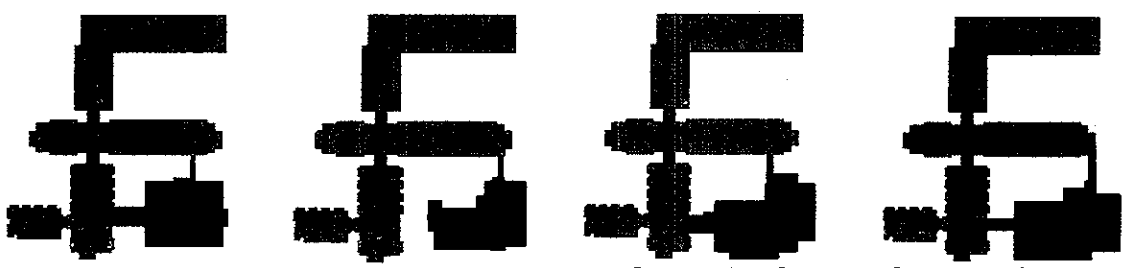
Connecting Options: North-South Orientation

Other alternatives that explored single connections to the existing building had greater potential. Options that connected to Spieth Hall / Life Sciences and had a north-south orientation violated the basic open space principles of the campus fabric. Options with



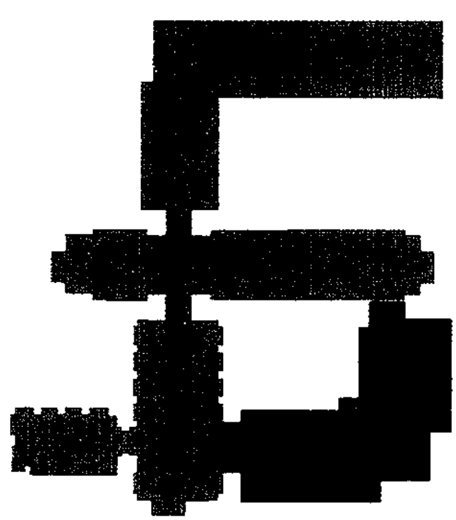
Connecting Options: East-West Orientation

an east-west orientation were more respectful of the open space / courtyard rhythm of the campus, but the building footprint became either too long (in the case of a linear interior circulation plan) or too deep (in the case of a central 'racetrack' circulation plan), and in either case precluded the possibility of future expansion of the building on or near the site.



Connecting Options: Courtyard Concepts

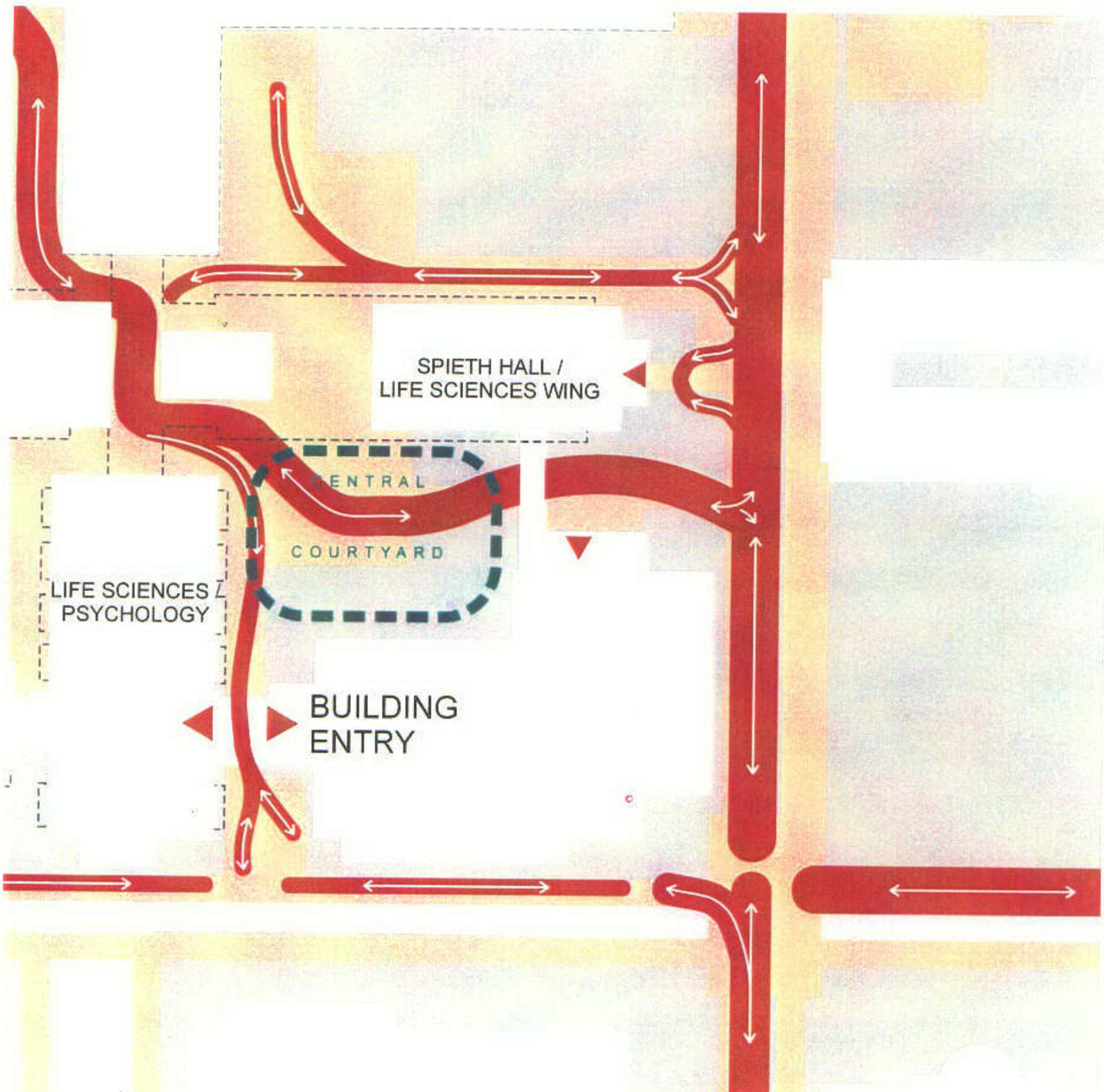
The favored approach emerged as an L-shaped building connected at each of its ends to the existing Spieth / Life Sciences / Psychology wings. This was achieved by taking the linear, single-loaded circulation concept and bending it so that the corridor could connect simply and directly from each end of the new building into rooms in the existing wings that seem to have been designed originally to act as connecting circulation to a future building. This approach also allowed for the laboratory functions all to lie 'outboard' of the building, and for the investigator offices and other support spaces to have a northerly exposure and view into the inner courtyard.



PREFERRED APPROACH

Connecting Options: Courtyard Concepts

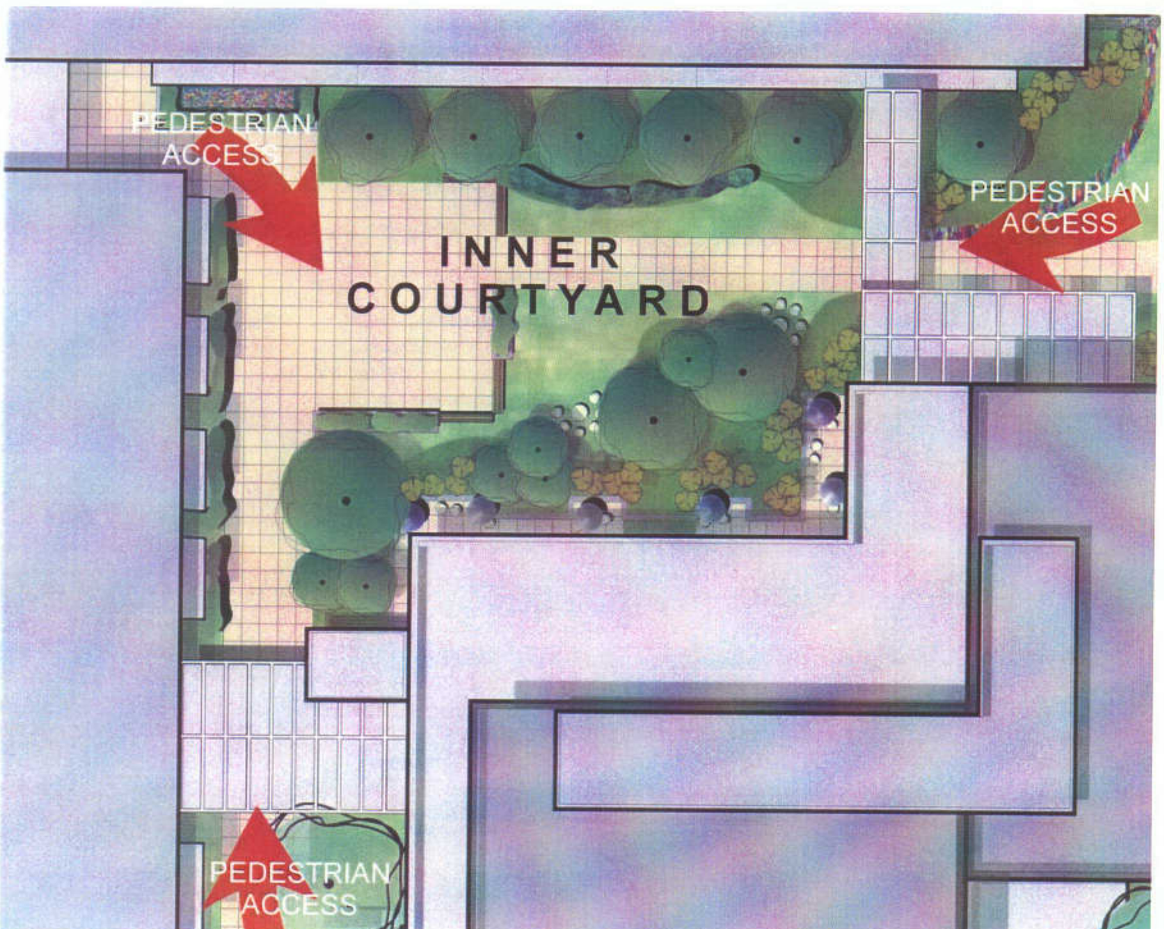
The public orientation or façade of the Biological Sciences Building should invite passers-by into the intimate open courtyard defined by the new building and the edges of the existing wings of Spieth / Life Sciences / Psychology. Currently, pedestrian circulation through the site is predominantly from the northwest, from under the wings of Spieth. Future circulation might be expected to become more intense to and from the growing precinct areas to the south.



Patterns of Pedestrian Circulation Through the Site

As illustrated in the diagram, future circulation demands from the northeast should be encouraged to cross the site through the courtyard. Entry points for the building should be located at or near these points of entry to the site. This will encourage the conception of unity of the buildings and underscore their functional as well as symbolic relationships. It will also allow entry to the building to be secure, given the desire to limit access to research areas, without compromising the accessibility of the public areas of the building. The design of the building and its landscaped frontages to the east and to the south should direct pedestrians to these entries.

The Biological Sciences Building should make of the courtyard and these points of entry a space where casual interaction can occur, and they should be designed to encourage such use. Functional connections to Spieth Hall to the north and to the Life Sciences / Psychology wing to the west should be made at upper levels via enclosed passages. This will be increasingly important as the Psychology wing becomes occupied by instructional and dry lab spaces in the biological sciences that will support the research in the Biological Sciences Building.



Courtyard and Points of Entry

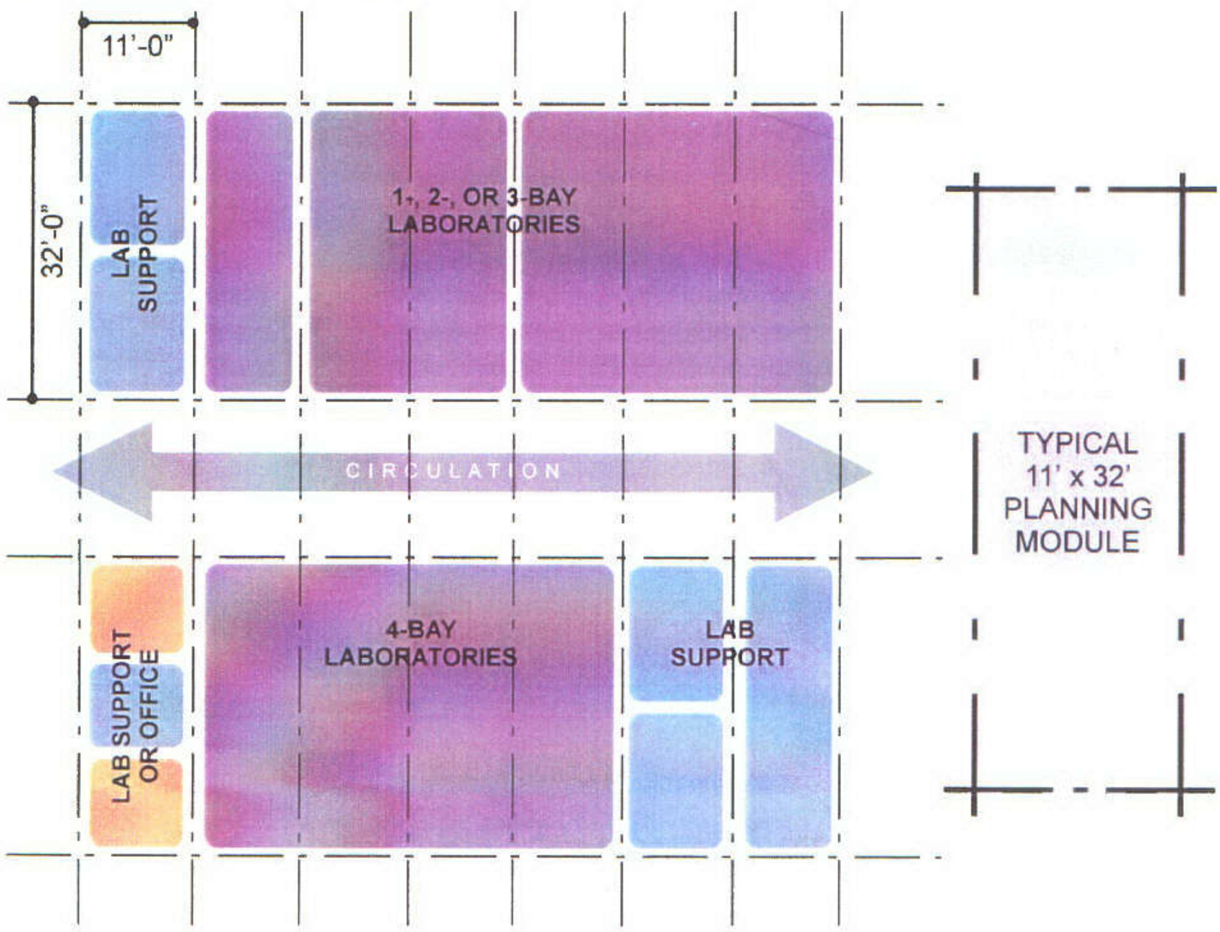
Program Overview

MODULAR PLANNING AND FLEXIBILITY IN LABORATORY DESIGN

Laboratory organization should be based upon modular planning principles and be constructed of standardized units or dimensions for flexibility and a variety of uses. Modular planning is an organizational tool to allocate space within a building. The module establishes a grid by which walls and partitions are located. As modifications are required because of changes in laboratory use, instrumentation, or departmental organization, partitions can be relocated, doors moved, and laboratories expanded into larger laboratory units or contracted into smaller laboratory units minimizing or eliminating reconstruction of structural or mechanical building elements.

Figure 5-1 illustrates how rooms can be planned within the framework of a modular planning guide. The planning modules may be combined to produce large, open laboratories or subdivided to produce small instrument or special-use laboratories.

Figure 5-1: Modular Planning



The above description of the planning module also includes the organized and systematic delivery of laboratory piped services, HVAC, fume hood exhaust ducts, power and signal cables. If these services are delivered to each laboratory unit in a consistent manner, changes in laboratory use requiring addition or deletion of services during design, construction, or in the future will be easy to accomplish because of the regular nature of the infrastructure.

The proposed laboratory planning module for the Biological Sciences Building was derived by analyzing the laboratory bench, equipment, and circulation space required for the proposed functions. The module is based on the bench space (width and length) required for technical work stations, instruments, and procedures. The space required between benches is designed to allow people to work back-to-back at adjacent benches, to allow for accessibility for disabled and still allow for movement of people and laboratory carts in the aisle.

A planning module approximately 11'-0" wide by 32'-0" deep is recommended for the laboratory spaces. This module will provide adequate bench space plus space for floor standing equipment and fume hoods, and can be divided for smaller support spaces such as equipment and instrument rooms. The recommended module size should be tested against the column spacing and exterior wall locations of the proposed site during the design phases, and may be slightly adjusted.

Island benches shall be 66 inches deep and wall benches shall be 33 inches deep to accommodate the anticipated instruments to be used in the Biological Sciences Building. A 60-inch minimum aisle between benches will minimize circulation conflicts and reduce potential safety hazards. It is critical that carts can maneuver without conflict in all laboratory aisles.

The proposed module width will accommodate the above requirements and will provide sufficient space in laboratories when movable computer stations or equipment racks are used near laboratory benches.

PROGRAM REQUIREMENTS WITHIN THE FLEXIBLE MODULE

Within the flexible framework of the planning module, laboratory space, laboratory support space, and office-related functions can be accommodated. Table 5-1 lists the required room types, their sizes, and the number of rooms required in each category. With the exception of those rooms specifically named (e.g., 'autoclave,' or 'darkroom'), the Shared Support Spaces are programmed as prototypical uses, currently reviewed and approved by faculty but subject to revision prior to final design. The modular framework, however, allows for many combinations of use (as illustrated in the Room Diagrams in Section 6).

Similarly, the number of laboratories is indicated here as a 'typical' number, showing that with an array of two-bay labs and a BSL-3 Suite, there would be a total capacity in the new building for 23 investigators. However, as Figure 4-1 illustrates, it will be possible within the modular framework to have laboratories of one or three bays as well, depending on the specific research agenda of the faculty investigators at the time of design.

'Lab adjacent' support spaces (i.e., the 'special use rooms' and the 'fume hood alcoves') should be considered as a part of the assigned domain of the individual laboratory. 'Shared Support Spaces,' on the other hand, are areas that would be shared among more than one research project and investigator, and their square footage would be pro-rated accordingly in assigning space. Taken on average, the overall typical assignment (including dedicated and shared areas) for each faculty investigator will be approximately 1351 asf (see p. 6-1).

Table 5-1. Summary of Room Requirements

Room Type	*Number of Rooms*	*Typical Dimensions (in feet) **			*Assignable Sq. Ft. (asf) Each room*	*Total*
Research Laboratory Spaces						
Laboratory (typical)	22	21.5	x	31.5	676.2	14,875.9
Special use room (lab adjacent)	22	10.5	x	10.5	110.3	2,425.5
Fume hood alcove (lab adjacent)	22	10.5	x	10.5	110.3	2,425.5
Subtotal, Laboratory Spaces						*19,727*
Shared Support Spaces						
Entry/equipment vestibule	1	10.5	x	18.5	194.3	194.3
Entry/equipment vestibule	11	21.5	x	18.5	397.8	4,375.3
Controlled temperature room	3	10.5	x	18.5	194.3	582.8
Autoclave room	3	10.5	x	12.38	130.0	390.0
Central glasswash	1	10.5	x	21.5	225.8	225.8
Radioisotope room	1	21.5	x	10.5	225.8	225.8
Dark room	1	10.5	x	15.5	162.8	162.8
BSL3 suite	1	21.5	x	21.5	462.3	462.3
Vestibule	1	10.5	x	27.95	293.5	293.5
Ice/equipment	3	10.5	x	6.67	70.0	210.1
Supply room	1	10.5	x	5	52.5	52.5
Subtotal, Shared Support Space						*7,175*
Office Space						
Faculty office	22	10.5	x	12.4	130.0	2,859.8
Conference room	3	11.8	x	22.5	264.4	793.1
Office support	3	12.0	x	30.9	370.5	1,111.5
Subtotal, Office Space						*4,764*
TOTAL ASF						***31,666***

** For purposes of determining assignable square feet, measurements are taken from face of wall to face of wall.*

DESIGN FOR COLLABORATION AND INTERACTION

One of the hallmarks of the UCR faculty in the Biological Sciences is the value placed on interaction, both formal and informal, among faculty, other researchers, other departments, and among students. Design to encourage interaction is fundamental to the Biology Department and the Biological Sciences Building. There are three basic aspects of interaction concern.

- within each laboratory group, spaces should be arranged to permit formal and informal collaboration among the research staff.
- at the intra-departmental level, opportunities for formal conferences, informal oversight of one another's work in the lab, and casual encounters in corridors and gathering places should be encouraged.

- at the inter-departmental level, connections to the existing buildings and the maintenance of some visual transparency in the public areas of the Biological Sciences Building will facilitate informal connection and collaboration.

Meeting these conditions for interaction requires that spaces be created within laboratories, between laboratories, on each floor, and in public areas of building. Areas for formal and, in particular, informal interaction should be considered in the overall planning of this building and with its connections to adjacent facilities.

Formal Interaction Considerations

Because the University's primary concern is to develop laboratory space, formal interaction facilities will not be provided in this project program, but will be required in the Life Sciences/Psychology wing, as close as possible to the connector. Formal meeting facilities will be provided in the form of group work areas and conference rooms scaled to accommodate a range of group sizes. Smaller spaces should be located close to laboratories; larger spaces can be remote. Small to medium sized conference rooms for 8 to 10 persons should be located with the faculty offices in the Biological Sciences Building. Other medium and larger sized conference rooms shall be provided in the Life Sciences/Psychology wing in a future project. Existing larger conference facilities elsewhere on campus will also serve this faculty.

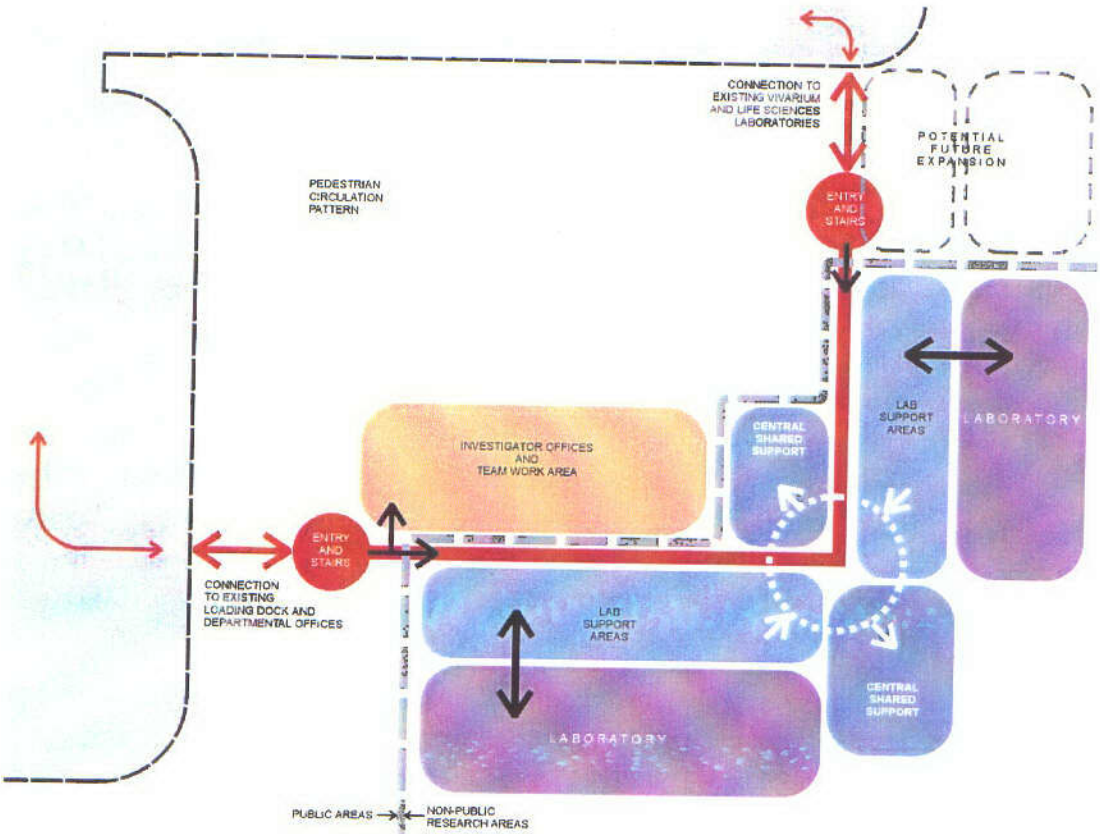
Informal Interaction Considerations

A great deal of valuable exchange of information and ideas comes in venues that are not organized for formal or "official" interaction. The Biological Sciences Building should be designed to provide a number of kinds of places for informal interaction, including

- Casual meeting/interaction spaces for short duration interaction,
- Outdoor gathering spaces should be highly visible, inviting, and furnished,
- Display/announcement boards serve as gathering places for informal contact, and
- Connections to other campus facilities will facilitate interaction amongst researchers and staff in other campus buildings.

The implications for the design of the building, as illustrated in Figure 5-2, are that there should be side-by-side connections between laboratories, and convenient cross-corridor laboratory connections, so that people can encounter one another in the course of their work. Similarly, shared support spaces (equipment and instrument rooms) should be located close to laboratories for inter-laboratory interactions on an unplanned or casual basis. To this end, circulation systems should encourage sharing of support functions. Additionally, inviting and visible horizontal and vertical circulation systems can also serve as interaction spaces. Finally, there should be clear and convenient links between outdoor gathering spaces and interior interaction spaces.

Figure 5-2: Functional Relationship Requirements in the Biological Sciences Building



Design for Interaction in Non-Laboratory Areas

In addition to the laboratory and laboratory support spaces, offices for faculty investigators and work spaces for graduate and post-graduate assistants are also required Investigator offices should allow for separation of functions between technical and more conventional office activities, including meetings and visitors, which should happen away from the laboratory. In order to maximize research space in the new building, staff and post-doctoral assistants' primary work spaces will be located in remodeled space in the Life Sciences/Psychology wing as part of a future project. However, secondary or group work space should be provided for these support personnel in the Biological Sciences Building either within the laboratories or in support areas near the investigators' offices.

A review of the work patterns and office "culture" of the faculty suggests that their office space be designed as a suite of rooms, with small 8 to 10 person conferencing/meeting facilities and open work areas for post-doctoral researchers. Work space, such as writing desks, should be provided within the laboratory areas, and additional work space for records, computation, and eating should be provided as a part of the office suite.

Offices for post-doctoral researchers and other support personnel will be located in the remodeled Life Sciences / Psychology wing of Spieth Hall. Thus, physical connections to the existing buildings will be required within the new Biological Sciences Building. In addition, these connections will be required to effect secure and safe access to vivaria located in the basement of each, as well as to the loading and service area in the basement level.

DESIGN FOR EFFICIENCY OF CIRCULATION

Effective circulation is an important element in the design of the Biological Sciences Building. Materials delivered to the facility will include chemicals, supplies, animals, and equipment. In addition to material delivery, the debris and waste generated by the laboratory's functions must be safely removed on a periodic and frequent basis.

Internal building circulation should provide safe pedestrian egress from each individual laboratory and laboratory support space through an uncomplicated path of egress to the building exterior at grade. The circulation system should accommodate the preferred adjacencies identified for the relationships between:

- Laboratories and laboratory support spaces,
- Laboratories and offices, and
- The Biological Sciences Building and connections to Spieth Hall / Life Sciences / Psychology.

Other features that should be considered in the design of the circulation system include:

- At least one door into each laboratory space should have a minimum 54-inch wide clear opening. This can be accomplished using openings with 36-inch active leaf and one 18-inch inactive leaf.
- Because users are not yet identified, actual equipment lists cannot be developed. However, anticipated equipment should be considered for each type of space in relation to the ability to maneuver such equipment through the building to those destinations.
- Interior circulation corridors should be a minimum of 72 inches wide.
- Doorways into corridors should open into recessed alcoves serving the corridor. All laboratory doors should swing out, in the direction of egress.
- Laboratory egress routes should avoid exiting in front of fume hoods.

Elevators

An elevator for both passenger and service use is required for the building. The elevator shall meet sizing and other requirements for freight and may also be used for passenger travel. Elevators shall be hydraulic.

- Capacity: 5,600 pounds, Class A loading (general freight loading/hand truck)
- Inside clear dimensions: 71 inches wide x 104 inches deep (nominal)
- Entrance opening: 54 inches wide x 84 inches high
- Speed: 150 feet per minute (full load up)
- The service elevator is proposed for passenger use and shall comply with all applicable accessibility requirements

Logistics and Waste Handling

Ideally, the Biological Sciences Building should have a loading dock, though site constraints make this difficult. If this cannot be achieved, loading facilities on the west side of Life Sciences/Psychology will need to be used to service the building. Routing through the building(s) should be carefully considered, particularly with respect to dimensional clearances.

Waste facilities should be provided outside the loading dock. Provisions should be made for the recycling of paper, plastic, and aluminum cans.

DESIGN FOR ACCESSIBILITY

Providing accessibility for persons with disabilities requires special design considerations. The facility must conform to applicable local, state and federal regulations. Early considerations should be given to the following accessibility aspects:

- All parts of the building should be accessible by persons with disabilities.
- Accessible entrance doors shall be provided with automatic door operators, either motion detector activated or with an oversized push plate.
- Accessible work stations and fume hoods should be provided in the laboratories based on code requirements.
- Location of accessible work stations as close as possible to eyewash and safety showers.
- An 18-inch clearance on the pull side and 12-inch clearance on the push side of doors opposite the hinged side is required.
- Site development shall allow for motorized carts to access the main entry.

Some general criteria and guidelines for accessible work stations in laboratories are as follows:

- At least one accessible laboratory station should be provided on each floor of the building, but one accessible station in each laboratory is preferred. This shall include sink, knee opening, fume hood, casework, various controls and services, and support spaces. The Department of the State Architect (DSA) considers five percent a reasonable amount of accessible stations.
- Work surfaces 30 inches to 34 inches above floor with wheelchair clearance below. Adjustable work surfaces can provide a range of possible height adjustments. Work surfaces allowing easy, crank-type adjustment should be investigated and considered.
- Laboratory service controls, equipment, and equipment controls within easy reach for persons with limited mobility. Controls should have single-action levers or blade handles for easy operation.
- Aisle widths and clearances adequate for maneuvers of wheelchair bound individuals. Aisles 60 inches wide are recommended with turnaround areas.

Design Criteria

LABORATORY SAFETY

Exhaust System

The laboratory HVAC system should promote the safe operation of the building and the health and comfort of the occupants. The laboratory environment may contain harmful chemical vapors, particulates and biological aerosols. These hazardous substances must be continuously removed from the breathing zone of the laboratory users. In addition, a safe environment should be maintained around the building. Wind tunnel studies should be conducted of building models during design in order to determine the most optimal location for air intakes and fume stack heights.

The HVAC design will be based on regulatory requirements and guidelines along with good engineering practices. Code requirements are a minimum standard.

(1) Primary Containment

The primary containment in laboratory ventilation consists of chemical fume hoods and other ventilated enclosures that operate under negative pressurization with respect to the laboratory. They are designed for preventing personnel exposure to hazardous materials.

- Chemical Fume Hoods

  Hoods should be located more than 10 feet from any door or doorway, with the exception of secondary exits, and should not be located on a main traffic aisle.

  With the view of energy and capital savings, the hood should be normally closed, except when the user is present. Sash stops shall be provided and the normal operating sash position shall be labeled. The sash will be fully open only during set-up or takedown operations. Horizontal sashes or combination of vertical-horizontal sashes can be used.

  All chemical fume hoods should maintain an average face velocity of 100 feet per minute (fpm) ±10%. The constant volume hoods designed to operate at 18-inch vertical sash opening will develop lower face velocities when the sash is raised above this limit. Under no circumstances shall face velocities drop below 70 fpm. Lower velocities of 60 to 80 feet per minute can be employed in variable air fume hoods by using occupancy sensors providing adaptive face velocity control. In some applications the average face velocity might exceed 100 feet per minute. CalOSHA requires face velocities of 125 fpm to 150 fpm when working with an identified list of carcinogens. These values are in excess of those recognized as generally safe based on industry testing. Higher values may cause turbulence, which may, in turn, cause fumes to be ejected from the sash opening.

  Each fume hood shall be equipped with a flow-measuring device and should be monitored locally to allow convenient confirmation of adequate hood performance. All laboratory fume hoods must be equipped with visual and audible alarms warning of unsafe airflow. UCR EH&S prefers the inclusion of occupancy presence sensors to control fume hood exhaust.

Any fume hood which is designated by UCR Environmental Health and Safety (EH&S) as especially hazardous shall have a dedicated duct, fan, and if required, treatment system. Fume hoods in this category may include radioisotope hoods, in accordance with the following criteria:

- Radioisotope Hoods

  Radioisotope hoods should be constructed from seamless stainless steel with coved corners for easy cleaning. Hood air foils and baffles should be adjustable and removable for cleaning. Radioisotope hoods should operate at an average face velocity of 125 fpm. Exhaust ducts and collars should be welded Type 316L stainless steel.

  Radioisotope hoods should have individual exhaust and should be provided with housing for bag-in and bag-out HEPA and/or Carbon filters.

(2) Secondary Containment

The negative pressure of the laboratory space relative to corridors and surrounding non-laboratory spaces provides secondary containment. To effectively maintain the negative pressure in the laboratory, windows shall be fixed and sealed and there shall be no doors directly to the building exterior. Doors to laboratories should be equipped with closers, must remain closed as much as possible and should not be held open. If the direction of airflow is deemed critical, monitoring devices shall be used to signal or alarm the inadequate pressure relationship of adjacent spaces.

The laboratory spaces will be continuously ventilated 24 hours per day.

Supply air shall be effectively distributed into all portions of the laboratory space by ceiling diffusers or perforated ceiling panels, without creating drafts at exhaust hoods. The maximum supply air velocity in the vicinity of fume hoods and biological safety cabinets shall be 50 feet per minute at 6 feet above the floor.

Air from laboratories and other spaces that might contain hazardous materials shall be exhausted outdoors and not recirculated.

Air from offices and other clean areas may be recirculated or directed toward negative pressure laboratories.

Other Exhaust Devices

- Canopy Hoods: Canopies are hoods located over work areas or equipment used to capture heat or steam. The recommended design flow rate is 75 cfm per linear foot of open perimeter.

- Snorkel Fume Extractors: Small capturing cones attached to an adjustable exhaust arm, suspended from the wall or ceiling, to capture heat or fumes from equipment or processes. Typical flow rates are 100-200 cfm.

- Vented Cabinets: Vented Cabinets used to store hazardous, corrosive, toxic and other health hazard storage cabinets may be connected to an exhaust system, providing a negative pressurization inside the cabinets. Venting of flammable liquid and corrosives storage cabinets is preferred by UCR EH&S; vent piping shall be non-combustible. Corrosives storage cabinets shall be lined with polypropylene.

- Slot Exhaust: Slot exhaust openings are used to draw away locally generated fumes, usually to the rear of the workstation.
- Down draft units: Used for benchtop working station exhaust, typically draw the air down below the worksurafce and convey the exhaust air horizontally to connection with an exhaust duct.
- Equipment Vent Connections: Exhaust ports will be provided for equipment requiring direct exhaust connection. Some equipment may have a separate exhaust system.

Biosafety

Primary and secondary biological barriers should be used to reduce or eliminate exposure of laboratory environment and the outside environment to potentially hazardous agents. Primary barriers protect the personnel and the laboratory environment from exposure to infectious agents. Only laboratory equipment is discussed in this biosafety level analysis. Secondary barriers represent facility design criteria providing protection for persons working inside and outside of the laboratory within the facility and for persons and animals in the outside environment from infectious agents which may be accidentally released from the laboratory. Generally, the laboratories should allow for Biosafety Level 2 activity, and a specially designated suite shall be provided for Biosafety Level 3 work. The combinations of primary and secondary barriers for Biosafety Levels 2 and 3 are described below.

In all instances, the U.S. Department of Health and Human Services Publication "Biosafety in Microbiological and Biomedical Laboratories", shall prevail in specifying and defining safety equipment, primary barriers, and architectural or laboratory facility secondary barriers.

Biosafety Level 2 (BSL-2)

Biosafety Level 2 is suitable for work involving agents of moderate potential hazard.

(1) <u>Primary Barriers</u>

- Biological safety cabinets, Class II/Type B3, are required for procedures with a potential for creating infectious aerosols or splashes and those where high concentration or large volumes of infectious agents are used. Exhaust should be hard-ducted out of the building.

(2) <u>Secondary Barriers</u>

- Lockable storage for restricted agents.
- Sink for handwashing; hands-free operation.
- Autoclave or other decontamination methods shall be available.
- Benchtops shall be impervious to water and resistant to acids, alkalis, organic solvents and moderate heat.
- Sturdy laboratory furniture, with easily cleaned surfaces.
- An eyewash and safety shower facility shall be readily available.

The HVAC criteria includes:

- 100% exhausted air system.
- Ten to Fifteen air changes per hour.
- Directional air flow into the laboratory rooms.

Biosafety Level 3 (BSL-3)

Biosafety Level 3 applies to facilities in which work is done with indigenous or exotic agents that may cause serious or potentially lethal disease as a result of exposure by inhalation.

(1) Primary Barriers

- All procedures involving the manipulations of infectious materials should be conducted within Class II/Type B2 biological safety cabinets. BSC exhaust shall be hard-ducted out of the building. Physical containment devices such as centrifuge safety cups, sealed centrifuge rotors or containment caging for animals should be used outside of the biological safety cabinets.

(2) Secondary Barriers

- The laboratory shall be separated from the areas open to unrestricted traffic within the building. Access from corridors or other contagious areas shall be provided by passage through two sets of locking, self-closing doors including an optional shower.
- Sink for handwashing installed near the laboratory exit door. Provide hands-free operation.
- The walls, floor and ceiling surfaces shall be durable and water-resistant for easy cleaning and decontamination. All penetrations shall be sealed.
- Benchtops shall be impervious to water and resistant to acids, alkalis, organic solvents and moderate heat.
- Sturdy laboratory furniture, with easily cleaned surfaces.
- Autoclave or other approved decontaminating equipment for laboratory wastes shall be available, preferably within the laboratory.
- Biological safety cabinets shall be located away from doors and heavily-traveled laboratory areas.
- An eyewash and safety shower facility shall be readily available.

The HVAC criteria include:

- 100% exhaust air system. Exhaust air filtration is not required, but should be considered based on site requirements and specific agents and use conditions.

- Directional airflow shall draw air from clean areas into the laboratory toward contaminated areas. Provide visual monitoring device to confirm directional airflow at room entry and audible alarms to notify personnel of HVAC system failure.

- Ten to fifteen air changes per hour.

- Continuous flow centrifuges or other equipment that may produce aerosols should be contained in devices that exhaust air through HEPA filters before discharge into the laboratory.

- Vacuum lines shall be protected with liquid disinfectant traps and HEPA filters.

Biological Safety Cabinets

The primary containment for the hazardous agents generated by microbiological procedures is provided in biological safety cabinets by negative pressurization and high efficiency HEPA filters. Biological safety cabinets should provide product and personnel protection.

- If offering personnel protection, biological safety cabinets should be connected to emergency power.

- Biological safety cabinets shall operate as designed for containment, unaffected by room supply air and exhaust air fluctuations.

Applicable Code Commentary

(1) California Building Code

- Occupancy: The laboratory areas shall be classified as a "B" occupancy. UCR prefers that laboratories be assumed to be H8 occupancies unless it can be demonstrated that the chemical inventory of the facility will not exceed the exempt amounts listed in the tables at the end of CCR Title 24, CBC Part 2, Chapter 3 for a B occupancy. This facility is not expected to have a chemical inventory large enough to warrant an H8 occupancy because of the size of the building and the type of scientific investigations proposed.

- Fire Separation: Laboratories shall be separated from each other and other portions of the building by not less than an one-hour fire resistive occupancy separation.

- Hazardous Materials: The quantities of hazardous materials shall not exceed those listed in Tables 3-D and 3-E of the code for any control area. Four control areas are allowed in the building. It is expected that material limits will not be exceeded with these provisions.

- Exits: Occupants in laboratories having an area in excess of 200 square feet shall have access to at least two exits from the room and all portions of the room shall be within 75 feet of an exit.

(2) NFPA 101: Safety to Life From Fire and Structures (Life Safety Code)

- Means of Egress: Where exits are not immediately accessible from an open floor area, safe and continuous passageways, aisles, or corridors shall be maintained leading directly to every exit. These shall be arranged as to provide convenient access for each occupant to at least two exits by separate ways of travel.

- Exit access shall be so arranged that it will not be necessary to pass through any area identified under protection from hazards (identified in Chapter 28 of the Code).

(3) NFPA 30: Flammable and Combustible Liquids Code

- Storage Cabinets: Not more than 120 gallons (454 l.) of Class I, Class II, and Class III A liquid may be stored in a storage cabinet. Of this total, not more than 60 gallons (227 l.) may be of Class I and Class II liquids and not more than three such cabinets may be located in a single fire area.

(4) NFPA 45: Fire Protection For Laboratories Using Chemicals

- Access to Exits: A second means of access to an exit shall be provided from a laboratory work area if any of the following situations exist:
- A laboratory work area contains an explosion hazard so located that an incident would block escape from or access to the laboratory work area.
- A fume hood in a laboratory work area is located adjacent to the primary means of exit access.
- A compressed gas cylinder in use which is larger than lecture bottle size, and contains a gas which is flammable or has a hazard rating of 3 or 4 and would prevent safe egress in event of accidental release of cylinder contents.
- The required exit doors of all laboratory work areas within Class A or Class B laboratory units shall swing in the direction of exit travel.
- Furniture and Equipment: Furniture and equipment in laboratory work areas shall be arranged so that means of access to an exit may be reached easily from any point.
- Explosion Hazard: Explosion hazard is considered to exist if reactivity rating of 4 materials are stored or used, or if highly exothermic reactions or procedures without established properties are planned, or if high pressure reactions are planned. Program information does not indicate that explosion hazards, as described above, exist in this project.

Emergency and Standby Power Considerations

Emergency and standby power considerations must be carefully analyzed in connection with laboratory systems. Measures involving emergency and standby power should be approved by the Campus Fire Marshal. Emergency power supply should be implemented if a definite potential for catastrophe such as explosion, fire, violent ejection of chemicals, accumulation of hazardous or objectionable concentrations of fumes, vapors and airborne materials, or other life-threatening situations is present. Emergency and standby power requirements are discussed in the mechanical and electrical design criteria sections.

Laboratory Wastes

Laboratory wastes will be removed from each laboratory by UCR EH&S by arrangement. EH&S prefers that an area in each laboratory be designated for waste holding.

Regulated Materials

At least one locked cabinet shall be provided in each laboratory for securing regulated substances.

Emergency Safety Shower / Eye-Wash

Emergency eye-wash/ safety showers must be provided as required by CCR Title 8 and ANSI Z358.1-1998. UCR EH&S would like alarms provided on safety shower and eyewash fixtures if they can be shunted when being tested. UCR EH&S has determined that incoming city water satisfies the ANSI requirement for tepid water.

Fire Extinguishers

Hand-held fire extinguishers shall be provided in accordance with NFPA 10.

Security Systems

Card access will be provided at main entrances and at special interior areas requiring controlled access to be determined during detailed design (for example, the Biosafety Level 3 suite). Refer to the Electrical design criteria section.

The University has no requirement for a closed circuit television (CCTV) system, though the building occupants could require this in the future. Infrastructure for a CCTV system is not required because most ceilings are anticipated to be accessible, and a cable tray system is likely.

NOISE CONTROL

The noise level should not exceed 55dB in the laboratories.

Noise control requires specific attention to design and construction details. The following features should be addressed in the design of the mechanical and electrical systems:

- Fan noise transmitted to spaces through the duct system or through the building structure. This noise is characterized by a low-frequency rumble and often includes annoying pure tones.
- Noise generated by the excitation of duct wall resonance produced by fan noise, by pressure fluctuations caused by fan instability, and by high turbulence caused by discontinuance in the duct system.
- Noise generated by air flowing past dampers, turning vanes, terminal device louvers, and comprising mid-to-high frequency energy.

- Water circulation system noise caused by high velocities or abrupt pressure changes and is generally transmitted through structural connections.

- Noise and vibration caused by out-of-balance forces generated by the operation of fans, pumps, compressors, etc.

- Magnetostrictive hum associated with the operation of fluorescent lighting ballasts, transformers, or electric motors.

- Elevator equipment noise from motor generators, hoist gear, and counterweight movement; or from hydraulic pump systems.

- Conduits should not directly link noise-sensitive spaces, nor should they mechanically bridge vibrationally-isolated building elements using a rigid connection. Areas requiring this treatment shall be identified during the Design Development phase.

- Flexible conduit must be used for connections to isolated floor slabs, walls, and vibrationally isolated mechanical/electrical devices.

- Duct silencers will be considered when duct distance is not sufficient to provide adequate acoustical separation.

HVAC ADAPTABILITY

Laboratory ventilation systems should be designed to be adaptable to changes of research protocols and building operations. The systems must be easily modified so that ventilation can be provided to new sources of hazards as they appear in the laboratory.

Modularity is one of the key concepts to an adaptable laboratory HVAC system. The HVAC laboratory system should be designed as an assembly of repetitive modules. Each laboratory planning module will have supply air diffusers, exhaust grilles, terminal air flow control device, with capability for individual temperature control based on zoning. This equipment, ducts, and grilles will be repeatable throughout the building such that all of these components can easily be located. The laboratory module may support various functions.

The laboratory ventilation system shall be flexible, allowing timely and cost effective changes over time without affecting the performance and operation of the building HVAC system. Careful consideration must be given to the future capacity of the HVAC systems. Both space and electrical capacity should be considered. Providing capabilities to support additional future fume hoods, in large open laboratory areas, is part of the flexibility concept.

Some laboratory spaces, exceeding the basic air quantity or airflow requirements, will need special HVAC considerations.

FINISHES

Recommended finishes for programmed spaces are identified in the Detailed Space Requirements sheets.

Sheet vinyl shall be high-vinyl content material and shall have heat welded seams. Ceiling suspension systems shall be heavy-duty type.

Non-Programmed Spaces

The following are general guidelines for non-programmed spaces:

(1) Corridors

Floor .... Solid vinyl tile or terrazzo
Base .... Resilient
Wall .... Gypsum wallboard with paint
Ceiling .... Suspended acoustical ceiling panels

(2) Stairs

Treads .... Resilient
Risers .... Resilient
Wall .... Gypsum wallboard with paint

(3) Toilets

Floor .... Ceramic tile
Base .... Ceramic tile
Wall .... Ceramic tile, gypsum wallboard with epoxy paint
Ceiling .... Gypsum wallboard with paint, or suspended panels with moisture resistant finish

Laboratory Casework

Laboratory casework materials should be reviewed during the design phases with respect to performance, maintenance, and budget. Wood is traditional in university environments, tends to perform well, is relatively easy to maintain, and should be the original basis for design. Plastic laminate may be acceptable for many uses, and while it may require more maintenance and be more susceptible to damage, it generally is less costly. Some special purpose cabinets, for corrosives and solvent storage, shall be metal, or high density polypropylene-lined, as required. Metal casework performance is generally superior, but its cost is also generally a premium and is probably not appropriate for this project.

Wall and tall cabinets should be provided with latches to restrict opening during earthquakes. Shelving should be provided with seismic edges to help prevent items from falling during an earthquake.

C-frame, or other flexible casework systems, which allow for vertical adjustment are proposed for some laboratory furnishings. These systems will allow for accessible workstations and for a variety of laboratory work surface height requirements.

Building System Requirements

STRUCTURAL SYSTEMS

Vibration Criteria

The nature of the scientific studies to be conducted in the Biological Sciences Building will require that the structure be relatively resistant to vibration. Special structural consideration may be required for specific areas of the building.

Vibrations caused by footfall require both structural and an architectural solutions. Footfall-induced vibrations, important for above-grade floors, can be reduced by confining heavily traveled areas to regions near column lines, placing sensitive equipment near columns, keeping as much distance as possible between heavily traveled areas and sensitive equipment and minimizing the length of spans.

Vibration is alleviated by increasing the stiffness of the floor slab. This stiffness can be increased by providing a combination of mass and/or depth for above grade slabs. Cast-in-place concrete has natural characteristics and mass advantages for vibration reduction; a concrete frame structural system is anticipated in this building. Structural steel may be considered at the time of design. If a sufficient floor-to-floor height is provided structural steel may allow for either schedule or costs savings; availability of these savings are closely linked to national and regional construction activity and cannot be anticipated at this time.

Air handling ductwork shall be designed to minimize vibration. Supply and exhaust air fans, compressors, pumps, and other noise and vibration producing equipment should be located in mechanical rooms with protective wall construction.

Special local vibration control devices may be utilized for any highly sensitive equipment such as optical benches and analytical instruments.

Laboratories should be designed for 125 pounds per square foot (psf) live load throughout the laboratory areas for vibration considerations.

Instruments that are extremely sensitive to vibration (for example, electron microscopes or other sensitive imaging instrumentation) are not anticipated for the initial use of the building. If provided in the future, this sort of instrumentation should be located on slab-on-grade construction to minimize transient structure-borne vibration.

Vibration criteria for areas intended to accommodate sensitive equipment are based on the product of two factors: the natural frequency of the system between column supports, "f_n.", and static stiffness, at the center of the bay "k".

Table 5-2, below, illustrates typical values of the factor kf_n, for laboratory structures designed for sensitive instrumentation and experimental processes.

It is recommended that the structural floor system be designed to meet the criterion listed for Class II equipment.

Table 5-2: Design criteria for sensitive instrumentation and equipment not otherwise vibrationally-isolated

CLASS OF EQUIPMENT	*VELOCITY SENSITIVITY (microinch/sec)*	*STRUCTURAL CRITERION FACTOR "kf_n" (kips/in-sec)*
I. Low power bench microscopes (magnification: 50X to 100X)	4,000	3,200
II. Medium power microscopes (magnification: 100X to 400X), microbalances, etc.	2,000	6,400
III. Higher power optical microscopes to 1000X and equipment used in 2 micron photo-lithography.	1,000	12,800
IV. 1 micron photo-lithography, very sensitive optical systems, ceiling-mounted operating room microscopes.	500	25,600
V. Sub-micron photo-lithography, E-beam lithography, and most electron microscopes (TEM/SEM) at high magnification (+100,000X)	250	51,200
VI. Long path, laser-based, small target systems and other systems requiring dynamically-stable critical alignment.	125	102,400

Structural Design

The Biological Science Building is proposed to be built as a three-story L-shaped building, connecting with the existing Spieth Hall/Life Sciences/Psychology Building at its north and southwest sides. The new biological science laboratories will be completely separated structurally from the existing building by providing a seismic joint at both ends of the new structure.

Because of its L-shaped plan, the new building will have structural plan irregularity. The floor height of the building is 15 feet. The second and third floor have openings in the floor at the southwest corner and at the northeast corner. There is a partial basement with a utility tunnel at the southwest corner of the building. The new utility tunnel will be connected to the existing utility tunnel.

Three basic structural systems were considered for the design of this building: (a) concrete floor slab with beam and concrete shear wall system; (b) steel floor with concrete as topping slab and concrete shear wall; and (c) concrete flat slab and a dual system for lateral loads consisting of shear walls and concrete special moment resisting frames. The selected system, and the basis for its selection, is described in the following discussion.

Gravity Load Carrying System

The gravity load carrying structural system of the building will consist of concrete beam slab construction due to the stringent requirement for vibration isolation of the floor. The beams/girders will be supported by interior concrete columns and concrete walls. The columns and walls will be supported on a shallow foundation. The stairs at the southwest and northeast ends will be in steel.

Lateral Load Carrying System

The lateral load carrying system will consist of interior and exterior concrete shear walls. The concrete structural system was chosen to match the surrounding buildings and to provide flexibility in interior space planning. The concrete slab beam system is more compatible with concrete shear wall construction, and also provides better floor vibration and sound control than a steel system. The concrete floor system is more durable and allows for a more impact-resistant floor surface for the laboratories, which may have heavy equipment loads and more wear and tear on the building fabric. The configuration of shear walls should be such that a monolithic slab wall construction with tie concrete beam will provide a better connection to transfer horizontal loads to the shear walls than would a steel moment frame construction.

Due to the stringent vibration criteria, the steel option and flat slab option will not be economical. The steel option would require 36" deep beams and the flat slab would be at least 18" deep to meet vibration criteria for a 25-foot grid layout. The configuration of interior shear walls is such that the exterior moment frames will not attract significant lateral loads.

Column Grid

The column layout for the proposed structural system should form a grid of 20 to 25 feet. This spacing will be economical to satisfy the vibration criteria. For these spans, the beams will need to be 10" x 24" deep at 5 feet on center, and the girder will be 24" x 30" deep. The slab will be five inches thick, and the concrete shear walls will be 12 inches thick. The columns will be 16" square. If column spacing is increased, the beam and girder sizes will be significantly increased.

Foundation

The foundation of the building will be on a conventional spread footing system. The columns will be supported on isolated pad footings and the walls will be supported on a continuous spread footing. The slab on grade will be 5" thick built over a moisture barrier surface consisting of sand and visqueen.

HEATING, VENTILATION, AND AIR CONDITIONING SYSTEMS

Outdoor Design Conditions

Summer, per ASHRAE Climatic Data for Region X (CA, AZ, HI, NV) 0.5% (except as noted), will be based on:

Dry Bulb Temperature = 110°F (UCR request)

Wet Bulb Temperature = 69°F

Outdoor Daily Range = 36°F

Winter, ASHRAE Climatic Data for Region X (CA, AZ, HI, NV) median of extremes, will be based on:

Dry Bulb Temperature = 29°F

Indoor Temperature and Humidity Design Conditions

The design conditions will be as follows:

Office, Conference, and Administrative Areas
Dry Bulb Temp.. 72°F ± 2°F
Relative Humidity:..(not controlled)

Laboratory and Laboratory Support
Dry Bulb Temp. .... 72°F ± 2°F
Relative Humidity:..(not controlled)

Telecommunication Spaces
Dry Bulb Temp. .... 72°F ± 2°F
Relative Humidity:..(not controlled)

Controlled Temperature Rooms
Dry Bulb Temp.. 4°C - 40°C
Relative Humidity...(controlled; non-condensing)

Mechanical Rooms
Dry Bulb Temp..85°F
Relative Humidity...(not controlled)

Heating and Cooling Loads

Internal

The loads for the mechanical system will be based on the following combined electrical and process loading for the various space.

(1) <u>Office, Conference, and Administrative Support Areas</u>

Lighting = 1.5 watts per square foot
Equipment = 3 watts per square foot

(2) <u>Laboratories</u>

Lighting = 2.0 watts per square foot
Equipment = 30 Btu per hour per square foot

(3) Laboratory Support Areas

Lighting	=	2.0 watts per square foot
Equipment (space)	=	60 Btu per hour per square foot
Equipment (chilled water)	=	5 Btu per hour per square foot

Some spaces may have internal loads that exceed the values previously noted. The internal loading for these spaces will be determined based on the electrical and process requirements of the equipment to be located in these spaces.

Occupancy

The occupancy heat rejection will be as follows:

Sensible	=	255 Btuh/person
Latent	=	255 Btuh/person

The number of occupants in each space will be based on the actual occupant density listed in the facility program.

Ventilation Loads and Space Classification

The minimum ventilation rates and space classifications for each occupancy type will be as follows:

All Areas:..25 cfm outside air per person

Laboratory and Laboratory Support Areas (unless noted otherwise on the Room Data Sheets):

Occupied:...........................(10) air changes per hour
Unoccupied:.......................(10) air changes per hour
BSL 3 Areas:......................(12) air changes per hour

Non-Laboratory Areas: .... (4) air changes per hour

Fume Hood Performance Criteria

The hoods will be variable air volume and constant volume type. The associated exhaust system will be sized with the capability to produce an average 100 FPM face velocity (measured over the entire face) at an 18" sash height at the chemical fume hoods and an average 125 FPM face velocity (measured over the entire face) at an 18" sash height at the radioisotope hoods. CalOSHA regulations require the average face velocity to be 100 feet per minute with no point less than 70 fpm as the hood is used. In addition, CalOSHA requires all hoods to contain all contaminants generated therein. These criteria correspond to the following exhaust rates at the listed fume hood types:

4' Chemical Fume Hood (18" sash height)..............................485 cfm
5' Chemical Fume Hood (18" sash height)..............................600 cfm
6' Chemical Fume Hood (18" sash height)..............................785 cfm
8' Chemical Fume Hood (18" sash height)............................1081 cfm
5' Radioisotope Hood (18" sash height).................................785 cfm
6' Radioisotope Hood (18" sash height).................................980 cfm
4' Biosafety Cabinet (type II/B2)..790 cfm

4" Biosafety Cabinet (type II/B3) .... 320 cfm
Snorkel (6"N) .... 150 cfm

The sizing of the exhaust system is based on the following assumptions about location of fume hoods and biosafety cabinets.

(1) Fume hoods are located in cooling load driven labs where supply air required for cooling exceeds supply air required for hood make-up (i.e. relatively low density of hoods in large open labs or alcoves that open into labs). The exhaust system will support a minimum of 33, 6 foot hoods in this location.

(2) Biosafety cabinets are located in ventilation driven rooms where supply air required for hood make-up exceeds air required for cooling (i.e. small enclosed special purpose rooms). The exhaust system will support 40 cabinets in the following arrangement: 6 type II//B2 cabinets located in 6 rooms (one per room). 34 type II/B3 cabinets located in 16 rooms (two per room). 2 cabinets in the BSL 3 lab.

Noise Criteria

The design will target the following average noise levels. The average noise levels in the laboratory areas are based on measurements taken three feet in front of a six foot fume hood. These noise levels do not include noise from equipment or personnel located within these spaces. Actual noise levels may exceed the design noise levels due to the actual type of equipment purchased, installation compromises, workmanship, etc.

Laboratory Areas with Fume Hoods (suggested): .... NC = 50 - 55
Laboratory Areas without Fume Hoods (suggested) .... NC = 45 - 50
Private Offices (from 1999 UCR Guidelines): .... NC = 30
Conference Rooms (suggested): .... NC = 30

Pressure Relationships

Building: .... Positive to ambient
Laboratories: .... Negative to adjacent spaces
Laboratory Special Use Rooms: .... Positive or negative to adjacent spaces (system should have ability to be adjusted as use changes)
Corridors: .... Positive to laboratory
Offices: .... Neutral or positive to adjacent spaces
Toilet Rooms: .... Negative to adjacent spaces

Pressure relationships will be maintained by offsets between supply and exhaust air flow rates.

Outdoor Air Quality Control Methods

Outdoor air intakes will be located to minimize cross-contamination between supply and exhaust air streams. A study of air flow around the building should be performed during the design phase to determine optimum location of air intakes and height of fume exhaust stacks above the roof. Fume exhaust fans will exhaust a constant volume of air at a stack discharge velocity of approximately 3500 fpm.

Central Plant Chilled Water Supply

It is assumed that chilled water from the central plant will be available at this building, at adequate flow rate and temperature to handle the building's cooling load. This is to be verified during the schematic design phase. Chilled water temperature available from the central plant is 46°F and the return water delta T is 14°F.

System Descriptions

(1) Plant Chilled Water System

Chilled water for the building will be provided year round from the Central Utility Plant. It will be extended from Eucalyptus Drive, into the building. Chilled water distribution in the building will be via a tertiary piping distribution loop, with the tertiary pumps located in the basement. Chilled water will be utilized in the building for HVAC cooling and for laboratory equipment cooling.

A two-way control valve will be provided at each point of chilled water use. Speed of variable volume chilled water pumps will be controlled to maintain a preset minimum pressure differential in most remote loop of the system.

Tertiary chilled water supply temperature, set at 46°F, will be maintained by modulating inflow of chilled water into the tertiary chilled water loop. The return water temperature will be 60°F.

(2) Plant Steam System

Plant steam is generated by boilers in the Central Plant. Plant steam is distributed at a nominal pressure of 100 psig. It will be extended from Eucalyptus Drive, into the building. Plant steam will be utilized for building heating, hot water for preheating of outside air, for heating of domestic and industrial hot water and for heating of autoclaves and glasswashers.

One pressure reducing station will be provided at a 1/3-2/3 sizing. The station will utilize multiple self-contained, pilot operated, pressure regulating valves.

Steam condensate will be returned to the Central Plant by electric powered condensate pumps.

(3) Central Fume/General Exhaust System

The building will be served by a zoned exhaust system serving fume hood exhaust, biosafety cabinet exhaust, canopy hood exhaust, chemical storage cabinet exhaust, snorkel exhaust, and general exhaust requirements of the building. Combined fume and general exhaust duct risers from each floor will connect at the roof level to a common plenum, exhausted by a minimum of two centrifugal fans.

The fume exhaust fan stacks for the combined fume and general exhaust fans, one per fan, will discharge at 15 feet above the roof unless determined otherwise by wind tunnel testing.

Sound attenuating devices will be provided at the central exhaust fan's intakes. The exhaust system will operate 24 hours per day, 365 days per year. One fan be on emergency power.

Pressure independent variable air volume exhaust air terminal devices will be provided to serve general exhaust grilles in lab areas. Pressure independent variable volume exhaust air terminal devices will be provided for the fume hoods in rooms where supply air is ventilation driven.

Pressure independent constant volume exhaust air terminal devices will be provided for the fume hoods in rooms where the supply air is cooling load driven. High pressure/high velocity exhaust ductwork will be utilized between the exhaust air terminal devices and the central exhaust plenum. 316 stainless steel will be used for all ductwork downstream of fume hoods. Galvanized ductwork will be used for general exhaust branch ducts, except the last 4 diameters of branch duct length before connection to main, shall be stainless steel. Sound attenuators at the air terminals will not be provided. Instead, sound attenuating flexible ductwork will be provided at general exhaust grilles (but not at hoods) to control noise. In addition, perforated plate dampers will be added at discharge of exhaust air terminals after construction as required to control noise.

A combination indirect evaporative cooling/heat recovery section in the inlet duct to each fan will transfer heat from the exhaust air stream to the outside air stream of each air handling unit to preheat or precool the outside air.

(4) <u>Laboratory and Fume Hood Airflow Control Systems</u>

Fume Hood Control. In the laboratories where the supply air requirement is cooling load driven (i.e. supply air required for cooling exceeds hood exhaust make-up air requirements), the fume hoods will be exhausted on a constant volume basis.

In the laboratories where the supply air requirement is ventilation driven (i.e., hood make-up air requirements exceed required room cooling supply air), the fume hoods will be variable air volume.

Laboratory Airflow Control. The laboratories will be non-stepped variable air volume supply and general exhaust with variable volume fume hood exhaust. The control method employed for achieving laboratory air volume control will be airflow tracking type control (i.e. the exhaust rate from the fume hoods and general exhaust will be totaled for each laboratory and the associated supply air valve will be modulated to maintain a predefined offset between the supply and exhaust air quantity).

(5) <u>Radioisotope Hood Exhaust</u>

The radioisotope hoods will be served by individual dedicated HEPA-filtered exhaust systems. The exhaust systems will operate 24 hours per day, 365 days per year on a constant air volume basis.

The exhaust air will be filtered before discharging into the ambient air. HEPA filters on the exhaust airstream will be located in bag-in bag-out filter housings on the roof. The filter housings will be sized to accept HEPA, prefilter and charcoal filters. Nuclear grade charcoal filters will be added to the housing as required depending on the type of isotope.

(6) <u>Biosafety Level 3 (BSL-3) Exhaust System</u>

The BSL-3 exhaust system will be served by a dedicated HEPA filtered exhaust system. The exhaust system will operate 24 hours per day, 365 days per year and shall be connected to emergency power. The exhaust air shall be filtered before discharging into the ambient air. HEPA filters on the exhaust air steam will be located in bag-in-bag-out filter housing on the roof.

(7) Controlled Temperature Room Cooling System

Controlled temperature rooms will be designed to maintain 4°C for cold room application and 40°C for warm room application. Humidity levels in the rooms will not be actively controlled and should range from 60-90%, non-condensing.

Humidity will be controlled by moisture removal at the cooling coil.

Room temperature will be centrally monitored by the building management system and locally monitored by digital recorders at each individual room. Both central and local alarms will be annunciated if the temperature in any room nears a critical level.

(8) Combined Preheat/Reheat System

Combined preheat and reheat water convertors will utilize steam from the Central Utility Plant to generate both preheat and reheat water. The steam will pass through a pressure reducing station and will be supplied to the convertors at 70 psig. The preheat and reheat water system will be designed to generate water at 140°F.

Two shell-and-tube, steam-to-water convertors will be utilized to generate the reheat water. Each convertor will be sized to provide 60% of the design load.

The preheat/reheat water piping system will consist of a variable flow water loop. Two base mounted, variable volume pumps will be utilized for the water circulation. Each pump will be capable of providing 60% of the design flow. Variable frequency drives will be provided at the pumps to minimize system pressure fluctuations at varying flow conditions.

A ten percent sidestream water filter will be provided to remove debris from the piping system.

(9) Heat Recovery System

An indirect evaporative heat recovery coil at the inlet to each air handler will preheat the outside air in the winter months and precool the outside air in the summer months. Heat would be recovered or rejected in the exhaust air stream via an indirect evaporative heat recovery system. Heat will be transferred between exhaust and outside air units using water filled piping loop and circulating pump.

(10) Smoke and Fire Control System

An engineered smoke control system is not required. Upon smoke detection the air handling units will shutdown, but fume exhaust fans will continue to run to maintain operation of hoods. The exhaust fans will run at approximately 50% capacity (to be field adjusted during air balancing) to prevent labs from becoming overly negative and allow safe exiting.

(11) Building Central Air Handling System

The building will be served by two equally-sized, variable volume, custom factory-fabricated rooftop air handling units with 2" thick double walls.

The air handling units will be designed as heating-cooling, single duct, reheat type to provide minimum outside air with a 100% outside air economizer on a constant volume basis. The units will operate 24 hours per day, 365 days per year. Supply fans will be plug type. Variable frequency drives will provide supply and return fan volume control to a signal from a duct mounted static pressure sensor. Air handling unit and return fan speeds will be modulated simultaneously as required by building load. Each air handling unit will have an indirect evaporative heat recovery coil in the outside air stream. Each air handling unit will have 30% efficiency prefilters and 85% efficiency final filters.

The supply distribution system will consist of high-pressure externally insulated galvanized steel ductwork with pressure-independent, electrically-actuated supply VAV air terminal devices; reheat coils; low-pressure, externally insulated ductwork downstream of air terminals; and diffusers. There will be no lined ductwork on the project. Sound attenuators at the air terminal devices will not be provided. Instead, sound attenuating flexible ductwork with woven nylon fabric type lining will be provided at the supply diffusers to control noise. In addition, perforated plate dampers will be added at the inlet of supply or exhaust air terminals after construction as required to control noise.

Ductwork will be constructed in accordance with SMACNA standards and duct leakage shall not exceed 1% of the design volumetric flow rate for high pressure ductwork and 2% for low pressure ductwork. The use of sound attenuating flexible duct at diffusers and grilles will be limited to six feet in total length to minimize duct static pressure losses.

Supply air will be distributed through riser duct(s) and horizontal main ducts on each floor. Generally, there will be one temperature control zone for each laboratory and one zone for each group of offices with a common exterior exposure.

(12) Biosafety Level-3 Air Handling System

The BSL-3 laboratory will be served by a dedicated air handling unit. The unit will be designed as heating-cooling single duct systems to provide 100% outside air and will have the same construction and components as the central air handling system. The unit will operate 24 hours per day, 365 days per year and shall be connected to emergency power.

Table 5-3: Mechanical Equipment Schedule

Equipment	*Manufacturer*	*Size (Each)*	*Total Quantity*	*Quantity Operating During Emergency Power*
Air Handling Unit	Pace Roof Top Unit	55,000 cfm @ 8" SP, 150 HP	2	1
Air Handling Unit (BSLL3 Lab)	Pace Roof Top Unit	1,500 cfm @ 8" SP, 5 HP	1	1
Return Fan	Barry	8,600 cfm @ 2" SP, 7.5 HP	1	1
Exhaust Fan (Fume Exhaust)	Barry	50,000 cfm @ 6" SP, 100 HP	2	1
Exhaust Fan (Radioisotope Hood)	Barry	980 cfm @ 7" SP, 5 HP	1	1
Exhaust Fan (BSL3 Lab)	Barry	1,500 cfm @ 7" SP, 5 HP	1	1
Preheat/Reheat Convertor	B & G	5,500 MBH	2	
Chilled Water Pumps	B & G	20 HP	2	1
Hot Water System Pumps	B & G	5 HP	2	1
Steam Condensate Pumps	Domestic Pump	(2) 5 HP	1	1

ELECTRICAL SYSTEMS

Load Calculation Criteria

Design Voltages

Primary Voltage .... 12,000V, 3 phase, 3 wire

Secondary Voltage
Normal .... 480Y/277V, 3 phase, 4 wire
208Y/120V, 3 phase, 4 wire

Standby/Emergency .... 480Y/277V, 3 phase, 4 wire
208Y/120V, 3 phase, 4 wire

230V will be provided at selected equipment locations via buck-boost transformer.

Design Loads

Overall Connected Volt-Amperes (VA) per Square Foot:

Office	Lighting	1.3
	Receptacle	5.0
Laboratory	Lighting	2.0
	Equipment/Receptacle	20
Laboratory Support	Lighting	2.0
	Equipment/Receptacle	35
Circulation, Lobby and Toilets	Lighting	0.8
	Receptacle	0.5
Storage	Lighting	0.5
Mechanical/Electrical Rooms	Lighting	1.5
	Power	Actual MotorH.P.

Equipment Sizing Criteria

(1) Branch Circuit Load Calculations

Lighting .... Actual installed wattage

Receptacles .... 180 VA per outlet

Surface Wireway .... 180 VA per outlet

Special Outlets/ .... Actual installed wattage of
Fixed Equipment equipment served

Motors .... 125% of motor wattage

(2) Demand Factors

Lighting .... 125% of total wattage (continuous load)

Receptacles .... 100% of first 10 kVA plus 50% of balance

Motors .... 125% of wattage of largest motor plus 100% of wattage of all other motors

Fixed Equipment.................. 100% of total wattage

(3) Minimum Bus Sizes

480Y/277V Normal and Emergency Lighting Panels 100A
480Y/277V Normal and Emergency Equipment Panels 225A
208Y/120V Standby Lab Equipment Panels 225A
208Y/120V General Receptacle Panels................................225A
480V Motor Control Center..600A

(4) Feeder Sizes

Feeders from service entrance to distribution panels to be sized the same as the distribution panel bus size.

Feeders from distribution panels to secondary panels to be sized the same as the secondary panel bus size. Distribution panels and secondary panels will be sized for a minimum of 25% future capacity and space availability.

(5) Design Lighting Levels

Average Maintained Footcandles

Office:...50
Conference:...50
Laboratory, Support and Technical Areas:
Bench and Table Top...90-100 (direct)
....70-80 (indirect)
Elsewhere ....65 (direct)
....55 (indirect)
Circulation, Lobby and Toilets...20
Storage:...10
Mechanical/Electrical Rooms:
Task 40
General 10-20
Exterior Lighting:...1-2

The design lighting levels listed above are general. Refer to Room Data Sheets for specific requirements.

(6) Receptacle Design Criteria

Laboratory and Laboratory Support. Dual channel pre-wired aluminum raceway (similar to Isoduct) will be installed at central island benches, around perimeter of room at laboratory benches or where equipment is located in laboratory support areas. 120V, 20A duplex receptacles will be mounted in the bottom compartment of the raceway, typically at 24" on center. The top compartment of the raceway will house communications outlets.

In general, circuits serving laboratory areas will have three to four duplex receptacles per circuit, with adjacent receptacles connected to alternate circuits.

Selected equipment, including fumehoods, biosafety cabinets, incubators and refrigerators will be served with dedicated receptacles.

208V receptacles will be provided as required, quantities, locations and configurations to be determined in subsequent design phases.

Offices. Enclosed offices will be provided with one 120V, 20A duplex receptacle per wall.

Conference Rooms and Common Areas. At least one 120V, 20A duplex receptacle will be provided per wall, 12'-0" on center minimum.

Corridors. One 120V, 20A duplex receptacle every 40'-0" on center minimum.

Building Support (Equipment Rooms, Storage). One 120V, 20A duplex receptacle per wall or one every 150 square feet, whichever is greater.

Separate neutral conductors for each circuit shall be provided in all computer and microprocessor-intensive areas, including office areas. All other areas will utilize oversized neutral conductors.

Systems Descriptions

Normal Power Service and Distribution System

The Biological Sciences Building will be served with electrical power from existing underground campus 12 kV medium voltage distribution system. Point of connection is at Eucalyptus Drive. Two new 12 kV feeders will be routed underground to medium voltage 15 kV unit substation, which will be located in the main electrical room in the basement of the Biological Sciences Building. The 12 kV feeders will be installed in 2 - 5" PVC conduit, red concrete encased ductbank with 36" cover, per the UCR Unit Substation Standard 16310.

Building electrical equipment will distribute power to loads as follows:

480V, 3 phase, 3 wire......................Motors 1/2 HP and larger
480Y/277V, 3 phase, 4 wire.............Fluorescent lighting, large laboratory equipment
208Y/120V, 3 phase, 4 wire.............Receptacles, specialized lights, motors under 1/2 HPand small equipment

The unit substation will consist of a 15 kV selector switch, cast coil, dry type transformer and a 480Y/277 volt, three phase, four wire switchgear.

The unit substation will feed 480Y/277 volt lighting and power panels and dry type 480-208Y/120 volt distribution transformers, which will be located in floor electrical rooms. These transformers will feed 208Y/120 volt secondary distribution switchboards located in the floor electrical rooms

208Y/120 volt branch panelboards will be located in floor electrical rooms, laboratories or non-rated corridors on the same floor as area served.

Laboratory branch panelboards will be located in the laboratory area served to minimize branch circuit length, with a minimum of one panelboard for each two to four 11' laboratory planning modules. Laboratory panelboards will be equipped with main circuit breakers.

The unit substation will also provide power to motor control centers (MCCs), which will serve mechanical motor loads.

A central UPS system will not be provided. Point-of-use UPS systems will be provided in the laboratories where required. The controls contractor will provide UPS power for the Building Management System (BMS). The telecommunications contractor will provide UPS power for telecommunications needs.

Transient voltage surge suppressors (TVSS) will be provided at the floor 208Y/120 volt secondary distribution switchboards.

Standby/Emergency Service and Distribution System

Standby/Emergency power will be provided by an on-site diesel engine generator set and distributed as follows:

Emergency Power (legally required)

- 480Y/277V, 3 phase, 4 wire .... Emergency egress and exit lighting
- 208Y/120V, 3 phase, 4 wire .... Fire alarm, controls, telephone and data system

Standby Power (not legally required)

- 480V, 3 phase, 3 wire .... Motors 1/2 HP and larger
- 480Y/277V, 3 phase, 4 wire .... Fluorescent lighting, large laboratory and mechanical equipment.
- 208Y/120V, 3 phase, 4 wire .... Receptacles, motors under 1/2 HP, small equipment and security

Refer to the Mechanical and Plumbing Equipment Schedules for a list of all mechanical and plumbing equipment to be served with emergency/standby power.

An existing rooftop gas generator currently serves Spieth Hall and the Life Sciences/Psychology wing. During detailed design, consideration will be given to consolidating these buildings' and the Biological Sciences Building's emergency and standby power requirements onto a single diesel emergency generator. This generator will provide power at 480Y/277 volt, 3 phase, 4 wire and will be located exterior to the buildings in a central location.

If not determined feasible to consolidate the emergency and standby loads of these buildings, a 400 kW/500 kVA emergency generator serving only the Biological Sciences Building will be connected to the unit substation. This generator will provide power at 480Y/277 volt, 3 phase, 4 wire and will be located in the basement of the building as close as possible to the main electrical room.

Emergency generator will consist of removable weatherproof sound attenuated enclosure, engine, generator, controls, UL listed sub-base double wall fuel tank which will provide 24 hours of full load engine operation, exhaust system, radiator, batteries, starting system and generator power circuit breaker. Remote annunciator panel will be provided in main electrical room. The emergency generator will be based on UCR Standard Emergency Electrical Generator Set 16620.

Automatic transfer controls will be via automatic transfer switches and will be located in main electrical room.

All emergency loads will be physically separated and supplied through a separate automatic transfer switch and an independent distribution system from the standby loads. This is based on UCR Standard Automatic Transfer Switch 16609.

Grounding System

All parts of the power distribution system will be provided with an equipment ground conductor. This system will extend from the building service transformer to the branch circuit load or device.

The reference ground for the equipment grounding system will be established from a structural ground grid as follows:

> A No. 4/0 AWG bare copper ground wire will be installed at 30" below grade around the entire perimeter of the building. 3/4" x 10' driven copper ground rods (test wells) will be installed and connected to this ground loop at not greater than 200 foot intervals with a No. 4/0 AWG bare copper conductor. Steel columns in exterior walls will also be connected to this ground loop at intervals not to exceed 60 feet. Interior steel columns will be connected to the exterior ground loop on each side of the building at intervals not to exceed 200 feet with a No. 4/0 AWG bare copper conductor.
>
> A wall mounted copper ground bus will be located in the main electrical room and floor electrical rooms. The main electrical room ground bus will be connected to the exterior ground loop and a separate insulated ground wire in conduit will be provided from the main electrical room ground bus to each floor electrical room ground bus.
>
> A No. 4/0 AWG bare copper grounding electrode conductor will be extended to all telephone closets, so that those systems can be properly bonded.
>
> A separate ground wire will be provided for all circuits.

Lighting Systems

A complete lighting system for all indoor and site illumination will be provided. The indoor lighting system will consist of energy efficient fluorescent fixtures. Incandescent fixtures will be provided in selected areas.

The outdoor lighting system will consist of high intensity discharge (HID) fixtures. Site lighting fixtures will be specified to match existing university standards.

Emergency/night lighting will be provided by unswitched branch circuits. These unswitched branch circuits will be fed from emergency lighting panel.

(1) Lighting Fixture Types

Office:	2' x 2', 2, 3 or 4 lamp fluorescent troffers with deep cell parabolic louvers, or suspended direct/indirect fluorescent fixtures.
Laboratory:	2' x 4', 3 or 4 lamp lensed fluorescent troffers, or suspended direct/indirect fluorescent fixtures.
Laboratory Support:	2' x 4', 3 or 4 lamp lensed fluores-cent troffers.
Common Areas:	Premium quality architectural fluorescent fixtures.
Circulation:	Recessed fluorescent fixtures or wall mounted compact fluorescent sconces.
Storage:	2 lamp lensed fluorescent troffers.
Mechanical/ Electrical Rooms:	2 lamp fluorescent, surface or pendant mounted, open industrial strip fixture.

Fixtures in cold rooms will be rated for intended applications.

Fixtures in wash rooms and wet areas will be UL listed for wet location.

EXIT signs will be State Fire Marshall approved LED type, located in all paths of egress in accordance with requirements of California Title 24.

(2) Lamps and Ballasts

In general, fluorescent lamps will be T8, 3500 degrees Kelvin color temperature, with a color rendering index (CRI) of 75 or greater.

Metal halide lamps will be clear with a color rendering index (CRI) of 60 or greater. High pressure sodium lamps will be clear.

Fluorescent ballasts will be high frequency electronic type with less than 10% total harmonic distortion. High intensity discharge ballasts will be high power factor, constant wattage type.

(3) Lighting Control

All lighting will be controlled to meet or exceed the requirements of California Title 24 including, but not limited to, building lighting shut-off, dual level switching and daylight switching.

In general, indoor lighting controls will consist of low voltage switches controlled by lighting control system and room occupancy sensors. Outdoor lighting controls will utilize photocells and time switches with line voltage manual override switches. This is based on UCR Standard Lighting Fixtures 16510.
Dimmers will be provided in all conference rooms and darkrooms as required.

Information and Telecommunication System

The Biological Sciences Building will be served with a complete voice/data/video communication system from the existing campus system. 2 - 4" conduits will be routed from the point of connection at the Spieth/Life Sciences/Psychology building Main Distribution Frame (MDF) to the building MDF located in the basement of the Biological Sciences Building. One of the conduits is designated for the fiber optic system and the other is designated for the copper tie cable.

The Main Distribution Frame (MDF) Room and Intermediate Distribution Frames (IDF) Rooms will house terminal equipment and active electronics for voice, data, and video information services. Others will provide the active electronics and cable plant (wire and outlets), while the infrastructure will be provided in this project.

The MDF located on the first floor will be approximately 200 square feet. IDFs will be minimum 70 square feet. We anticipate the need for one MDF on the first floor and one IDF on each of the first, second and third floors (total of three). This will result in circuit lengths less than 250'.

The IDFs will be stacked vertically in the building and connected with multiple 4" conduit sleeves for distribution of voice, data, and video riser cables. Specific quantities will be determined in the design development phase, but at this time we anticipate at least two 4" conduits from the MDF to each IDF, or an equivalent pathway capacity.

The MDF and IDFs will be provisioned with emergency power receptacles, a convenient connection to the building grounding electrode system, fire retardant plywood material on the walls, lighting, and access control.

Horizontal distribution from the MDF and IDFs to station outlets will be supported by a combination of cable tray and conduits. Cable tray will be routed in the corridor ceiling area and conduit will be routed from the cable tray (within 3') to the individual station locations.

Station outlet configurations will consist of wall mounted telephones, wall mounted combination outlets (voice, data, and video), and surface mounted raceway combination outlets (voice and data). A ring down phone without dialing capabilities will be provided in the elevator. Exact locations of station outlets will be determined during the design development phase of this project.

The following cable plant information was provided by Brad Alms with UCR Telecommunications:

> *Copper Connection Point.* Install 200 pairs from the Biological Sciences Building MDF, to the Life Sciences Psychology Building MDF Room 405. Terminate this cable in the Biological Sciences Building on 110 style blocks and use 66 style blocks on the existing back board in room 405 of the Life Sciences Psychology Building.
>
> *Fiber Connection Point.* Install a 2-cell fiber tube cable from the Biological Sciences Building new fiber termination unit (FTU) in the new MDF, to the Life Sciences Psychology Building MDF Room 405, where it will be terminated *into* existing FTU 5.1.6. This tube cable is the duct system of the 6-strand air blown fiber.
>
> Install 6-strands multi-mode fiber from Biological Sciences Building MDF, to the Life Sciences Psychology Building MDF Room 405 existing backboard. Terminate all strands, both ends. This project necessitates installing a new FTU in the Biological Sciences Building MDF, and terminating the other ends in the existing FTU 5.1.6 of the Life Sciences Psychology Building MDF Room 405.

Fire Alarm System

The fire alarm system will be an electronically multiplexed voice communication system. Remote transponder panels will be used to provide supervised amplifiers and signal circuits for audio/visual devices and magnetic door holders. The system will utilize individual addressable photoelectric smoke detectors, heat detectors, addressable manual pull stations, and addressable monitor and control modules. The system will monitor all sprinkler supervisory and water flow switches and will interface with elevators, HVAC smoke control and smoke fire dampers. The fire alarm signal will be via telephone to the campus police. The system is based on UCR Standard Fire Detection and Alarm System 16720.

Security System

The security system will be capable of providing door closure, card reader, magnetic contact alarms and motion detectors. The system will also have provisions for future CCTV capability. The security alarm signal will be via telephone line to the campus police. The system is based on UCR Standard Card Access System 16721 and Security Instruction Alarm System 16722.

Security components and panels will not be located in mechanical rooms, electrical rooms, MDF or IDFs. All security components and wiring will be provided by others, while the infrastructure will be provided in this project.

Table 5-4: Electrical Equipment Schedule

Equipment	*Manufacturer*	*Size (Each)*	*Total Quantity*	*Remarks*
Unit Substation	Cutler-Hammer, Square D, GE	2,000A, 480Y/277V, 3 PH, 4W	1	A.I.C. to be Determined
Transformer	Cutler-Hammer, Square D, GE	1,500 kVA, 12 kV-480Y/277V, 3 PH, 4W	1	Cast Coil Dry Type
Generator	Caterpillar, Kato, Onan	600 kW/750 kVA, 480Y/277V, 3 PH, 4W	1	Diesel
Sec. Transformer	Cutler-Hammer, Square D, GE	225 kVA, 480V/208Y/120V	3	Dry Type
Lighting Panel	Cutler-Hammer, Square D, GE	42 CKT, 100A Mains, 3 PH, 4W	3	A.I.C. to be Determined
Power Panel	Cutler-Hammer, Square D, GE	42 CKT, 225A Mains, 3 PH, 4W	TBD	Final Quantity to be Determined
Lab Panel	Cutler-Hammer, Square D, GE	42 CKT, 225A Mains 3 PH, 4W	TBD	Final Quantity to be Determined
Emergency Distribution Panel	Cutler-Hammer, Square D, GE	600A Mains, 3 PH, 4W	1	Final Circuit Quantity to be Determined
Distribution Panel	Cutler-Hammer, Square D, GE	400A Mains, 3 PH, 4W	3	Final Circuit Quantity to be Determined
Emergency Sec. Transformer	Cutler-Hammer, Square D, GE	30 kVA, 480V-208Y/120V	3	Dry Type

PLUMBING AND FIRE PROTECTION SYSTEMS

System Descriptions

Domestic Hot & Cold Water (Potable)

Potable hot and cold water will be provided for all toilet rooms, showers, emergency shower/eyewash units, and all other fixtures and devices that require a potable water supply. Building cold water source will be extended from the existing campus water distribution system in the street, to the building property.

Once inside the mechanical room, the water service main will branch out with 2 cold water mains, 1 for potable water, and 1 with a (RPBP) reduced pressure backflow preventer to serve the industrial cold water system. A duplex (hi/lo) readout water meter will be installed immediately, upstream of both cold water mains.

Duplex pressure reducing valve set-ups will be provided upstream of the potable and industrial cold water service. Campus water pressure is above 80 psig. These pressure reducing valves will be sized as follows: 1 for 75% of the design flow, and 1 for 33% of the design flow.

Duplex steam to water, water heaters, will be provided to produce hot water for the 120°F system. (120°F) hot water system will be circulated back to water heaters from the building with the use of a continuous duty pump.

The potable hot and cold water distribution piping will be sized for a maximum velocity of 8 fps. Water conservation faucets and fixtures will be utilized to meet and/or exceed required code minimums.

A separate potable cold water line originating in the mechanical room, will supply water to the emergency shower/eyewash fixtures. This line will be monitored by an in-line flow sensor, that in turn is connected to an electric alarm gong and building security system for 24 hour observation; or other location(s) as directed by the University Representative.

Equipment and Materials. The domestic hot and cold water systems shall be Type L copper tubing with wrought copper fittings and lead free soldered joints.

All potable hot water piping will be insulated. Potable cold water main(s) in the mechanical room will be insulated if required by mechanical room ambient temperature.

Industrial Hot & Cold Water (Non-potable)

Industrial hot and cold water will be provided to serve all laboratory and process related equipment, lab sinks, cup sinks, and devices that require an industrial water supply. Industrial cold water will also serve HVAC equipment as required. The industrial cold water distribution system will be isolated from the potable system by providing a reduced pressure backflow preventer (RPBP's) at source point.

Duplex steam to water, water heaters, will be provided to produce hot water for the 140°F system. (140°F) hot water system will be circulated back to water heaters from the building with the use of a continuous duty pump.

Equipment and Materials. The industrial hot and cold water systems shall be Type L copper tubing with wrought copper fittings and lead free soldered joints.

All non-potable hot water piping will be insulated. Non-potable cold water main(s) in the mechanical room will be insulated if required by mechanical room ambient temperature.

Pure Water System

The Pure Water system will provide a single grade of Pure Water to all points of use throughout the Labs. The system will provide water complying with ASTM Type II water quality specifications as follows:

The water quality requirements at the use points are as follows:

Resistivity (minimum)... 2 megohms-cm

Conductivity (maximum) .... 0.5 micromhos/cm

T.O.C. (maximum): ....500 ppb

Bacteria (maximum): ....1000 CFU/ml

High purity water (10-18 megohm) can be produced by locally polishers such as Millipore "Super-Q".

The tank will be sized to have the capacity to supply purified water to all users in case of system shutdown for a determined number of hrs set by the university.

The distribution system will be designed to continuously circulate at 3 to 7 feet per second under a maximum draw or no draw conditions.

The building pure water system will be extended from the existing campus DI water loop and into the mechanical room.

Equipment and Materials. The Pure Water system equipment will consist of a multimedia filter, duplexed water softeners, exchangeable carbon filters, reverse osmosis system with TFC membranes. FDA vinylester-lined fiberglass tank equipped with 0.2 micron hydrophobic filter, 316L stainless steel centrifugal distribution pumps, resistivity monitored mixed bed exchange columns, hydrophilic 0.45 micron water filters, 254 nanometer ultraviolet light, hydrophilic 0.2 micron final water filter, and a 185 nanometer UV light (TOC reducing) in the return lines of the distribution loop.

The system will be controlled by a PLC. The local control panel will display the *tank* level, system resistivity, system TOC, and loop flow rates. The PLC will send a discrete alarm signal to the Building Management System (BMS). The BMS will not provide any water system control functions.

Acceptable materials for the pure water distribution system will be (butt welded) (fusion type) schedule 80, unpigmented, flame retardant polypropylene piping and fittings, or (butt welded) 316 stainless steel piping and fittings.

The polypropylene piping will be continuously supported in a hung "V" channel, with 1/8"/ft slope in the direction of flow. Horizontal expansion loops will be installed in any straight run longer than 100 feet. Distribution system will employ individual loops dedicated for each floor. Dead legs in the distribution system will be kept to a minimum. Where unavoidable, they will not be longer than six (6) times the inner diameter of the distribution piping.

Points of use will utilize a manual type - "zero" Dead Leg Diaphragm Valve with bottom outlet. The supply and return pipes or will drop within the utility chase at the peninsula and island benches or at wall for other required connections.

System monitoring and/or control will be as deemed acceptable by UCR design guidelines. All DI return water will be circulated continuously to the main campus pure water loop system.

Compressed Air

The main compressed air system originates in the Central Utility Plant, and is distributed as a campus loop.

Compressed air pressure from the campus main will be verified during the schematic phase. Tentatively, it is assumed that a receiver tank, filter and dryer will be provided in the mechanical room. The system downstream of filter and dryer will be distributed at 100 psig. The 100 psig system will be reduced so that a 15 psig system serves each laboratory. Only 1 compressed air main riser will rise up through the building. From this main riser, all system branches on each floor will be extended. Other PRV stations can be provided to regulate pressure for other desired settings if necessary.

The distribution system will be sized so that the uniform friction loss does not exceed 10% of the delivered pressure and the velocity does not exceed 4,000 fpm.

Compressed air will be extended from the campus main and into the mechanical room.

> *Equipment and Materials.* The compressed air piping system shall be Type L copper tubing with wrought copper fittings and brazed joints.

Laboratory Vacuum

The central laboratory vacuum system will be located in the Mechanical room of the building. Provide laboratory vacuum to all vacuum inlets and laboratory equipment designated in the program.

The depth (pressure required) of the laboratory vacuum system will be verified during the schematic phase.

The system will be assumed capable of extracting 0.5 Scfm at each lab inlet (turret) @ 23" of vacuum. The piping system will be sized to maintain an approximate (constant) overall system pressure loss of 2" Hg, without exceeding a velocity of 6,000 fpm.

> *Equipment and Materials.* The lab vacuum piping system shall be Type K copper tubing with wrought copper fittings and brazed joints.
>
> The system will include rotary vane type duplex pumps, a receiver tank, controls, and distribution piping. System controls shall be designed to periodically operate the vacuum pump on a purge cycle, which shall be isolated from the process, to purge *any* condensed vapors from the oil to alleviate any possible problem. The purge cycle will be maintained for at least 15-minutes of operation. The cycle of all pumps shall be timed to provide even wear on the system.

Equipment vacuum piping in sizes larger than 3 in size will have drainage fittings.

Specialty Gases

Specialty gases (Oxygen, Carbon dioxide, Propane, etc.), of types as necessary, will be furnished and maintained by the individual user groups within the laboratories under a separate service contract.

Equipment and Materials. Specialty gases will be provided by local gas cylinder stations located in designated closets adjacent to laboratories. Multi-cylinder manifolds with regulators and wall brackets will be provided. Automatic changeover will be provided, with provisions to send low gas pressure alarms to the Building Management System.

Specialty gases will be distributed in Type 316L stainless steel tubing with orbital welded fittings and joints. Copper tubing is an option for gas services not requiring a high degree of purity. Determination of purity levels shall be determined in the design phase of the project.

Natural Gas

Natural gas will be distributed centrally throughout the building. Laboratories will be supplied with low pressure gas at 7" W.C. or lower.

The natural gas will be supplied by a campus loop. It will be extended into the building.

Equipment and Materials. The use of a (rated) natural gas pressure regulator and meter will be required upstream of point of entry into mechanical room. If pressure regulator is not located at grade, outside building, then it must be vented to atmosphere. Gas meter and pressure regulator cannot be located in a confined or inaccessible space, or under stairs.

Low pressure natural gas will be distributed in Schedule 40 black steel piping with malleable iron threaded fittings.

Fire Protection

All areas of the building will be fully sprinklered by a total coverage, hydraulically designed automatic wet sprinkler system, based on Ordinary Hazard, Group II, with a maximum sprinkler head spacing of 130 square feet. The fire protection system that will serve the new building, will be supplied from the campus fire main distribution system, via a detector check valve and post indicating valve. The use of a fire department siamese hose connection at building wall will also be required. The new system will be supplied by a 6" water main to the building that will be extended from the campus main. The 6" main will serve wet sprinklers. Each floor will be considered a separate zone.

Equipment and Materials. Piping for the wet sprinkler system will be Schedule 40 black steel with malleable iron threaded fittings.

Sanitary Waste

A sanitary waste and vent system will be provided for sanitary waste producing fixtures and equipment. All fixtures will be individually trapped and vented to atmosphere.

The building sanitary sewer system will flow by gravity to a location 5'-0" beyond the building exterior. It will then be extended from the building to the campus sanitary sewer system.

Equipment and Materials. Sanitary waste and vent piping above and below ground will be service weight hubless cast iron pipe. Couplings for below ground installation shall be approved cast-iron couplings, and above ground shall be approved stainless steel couplings. Below ground piping can also be service weight cast iron pipe, bell and spigot, with push (neoprene) joints.

Storm Water

A storm water drainage systems will be provided for the building to convey rain water from primary and overflow roof drains.

The building storm water drainage system will flow by gravity to a location 5'-0" beyond the building exterior. It will then be extended to the campus main. Overflow roof drains will spill to grade with the use of downspout nozzles at termination points.

Equipment and Materials. Storm water piping materials will be identical to the sanitary waste system.

Laboratory Waste

Laboratory waste is produced by lab sinks, cup sinks, floor drains and lab appliances. It is assumed that lab waste is primarily clear water from washing, rinsing and dilution functions, generally without solids. The laboratory waste effluent will flow to a sampling well, prior to discharge to the campus sanitary sewer system.

Equipment and Materials. The piping material for the laboratory waste system will be flame retardant corrosion resistant Schedule 40 polypropylene with a combination of both mechanical and fusion joints for above ground, fusion welded joints, Schedule 80 polypropylene, for below ground. No threaded joints allowed anywhere on the system.

NOTE: A separate system that employs the use of a portable chemical effluent collection set-up at certain lab sinks, will be used where directed by the University Representative.

Table 5-5: Preliminary Plumbing Equipment Schedule

EQUIPMENT	MANUFACTURER	SIZE	QUANTITY	NO. ON EMERG. PWR	REMARKS
Pure Water Storage Tank	Raven	500 gallons	1	N/A	FRP
Pure Water Distribution Pumps	Tri-Clover	60 GPM @ 80 PSIG TDH	2	2	316L S/S, 2 Standby, 5 HP Motor each
Pre-treatment and Reverse Osmosis Skids	US Filter	2000 GPD	1	1	5 HP Reverse Osmosis Pump Motor and others
Polishing System	US Filter	2,000 GPD	1	N/A	
Domestic Water Heaters	Patterson-Kelly, Aerco	40-140°F Temp. Rise 60 GPM each	2	N/A	Steam to Water, Double Wall
Laboratory Vacuum Pumps	Busch, Rietschle, Squire-Cogswell	35 Scfm	1	N/A	Air Cooled, Duplex (2) 5 HP
Gas Meter	Per PG&E	600 CFH	1	N/A	

The following pages contain the space requirements for the major program areas. These summaries provide a complete room list for each area indicating the required assignable square feet (asf) per room.

The Program area totals and the total assignable square feet for the facility are as follows:

Table 6-1: Space Requirement Summary

SPACE TYPE	*asf*	*%*
Offices and non-laboratory space	4,764	15%
Laboratory space	17,302	55%
Laboratory support space	9,600	30%
TOTAL	31,666	100%
PROJECTED GROSS AREA	54,500	gsf

OVERALL SUMMARY: AREA RELATIONSHIPS	*RATIO*
Net area/gross area (projected efficiency)	0.58
Laboratory support/(Laboratory+Laboratory support)	0.36
Total laboratory nsf/gsf	0.49

AVERAGE SPACE ASSIGNMENT (average space per faculty)	*asf*
Laboratory space	786
Dedicated support space (discretionary assignment)	305
Office space	130
Portion of shared laboratory and office support space	130
TOTAL	1,351

Note: *Total average space assignment is exclusive of any computational space assigned in the Life Sciences / Psychology Wing.*

Table 6-2: Room List

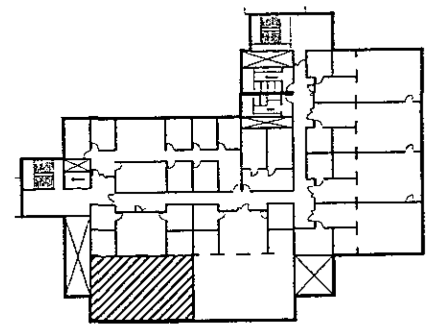
Room No	Room Name	qty	asf	Laboratory asf	Laboratory Support asf	Non-Laboratory asf	Subtotals asf
1.0	**Research Laboratory**						
1.1	Laboratory	22	676	14,876			
1.2	Special use room	22	110		2,426		
1.3	Fume hood alcove	22	110	2,426			
	Research laboratory			17,301	2,426	0	19,727
2.0	**Shared Support Spaces**						
2.1a	Entry/equipment vestibule	1	194		194		
2.1b	Entry/equipment vestibule	11	398		4,375		
2.2	Controlled temperature room	3	194		583		
2.3	Autoclave room	3	130		390		
2.4	Central glasswash	1	226		226		
2.5	Radioisotope room	1	226		226		
2.6	Dark room	1	163		163		
2.7	BSL3 suite	1	462		462		
2.8	Vestibule	1	293		293		
2.9	Ice/equipment	3	70		210		
2.10	Storage	1	53		53		
	Shared support space			0	7,175	0	7,175
3.0	**Office Space**						
3.1	Faculty office	22	130			2,860	
3.2	Conference room	3	264			793	
3.3	Office support	3	371			1,112	
	Office space			0	0	4,764	4,764
	TOTALS			**17,301**	**9,600**	**4,764**	**31,666**

Space Requirements and Room Diagrams

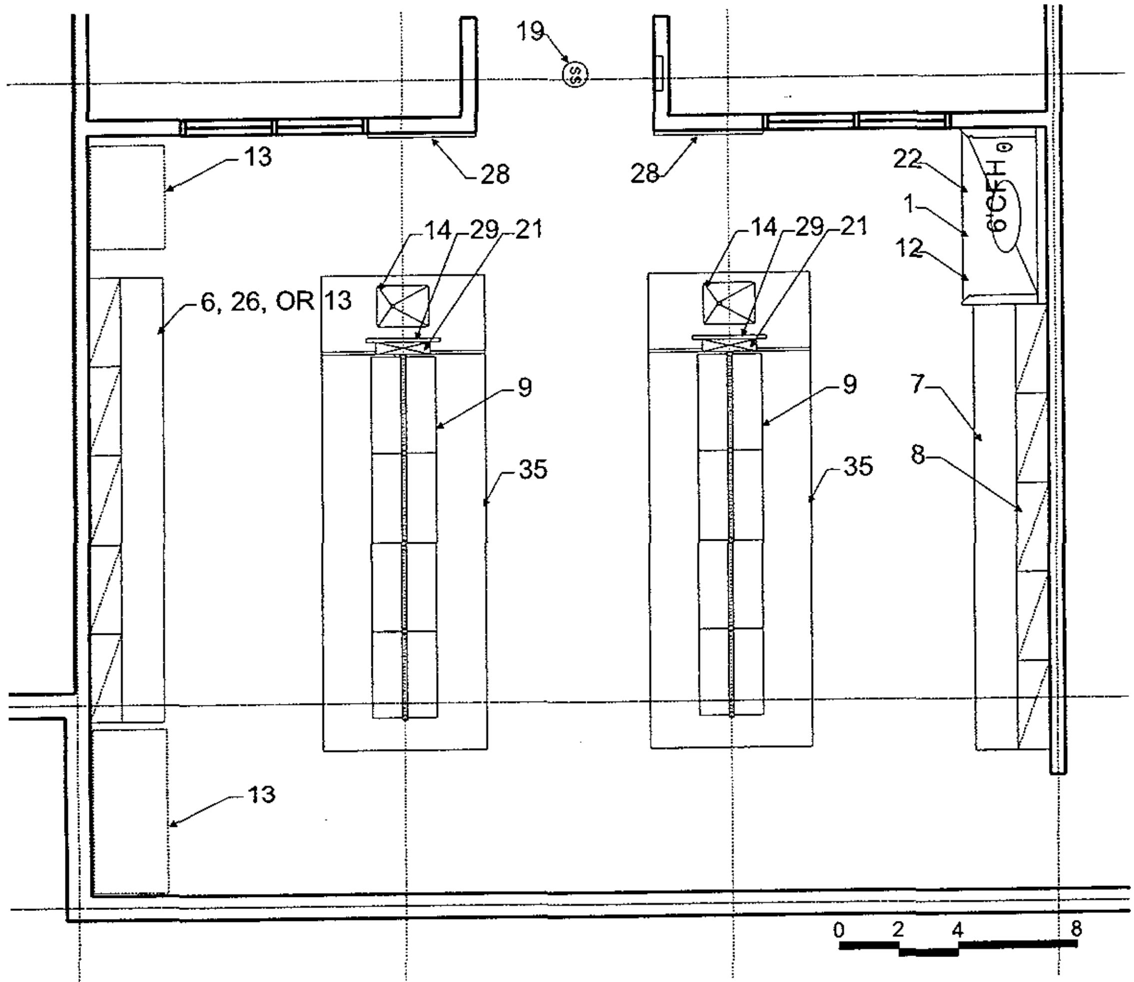
The following pages describe the general requirements of the individual spaces for the new facility. For each assignable space a Detailed Space Requirement, Room Diagram, and Equipment Schedule is provided.

- The Detailed Space Requirement sheet identifies design requirements for each space including laboratory services, exhaust devices, electrical power, daily use, environmental conditions, equipment and chemical use and storage.
- The Room Diagram provides a program level diagram of a room satisfying the identified requirements. The layout of the room may evolve during the design of the project.
- The Equipment Schedule to be used in each space identifies present and projected future equipment functions.

Space Requirements


Typical Location

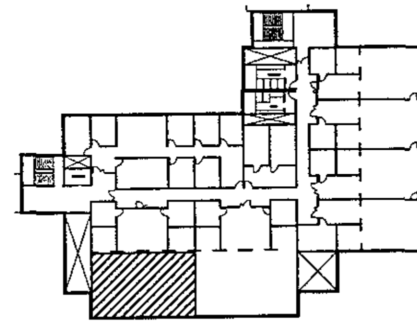
DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **LABORATORY (ALT. A)**
ROOM NUMBER: **1.1a**



FURNISHINGS

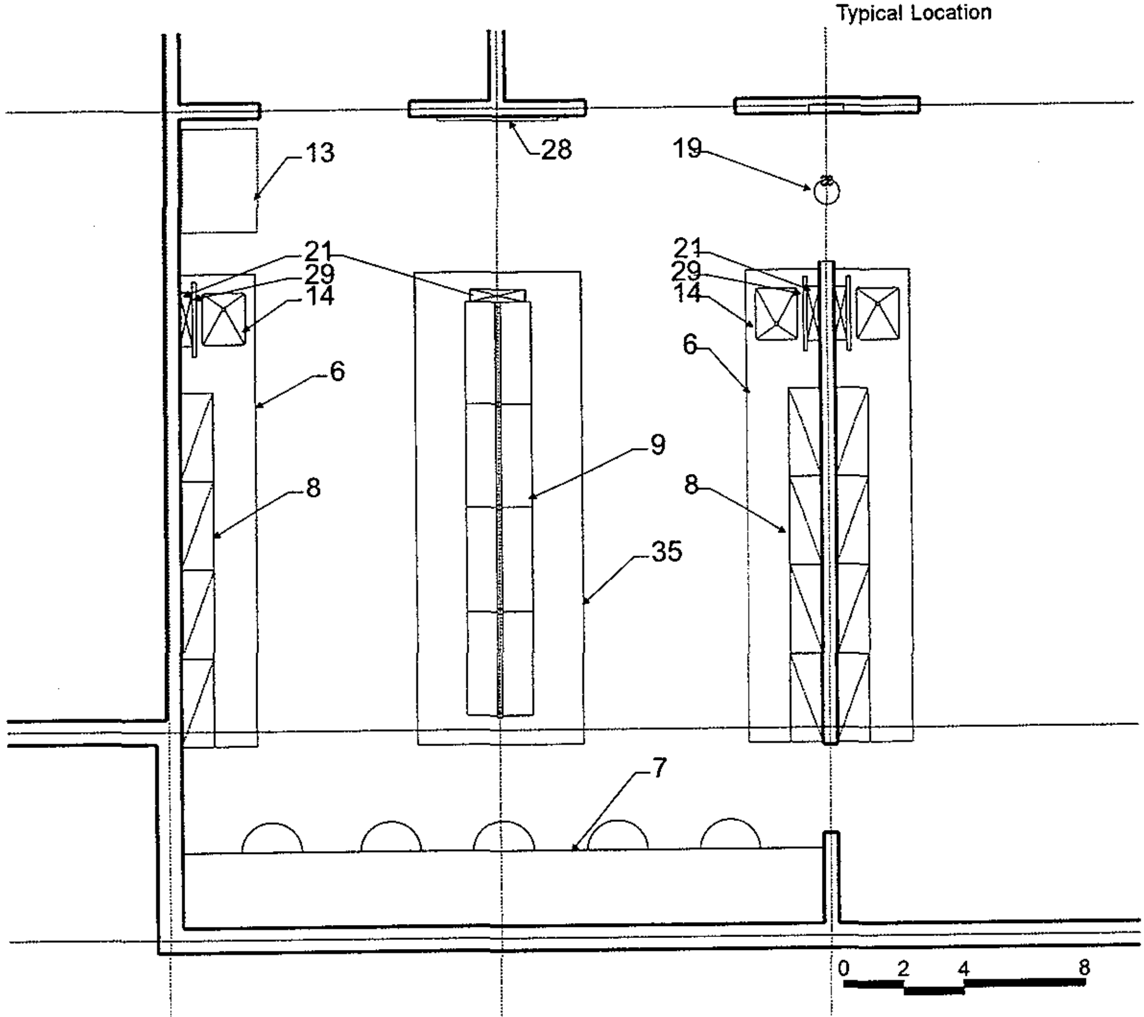
1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **LABORATORY (ALT. B)**
ROOM NUMBER: **1.1b**

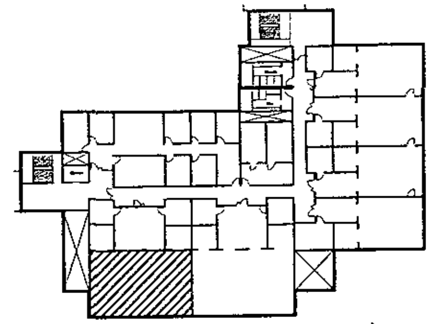


FURNISHINGS

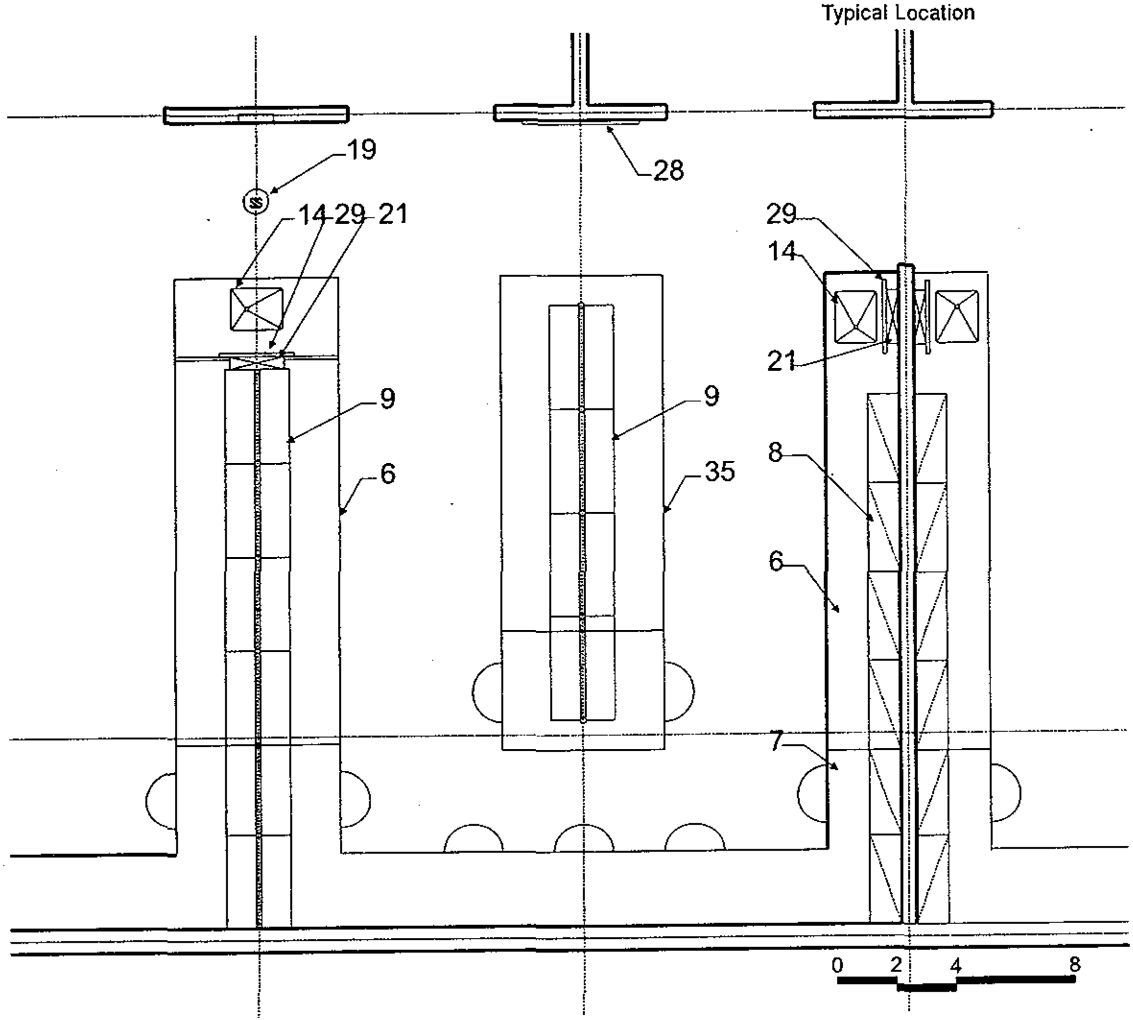
1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **LABORATORY (ALT. C)**
ROOM NUMBER: **1.1c**



Typical Location



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	1.1
ROOM NAME	LABORATORY
ASSIGNABLE AREA	676 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	
Negative Air Pressure	■
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	■
Laboratory Air, 15 psig	LA	■
Compressed Air, 100 psig	A	
Laboratory Gas	LG	■
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	■
Industrial Water	ICW, IHW	■
Deionized Water	DI	■
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	■
Drench Hose	DH	■
Floor Drain	FD	
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	
Standby/Emergency Power	
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	90
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	■
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	■
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	■
Stainless Steel Sinks	

REMARKS

SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	■
View Windows to:	

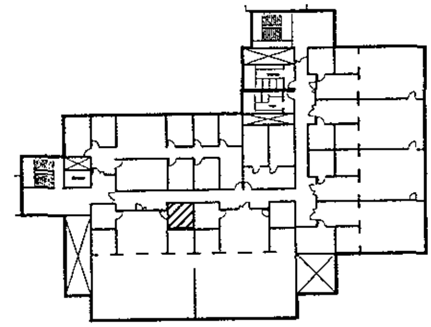
Equipment Schedule

ROOM NUMBER 1.1
ROOM NAME LABORATORY

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
	Refrigerator/Freezer		Size 30 "w x 32 "d x 67 "h, 250 lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 120 V 15 A 1 Ø Power type ■N □S
	Group 3	Remarks:		
	-80 ultra low freezer		Size 35 "w x 31 "d x 77 "h, 660 lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 208 V 6 A 1 Ø Power type □N ■S
	Group 3	Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		

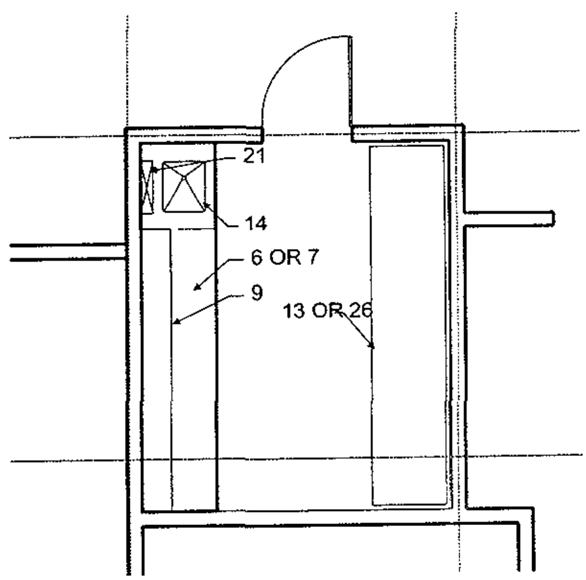
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

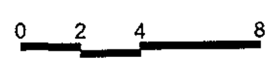
Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **SPECIAL USE ROOM (ALT. A)**
ROOM NUMBER: **1.2a**





FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	1.2A
ROOM NAME	SPECIAL USE ROOM (ALT. A)
ASSIGNABLE AREA	110 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	
Negative Air Pressure	■
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	■
Laboratory Air, 15 psig	LA	■
Compressed Air, 100 psig	A	
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	■
Industrial Water	ICW, IHW	■
Deionized Water	DI	■
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	
Drench Hose	DH	■
Floor Drain	FD	
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	■
Standby/Emergency Power	■
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	80
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	■
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	■
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	■
Stainless Steel Sinks	

REMARKS

Equipment/instrument room

SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

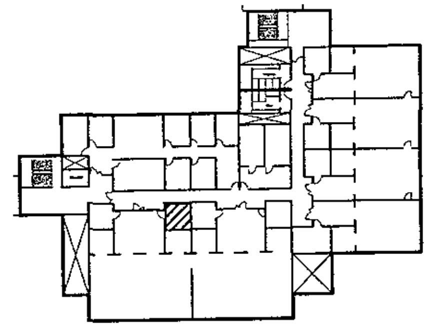
Equipment Schedule

ROOM NUMBER 1.2A
ROOM NAME SPECIAL USE ROOM (ALTERNATE A)

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
	refrigerator/freezer		Size 34 "w x 32 "d x 67 "h, lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 120 V A 1 Ø Power type ■N □S
	Group 3	Remarks:		
	freezer		Size 34 "w x 32 "d x 67 "h, lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 120 V A 1 Ø Power type ■N □S
	Group 3	Remarks:		
	ultra low freezer		Size 35 "w x 31 "d x 77 "h, 660 lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 208 V 6 A 1 Ø Power type □N ■S
	Group 3	Remarks:		
	ultra centrifuge		Size 39 "w x 28 "d x 51 "h, lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 208 V # 1 Ø Power type ■N □S
	Group 3	Remarks:		
	incubator shaker		Size 43 "w x 28 "d x 37 "h, lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 120 V 6 A 1 Ø Power type ■N □S
	Group 3	Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		

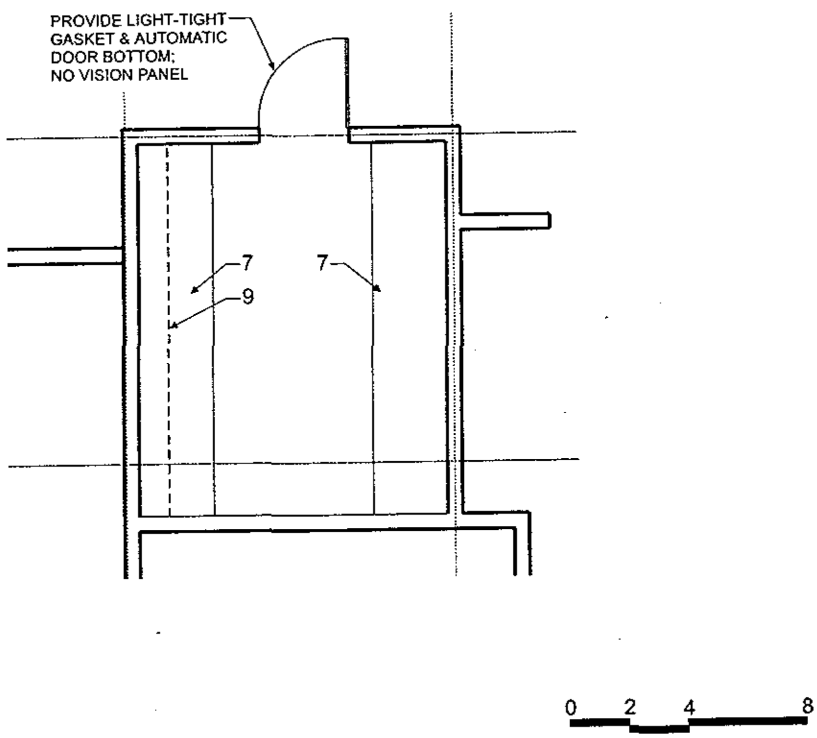
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **SPECIAL USE ROOM (ALT. B)**
ROOM NUMBER: **1.2b**



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	1.2B
ROOM NAME	SPECIAL USE ROOM (ALT. B)
ASSIGNABLE AREA	110 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	■
Negative Air Pressure	
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	
Laboratory Air, 15 psig	LA	
Compressed Air, 100 psig	A	
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	
Industrial Water	ICW, IHW	
Deionized Water	DI	
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	
Drench Hose	DH	
Floor Drain	FD	
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	■
Standby/Emergency Power	
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	■
Safe Light	
Lighting Level (fc)	80/35
Darkenable	■

EQUIPMENT

Vibration Sensitive	
Light Sensitive	■
Vibration Producing	
Heat Producing	■
Noise Producing	

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	■
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	■
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	

REMARKS

Microscopy room
Provide light-tight door gaskets and automatic door bottom.
Provide two lighting levels.

SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	
Gasketing	
Natural Daylight	
View Windows to:	

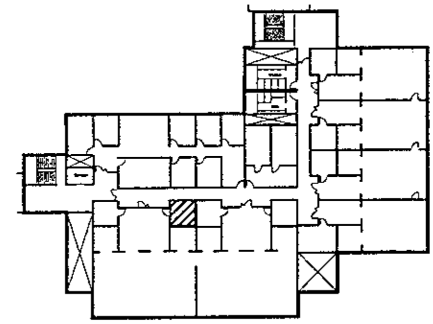
Equipment Schedule

ROOM NUMBER 1.2B
ROOM NAME **SPECIAL USE ROOM (ALTERNATE B)**

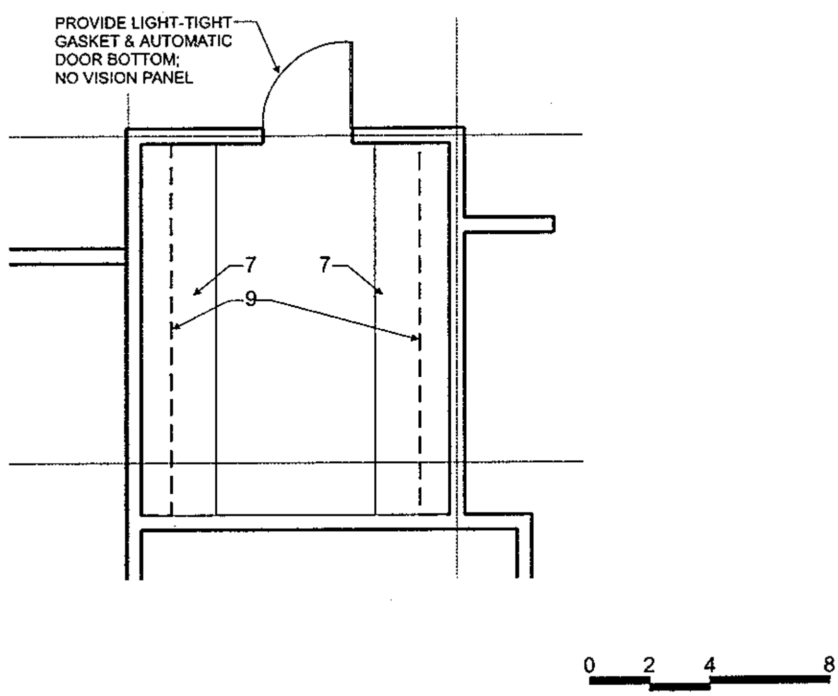
Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
	microscopes		Size "w x "d x "h, lbs. Mtg. ☐F ■B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 120 V A 1 Ø Power type ■N ☐S
	Group 3	Remarks:		
	vibration isolation table		Size "w x "d x "h, lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ■A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
	Group 3	Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		

Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements


Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **SPECIAL USE ROOM (ALT. C)**
ROOM NUMBER: **1.2c**



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	1.2C
ROOM NAME	SPECIAL USE ROOM (ALT. C)
ASSIGNABLE AREA	110 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	■
Negative Air Pressure	
100% Exhaust	
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	
Laboratory Air, 15 psig	LA	
Compressed Air, 100 psig	A	
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	
Industrial Water	ICW, IHW	
Deionized Water	DI	
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	
Drench Hose	DH	
Floor Drain	FD	
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	
Standby/Emergency Power	
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	65/35
Darkenable	■

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	■
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	■
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	

REMARKS

Technicians office
Provide two lighting levels.

SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

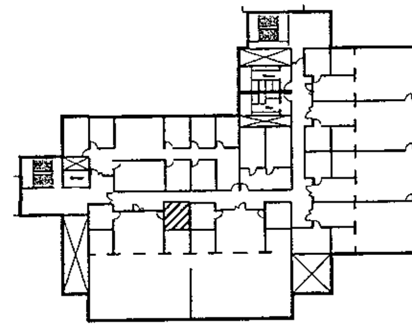
Equipment Schedule

ROOM NUMBER 1.2C
ROOM NAME SPECIAL USE ROOM (ALTERNATE C)

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
	microscopes		Size "w x "d x "h, lbs. Mtg. ☐F ■B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 120 V A 1 Ø Power type ■N ☐S
	Group 3	Remarks:		
	vibration isolation table		Size "w x "d x "h, lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ■A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
	Group 3	Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		

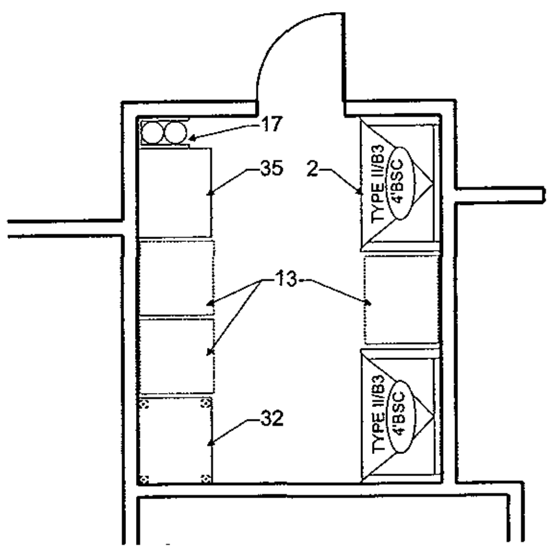
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **SPECIAL USE ROOM (ALT. D)**
ROOM NUMBER: **1.2d**



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
17 10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	1.2D
ROOM NAME	SPECIAL USE ROOM (ALT. D)
ASSIGNABLE AREA	110 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	■
Negative Air Pressure	
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	Class II/B3
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	■
Laboratory Air, 15 psig	LA	
Compressed Air, 100 psig	A	
Laboratory Gas	LG	■
Carbon Dioxide	CO2	■
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	
Industrial Water	ICW, IHW	
Deionized Water	DI	
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	
Drench Hose	DH	
Floor Drain	FD	
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	
Standby/Emergency Power	■
Telephone Outlet	
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	90
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	■

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	■
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	■
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	

REMARKS

Tissue culture room

SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	
Vinyl-faced Panel	■
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door.	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

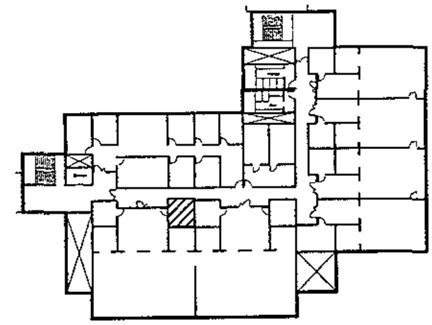
Equipment Schedule

ROOM NUMBER **1.2D**
ROOM NAME **SPECIAL USE ROOM (ALTERNATE D)**

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
	Incubator		Size 26 "w x 25 "d x 40 "h, 330 lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat 344 Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ■CO_2 120 V 4 A 1 Ø Power type ☐N ■S
	Group 3	Remarks:	Stacked in a pair.	
	Biological safety cabinet		Size 54 "w x 34 "d x 90 "h, 840 lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh 408 cfm exh.	☐CW ☐HW ☐PW ■VAC ☐A ☐LA ☐LG ☐ 120 V 16 A 1 Ø Power type ☐N ■S
	Group 1	Remarks:	Class II/B3	
	Refrigerator		Size 32 "w x 32 "d x 67 "h, lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 120 V A 1 Ø Power type ■N ☐S
	Group 3	Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		

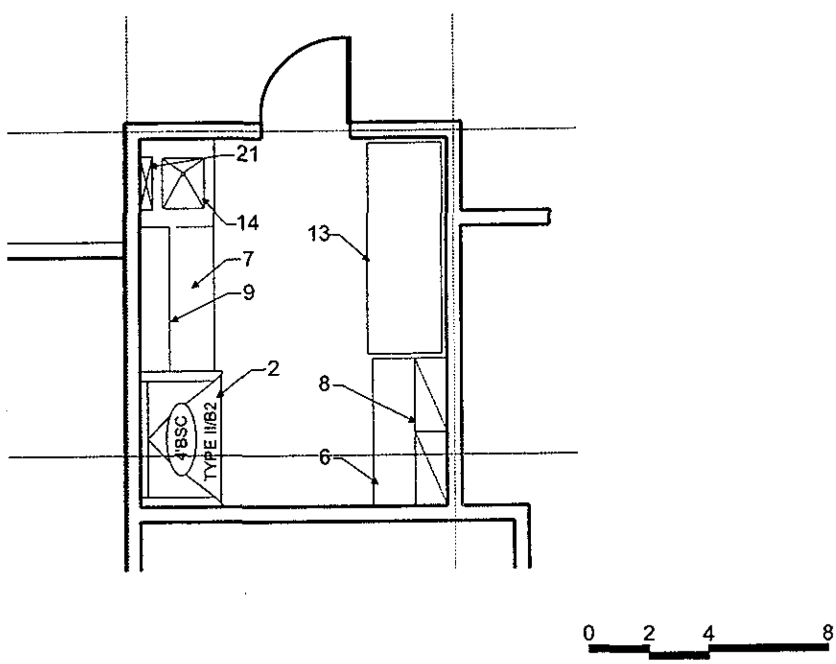
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **SPECIAL USE ROOM (ALT. E)**
ROOM NUMBER: **1.2e**



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
17 11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	1.2E
ROOM NAME	SPECIAL USE ROOM (ALT. E)
ASSIGNABLE AREA	110 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	■
Negative Air Pressure	
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	Class II/B2
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	■
Laboratory Air, 15 psig	LA	■
Compressed Air, 100 psig	A	
Laboratory Gas	LG	■
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	■
Industrial Water	ICW, IHW	■
Deionized Water	DI	■
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	
Drench Hose	DH	■
Floor Drain	FD	
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	
Standby/Emergency Power	■
Telephone Outlet	
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	90
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	■

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	■

FIXED/LABORATORY MATERIALS

Wood Casework	
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	
Stainless Steel Tops	■
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	■

REMARKS

Animal procedure room.
Provide solid phenolic or stainless steel casework.

SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	■
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	
Vinyl-faced Panel	■
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

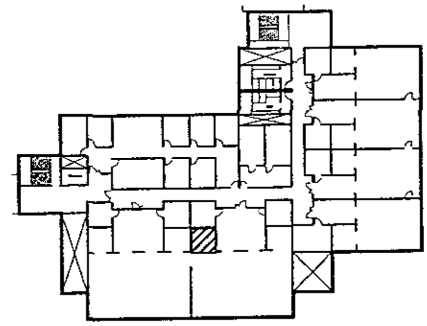
Equipment Schedule

ROOM NUMBER 1.2E
ROOM NAME **SPECIAL USE ROOM (ALTERNATE E)**

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
	Biological safety cabinet		Size 54 "w x 34 "d x 90 "h, 840 lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh 408 cfm exh.	☐CW ☐HW ☐PW ■VAC ☐A ☐LA ☐LG ☐ 120 V 16 A 1 Ø Power type ☐N ■S
	Group 1	Remarks:	Class II/B3	
	Refrigerator		Size 32 "w x 32 "d x 67 "h, lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 120 V A 1 Ø Power type ■N ☐S
	Group 3	Remarks:	Class II/B3	
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		

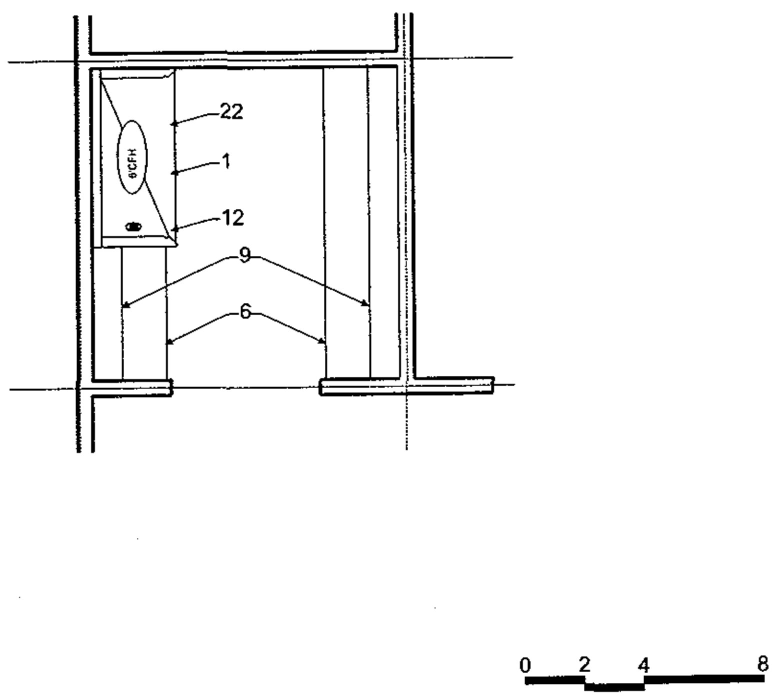
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **FUME HOOD ALCOVE**
ROOM NUMBER: **1.3**



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	1.3
ROOM NAME	FUME HOOD ALCOVE
ASSIGNABLE AREA	110 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	
Negative Air Pressure	■
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	■
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	■
Laboratory Air, 15 psig	LA	■
Compressed Air, 100 psig	A	
Laboratory Gas	LG	■
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	
Industrial Water	ICW, IHW	■
Deionized Water	DI	
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	
Drench Hose	DH	
Floor Drain	FD	
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	
Standby/Emergency Power	
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	90
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	■

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	■
Corrosives	■
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	■
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	■
Metal Casework	■
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	■
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	■
Stainless Steel Sinks	

REMARKS

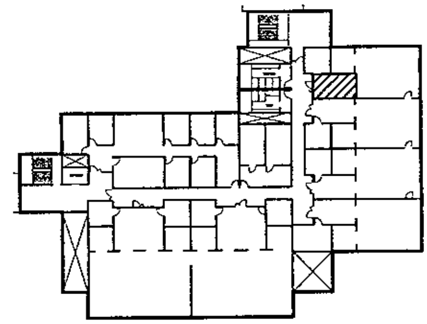
SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

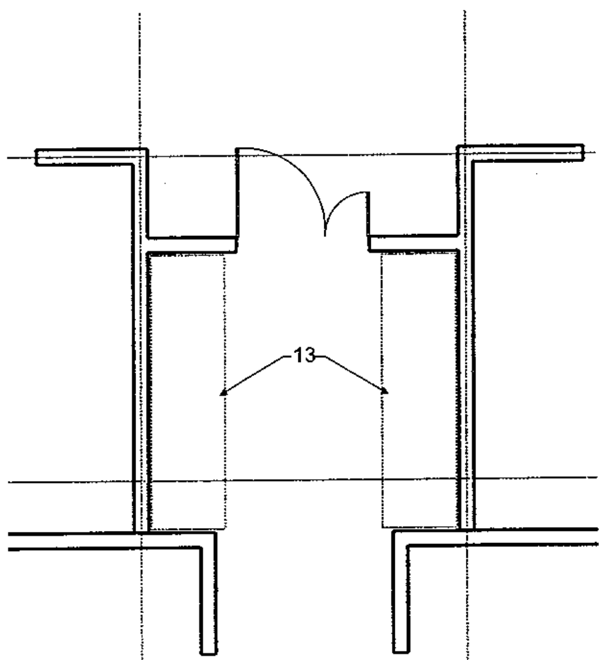
Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	
Gasketing	
Natural Daylight	
View Windows to:	

Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **EQUIPMENT/ENTRY VESTIBULE**
ROOM NUMBER: **2.1a**



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	2.1A
ROOM NAME	EQUIPMENT/ENTRY VESTIBULE
ASSIGNABLE AREA	194 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	
Negative Air Pressure	■
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	
Laboratory Air, 15 psig	LA	
Compressed Air, 100 psig	A	
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	■
Industrial Water	ICW, IHW	
Deionized Water	DI	
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	■
Drench Hose	DH	
Floor Drain	FD	■
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	■
Standby/Emergency Power	■
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	80
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	■

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	■
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	

REMARKS

SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	■
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

Equipment Schedule

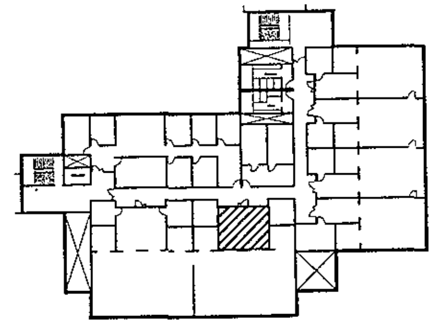
ROOM NUMBER 2.1A
ROOM NAME EQUIPMENT/ENTRY VESTIBULE

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
	refrigerator/freezer		Size 34 "w x 32 "d x 67 "h, lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 120 V A 1 Ø Power type ■N □S
	Group 3	Remarks:		
	freezer		Size 34 "w x 32 "d x 67 "h, lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 120 V A 1 Ø Power type ■N □S
	Group 3	Remarks:		
	ultra low freezer		Size 35 "w x 31 "d x 77 "h, 660 lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 208 V 6 A 1 Ø Power type □N ■S
	Group 3	Remarks:		
	ultra centrifuge		Size 39 "w x 28 "d x 51 "h, lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 208 V # 1 Ø Power type ■N □S
	Group 3	Remarks:		
	incubator shaker		Size 43 "w x 28 "d x 37 "h, lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 120 V 6 A 1 Ø Power type ■N □S
	Group 3	Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		

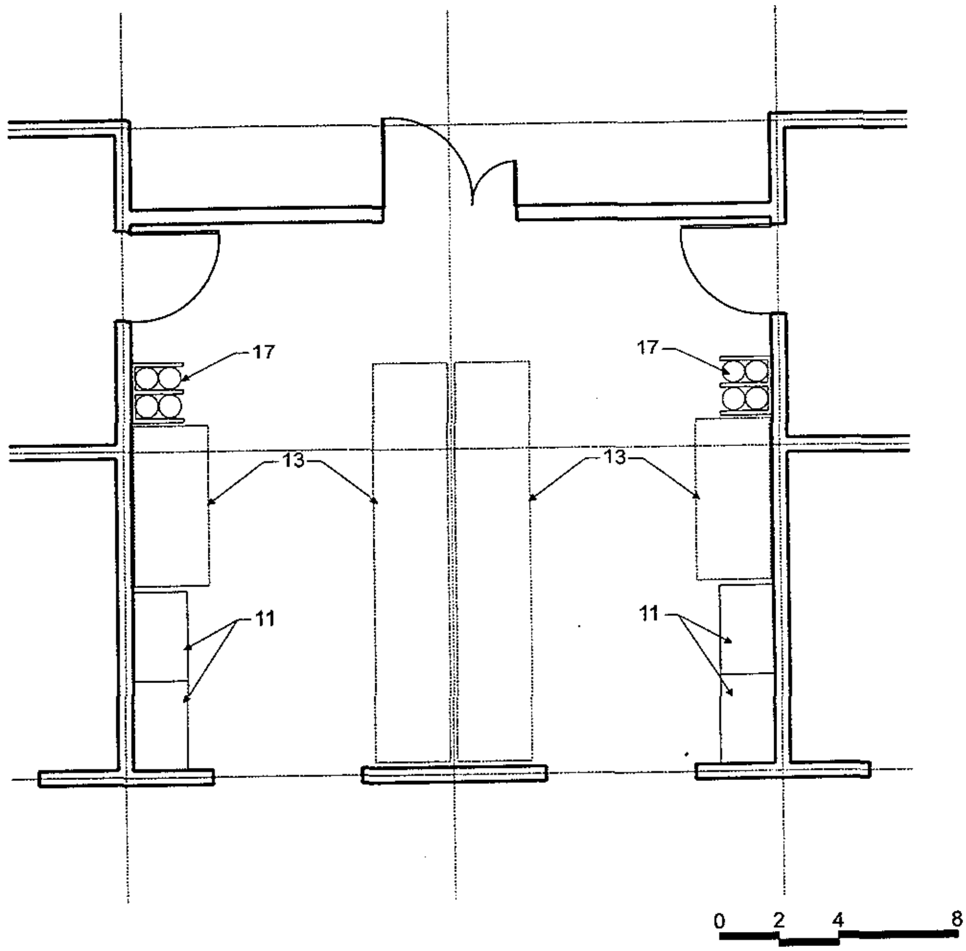
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **EQUIPMENT/ENTRY VESTIBULE**
ROOM NUMBER: **2.1b**



Typical Location



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	2.1B
ROOM NAME	EQUIPMENT/ENTRY VESTIBULE
ASSIGNABLE AREA	398 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	
Negative Air Pressure	■
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	
Laboratory Air, 15 psig	LA	
Compressed Air, 100 psig	A	
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	■
Industrial Water	ICW, IHW	
Deionized Water	DI	
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	■
Drench Hose	DH	
Floor Drain	FD	■
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	■
Standby/Emergency Power	■
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	80
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	■

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	■
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	

REMARKS

SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	■
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

Equipment Schedule

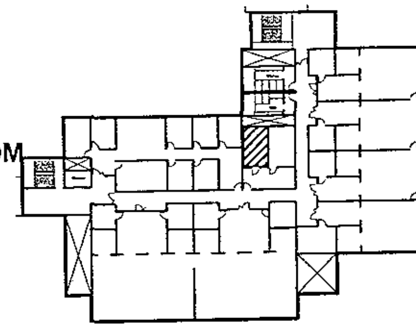
ROOM NUMBER 2.1B
ROOM NAME EQUIPMENT/ENTRY VESTIBULE

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
	refrigerator/freezer		Size 34 "w x 32 "d x 67 "h, lbs. Mtg. [x] F [ ] B [ ] W [ ] C Status [ ] E [x] P Heat Btuh cfm exh.	[ ] CW [ ] HW [ ] PW [ ] VAC [ ] A [ ] LA [ ] LG [ ] 120 V A 1 Ø Power type [x] N [ ] S
	Group 3	Remarks:		
	freezer		Size 34 "w x 32 "d x 67 "h, lbs. Mtg. [x] F [ ] B [ ] W [ ] C Status [ ] E [x] P Heat Btuh cfm exh.	[ ] CW [ ] HW [ ] PW [ ] VAC [ ] A [ ] LA [ ] LG [ ] 120 V A 1 Ø Power type [x] N [ ] S
	Group 3	Remarks:		
	ultra low freezer		Size 35 "w x 31 "d x 77 "h, 660 lbs. Mtg. [x] F [ ] B [ ] W [ ] C Status [ ] E [x] P Heat Btuh cfm exh.	[ ] CW [ ] HW [ ] PW [ ] VAC [ ] A [ ] LA [ ] LG [ ] 208 V 6 A 1 Ø Power type [ ] N [x] S
	Group 3	Remarks:		
	ultra centrifuge		Size 39 "w x 28 "d x 51 "h, lbs. Mtg. [x] F [ ] B [ ] W [ ] C Status [ ] E [x] P Heat Btuh cfm exh.	[ ] CW [ ] HW [ ] PW [ ] VAC [ ] A [ ] LA [ ] LG [ ] 208 V # 1 Ø Power type [x] N [ ] S
	Group 3	Remarks:		
	incubator shaker		Size 43 "w x 28 "d x 37 "h, lbs. Mtg. [x] F [ ] B [ ] W [ ] C Status [ ] E [x] P Heat Btuh cfm exh.	[ ] CW [ ] HW [ ] PW [ ] VAC [ ] A [ ] LA [ ] LG [ ] 120 V 6 A 1 Ø Power type [x] N [ ] S
	Group 3	Remarks:		
			Size "w x "d x "h, lbs. Mtg. [ ] F [ ] B [ ] W [ ] C Status [ ] E [ ] P Heat Btuh cfm exh.	[ ] CW [ ] HW [ ] PW [ ] VAC [ ] A [ ] LA [ ] LG [ ] V A Ø Power type [ ] N [ ] S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. [ ] F [ ] B [ ] W [ ] C Status [ ] E [ ] P Heat Btuh cfm exh.	[ ] CW [ ] HW [ ] PW [ ] VAC [ ] A [ ] LA [ ] LG [ ] V A Ø Power type [ ] N [ ] S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. [ ] F [ ] B [ ] W [ ] C Status [ ] E [ ] P Heat Btuh cfm exh.	[ ] CW [ ] HW [ ] PW [ ] VAC [ ] A [ ] LA [ ] LG [ ] V A Ø Power type [ ] N [ ] S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. [ ] F [ ] B [ ] W [ ] C Status [ ] E [ ] P Heat Btuh cfm exh.	[ ] CW [ ] HW [ ] PW [ ] VAC [ ] A [ ] LA [ ] LG [ ] V A Ø Power type [ ] N [ ] S
		Remarks:		

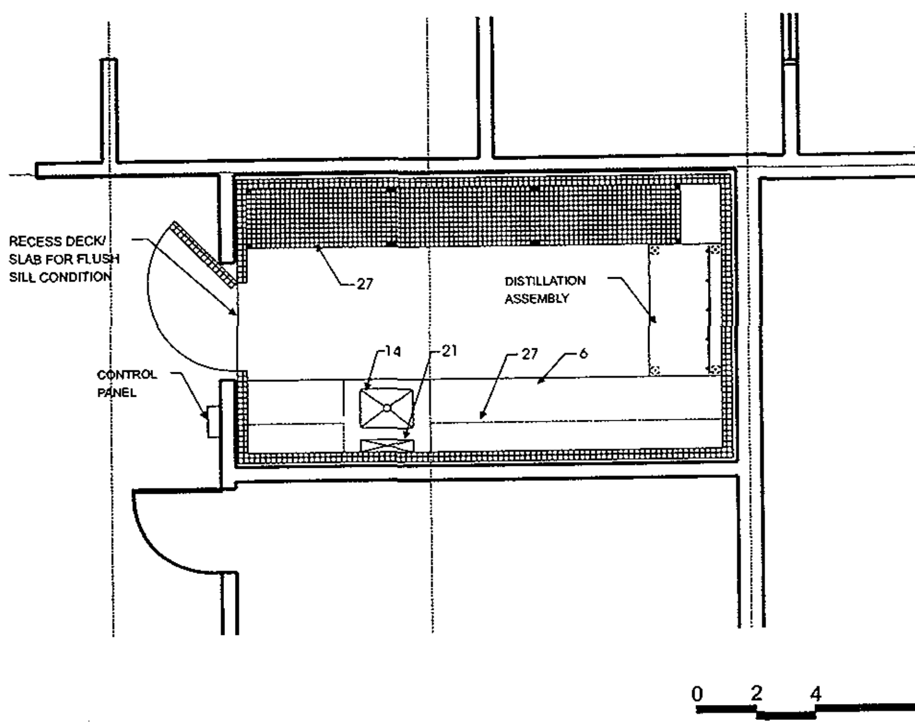
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **CONTROLLED TEMPERATURE ROOM**
ROOM NUMBER: **2.2**



Typical Location



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	2.2
ROOM NAME	CONTROLLED TEMPERATURE RM
ASSIGNABLE AREA	194 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	
4°C	
Other	4°- 40°C
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	
Positive Air Pressure	■
Negative Air Pressure	
100% Exhaust	
Return Air	■
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	■
Laboratory Air, 15 psig	LA	■
Compressed Air, 100 psig	A	
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	■
Industrial Water	ICW, IHW	■
Deionized Water	DI	
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	
Drench Hose	DH	■
Floor Drain	FD	
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	
208V, 30A, 3 phase	■
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	
Standby/Emergency Power	■
Telephone Outlet	
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	75
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	■
Corrosives	■
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	
Stainless Steel Tops	■
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	■

REMARKS

Provide 34" x 78" door.
Prefabricated panel construction.
Sheet vinyl floor runner.
Recess slab for flush entry.

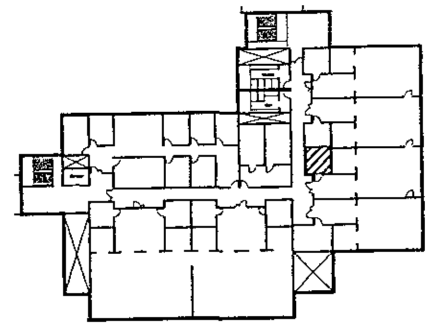
SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

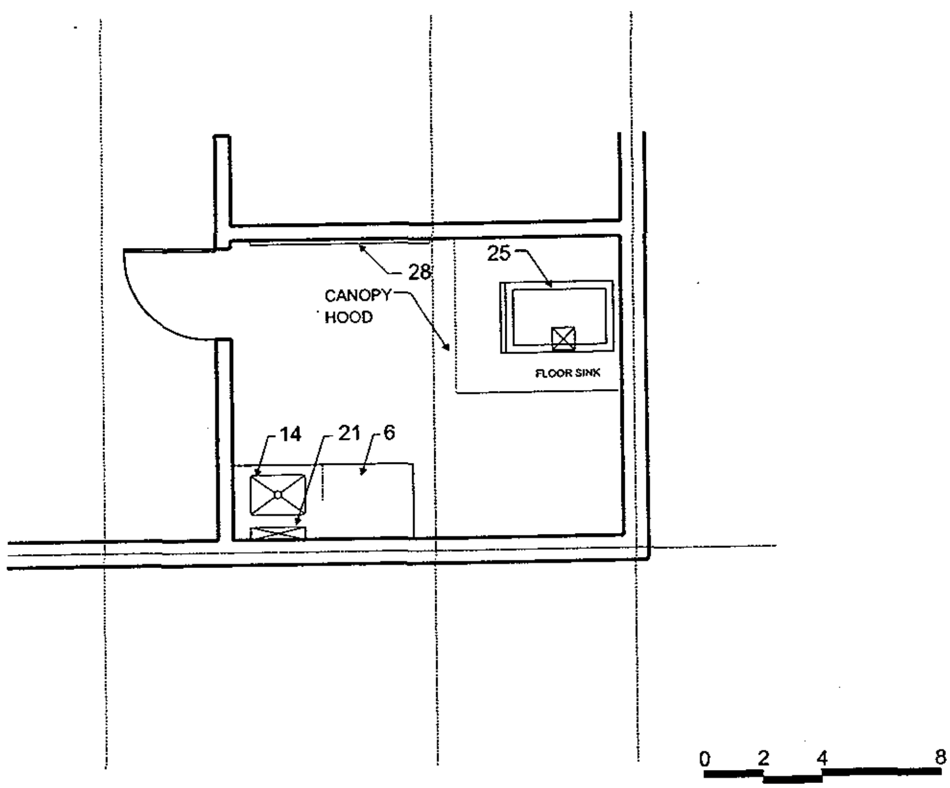
INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	■
Base	
Integral with Floor	
Resilient	
Other	■
Partitions	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	■
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	■
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	
1'-6" x 7'-0"	
Other	■
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

Space Requirements


Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **AUTOCLAVE**
ROOM NUMBER: **2.3**



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	2.3
ROOM NAME	AUTOCLAVE
ASSIGNABLE AREA	130 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	
Negative Air Pressure	■
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	■
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	
Laboratory Air, 15 psig	LA	
Compressed Air, 100 psig	A	■
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	
Industrial Water	ICW, IHW	■
Deionized Water	DI	■
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	
Drench Hose	DH	
Floor Drain	FD	
Floor Sink	FS	■

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	■
Standby/Emergency Power	
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	65
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	■

GROUP 1 EQUIPMENT

Autoclave	■
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	
Stainless Steel Tops	■
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	■

REMARKS

SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	OPTION
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	■
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	■
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

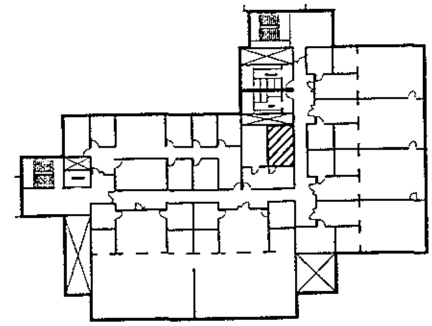
Equipment Schedule

ROOM NUMBER 2.3
ROOM NAME AUTOCLAVE

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
1	autoclave 20 x 20 x 38 chamber		Size 30 "w x 45 "d x 75 "h, ### lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat 8750 Btuh cfm exh.	■CW ☐HW ■PW ☐VAC ■A ☐LA ☐LG ☐ 480 V 37 A 3 Ø Power type ■N ☐S
	Group 1	Remarks:	Provide integral electric steam generator. Requires 120V control power	
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		

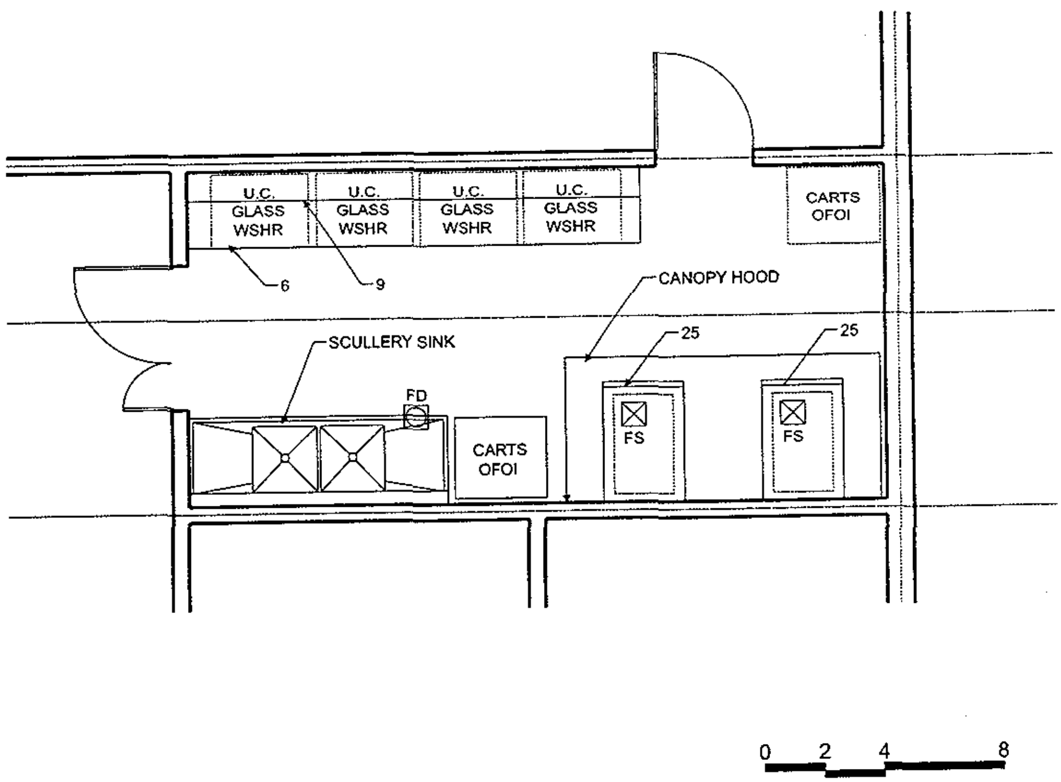
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **CENTRAL GLASS WASH**
ROOM NUMBER: **2.4**



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	2.4
ROOM NAME	CENTRAL GLASSWASH
ASSIGNABLE AREA	226 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	
Negative Air Pressure	■
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	■
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	■
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	
Laboratory Air, 15 psig	LA	
Compressed Air, 100 psig	A	■
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	■
Industrial Water	ICW, IHW	■
Deionized Water	DI	■
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	■
Drench Hose	DH	■
Floor Drain	FD	■
Floor Sink	FS	■

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	■
Isolated Ground Outlet	
Dedicated Circuit	■
Standby/Emergency Power	
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	65
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	■

GROUP 1 EQUIPMENT

Autoclave	■
Glassware Washer	■
Glassware Dryer	■

HAZARDOUS STORAGE

Flammables	
Corrosives	■
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	
Metal Casework	
Stainless Steel Casework	■
Plastic Laminate Casework	
Epoxy Resin Tops	
Stainless Steel Tops	■
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	■

REMARKS

SECURITY

Pushbutton Combination Lock	■
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	OPTION
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	■
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	OPTION
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	■
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	■
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

Equipment Schedule

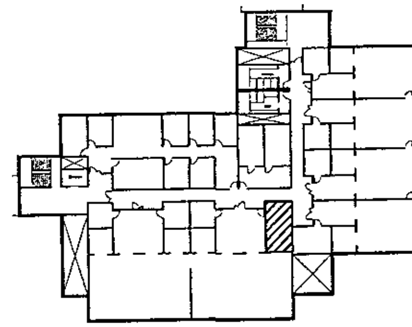
ROOM NUMBER 2.4
ROOM NAME CENTRAL GLASSWASH

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
4	glassware washer (undercounter)	Miele G7783 CD or equal	Size 36 "w x 28 "d x 34 "h, 308 lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	■CW ■HW ■PW □VAC □A □LA □LG □ 208 V 20 A 3 Ø Power type ■N □S
	Group 1	Remarks:	Requires waste standpipe.	
2	autoclave 24 x 36 x 36 chamber		Size 44 "w x 50 "d x 75 "h, lbs. Mtg. ■F □B □W □C Status □E ■P Heat 14650 Btuh cfm exh.	■CW □HW ■PW □VAC ■A □LA □LG ■STEAM 120 V 2 A 1 Ø Power type ■N □S
	Group 1	Remarks:	Requires floor sink. Weight: 4200 lbs.	
1	oven		Size "w x "d x "h, lbs. Mtg. □F ■B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type ■N □S
	Group 2	Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		

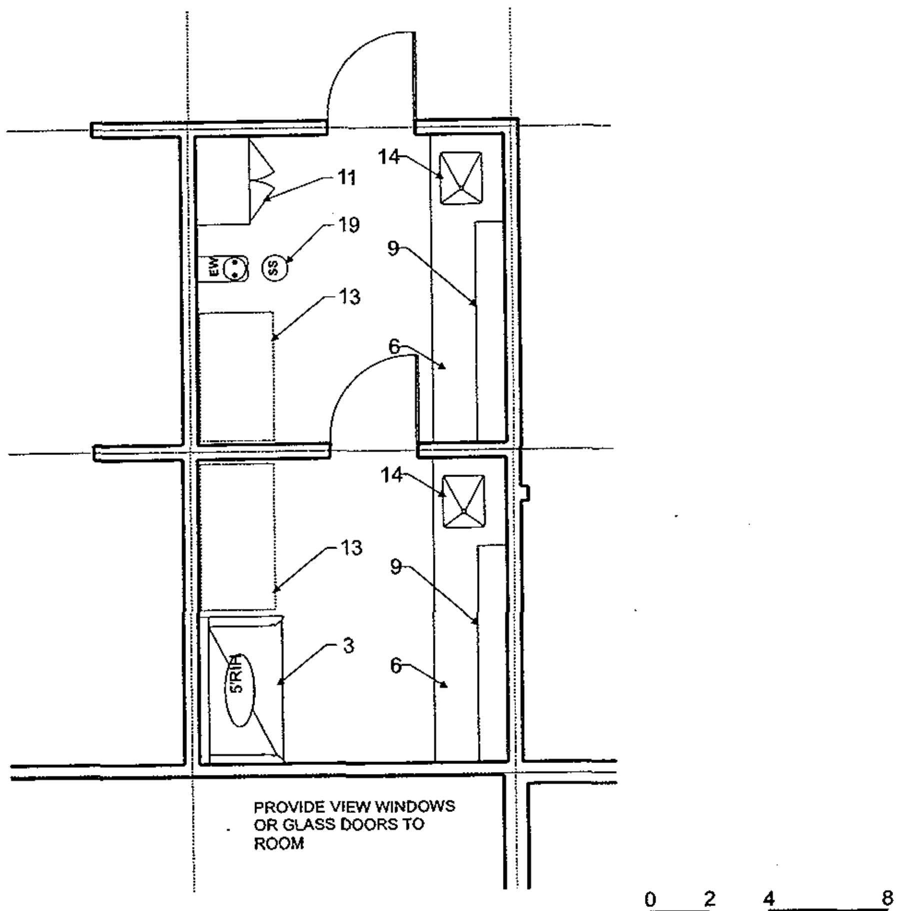
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **RADIOISOTOPE ROOM**
ROOM NUMBER: **2.5**



Typical Location



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	2.5
ROOM NAME	RADIOISOTOPE ROOM
ASSIGNABLE AREA	226 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	
Negative Air Pressure	■
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	■
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	■
Laboratory Air, 15 psig	LA	■
Compressed Air, 100 psig	A	
Laboratory Gas	LG	■
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	■
Industrial Water	ICW, IHW	■
Deionized Water	DI	■
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	■
Drench Hose	DH	■
Floor Drain	FD	■
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	
Standby/Emergency Power	■
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	90
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	■

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	■
Corrosives	■
Toxics	
Carcinogens	
Radioisotopes	■
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	■
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	
Metal Casework	
Stainless Steel Casework	■
Plastic Laminate Casework	
Epoxy Resin Tops	
Stainless Steel Tops	■
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	■

REMARKS

SECURITY

Pushbutton Combination Lock	■
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	■
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	
Vinyl-faced Panel	■
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	■

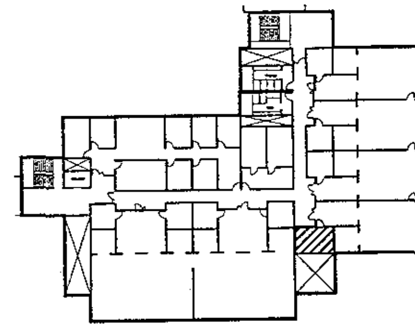
Equipment Schedule

ROOM NUMBER **2.5**
ROOM NAME **RADIOISOTOPE ROOM**

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
	Refrigerator/Freezer		Size 30 "w x 32 "d x 67 "h, 250 lbs. Mtg. ■F □B □W □C Status □E ■P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ 120 V 15 A 1 Ø Power type ■N □S
	Group 2	Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. □F □B □W □C Status □E □P Heat Btuh cfm exh.	□CW □HW □PW □VAC □A □LA □LG □ V A Ø Power type □N □S
		Remarks:		

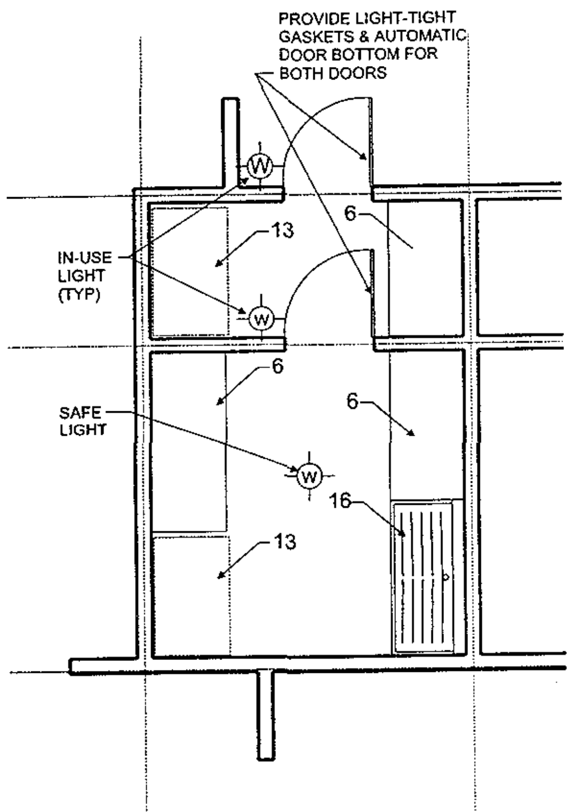
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **DARK ROOM**
ROOM NUMBER: **2.6**



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	2.6
ROOM NAME	DARK ROOM
ASSIGNABLE AREA	163 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	
Negative Air Pressure	■
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	■

PLUMBING/PIPING

Laboratory Vacuum	VAC	
Laboratory Air, 15 psig	LA	
Compressed Air, 100 psig	A	
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	■
Industrial Water	ICW, IHW	■
Deionized Water	DI	■
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	
Drench Hose	DH	■
Floor Drain	FD	
Floor Sink	FS	■

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	
Standby/Emergency Power	
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	■
Safe Light	■
Lighting Level (fc)	65
Darkenable	■

EQUIPMENT

Vibration Sensitive	
Light Sensitive	■
Vibration Producing	
Heat Producing	■
Noise Producing	

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	■
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	■
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	■
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	■
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	

REMARKS

Provide light-tight door gaskets and automatic door bottom.

For photographic work; provide fiberglass processing sink.

SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	
Gasketing	
Natural Daylight	
View Windows to:	

Equipment Schedule

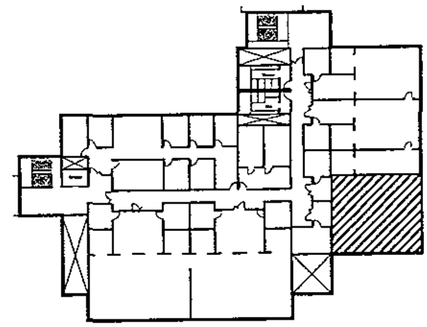
ROOM NUMBER 2.6
ROOM NAME DARK ROOM

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
1	Copy Stand		Size 32 "w x 28 "d x 45 "h, 20 lbs. Mtg. ☐F ■B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 120 V A 1 Ø Power type ■N ☐S
	Group 3	Remarks:		
1	Enlarger		Size 14 "w x 19 "d x "h, 20 lbs. Mtg. ☐F ■B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 120 V A 1 Ø Power type ■N ☐S
	Group 3	Remarks:		
1	Automated film processor		Size 42 "w x 31 "d x 45 "h, 350 lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat 4000 Btuh 75 cfm exh.	■CW ■HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 208 V 20 A 1 Ø Power type ■N ☐S
	Group 2	Remarks:	Provide 30A disconnect switch; 4"diameter duct connection.	
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		

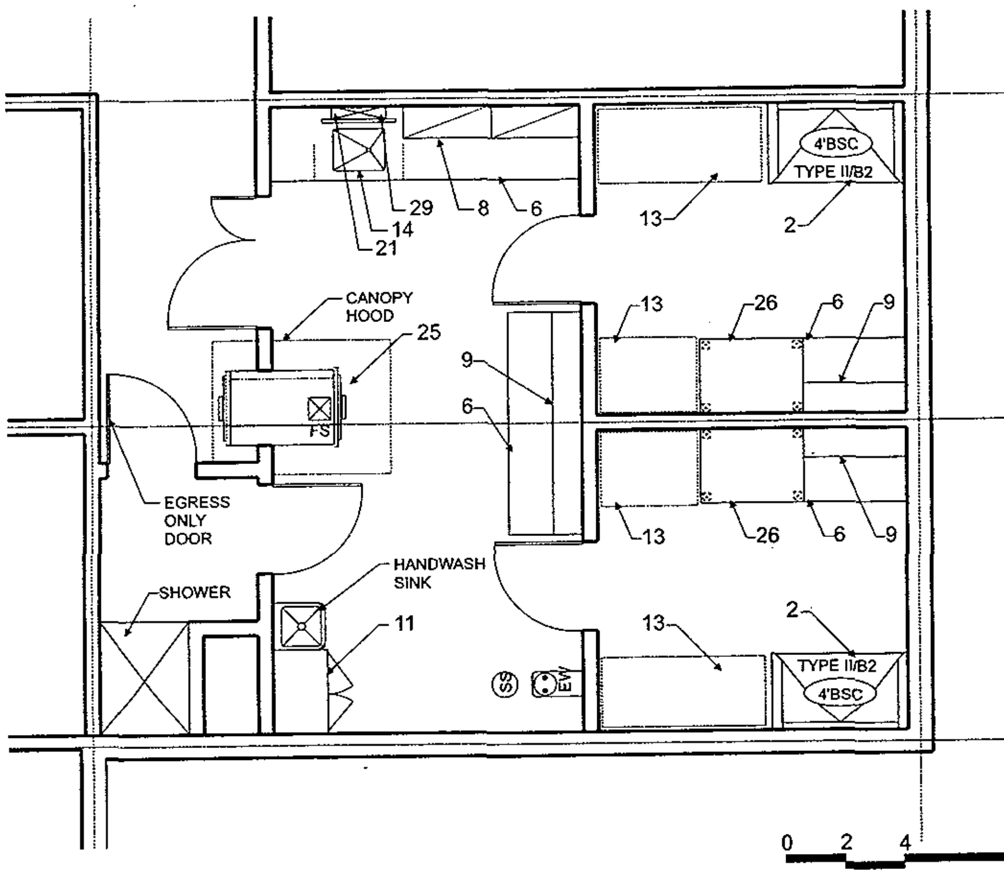
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **BSL3 SUITE**
ROOM NUMBER: **2.7**



Typical Location



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	**2.7**
ROOM NAME	**BSL3 SUITE**
ASSIGNABLE AREA	**462 ASF**

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	12
Positive Air Pressure	
Negative Air Pressure	■
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	■

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	Class B2
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	■
Laboratory Air, 15 psig	LA	■
Compressed Air, 100 psig	A	
Laboratory Gas	LG	■
Carbon Dioxide	CO2	■
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	■
Industrial Water	ICW, IHW	■
Deionized Water	DI	■
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	■
Drench Hose	DH	■
Floor Drain	FD	■
Floor Sink	FS	■

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	■
Isolated Ground Outlet	
Dedicated Circuit	
Standby/Emergency Power	■
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	90
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	■

GROUP 1 EQUIPMENT

Autoclave	■
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	■

FIXED/LABORATORY MATERIALS

Wood Casework	
Metal Casework	■
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	■
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	■
Stainless Steel Sinks	

REMARKS

Provide separate handwashing sink with hands-free operation.
Provide HEPA filters and liquid disinfectant traps on vacuum lines.

SECURITY

Pushbutton Combination Lock	■
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	■
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	■
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	■
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	■

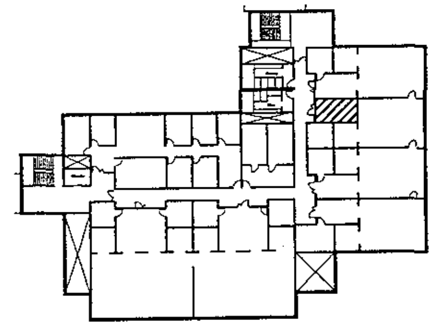
Equipment Schedule

ROOM NUMBER 2.7
ROOM NAME **BSL3 SUITE**

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
2	Incubator		Size 26 "w x 25 "d x 40 "h, 330 lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat 344 Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ■CO_2 120 V 4 A 1 Ø Power type ☐N ■S
	Group 3	Remarks:	Stacked in pairs.	
1	Biological safety cabinet		Size 54 "w x 34 "d x 90 "h, 840 lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh 408 cfm exh.	☐CW ☐HW ☐PW ■VAC ☐A ☐LA ☐LG ☐ 120 V 16 A 1 Ø Power type ☐N ■S
	Group 1	Remarks:	Class II/B3	
1	Refrigerator		Size 32 "w x 32 "d x 67 "h, lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 120 V A 1 Ø Power type ■N ☐S
	Group 2	Remarks:		
1	autoclave 20 x 20 x 38 chamber		Size 30 "w x 45 "d x 75 "h, ### lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat 8750 Btuh cfm exh.	■CW ☐HW ■PW ☐VAC ■A ☐LA ☐LG ☐ 480 V 37 A 3 Ø Power type ■N ☐S
	Group 1	Remarks:	Provide integral electric steam generator. Requires 120V control power	
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		

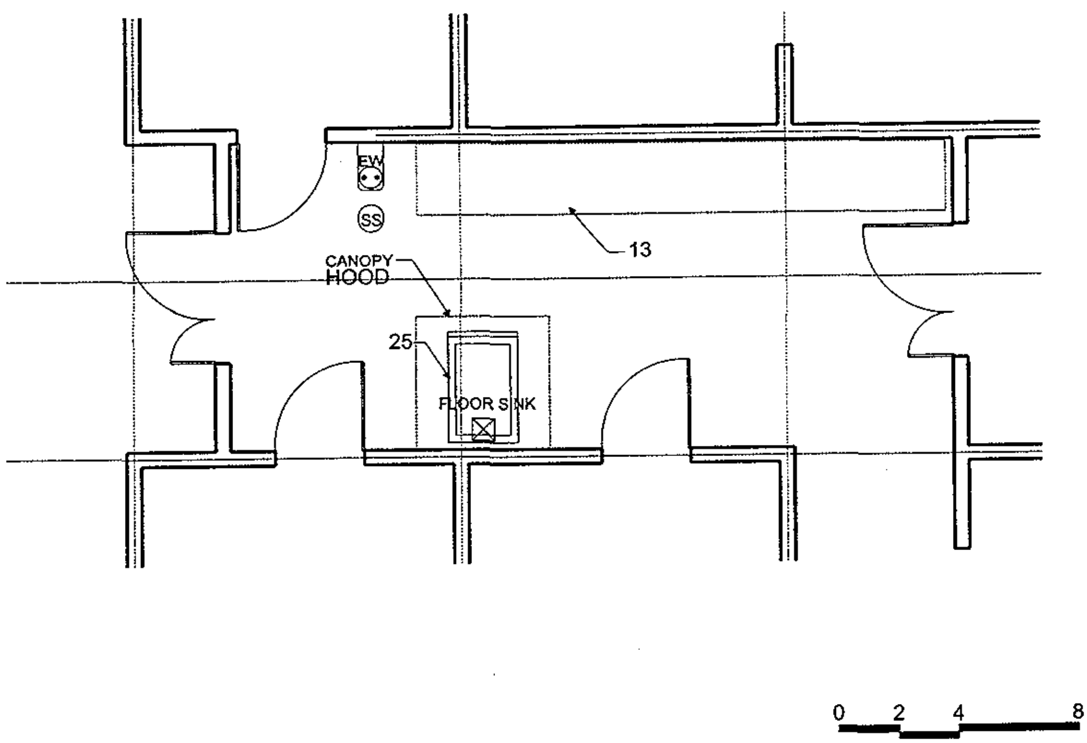
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **VESTIBULE**
ROOM NUMBER: **2.8**



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	2.8
ROOM NAME	VESTIBULE
ASSIGNABLE AREA	293 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	
Negative Air Pressure	■
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	■
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	
Laboratory Air, 15 psig	LA	
Compressed Air, 100 psig	A	
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	■
Industrial Water	ICW, IHW	
Deionized Water	DI	
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	■
Drench Hose	DH	
Floor Drain	FD	■
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	■
Standby/Emergency Power	■
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	80
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	■

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	■
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	

REMARKS

SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	■
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

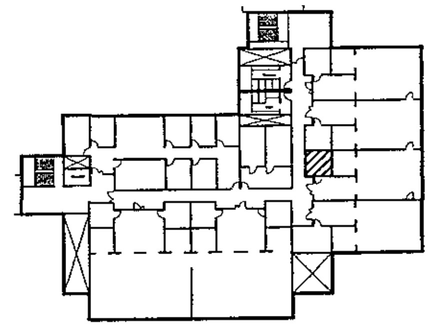
Equipment Schedule

ROOM NUMBER 2.8
ROOM NAME VESTIBULE

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
	refrigerator/freezer		Size 34 "w x 32 "d x 67 "h, lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 120 V A 1 Ø Power type ■N ☐S
	Group 3	Remarks:		
	freezer		Size 34 "w x 32 "d x 67 "h, lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 120 V A 1 Ø Power type ■N ☐S
	Group 3	Remarks:		
	ultra low freezer		Size 35 "w x 31 "d x 77 "h, 660 lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 208 V 6 A 1 Ø Power type ☐N ■S
	Group 3	Remarks:		
	ultra centrifuge		Size 39 "w x 28 "d x 51 "h, lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 208 V # 1 Ø Power type ■N ☐S
	Group 3	Remarks:		
	incubator shaker		Size 43 "w x 28 "d x 37 "h, lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 120 V 6 A 1 Ø Power type ■N ☐S
	Group 3	Remarks:		
1	autoclave 20 x 20 x 38 chamber		Size 30 "w x 45 "d x 75 "h, ### lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat 8750 Btuh cfm exh.	■CW ☐HW ■PW ☐VAC ■A ☐LA ☐LG ☐ 480 V 37 A 3 Ø Power type ■N ☐S
	Group 1	Remarks:	Provide integral electric steam generator. Requires 120V control power	
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		

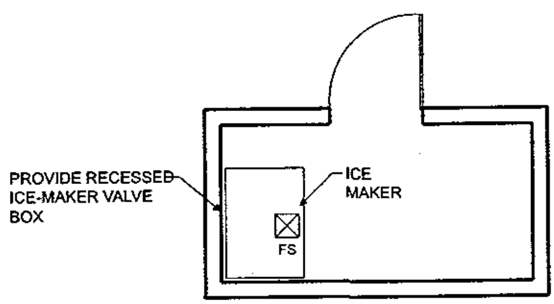
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

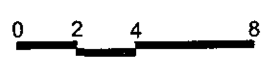
Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **ICE/EQUIPMENT**
ROOM NUMBER: **2.9**





FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	2.9
ROOM NAME	ICE/EQUIPMENT
ASSIGNABLE AREA	70 ASF

UTILIZATION

Occupied Hours	
14 hours/day	
24 hours/day	■
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	10
Positive Air Pressure	
Negative Air Pressure	■
100% Exhaust	■
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	
Laboratory Air, 15 psig	LA	
Compressed Air, 100 psig	A	
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	
Industrial Water	ICW, IHW	■
Deionized Water	DI	
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	
Drench Hose	DH	
Floor Drain	FD	
Floor Sink	FS	■

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	■
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	
Standby/Emergency Power	
Telephone Outlet	
LAN/WAN Outlet	
In-Use Light	
Safe Light	
Lighting Level (fc)	65
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	■
Noise Producing	

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	

REMARKS

SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	■
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	
Ceramic Tile	
Other	
Base	
Integral with Floor	■
Resilient	
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

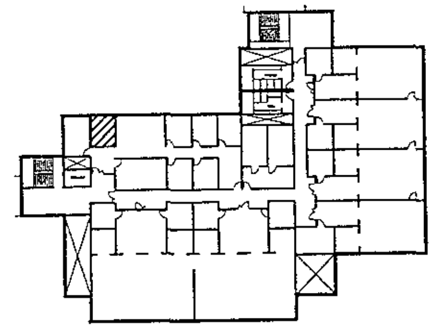
Equipment Schedule

ROOM NUMBER 2.9
ROOM NAME ICE/EQUIPMENT

Qty.	Equipment	Manufacturer/ Model	Characteristics	Services
1	ice maker		Size 36 "w x 24 "d x 39 "h, 200 lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	■CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ 120 V 6 A 1 Ø Power type ■N ☐S
	Group 2	Remarks:		
1	dry ice freezer		Size "w x "d x "h, lbs. Mtg. ■F ☐B ☐W ☐C Status ☐E ■P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ■N ☐S
	Group 2	Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		
			Size "w x "d x "h, lbs. Mtg. ☐F ☐B ☐W ☐C Status ☐E ☐P Heat Btuh cfm exh.	☐CW ☐HW ☐PW ☐VAC ☐A ☐LA ☐LG ☐ V A Ø Power type ☐N ☐S
		Remarks:		

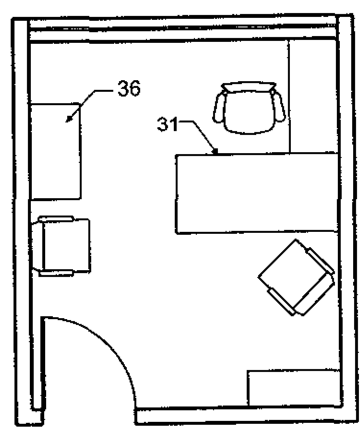
Mtg: F (floor), B (bench), W (wall), C (ceiling) Status: E (existing), P (proposed) Electric Power Type: N (normal), S (standby)
Services: CW (cold water), HW (hot water), PW (purified water), VAC (vacuum), A (compressed air: <100 psi), LA (laboratory air: 15 psi), LG (laboratory gas)

Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **FACULTY/INVESTIGATOR OFFICE**
ROOM NUMBER: **3.1**



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	3.1
ROOM NAME	FACULTY OFFICE
ASSIGNABLE AREA	130 ASF

UTILIZATION

Occupied Hours	
14 hours/day	■
24 hours/day	
Operating Hours	
14 hours/day	■
24 hours/day	

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	4
Positive Air Pressure	■
Negative Air Pressure	
100% Exhaust	
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	
Laboratory Air, 15 psig	LA	
Compressed Air, 100 psig	A	
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	
Industrial Water	ICW, IHW	
Deionized Water	DI	
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	
Drench Hose	DH	
Floor Drain	FD	
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	
Standby/Emergency Power	
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	50
Darkenable	

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	

REMARKS

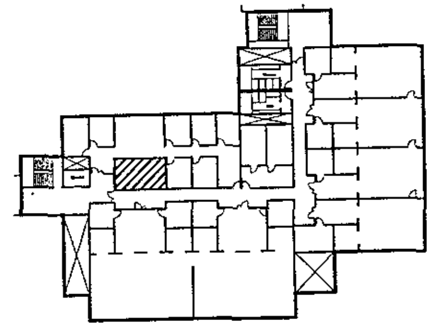
SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

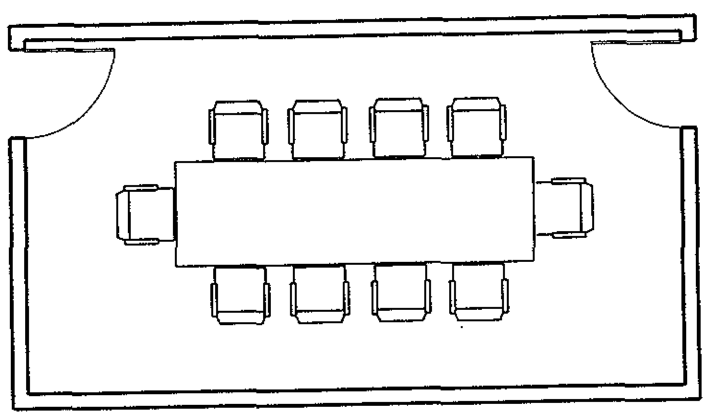
Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	■
Ceramic Tile	
Other	
Base	
Integral with Floor	
Resilient	■
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	■
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	
Gasketing	
Natural Daylight	■
View Windows to:	

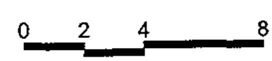
Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **CONFERENCE ROOM**
ROOM NUMBER: **3.2**





FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
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14. Laboratory Sink
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16. Processing Sink
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19. Safety Shower/Eyewash
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23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	3.2
ROOM NAME	CONFERENCE ROOM
ASSIGNABLE AREA	264 ASF

UTILIZATION

Occupied Hours	
14 hours/day	■
24 hours/day	
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	4
Positive Air Pressure	■
Negative Air Pressure	
100% Exhaust	
Return Air	
HEPA Filter Supply Air	
HEPA Filter Exhaust Air	

EXHAUST/CLEAN AIR EQUIPMENT

Chemical Fumehood	
Radioisotope Fumehood	
Canopy Hood	
Snorkel Exhaust	
Laminar Flow Hood	
Exhaust Manifold Connection	
Biological Safety Cabinet	
Low Slotted Exhaust	

PLUMBING/PIPING

Laboratory Vacuum	VAC	
Laboratory Air, 15 psig	LA	
Compressed Air, 100 psig	A	
Laboratory Gas	LG	
Carbon Dioxide	CO2	
Cylinder Gas, Inert		
Cylinder Gas, Toxic/Flammable		
Potable Water	CW, HW	
Industrial Water	ICW, IHW	
Deionized Water	DI	
Steam, Condensate	MPS, CD	
Cooling Water	CWS/R	
Safety Shower/Eyewash	SS	
Drench Hose	DH	
Floor Drain	FD	
Floor Sink	FS	

ELECTRICAL

120V, 20A, 1 phase	■
208V, 30A, 1 phase	
208V, 30A, 3 phase	
480V, 3 phase	
Isolated Ground Outlet	
Dedicated Circuit	
Standby/Emergency Power	
Telephone Outlet	■
LAN/WAN Outlet	■
In-Use Light	
Safe Light	
Lighting Level (fc)	50
Darkenable	■

EQUIPMENT

Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

GROUP 1 EQUIPMENT

Autoclave	
Glassware Washer	
Glassware Dryer	

HAZARDOUS STORAGE

Flammables	
Corrosives	
Toxics	
Carcinogens	
Radioisotopes	
Explosives	
Unstable materials	
Water reactive materials	
Chemical Waste	
Radioisotope Waste	
Biological Waste	

FIXED/LABORATORY MATERIALS

Wood Casework	
Metal Casework	
Stainless Steel Casework	
Plastic Laminate Casework	
Epoxy Resin Tops	
Stainless Steel Tops	
Plastic Laminate Tops	
Epoxy Resin Sinks	
Stainless Steel Sinks	

REMARKS

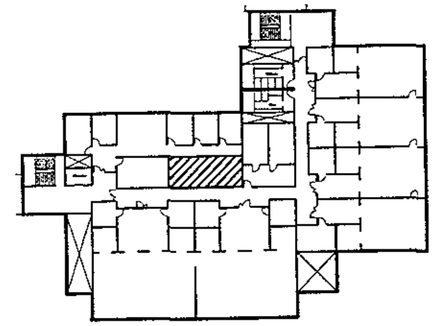
SECURITY

Pushbutton Combination Lock	
Swipe Card Lock	

INTERIORS

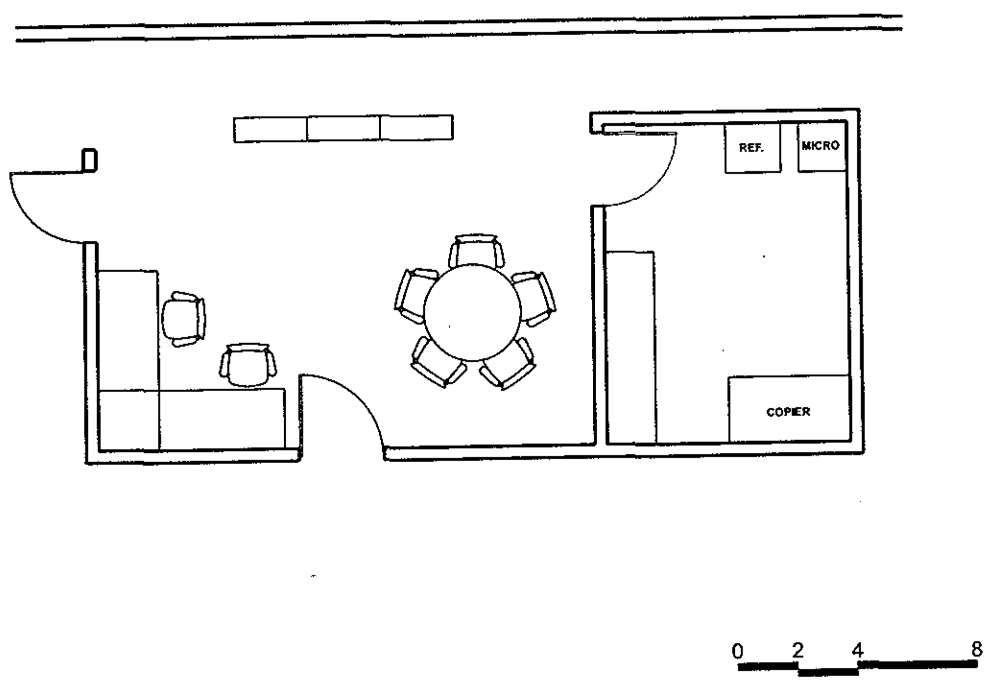
Floor	
Vinyl Composition Tile	
Welded Sheet Vinyl	
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	■
Ceramic Tile	
Other	
Base	
Integral with Floor	
Resilient	■
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	■
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

Space Requirements



Typical Location

DEPARTMENT: **BIOLOGICAL SCIENCES**
ROOM NAME: **WORK AREA**
ROOM NUMBER: **3.3**



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench. Standing Height
7. Laboratory Bench. Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Processing Sink
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Corrosives Storage Cabinet
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable laboratory Table
27. Wire Shelving
28. White Markerboard
29. Drying Rack
30. Tackboard
31. Desk
32. Microscope Table
33. Writing Table
34. A/V Screen
35. Multi-media Projector (Ceiling Mount)
36. File Cabinet

Space Requirements

ROOM NUMBER	3.3
ROOM NAME	OFFICE SUPPORT
ASSIGNABLE AREA	371 ASF

UTILIZATION

Occupied Hours	
14 hours/day	■
24 hours/day	
Operating Hours	
14 hours/day	
24 hours/day	■

MECHANICAL

Temperature	
70°F-73°F ± 2°F	■
4°C	
Other	
Humidity Ambient	■
Humidity Controlled	
Min. Air Changes/Hour	4
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Floor Drain	FD	
Floor Sink	FS	

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Welded Sheet Vinyl	
Resinous, Troweled	
Concrete, Paint/Seal	
Carpet	■
Ceramic Tile	
Other	
Base	
Integral with Floor	
Resilient	■
Other	
Partitions	
Gypsum Board, Paint	■
Gypsum Board, Epoxy Paint	
Gypsum Board, Wallcover	
CMU, Paint	
Ceramic Tile	
Other	
Acoustical Insulation	■
Wall Protection	
Ceiling	
Suspended Acoustic Panel	■
Vinyl-faced Panel	
Gypsum Board, Paint	
Gypsum Board, Epoxy Paint	
Underside of Structure, Paint	
Other	
Doors	
3'-6" x 7'-0"	
3'-0" x 7'-0"	■
1'-6" x 7'-0"	
Other	
Light-tight Rotating Door	
Vision Panel	■
Gasketing	
Natural Daylight	
View Windows to:	

This opinion of probable budget cost has been prepared to reflect the anticipated construction cost for the Biological Sciences Building in the campus of the University of California, Riverside.

This document is based on the measurement and pricing of quantities wherever information is provided and/or reasonable assumptions for other works not covered in the drawings and programs as stated in this document. The unit rates reflected herein have been obtained from historical records and discussion with subcontractors and suppliers. All unit rates relevant to subcontractor works include the subcontractors' overheads and profit.

Scope of the Project

The project includes the construction of a three story building and associated site preparation, improvements and utility work . The building will house 24 laboratories and some administrative offices. The overall size of the building is 54,500 SF.

Documentation

Hanscomb received the following documents from the Architect in February 2000 for the preparation of this estimate:

Architectural
Floor plans, elevations, sections, site plans, space requirements and room diagrams

Structural
Narrative outlining the structural design

Mechanical, Electrical & Plumbing
Narratives outlining the design

Discussion with designers and engineers.

Design Contingency

A design contingency of 12% has been included in this estimate. This is to allow for work not defined or unknown at this time of development

Escalation:

The project is assumed to be bid in July this year and with a construction period of 18 months. Escalation allowance has been included in this estimate to the midpoint of construction at 4% per annum.

Exclusions:

Land acquisition fees
Legal and accounting fees
Design, engineering and consultant fees
Plan check, building permit fees
Testing and inspection
Fire and all risk insurance
Construction contingency
Hazardous material mitigation
Removal of unforeseen underground obstructions
Relocation of owner's furniture, furnishings and equipment
Loose furniture and equipment except as noted
Demolition of existing building
Paging system
Master clock system

Items that may affect the cost estimate:

Modifications to the scope of work included in this estimate.
Unforeseen sub-surface conditions.
Special phasing requirements.
Restrictive technical specifications or excessive contract conditions.
Any other non-competitive bid situations.
Bids delayed beyond the projected schedule.

Recommendation for Cost Control:

Hanscomb Associates recommends that the owner, architect and engineers carefully review this document, including line item descriptions, unit prices, clarifications, exclusions, inclusions and assumptions, contingencies, escalation, and markups. If the project is over budget, or if there are unresolved budgeting issues, alternative systems/schemes should be evaluated before proceeding into the next design phase.

Requests for modifications of any apparent errors or omissions to this document must be made to Hanscomb within ten (10) days of receipt of this estimate. Otherwise, it will be understood that the contents have been concurred with and accepted.

Cost Studies:

This opinion has been based on a competition open bid situation with a recommended 5 - 7 bonafide reputable bids from general contractors and a minimum of 3 bidders for all items of sub-contracted work. Experience indicates that a fewer number of bidders may result in higher bids, conversely an increased number of bidders may result in more competitive bids.

Since Hanscomb has no control over the cost of labor, materials, or equipment, or over the contractor's method of determining prices, or over competitive bidding or market conditions, the opinion of probable construction cost provided for herein is made on the basis of professional experience and qualifications. The opinion represents Hanscomb's best judgment as a professional construction consultant familiar with the construction industry. However, Hanscomb cannot and does not guarantee that proposals, bids, or the construction cost will not vary from opinions of probable cost prepared by them.

Key Criteria:		Ratio to Gross Floor Area
Gross Floor Area	54,500 SF	1.00
Exterior Wall Area	38,000 SF	0.70
Roof Area	16,500 SF	0.30
Interior Partition	4,500 LF	0.083
Plumbing	158 EA	
Laboratories	24 EA	
HVAC	125,600 Cfm	
Electrical	2,000 kVA	
Elevator	1 EA	

7 Apr 2000

UC RIVERSIDE BIOLOGICAL SCIENCES - BUIIDING, CONCEPT DESIGN

PROJECT SUMMARY

HANSCOMB

		QUANTITY	UOM	UNIT COST	TOTAL COST
A	BUILDING				
AA	Foundations	54,500	SF	4.37	237,900
AB	Vertical Structure	54,500	SF	7.92	431,475
AC	Horizontal Structure	54,500	SF	23.17	1,262,880
AD	Exterior Closure	54,500	SF	24.62	1,341,733
AE	Roofing & Waterproofing	54,500	SF	3.98	216,941
AF	Interior Construction	54,500	SF	23.34	1,271,931
AG	Conveying System	54,500	SF	2.86	156,000
AI	Mechanical Systems	54,500	SF	61.63	3,358,613
AK	Electrical Systems	54,500	SF	27.95	1,523,425
AM	Equipment and Furnishings	54,500	SF	36.79	2,005,280
SUBTOTAL		*54,500*	*SF*	*216.63*	*11,806,178*
	GC Overhead & Profit 13%				1,534,803
SUBTOTAL					*13,340,981*
	Design Contingency 12%				1,600,918
SUBTOTAL					*14,941,898*
	Escalation 5%				747,095
TOTAL BUILDING				**287.87**	**15,688,993**
C	SITE WORK				
C2	Site Clearing	54,500	SF	2.57	140,265
C4	Site Development	54,500	SF	5.26	286,419
C6	Site Utilities	54,500	SF	4.17	227,000
SUBTOTAL		*54,500*	*SF*	*11.99*	*653,684*
	GC Overhead & Profit 13%				84,979
SUBTOTAL					*738,663*
	Design Contingency 12%				88,640
SUBTOTAL					*827,302*
	Escalation 5%				41,365
TOTAL SITE WORK				**15.94**	**868,668**

	QUANTITY	UOM	UNIT COST	TOTAL COST
BUILDING				
Foundations				
Standard Foundations				
Reinfoced concrete spread footing	54,500.00	SF	2.00	109,000
Subsurface perforated drain pipe	850.00	LF	14.00	11,900
Elevator pit	1.00	EA	8,000.00	8,000
TOTAL Standard Foundations	*54,500.00*	*SF*	*2.37*	*128,900*
Special Foundations				
Allowance for special foundation	54,500.00	SF	2.00	109,000
TOTAL Special Foundations	*54,500.00*	*SF*	*2.00*	*109,000*
TOTAL Foundations	**54,500.00**	**SF**	**4.37**	**237,900**
Vertical Structure				
Reinforced concrete walls 12" and columns 16" square	54,500.00	SF	5.55	302,475
Reinforced concrete retaining walls	5,000.00	SF	24.00	120,000
Seismic joints at connection to existing buildings - vertical	60.00	LF	150.00	9,000
TOTAL Vertical Structure	**54,500.00**	**SF**	**7.92**	**431,475**
Horizontal Structure				
Reinforced concrete slab on grade 5"	15,326.00	SF	6.00	91,956
Reinforced concrete slab with beams 10x24 @ 5' & girdles 24x30	38,777.00	SF	22.00	853,094
Suspended reinforced concrete roof slab	16,290.00	SF	19.00	309,510
Seismic joints at connection to existing buildings - horizontal	52.00	LF	160.00	8,320
TOTAL Horizontal Structure	**54,500.00**	**SF**	**23.17**	**1,262,880**
Exterior Closure				
Exterior Walls and Finishes				
Brick veneer with support system	3,800.00	SF	30.00	114,000
Glazed panel to bridges	3,800.00	SF	50.00	190,000

	QUANTITY	UOM	UNIT COST	TOTAL COST
Metal panel with support system	7,700.00	SF	40.00	308,000
Window system	7,700.00	SF	35.00	269,500
Metal stud and gypsum board to interior face of exterior walls	22,300.00	SF	2.70	60,210
Batt insulation	22,300.00	SF	0.80	17,840
Metal stud with stucco to innner side of parapat	1,700.00	SF	12.00	20,400
Vapor barrier	22,300.00	SF	0.25	5,575
Finish to exposed concrete frame	7,000.00	SF	5.00	35,000
Caulking to exterior walls	30,000.00	SF	1.00	30,000
Architectural detailing	30,000.00	SF	4.00	120,000
Form openings at existing walls including patching	1.00	LS	25,000.00	25,000
TOTAL Exterior Walls and Finishes	*54,500.00*	*SF*	*21.94*	*1,195,525*
Exterior Doors				
Glazed entry doors	4.00	PR	5,000.00	20,000
Allowance for service doors	1.00	LS	5,000.00	5,000
TOTAL Exterior Doors	*54,500.00*	*SF*	*0.46*	*25,000*
Exterior Soffit and Screens				
Sheet metal soffit to underside of bridges	964.00	SF	22.00	21,208
Sun screens	1.00	LS	100,000.00	100,000
TOTAL Exterior Soffit and Screens	*54,500.00*	*SF*	*2.22*	*121,208*
TOTAL Exterior Closure	**54,500.00**	**SF**	**24.62**	**1,341,733**
Roofing & Waterproofing				
Built-up roofing - 4 ply	16,500.00	SF	2.65	43,725
Rigid insulation - tapered	16,500.00	SF	2.00	33,000
Skylight to bridges	728.00	SF	120.00	87,360
Waterproofing to retaining wall	5,000.00	SF	3.00	15,000
Metal cap flashing	610.00	LF	8.00	4,880
Metal cap flashing to parapat wall	372.00	LF	8.00	2,976
Miscellaneous sheet metal	1.00	LS	10,000.00	10,000
Caulking and sealant	1.00	LS	10,000.00	10,000
Roofing accessories	1.00	LS	10,000.00	10,000
TOTAL Roofing & Waterproofing	**54,500.00**	**SF**	**3.98**	**216,941**

Interior Construction

	QUANTITY	UOM	UNIT COST	TOTAL COST
Interior Walls				
2 hour rated walls	10,000.00	SF	7.50	75,000
1 hour rated walls	53,000.00	SF	5.00	265,000
Non rated walls	3,500.00	SF	4.25	14,875
Plumbing chase walls	1,000.00	SF	5.50	5,500
Glazed partition to conference rooms	700.00	SF	30.00	21,000
TOTAL Interior Walls	*54,500.00*	*SF*	*7.00*	*381,375*
Interior Finishes				
Floor Finishes				
Sealed concrete	5,138.00	SF	0.60	3,083
Ceramic tile	1,386.00	SF	9.00	12,474
Resilient	8,584.00	SF	2.00	17,168
Welded sheet vinyl	33,442.00	SF	3.85	128,752
Carpet	4,950.00	SF	3.00	14,850
Waterproofing coating to glass wash and wet area	1,000.00	SF	5.00	5,000
TOTAL Floor Finishes	*54,500.00*	SF	*3.33*	*181,327*
Base				
Ceramic tile	492.00	LF	8.00	3,936
Resilient	4,700.00	LF	1.50	7,050
Welded sheet vinyl integral with floor	6,000.00	LF	3.00	18,000
TOTAL Base	*54,500.00*	SF	*0.53*	*28,986*
Wall Finishes				
Ceramic tiles to bathroom	3,936.00	SF	8.00	31,488
Epoxy paint	5,000.00	SF	1.50	7,500
Regular painting	52,000.00	SF	0.60	31,200
TOTAL Wall Finishes	*54,500.00*	SF	*1.29*	*70,188*
Ceiling Finishes				
Suspended gypsum board, painted	3,870.00	SF	5.00	19,350
Suspended gypsum board epoxy painted	319.00	SF	6.50	2,074
Suspended vinyl faced panel	429.00	SF	4.00	1,716
Suspended acoustical panel	45,954.00	SF	2.50	114,885
Gypsum board bulk heads and other architectural treatment	1.00	LS	45,000.00	45,000
TOTAL Ceiling Finishes	*54,500.00*	SF	*3.36*	*183,025*

	QUANTITY	UOM	UNIT COST	TOTAL COST
TOTAL Interior Finishes	*54,500.00*	*SF*	*8.51*	*463,525*
Interior Doors and Windows				
Solid wood door to bathroom	6.00	EA	900.00	5,400
Solid wood door with glazing panel - single	74.00	EA	1,100.00	81,400
Ditto - double	27.00	EA	2,000.00	54,000
Glazed door to conference room - single	6.00	EA	2,000.00	12,000
Service doors in basement	2.00	EA	800.00	1,600
Access doors and panels	1.00	LS	10,000.00	10,000
TOTAL Interior Doors and Windows	*54,500.00*	*SF*	*3.02*	*164,400*
Building Specialties				
Toilet partitions - General	18.00	EA	650.00	11,700
Toilet partitions - Handicap	12.00	EA	850.00	10,200
Toilet accessories	1.00	LS	12,000.00	12,000
Urinal screen	6.00	EA	300.00	1,800
Built in shelving in offices and conference rooms	1.00	LS	50,000.00	50,000
Blind	7,579.00	SF	3.00	22,737
Building specialties	54,103.00	SF	2.35	127,142
Interior signage	54,103.00	SF	0.50	27,052
TOTAL Building Specialties	*54,500.00*	*SF*	*4.82*	*262,631*
TOTAL Interior Construction	**54,500.00**	**SF**	**23.34**	**1,271,931**
Conveying System				
Hydraulic elevator, 5,600 lb, 4 stops	1.00	EA	100,000.00	100,000
Steel stairs with concrete infill	7.00	FL	8,000.00	56,000
TOTAL Conveying System	**54,500.00**	**SF**	**2.86**	**156,000**
Mechanical Systems				
Plumbing				
Sanitary fixtures and local connection pipework:	0.00		0.00	0
Water closets	30.00	EA	850.00	25,500
Lavatories	24.00	EA	850.00	20,400
Sinks, countrtop	2.00	EA	700.00	1,400

	QUANTITY	UOM	UNIT COST	TOTAL COST
Service sinks	3.00	EA	950.00	2,850
Drinking fountains, handicapped	3.00	EA	2,250.00	6,750
Urinals	6.00	EA	850.00	5,100
Laboratory fixtures:	0.00		0.00	0
Laboratory sinks	48.00	EA	700.00	33,600
Emergency eye wash/showers, c/w mixing valve	24.00	EA	3,500.00	84,000
Sanitary waste, vent and service pipiwork:	0.00		0.00	0
Floor drains and sinks, <=4"	20.00	EA	275.00	5,500
Hose bibbs, 3/4"	1.00	LS	4,000.00	4,000
Rough-in sanitary fixtures	62.00	EA	1,450.00	89,900
Condensate drainage, 1"	1.00	LS	5,000.00	5,000
Mechanical make-up	1.00	LS	5,000.00	5,000
Water treatment, storage and circulation:	0.00		0.00	0
Duplecx steam to water, 120 deg & 140 deg	2.00	EA	12,500.00	25,000
Circulation pumps, <=1/3 hp	2.00	EA	1,250.00	2,500
Laboratory service equipment:	0.00		0.00	0
Compressed air and laboratory vacuum connect to existing syste	1.00	EA	15,000.00	15,000
Reverse osmosis & de-ionsied water generation to existing	1.00	EA	5,000.00	5,000
Laboratory waste and vent	17,301.00	SF	5.00	86,505
Surface water drainage	54,500.00	SF	1.20	65,400
Natural gas system	1.00	LS	15,000.00	15,000
Test, purge and sterilize	90.00	HR	75.00	6,750
Lab plumbing incl. steam, ind. water, gas, vacuum & air	17,301.00	SF	18.00	311,418
TOTAL Plumbing	*54,500.00*	*SF*	*15.07*	*821,573*
HVAC				
Cooling:	0.00		0.00	0
Chilled water, connection to existing campus supply	1.00	LS	20,000.00	20,000
Primary/secondary chilled water pump	2.00	EA	6,500.00	13,000
VFD to secondary chilled water pump	2.00	EA	2,500.00	5,000
Chemical treatmenrt	1.00	LS	5,000.00	5,000
Chilled water piping, valves, specialties and insulation	54,500.00	SF	1.15	62,675
Process cooling and piping	1.00	LS	20,000.00	20,000

	QUANTITY	UOM	UNIT COST	TOTAL COST
Heating:	0.00		0.00	0
Heating water, connection to existing campus supply	1.00	LS	10,000.00	10,000
Heating water pumps	2.00	EA	5,000.00	10,000
Reheat/steam and condensate package	1.00	LS	20,000.00	20,000
Heating water piping, valves, speacialties and insulation	54,500.00	SF	1.30	70,850
Heat recovery systems	1.00	LS	25,000.00	25,000
Air distribution:	0.00		0.00	0
Air handling unit, VAV, 62,000 cfm	2.00	EA	248,000.00	496,000
Air handling unit, VAV, 1650 cfm (BSL3)	1.00	EA	6,000.00	6,000
Exhaust fan for BSL 3	1.00	EA	2,000.00	2,000
Variable frequency drive to ahu fans	6.00	EA	2,000.00	12,000
Terminal supply air valves	180.00	EA	650.00	117,000
Laboratory exhaust air valve c/w Phoenix valves	160.00	EA	800.00	128,000
Fumehood exhaust air fans @ 55,000 cfm each	2.00	EA	50,000.00	100,000
Radioisotope exhaust fan	1.00	EA	2,500.00	2,500
General exhaust fan	1.00	LS	10,000.00	10,000
Ductwork and insulation	54,000.00	LB	5.00	270,000
Fumehood and exhaust ductwork	40,000.00	LB	10.00	400,000
Sound trap, attenuators	1.00	LS	36,000.00	36,000
Air outlets & dampers	1.00	LS	20,000.00	20,000
Balancing & testing - air & water systems	1.00	LS	20,000.00	20,000
Controls:	0.00		0.00	0
DDC control system	54,500.00	SF	4.75	258,875
Laboratory controls, Phoenix	17,301.00	SF	15.00	259,515
Miscellaneous:	0.00		0.00	0
Emergency generator services: pumps, piping, vent. & exhaust	1.00	EA	15,000.00	15,000
TOTAL HVAC	*54,500.00*	*SF*	*44.30*	*2,414,415*
Fire Protection				
Automatic fire sprinkler system	54,500.00	SF	2.25	122,625
TOTAL Fire Protection	*54,500.00*	*SF*	*2.25*	*122,625*
TOTAL Mechanical Systems	**54,500.00**	**SF**	**61.63**	**3,358,613**

	QUANTITY	UOM	UNIT COST	TOTAL COST
Electrical Systems				
Service & Distributions				
Unit substation	1.00	EA	110,000.00	110,000
480/277V panelboards	20.00	EA	4,500.00	90,000
Transformers, 225kVA	3.00	EA	10,000.00	30,000
Transformers, 30kVA	3.00	EA	3,500.00	10,500
208/120V panelboards	35.00	EA	5,200.00	182,000
Motor wiring, connection	54,500.00	SF	0.75	40,875
Grounding	54,500.00	SF	0.15	8,175
Emergency generator, ATS, 400kW	1.00	EA	130,000.00	130,000
TOTAL Service & Distributions	*54,500.00*	*SF*	*11.04*	*601,550*
Lighting & Power				
Laboratory fixtures	250.00	EA	350.00	87,500
Miscellaneous flourescent	575.00	EA	215.00	123,625
Exit lights	30.00	EA	250.00	7,500
Fixture connections	855.00	EA	50.00	42,750
Lighting controls	54,500.00	SF	0.50	27,250
Convenience outlets	330.00	EA	140.00	46,200
Gfi outlets	6.00	EA	150.00	900
Waterproof outlets	6.00	EA	175.00	1,050
TOTAL Lighting & Power	*54,500.00*	*SF*	*6.18*	*336,775*
Special Systems				
Fire alarm	54,500.00	SF	2.00	109,000
Security rough-in	54,500.00	SF	0.20	10,900
Security equipment and devices	54,500.00	SF	0.40	21,800
Surface mounted raceways	2,500.00	LF	50.00	125,000
Telephone/data outlets, conduit only	330.00	EA	130.00	42,900
Telephone/data outlets and cables	330.00	EA	450.00	148,500
Miscellaneous connections	54,500.00	SF	1.00	54,500
Cable tray	500.00	LF	45.00	22,500
Routers	1.00	LS	50,000.00	50,000
TOTAL Special Systems	*54,500.00*	*SF*	*10.74*	*585,100*
TOTAL Electrical Systems	**54,500.00**	**SF**	**27.95**	**1,523,425**
Equipment and Furnishings				
Special Equipment				

	QUANTITY	UOM	UNIT COST	TOTAL COST
Fume hoods - 6'	23.00	EA	6,500.00	149,500
Ditto - 5'	1.00	EA	6,000.00	6,000
Cold room 18x10	3.00	EA	45,000.00	135,000
Cylinder racks	36.00	EA	30.00	1,080
Biological safety cabinet 54x34x90	2.00	EA	13,800.00	27,600
Biological safety cabinet	23.00	EA	8,200.00	188,600
Autoclaves 20x20x38	2.00	EA	45,000.00	90,000
Glassware washer 36x28x34	4.00	EA	15,000.00	60,000
TOTAL Special Equipment	*54,500.00*	*SF*	*12.07*	*657,780*
Furnishings				
Laboratory island benches - 2 sided & adjustable	488.00	LF	1,150.00	561,200
Ditto - one sided	512.00	LF	500.00	256,000
Buillt in counter in laboratories	530.00	LF	100.00	53,000
Base cabinet in laboratories	787.00	LF	300.00	236,100
Wall and base cabinets in laboratories	536.00	LF	450.00	241,200
TOTAL Furnishings	*54,500.00*	*SF*	*24.72*	*1,347,500*
TOTAL Equipment and Furnishings	**54,500.00**	**SF**	**36.79**	**2,005,280**
TOTAL BUILDING	54,500.00	SF	216.63	11,806,178
SITE WORK				
Site Clearing				
Clearing and grubbing	38,000.00	SF	1.00	38,000
Finish grading	38,000.00	SF	0.30	11,400
Remove trees and other landscaping	1.00	LS	20,000.00	20,000
Excavate basement and remove	1,300.00	CY	15.00	19,500
Backfill using excavated material	55.00	CY	5.00	275
Shoring assume not required	0.00	SF	0.00	0
Excavate site to proposed 1st floor level	3,406.00	CY	5.00	17,030
Remove excavated material	3,406.00	CY	10.00	34,060
TOTAL Site Clearing	**54,500.00**	**SF**	**2.57**	**140,265**

Site Development

	QUANTITY	UOM	UNIT COST	TOTAL COST
Scored colored concrete paving with curbs	4,160.00	SF	5.50	22,880
Scored natural color concrete paving with curbs & brick bands	3,110.00	SF	8.00	24,880
Planter	1,225.00	SF	30.00	36,750
16" high concrete seat wall with reveal	105.00	LF	50.00	5,250
Concrete bench	5.00	EA	1,000.00	5,000
Bike rack	3.00	EA	1,000.00	3,000
Trash receptacles	3.00	EA	500.00	1,500
Bulletin board	1.00	EA	5,000.00	5,000
Directional sign	2.00	EA	500.00	1,000
Landscaping:	0.00		0.00	0
Turf	4,358.00	SF	1.00	4,358
Ground cover and shrub	9,196.00	SF	8.00	73,568
Trees - 48" box	14.00	SF	1,200.00	16,800
Trees - 60" box	8.00	SF	2,500.00	20,000
Concrete walk with curb	625.00	SF	5.00	3,125
Mow strips	600.00	LF	2.00	1,200
Irrigation and soil preparation	13,554.00	SF	2.00	27,108
Connect to existing building and restore finishes	1.00	LS	35,000.00	35,000
TOTAL Site Development	**54,500.00**	**SF**	**5.26**	**286,419**
Site Utilities				
Site lighting, allowance	1.00	LS	25,000.00	25,000
Tree up- light (bullet type)	10.00	EA	200.00	2,000
Incoming power	1.00	LS	50,000.00	50,000
Incoming communication	1.00	LS	50,000.00	50,000
Mechanical utility	1.00	LS	100,000.00	100,000
TOTAL Site Utilities	**54,500.00**	**SF**	**4.17**	**227,000**
TOTAL SITE WORK	54,500.00	SF	11.99	653,684
TOTAL UC RIVERSIDE BIOLOGICAL SCIENCES	54,500.00	SF	228.62	12,459,862

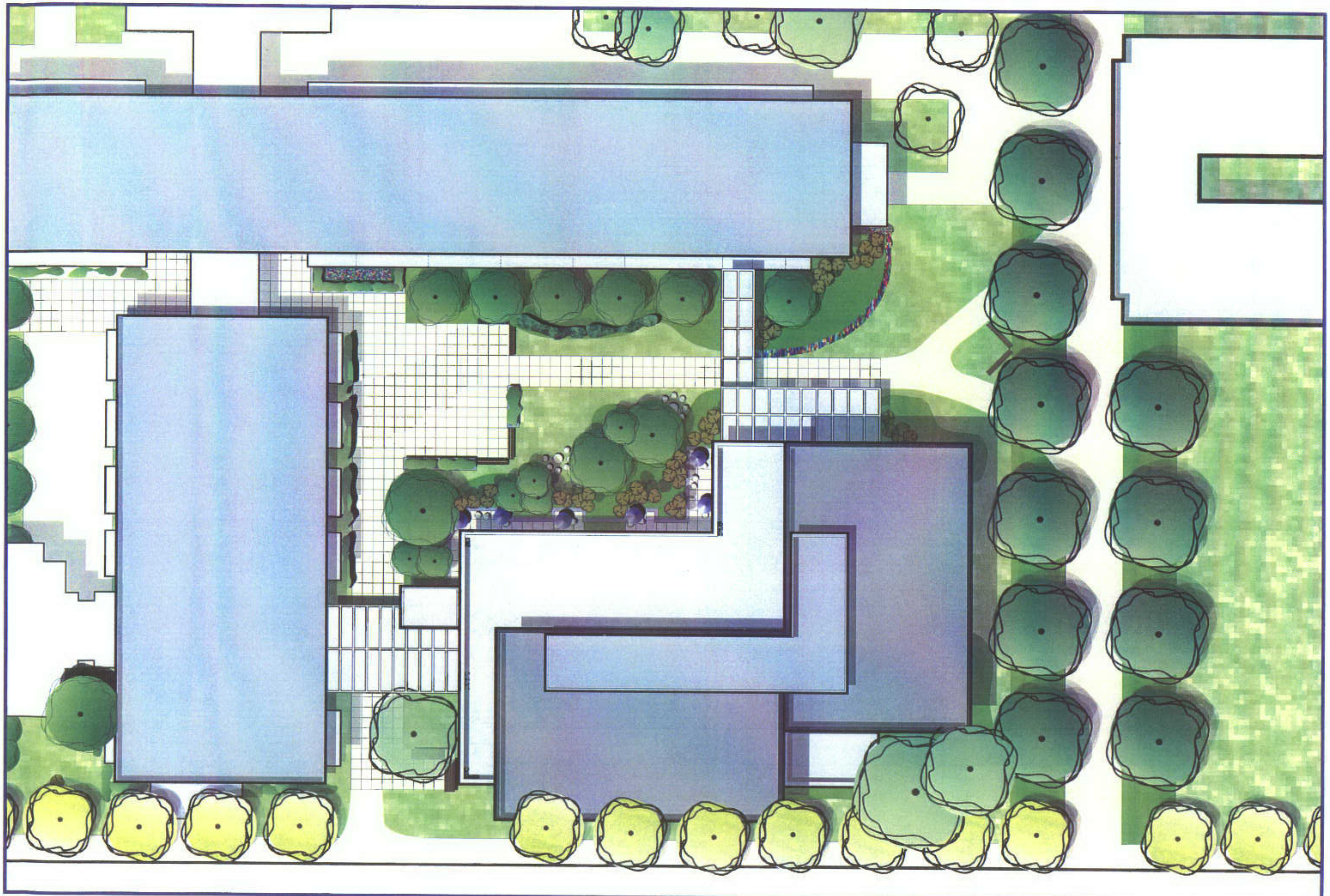
Appendices 8

A. Documents Consulted

1. California Building Code (Title 24, Part 2), 1998
2. California Electric Code (Title 24, Part 3), 1998
3. California Mechanical Code (Title 24, Part 4), 1998
4. California Plumbing Code (Title 24, Part 5), 1998
5. California Energy Code (Title 24, Part 6), 1998
6. California Elevator Safety Construction Code (Title 24, Part 7), 1998
7. California Fire Code (Title 24, Part 9), 1998
8. California State Reference Standards Code (Title 24, Part 12), 1998
9. NFPA 30, *Flammable and Combustible Liquids Code*, 1996
10. NFPA 45, *Fire Protection for Laboratories Using Chemicals*, 1996
11. NFPA 101, *Safety to Life from Fire in Buildings and Structures*, 1997
12. CFR 1910.1450, Occupational exposures to hazardous chemicals in laboratories (OSHA Standard 29).
13. Americans with Disabilities Act Accessibility Guidelines (ADAAG), U. S. Architectural and Transportation Barriers Compliance Board
14. ANSI/CABO A117.1, *Access and Usable Buildings and Facilities*, 1992
15. ANSI/AIHA Z9.5, American National Standard for Laboratory Ventilation, 1992
16. ANSI Z358.1, Emergency Eyewash and Shower Equipment, 1998
17. HHS (CDC) 93-8395, *Biosafety in Microbiological and Biomedical Laboratories*, 4th edition, 1999
18. NIH Design Policy and Guidelines, Bethesda, MD, Feb 1996
19. *Guide for the Care and Use of Laboratory Animals*, Institute of Laboratory Animal Resources, National Research Council, 1996
20. National Electrical Code with California Amendments, Latest edition
21. Title 24 California Code of Regulations Energy Commission
22. Americans with Disabilities Act Accessibility Guidelines
23. NESC, National Electrical Safety Code
24. UBC, *Uniform Building Code*, Latest edition with Amendments
25. 1998 , Title 24 California State Energy Code
26. 1998, California State Building Code
27. 1998, California State Mechanical Code

28. ASME Guidelines and Standards
29. ASHRAE Design Guides
30. SMACNA Design Guides
31. AIHA Guidelines and Standards
32. 1994, Uniform Plumbing Code
33. University of California, *Riverside Campus Design Guidelines*
34. University of California, Riverside *Environmental Health & Safety Laboratory Safety Design Guide*
35. University of California, Riverside *Long Range Development Plan*, 1990
36. University of California, Riverside *LRDP Planning Guidelines*, 1990
37. University of California, Riverside *Campus Design Guidelines*, 1990
38. University of California, Riverside *College of Natural and Agricultural Sciences Master Space Plan*, 1995

B. Supplemental Drawings



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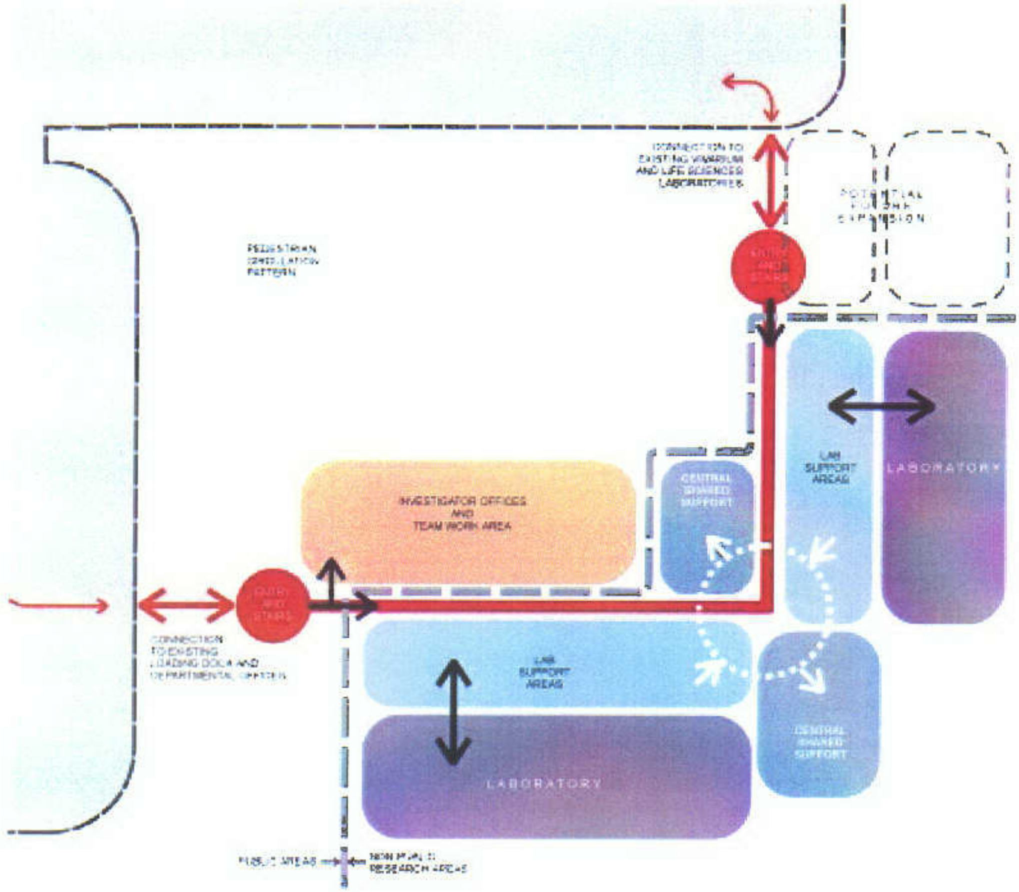
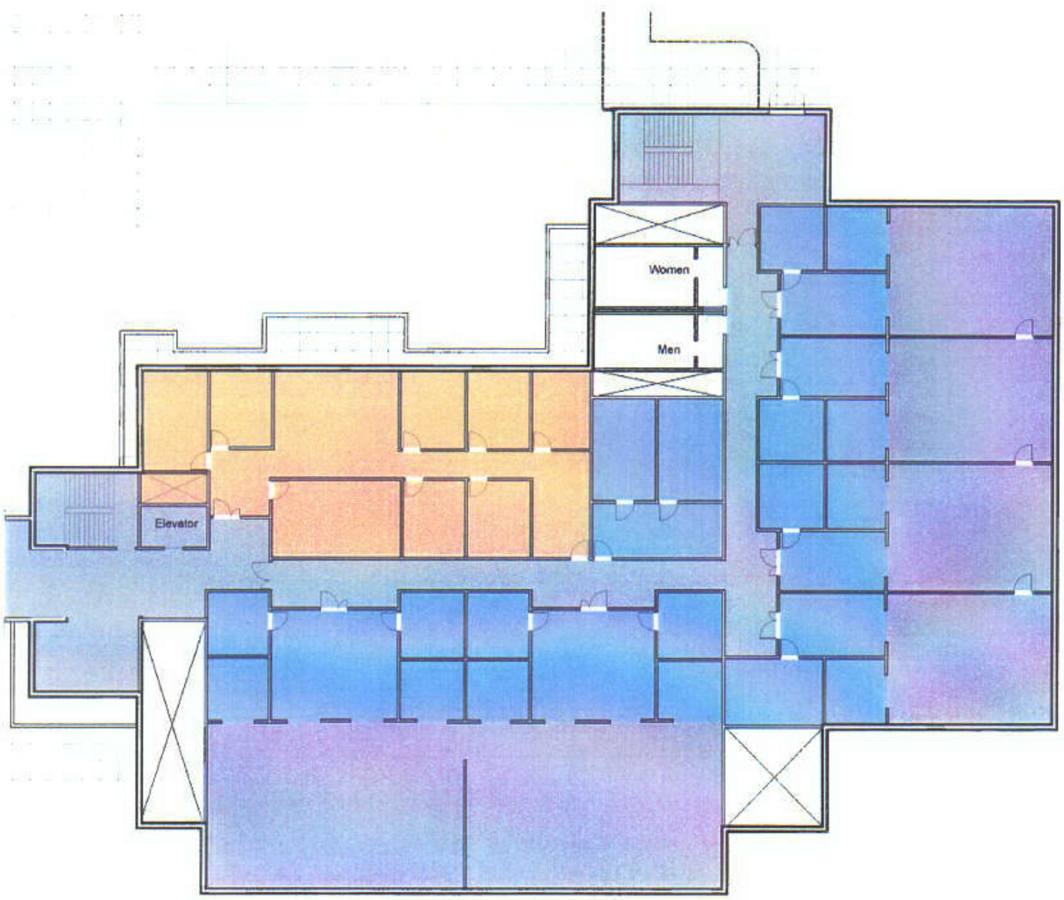
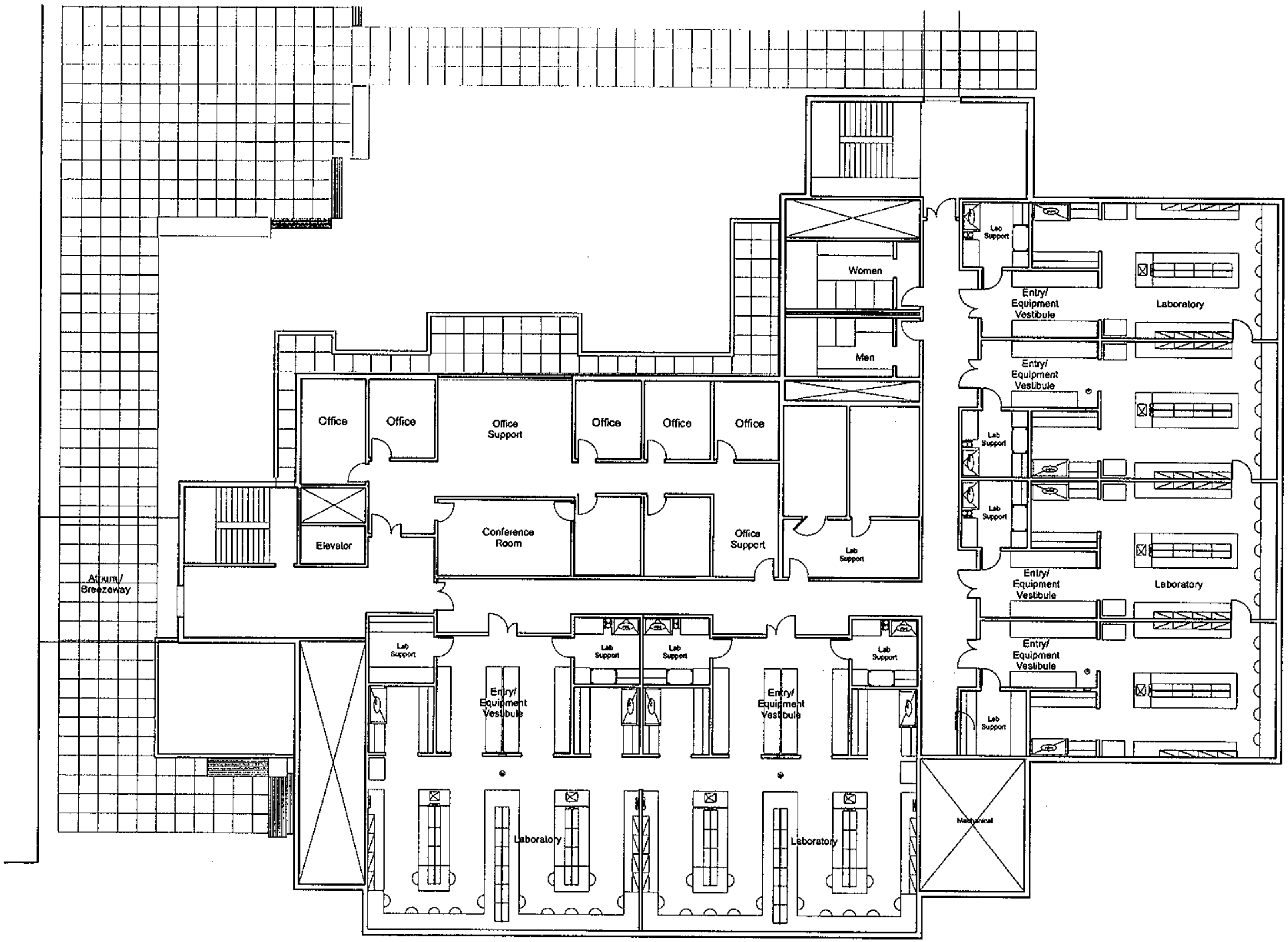

CONNECTION TO EXISTING VIVARIUM AND LIFE SCIENCES LABORATORIES
INVESTIGATOR OFFICES AND TEAM WORK AREA
CENTRAL SHARED SUPPORT
LAB SUPPORT AREAS
LABORATORY
LAB SUPPORT AREAS
CENTRAL SHARED SUPPORT
LABORATORY


Women
Men
Elevator



First Floor Plan

University of California Riverside **Biological Sciences Building DPP**

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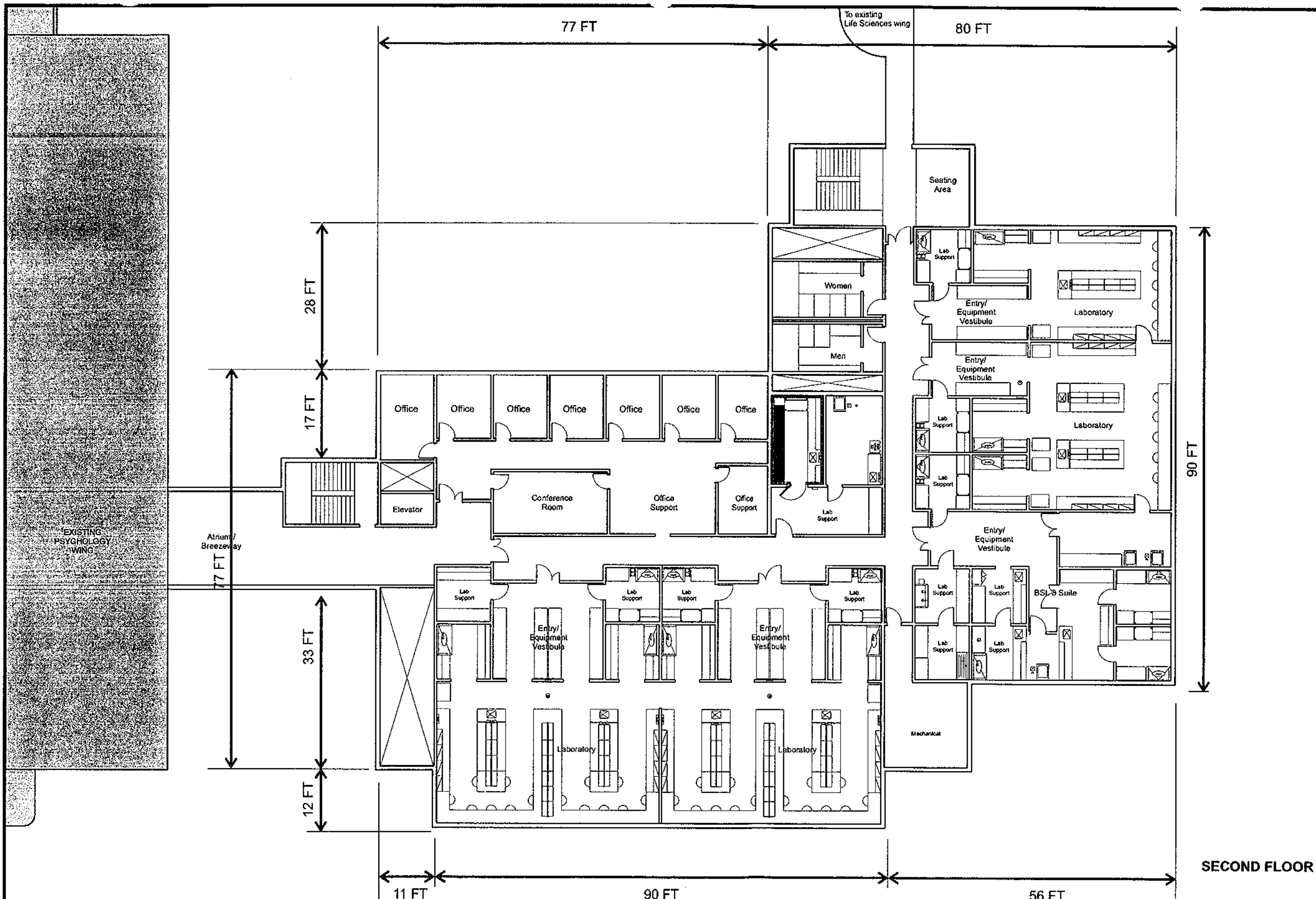
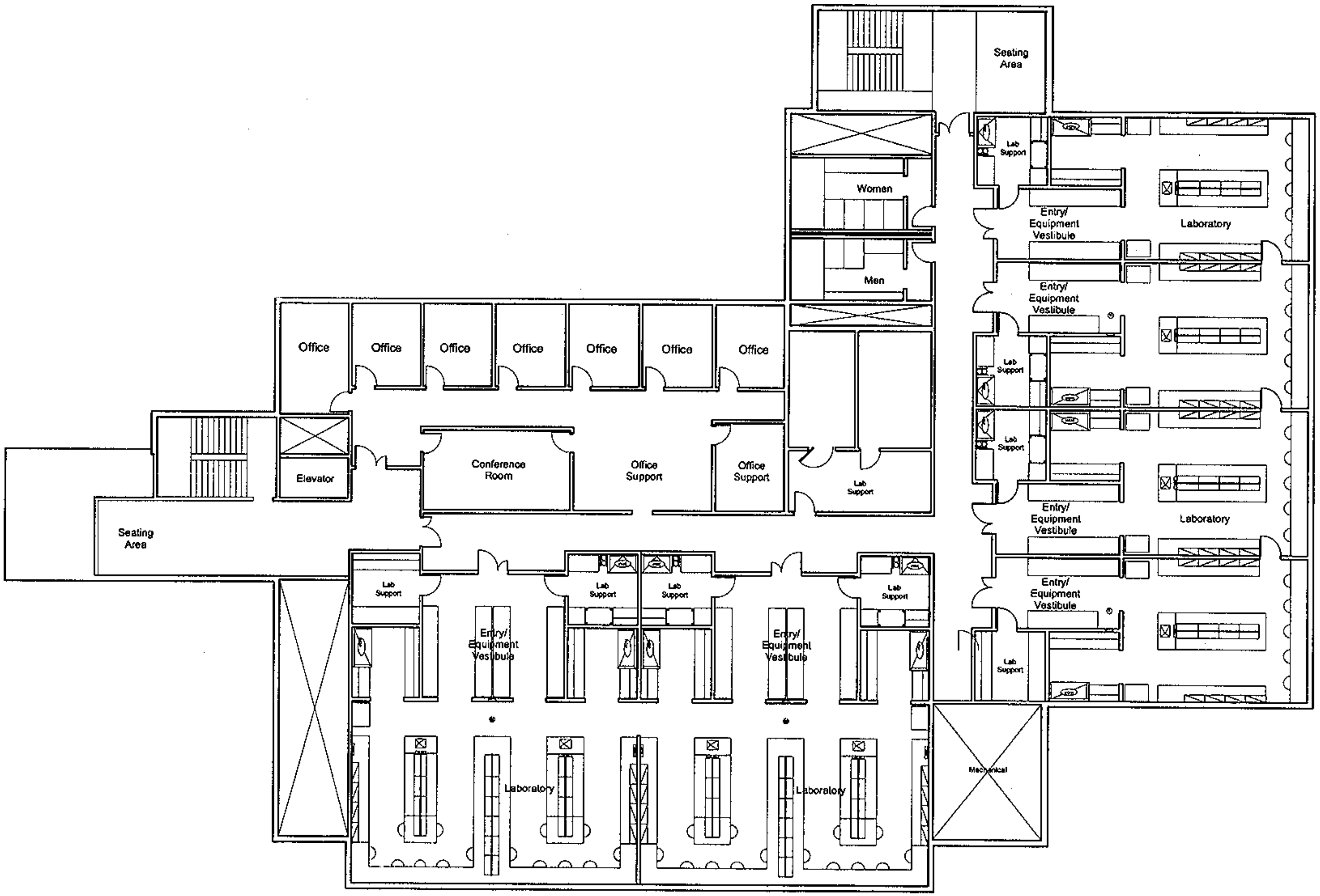
JOHNSON FAIN PARTNERS



University of California Riverside Biological Sciences Building DPP



Third Floor Plan

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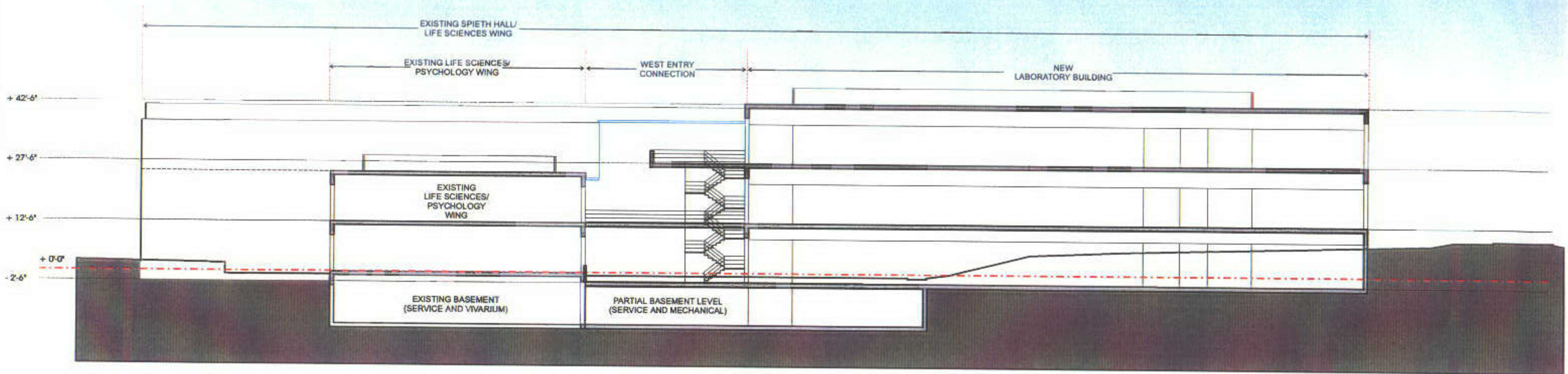
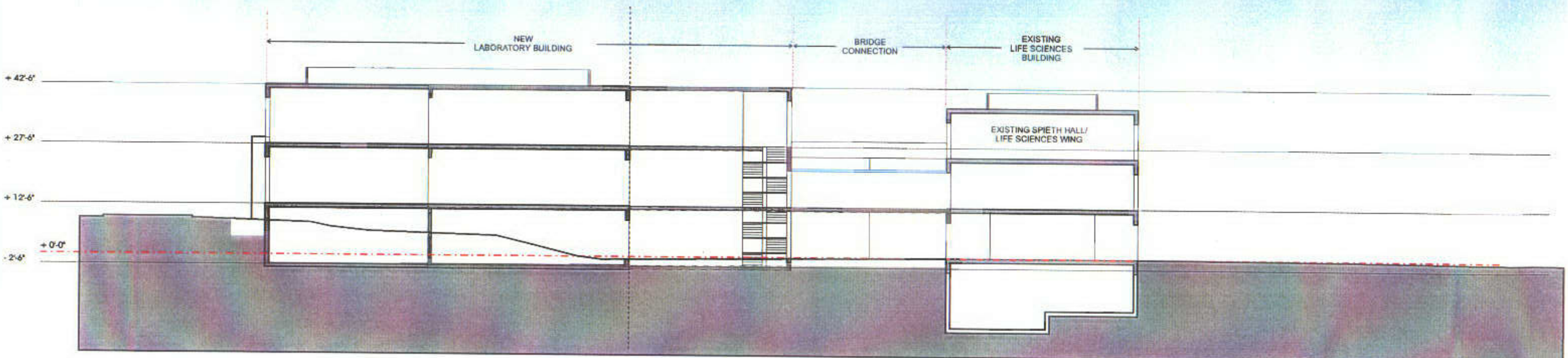
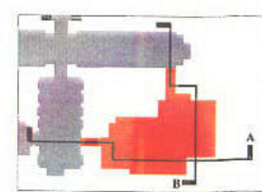


SECTION A



SECTION B



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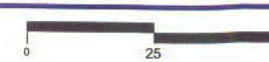

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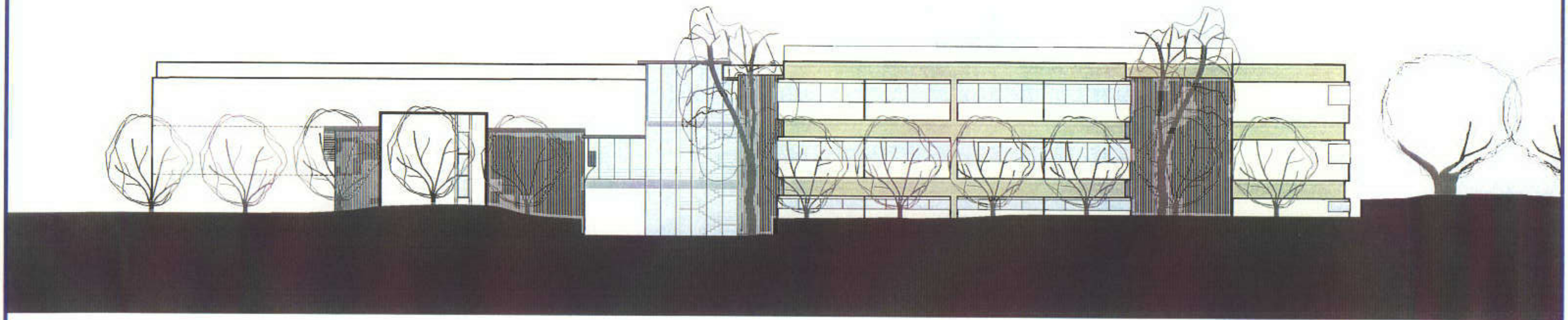
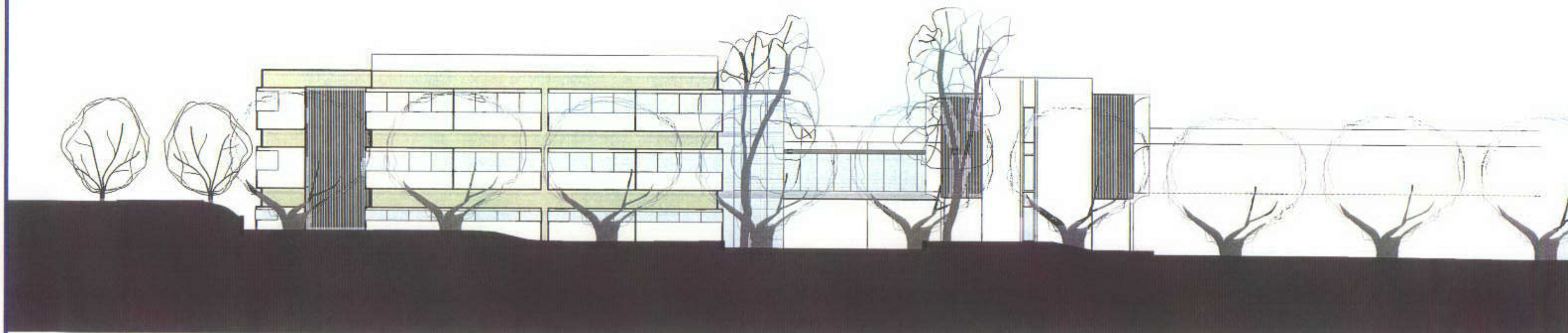


SOUTH ELEVATION



EAST ELEVATION

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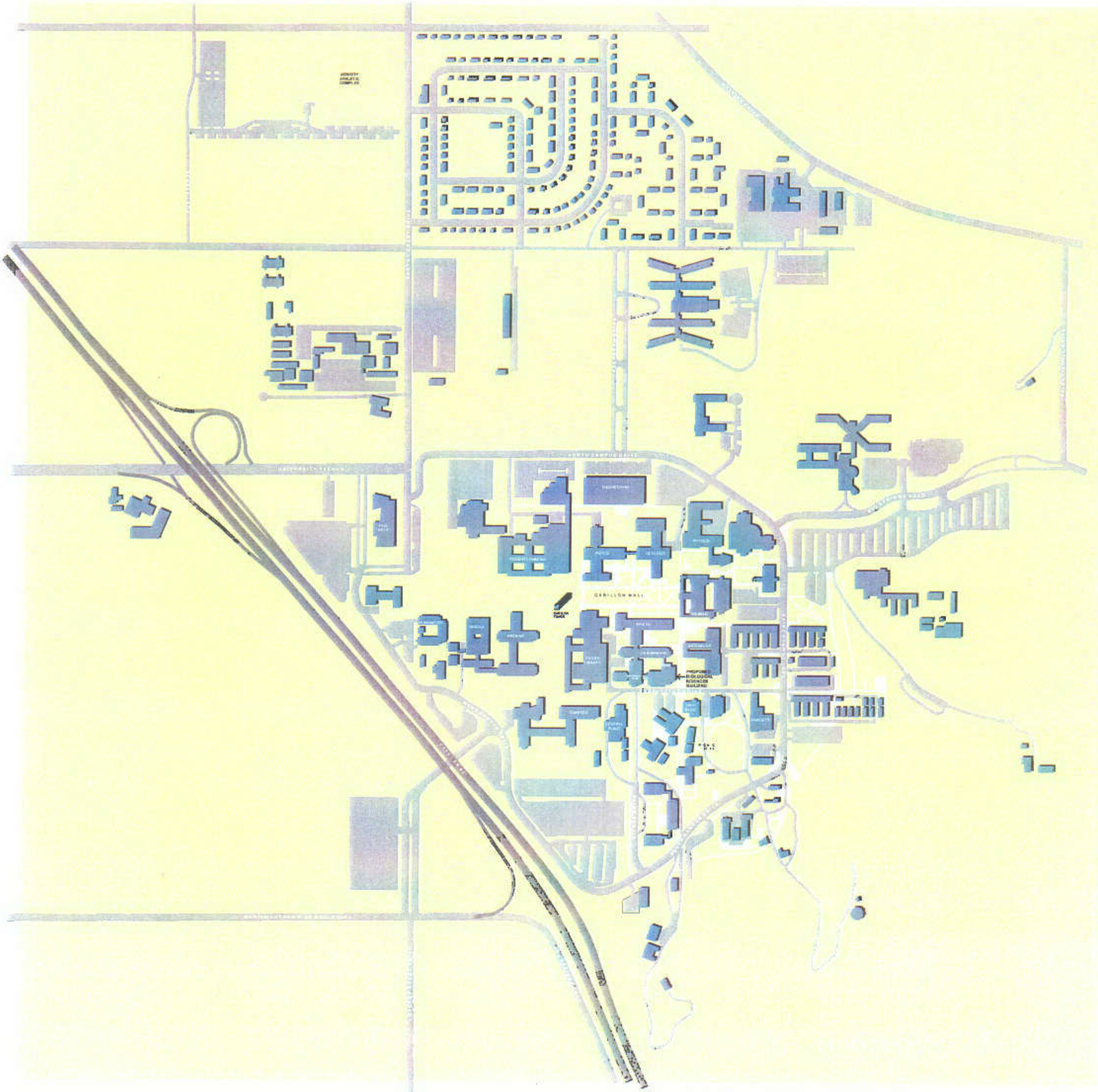
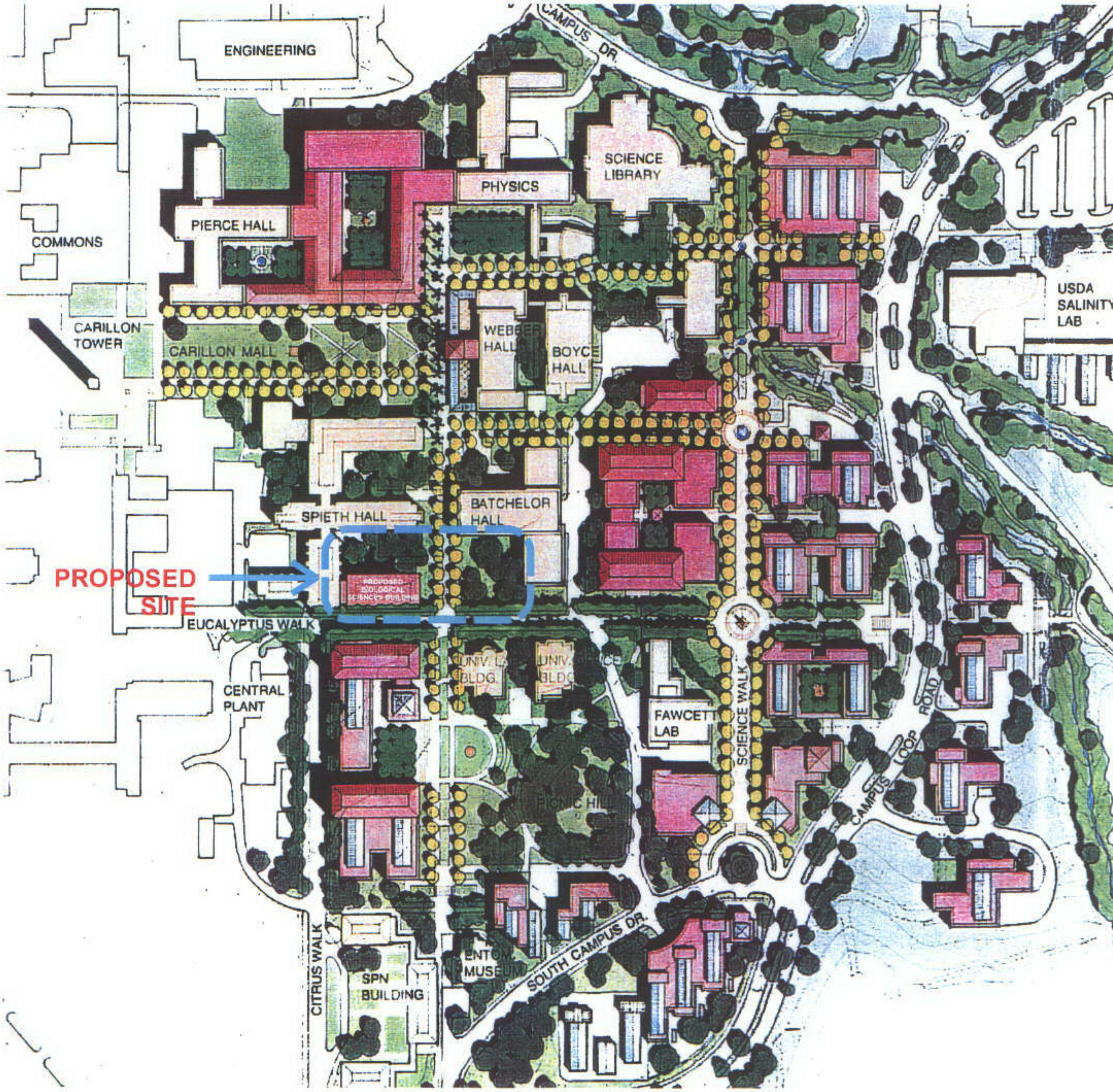
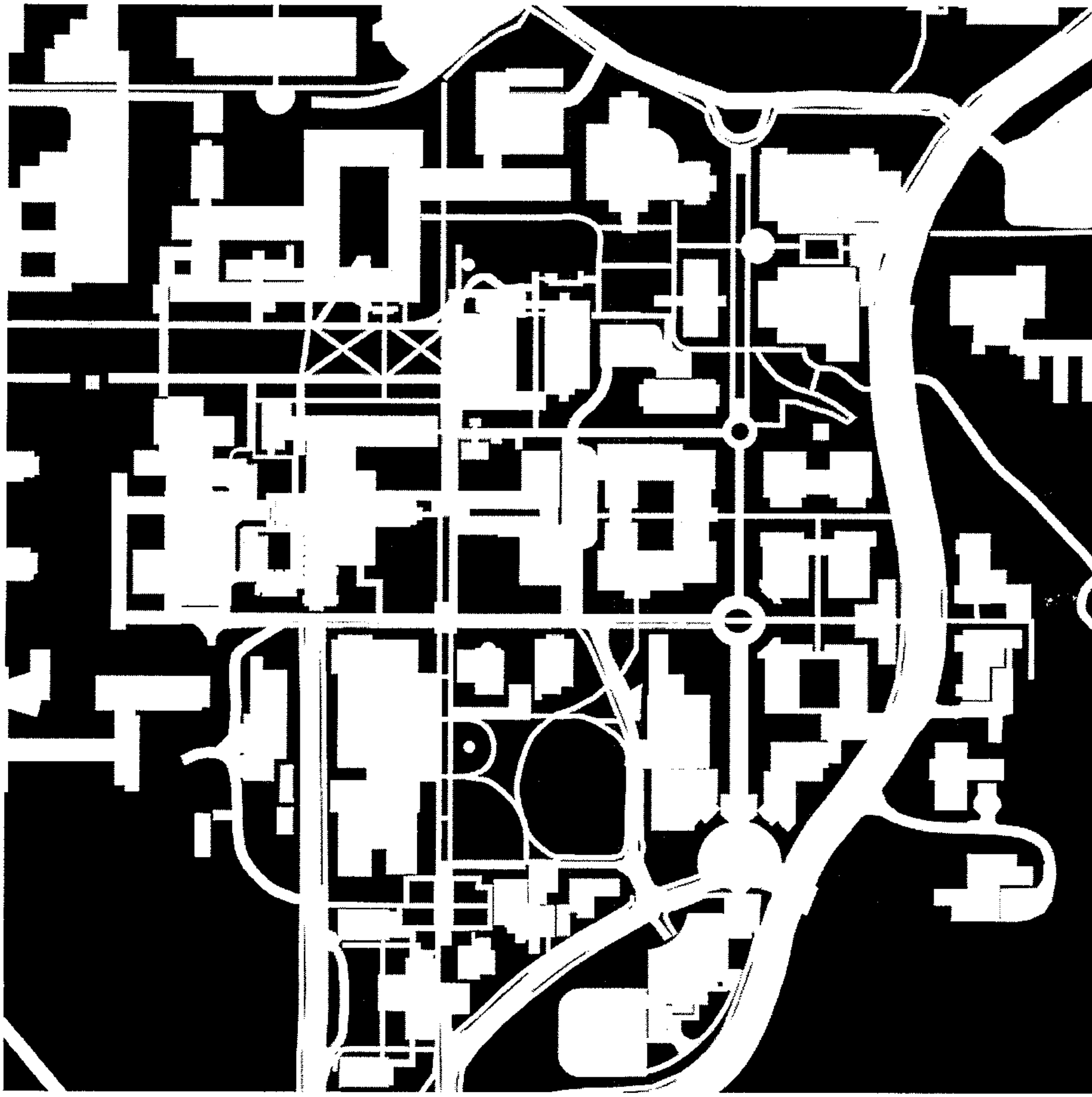


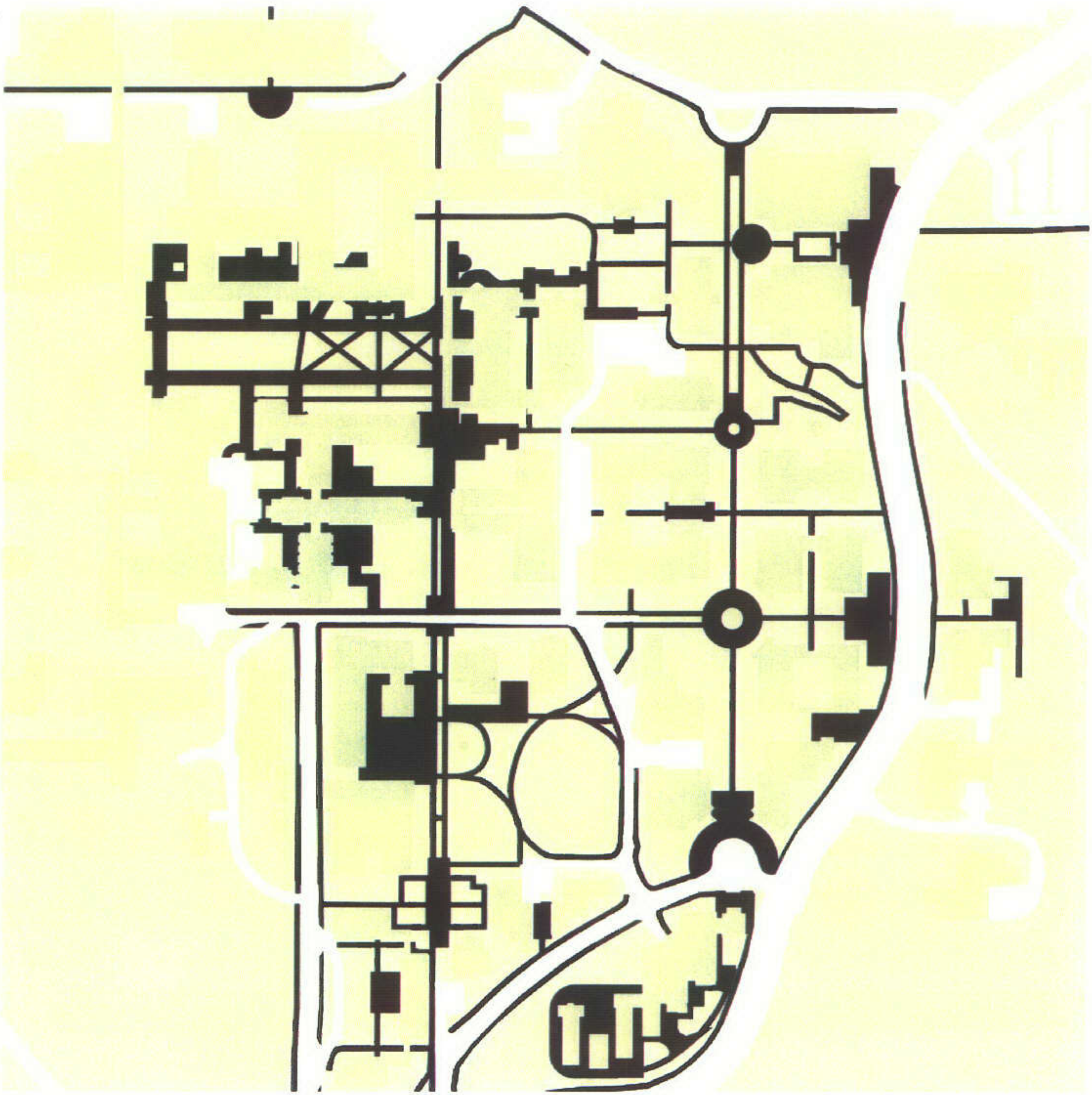
University of California, Riverside
Existing Campus Plan



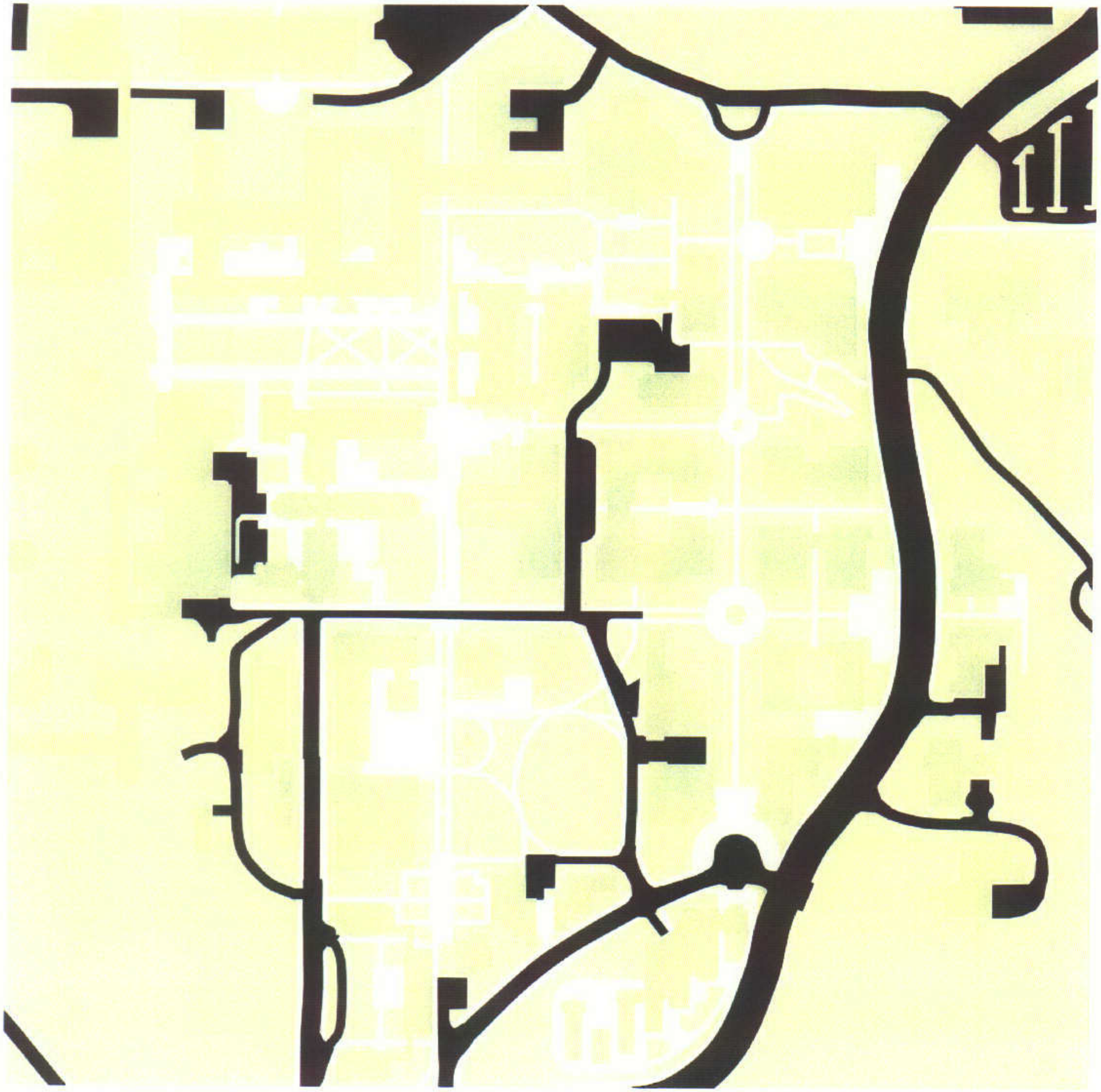
CNAS Precinct Master Plan (1995)



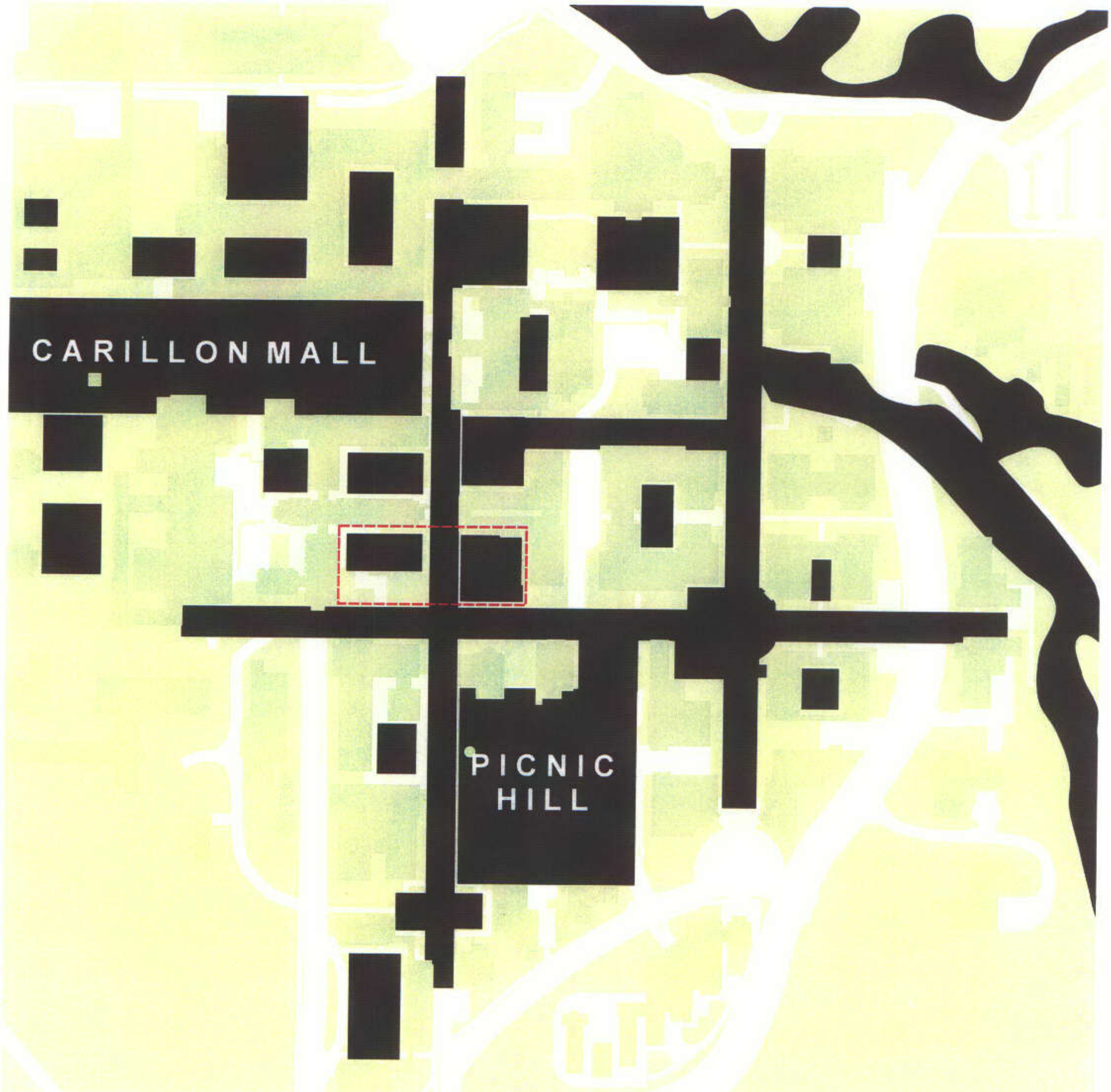
Built Space *v.* Open Space
(Figure-Ground Analysis)



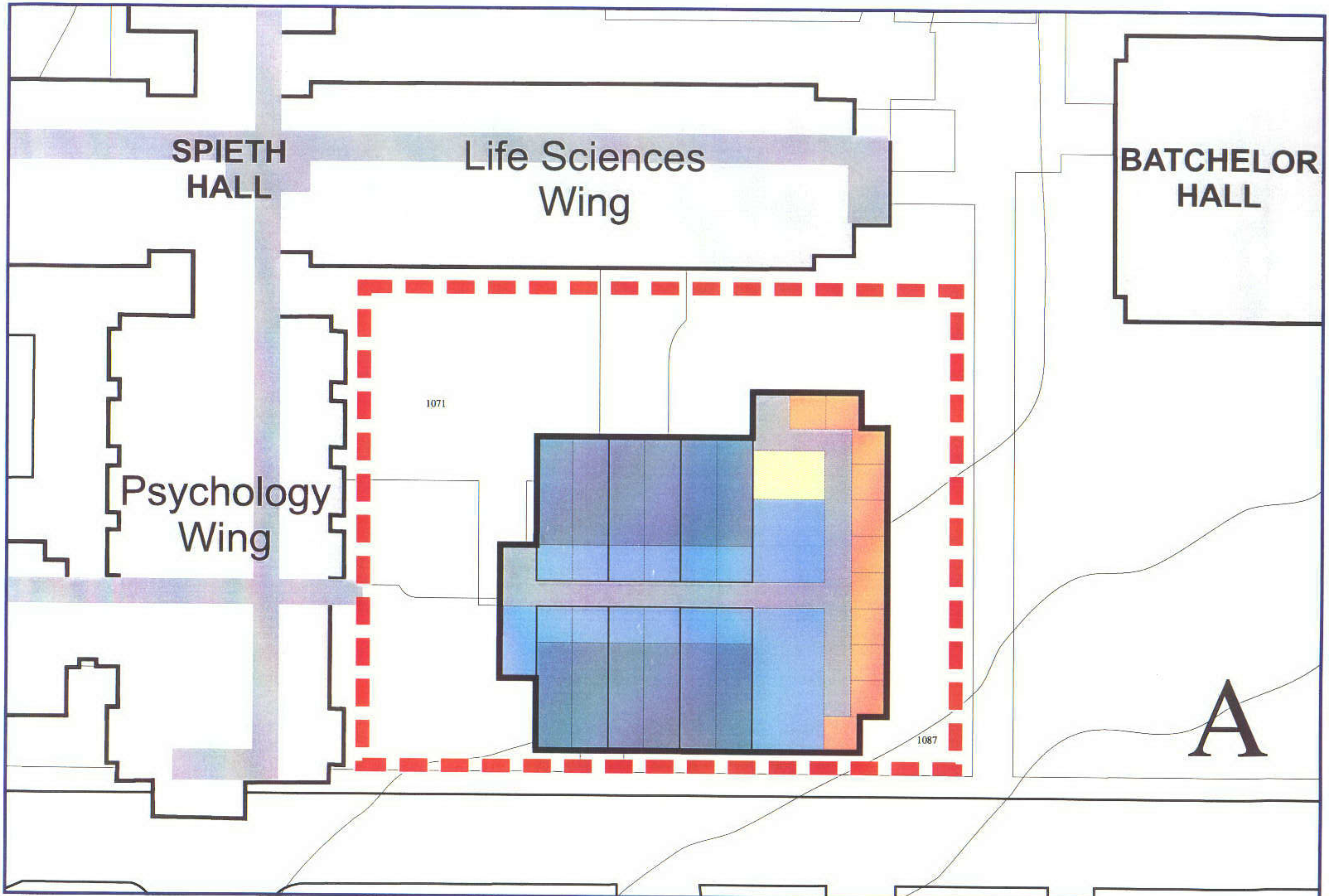
Campus/CNAS Precinct Pedestrian Circulation Patterns
(As proposed in LRDP)



Campus/CNAS Precinct Vehicular Circulation and Parking Patterns
(As proposed in LRDP)



Campus/CNAS Precinct Open Space Framework
(As proposed in LRDP)



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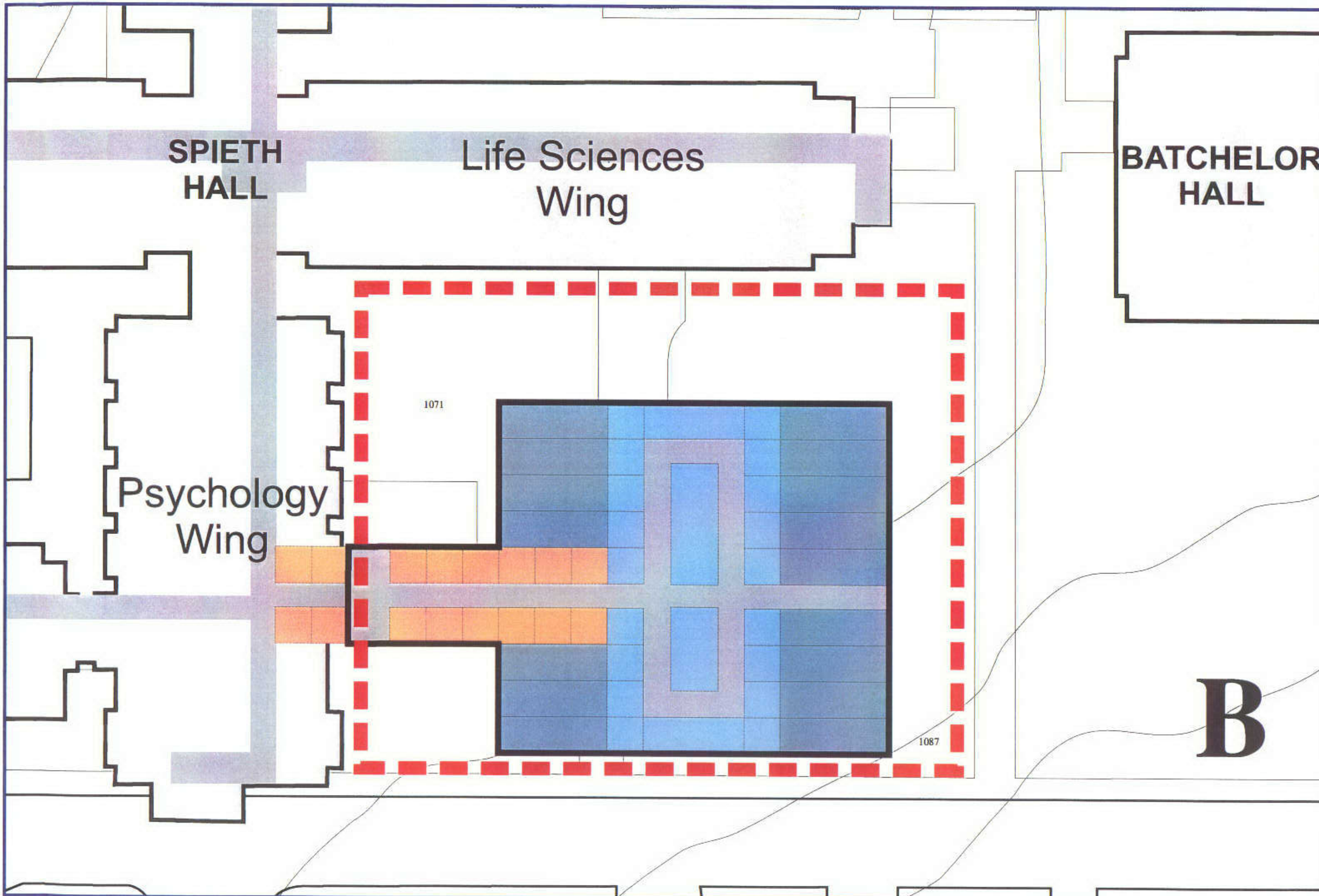

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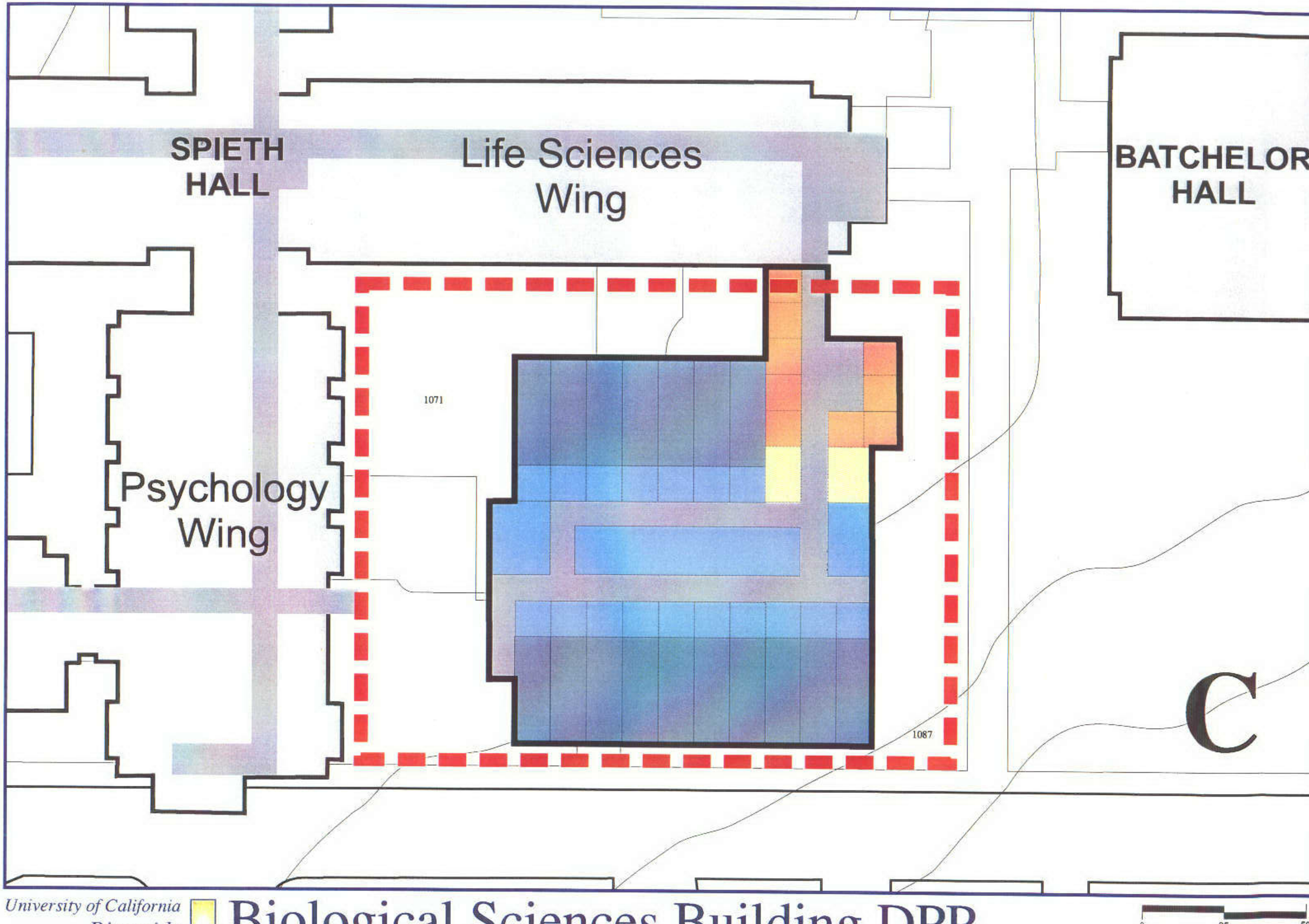

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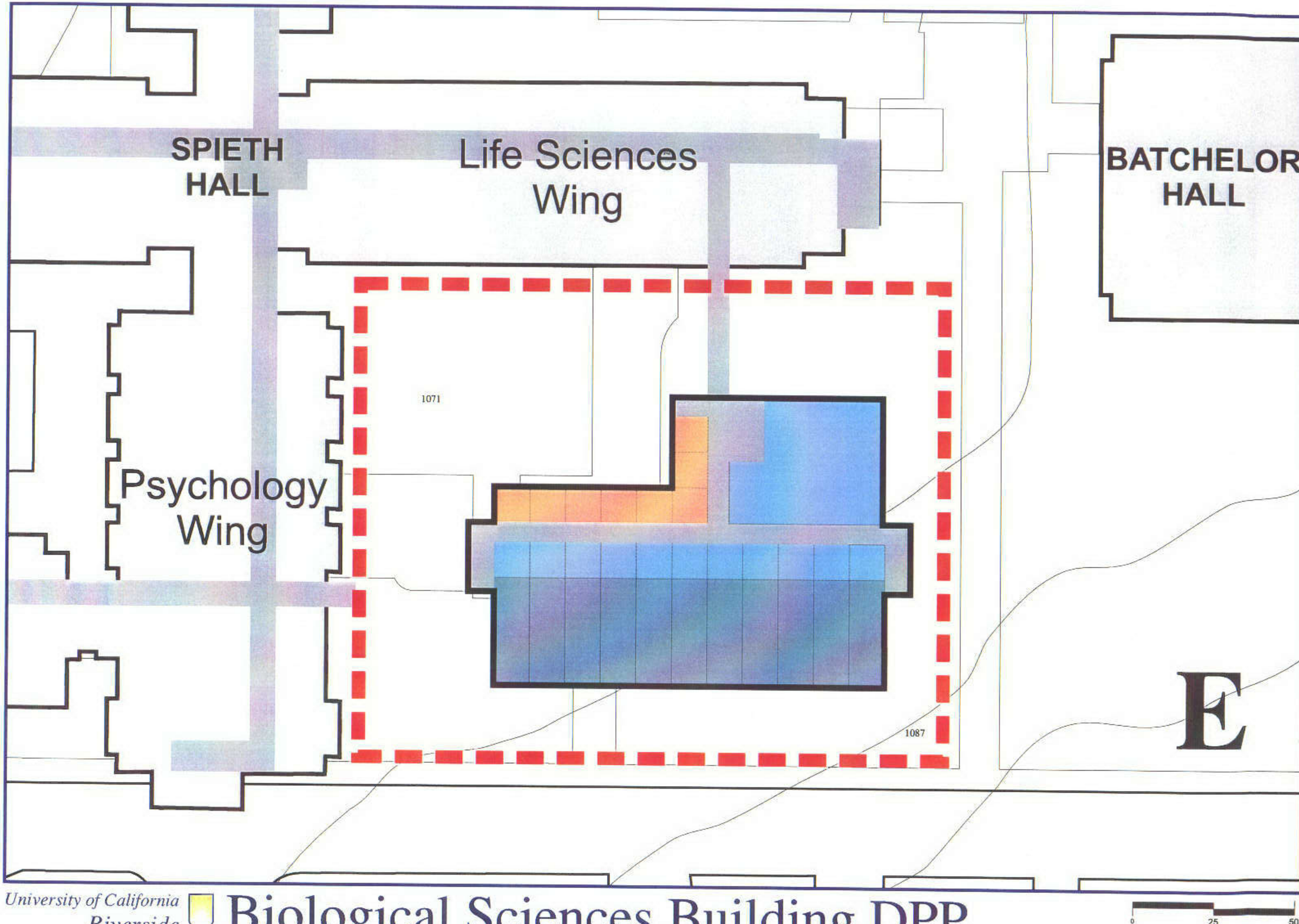

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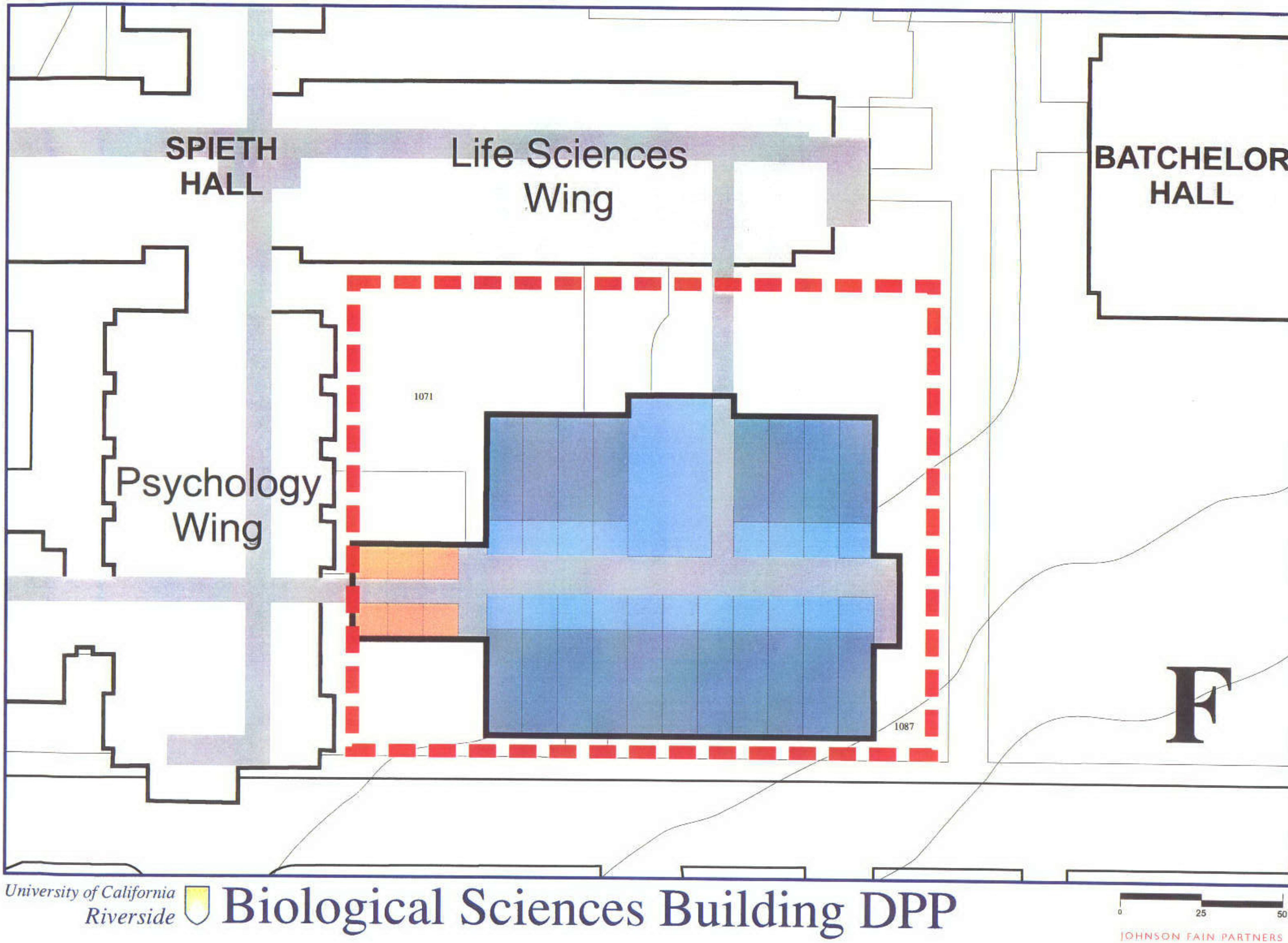

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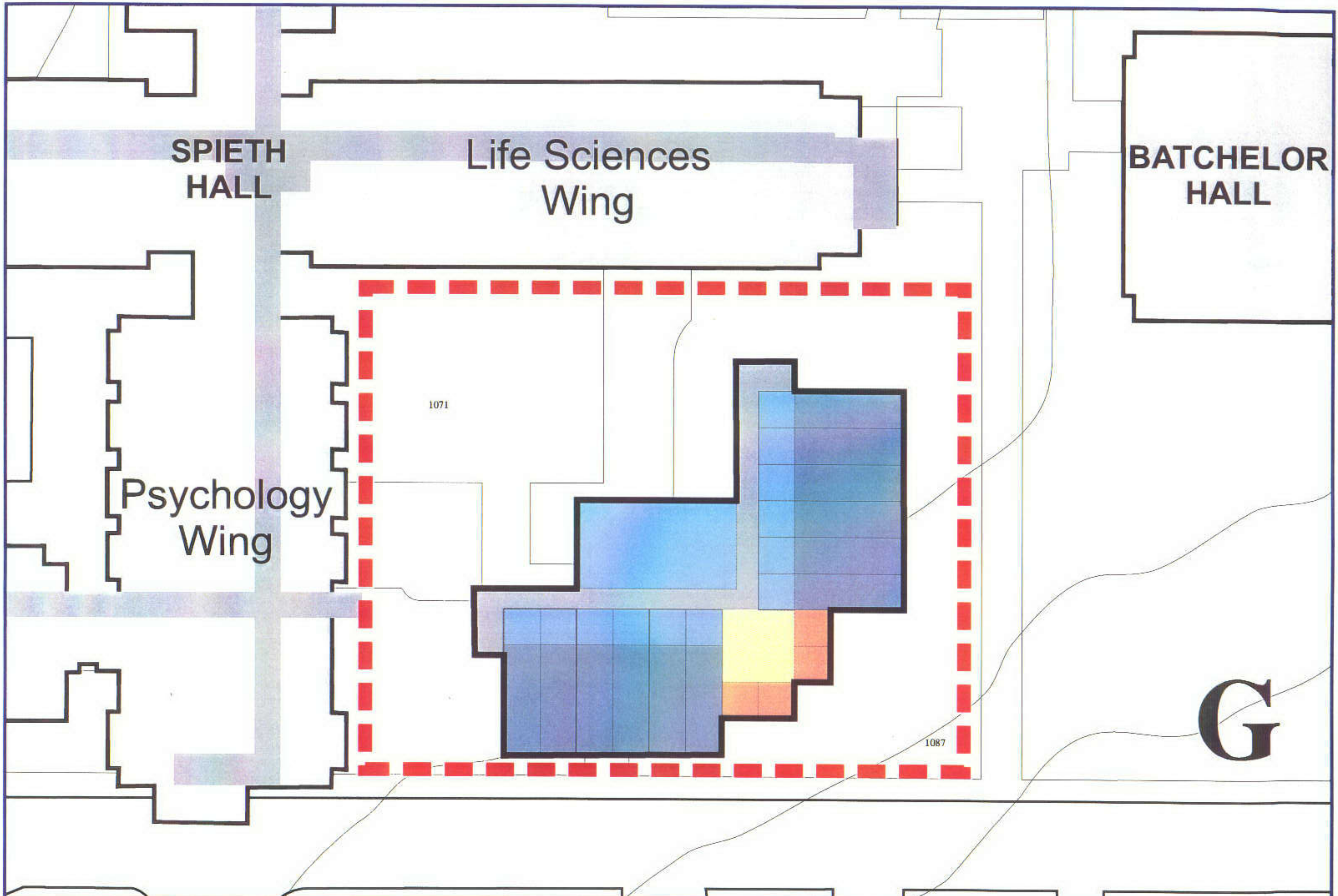

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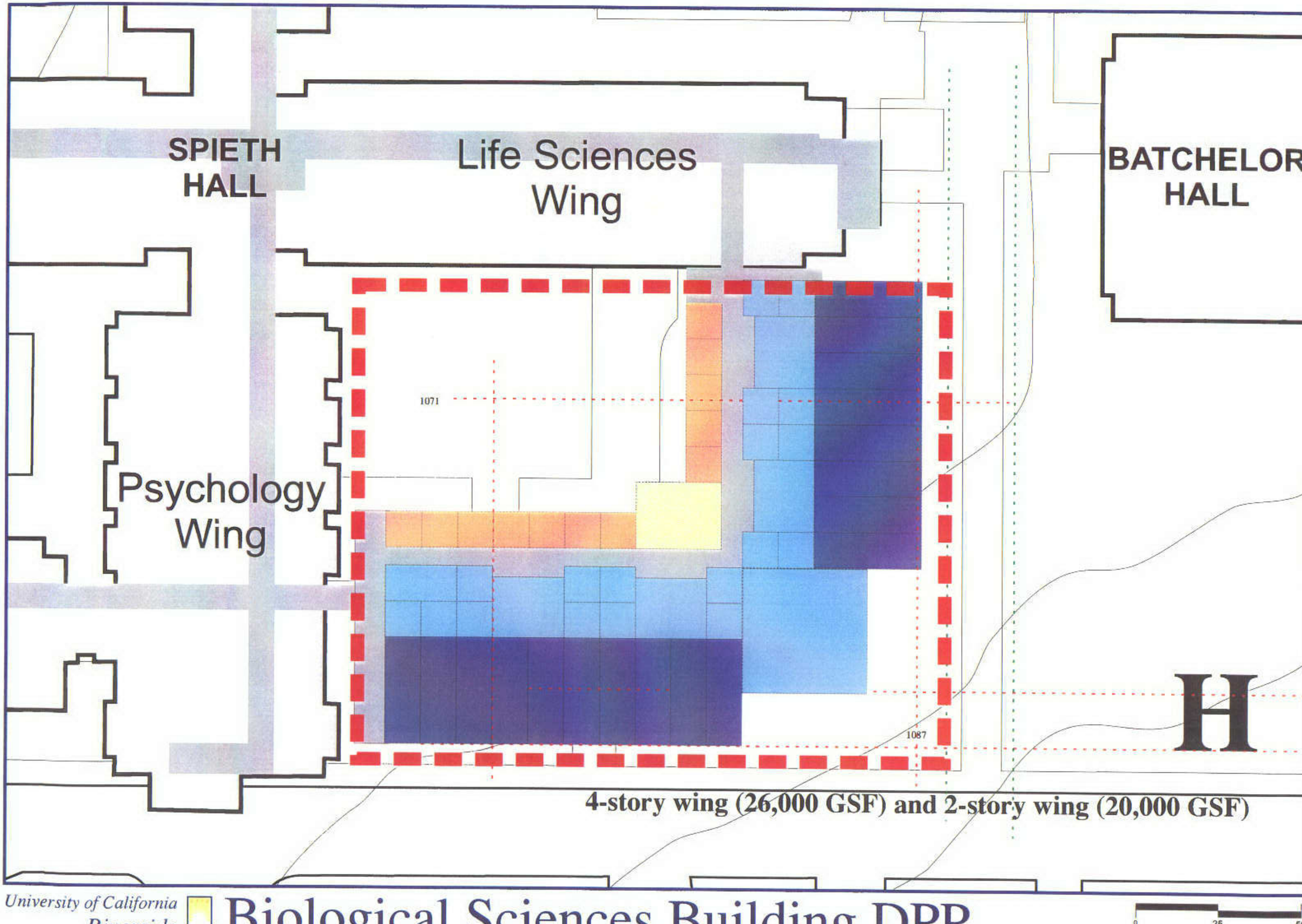

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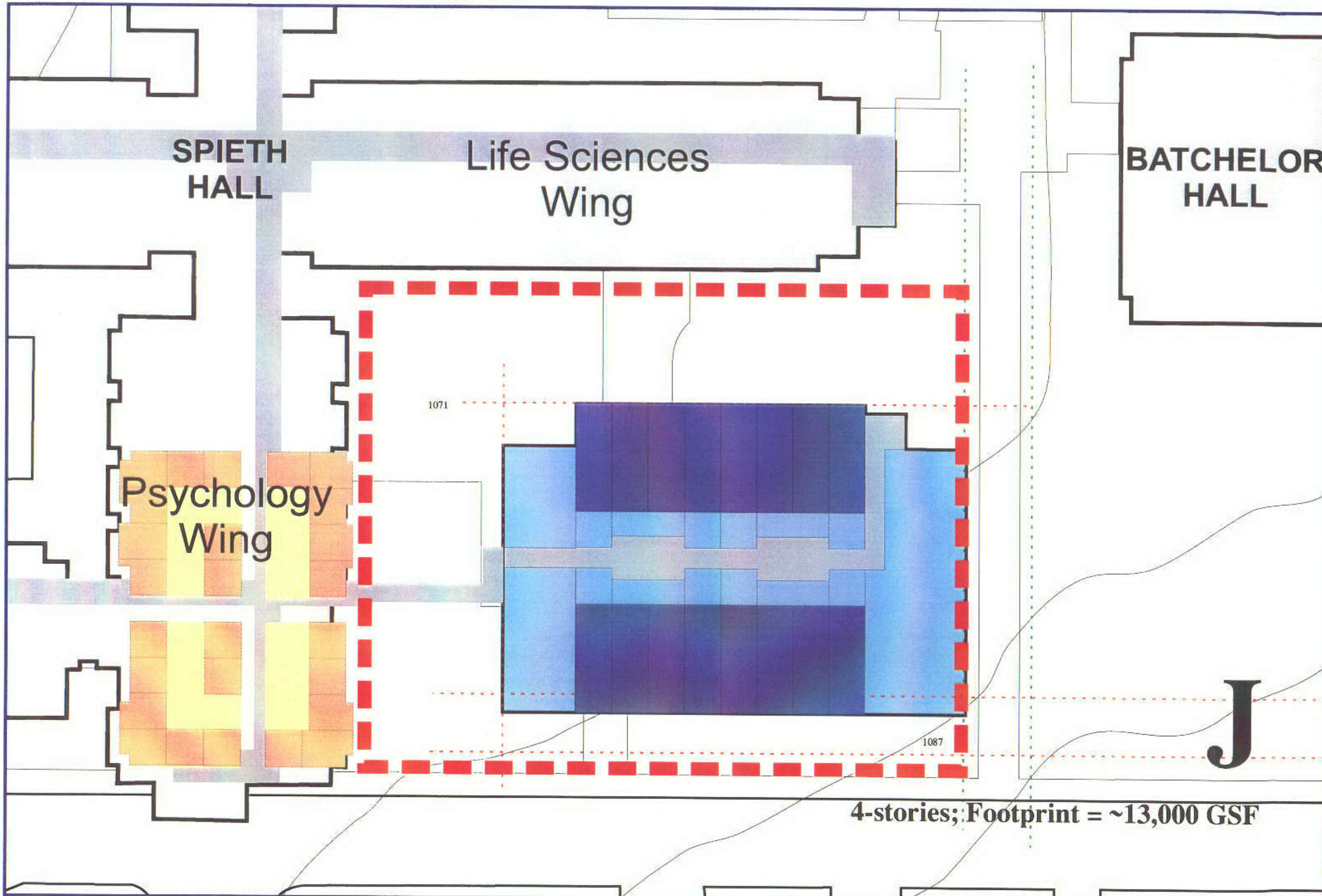

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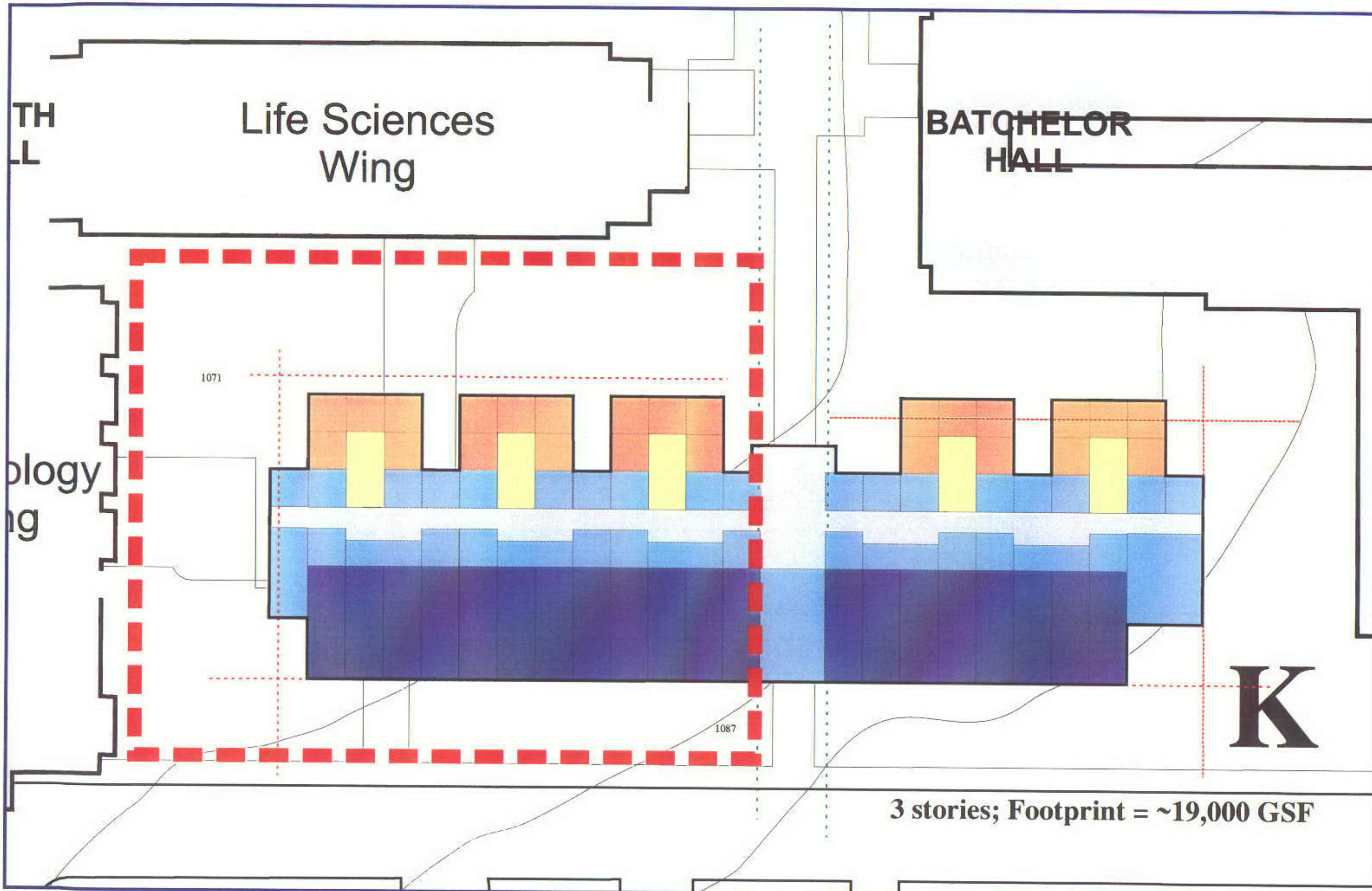

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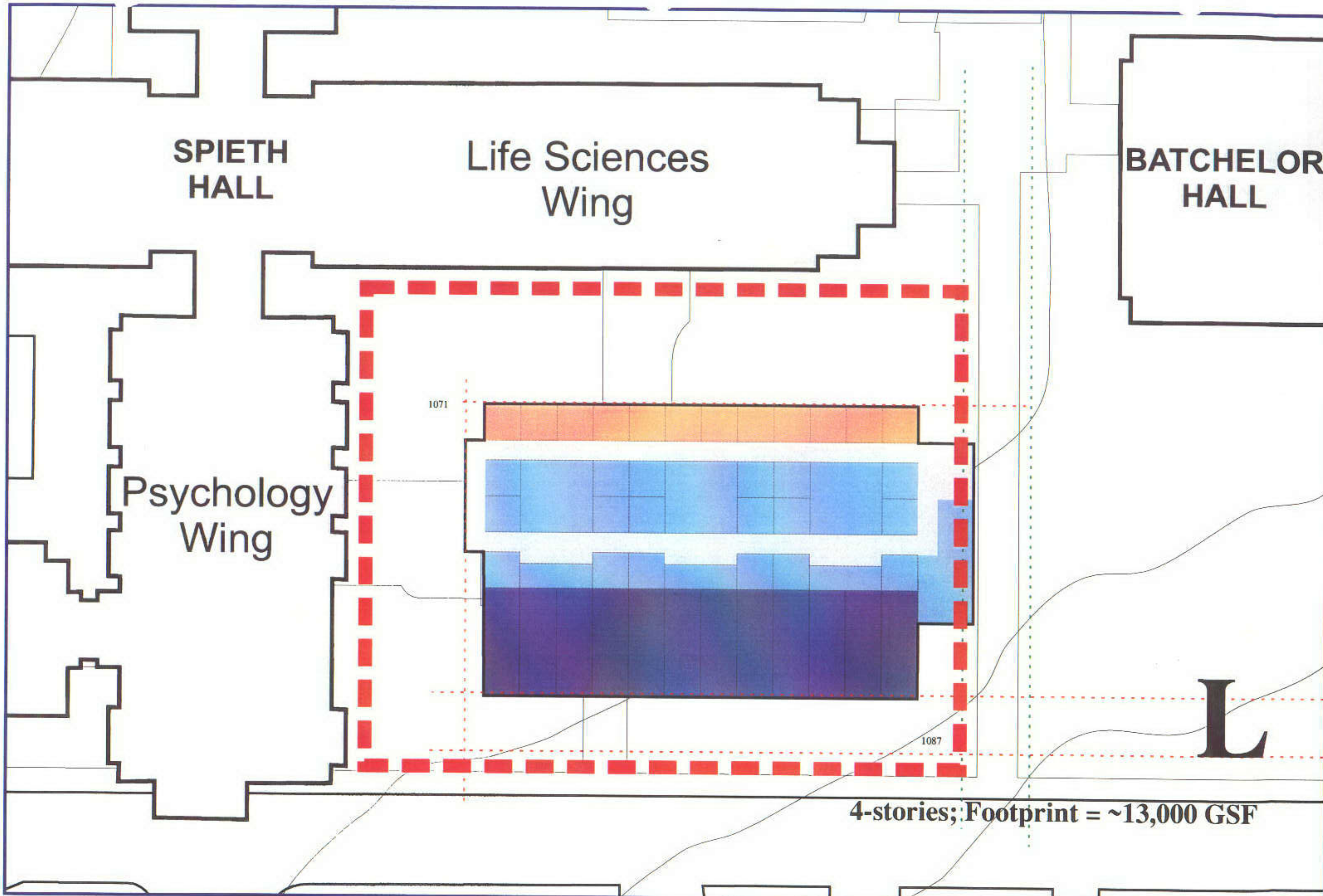

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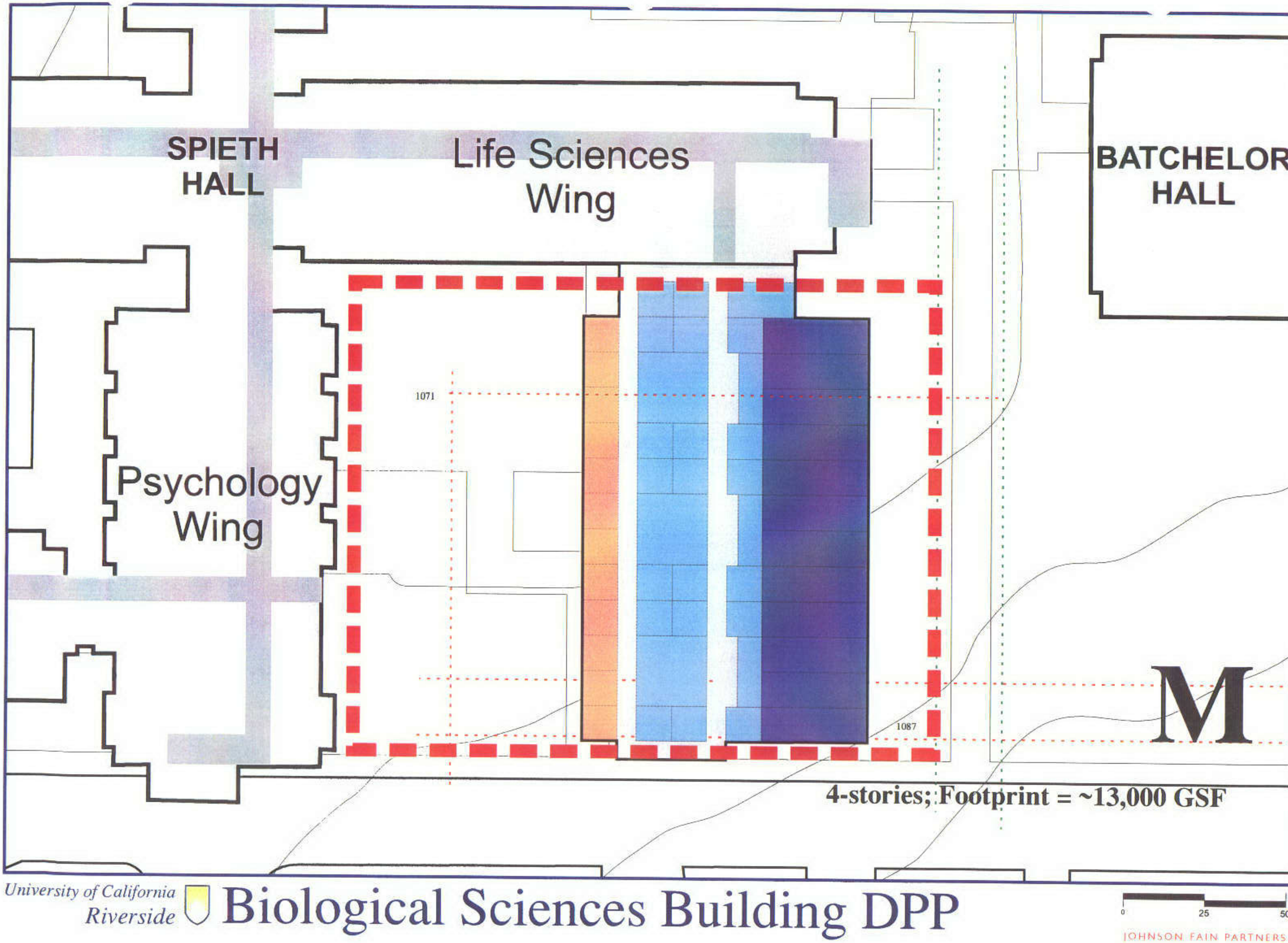

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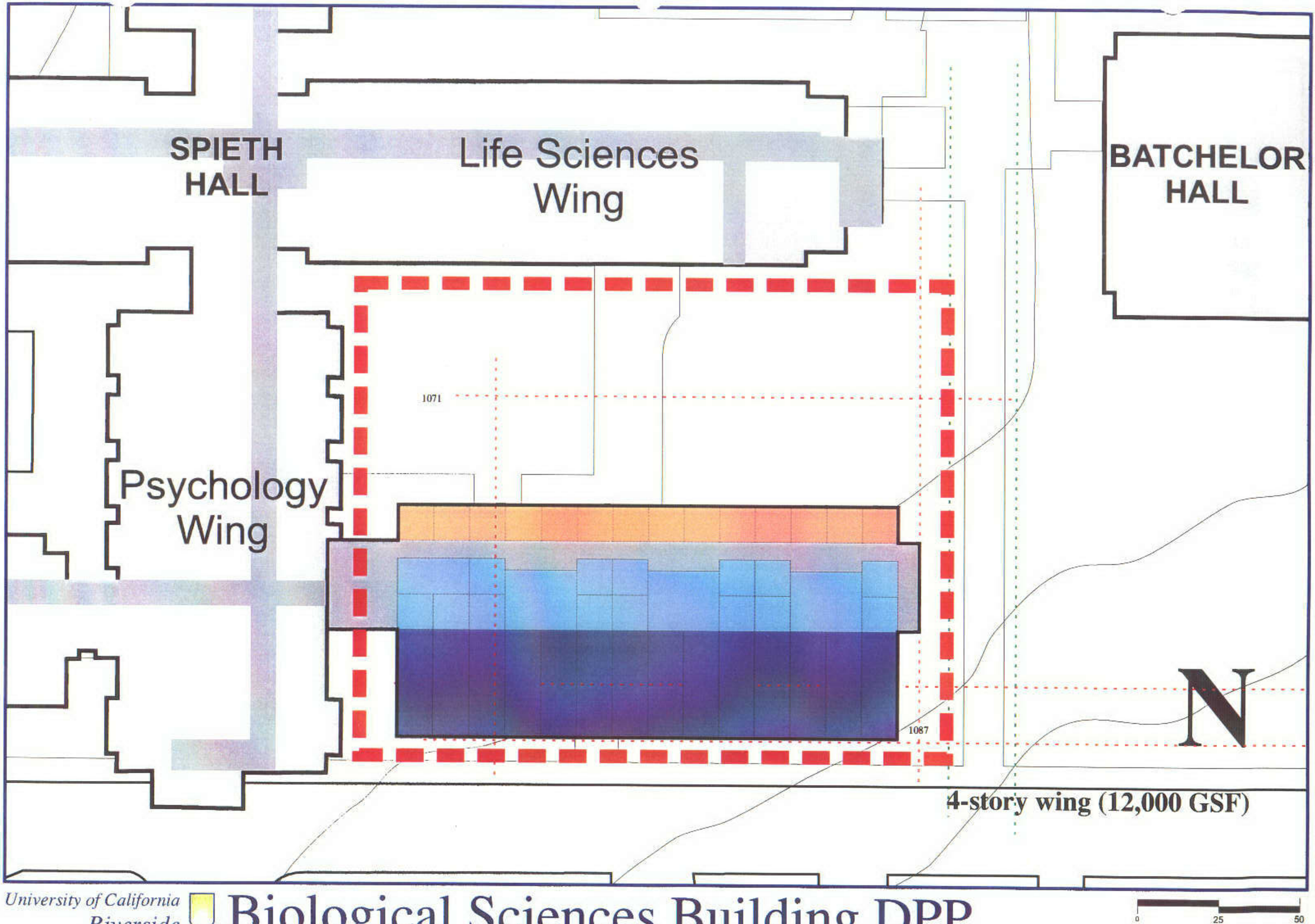

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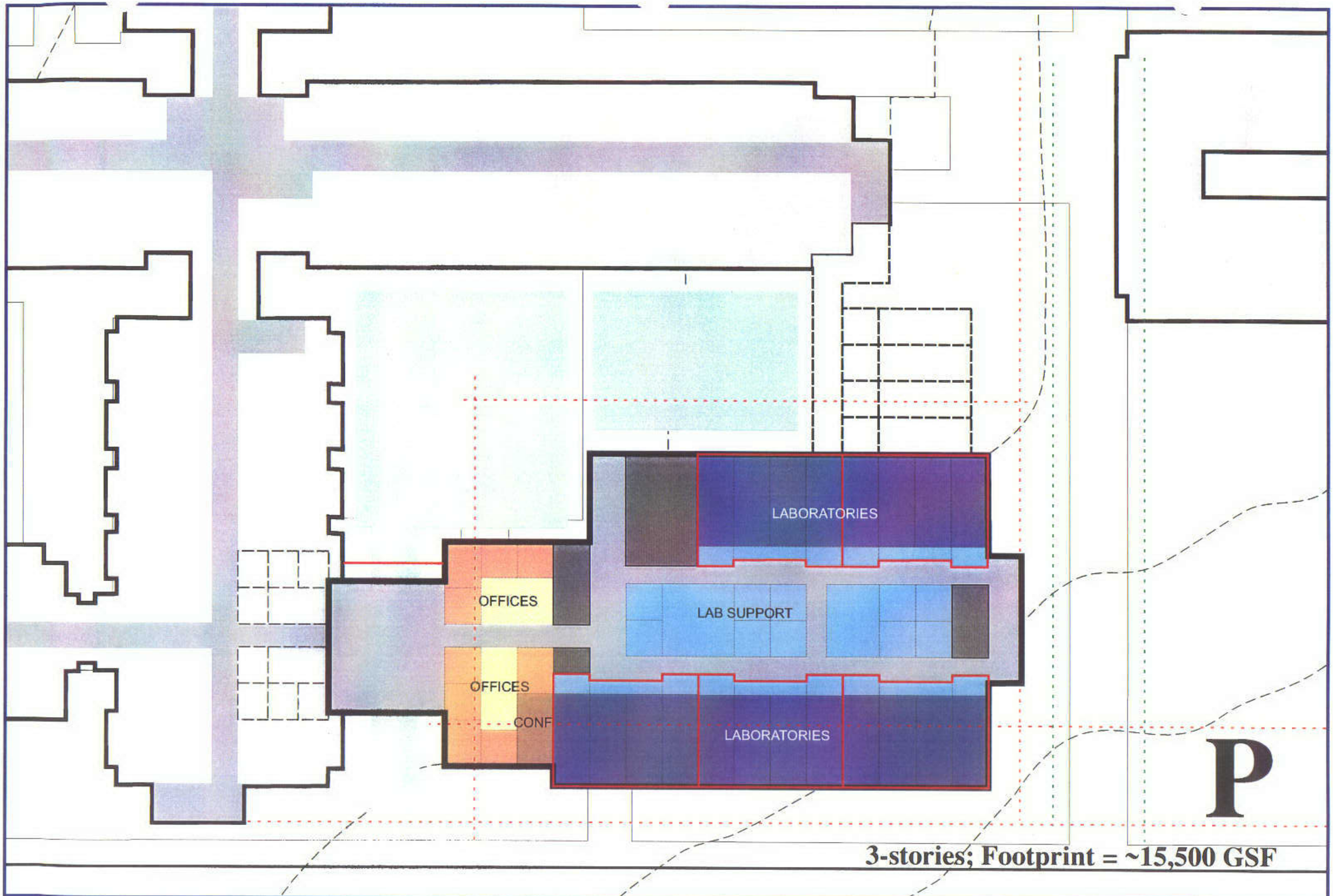
JOHNSON FAIN PARTNERS



3-stories; Footprint = ~15,500 GSF

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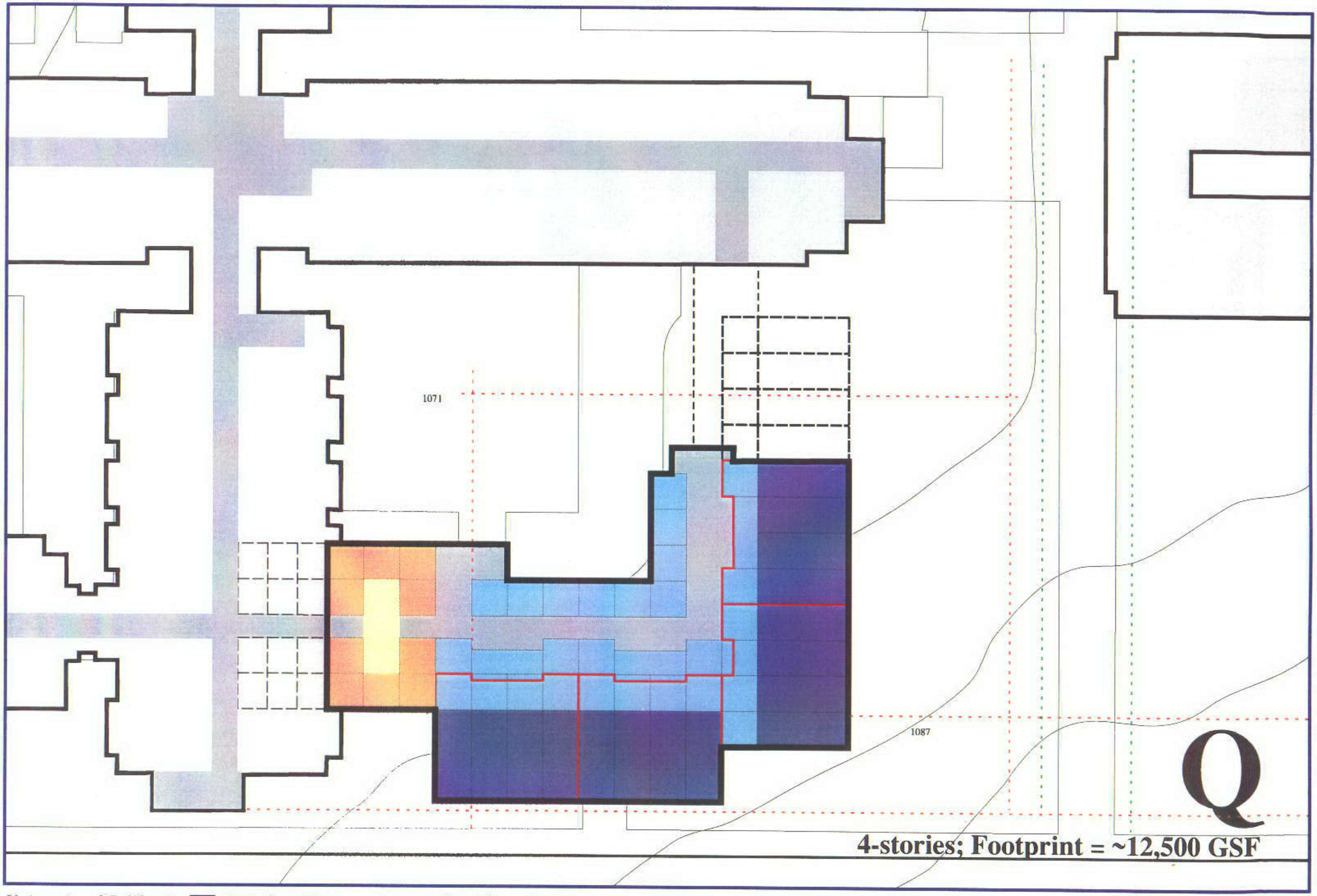

University of California Riverside

Biological Sciences Building DPP

JOHNSON FAIN PARTNERS

C. Minutes and Interview Notes

MEETING MINUTES: Pre-Kick Off Meeting 9/24/99
AT: UC Riverside

PRESENT: University of California, Riverside (UCR): Luis Carrazana, Michael Adams, Jalinda Traugh, Gretchen Bolar, and Dan Johnson.

Research Facilities Design (RFD): Tom Mistretta

Johnson Fain Partners (JFP): Scott Johnson, David Alpaugh, Ben Levin and Gretchen Griner

ITEM	ACTION	DATE	DESCRIPTION
1	Info.		Interviews: a varied base of people will be selected for the programming interviews because the occupants of the new building have not been selected. UCR will begin to identify those individuals next week and the groups will be selected at the kick-off meeting.
2	JFP/RFD/ UCR		Interview questions: the interview questionnaires used by both JFP and RFD will be emailed to UCR to provide direction in selecting the interview group. All parties will work together to fine tune the questionnaires if necessary prior to the kick-off meeting on Thursday, Sept. 30, 1999. Questionnaires will be distributed to interview groups prior to interview so they are aware of the type of information that will be requested of them.
3	Info.		At this time, the researchers for the project are unknown. However, the building will be planned as a multi-disciplinary biological sciences facility for flexibility. There will be no education or instructional component within the building. The focus will be on laboratory space and only required support spaces. Adjacent building will be looked to for existing support spaces and potential reuse/renovation areas.
4	Info.		UCR is expected to grow to a population of 21,000 within the next ten years. Therefor, UCR is looking to determine what will be needed in terms of new construction and renovation. Currently, UCR is looking to expand the lab and research facilities through new construction and expand support, educational, and instructional facilities within renovated buildings.
5	UCR	9/24/99	UCR passed along to JFP relevant documentation including the LRDP, landscape plan, and a space analysis document.
6	Info.		As adjacent buildings will be used for support spaces, those buildings need to be determined, the support spaces defined and the current users of the space included in the programming/interview process.
7	Info.		Case studies: JFP suggested that a case study approach – presenting comparable facilities to the group and/or visiting new lab/research buildings - may be useful to determine what UCR is looking for and requires early on in the planning process. UCR mentioned that the campus has been involved in a very limited number of lab building construction that tours and case studies would be helpful in bringing staff and project leaders up to speed.
8	Info.	9/30/99	RFD suggested a short slide presentation at the 9/30/99 kick-off meeting as a method to get people excited about the project, promote creative ideas, and

			show that this project is an exploratory process. UCR and JFP agreed.
9	JFP / RFD	9/30/99	UCR requested that a package of information, images be put together for the kick-off meeting. The meeting should have approximately 30 people in attendance.
10	Info.		All direct correspondence will be channeled through Luis Carrazana.
11	JFP/RFD/ UCR		Between 9/2799 and 9/29/99, all parties shall transfer data so that by the kick-off meeting, the group will be able to identify interviewees and get a package to them including the questionnaires and any other additional information.
12	Info.		The interviews themselves will vary between small groups and individuals depending on the department and their function.

MEETING MINUTES: University of California Riverside – DPP Biological Sciences Building

DATE: 9.30.99
AT: UCR, Bannockburn – J102

PRESENT: See Attached Sheet

ITEM	ACTION	DATE	DESCRIPTION
1	Info.		Introductions; Luis Carazana is identified as the main point of contact for the DPP project.
2	Info.		Johnson Fain Partners (JFP) presented an overview of the DPP Biological Sciences project. The programming portion will be divided into three phases, the initial phase including data gathering through interviews. Research Facilities Design (RFD) and JFP will interview individuals to program both the lab/research facilities as well as support space. Following interviews, the data will be presented to the group for verification before beginning the analysis phase. Key meetings with the steering committee will be held to provide updated information as well as resolve general issues as necessary. Following a review period, the final draft of the program will be completed by mid January.
3	Info.		It was suggested that site visits to comparable research/lab facilities take place within the first four weeks of the programming process. The project team, steering committee, and individuals identified for interviews will be notified of the tour dates and times.
4	Info.		The issue of the accelerated schedule for the programming process was addressed. Only minor modification can be made to the DPP and PPG after mid January, as UCR will lose funding if they don't begin to move forward in January. For this reason, it is critical that the right questions are asked and the right information sought during the interview process. Also, UCR mentioned that because the building is being programmed to support the biological sciences, not a specific department, the program – and thus the building - will have a degree of flexibility and adaptability. Our goal is to anticipate the various departments that may eventually occupy the building during the programming process to see how the spaces will accommodate changes.
5	Action	JFP/RFD/ UCR	The project team will work together to fine tune the interview questionnaires (distributed to project team and steering committee) so that the critical information is gathered during the interview sessions. It was proposed that the focus of the interview be more generic as departments have not yet been selected to move into the building. A revised questionnaire will be forwarded to UCR early next week.
6	Info.		Site: during this project, JFP will look at how the program for the Biological Sciences Building integrates into the existing campus so that the ultimate building is a positive addition to UCR's campus. If the building is to be exclusively a lab and research facility with support in adjacent buildings, it is important to look at the adjacencies and accessibility of surrounding buildings. The grade of the site will also be an issue in determining the opportunities for linkages between buildings for people flow and utility connections. The existing landscape and its integration into the siting of the building is also important. As the DPP provides the basis for good and

			reliable cost estimates, it will be important to understand how the building will be sighted.
7	Action	UCR	J. Traugh presented a list of 26 people who are appropriate for inclusion in the interview process. The list was passed among the steering committee for additional names. The final list of people will be divided into groups of 3 to 6 for interviews.
8	Info.		"DPP Veterans" were asked to share knowledge gained from past experience. – Remember that the building isn't being designed at this point. This portion of the project is to identify needs, gross square footage, required facilities, adjacencies, etc. Following the program verification, there will be a period for fine tuning the information before the final draft is prepared.
9	Action	UCR	UCR will schedule and coordinate tours to UCLA, UCSD, and a facility in Loma Linda within the week of 10.4.99. Researchers and others using the facilities will be asked to join the tours for 1st hand input.

MEETING MINUTES: University of California Riverside – DPP
BIOCHEMISTRY

DATE: 10.11.99
AT: UCR, Bannockburn – J102

PRESENT: Tom Mistretta, Raphael Zidovetzki, Mike Adams, Jolinda Traugh, Nita Bullock, Luis Carrazana, Gretchen Griner

ITEM	ACTION	DATE	DESCRIPTION
1	Info.		General Information Currently, the biochemistry building has 16 investigators. All tend to do some work with cell/tissue cultures, many do optical type experiments – requirements for space differ between tissue culture and optical work. Need two rooms to isolate various aspects of work… preparation, tissue culture, isolation work. Almost everyone does spectrophotometry and therefore need to be in a different portion of the lab.
2	Info.		Fume Hoods Is 1 hood per investigator enough? For some faculty yes, others may need multiple hoods. (J. Traugh has 3 hoods in lab. One hood is dedicated to radioactive waste.) Doing radioactive work in the lab – store in hood. Overall number is based on size of lab – 1 hood per lab at 600 sf… if lab grows – then take over another lab with a fume hood. 1 hood per lab sounds appropriate.
3	Info.		Shared facilities Cold rooms Currently – individual freezer provides enough space. Warm room Not a good idea to have a shared tissues culture room. Everyone likes their own tissue culture space. Special instrumentation that could be shared Shared facilities – for spectrophotometers, centrifuges, etc.
4	Info.		Office to Lab Adjacency Would like to have offices next to the labs (i.e. across the hall) A suggestion was made that of the 20 investigators that may go into the building, 5 lab spaces be provided with adjacent offices and the other 15 with offices in the adj. building. May cause an issue of inequality(?) Zidovetizki's feeling about the building is that it is better to slightly decrease the number of investigators within the building (ie. 17 or 18 instead of 20) in order to provide directly adjacent offices instead of offices in the adjacent building.
5	Info.		Post docs, technicians, grad students Students have desks in the lab (never use space outside of labs). Post docs, techs, graduates – ideal location would be separate from the lab but immediately adjacent.
6	Info.		Adjacency to vivaria

			There is a minimal use of animals so the relationship of animal facilities is not necessarily an issue.
7	Info.		Lab design The openness or enclosure of lab space – difference between the two types seems psychological. The appropriateness of connected labs depends on the investigator next door. If neighbor is doing same type of research, using similar approach then openness is okay. If they are not, it can pose a problem. In this building may be better to be closed as no one knows who will be adjacent. Sharing space doesn't work well because it becomes a contention point. Good to have areas outside the lab for interaction. A wall between 2 adjacent labs will not prevent interaction. Another issue – incompatible research adjacent to each other - greater possibility for contamination. Don't necessarily have a need for flexible casework but do see practicality of its use. Some toxic, carcinogenic materials used. Store those materials in labs – watched by EH&S. Works for most people to put those materials in a vented cabinet under the hood.

MEETING MINUTES: University of California Riverside – DPP
CELLULAR BIOLOGY

DATE: 10.11.99
AT: UCR, Bannockburn – J102
8:30 am

PRESENT: Luis Carrazana, Tom Mistretta, Nancy Beckage, Elizabeth Bray, Mike Adams, Richard Cardullo, Nita Bullock, Cindy Giorgio, David Eastmond, Leah Haimo, Jolinda Traugh, and Gretchen Griner

ITEM	ACTION	DATE	DESCRIPTION
1	Info.		Introductions
2	Info.		**Office to lab adjacency** Faculty representatives mentioned that the offices should be as near to the lab as possible, but separate. Ideally located across the hallway from lab space so students are not going into the lab. Don't feel it is ideal to have offices in a separate wing. But if it is a necessity for the building, site the building to provide for close connections. Faculty realizes the trade off to maximize research space in lue of offices and support space and feel there is sense in keeping teaching and research separate.
3	Info.		**Space for post docs, graduate students, technicians, etc.** The ideal location for post docs/graduate students is close to the lab but separate for health and safety reasons. They don't necessarily have to be adjacent to the investigators and space is not typically distinguished for post docs, graduate students and technicians – they can all work together. The average size group for cellular biology labs is generally around 4 to 6 but can range from 2 to 12 people. Visiting investigators will come for an extended so also need a desk and lab space as well.
4	Info.		**Space Allocation** Approximately 1,000 s.f. + is allocated to investigators currently, including office space. Ideal would be 1,500 s.f. Space allocation depends on how many investigators can use/rely on shared space. Currently a lot of duplication.
5	Info.		***Shared Spaces*** Cold rooms Tissue culture room (certain investigators can share T.C. rooms) Ultra centrifuge (can and should be shared) Imaging equipment probably would not be placed in this building. Microscope rooms: high end optical scopes, EM, confocal, etc. (EM microscope probably won't go into this building) High end light microscope can also be shared Growth chambers Autoclaves Glass wash – faculty is used to taking responsibility for their own. Issues become a loss of control over glassware, how clean is it, who pays for it over time, etc. If a central glass wash was provided in the building and individual investigators retained control over washing glassware, may fit.

6	Info.		Crystallography At some point, would this group think that it would be better to have a crystallographer in this facility? Yes – it seems to be the direction of things. Do need structural biologists in facility. However, a separation between the structural biologists and the cellular biologists would not be problematic.
7	Info.		Adjacency to vivaria, greenhouses, etc. Growth space needs to be provided for "plant" people – distance between the investigators and plants can be a problem. Need rooms that are able to grow arabodopsos and hold experimental material. Require a space to have plants growing in soil as well as in a sterile environment. Reasonable access to vivaria would be fine. Some animals will be brought to the labs for short periods of time. A shared procedure room in the vivaria would also be beneficial.
8	Info.		Typical support spaces required in lab Tissue culture – individual tissue culture rooms best for faculty. Possibility to have a shared tissue culture space in addition to individual rooms for overflow. Plant group is willing to share a tissue culture space. An investigator whose individual tissue culture area has been contaminated could also use a shared facility. If there were a shared tissue culture room, contamination would impact many more people. Faculty would prefer to have more control Darkrooms – there is a need for a darkroom but it doesn't have to be in the lab building or necessarily in one of the two adjacent building wings. Common room for instruments – fine to have a common equipment room for instrument… located close to labs. Specialized room for freezers Cell sorters – probably in individual's support space, but accessible to others.
9	Info.		**Services** Special gases – centralized good for Health and Safety but somewhat inconvenient. General need? Not necessarily. Not an overall department need. Back up electricity for freezers…. Emergency power will be provided in building. Stand-by power used for non-critical (in terms of life safety) equip. like –80 freezers, incubators… for computers? UPS – typically not provided with the building but if you need to keep a computer up and running, should be provided by investigator. Probable to have 1 or 2 outlets per lab with an emergency back up system.

MEETING MINUTES: University of California Riverside – DPP
DEPARTMENT HEADS

DATE: 10.11.99
AT: UCR, Bannockburn – J102

PRESENT: Luis Carrazana, Mike Adams, Jolinda Traugh, Cindy Giorgio, David Alpaugh, Gretchen Griner, Glen Hatton, Nita Bullock, Mark Chappell

ITEM	ACTION	DATE	DESCRIPTION
1	Info.		Overall Concept for Building - Ought to be a state-of-the-art facility to attract the best faculty. One suggestion was to leave as much of the building vacant to attract new faculty. - Some existing faculty will have to be moved into the building, but what is the "test" of who versus who does not go into the building? - Because the faculty is growing very quickly, there is great pressure on current space – therefore some existing department(s) will have to move in upon completion. Additionally, funding sources (state) will want to see the building occupied and functioning as early as possible. - May need to occupy building with certain researchers/departments in order to again attract high level faculty. - "Rising stars" should possibly be given the option to move into the new building. - Another strategy for department selection would be those that would be able to generate funds for the necessary equipment through grants. [i.e.: people with NIH grants or NSF]. Four factors in who occupies the building 1. new hires 2. rising junior faculty 3. "surge" space 4. consolidation of department (may be in new building or within existing facilities)
2	Info.		What should be in this building – asset to departments - Biosafety level 3 lab - Back up power for –80 freezers, etc. Some standby power available in the lab as well. - Structural biologists/crystallography – isolation, cooling water needs, vibration isolation - Electrical isolation – special grounding and unwrinkled power - Labs located far away from elevators – electrical signals can be a problem with specific types of research tools. - Special instrumentation – if an AFM was to arrive on campus, it may arrive in this building. - To meet vibration requirements of specific machinery, would look at providing a group of labs built to those specifications. Important to provide for that within the building.
3	Info.		Lab Equipment - Flexible lab casework: look at equipment that is designed for flexibility – but there is a premium for the flexibility. Easier to reconfigure dry cabinets versus wet therefore those that are

			moveable/flexible could be dry and the wet be fixed.
4	Info.		Openness of Labs - Favor doors between labs. - Ideal square footage is between 700 and 800 sf for actual lab space. This size would be sufficient as long as other support spaces are provided within the building or adj. buildings.
5	Info.		Adjacent Vivaria - Vivaria shouldn't necessarily be a driving force as to how the building is connected to the adjacent buildings. However, the vivaria in Speith is a "dirty" vivaria with wild animals whereas the vivaria in the psychology wing is "clean." May become an issue for future researchers. - May be best to tie into both buildings. If the tie-in is through Sheath, some lab space will be disrupted and lost.
6	Info.		Administration/Support Space - Support and core facility need consideration – i.e. mail, copiers, break/conference rooms, etc.

MEETING MINUTES: University of California Riverside – DPP
NEUROSCIENCE

DATE: 10.8.99
AT: UCR, Bannockburn – J102

PRESENT: Luis Carrazana, Jolinda Traugh, Mike Adams, Margarita Curras-Collazo, Nita Bullock, Glenn Hatton, Eugene Nothnagel, Tom Mistretta, Ben Levin, Gretchen Griner

ITEM	ACTION	DATE	DESCRIPTION
1	Info.		Adjacency of Office to Lab - If the building is connected to Speith, then offices would be close enough to the lab. Increased lab space is worth the separation. - Good to have some separation because faculty does not want students in the lab. A remote location has advantages, such as fewer interruptions. - A bridge between buildings will reduce the psychological distance between the lab and offices. Possibly have multiple links to adjacent building. - Worse case scenario would be a totally independent building.
2	Info.		Post doc space - Post docs can be in lab or in adjacent location – multiple post docs to a space is typical. - Good to have close adjacency for write-up work. - Noise is an issue for post docs working in the lab for write-up activities. Also, doesn't work to tie up lab computers for word processing type work – needed for data. - Since many do write/work in lab, provide break room within building. Also to promote interaction. - Post docs do need a space to keep their "stuff" outside of the lab. - Grad student are involved in more bench work so desk space in lab is fine. If post doc space was available, then grads may also use that space. - Need computers in both spaces - Dry lab area for equip., computers, etc. becomes a more flexible space. - Average number of post docs, techs., grad students – 6 to 8. Range from 4 to 12 (12 being the extreme). Depends on the cycle of grants. - Also have undergraduates - Want lab to grow into - 1,500 sf as average for senior faculty, 1,000 sf for junior)
3	Info.		Vivaria - Currently use the vivaria in Royce Hall. Location is not a problem. - Use rats as main animal, but mice are increasing in popularity. - Bring animals back and forth to vivaria… they can't be kept for more than a day. - Frogs, turtles, rabbits, chickens, insects, etc. Variety of animals used.

4	Info.		Support Spaces Adjacent tissue culture (individual space is ideal) Cold rooms (shared) Dark room (doesn't have to be big – existing 8' x 8' works fine) (shared) Freezers (walk-ins aren't efficient and are very expensive) Assume a few "ultra low" freezers per investigator for typical life science. One walk in freezer per floor would also work. (shared) Sterilizers (shared) Shared fluorescence microscopy Contained room for use of vectors – biological safety level (BSL) 2 or 3 room. At least 1 BSL 3 room should be provided. [botany – tissue culture, autoclaves, fluorescent micro., growth chambers (currently sit in corridors and labs) / Rooms with growth conditions for arabidopsos (model).] Electrical requirements: isolated grounds Fume hoods, vacuum (1 per 6 to 8 people in a lab) CO2 in tissue culture room Average of 6' to 8' of lab bench per person Like connections between labs Open, contiguous space is okay – good because disciplines come together. Security and noise do become an issue. A completely open lab doesn't work.

MEETING MINUTES: University of California Riverside
CAMPUS DEPARTMENTS

DATE: 10.14.99
AT: UCR, Bannockburn – J102

PRESENT: Luis Carrazana, Tom Mistretta, King Henderson, Ross Grayson, Suzanne Trotta, Nita Bullock, Earl Levoss, Russell Vernome, Ross Grayson, Ted Chin

ITEM	ACTION	DATE	DESCRIPTION
1	Info.		**Environmental Health and Safety** Provide for biological, radioactive, etc. waste within individual labs. Design to accommodate BSL 2 and allow for the conversion of one lab to biological safety level 3 (BSL) –. Designate a room that could convert to a bsl 3 in the future. Currently there is no bsl 3 facility on campus so this building may qualify to have such a facility. Good idea to plan and include cost of room in program. Follow NIH guidelines for bsl 3 facilities. Fume hood exhaust – EH&S prefers the performance criteria met by Phoenix for VAV systems. Safety showers – Locate showers in accordance with ANSI standards. Hallway locations are fine but NIH has more stringent requirements (1 in every lab). NIH compliance is EH&S preference. Alternative: in "hallway" between lab and corridor or just inside the doorway. Floor drains: Prefer to install drains although they are an additional expense and maintenance item. Somewhat depends on who will be using the building. Alarming showers: desirable feature for vandalism reasons and as a call for help. Alarm would need to accommodate testing… check into shunting features of alarm systems. Fume hoods – Prefer to have one hood/lab meet the requirements fully open. Use occupancy sensors to maximize efficiency. Heat load or safe ventilation rates, not fume hood exhaust volume, will probably drive the exhaust system of the building, therefor VAV may not be justified (evaluate during design/programming). Prefer VAV – high performance without the premium. A heat recovery system is often value engineered out of a project. However, the premium paid at the time of construction may be recovered in as little as the first three years. Flammable liquid storage – under fume hood Preference is to have short exhaust stacks with induction fans properly placed.
2	Info.		Accessibility

			Americans with Disabilities Act Accessibility guidelines are used on campus. Currently, there is no campus policy on lab accessibility. Ideally, an accessible bench, safety shower, etc. would be provided in every lab. Accessible lab on ground/entrance floor is desirable. If only one accessible lab is provided, then it should also be close to parking. Some lab benches could be adjustable. Important to have gas, vacuum outlets and shower and eye wash within reach ranges/heights and adequate maneuvering space throughout the lab. Fume hood accessibility becomes the difficult issue to address. If all labs were accessible, then all fume hood heights would need to be located accordingly. Maybe best to provide one accessible lab per floor.
3	Info.		Security Cameras are not necessary from a physical plant perspective but could be user driven (and managed by the building).. No campus policy for security nor is there a central monitoring service on campus. Better to plan for a security system because it's installation following construction requires additional demolition and finish work. Plan for a central area for CPU for card access and a way to get electrical chase to it. For this building, most effective level of security is at the building entry. Not necessary for individual labs.
4	Info.		Seismic Safety Issues Refer to EH&S Laboratory Safety Design Guide for guidelines..
5	Info.		Logistics Important to program the building to accommodate bulky, heavy, large items throughout the building including loading dock, wide doors, large elevator, etc. Shortest access to building is ideal. There is a dock on the library side of Speith although it would be ideal to have a dock within this building… evaluate loading dock, travel route, location, floor to ceiling height, etc. Consider flooring material – accommodate traffic and heavy deliveries. Deliveries are made every day – need materials to support these functions.
6	Info.		Recycle Provide for recycling paper and aluminum.
7	Info.		Telecomm – information tech There are campus guidelines – talk with Chuck Rolly for information.
8	Info.		Emergency power Preference in manifolding fume hood system with some redundancy – eg. prefer to have (2) 15,000 cfm or 20,000 cfm fans if system requires 30,000 cfm for maintenance, back up, etc.

			Emergency generator – address location. Life Sciences Building ad Speith currently have a rooftop natural gas generator. Possibly replace this generator and tie all buildings together (roof-top location is not desirable.) UPS – individual issue; not typically provided in new buildings.
8	Info.		**Site issues** Comply with LRDP, height constraints, etc. Address the existing landscape in new design – protect, relocate or remove mature trees. Design coordination with adjacent building Follow exterior design guidelines and landscape guidelines Wind study required CPA – considered a class 32 infill project Consider the remodel cost for connecting new building to adjacent buildings.

MEETING MINUTES: University of California Riverside – DPP
MOLECULAR BIOLOGY

DATE: 10.14.99
AT: UCR, Bannockburn

PRESENT: Luis Carrazana, Tom Mistretta, Ben Levin, Gretchen Griner, Patricia Springer, Zheubiao Yang

ITEM	ACTION	DATE	DESCRIPTION
1	Info.		Office to lab adjacency Ideal to have faculty offices as close to the lab as possible (across the hall), but not in the lab. The same adjacency is true for post docs and students, but not as important as faculty. Close adjacency to lab is important as a lot of time is spent in the lab, spend considerable time back and forth between space, convenient access for students, etc. Patricia and Zheubiao believe this opinion is shared among the faculty in their department. "Write-up" space (benches and tables) provided for the post docs and students within the lab is fine. An office/room elsewhere is not critical – however convenient for additional write-up space, a place for storage, quiet place to concentrate, etc. Adjacency to lab is more important than adjacency to other faculty. Conference rooms, student offices and other support spaces are fine to locate in adjacent buildings. Undesirable to have offices within an adjacent building. There are an average of 6 to 10 post docs/techs./grad students per investigator.
2	Info.		Relationship to greenhouse space Close relationship to a growing space is critical but not for a real greenhouse. Requirements include a growth rooms/chambers with controlled temperatures and low light for growing arabodopsis. Others within the department are working with bigger plants and often use the greenhouse (but there isn't a close adjacency currently between labs and greenhouse space). Requirements for arabodopsis: 22 degrees c, low light (150 to 200 microeinsteins – use fluorescent lights), and automatic lighting cycles. Temperature is the most critical issue in working with arabodopsis. Ideal to have a source of water in the room. Shelves for plant storage (2' between shelves with lighting canopy underneath shelves) Adjacent soil storage. Attraction to arabodopsis: model genetic system, small size (grow more within a given space), and short life cycle.
3	Info.		Support Facilities Growth space/chambers Equipment rooms for –80 freezers, centrifuges, and large equipment that is now located in lab but could and should be shared. Glasswash facility - shared Tissue culture room(s) – shared Soil (autoclaved, sterile) – ideally, a space - other than in lab or growth

			space – should be provided for soil storage. Location should be within close proximity to the growth rooms and both could be located in the adjacent building as long as horizontal and vertical transportation of soil and plants to the lab is accommodated. Computer/media room for students (Currently have a room with scanners and other computer equipment. Dark room (shared) for imaging equipment. If 20 faculty within the building are all doing cell biology – desirable to have central confocal microscope. Better to have adjacent. Walk-in cold rooms for work and storage (shared) Centrifuge – shared Ultralow – one or two per investigator Some faculty are doing more chemistry type work – they may need separate space for chemicals. Need liquid nitrogen dewars in lab – no other specialty or instrumentation gases needed to be piped in. Fume hood use – 1 per lab is fine. Occasionally it is a bit tight but don't want to take the space in lab for a second. 6' fume hood. Faculty like openness between labs – incompatible uses in adjacent labs is not a problem. Sliding boundaries work fine.
4	Info.		Average Space per Investigator 6' bench, approximately 600 to 1,000 sq. ft.

MEETING MINUTES: University of California Riverside - DPP

DATE: 11.15.99
AT: UC Riverside

PRESENT: Mike Adams, King Henderson, Earl Levoss, Ted Chiu, E. Lord, M. Chappell, T. Paine, Cindy Giorgio, Luis Carrazana, Polly Breitkbeuz, Ben Levin, Bill Fain, Tom Mistretta, Russell Vernonclark, Dave Eastwood, Gretchen Griner

ITEM	ACTION	DATE	DESCRIPTION
1	JFP		**Introduction to Presentation** Presentation includes 7 schemes with a variety of building floor plates. Considerations in design: - CNAS Master Plan – looking at the maintenance of open space, green areas - Site limits, pedestrian corridor - Process of spreading the building out and lowering number of floors - Possibility of building as densely as possible in this space as it is the primary area for the Biological Sciences to grow. - Need to accommodate a certain amount of density because there is not a lot of room in close proximity - A more "vertical" building will translate to a smaller footprint and therefore a larger open space
2	JFP		**Scheme L** Self contained, freestanding building – 4 story with raceway corridor Respects all setbacks where possible and allows for future development Module: wet lab, support for lab, office Offices off of one corridor with access to support, separate offices from lab Central breakthrough Lab module = 4 - 11'x 33' with entry room/space with connected lab support function Central support functions at corridor ends 13,000 gsf footprint 6 investigators per floor
3	JFP		**Scheme J** Self contained, 4 story building 4 lab modules per floor Double loaded corridor with lab, flex support spaces on office side of hall, office clusters Respects set backs for additional growth while looking toward future growth Greater open space between Speith and new building
4	JFP		**Scheme K** Occupies whole space, 21,000 sf per floor with 3 stories Offices looking out to courtyard

			Double loaded corridor Atrium walk through – public pass through Suppresses the height to 3 stories Figured grounds – sits in middle of circ. space, preserves courtyard spaces off main spine
5	JFP		**Scheme I** Double loaded corridor with lab only – offices in Psychology Wing Issue – 15' floor to floor height for optimal mechanical and utility support for lab spaces… but Psychology Wing ceiling height is12'6". Therefore, connect at the second floors of each building. Ground floor access will require ramping Size of open space is smaller because building has larger footprint
6	JFP		**Scheme H** L shape – enlarged floor plate with a 2nd floor connection 3 stories, or a portion at 2 and another at 4 2nd floor of Psychology Wing used for dry lab Lab module – has more support on lab side of corridor with Investigator offices on the other side Corner – office clustering (to include post doc, tech general shared use…. open work station/library area, circulation) Creates an internal courtyard
7	JFP		**Scheme N** 3 story building Dry lab – support in Psychology Wing Offices included in footprint of new building Retains courtyard typical in planning documents Possibly place mechanical plenum on roof of Psychology Wing – integrate with functions of new building Increases use of existing building 2nd floor lab space in Psychology Wing – closer to number of Investigators per floor for interaction without pushing building to limits
8	JFP		**Scheme M** Connects to Speith Hall Raceway corridor Office – support – lab Problem with floor plate is that is does allow for passage through the courtyard but it is orientated toward Eucalyptus
9	JFP, UCR, RFD		**Discussion** Courtyards - Currently the spaces are almost neglected as not a lot of attention is given to the spaces between buildings in this area of campus. - The courtyard should have access from new building so that people can and will use it. - Sun access to the courtyard is also important (which impacts the height of the building on the south side). - Need to make the courtyard an active space in order for people to use it. - An attractive feature is full access from new building, the Psychology Wing and Speith - UCR – many meeting representatives are not in favor of a building

			that crosses the pedestrian path between Speith and Bachelor. - UCR – many meeting representatives do not want to see a solid line of buildings along Eucalyptus. Instead, try to preserve the open space along the road.
10	RFD		**Program Discussion by RFD** Presentation of the lab module and square footage allocation Critical Issues 1. Building location and the amount of site the building will occupy 2. Accommodating Investigator offices in the new building - In this program, 1,250 sf have been assigned to each PI, the remaining square footage is shared. - More flexible to have the smaller support spaces so that they can be assigned as needed. - Exiting will be through adjacent labs so no one will be able to "wall off" their lab. - Biosafety Level 3 suite – a portion of the shared space will accommodate a BSL 3 lab suite.
11	JFP, RFD, UCR		- UCR - What do the design consultants need from faculty? JFP/RFD have defined the horizon of options, need to narrow the scope to a few of the presented options. Scheme H - Tie into the existing buildings to allow circulation between allied faculty in Speith and the Psychology Wing (space available in 2001). This scheme allows flexibility of support spaces and offices in the Psychology Wing and Speith. Also supports the intellectual connection of the Neuro. Faculty in Speith with the new faculty. - 3 stories throughout this scheme, versus a portion at 2 and another at 4 stories, works much better for faculty and student interaction. - Hold the Eucalyptus elevation as far from the street as possible - Can shrink the inner courtyard in H - Study the L-shaped building further. - Maximize the lab space in the new building. The modification of the adjacent buildings will come from another funding source so it will be easier to convert the existing area for post doc, tech space versus wet labs. - There will be multiple department members within the new building so there will also be a need for administration space. Speith/Psych. Wing is the best location for the admin. location - Tie into the 2nd floor with another connection at the 1st floor via an excavated area at the core of the new building. This allows for only one vertical maneuver via elevator from the Psychology Wing (loading dock). - Post doc space, conference rooms, etc. to be provided in

			Psychology Wing, faculty offices in new building. Recap of Issues 1. Courtyard – building amenity to be incorporated into design in one manner of another. Important to incorporate language into the DPP so a useable courtyard is included. 2. Adding to the building – allow for expandability but do not cut the walkway between Speith and Bachelor with a building. Look at other expandability options. 3. Issue of non-lab spaces (offices, conf.,) – All offices to be located in the new building with support spaces located in both the new building and adjacent buildings. - Fume Hoods: program for 1.5 fume hoods per 22' wide laboratory. - Circulation: there are no particular preferences between the double loaded corridor and raceway corridor. UCR meeting representatives suggested looking at any pertinent information obtained during faculty interviews.

MEETING MINUTES: University of California Riverside - DPP

DATE: 12.1.99
AT: UC Riverside

PRESENT: Ben Levin, Kigron Brunelle, Frances Sladek, Andrew Brosovsky, Elizabeth Lord, King Henderson, Earl Levoss, Mark Chappell, Rich Cardullo, Tim Paine, Mike Adams, Jolinda Traugh, Cindy Giorgio, Polly Breitkreuz, Luis Carrazana, Bill Fain, Tom Mistretta, David Alpuagh, Gretchen Griner

ITEM	ACTION	DATE	DESCRIPTION
1			**Introduction to Schemes** Focus of three options - Siting – retain/manage space between the new and existing buildings; leave north/south access corridor as a significant pedestrian access; look at circulation between buildings and access from existing buildings - Look at the relationship between offices and lab modules including support areas and the opportunities those relationships propose along with interaction space; secured separation between research areas and more public areas of the building. - Second floor connection is constant between all three options
2			**Scheme P** - Hybrid scheme – raceway circulation with labs on either side, central lab support space, clustered offices, and connection to psych wing. - Linkage – pass through, atrium, open breezeway – interaction space with convenient connections - Yields 15,000 SF footprint with lab and office in a 3 story structure - Encroaches out from the east end of Speith - Access to support across the corridor - Restricted access to labs – could be secured - Sections – 2nd floor connection with basement extension from psych wing to new building for service access into the new building and potentially expanded to accommodate mechanical equipment. - Smaller courtyard - Issue – ragged edge in courtyard and isn't as clearly defined - Future expansion – area for expansion toward Speith – Life Sciences. Shortcoming – future expansion to Speith would block fenestration possibilities for the labs on the northeast end of the building - 2nd floor connection – minimal fenestration for first floor labs on south east side of building – could increase light with window well - Sacrifice a lab to expand or at least disrupt a lab module - LABS – 28 to 30 investigators
3			**Scheme Q1** - Scheme holds eastern edge of building to Life Sciences - 12,500 SF to 13,000 SF per floor – 4 story building - LABS - 20 investigators - Scheme establishes a clearer definition of courtyard space and accommodates growth potential without denigrating existing/future

			building at that point. Fully connects to the life sciences wing of Speith but will have a major impact to that end of that wing of Speith. - Connection at 2nd floor via bridge….. full circulation between new bldg. and Speith and interaction space - Labs with support across the hall - Concern – may be short lab support space, may have to push further into courtyard to increase support space. Also forced to 4 stories. - Section: basement connection
4			**Scheme Q2** - Encroaches in easterly direction to bring the building back to 3 stories - Clustered lab and offices - Retain secure separation between public and private areas - LABS – 24 investigators - Bridge connection at psych wing with possible expansion toward life sciences wing - Suite of offices with interaction/post doc space accessible from bridge connection and another office suite on other wing of new building with circulation accessible to both students and investigators - Building also pulled toward Eucalyptus with a 15' setback versus the 20' setback of the other two schemes – 70' separation versus the 90' separation between new building across Eucalyptus (70' and 90' are assumed distances) - Redundant circulation system – need to work with the system to increase efficiency of floor plate
5			**Lab Configuration – RFD** - Space allocation – investigators may get two or three lab planning modules - All modules can apply to any of the schemes - Linear ft. of bench space is similar for all three schemes. – at 6'6 to 7' of bench per person ***Scheme 1*** - Arrangement is similar to UCLA labs with centralized support space - Lab is deeper than planning module because equipment space has been added - Area typically assigned to an investigator is approx. 1000 sq. ft. including office so lab is around 700 sq. ft. + 200 support + 130 sq. ft. office - Q: what is the distance between benches? A: Approximately 5'6 when there isn't a wall between two modules. - Q: Is there a reason to incorporate a peninsula lab bench versus the island bench shown? A: Although more bench space is added, circulation throughout the lab is significantly diminished and an exiting concern. Also, the corners become "dead space". - Q: This configuration seem to be inconvenient because one can't get very many people working in lab at the same time – can comfortably fit 4 to 5 people but all using same circulation spaces.

			If the islands are reoriented, workspace is more defined and increased. A: There are pros and cons to this layout but it will be explored for the next meeting. - Support space is included within the lab module for tissue culture, equipment, write-up space, etc. - Q: Can there be different lab configurations within the same building? A: Hard to do that at this point not knowing who is going into the building – harder to plan. <u>Scheme 2</u> - Scheme provides the ability to have a wall between individual lab modules or open for connected space - Distinction between wet and dry bench space - Fume hood alcove - Additional room adjacent to the lab - investigator to determine best use for the space - Arrangement has more flexibility for investigator. - 1,225 sq. ft. lab module ***Scheme 3*** - For investigators with larger research program, scheme provides investigator with 3 modules. - 2 areas adjacent to wet lab for tissue culture, write up space, etc. and equipment alcove at the entrance. - 1,560 sq. ft. - If all investigators have 3 lab modules, there is space for 15 investigators.
6			**Discussion of Lab Module** - Important to have flexibility because there are so many differences between investigators. - Can incorporate the 3-lab module into an enclosed 2-lab module design to provide investigators with growth room, but will force investigators to share space. - Appears that the Scheme 2 is the most flexible… Scheme 2 and 3 provide the most adaptability - Scheme 2 and 3 both have 44 modules – ranging between 15 to 22 investigators - Some shared support areas may cut into the lab space portion of the building, thus reducing the number of investigators in the building - Problematic to give a smaller lab module to a new investigator because then functionally, they can't grow. Need to design the lab module to accommodate for "mature" investigators - At move in… more successful to have a partition every 4th lab module versus every 2 so that expansion is enabled. - Security issues of lab…. open labs encourage "sharing" of equipment and shifting. Will work well within investigators who do closely coordinate but may be difficult for others. For equipment, can use locked cabinets… - Can have doors in-between modules so expansion is still enabled….. doesn't necessarily help with security. - Option to open versus closed lab modules is to include surge space – investigators may end up sharing the extra space with

			another investigator but it will provide space to move into until space can be reassigned - Core lab ought to be walled with doors .... Territory. - Disadvantage – larger / more open the room, more noise. Separations enable acoustical privacy. - Open lab module good for sharing of information - learn so much more without the barriers. - Doesn't have to be an either-or situation. Walls don't necessarily cut off or prevent interaction. - But keep in mind that it is important that people have interaction with each other. Flexibility is also crucial. A separate meeting may be scheduled to discuss the open lab module versus the closed lab module.
7			**Connection Discussion** - Favor broad connection to maximize space - Design element in connection - Use for offices, meeting space, interaction space. Close off options if it is narrow. - Have enhanced entrance (demonstration space, gathering space, interaction space)
8	JFP, RFD		**Action** Next meeting – develop a hybrid of Scheme Q1 and Q2 with atrium/entrance idea Move setback from N/S walkway back in line with Speith Maximize open space, pull back east elevation, go for 3 stories but if the building encroaches too much, then go to a 4 story. Articulate interaction space - identify what the yellow interaction spaces will be used for - especially outside of faculty offices. Maximize window space for offices.... Some window space on Q1 is being used for support space. Provide one scheme with clustered offices and another with offices spread out along perimeter of the building.

MEETING MINUTES: University of California Riverside - DPP

DATE: 12.9.99
AT: UC Riverside

PRESENT: Mike Adams, Kieron Brunelle, Nita Bullock, Andrew Grosovsky, Frances Sladek, Mark Chappell, Jolinda Traugh, Polly Breitkreuz, Luis Carrazana, Tom Mistretta, Bill Fain, Ben Levin, Dave Eastmond, Russel Vernonclark, Gretchen Griner

ITEM	ACTION	DATE	DESCRIPTION
1	Info.		**Presentation of Scheme Q2** ***Scheme Description*** Eastern edge goes beyond east boundary of Spieth but maintains 3 stories height Developed bridge between psyche wing and new building – connection made at 2nd floor Banks of lab at building perimeter with lab support between the lab and corridor with office suite containing offices, conference room and office support. Combination of offices and work area provides internal center for interaction and allows for this area to be accessed directly from bridge so labs remain "off-limits" L-shaped circulation Connection into Spieth from north end of building – works better to cut into lab versus stairway and is definitely preferred by consultants. Conversation of corridor through center of building or through lab: corridor gives more flexibility and enables more investigators from different focus work on the same floor whereas a corridor through the lab may cause cross contamination, etc. There will however be some connections between labs. <u>Conference/Support Space</u> Within the new building, one floor could include a larger conference room and the others could have varied support spaces. Don't have to have identical support space design on each floor. The conference room will be used for lab meeting and therefore need to accommodate up to 15 people. The current plan does allow for at least 15 people in the room. Would be beneficial to have a conference room that allows for a 3 to 4 lab meeting – approximately 30 people. Maybe one floor gets a lunchroom / break room and the others get conference room. Larger conference room on one floor could incorporate shelves for journals. 1 – library, 1 – seminar, 1 – lunch/meeting room. Periodicals could also be set into the interaction space and computer terminals in journal room.
2	Info.		**Lab modules** ***Discussion of Three Lab Modules*** "Shared support space" may be assigned to an individual investigator

			Plan development has a cost effective consideration – the office portion of the building is separate and therefore doesn't have the same structural/construction requirements as the lab portion which can reduce the cost of the building by 10% to 15%. However, if built to the lower construction standard, the area would not be able to be converted into lab space at a later time. Can develop an "equipment" corridor through the lab space Module shows both open and closed lab modules. Might be a good approach to take – i.e. the southern wing may work better as the "closed" wing and the other wing as an open wing. Also, lab partitioning can be different within the three floors of the building. Fume hoods are located in alcoves. Concern – lab space does not provide post docs, techs with good space within the lab. The investigator has the option of whether or not to assign "support" space to post docs, techs 2-module lab is approx. 1,100 to 1,200 sq. ft. Bench is 13' long with 2 people on each side. As the labs are assigned, some investigators may want less bench space and more support space or vice versa. Some degree of flexibility will be designed into the module so that this can be accommodated. These plans offer a large degree of flexibility Issue – 1 sink per lab may not be enough. Can include more sinks for the DPP and value engineer out later if necessary. Consider efficient layout for dishwashing in placement of the sinks within the labs. 1 cup sink per lab in addition to the dishwashing sink was suggested.
3	Info.		***General Building Discussion*** Biosafety level 3 suite is accommodated – loose one lab on one floor to accommodate glass wash, autoclave, dark room, bl3 space, etc. Health & Safety - may want to include a bathroom in the bsl3 facility so that people won't contaminate the rest of the building if they don't fully decontaminate before leaving the facility. Would rather see the restroom in the DPP now and value engineer out later if necessary. A shower is also recommended. May be laser based work in this facility and therefore consider the heat load that the equipment will put on the room where it is located. Build in the capability. Decision level for the lab module – a decision about lab module doesn't have to be decided on now but the design team will eventually need the information to complete the building design for the DPP. Address sun issues and lighting in labs from windows. What type of window treatment(s) will be proposed? Emergency backup – propose a certain number of receptacles per lab module and support room to be on emergency power. Most important are the 220s. Spieth has gas generator on roof – not a code compliant condition. May upgrade all of Spieth and new building with an emergency generator. Undefined lab support space can be used as core facility space and area for large, shared equipment.
4	RFD/JFP		***Conclusion*** 2 lab module options will be shown in the DPP with 2 sinks per

			investigator/lab. Add chilled water as service to the building Make bsl3 suite more efficient - One lab wing will be open and the other closed in the DPP. Exterior courtyard – program in tables with umbrellas. Provide one access point from the first floor out into the courtyard, possibly through a lunch room in the office suite.

MEETING MINUTES: University of California Riverside - DPP

DATE: 12.13.99
AT: UC Riverside

PRESENT: Gretchen Bollar, Mike Klagen, Cindy Giorgio, Nita Bullock, Mike Adams, Luis Carrazana, Tom Mistretta, Bill Fain, David Alpaugh, Ben Levin, Gretchen Griner, Polly Breitkreuz. Kieron Brunelle, Jolinda Traugh

ITEM	ACTION	DATE	DESCRIPTION
1	Info.		**Process** - Assessed defined site as well as existing planning documents as significant thought has already been given to the site - Studied the pedestrian and vehicular circulation - Looked at open spaces – both large and intimate - in close proximity to the site - Assessed site opportunities – limits of setbacks, site lines, adjacent buildings, future development, etc. - Studied various building configurations: 3 to 4 story buildings, a stand alone building, connections with Spieth, L-shaped building connecting to both wings of Spieth, and a building expanding across the North/South pedestrian corridor toward Batchelor. - Objectives: 1) develop a configuration to allow for more public spaces within the building to provide access without bringing people through the lab spaces; 2) maintain continuity of circulation throughout new building and Spieth; 3) maintain North/South pedestrian corridor; 4) maintain a useable courtyard space for faculty and students; and 5) maximize lab space within new building by moving a portion of the program into Spieth
2	Info.		**Final Scheme = Q2** - Incorporates key features of program: wet lab spaces, lab support space, and investigator offices. The scheme maximizes lab and critical lab support space and minimizes secondary/additional support space. - 3-story structure connecting to both the Life Sciences and Psych Wing of Spieth. The main connection is at the Psych Wing with a proposed atrium type connection. - Building connections are at the 2nd floor as well as the ground floor adjacent to the Psych Wing. May enclose the connection for interaction space – seating areas, magazine racks, etc. or leave open depending on budget. The connection to the Life Sciences Wing is somewhat more utilitarian - Provides lab space for 22 to 23 investigators, including 1 BSL 3 lab. - Site concept: define courtyard to create various spaces within the whole. Useable spaces for larger gatherings, formal and informal spaces, lawn areas, and a patios/courtyard area outside of the offices for faculty and student access.
3	Info.		**Program** - Space for 22 investigators, including offices, within the building. - Developed support spaces associated with the lab – generally shared. Includes a 1 BSL3 suite and radioisotope room as well

			which may also be used by people outside the building. - Weakness: fairly small floorplate for biosciences building. By shifting some of the program elements out to the adjacent building, then floorplate is adequate for lab space and interaction. - Positive features of the plan: compact building plan with the capability to grow, the building wraps around courtyard, the office suite can be built to a lesser construction standard from the rest of the building to save on construction cost (10% cost savings to the budget), and the building provides a good relationship of investigators to lab space. - Discussion – construction standard of the office area: may want to design the office suite to accommodate the conversion to labs at a later date – the conversion would provide approx. 3 labs. A discussion of converting the top floor of the Psych wing into lab space took place at previous meetings and would accommodate dry labs and possibly wet labs with mechanical services on the roof. - 1st price out at the same structural makeup and value engineer out the office suite to a downgraded construction type if necessary. - Various schemes have been developed for the lab module, all providing approx. 1500 sq. ft per investigator including shared support and office. - Openness of labs - 4 walls versus open. There was no consensus from the committee and strong opinions both ways. As the design is developed, may take a mixed approach to the building. Provide closed labs in one wing and open in the other. - May have an extra space not included in the program which would provide an opportunity for "flex" space.
4	Info.		**Discussion** - Next steps: meet with building engineer to establish appropriate systems, work with cost estimators, and come back in mid January with DPP draft - Net to gross ratio – 60 to 65. Aiming for 58% for the DPP level. - UCR will want services in basement and the roof clear. Issue: building across Eucalyptus may be 4 to 5 stories and will therefor look over new building. - Windows – the inclusion of windows is positive but may limit equipment storage. A low bench space along the perimeter, window wall will not cause investigators to lose lab bench space or fume hood space as fume hoods are provided for in an interior alcove within the lab. On the ground floor, which is below grade, there is only room for a small band of windows high on the wall. - Walls between interior labs will be designed to move, be flexible. A scheme for flexibility may include one bench in each module that is not fully developed. The assigned investigator will fit out the bench as needed. - North connection – 2nd floor connection - Issue of "extra" space = unresolved issue at this point. Ideas: if needed for shared support, it is there to absorb that need. If it isn't needed for additional support, then it could become a core facility / central lab support, a space to run clinics, a teaching lab, etc. Approximately 500+ asf.

			- Very flexible plans because they allows any investigator to have access to adjacent shared support within their lab wing. Also flexibility for the department(s) in terms of assigning space to investigators – no structural limits. - Main entrance / connection: an important connection that can provide a dramatic space in this area. Can become the street access point to the entire complex of Spieth and the new building. It has a small footprint but can also have a strong impact. Also, it is not a "public" building so a more "hidden" entrance is appropriate.
5	JFP/RFD/ UCR		**Next steps** Further refine design elements of the building, including cost estimates, and have a meeting with the Chancellor in February to present the DPP. Focus on remaining $3.2 million in funding for this building. Have a pre-meeting to review the DPP, identify outstanding issues, and develop a marketing strategy around this building at the end of January.

MEETING MINUTES: University of California Riverside - DPP

DATE: 2.25.00
AT: UCR, College Building North

PRESENT: **(UCR)** Luis Carrazana, Tim Paine, Mike Adams, Jolinda Traugh, Kieron Brunelle, Polly Breitkreuz,
Nita Bullock, Dave Eastmond, Ted Chiu, Russell Vernon, Suzanne Trotta, Brad Almis, Earl Levoss
(AEI) John McDonald
(RFD) Tom Mistretta
(Hanscomb) Steve Wong
(JFP) Bill Fain, Ben Levin, Gretchen Griner

ITEM	ACTION	DATE	DESCRIPTION
1	JFP		JFP will reorganize the final draft document to provide the introductory, macro level information in front, with a transition to more micro level information throughout the remaining document.
2	JFP RFD		Kieron Brunelle 1. Space requirement/room data sheets – the size of doors listed is inconsistent with those on the floor plan. Reconcile information. 2. Is sheet vinyl the appropriate flooring in the autoclave, glass wash? 3. Gypsum board partitions are designated in the glass wash room; appropriate due to the humid conditions of the room? Ceramic tile may be a better choice. 4. BSL 3 Suite – steam condensate and eyewash omitted. Also, OSHA calls for 12 air changes but 10 are noted in DPP.
3	JFP		Nita Bullock 1. Revise acknowledgements 2. Pg 3: is organismal biology a correct word? Yes, but add Neuroscience into the sentence 3. GENERAL NOTE: Biology department and biological sciences are used interchangeably throughout the document. Should all be listed as biological sciences. 4. Pg 6-1: 3rd paragraph: change formal to format 5. Pg 6-4: "the building should not appear to pedestrians as a likely place to enter" – change text to say entrances will be located at the north and west ends of the building. 6. Pg 8-2: Reference: UCR standards and guidelines – LRDP, LRDP Planning Principles, LRDP Landscape Guidelines, CNAS Precinct Plan, CEQA (California Environmental Quality Act). Discussion *Jolinda*: In the text, refers to the focus of the project being solely research but this is not correct. Undergraduate and graduate students will be working in the laboratories. Change text where necessary. *Tim*: In reference to Pg 6-4, "the building should not appear to pedestrians..." This whole section should be revised. The building is not intended to be an isolated fortress or elitist. Want to positively explain that the building is a place where students and others will want to come but that it is not a building to wander or hand around in... need to strike a balance between a place where people can feel

			comfortable in but not pass through. Leave negative words out and concentrate of the positives: "entry will be focused in certain areas", limited access, guide design by explaining that UCR is not looking for a grand, inviting entrance but one that is obvious with a definite impact of what the building wants to convey. A corner location has a different implication from a side entrance atrium. *Luis*: In reference to the atrium – it appears that in some areas, the program and drawings don't seem to match up. What is enclosed, what is not enclosed will impact the overall square footage information. Also, when speaking of this entry space in the document, don't use the work atrium and be very careful in the terms used to describe the space.
4	RFD JFP AEI		Dave Eastmond 1. Space requirements: it seems that all the conference rooms within the building are small, accommodating only 8 to 10 people. How do we get assurance that the space in the Psychology wing will be available? Space has been programmed in the Psychology wing for this purpose. For now, the conference rooms allocated in the DPP will remain at the current size. 2. Space Requirements 1.1 – How will the decision be made between the three plans? The decision will be made during the next phase of the project. Suggestion: label the plans Alternate A, Alt. B, and Alt. C so that there does not seem to be an option preference in the DPP. 3. GENERAL NOTE: Within the Space Requirement section, within the first line of text, describe what the diagram is showing and if alternates are provided for one space, tell the reader the differences between the schemes. 4. Particulates: have filters been specified on the ventilation system for the labs? A filter has been added into the mechanical system. State 85% in the text and provide a diagram. 5. Floor plans: some plans show doors while others do not. Bring all building plans up to the level of detail of the second floor. 6. Basement: is the basement space primarily for mechanical uses or can space for freezer storage be programmed into the space? More appropriate to program freezer storage space into the dry lab areas of the Psychology wing.
5			Jolinda Traugh 1. BSL 3 Suite: what are the functions of the rooms in the lower left corner and upper right corner of the BSL 3 suite? From left to right, the first pair of rooms is the darkroom, the second pair fdesignated or radioisotope work, and the upper right hand room is the glass wash area.
6	JFP RFD		Mike Adams 1. GENERAL NOTE: It is difficult to get into the detail of the project at the beginning of the document.... Better to have the overall project information first and get into the details of the project in steps. 2. Corrections in the acknowledgements 3. Will there be centralized CO_2 in the building? No, CO_2 will be provided on a per lab basis due to management and sharing issues. Space Requirement Equipment Vestibule 2.1b shows the space allocated for the cylinders in the support area of the lab.

			4. GENERAL NOTE: Space requirements – it is difficult to look at the individual diagrams and understand their context to the lab. Provide a key plan or a small diagram on each page that shows the relationship of the room to the lab. 5. GENERAL NOTE: revise page numbering so that it is consistent throughout the document 6. Space requirement sheets: can #26 – moveable laboratory tables be changed to moveable laboratory benches? Yes but changing to adjustable lab benches has an associated premium. For the DPP, the perimeter casework and benches will be fixed and a flexible bench will be provided for in the center. Depending on budget, another option is to have only a section of the center bench adjustable. 7. GENERAL NOTE: Pg 6-1: Only Speith is mentioned however the buildings are Speith Hall to the north and Life Sciences/Psychology Wing to the west. Be consistent throughout the document. 8. Pg 6-2: Not sure of the appropriateness of the arch picture. It is exactly what UCR does not want replicated in the new building. 9. Pg 7-1: What does this diagram show? Label the diagram so that it is more definitive.
7	JFP RFD AEI Hanscom b		Tim Paine 1. Lighting Levels: somewhat concerned with the specified lighting levels… many seem very low. Prefer to see an option built into the DPP where lighting levels can be high and reduced as needed. There are also discrepancies between lighting levels on Pg 9-14 and the room equipment list lighting information. Reconcile. Tim suggested the lighting is a program verification topic and individual users are asked their preference on lighting level at the appropriate time. Dual switching may help to accommodate adjustability in the lighting. Include some text dealing with energy efficiency and having adequate light. 2. GENERAL NOTE: BSL and BLS are both used for the BSL 3 Suite. Correct all inconsistencies. 3. For surfaces/finishes in areas or water and humidity, it seems appropriate to us a solid surface (i.e. Corian) instead of tile; especially around the autoclaves. May also want to be using epoxy paint in the BSL 3 suite, labs, etc. Check for consistency throughout the Space Requirements. 4. Storage will be vital to this building however if it is labeled as storage in the DPP, then it comes out in the process. Space Requirement 2.1 is listed at storage… may want to label the space as Lab Support. 5. Hanscomb: bottom of 2nd page, seismic misspelled 6. Concerned by the open space in the faculty office areas. Text (Pg 7-2) mentions the space will be used for post doc and grad students but it should not be used this way. Change text to read Office Support – for items such as copiers, faxes, kitchen support, etc.
8	JFP RFD		Luis Carrazana 1. Coordinate the header and footer, paging, etc. of the document 2. Pg 4-2: Space program – it seems that there are office support

			areas not included in the equation. Coordinate labeling of the space requirements and floor plans. 3. Floor plans: Revise labeling of adjacent building as the entire building is not Speith Hall. To the north – Speith Hall, to the west – Life Science Psychology Wing 4. Coordinate door sizes on plans and space requirements. 5. Space requirement headers: remove "department", flip the "room name, room number" with the information. Also include square footage. 6. Equipment schedule: when equipment is identify, label as user furnished 7. BSL 3 Suite: In the Space Requirements section, the suite is labeled BLS. Also, a shower has been included… is it required? EH&S would prefer to see the shower included. Leave in for now, may VE out of the project at a later date. 8. Cabinetry: specify "earthquake latches" be built-in as a standard on the doors.
9	UCR AEI RFD JFP		Brad Almis 1. Brad will provide AEI, UCR, JFP and RFD with the information system requirements – fiber and connection points. 2. Elevators: specify a ring down phone without dialing capabilities for the elevator.
10	JFP RFD AEI		Russell Vernon 1. Pg 1-1: R. Vernon is a staff member in the Department of Environmental Health & Safety; Mark Chappell is also the chair of the Biology Department 2. Pg 3-1: under Facility Goals and Objectives, the 2nd sentence, last phrase doesn't make sense. 3. Pg 5: Under the plumbing estimate, the item listed as "Laboratory waste and vent, including neutralization" implies the inclusion of a laboratory waste neutralization tank. This is neither required nor preferred by UCR, EH&S. 4. Pg 7-7: Under Laboratory Casework, in the 4th sentence it implies that both corrosive and solvents will be stored in metal cabinets. Corrosive materials generally are best stored in High-Density Polyethylene or Polypropylene cabinets. (Exceptions are for strongly oxidizing corrosives.) 5. Pg 7-9: Under Chemical Fume Hoods, 2nd paragraph, the 1st sentence states "With the view of energy and capitol savings, the hood should be normally operated at 18 inch vertical sash opening." This should read "With the view of energy and capitol savings, the hood should be normally closed, except when user is present." 6. Pg 7-10: Under Other Exhaust Devices, bullet point: Vented Cabinets: the last sentence should read – Venting of flammable liquid storage cabinets is required to be with non-combustible pipes. Venting of all storage cabinets is preferred by UCR, EH&S. 7. Pg 7-12: Under (2) Secondary Barriers, the last bullet point should read: "An eyewash safety shower shall be readily available." 8. Pg 8-2: Under Applicable Code Commentary, in the California Building Code section, 1st bullet point: the Draft DPP claims that "This facility is not expected to have a chemical inventory large

			enough to warrant an H8 occupancy…" A composite chemical inventory of intended types or researcher as selected by the involved departmental faculty was completed. Russell will forward a copy of the inventory to RFD. Include information in document and revise text as necessary. 9. Pg 9-6: Under Fume Hood Performance Criteriai nclude the sentences: "Cal/OSHA regulations require the average face velocity to the 100 feet per minute with no point less than 70 fpm as the hood is used. In addition, OSHA requires all hoods to contain all contaminants generated therein." 10. Pg 9-9: Under Biosafety Level (BSL-3) Exhaust System, the last sentence should read "bag-in – bag-out" not bag-off. 11. Pg 9-10: Smoke and Fire Control. It is unwise to shutdown the air supply completely as the occupants will not be able to exit the labs. It is better to keep enough air flowing into the labs to allow egress (at the ADA required exit force). It may be acceptable to cut off the supply air and reduce the exhaust air so the laboratories do not become too negative to prevent door operation. 12. Pg 9-11: The last sentence should read "standards January 2000" not January 1999. RFD /JFP to check appropriate date. 13. Pg 9-16: Under Standby/Emergency Service and Distribution System: Not included is the power required for minimal fume hood exhaust fans or for partial air supply fans to keep the lab roughly balanced to allow egress.
11	JFP RFD AEI Hanscom b		Earl Levoss 1. Pg 9-4: Existing temperature of 102 should be changed to 110 degrees 2. Pg 9-9: Combined preheat/reheat is currently at 180 degrees. Change to 140 degrees. 3. 3-way valve on chilled water system. Design issue . 4. Pg 9-7: Currently chilled water system specifies 66 degrees, UCR prefers 60. 5. A question was asked re: the capacity of the central plant to provide chilled water to this building. Although the building proximity to the central plant seem to be okay for connection, EL can't answer at this time. PD&C is currently doing a capacity study. 6. Luis suggested that the following be incorporated into the text – Class 1 water… Millipore or Bamstead system – so that it is understood that the campus system is not providing that type of water. Also, price out an RO system and backing system for the building.
12			Suzanne Trotta 1. Currently there is a shuttle cart used as transport around the campus. Ensure that the carts will be able to get in close proximity of the building 2. Specify electric exterior doors with an automatic door opening device 3. Accessible fume hood: has seen a walk-in, immediately adjustable and accessible fume hood. Current plan for a flexible central bench in each lab will allow for some accessibility…. Additional accessibility can be built into each lab as needed.