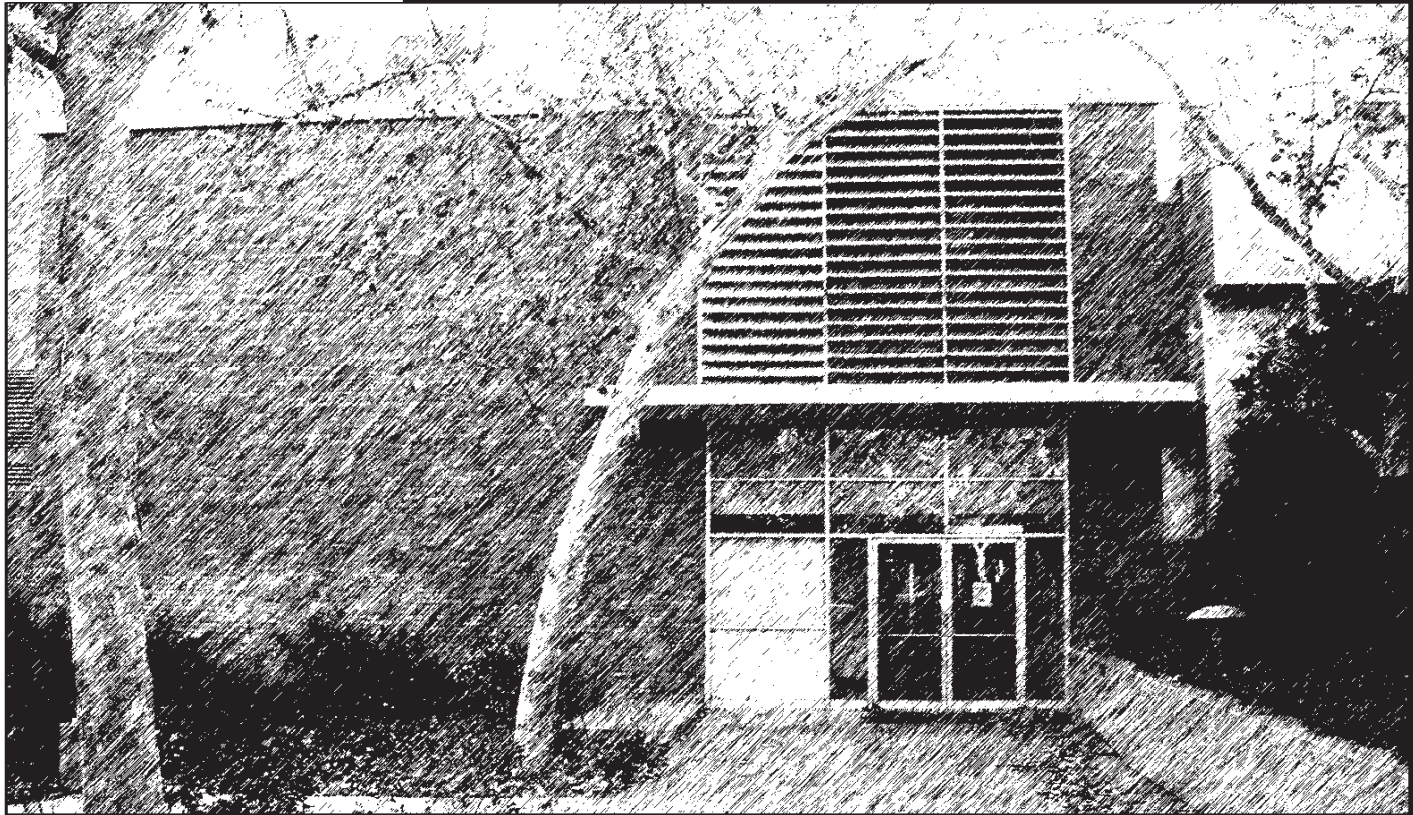


Geology Building Renovation Project Phase II Detailed Project Program Amendment



University of California, Riverside

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1.1 Detailed Project Program Amendment Overview

The Geology Building is located within the College of Natural and Agricultural Sciences (CNAS) precinct, a 57-acre area on the eastern edge of the University of California, Riverside (UCR) campus. Given the current enrollment projections for CNAS and associated increase in faculty and staff, coupled with the shortage of laboratory and office space on campus, the provision of modern laboratory facilities is necessary to attract new faculty and support growth and development of high-quality academic programs for students. The Geology Building, constructed over 45 years ago, was identified as a candidate for renovation in 2000 to meet the Environmental Sciences, Earth Science and the Institute for Geophysics and Planetary Physics (IGPP) needs for state-of-the-art, moderate to low-intensity research facilities.

The Geology Building Renovation Detailed Project Program (DPP) was completed in August 2001 by JLP Architects, Inc. to identify the project objectives, scope of work, design intent, phasing and project costs. Over the last four years, a portion of the Geology Building renovation scope, as outlined in the 2001 DPP, has been addressed through deferred maintenance projects, and Phase I of the Geology Building system upgrades and renovation. The intent of this DPP Amendment is to confirm and outline the remaining scope of work required to fulfill the intent of the renovation as defined in the 2001 DPP. The remaining work will be included within the Geology Building Renovation Project Phase II.

(Deferred Maintenance) + (Phase I) + (Phase II) = 2001 DPP Intent

Deferred Maintenance

A portion of the 2001 DPP renovation scope was completed in the Geology Building as part of a campus deferred maintenance project. The scope of work included:

- Supply and exhaust system replacement
- Heating Ventilation and Air Conditioning ductwork and controls replacement
- Roof replacement
- Elevator upgrades

Phase I

In the fall of 2002, UCR had an opportunity consolidate the necessary phases of construction to complete the scope of work as identified in the 2001 DPP to two phases. Funding for Phase I of the project became available in the budget year 2004-05 and is currently in schematic design. The scope of work includes the following:

- Upgrades to all building infrastructure systems not completed during the Geology Building Deferred Maintenance Project
- Upgrades to building circulation, hardware, drinking fountains, toilet rooms, alarms, signage, etc. to meet Americans with Disabilities (ADA) accessibility requirements
- Renovation of approximately 26,928 assignable square feet (ASF) of existing obsolete laboratory, support and office area on a portion of the first floor and full second floor for the departments of Environmental and Earth Science, IGPP and the AEEI Administrative Unit.

Phase II

The remaining Geology Building renovation work, required to fulfill the intent of the 2001 DPP, will be included in Phase II. This amendment will focus specifically on the Phase II scope of work, design intent, phasing and project costs. Similar to Phase I, Phase II will also provide the department of Earth Science, IGPP and a portion of the AEEI Administrative Unit with new, efficiently configured research and office facilities.

1.2 Project Description

The original Geology Building was constructed in two phases; the south portion in 1953 and the north portion in 1959. The four-story building measures 58,222 ASF and 94,185 gross square feet (GSF) and adjoins the new Science Laboratories 1 building on both the first and second floors. 26,928 ASF within the first and second floors will be renovated during Phase I of the project and 25,127 ASF within the basement and first floor will be renovated as part of Phase II.

Phase I

First Floor (center wing & portion of north wing)	6,410 ASF
Second Floor	20,518 ASF
Phase I Total ASF	26,928 ASF

Phase II

Basement	10,517 ASF
First Floor (portion of north wing & south wing)	14,610 ASF
Phase II Total ASF	25,127 ASF

As upgrades to the building systems and infrastructure have been addressed by previous projects, the Geology Building Renovation Project Phase II will primarily involve interior reconfiguration, construction and improvements to the basement and a portion of the first floor.

The objectives for Phase II remain consistent with the Phase I objectives reviewed and amended by the Phase I project committee members, Office of Design & Construction representatives, and project consultants (Appendix A). The renovation objectives are as follows:

- Replace existing outmoded and unsafe instructional and research space with new, modernized research space.
- Create a generic, adaptable building that responds to changing technological and functional requirements for the departments of Earth Sciences, IGPP, Environmental Sciences, AEEI Administrative Spaces, and other future uses as determined by the College of Natural and Agricultural Sciences.
- Encourage and support safe, high-quality academic research.
- Create a building that stimulates students, faculty and visitors and invites people into the worlds of Earth Sciences and Environmental Sciences by creating interaction zones internally and externally.
- Delineate an integrated phasing plan for the renovation of the Geology Building.
- Organization should foster disciplinary interaction, even between laboratories that may be located on different floors (short term goal).

- Research laboratory floors should be designed to be efficient, flexible, and minimize unnecessary travel between support space, yet create accessible shared / re-assignable support space.
- A strong relationship between the laboratories and the faculty offices should be maintained.
- Spaces with greater public functions should be located on or near the ground floor. In addition, there should be provisions for loading and receiving on the ground floor.
- Circulation patterns should be straightforward and clearly identified.
- Vertical circulation should be easily found and convenient to use.
- Corridors and doorways should be sized to accommodate movement of large pieces of equipment and should create an environment different from that of the labs. 6'-0" to 7'-0" should be adequate for equipment movement.

1.3 Planning Process

Planning for Phase II, the final phase of the Geology Building Renovation Project, commenced in February 2005. The planning team includes a project committee of building users from the departments of Earth Science and Environmental Sciences and IGPP, representatives from the Office of Capital and Physical Planning, Design and Construction, the College of Natural and Agriculture Sciences (CNAS) Dean's office, WWCOT and MEP, laboratory and cost consultants. WWCOT and the Office of Capital and Physical Planning facilitated three charettes in February and March 2005 to confirm and update the Phase II Earth Science, IGPP and AEEI Administrative Unit program requirements, conceptual program organization and adjacencies, and define planned improvements to the building interior within the Phase II scope of work (Appendix B).

This Phase II amendment to the 2001 DPP for the Geology Building renovation and the conceptual block plan diagrams (Appendix C) are the outcome of this planning process. The Phase I design development drawings are also included in the Appendix for reference. (Appendix D)

1.4 Schedule and Budget

Schedule

Based on the release of funding for the Geology Building Renovation Project Phase II in June 2006, the following project schedule is proposed:

- Preliminary Design July 2006 – December 2006
- Preliminary Plan Review December 2006
- Construction Documentation January 2007 – May 2007
- Agency Review May 2007 – July 2007
- Construction Documentation Review July 2007 – August 2007
- Bid Award Contract September 2007 – November 2007
- Construction December 2007 – February 2009

Budget

Refer to Section 8 for the Statement of Probable Cost.

2.1 Background

University of California, Riverside

The University of California, Riverside (UCR) is situated on 1,106 acres located three miles east of downtown Riverside. It is in the heart of the “Inland Empire,” an area that includes western Riverside and San Bernardino counties and has become one of the fastest growing areas in California. UCR serves as one of the most important educational and cultural resources for the area.

Undergraduate and graduate degree programs are offered by the College of Humanities, Arts, and Social Sciences; the College of Natural and Agricultural Sciences; the Bourns College of Engineering; the Anderson Graduate School of Management; the Graduate School of Education; and the Division of Biomedical Sciences.

UCR Enrollment Growth

Enrollment growth has been especially significant in the last decade. UCR had an actual enrollment of 8,200 FTE in 1997-98 and a budgeted enrollment of 15,250 FTE in 2004-05, an increase of 86%. At present, overall campus enrollment is projected to increase from 15,250 student FTE in 2004-05 to 20,320 FTE student enrollment in 2010-11 – an increase of approximately 33%. This enormous growth rate calls for significant campus change and adjustment to provide adequate, up-to-date instructional and research space.

UCR General Campus

Undergraduate and Graduate Instructional Workload (FTE)

General Campus	Budgeted 2004-05	Projected 2010-11	% Growth 2004-05 to 2010-11
Undergraduate FTE	13,318	17,320	30%
Graduate FTE	1,932	3,000	55%
Total Campus	15,250	20,320	33%

Source: UCR Geology Building Renovation Project Phase II PPG

College of Natural and Agricultural Sciences (CNAS)

CNAS has its origin in the Citrus Experiment Station, which was established in 1906. CNAS as currently organized, however, had its beginnings in 1974. It is unique in the UC system in its integration of biological, agricultural and physical sciences within a single college. Today, CNAS consists of thirteen academic departments and three organized research units that occupy seventeen major structures. This academic framework provides students with a strong foundation in the fundamental sciences, which includes biology, chemistry, earth sciences, mathematics and physics.

Enrollment growth in CNAS during the last seven years has also been significant, increasing by 50% from 1997-98 to 2004-05. Undergraduate enrollment in the thirteen CNAS academic departments is expected to increase by 25% to 4,694 student FTE from 2004-05 to 2010-11, while graduate enrollment is projected at 934 student FTE during the same period, an increase of 51%. The number of faculty required as a result of this growth will increase by 30% to 298 faculty FTE by 2010-11 compared to 229 faculty FTE in 2004-05. This enormous growth necessitates significant changes in CNAS’ academic programs and services and the facilities required to support them.

**UCR College of Natural and Agricultural Sciences (CNAS)
Undergraduate and Graduate Instructional Workload (FTE)**

CNAS	Budgeted 2004-05	Projected 2010-11	% Growth 2004-05 to 2010-11
Undergraduate FTE	3,756	4,694	25%
Graduate FTE	617	934	51%
Total Campus	4,373	5,628	29%

Source: UCR Geology Building Renovation Project Phase II PPG

Based on 2004-05 enrollments, adjusted for summer term assumed at 40 % of average F/W/S term, total instruction and research space at UCR was at 76 % of the California Postsecondary Education Commission (CPEC) space planning guidelines, a deficit of 246,000 ASF. The campus is expected to be at 87% of CPEC guidelines, a deficit of approximately 190,000 ASF by 2010-11 including all currently approved projects.

Meeting CNAS space needs during the next decade will require both new space to accommodate the growth in students and faculty and significant attention to the type and adequacy of space necessary for a twenty-first century teaching and research environment. Projections indicate that CNAS requires more than 701,000 ASF of instruction and research space by 2010-11 based on CPEC guidelines. With the construction of the State funded Biological Sciences, (Currently under construction) Materials Sciences and Engineering (currently in design), and Genomics Buildings (currently in design) CNAS will occupy 655,765 ASF by 2010-11 excluding greenhouse or field buildings. However much of this space is in older buildings that require renovations due to age and condition. The Geology Building Renovation Project Phase II will provide modernized research and office facilities for the Department of Earth Science, the Institute of Geophysics and Planetary Physics and the AEEI Administrative Unit.

2.2 Project Design Objectives

During the development of the 2001 DPP, specific design objectives were identified which represent opportunities and challenges for the final design of the renovation project. The design objectives applicable to Phase II are:

1. Foster disciplinary interaction, even between laboratories located on different floors
2. Design research laboratory floors to be efficient and flexible, minimize unnecessary travel between support spaces, and create accessible shared, reassignable support space.
3. Maintain a strong relationship between the laboratories and the faculty offices.
4. Size corridors and doorways to accommodate movement of large pieces of equipment and create an environment different from that of the labs. Additionally, accentuate the experience of entering a lab by grouping together and recessing lab entries within the corridor.
5. Maintain laboratory security requirements while encouraging interaction and movement throughout the building.

6. Encourage casual interaction by including inviting spaces strategically located at natural meeting places within the plan.
7. Coordinate natural and artificial lighting with the specific function of each program space.
8. Utilize a modular laboratory design to ensure adaptability of the building / labs to changes in technology and science.

2.3 Overview of Existing Conditions

The Geology Building is located just north of the Carillon Mall and is connected by a second-story bridge to Pierce Hall on the west and to the Science Laboratories Building, at both the first and second floors, on the south. A freestanding chemical storage building is located in the dock-level loading area on the east side of the building.

The two-story with basement and sub-basement Geology Building was constructed in two phases, the south portion in 1953 and the north portion in 1959, and comprises 58,222 ASF and 94,185 gross square feet (GSF).

Subbasement Level	6,167 ASF	9,891 GSF
Basement Level	10,517 ASF	20,000 GSF
First Level	21,020 ASF	33,048 GSF
Second Level	20,518 ASF	31,246 GSF
Total	58,222 ASF	94,185 GSF

2.4 Geology Building Renovation Project Scope

As the building is over 45 years old, it requires significant renovation and rehabilitation in order to support the current and future research activities and technologies utilized by Environmental Sciences, Earth Science and IGPP. To date, the Geology Building Deferred Maintenance project has replaced the building’s supply and exhaust system as well as the building Heating Ventilation and Air Conditioning (HVAC) ductwork and controls. The Geology Building’s roof was also replaced in 2000. The remaining renovation work will be completed during Phase I and Phase II of the Geology Building Renovation Project.

Phase I Building System Upgrades

- Structural / seismic improvements as required
- Building system infrastructure improvements not included in the Deferred Maintenance Project
- Electrical system upgrade and installation of an energy efficient lighting system
- Plumbing system upgrade as needed to meet functionality and code requirements
- Fire protection system expansion and upgrade
- Asbestos removal
- Window and window frame replacement to provide improved energy conservation and building pressurization

- Door and hardware replacement as needed to meet functionality and code requirements

Phase I Renovations (Appendix E)

- 26,928 ASF
 - First Floor: approximately 6,410 ASF within the center wing and the southwest quadrant of the north wing
 - Second Floor: full renovation of the 20,518 ASF floor plate
- Interior construction to include new:
 - Partitions
 - Floor coverings
 - Ceilings
 - Doors
 - Casework
 - Fume Hoods
 - Fixtures
 - Finishes

Phase II Renovations (Appendix E)

- 25,127 ASF
 - Basement: approximately 10,517 ASF within the north and center wings
 - First Floor: remaining 14,610 ASF
- Interior construction to include new:
 - Partitions
 - Floor coverings
 - Ceilings
 - Doors
 - Laboratory Casework
 - Fixtures
 - Finishes

Since 1999, the department of Earth Science and IGPP have responded to changes in the field with an increased emphasis on Geochemistry. This shift initiates an increased utilization of perchloric and hydrofluoric acids in research practices thus requiring the integration of specialty fume hood within the Geology Building to support research activities. The planned Phase I building system and infrastructure upgrades will provide adequate capacity to support the installation of these specialty hoods within identified laboratories in addition to standard chemical fume hoods and/or laminar flow fume hoods.

3.1 Program Overview

Phase II of the Geology Building Renovation Project will provide approximately 25,127 assignable square feet (ASF) of renovated research laboratories, laboratory support, offices, conference, and administrative space for the department of Earth Science, IGPP and AEEI. The Phase II Earth Sciences space is divided into five (5) program categories as follows:

Program Category	Assignable Square Footage
Department of Earth Science & IGPP Offices	1,391
AEEI Administrative Unit	405
Research Labs / Research Lab Support	14,325
Faculty Office & Support	8,091
Building Support	915
Total	25,127

3.2 Program Workload

The following Earth Science workload projection highlights the anticipated growth of department Faculty, Graduate Students and Post Doctorate Students through 2010-11. Based on the defined Earth Sciences program, the Geology Building Phase II renovation will accommodate the department headcount through 2011 with the provision of seventeen (17) faculty offices, three (3) visitor offices, forty-seven (47) graduate student workspaces and ten (10) post doctorate workspaces.

Earth Sciences / IGPP Workload Projections 2005-06 through 2010-11						
	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Faculty FTE	15.64	16.31	17.14	17.86	18.51	19.16
Graduate HC	29	32	35	38	40	43
Post Doc HC	5	6	6	6	6	7

Source: 2004-05 Space Analysis Tables

3.3 Phase II Master Space List

Based on the University of California, Riverside Corporate Equipment and Facilities System "Room Use Codes and Definitions," the Geology Building Renovation Project Phase II involves the following space types:

200 Research and Teaching Laboratory Facilities

- 210 Research Laboratory
- 211 Research Office
- 225 Research Laboratory Service

300 Office Facilities

- 310 Academic Office
- 320 Other Office
- 335 Office Service
- 340 Conference

The following spaces are included as part of the gross square footage of the building and were considered when distributing the program within the framework of the first floor and basement:

- Circulation – Stairs, Elevators & Corridors
- Lobby
- Public Restrooms
- Communication Closets

- Electrical Closets
- Janitors Closets
- Loading Dock

3.4 Phase II Space Standards

▪	Geology Building Basic Planning Module	400 ASF
▪	Research Lab Planning Unit (2 Modules)	800 ASF
▪	Chair / Director Office	150 ASF
▪	Student Affairs Office	150 ASF
▪	Administrative Office	125 ASF
▪	Administrative Workspace	64 ASF
▪	Faculty & Visitor Office	135 ASF
▪	Post Doctorate Student Workspace	64 ASF
▪	Graduate Student Workspace	48 ASF

3.5 Phase II Space by Planning Module

Basement

North Wing	21.0 Modules @ 400 ASF/each	8,400 ASF
North Wing	Aerial Photo Rm, 'Off-Module' Portion of Primary Research Lab 12, Misc.	502 ASF
Center Wing	Field Logistics, Rock Prep	1,615 ASF
South Wing	None	0 ASF

Subtotal	10,517 ASF
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1st Floor

North Wing	14.0 Modules @ 400 ASF/each	5,600 ASF
North Wing	Darkroom	100 ASF
Center Wing	Acid Room	145 ASF
South Wing	21.0 Modules @ 400 ASF/each	8,400 ASF
South Wing	Mail/Copy/Fax & 'Off-Module' portion of Conference Room	365 ASF

Subtotal	14,610 ASF
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Total Existing ASF for Phase II	25,127 ASF
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*Note: Miscellaneous space category represents all space outside the planning module.

3.6 Phase II Space by Floor

Floor	North Wing	Center Wing	South Wing	Dock Area	ASF
Basement	8,902	1,615	0	-	10,517
1 st Floor	5,700	145	8,765	-	14,610
Phase II Total					25,127

3.7 Proposed Space Program by Category

	Room Code	ASF / Space Stnd	ASF / Room	No. of Rooms	Total ASF
Department of Earth Science & IGPP Offices ¹					
Department Chair	310C	150	150	1	150
SCEC Director	310C	150	150	1	150
Department Chair Admin	320	64	64	1	64
SCEC Admin	320	64	64	1	64
Conference Room	340	NA	630	1	630
Mail / Copy / Fax	355	NA	105	1	105
Interspace Circulation / Support Space ²	355	NA	NA	NA	228
Subtotal					1,391
AEEI Administrative Unit ¹					
Student Affairs Office	320	150	150	1	150
Student Affairs Admin	320	64	64	2	128
Interspace Circulation / Support Space ²	335	NA	NA	NA	127
Subtotal					405
Research Labs / Research Lab Support					
Primary Wet Research Lab ³	210	800	795 (ave.)	4	3,180
Primary Wet Hydrofluoric Research Lab ³	210	800	795 (ave.)	4	3,180
Primary Dry Research Lab ³	210	800	830 (ave.)	4	3,320
Acid Room	225	NA	145	1	145
Digital Mapping Lab	225	400	400	1	400
Research / Museum Collections	225	400	390	1	390
Rock Mechanics Machine Shop	225	400	380	1	380
Optical Polishing Lab	225	400	370	1	370
Mass Spectrometry Lab	225	800	805	1	805
GIS Computer Research Lab ⁴	NA	NA	0	0	0
Geophysics Field Logistics Lab	225	400	350	1	350
Geology Field Logistics Lab	225	400	350	1	350
Fossil Prep Room	225	800	790	1	790
Electronic Lab	225	400	400	1	400
Darkroom ⁵	225D	NA	100	1	100
Aerial Photo Room ⁶	225	NA	165	1	165
Research Computer Lab ⁷	NA	NA	0	0	0
Subtotal					14,325
Faculty Offices and Support					
Faculty Office	310F	135	135	17	2,295
Visitor Office	320	135	135	3	405
Graduate Student Workspace ⁸	211	48	48	41	1,968
Post Doctorate Workspace ⁹	310P	64	64	11	704
Interspace Circulation / Support Space ²	335	NA	NA	NA	2,719
Subtotal					8,091
Building Support					
Rock Prep and Storage	225E	NA	NA	NA	915
TOTAL PROGRAM					25,127

* The **Total ASF** estimates are based on the preliminary Phase II Conceptual Block Plan Diagrams (Appendix C). These plans were developed using the Phase II Space Standards as listed in Section 3.4. Based on existing conditions within the Geology Building, some variations from these standards have been made within the plans to accommodate the Phase II program. The Conceptual Block Plan Diagrams are intended for reference only and will continue to develop and change during Schematic Design portion of the project.

Program Notes

1. The Department of Earth Science and IGPP office was originally programmed as 2,400 ASF in the 2001 DPP. In response to organizational changes within CNAS, a large portion of the Department of Earth Science and IGPP office program is now included within the AEEI Administrative Unit program, most of which is accommodated in Phase I. The Earth Science Department Chair and administrative support were included in the original 2,400 ASF while the SCEC Director and administrative support have been added to the program.
2. The “Interspace Circulation/Support Space” line items within the Department of Earth Science and IGPP Offices, AEEI Administrative Unit and Faculty Office & Support program components includes space within the suites dedicated to files, bookcases, and circulation outside of offices and workstations.
3. The Primary Research Lab program has changed from the seventeen (17) labs identified in the 2001 DPP to twelve (12) in Phase II. Five (5) of the seventeen (17) research labs are included in Phase I; two (2) labs within the northwest quadrant of the first-floor north wing and two (2) labs, shared by three P.I.s, within the first-floor center wing. (Refer to Appendix K) In addition, 11 of the 12 labs range in size from 780 asf to 810 asf. One dry lab within the basement measures 970 asf due to existing conditions within the floor.
4. The originally programmed 800 ASF Earth Science GIS Computer Research Lab is included in Phase I within the first-floor center wing. Per Phase I schematic design plans, the computer lab will be approximately 527 ASF as approved by the Earth Science and IGPP project committee members.
5. As recommended by the Department of Earth Science and IGPP project committee, the Darkroom was reduced from 200 ASF to approximately 100 ASF.
6. The 168 ASF Aerial Photo Room was added to the Phase II program by the Earth Sciences and IGPP project committee.
7. The originally programmed 400 ASF Research Computer Lab is included in Phase I within the first-floor center wing. Per Phase I schematic design plans, the computer lab will be approximately 1,208 ASF to support multiple P.I.s. (Refer to Appendix K)
8. The Graduate Student headcount has increased from the originally programmed 28 in the 2001 DPP to 40 students. Based on the desired Faculty/Graduate Student/Post Doctorate office suite configuration, 41 Graduate Student workstations have been accommodated in the preliminary Conceptual Block Plan Diagrams. (Appendix C)
9. The Post Doctorate headcount has increased from the originally programmed 3 in the 2001 DPP to 10 Post Docs. Based on the desired Faculty/Graduate Student/Post Doctorate office suite configuration, 11 Post Doctorate workstations have been accommodated in the preliminary Conceptual Block Plan Diagrams. (Appendix C)

4.1 Flexibility / Adaptability

Critical to the success of the Phase II renovation of Earth Science and IGPP research laboratories is the provision for future flexibility and adaptability of research practices, technology and laboratory function. Careful planning of the following design components will increase the flexibility and adaptability of the Geology Building:

- Existing Building Structure
- Modular Design Approach
- Utility Distribution Strategy
- Mechanical, Electrical and Plumbing Systems Capacity
- Laboratory Casework

Existing Building Structure

Similar to Phase I of the renovation project, a modular approach to the organization and design of laboratory spaces, as well as other programmatic spaces, has been utilized in the planning for Phase II. Per the 2001 DPP, this approach “provides a methodology to develop a predictable pattern for the layout of casework and equipment within each lab and the distribution of piped utilities. The use of a repetitive module establishes an organization for all the physical elements of the building, increases efficiency, ease of construction, serviceability, and the capability for functional change.” The planning module for both phases of the renovation project is based on the existing Geology Building structure.

Modular Laboratory Design

The width of the basic planning module for the Geology Building is based on the existing structural grid and is approximately 14'-0" by 28'-6" (approximately 400 ASF). While this planning module is larger than the standard module developed for new laboratory construction on the campus, it has been successfully integrated into the design of the Phase I research laboratories and will also be integrated into Phase II. One-module and two-module laboratories have been identified by the department of Earth Science and IGPP for Phase II.

Utility Distribution Strategy

Per the 2001 DPP, “access to central building utilities in each laboratory module is essential to the flexible, long-term use of the laboratories in the Geology Building. Upgrades to all building utilities, including plumbing (natural gas, vacuum, industrial hot and cold water, deionized water and localized specialty gas plumbing), electrical, telecommunications and data will be included in Phase I of the Geology Building Renovation Project and will be installed to the point of connection in Phase II spaces.

Mechanical, Electrical and Plumbing Systems Capacity

The mechanical, electrical and plumbing system upgrades to the Geology Building will provide adequate capacity to support the programmatic requirements of the department of Earth Science, IGPP and AEEI. All upgraded systems included in the Phase I scope of work will be installed to the point of connection in Phase II spaces.

Laboratory Casework

The laboratory casework system is a key element in the overall flexibility of a laboratory building. The selection process for a system is critical if it is to match the budget with the desired level of flexibility for a variety of users over the life cycle of the facility. Evaluation of four major “industry standard” casework systems was suggested in the 2001 DPP:

- Standard Floor-mounted System
- C-frame System
- End Rigger System
- Unistrut system

At this time, a laboratory casework system has not been selected for the renovation of the Geology Building laboratories included in Phase I. To ensure design consistency within the building, specify and install the same casework system in Phase II as installed in Phase I.

Laboratory Counter Tops

The selection of laboratory counter tops should be based on the intended use of the laboratory while also supporting future flexibility and adaptability of research functions within the space. To ensure design consistency within the Geology Building, specify and install similar counter tops in Phase II as installed in Phase I based on lab function.

Fume Hood Base Cabinets

Fume hood base cabinets should match the selected laboratory casework and support the intended use and storage needs of the lab. For design consistency, specify and install the same fume hood base cabinets in Phase II as installed in Phase I. Also note that a percentage of the fume hoods within Phase II will need to be accessible; the location and quantity of accessible fume hoods and base cabinets should be determined during the design phase.

Per the 2001 DPP, the “primary purpose of a fume hood is as a safety device to protect people working with hazardous materials. An inward flow of air to the hood provides personal protection for the researcher at the fume hood and others within the lab. It is good laboratory practice to move air from the least hazardous area to more hazardous areas. Fume hoods should be located away from any drafts that may disturb this directional airflow. Examples of systems or activities which should be considered in the placement of fume hoods are room ventilation supply and exhaust, operable windows, room doors which constantly open and shut, and main routes of circulation. Personnel should always be able to exit away from and without passing a fume hood.”

Specialty Fume Hoods

In addition to the provision of standard chemical fume hoods within the primary research laboratories and identified research support labs (refer to Section 6), the department of Earth Sciences and IGPP has requested that the future installation of one 6’-0” perchloric-acid fume hood and up to six 6’-0” hydrofluoric fume hoods be supported by the infrastructure upgrades included in Phase I. The specialized ducting and all infrastructure to the point of connection within laboratories identified for hydrofluoric acid hoods will be incorporated into the Phase I infrastructure upgrades. The required ducting and infrastructure for the perchloric hood in the acid room will be included in

Phase II. The installation of a roof fan will be required upon purchase and installation of fume hoods within identified laboratories.

The existing Acid Room, located within the first floor center wing adjacent to the loading dock, is the proposed location for the perchloric fume hood. Two of the six Earth Science hydrofluoric fume hoods are included in the Phase I renovation scope of work and are planned for first floor laboratories in the southwest quadrant of the north wing. One of these two Phase I hydrofluoric hoods will be provided under the base contract while the second hood will be an additive alternate. Connections for the remaining four hydrofluoric fume hoods are planned for the first floor: within two labs in the northwest quadrant of the north wing and within two labs in the south wing.

Additional specialty fume hood considerations included in the 2001 DPP are:

- Investigate special hood configurations and materials designated for the use of hot aqua regia during the design phase.
- Determine if snorkel exhaust is required for certain laboratory procedures.
- Install canopy hoods as required for the containment and removal of heat, steam, combustion products, vapors, mist, objectionable odors and or dust from specific laboratory equipment. This equipment includes, but is not limited to, growth chambers, rock cutting and grinding, and crushing equipment, etc.
- Install vented flammable storage cabinets in all labs containing fume hoods. Environmental Health & Safety and the Campus Fire Marshal should review the location of cabinets during the design phase.

4.2 Laboratory Safety Features

Per the 2001 DPP, “details of laboratory safety design shall be consistent with the draft version of the UCR Environmental Health & Safety Laboratory Safety Design Guide. Variances from these requirements should be reviewed with the Environmental Health & Safety office.”

“It is anticipated that the most likely occupants of the Geology Building will not be researchers who use large quantities of highly hazardous classes of chemicals. Therefore, the building may be classified as a B-occupancy building. Fixed emergency eyewash and safety showers will be provided within each lab suite. A dedicated closet for emergency response supplies must be provided on each floor of the building. An emergency gas shut-off valve, located adjacent to the main lab entrance door, will be provided for each laboratory suite. All fume hoods will be equipped with low-flow alarms. Fume hood sashes shall be equipped with at least ¼-inch thick safety glass.”

4.3 Other Laboratory Design Features

Special laboratory design features for the Geology Building Renovation:

- The fume hood diversity factor is 40-60% for the research labs, assuming that a sash sensor, occupancy sensor, and sash management are provided.
- The fume hood face velocity must remain at a minimum of 100 feet per minute with the sash in the half-open position.

5.1 Functional Description

The Geology Building Renovation Project Phase II will improve space within the building for the department of Earth Science and IGPP. Earth Science currently occupies approximately 20,247 ASF within the building and offers a Bachelor of Science degree in Geology and Geophysics and Master of Science and Doctoral degrees in Geological Science with a focus on Organic and Paleoenvironmental Evolution, Earthquake Science and Geodynamics, and Quantitative Earth Surface Processes. IGPP currently occupies 6,623 ASF. The Institute’s mission is to promote basic research in the structure, origin, and evolution of the universe including the solar system and its planets.

As described in the 2001 DPP, “Earth Science occupies portions of the subbasement, basement and first floor levels of the Geology Building. Several areas in the subbasement and basement are used as storage rooms for rock, mineral, paleontology and fossil storage. This storage requires convenient access to loading dock facilities. The department uses vibration sensitive equipment (i.e. microprobe equipment) and vibration producing equipment that will require special placement consideration.” The existing Earth Science functions within the subbasement will remain in place, receiving minor renovation as required.

Geochemistry is a fast-growing component within the department of Earth Science, comprising approximately one-third of the total department space. Current Geochemistry research practices utilize perchloric and hydrofluoric acids and will therefore require the infrastructure necessary to support the installation of specialty acid fume hoods within identified laboratories in the future. Other Earth Science components require standard chemical fume hoods within the laboratories as detailed in Section 6: Room Design Criteria. The department also requires convenient access to chemical storage facilities.

A general assignment classroom (#1408) is currently located in the northwest corner of the first-floor north wing and will relocate to Pierce Hall as part of a separate project. The vacated space will be renovated during Phase II of the Geology Building Renovation Project for Earth Sciences laboratories.

The Geology Museum is located in the wide corridor connecting the two wings of the building on the first floor. As described in the 2001 DPP, the “museum performs a major recruitment and service function offering self-guided tours to students and visitors.” The museum will remain in its current location during the Phase I and Phase II renovations.

5.2 Materials and Finishes

Floors

The primary floor material within the Geology Building is vinyl asbestos tile (VAT). Due to the asbestos content, all VAT flooring will be removed within spaces renovated during Phase II to comply with Campus standards. Recommended replacement floor materials include vinyl composition tile (VDT) for circulation areas, storage rooms, offices and dry labs and corrosion resistant seamless vinyl flooring for wet labs. Areas within the subbasement and basement that have exposed concrete floors with a sealed finish may remain as is.

Walls

As described in the 2001 DPP, “the existing walls are generally in good condition and in most cases would require minimal patching and repainting. Walls and wall finishes typically extend from the floor to the bottom of the floor deck or roof, since most laboratory areas have no ceilings. The existing wall/floor base is a 4” topset rubber base. Due to the installation of new flooring to replace the existing VAT, the existing base will be removed throughout the facility and a new topset rubber base would be installed. If sheet vinyl is installed, then a coved sheet vinyl base should be installed in those specific rooms.”

For design consistency, new interior partitions and corridor walls shall be of the same construction as incorporated in Phase I. Specific wall types and details will be developed during design development.

Ceilings

As described in the 2001 DPP, “existing laboratory spaces typically have no ceiling with exposed painted structure and exposed utility systems including piping, mechanical ductwork, electrical conduit and electrical lighting. It would be preferable to maintain the operation as an exposed system for both accessibility and economy. Several of the exposed systems would be affected in the renovation and the new elements would require a new paint finish. Based on asbestos reports, exposed pipes have insulation containing asbestos. These reports did not identify any spray-on asbestos material.”

The corridor ceiling within the south and center wings of the first floor has been updated as part of a deferred maintenance project. The renovation of the north wing, first floor corridor ceiling and the second floor corridor ceilings is included in the Phase I scope of work.

Windows and Frames

The replacement of windows and window frames is included in the Phase I renovation scope. The existing window system will be replaced with new double glazed units comprising Solar Control Low-E glass in order to improve energy conservation and building pressurization.

Doors and Hardware

As described in the 2001 DPP, “existing corridor doors to laboratories and offices are typically solid core wood with a birch face veneer and natural stain and lacquer finish. The doors are in fair condition. Doors typically do not have a fire-rating label, as this was not a requirement at the time of construction. All doors onto corridors require a 20-minute fire-rating label. Laboratories using chemicals in the building require a 1-hour fire-rating label. All laboratories over 200 ASF require the addition of a second exit door to meet code requirements.” For design consistency, specify and install the same doors in Phase II as installed in Phase I.

Per the 2001 DPP, “existing door hardware consists of doorknobs that are not in compliance with handicap accessibility requirements. In addition, most doors do not have the required 18-inch clearance between the wall and the strike surface. The doors, frames and hardware sets will need to be replaced during the renovation. For design consistency, specify and install the same door hardware in Phase II as installed in Phase I.

Toilet Rooms

Toilet rooms will be renovated to comply with accessibility requirements during the Geology Building Renovation Project Phase I.

5.3 Laboratory Benchwork and Equipment

Laboratory Benchwork

As described in the 2001 DPP, the “existing laboratory benchwork consists of wood base cabinets and wall cabinets in a birch finish material with a natural stain and clear lacquer finish. Benchtops consist of acid-resistant standard ‘stone’ material in a gray or black color and transite counter tops. Benchtops are equipped with two-tier open shelving units and utility monuments for process vacuum, natural gas and compressed air. The layout of the lab benches, fume hoods and gas cylinder storage racks is typically in island configurations allow for good circulation, but fume hoods are often located adjacent to laboratory exit doors. Fume hoods usually involve the most hazardous laboratory operations and should be located in the far corners of laboratory space away from the path of travel to the exit doors for safety consideration.” New laboratory benchwork will be installed in all laboratories included in the Phase II renovation. For design consistency, specify and install the same benchwork as installed in Phase I.

Laboratory Equipment

Per the 2001 DPP, the “existing fume hoods are typically in poor and/or inoperable condition. The campus Environmental Health and Safety Department conducted an inventory of existing fume hoods and their state of repair which identifies which of the fume hoods are inoperable or operating poorly. The deficiencies include, but are not limited to:

- Asbestos panel lining in the cabinet
- No laminated safety glass sash
- No self-closing doors for solvent storage in base cabinets
- No containment lips around cup sinks
- No flow controls for air velocity
- No emergency power shut-off
- No audible and visual alarms”

All fume hoods will be replaced within spaces renovated during Phase II. The department of Earth Science requires specialty fume hoods, including perchloric and hydrofluoric hoods, in addition to standard chemical fume hoods. Refer to Section 6: Room Design Criteria for the proposed locations and quantity of standard and specialty fume hoods.

Electrical Power, Process Cooling and Makeup Air

Electrical power, process cooling and makeup air improvements are included in Phase I of the Geology Building Renovation Project. Utilities will be installed to the point of connection in Phase II spaces during Phase I.

Equipment Weight, Vibration and Noise

Per the 2001 DPP, “some equipment is very heavy and may require special structural consideration. Vibration control is an issue for both vibration producing equipment and vibration sensitive equipment. Vibration producing equipment should be mounted on spring isolators or dampening devices. Vibration sensitive equipment should be mounted on heavy inertia base tables. These tables could also require special structural consideration. If possible, the equipment should be located in the lower floors of the building.”

“Some equipment is noise producing and will require special noise isolation features if placed within a laboratory. New walls should be constructed to maintain appropriate acoustic separation and isolation when equipment is located in separate equipment rooms. The recommended criteria for various spaces are tabulated below:”

Space Category	Noise Criterion
▪ Laboratories	PNC-50
▪ Conference Rooms	PNC-35
▪ Lounges and Seminar Rooms	PNC-35
▪ Private Offices	PNC-35
▪ Reception Areas, Lobbies, Open Offices	PNC-40
▪ Corridors, Stairways (nonsensitive listening)	PNC-50
▪ Classrooms	PNC-35

5.4 Hazardous Material Handling

Chemical Handling Distribution

The handling and distribution of chemicals, gas cylinders and hazardous waste disposal within the department of Earth Science and IGPP is governed campus wide by the Environmental Health and Safety Department. Per the 2001 DPP, “chemicals are primarily stored in a separate chemical storage building located adjacent to the loading dock on the east side of the Geology Building and are delivered from the storage area to the point of use by standard chemical carts. Chemicals typically come in one-gallon containers and are pre-mixed to avoid on-site chemical mixing or open-system dispensing requirements. Once delivered to the laboratories, the chemicals are utilized in research conducted either on open laboratory benches or within fume hoods. Unused chemicals are stored for long periods of time either within approved chemical storage cabinets or within the laboratory fume hoods. Used chemicals are stored in approved containers for pickup by EH&S Department for disposal off-site by an approved vendor.”

The 2001 DPP list of laboratory chemicals used by the Department of Earth Science and IGPP is included in the appendix of this report (Appendix F). According to the 2001 DPP, the chemical quantities stored within the laboratory must be kept within the guidelines of Table 9-A of the 2001 California Building Code (CBC) to maintain the present occupancy group rating.

**Table 9-A: Standpipe Requirements
2001 California Building Code**

Occupancy x 304.8 for mm x 0.0929 for m ²	Nonsprinklered Building ¹		Sprinklered Building ²	
	Standpipe Class	Hose Requirement	Standpipe Class	Hose Requirement
1. Occupancies exceeding 150 feet in height and more than one story	III	Yes	I	No
2. Occupancies four stories or more but less than 150 feet in height, except Group R, Division 3 ⁶	[I and II ⁴] (or III)	Yes ⁵	I	No
3. Group A Occupancies with occupant load exceeding 1,000 ⁷	II	Yes	No requirement	No
4. Group A, Division 2.1 Occupancies over 5,000 square feet in area used for exhibition	II	Yes	II	Yes
5. Groups I; H; B; S; M; F, Division 1 Occupancies less than four stories in height but greater than 20,000 square feet per floor ⁶	II ⁴	Yes	No Requirement	No
6. Stages more than 1,000 square feet in area	II	No	III	No

¹Except as otherwise specified in Item 4 of this table, Class II standpipes need not be provided in basements having an automatic fire-extinguishing system throughout.

²The standpipe system may be combined with the automatic sprinkler system.

³Portions of otherwise sprinklered buildings that are not protected by automatic sprinklers shall have Class I standpipes that are located as required for Class II standpipes.

⁴In open structures where Class II standpipes may be damaged by freezing, the building official may authorize the use of Class I standpipes that are located as required for Class II standpipes.

⁵Hose is required for Class II standpipes only.

⁶For the purposes of this table, occupied roofs of parking structures shall be considered an additional story. In parking structures, a tier is a story.

⁷Class II standpipes need not be provided in assembly areas used solely for worship.

Gas Cylinder Handling and Distribution

Per the 2001 DPP, “gas cylinders are delivered to the loading dock of the Geology Building, stored and then distributed to the various departments. Inside the laboratory, standard cylinders are placed in approved racks with safety chain straps to hold them in place. Some large cylinder gases and other storage containers are stored in the exit corridors and hallways. This is not an acceptable or approved storage method.” A complete list of cylinder gases is included in the appendix of this report (Appendix F) and storage quantities must be maintained at the levels allowed in 2001 CBC Table 9-A.

Hazardous Waste Handling and Distribution

Per the 2001 DPP, “all hazardous wastes are collected in small quantities by the Environmental Health and Safety Department and disposed of off-site by approved methods. This method is quite expensive and a detailed analysis of exact chemical quantities should be reviewed in relation to the cost of a waste treatment system. It may be more economical to install an acid neutralization system for the building depending on the future use of the facility. The Environmental Protection Agency (EPA) as well as Building Codes and Fire Codes dictate guidelines for handling and disposal of hazardous wastes. Ultimately, the operation must be reviewed in detail by the Environmental Health and Safety Department and the Campus Fire Marshal as well.”

Asbestos Abatement

Based on the “Asbestos & Lead Based Paint Survey” by Ambient Environmental, Inc. (Appendix H), the Geology Building contains asbestos in the following areas:

- Vinyl asbestos tile (VAT) on floors and baseboard mastic
- Asbestos insulation around mechanical piping and fittings
- Transite counter tops
- Transite piping and fume hoods
- Transite sinks

Asbestos abatement will occur as spaces are renovated during Phase I and Phase II of the Geology Building renovation.

5.5 Disabled Access

California State Title 24 governs handicap accessibility requirements for disabled access design and is enforced by the Office of the State Architect. The Geology Building will require extensive facility modification to meet Title 24 requirements. Per the 2001 DPP, these modifications will include, but are not limited to the following:

- Additional ramps
- Stairs with special tread nosing striping and new handrails
- Doors will be required to have level handles and 36” minimum width. Additionally an 18” side clearance at the strike side of the jamb will be required. This could necessitate relocating some laboratory benchwork.
- Drinking fountains will be required to be handicap accessible
- Toilet rooms will need to be modified which will include water closets, toilet stall sizes, urinal mounting heights, lavatory mounting and traps, mirrors, sink faucet controls, installation of grab bars, etc.
- Alarms will be required to be both audible and visual
- Signage will be required at all door locations identifying functions of rooms
- Automatic door operators
- Controls and operating devices for building systems will require mounting height modifications to appropriate levels: light switches, thermostat controls, fire alarm pull stations, etc.

Disabled Access Renovations – Phase I

- Building Entries, Ramps and Corridors
- Stairs
- Drinking Fountains
- Restrooms
- Environmental Sciences, Earth Science, IGPP and AEEI Faculty, Administrative and Support Space
- Environmental Sciences, Earth Science and IGPP Research Laboratories

Disabled Access Renovations – Phase II

- Earth Sciences and IGPP Faculty, Administrative and Support Space
- Earth Sciences and IGPP Research Laboratories and Research Support Laboratories

5.6 Codes and Regulations

The following list includes various codes, ordinances, regulations, industry organizations and federal, state and local agencies that are applicable to the renovation of the Geology Building.

- American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Americans with Disabilities Act (ADA)
- California Occupational Safety and Health Act (Cal OSHA)
- California Environmental Protection Agency (EPA)
- California Building Code (CBC) and standards
- California Office of the State Architect (OSA) Handicap Compliance Unit
- California Administrative Code (CAC) Title, 8, 9, 10, 20, 24, 25
- National Electric Code (NEC)
- National Fire Protection Association (NFPA)
- Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
- South Coast Air Quality Management District (SCAQMD)
- State Fire Marshal (SFM)
- Underwriters Laboratories (UL)
- Uniform Fire Code (UFC) and standards
- Uniform Building Code (UBC) and standards with California Amendments
- Uniform Plumbing Code (UPC)
- Uniform Mechanical Code (UMC)

Building Code Analysis

Per the 2001 DPP and based on the requirements of Table 5-A (Appendix I) in the 2001 California Building Code, the “existing Geology Building operates under both Occupancy Group B-2 (educational purposes) and Occupancy Group A-3 (assembly room). Maintaining the B-2 occupancy group for the laboratories requires chemical and gas quantities to be within the limits of Table 9-A of the 2001 California Building Code. If quantities exceed those limits, the facility will be classified as an H occupancy.”

“Also per Table 5-A of the Building Code, the Geology Building is Construction Type III 2001 California – 1 hour. This will allow a B-2 occupancy to be four stories in height and an A-3 occupancy to be two stories in height. A basement is not considered a floor level, but since the existing Geology Building has both a basement and subbasement this may be subject to interpretation regarding allowable floor area when reviewed by the State Fire Marshall. All renovation concepts assume the Geology Building will be used for general office and less intensive research laboratories. These uses will probably not involve large quantities of chemicals and consequently the building operation will remain a B-Occupancy and not an H-Occupancy.”

Room Design Criteria

The following pages contain generic room design criteria sheets for the department of Earth Science and IGPP primary research labs, laboratory support space, and faculty office suites. The drawings associated with the criteria sheets are based on:

- the generic 400 ASF Geology Building planning module as described in Section 4.1 and
- the Phase II Recommended Space Standards as listed in Section 3.4.

The actual configuration of each program component will be further developed during the Schematic Design portion of the project.

Note: the ASF estimate provided on each Room Criteria Sheet is based on the preliminary Conceptual Block Plan Diagrams (Appendix C). These plans were also developed using the planning module (Section 4.1) and Phase II Space Standards (Section 3.4). Based on existing conditions within the Geology Building, some variations from these standards have been made within the plans to accommodate the Phase II program. The Conceptual Block Plan Diagrams are intended for reference only and will continue to develop and change during Schematic Design portion of the project.

6.1 Room Design Criteria Sheet Legend

ICW	Industrial Cold Water	ASF	Assignable Square Feet
IHW	Industrial Hot Water	FPM	Feet Per Minute
DI	Deionized Water	NIC	Not in Contract
LA	Laboratory Air	TBD	To Be Determined
LG	Laboratory Gas	V	Volts
LV	Laboratory Vacuum		
UPS	Uninterrupted Power System		

6.2 Room Design Criteria Sheets

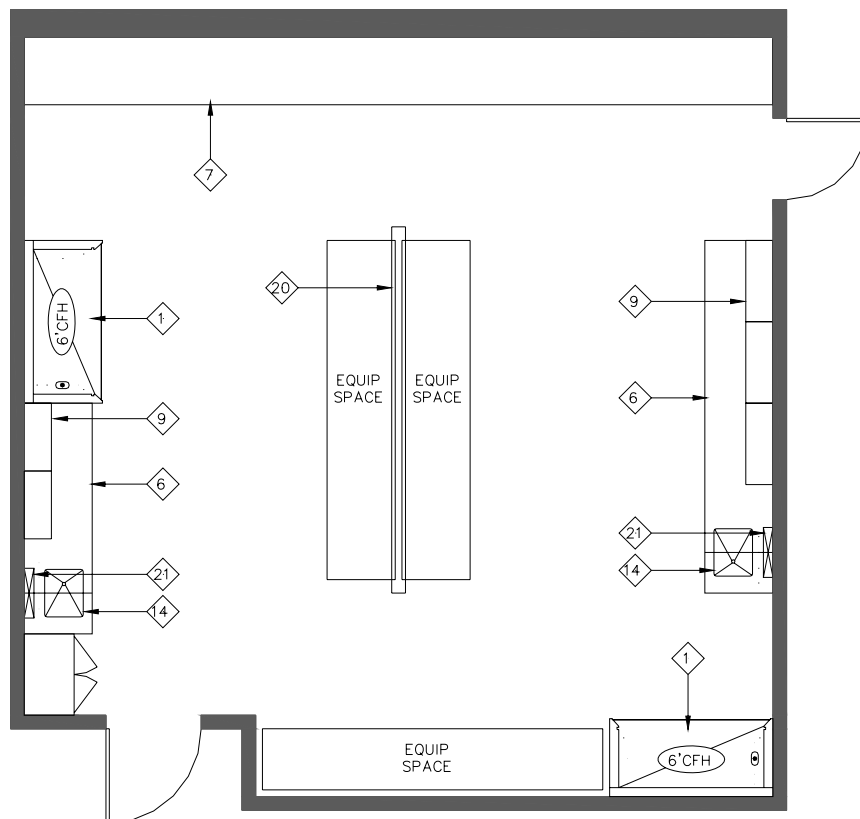
▪ Primary Wet Research Lab	6-2
▪ Primary Wet Hydrofluoric Research Lab	6-4
▪ Primary Dry Research Lab	6-6
▪ Acid Room	6-8
▪ Digital Mapping Lab	6-10
▪ Research / Museum Collections Support	6-12
▪ Rock Mechanics Machine Shop	6-14
▪ Optical Polishing Lab	6-16
▪ Mass Spectrometry Lab	6-18
▪ Geophysics Field Logistics Lab	6-20
▪ Geology Field Logistics Lab	6-22
▪ Fossil Prep Room	6-24
▪ Electronic Laboratory	6-26
▪ Darkroom	6-28
▪ Aerial Photo Room	6-30
▪ Faculty, Post Doc. & Grad. Student Office Suite – 1 Module	6-32
▪ Faculty, Post Doc. & Grad. Student Office Suite – 2 Modules	6-34
▪ Rock Prep and Storage	6-36

Earth Sciences Primary Wet Research Lab

ASF	795 ASF (average)
Planned Use	Chemical, physical and biological experiments involving groundwaters, rocks, sediments and fossils
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: exposed (12'-8" slab to slab)
Doors / Windows	One (1) 3'-6" corridor door and one (1) 3'-0" secondary exit
Window Coverings	Yes (where applicable)
Mechanical	<ul style="list-style-type: none"> • 74°F (cooling) and 68°F (heating) • Fume hood(s) to operate at 100 FPM face velocity w/ sash height at 18"
Piping	Exposed
Plumbing	<ul style="list-style-type: none"> • ICW / IHW / DI / LA / LG / LV • 1 floor drain • Emergency eyewash station • 2 sinks (refer to "Casework" section)
Power	120 and 208 V, 60 amp, including outlets in center; emergency power (TBD) provided in Phase I to support lab equipment
Lighting	75 foot candles general
Communication	4-6 data lines, 2 voice lines
Casework	<ul style="list-style-type: none"> • Fixed waterproof casework on perimeter walls with 2 sinks • 36" high waterproof benches in center, along walls • Epoxy countertops
Group 1 Equipment	Two (2) 6'-0" fume hood with four (4) laboratories
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	The planned Phase I building systems upgrades will provide adequate capacity to support the installation of the two chemical fume hoods as well as the installation of a laminar-flow fume hood (NIC) within the lab in the future.

Earth Sciences Primary Wet Research Lab

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

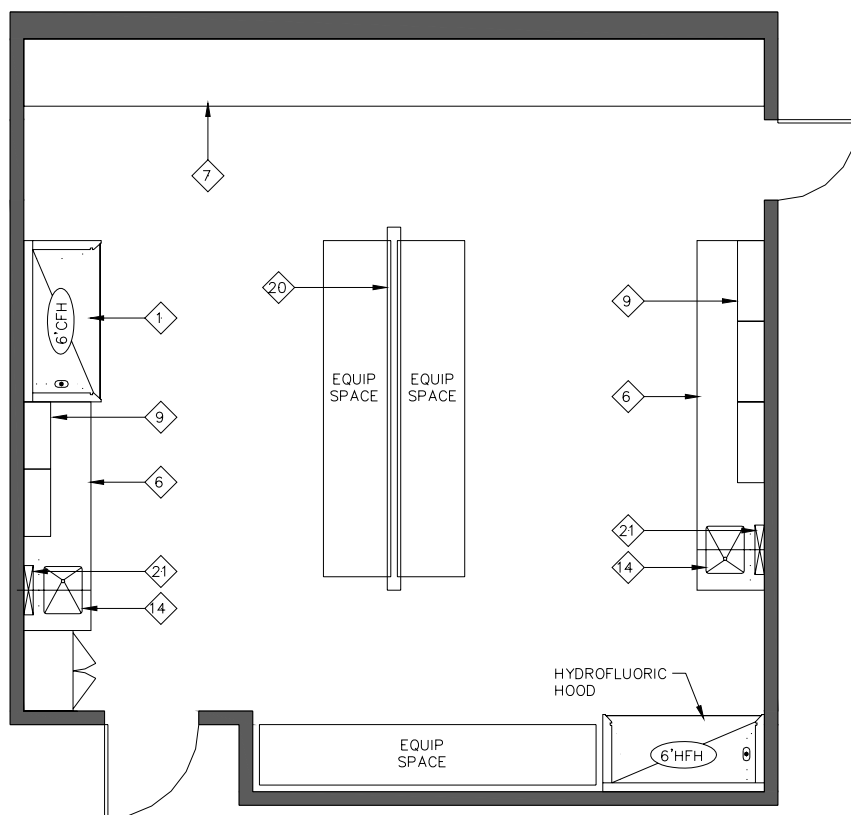
Research Facilities Design

Earth Sciences Primary Wet Hydrofluoric Research Lab

ASF	795 ASF (average)
Planned Use	Chemical, physical and biological experiments involving groundwaters, rocks, sediments and fossils
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: exposed (12'-8" slab to slab)
Doors / Windows	One (1) 3'-6" corridor door and one (1) 3'-0" secondary exit
Window Coverings	Yes (where applicable)
Mechanical	<ul style="list-style-type: none"> • 74°F (cooling) and 68°F (heating) • Fume hood(s) to operate at 100 FPM face velocity w/ sash height at 18"
Piping	Exposed
Plumbing	<ul style="list-style-type: none"> • ICW / IHW / DI / LA / LG / LV • 1 floor drain • Emergency eyewash station • 2 sinks (refer to "Casework" section)
Power	120 and 208 V, 60 amp, including outlets in center; emergency power (TBD) provided in Phase I to support lab equipment
Lighting	75 foot candles general
Communication	4-6 data lines, 2 voice lines
Casework	<ul style="list-style-type: none"> • Fixed waterproof casework on perimeter walls with 2 sinks • 36" high waterproof benches in center, along walls • Epoxy countertops
Group 1 Equipment	<ul style="list-style-type: none"> • One (1) 6'-0" fume hood within four (4) laboratories • One (1) 6'-0" hydrofluoric fume hood within four (4) laboratories (NIC)
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	Specialty ducting and systems are required to support hydrofluoric acid fume hoods. The planned Phase I building systems upgrades will provide adequate capacity and infrastructure to support the installation of the specified fume hoods as well as the installation of a laminar-flow fume hood (NIC) within the lab in the future.

Earth Sciences Primary Wet Hydrofluoric Research Lab

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

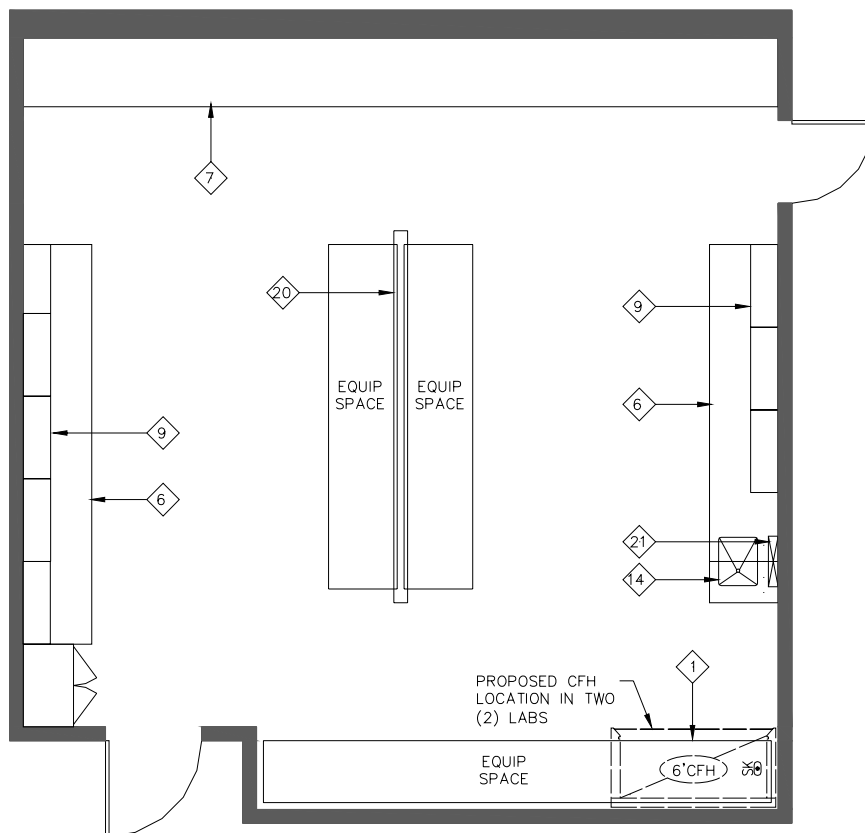
Research Facilities Design

Earth Sciences Primary Dry Research Lab

ASF	830 ASF (average)
Planned Use	Computational modeling and simulation; map digitizing, plotting macroscopic and microscopic rock and fossil study
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: finished 9'-0" high ceiling
Doors / Windows	One (1) 3'-6" corridor door and one (1) 3'-0" secondary exit
Window Coverings	Yes (where applicable)
Mechanical	<ul style="list-style-type: none"> • 74°F (cooling) and 68°F (heating) • Fume hood(s) to operate at 100 FPM face velocity w/ sash height at 18"
Piping	<ul style="list-style-type: none"> • Exposed, 1CW • 1 sink (refer to "Casework" section)
Plumbing	Accessible in corridor
Power	120 and 208 V, 60 amp, including outlets in center with vinyl floor surface; UPS for servers; emergency power (TBD) provided in Phase I to support lab equipment
Lighting	75 foot candles general
Communication	4-6 data lines, 2 voice lines
Casework	<ul style="list-style-type: none"> • Fixed waterproof casework on perimeter walls with one sink • Center area open
Group 1 Equipment	One (1) 6'-0" chemical fume hood within two (2) of the four (4) labs
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	The planned Phase I building systems upgrades will provide adequate capacity to support the installation of the a chemical fume hood with the specified as well as the installation of a laminar-flow fume hood (NIC) within the lab in the future.

Earth Sciences Primary Dry Research Lab

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

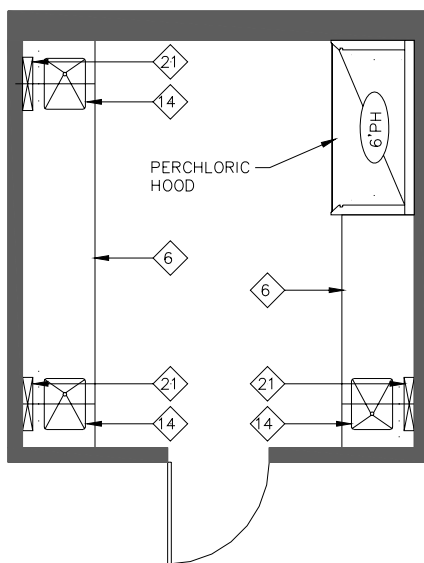
Research Facilities Design

Earth Sciences Acid Room

ASF	145 ASF
Planned Use	Chemical, Physical and biological experiments involving groundwater, rocks, sediment and fossil
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base or existing exposed concrete • Ceiling: exposed
Doors / Windows	One (1) 3'-6" door
Window Coverings	NA
Mechanical	<ul style="list-style-type: none"> • 74°F (cooling) and 68°F (heating) • Perchloric acid fume hood to operate at 100 FPM face velocity w/ sash height at 18"
Piping	Exposed
Plumbing	<ul style="list-style-type: none"> • ICW / IHW / DI / LA / LG / LV • 1 floor drain • 3 sinks (refer to "Casework" section)
Power	120 and 208 V, 60 amp; emergency power (TBD) provided in Phase I to support lab equipment
Lighting	75 foot candles general
Communication	4 data lines, 2 voice lines
Casework	<ul style="list-style-type: none"> • Fixed waterproof casework on perimeter walls with 3 sinks • 36" high waterproof benches along walls
Group 1 Equipment	One (1) 6'-0" perchloric fume hood (NIC)
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	Specialty ducting and systems are required to support the perchloric acid fume hood (NIC).

Earth Sciences Acid Room

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

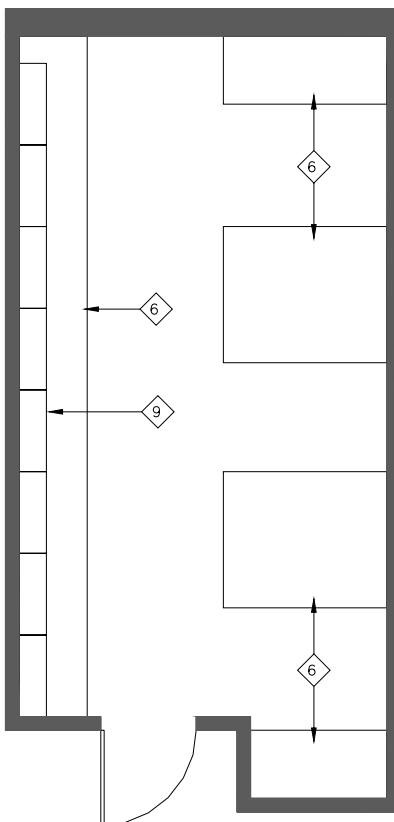
Research Facilities Design

Earth Sciences Digital Mapping Lab

ASF	400 ASF
Planned Use	Computational modeling and simulations; map digitalizing, plotting macroscopic and microscopic rock and fossil study
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: finished 9'-0" high ceiling
Doors / Windows	One (1) 3'-6" corridor door
Window Coverings	Yes (where applicable)
Mechanical	74°F (cooling) and 68°F (heating)
Piping	Exposed
Plumbing	Accessible in corridor
Power	120 and 208 V, including outlets in center; UPS for servers
Lighting	75 foot candles general
Communication	6-10 data lines, 2 voice lines
Casework	Fixed casework and benches on perimeter walls
Group 1 Equipment	TBD
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	TBD

Earth Sciences Digital Mapping Lab

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

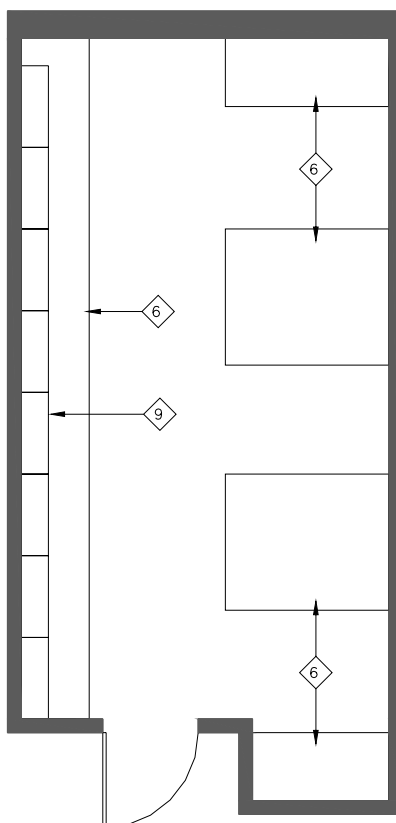
Research Facilities Design

Earth Sciences Research / Museum Collections Support

ASF	390 ASF
Planned Use	Computational modeling and simulations; map digitalizing, plotting macroscopic and microscopic rock and fossil study
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: finished 9'-0" high ceiling
Doors / Windows	One (1) 3'-6" corridor door
Window Coverings	Yes (where applicable)
Mechanical	74°F (cooling) and 68°F (heating)
Piping	Exposed
Plumbing	LA / LV
Power	120 and 208 V, 60 amp, including outlets in center, UPS for servers
Lighting	75 foot candles general
Communication	4 data lines, 2 voice lines
Casework	Fixed casework and benches on perimeter walls
Group 1 Equipment	TBD
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	TBD

Earth Sciences Research / Museum Collections Support

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

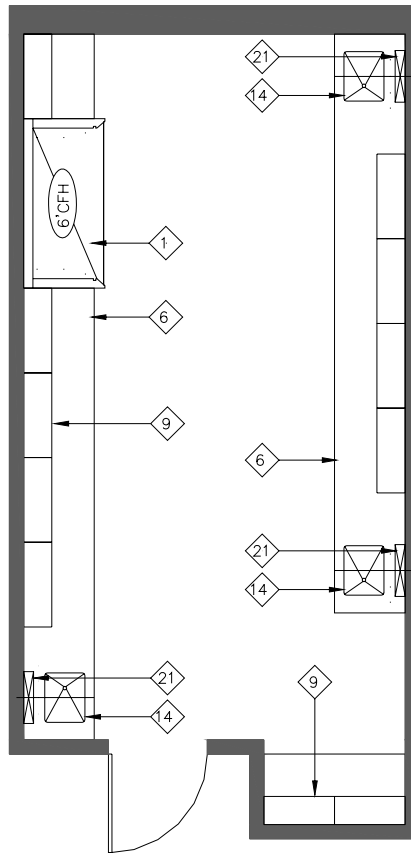
Research Facilities Design

Earth Sciences Rock Mechanics Machine Shop

ASF	380 ASF
Planned Use	Chemical, Physical and biological experiments involving groundwater, rocks, sediment and fossils
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: exposed (12'-8" slab to slab)
Doors / Windows	One (1) 3'-6" door to corridor
Window Coverings	Yes (where applicable)
Mechanical	<ul style="list-style-type: none"> • 74°F (cooling) and 68°F (heating) • Fume hood(s) to operate at 100 FPM face velocity w/ sash height at 18"
Piping	Exposed
Plumbing	<ul style="list-style-type: none"> • ICW / IHW / DI / LA / LG / LV • 1 floor drain • 3 sinks under "Casework" section below
Power	120 and 208 V, 60 amp, including outlets in center; emergency power (TBD) provided in Phase I to support lab equipment
Lighting	75 foot candles general
Communication	2 data lines, 2 voice lines
Casework	<ul style="list-style-type: none"> • Fixed waterproof casework on perimeter walls with 3 sinks • 36" high waterproof benches along walls
Group 1 Equipment	One (1) 6'-0" chemical fume hood
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	Minimal floor vibration for optical and instrumental stability. Heavy floor load support for mass spectrometers and high-pressure rock anvils.

Earth Sciences Rock Mechanics Machine Shop

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

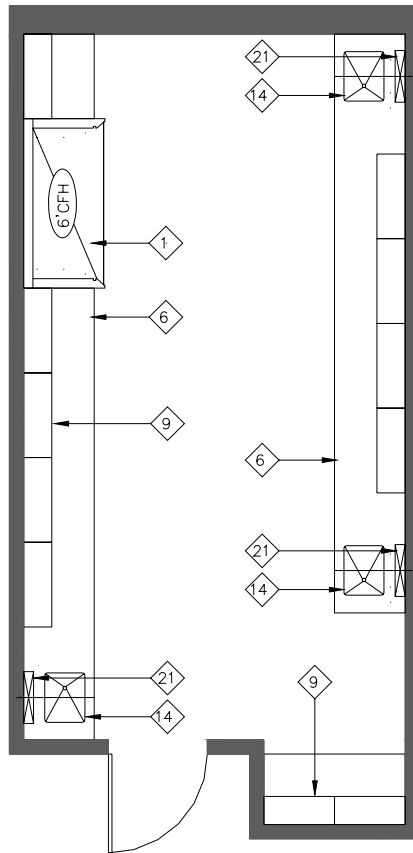
Research Facilities Design

Earth Sciences Optical Polishing Lab

ASF	370 ASF
Planned Use	Chemical, Physical and biological experiments involving groundwater, rocks, sediment and fossils
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: exposed (12'-8" slab to slab)
Doors / Windows	One (1) 3'-6" door to corridor
Window Coverings	Yes (where applicable)
Mechanical	<ul style="list-style-type: none"> • 74°F (cooling) and 68°F (heating) • Fume hood(s) to operate at 100 FPM face velocity w/ sash height at 18"
Piping	Exposed
Plumbing	<ul style="list-style-type: none"> • ICW / IHW / DI / LA / LG / LV • 1 floor drain • Emergency eyewash station • 3 sinks (refer to "Casework" section below)
Power	120 and 208 V, 60 amp, including outlets in center with vinyl floor surface; UPS for servers; emergency power (TBD) provided in Phase I to support lab equipment
Lighting	75 foot candles general
Communication	2 data lines, 2 voice lines
Casework	<ul style="list-style-type: none"> • Fixed waterproof casework on perimeter walls with 3 sinks • 36" high waterproof benches along walls
Group 1 Equipment	One (1) 6'-0" chemical fume hood
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	Minimal floor vibration for optical and instrumental stability. Heavy floor load support for mass spectrometers and high-pressure rock anvils.

Earth Sciences Optical Polishing Lab

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

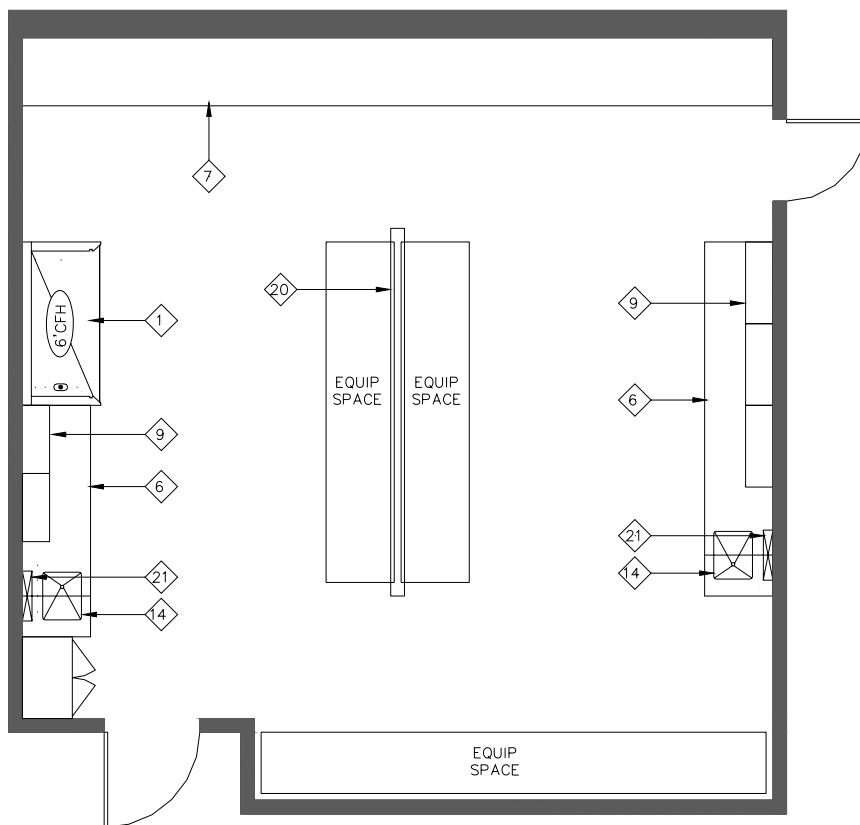
Research Facilities Design

Earth Sciences Mass Spectrometry Lab

ASF	805 ASF
Planned Use	Chemical, Physical and biological experiments involving groundwater, rocks, sediment and fossils
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: exposed (12'-8" slab to slab)
Doors / Windows	One (1) 3'-6" corridor door and one (1) 3'-0" secondary exit
Window Coverings	Yes (where applicable)
Mechanical	<ul style="list-style-type: none"> • 74°F (cooling) and 68°F (heating) • Fume hood(s) to operate at 100 FPM face velocity w/ sash height at 18"
Piping	Exposed
Plumbing	<ul style="list-style-type: none"> • ICW / IHW / DI / LA / LG / LV / Carbon Monoxide Cylinders • 1 floor drain • 2 sinks under "Casework" section below
Power	120 and 208 V, 60 amp, including outlets in center; UPS for servers; emergency power (TBD) provided in Phase I to support lab equipment
Lighting	75 foot candles general
Communication	4-6 data lines, 2 voice lines
Casework	<ul style="list-style-type: none"> • Fixed waterproof casework on perimeter walls with 2 sinks • 36" high waterproof benches along walls • Center area open with unistrut grid above
Group 1 Equipment	One (1) 6'-0" chemical fume hood
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	Minimal floor vibration for optical and instrumental stability. Heavy floor load support for mass spectrometers and high-pressure rock anvils.

Earth Sciences Mass Spectrometry Lab

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Marker Board |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

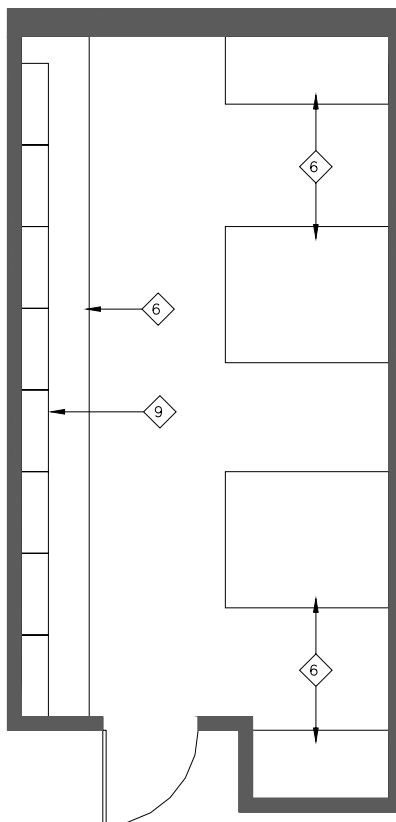
Research Facilities Design

Earth Sciences Geophysics Field Logistics Lab

ASF	350 ASF
Planned Use	Chemical, Physical and biological experiments involving groundwater, rocks, sediment and fossils
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: finished 9'-0" high ceiling
Doors / Windows	One (1) 3'-6" corridor door
Window Coverings	Yes (where applicable)
Mechanical	74°F (cooling) and 68°F (heating)
Piping	Exposed
Plumbing	LA / LV
Power	120 and 208 V, 60 amp, including outlets in center, UPS for servers
Lighting	75 foot candles general
Communication	4-6 data lines, 2 voice lines
Casework	Fixed waterproof casework on perimeter walls
Group 1 Equipment	TBD
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	TBD

Earth Sciences Geophysics Field Logistics Lab

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

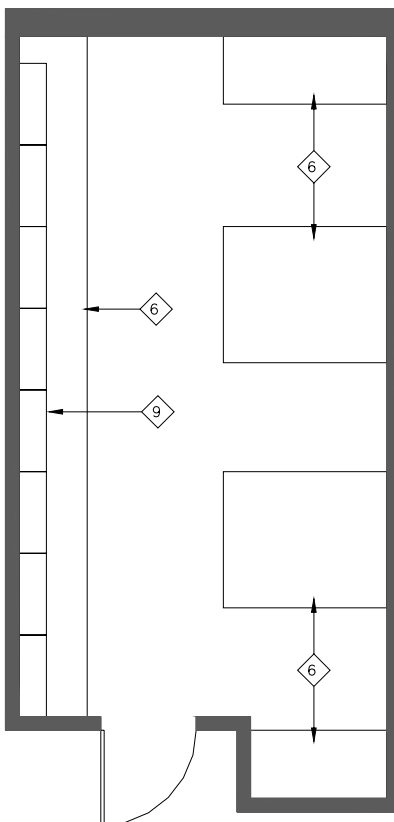
Research Facilities Design

Earth Sciences Geology Field Logistics Lab

ASF	350 ASF
Planned Use	Chemical, Physical and biological experiments involving groundwater, rocks, sediment and fossils
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: finished 9'-0" high ceiling
Doors / Windows	One (1) 3'-6" corridor door
Window Coverings	Yes (where applicable)
Mechanical	74°F (cooling) and 68°F (heating)
Piping	Exposed
Plumbing	LA / LV
Power	120 and 208 V, 60 amp, including outlets in center, UPS for servers
Lighting	75 foot candles general
Communication	4-6 data lines, 2 voice lines
Casework	Fixed waterproof casework on perimeter walls
Group 1 Equipment	TBD
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	TBD

Earth Sciences Geology Field Logistics Lab

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

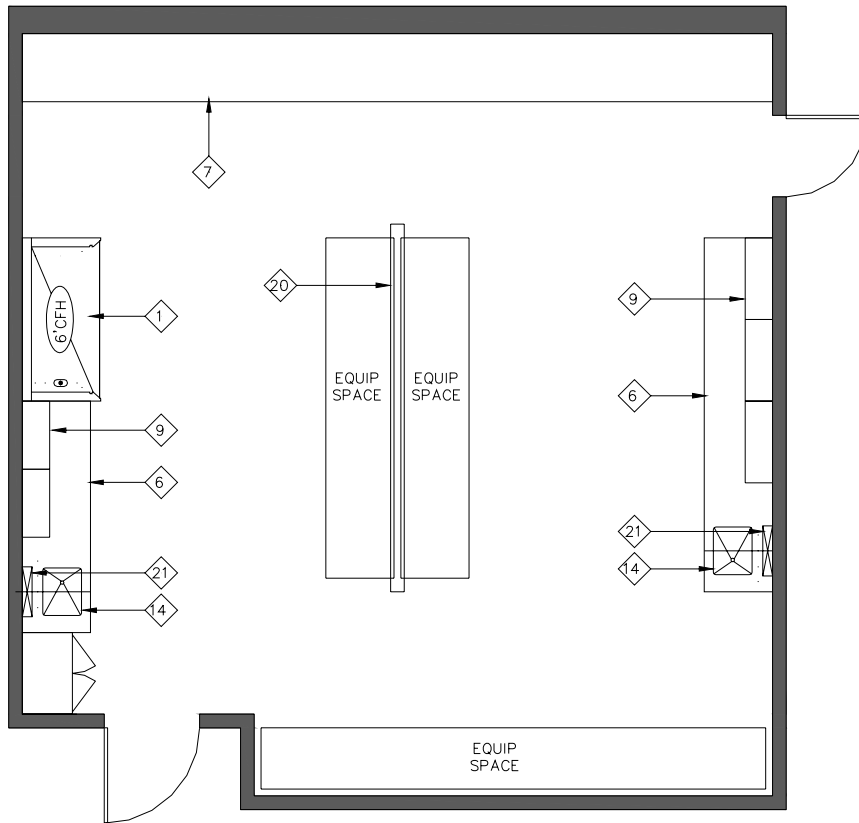
Research Facilities Design

Earth Sciences Fossil Prep Room

ASF	790 ASF
Planned Use	Chemical, Physical and biological experiments involving groundwater, rocks, sediment and fossils
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: exposed (12'-8" slab to slab)
Doors / Windows	One (1) 3'-6" corridor door and one (1) 3'-0" secondary exit
Window Coverings	Yes (where applicable)
Mechanical	<ul style="list-style-type: none"> • 74°F (cooling) and 68°F (heating) • Fume hood(s) to operate at 100 FPM face velocity w/ sash height at 18"
Piping	Exposed
Plumbing	<ul style="list-style-type: none"> • ICW / IHW / DI / LA / GA / LV • 1 floor drain • See 2 sinks under "casework" below
Power	120 and 208 V, 60 amp, including outlets in center; UPS for servers; emergency power (TBD) provided in Phase I to support lab equipment
Lighting	75 foot candles general
Communication	4-6 data lines, 2 voice lines
Casework	Fixed waterproof casework on perimeter walls with 2 sinks
Group 1 Equipment	One (1) 6'-0" chemical fume hood
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	Minimal floor vibration for optical and instrumental stability. Heavy floor load support for mass spectrometers and high-pressure rock anvils.

Earth Sciences Fossil Prep Room

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

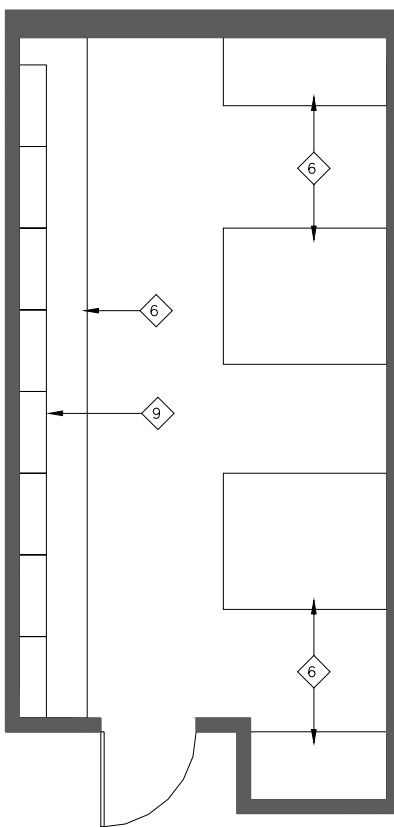
Research Facilities Design

Earth Sciences Electronic Laboratory

ASF	400 ASF
Planned Use	Chemical, Physical and biological experiments involving groundwater, rocks, sediment and fossils
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: VCT with cove base • Ceiling: finished 9'-0" high ceiling
Doors / Windows	One (1) 3'-6" corridor door
Window Coverings	Yes (where applicable)
Mechanical	74°F (cooling) and 68°F (heating)
Piping	Exposed
Power	120 and 208 V, 60 amp, including outlets in center, UPS for servers
Lighting	75 foot candles general
Communication	4 data lines, 2 voice lines
Casework	Fixed waterproof casework on perimeter walls
Group 1 Equipment	TBD
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	TBD

Earth Sciences Electronic Laboratory

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

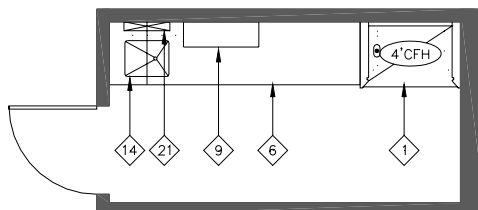
Research Facilities Design

Earth Sciences Darkroom

ASF	100 ASF
Planned Use	Chemical, physical and biological experiments involving groundwater, rocks, sediment and fossils
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: exposed (12'-8" slab to slab)
Doors / Windows	One (1) 3'-6" corridor door
Window Coverings	Yes (where applicable)
Mechanical	<ul style="list-style-type: none"> • 74°F (cooling) and 68°F (heating) • Fume hood(s) to operate at 100 FPM face velocity w/ sash height at 18"
Piping	Exposed
Plumbing	<ul style="list-style-type: none"> • ICW / IHW / DI / LA / LG / LV • Emergency eye wash station • 1 floor drain • 1 sink (refer to "Casework" section below)
Power	120 and 208 V, 60 amp, including outlets in center; emergency power (TBD) provided in Phase I to support lab equipment
Lighting	75 foot candles general; Safelight on separate switch
Communication	2 data lines, 2 voice lines
Casework	<ul style="list-style-type: none"> • Fixed waterproof casework on perimeter walls with 1 sink • 36" high waterproof benches along walls
Group 1 Equipment	One (1) 4'-0" chemical fume hood
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	TBD

Earth Sciences Darkroom

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
| 8. Wall Cabinet | 20. Overhead Service Center | 32. Balance Table |
| 9. Adjustable Wall Shelves | 21. Pipe Drop Enclosure | 33. Writing Table |
| 10. Island Bench Shelves | 22. Movable Demonstration Bench | 34. A/V Screen |
| 11. Tall Storage Cabinet | 23. Glassware Washer | 35. Multi-media Projector (Ceiling Mount) |
| 12. Vented Flammable Storage Cabinet | 24. Metro Shelving | 36. Lattice Rod |

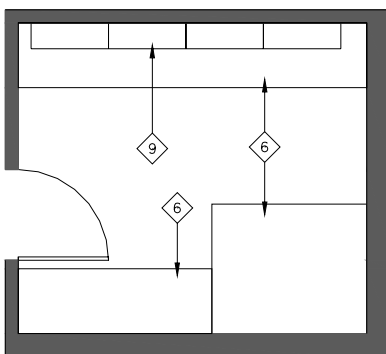
Research Facilities Design

Earth Sciences Aerial Photo Room

ASF	165 ASF
Planned Use	Computational modeling and simulations; map digitalizing, plotting macroscopic and microscopic rock and fossil study
Security	Keyed lockable door. Department to provide keypad security system. Box & conduit to be provided. Contractors to salvage existing devices for reinstallation.
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: sheet vinyl with top set base • Ceiling: finished 9'-0" high ceiling
Doors / Windows	One (1) 3'-6" corridor door
Window Coverings	Yes (where applicable)
Mechanical	74°F (cooling) and 68°F (heating)
Piping	Exposed
Plumbing	LA / LV
Power	120 and 208 V, 60 amp, including outlets in center, UPS for servers
Lighting	75 foot candles general
Communication	4 data lines, 2 voice lines
Casework	Fixed casework and benches on perimeter walls
Group 1 Equipment	TBD
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	TBD

Earth Sciences Aerial Photo Room

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



Furnishings

- | | | |
|--------------------------------------|---------------------------------|---|
| 1. Chemical Fume Hood | 13. Glove Box | 25. Autoclave |
| 2. Biological Safety Cabinet | 14. Laboratory Sink | 26. Movable Laboratory Table |
| 3. Radioisotope | 15. Cupsink | 27. Wire Shelving |
| 4. Vented Workstation | 16. Processing Sink | 28. White Markerboard |
| 5. Snorkel Exhaust | 17. Cylinder Rack | 29. Black Chalkboard |
| 6. Laboratory Bench, Standing Height | 18. Distillation Rack | 30. Drying Rack |
| 7. Laboratory Bench, Sitting Height | 19. Safety Shower/Eyewash | 31. Water Purifier |
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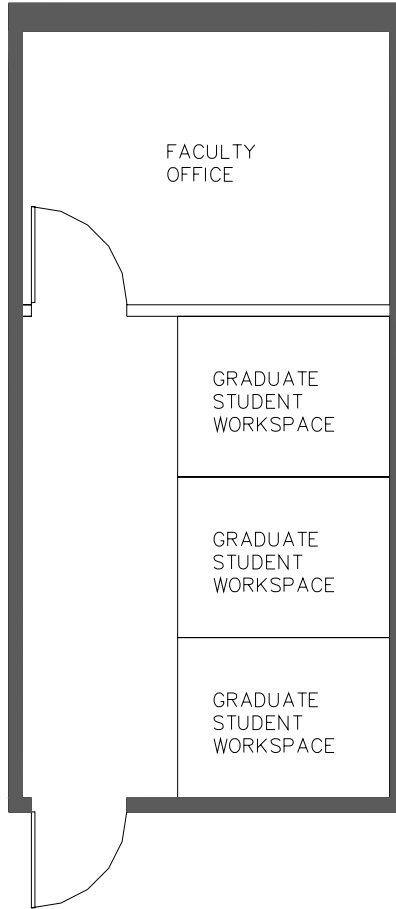
Research Facilities Design

Earth Sciences Faculty, Post Doctorate & Graduate Student Office Suite – 1 Office Suite

ASF	410 ASF (average)
Planned Use	Desk-based research and academic work
Security	Keyed lockable corridor door
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: Carpet with cove base • Ceiling: finished 9'-0" high ceiling
Doors / Windows	One (1) 3'-6" corridor door
Window Coverings	Yes (where applicable)
Mechanical	74°F (cooling) and 68°F (heating)
Piping	NA
Plumbing	NA
Power	120 V
Lighting	65 foot candles general; 100 foot candles task
Communication	1 data line, 1 voice line per faculty office, post doc workspace and graduate student workspace
Casework	TBD
Group 1 Equipment	TBD
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	Faculty offices must be zoned independently; install thermostat in each office.

Earth Sciences Faculty, Post Doctorate & Graduate Student Office Suite – 1 Office Suite

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.

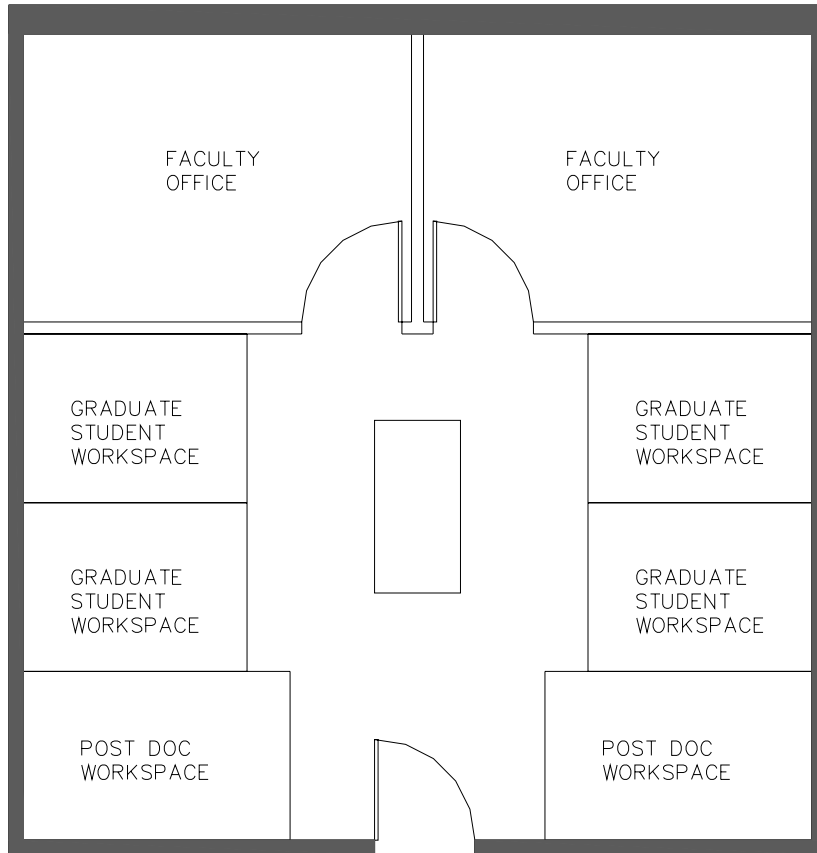


Earth Sciences Faculty, Post Doctorate & Graduate Student Office Suite – 2 Office Suite

ASF	795 ASF (average)
Planned Use	Desk-based research and academic work
Security	Keyed lockable corridor door
Finishes	<ul style="list-style-type: none"> • Wall: new and existing gypsum board • Floor: Carpet with cove base • Ceiling: finished 9'-0" high ceiling
Doors / Windows	One (1) 3'-6" corridor door
Window Coverings	Yes (where applicable)
Mechanical	74°F (cooling) and 68°F (heating)
Piping	NA
Plumbing	NA
Power	120 V
Lighting	65 foot candles general; 100 foot candles task
Communication	1 data line, 1 voice line per faculty office, post doc workspace and graduate student workspace
Casework	TBD
Group 1 Equipment	TBD
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	Faculty offices must be zoned independently; install thermostat in each office.

Earth Sciences Faculty, Post Doctorate & Graduate Student Office Suite – 2 Modules

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.

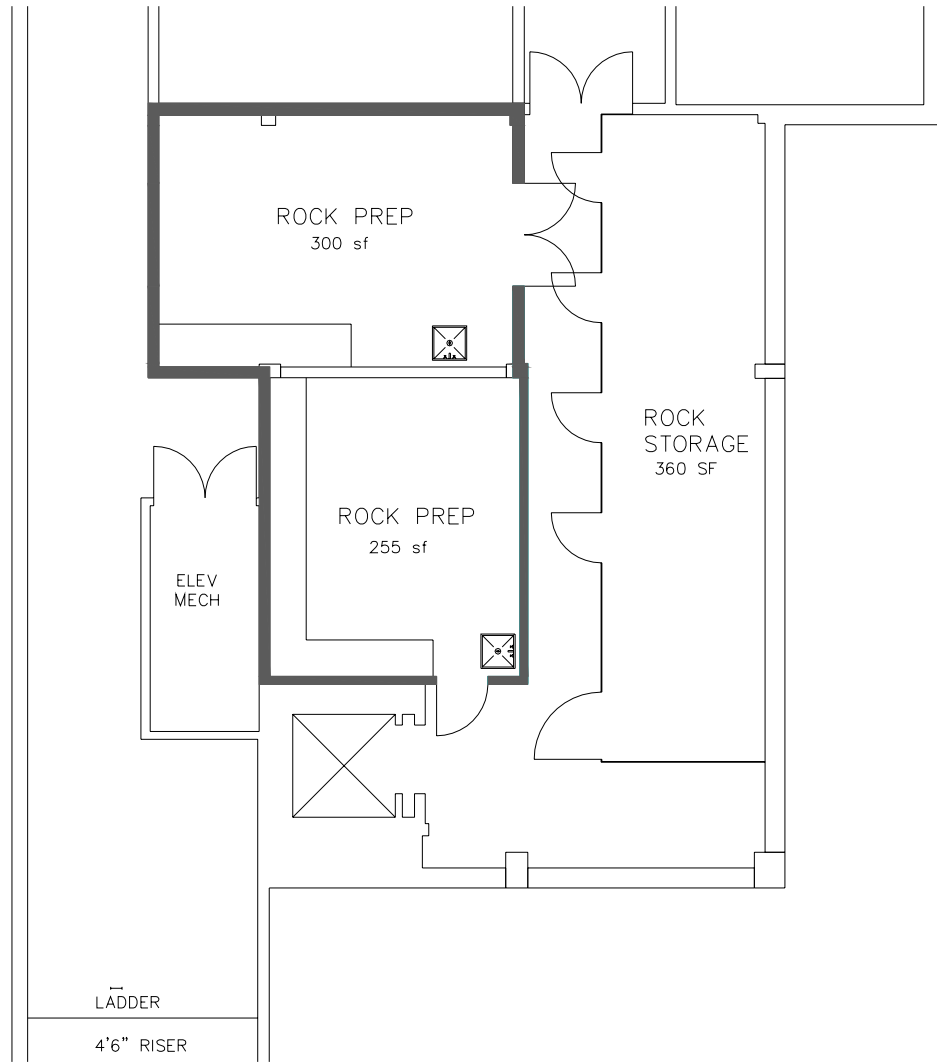


Earth Sciences Rock Prep and Storage

ASF	915 ASF (existing space within ground floor center wing)
Planned Use	Chemical, physical and biological experiments involving groundwater, rocks, sediment and fossils
Security	Existing keyed lockable door
Finishes	<ul style="list-style-type: none"> • Wall: existing • Floor: existing concrete floor • Ceiling: exposed (12'-8" slab to slab)
Doors / Windows	Existing
Window Coverings	NA
Mechanical	74°F (cooling) and 68°F (heating)
Piping	Existing
Plumbing	Existing
Power	Existing
Lighting	Existing
Communication	Existing
Casework	Existing
Group 1 Equipment	Existing
Group 2 Equipment	TBD
Furnishings	TBD
Special Needs	TBD

Earth Sciences Rock Prep and Storage

This diagram is the existing layout of the Rock Prep and Storage facility within the Geology Building Basement.



Phase 4A

- First-floor south wing

The areas identified in Phase 1A and 2A of the Architectural Renewal phasing plan are included in Phase I of the Geology Building Renovation Project. The areas included in Phase 3A and 4A correspond with Phase II of the project. Further phasing detail related to the Phase II areas will be developed during the Design Development phase of the project.

8.0 Statement of Probable Cost

Cumming LLC has prepared the following Statement of Probable Cost.



**University of California, Riverside
Geology Building Renovations - Phase II
Riverside, CA**

Amended DPP Statement of Probable Cost
April 29, 2005
CLLC Project No. 04-547.01
UCR Project # 950461

INTRODUCTION

1. Basis Of Estimate

This statement is based on "Program plans" drawing package received 3-14-05 as prepared by WWCOT Architects.

- A Architectural drawings: Geology Ground Floor and First Floor plans
- B Preliminary DPP Draft Document as prepared by WWCOT.
- C Cost Estimate per Lab consultants, RFD dated 3-18-05.

The information listed above is considered schematic design level for estimating purposes.

2. Items Not Included Within Estimate

The following cost items are excluded from this estimate.

- A Professional fees, inspections and testing.
- B Escalation beyond Beginning of Construction, (8-2007)
- C Plan check fees and building permit fees.
- D Furnishings, fixtures and equipment (FF&E), except built-in cabinets, counters and other casework indicated.
- E Major site and building structures demolition unless noted in body of estimate.
- F Costs of hazardous material surveys, abatements, and disposals unless noted in estimate.
- G Costs of offsite construction unless noted in estimate.
- H Construction contingency costs.
- I Relocation of lab equipment, moving of furniture, computers, shelving. (by UCR)
- J HVAC or ceiling work in corridors, work done under Phase 1.
- K Phasing of the work

3. Notes

We recommend that the client review this statement, and that any interpretations contrary to those intended by the design documents be fully addressed. The statement is based upon a detailed measurement of quantities, when possible, and reasonable allowances for items not clearly defined in the documents.

The statement reflects probable construction costs obtainable in a competitive and stable bidding market. This estimate is based upon a minimum of four competitive bids from qualified general contractors, with bids from a minimum of three (3) subcontractors per trade. This statement is a determination of fair market value for the construction of the project and is not intended to be a prediction of low bid. Experience indicates that a fewer number of bidders may result in a higher bid amount, and more bidders may result in a lower bid result.

market value for the construction of the project and is not intended to be a prediction of low bid. Experience indicates that a fewer number of bidders may result in a higher bid amount, and more bidders may result in a lower bid result.

In accordance with Saylor Associates' analyses, they determined that the number of competitive bids obtained had the following effect:

1 bidder	add	15% to 40%
2 to 3 bids	add	8% to 12%
4 to 5 bids		-4% to +4%
7 to 8 bids	deduct	5% to 7%

INTRODUCTION

4. Scope of Estimate

The existing Geology Building consists of a 2-story building with a ground floor and sub-basement level totaling approximately 97,728 GSF.

All seismic corrections and infrastructure upgrades will have been accomplished under Phase I of the project.

Horizontal Structure

an allowance for floor or penetration reinforcement is assumed

Roofing and Waterproofing

Caulking and sealing of penetration.

Interior Partitions, Doors and Glazing

Assume metal studs with 5/8' drywall at ordinary areas, type X at all fire rated areas and shaft wall where necessary. Batt insulation is included for sound attenuation.

Assumed wood or hollow metal doors in metal frames with institutional grade finished hardware (fire rated where required).

Floors, Wall and Ceiling Finishes

Floor materials are: VCT with rubber base in offices, storage rooms and circulation areas, sheet vinyl with integral covered base in wet labs. Exposed concrete floors shall be sealed

Offices shall receive acoustic tile ceilings while wet lab space utilizes painted exposed structure .

All walls shall receive paint finish.

Function Equipment and Specialties

Functional equipment includes wall and corner guards, bulletin boards, marker boards, projection screens, signage and fire extinguishers and cabinets. Casework includes non-lab countertops, allowances for miscellaneous shelving and millwork and trim.

Lab Casework and Equipment - includes base cabinets, bench shelving, tall storage cabinets, epoxy resin countertops and appropriate sink units.

Fume hoods - chemical hoods are provided. Hydrophloric and perchloric hoods are alternates.

Window coverings are assumed at all glazed openings except at public areas.

Mechanical and Electrical

Plumbing

Building plumbing including waste and vent piping, roof drainage, water, sewer, gas, condensate, and sinks.

Laboratory plumbing - waste and vent, domestic and industrial water, deionized water, gas, air, vacuum and all special gases.

HVAC

Chilled and heated water are from central plant. HVAC systems incorporate all piping and air distribution, air handling units, exhaust for labs and general spaces, VAV /fancoil units, and controls systems.

Electrical

Standard building and Emergency power.

Lighting, an allowance is provided for building lighting.

Convenience and equipment power connections

INTRODUCTION

Phone/data including conduit cat 6 and fiber optic cabling.

Lighting controls - occupancy sensors at all rooms, all lighting controlled by lighting control system is provided by allowance.

Fire alarm system - included and connected to University Campus system.

Fire Protection

Wet pipe system including tie-in to existing system.

Site Preparation and Demolition

This section includes selective building component demolition, HVAC , plumbing and electrical demolition.

Hazardous materials abatement is included as an allowance.

CONSTRUCTION COST SUMMARY

Element	Area	Cost / SF	Total
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Base Estimate

A Geology Building Renovations, Phase II	43,430 GSF	\$151.62	\$6,584,962
(Partial Ground floor and partial First floor)			

TOTAL ESTIMATED CONSTRUCTION COST (CCCI 4100)	<u>\$6,584,962</u>
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Allowance for Rising Costs at 5.0% per Annum to BOC	12.1%	\$796,780
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TOTAL ESTIMATED CONSTRUCTION COST (August 2007)	<u>\$7,381,743</u>
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Alternates

Fume Hoods, Hydrofluoric acid, including fans, controls and associated ductwork	\$152,616
Fume Hoods, Perchloric acid, per hood, including fans, controls and associated ductwork	\$77,021

Geology Building Renovations, Phase II

University of California, Riverside
Geology Building Renovations, Phase II
Schedule of Areas & Control Quantities
Amended DPP Statement of Probable Cost

04/29/05

Schedule of Areas	SF	SF
Enclosed Areas		
Sub-Basement		
Ground Floor	20,000	
First Floor	23,430	
Second Floor		
Subtotal, Enclosed Areas		<u>43,430</u>
Unenclosed Areas		
First Floor		
Second Floor		
Third Floor		
Subtotal, Unenclosed Areas		
Unenclosed Areas @ 50%		<u> </u>
Total Gross Floor Area		<u>43,430</u>

Geology Building Renovations, Phase II Construction Cost Summary

Element	Subtotal	Total	Cost / SF	Cost / SF
A) Shell (1-5)		\$12,868		\$0.30
1 Foundations				
2 Vertical Structure				
3 Floor & Roof Structures	\$6,434		\$0.15	
4 Exterior Cladding				
5 Roofing and Waterproofing	\$6,434		\$0.15	
B) Interiors (6-7)		\$898,903		\$20.70
6 Interior Partitions, Doors and Glazing	\$497,966		\$11.47	
7 Floor, Wall and Ceiling Finishes	\$400,937		\$9.23	
C) Equipment and Vertical Transportation (8-9)		\$800,355		\$18.43
8 Function Equipment and Specialties	\$800,355		\$18.43	
9 Stairs and Vertical Transportation				
D) Mechanical and Electrical (10-13)		\$2,434,399		\$56.05
10 Plumbing Systems	\$529,864		\$12.20	
11 HVAC	\$921,132		\$21.21	
12 Electrical Lighting, Power and Communications	\$867,597		\$19.98	
13 Fire Protection Systems	\$115,806		\$2.67	
E) Site Construction (14-16)		\$525,623		\$12.10
14 Site Preparation and Demolition	\$525,623		\$12.10	
Subtotal		\$4,672,148		\$107.58
Gen'l Cond, Bonds and Insurance	12.0%	\$560,658		\$12.91
Subtotal		\$5,232,805		\$120.49
General Contractor's Fee	4.0%	\$209,312		\$4.82
Subtotal		\$5,442,118		\$125.31
Design Contingency	10.0%	\$544,212		\$12.53
Subtotal		\$5,986,329		\$137.84
Phasing/Overtime	10.0%	\$598,633		\$13.78
TOTAL ESTIMATED CONSTRUCTION COST (CCCI 4100)		<u>\$6,584,962</u>		\$151.62
Allowance for Rising Costs at 5.0% per Annum to BOC	12.1%	\$796,780		
TOTAL ESTIMATED CONSTRUCTION COST (August 2007)		<u>\$7,381,743</u>		\$169.97

Total Area: 43,430 SF

Geology Building Renovations, Phase II Detail Elements

Element	Quantity	Unit	Unit Cost	Total
3 Floor & Roof Structures				
Misc. metals, allowance	25,107	sf	\$0.26	<u>\$6,434</u>
Total - 3 Floor & Roof Structures				<u>\$6,434</u>
5 Roofing and Waterproofing				
Caulking & sealants	25,107	sf	\$0.26	<u>\$6,434</u>
Total - 5 Roofing and Waterproofing				<u>\$6,434</u>
6 Interior Partitions, Doors and Glazing				
Interior partitioning Interior gypboard partitions, based on asf	25,107	sf	\$15.22	\$382,160
Doors & Frames Doors in renovated areas, based on asf	25,107	sf	\$4.61	<u>\$115,806</u>
Total - 6 Interior Partitions, Doors and Glazing				<u>\$497,966</u>
7 Floor, Wall and Ceiling Finishes				
Floor wall & ceiling finishes Finishes in renovated areas, labs, based on asf	12,085	sf	\$12.30	\$148,646
Finishes in renovated areas, office and support, based on asf	13,022	sf	\$16.40	\$213,561
Corridor flooring	7,557	sf	\$5.13	<u>\$38,730</u>
Total - 7 Floor, Wall and Ceiling Finishes				<u>\$400,937</u>
8 Function Equipment and Specialties				
Lab Casework & Equipment				
Lab Casework				
Base cabinets, sitting height	1,271	lf	\$123.00	\$156,333
Upper bench shelving/cabinets	176	lf	\$153.75	\$27,060
Wall Shelving	466	lf	\$102.50	\$47,765
Tall cabinets	56	ea	\$768.75	\$43,050
Umbilicals	18	ea	\$563.75	\$10,148
Drying racks, allow	18	ea	\$461.25	\$8,303
Misc. equipment supports, based on asf	25,107	sf	\$1.03	\$25,735
Countertops & special sinks Epoxy resin tops	1,271	lf	\$169.13	\$214,958
Sinks				
Sinks, epoxy/stainless	50	ea	\$461.25	\$23,063
Cup Sinks	15	ea	\$153.75	\$2,306
Misc. equipment, gas cocks & other lab hardware	1	ls		

Geology Building Renovations, Phase II Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Eyewash/Shower wash	18	ea	\$922.50	\$16,605
Lab equipment				
Fume Hoods, See Summary for Alternates				
Fume Hoods - 6'-0"	15	ea	\$9,430.00	\$141,450
Fume Hoods - 6'-0" , hydrofluoric acid, see summary				
Fume Hoods - 6'-0" , perchloric acid, see summary				
Furnishings and equipment				
Admin area casework & specialties, based on asf	13,022	sf	\$3.59	\$46,716
Building specialties				
Misc. building specialties, based on asf	25,107	sf	\$1.03	\$25,735
Signage				
Signage allowance	43,430	sf	\$0.26	<u>\$11,129</u>
Total - 8 Function Equipment and Specialties				<u>\$800,355</u>
10 Plumbing Systems				
Laboratory Plumbing				
Waste & vent, lab gases, etc., based on asf	12,085	sf	\$32.80	\$396,388
Office and Support Area Plumbing				
Waste & vent, misc. plumbing, based on asf	13,022	sf	\$10.25	<u>\$133,476</u>
Total - 10 Plumbing Systems				<u>\$529,864</u>
11 HVAC				
Laboratory HVAC				
Ductwork, grilles, registers, piping, test & balance, controls, based on asf	12,085	sf	\$48.61	\$587,444
Admin HVAC				
Ductwork, grilles, registers, piping, test & balance, controls, based on asf	13,022	sf	\$25.63	\$333,689
Total - 11 HVAC				<u>\$921,132</u>
12 Electrical Lighting, Power and Communications				
Power, Lighting and Communication				
Electrical systems, Emergency power, convenience power, lighting, cable trays & raceways, telephone & data including jacks, wiring and conduit, based on asf	25,107	sf	\$32.71	\$821,275
Fire Alarm				
Fire Alarm system & related work & devices	25,107	sf	\$1.74	\$43,749
Miscellaneous				

Geology Building Renovations, Phase II Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Core drilling, 3M firestopping	25,107	sf	\$0.10	<u>\$2,573</u>
Total - 12 Electrical Lighting, Power and Communications				<u>\$867,597</u>
13 Fire Protection Systems				
Fire protection work				
Fire sprinklers, based on asf	25,107	sf	\$4.61	<u>\$115,806</u>
Total - 13 Fire Protection Systems				<u>\$115,806</u>
14 Site Preparation and Demolition				
Demolition				
HVAC & plumbing demolition, based on asf	25,107	sf	\$1.54	\$38,602
Electrical demolition, based on asf	25,107	sf	\$1.03	\$25,735
General demolition, architectural, based on asf	25,107	sf	\$4.10	\$102,939
Hazardous materials abatement				
Abatement work, including corridors	1	ls	\$306,877.83	\$306,878
General requirements				
Temporary partitioning and other temporary work, based on asf	25,107	sf	\$2.05	\$51,469
Total - 14 Site Preparation and Demolition				<u>\$525,623</u>