University of California Riverside Boyce & Webber Hall Renovations

Detailed Project Program
Project No. 950462
July 2005

CHONG | **PARTNERS** ARCHITECTURE

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executive summary

CHAPTER 1

1.0 Executive Summary

The Detailed Project Program (DPP) for the Boyce/Webber Hall Renovation Project represents the cumulative results of review of previous studies, analysis of existing conditions and various focus groups meetings and workshops with the facility and other share holders. It is the synthesis of all this information to delineate the highest and best use of both Boyce and Webber Hall facilities. This DPP defines the goals, objectives and constraints of the project in sufficient detail to identify the project scope and confirm the construction budget.

The proposed project is to renovate the 118,832 gross square foot (GSF) Boyce Hall and the 48,565 (GSF) Webber Hall to provide two laboratory buildings as a critical component of a multi-phased plan that includes major renovations of existing campus science buildings and new construction. As proposed the project will target building infrastructure systems and code deficiencies in both buildings, and modernization of instructional and research space in support of campus life sciences programs, including biological and agricultural programs within the College of Natural and Agricultural Sciences (CNAS).

Enrollment growth at UCR has been massive over the last six years, increasing by over 88%, from 8,200 student FTE in 1997-98 to 15,408 student FTE in 2003-04. The magnitude of this rapid growth has created severe pressures on the adequacy and availability of space in the campus. With significant enrollment growth expected to continue through 2010-11 the need to renovate outdated facilities to better serve the campus' growing teaching and research needs will only increase. The age, condition, and physical characteristics of most of the existing science buildings have created a difficult environment in which to meet the needs of students and faculty.

CNAS in particular faces several challenges related to rapid enrollment growth including aging science facilities, and the development of existing and new programs. For example, the need to accommodate more computational equipment and larger student/faculty research groups is hampered by the conditions of many laboratory facilities within CNAS.

Outmoded mechanical and electrical systems, inefficient and deteriorating laboratory environments, and overall systems degradation are among the factors limiting CNAS' instructional and research programs. Today's research laboratories are bringing people and technology together in ways that were not envisioned thirty and forty years ago when most of the CNAS buildings were built. These buildings were designed during an era when science was less collaborative and independent research groups made up the composition of research laboratory buildings. However, the interdisciplinary nature of teaching and research today requires a different approach to science laboratory and their related utility distribution systems. It requires buildings that engender collaboration and the ability to change as the technological tools used for instruction and scientific explorations change. The Boyce Hall/Webber Hall renovation project is founded on these principles and will employee a comprehensive modernization strategy of the two building to extend there useful life as teaching and research facilities for UCR.

Presently, Boyce Hall built in 1974 and Webber Hall built in 1953 house the following programs in the life sciences, Biochemistry, Plant Pathology, Biomedical Science, Cell Biology and Neuroscience, Nematology, Entomology and campus Vivaria facilities. To better support the needs of these programs, the Boyce/Webber Hall Renovation project is included in an aggressive multi-phased capital improvement program that consist of both new construction and renovation. For instance, the occupancy of the new State funded Biological Science Building (currently under construction) and new State funded Genomics Building (currently in the planning phase) will create opportunities within Boyce Hall and Webber Hall to undertake a phased renovation in each building. The proposed project will renovate the two buildings in a practical (cost effective) manner addressing the critical needs of the highest and best use strategies identified for each building. Webber Hall's highest and best use strategies, includes down grading parts of the building from a utility intensive (wet) research building to more office, classroom, and computation type space use. Boyce Hall will continue to support a medium level of utility intensive instructional and research needs, and Vivaria facilities in support of programs in the life sciences.

The programmatic Objectives of the Boyce Hall/Webber Hall Renovation project will result in the following:

- To renew and upgrade Boyce Hall and Webber Hall's building systems to support each buildings future intended use. The renovations will addressing all of the key infrastructure problems for each building including Heating Ventilation and Air Conditioning (HVAC), electrical distribution, fire protection, hazardous materials abatement, piped services, and functional equipment.

- To provide the campus with modernized instructional and research facilities in support of programs in the life sciences. The renovation of Boyce Hall and Webber Hall will update academic offices, administrative and related support areas, research laboratories, and research support space.

- To upgrade outmoded and unsafe Biological Safety Level 2 laboratories in Boyce Hall and Webber Hall with new, efficiently configured instructional and research space. Existing laboratory space on the third floor of Webber Hall and on the fourth and fifth floors of Boyce will be reconfigured and serviced to meet current building and life safety codes.

The proposed project schedule is to develop design and construction documentation during the 2006-07 and 2007-08 fiscal years with the initial construction start scheduled for October 2008. Since the facilities will remain largely occupied during renovation the construction and occupancy sequence will be as outlined in section 6.0 refined on the basis of the College Master Planning Department Space Allocation Studies currently in progress.

The DPP construction budget estimate is $25.4 mil plus an alternate for the Vivarium infrastructure renovation of $0.9 mil. Assuming construction cost at 80% of the total would require a total project budget of $31.75 mil excluding the Vivarium renovation or $32.65 mil with the Vivarium.

project background

CHAPTER 2

2.0 General Background

Boyce Hall and Webber Hall are at the head of the Carillon Mall at its eastern end and houses several departments associated with the College of Natural and Agricultural Sciences (CNAS) as well as laboratories for the Division of Biomedical Sciences (DBS). As such, they are among the most, if not the most, visible buildings occupied by CNAS and DBS. Both units place significant emphasis on laboratory instruction. The capability to have students connect theories learned in the classroom with hands on experience in the laboratory is considered pivotal in the learning process.

Boyce Hall contains 125,095 OGSF / 65,141 ASF of research and office space. It was first occupied in 1974. This facility provides support to multi disciplinary research groups in the areas of Biomedical Sciences, Biochemistry, Cell Biology and Neurosciences, Plant Pathology, Nematology and Entomology. Webber Hall contains 50,015 GSF / 27,346 ASF. It was first occupied in 1953. This facility support Biomedical Sciences, Nematology and Plant Pathology.

Webber Hall viewed from the Carillon Mall

2.1 Basis of DPP

Due to growth within programs over the past several years, CNAS had to accommodate some researchers outside their home departments. This created problems in developing synergies necessary to foster cohesive research programs. Upon completion of the Biological Sciences building in 2005, 13,000 assignable square feet (ASF) will become available in Boyce Hall. At that time, the Cell Biology and Neuroscience, and Entomology Departments will vacate Boyce Hall and Webber Hall. This provides an opportunity to substantially rezone and upgrade both Boyce and Webber to support programmatic needs. It is anticipated that secondary and tertiary ripples will be necessary to accommodate these needs.

In addition to the programmatic needs, both Boyce Hall and Webber Hall have significant issues with the existing building infrastructure including mechanical, electrical, plumbing and architectural systems, which are summarized in sections 2.2.1 & 2.2.2, and indicated in detail in the appendix of this DPP. Additionally both facilities have deteriorating laboratory conditions. With the exception of a few areas that have been remodeled, both buildings are in need of laboratory upgrade and renovation.

On the basis of these issues, UCR proposed the Boyce Hall and Webber Hall Renovation Project. The total proposed budget for the project is $33.5 million. Although the funds earmarked for construction in the CIP are $33.5 million, we will budget $27.6 million or 82% of the total allocated funds.

2.2 Building Evaluation Summary

Architectural Evaluation Summary

From an architectural perspective, both buildings have served the university well, but show significant signs of wear in their architectural finish systems (i.e.: worn out flooring, wall paints and coverings, and ceilings). Relative to code requirements by today's standards, observations were as follows for both buildings:

Observed Accessibility Issues:

- Path of travel issues:
  - Handrails in Stairways non-compliant configuration
  - Elevator Controls not at accessible height/layout
  - Building Signage non-compliant
  - Clearance requirements not provided at many doorways
- Building accessory items:
  - Toilets not compliant for space or accessory provisions
  - Drinking Fountains non-compliant
  - Telephone non-compliant
  - Door handles are knobs; not lever type
- Internal spaces:
  - Many rooms not laid out with proper turning areas
  - Accessories such as safety showers non-compliant
  - Benches, hoods and fixed items non-compliant for heights & reach ranges

Observed Fire and Life Safety Issues:

- Open egress stairs
- Elevator smoke vestibule or other smoke containment provisions not provided
- Fire alarm modifications and upgrades required
- Fire protection modifications and upgrades required

No handrail extension

Narrow dimension between lab benches

ADA violation of 18" clear dimension at pull side of door

Eye wash and safety shower in corridor

2.2.1 Webber Hall

Structural Evaluation Summary

Webber Hall was originally constructed in approximately 1953 and it is estimated that it was designed in accordance with the 1952 Uniform Building Code. Based on the review of available documents for Webber Hall, the structure appears to be in good structural condition and appears to be in conformance with the building design standards at the time of its original design.

The structure was evaluated in 1978 and again in 1998. Done by Degenkolb Engineers, the 1998 evaluation rated Webber Hall as "FAIR" based on the University rating system. The University rating system defines a "FAIR" structure as one that will experience "damage" with hazard to life categorized as "low". There is no evidence to suggest this rating has changed or is different today.

HVAC Systems Evaluation Summary

Webber Hall is served by two air handling units (AHU's). AH-2 was replaced and AH-1 was refurbished in 2001. Both units are located in the basement mechanical room. Although one unit was rebuilt, there are vibration problems associated with it. The first floor labs immediately above the basement mechanical room are hardest hit with a vibration.

Heating and cooling is accomplished via steam and chilled water from the campus central plant. The existing dual duct constant volume (CV) air distribution system was installed in two phases in 1974 and 1977. Each individual fume hood has its own dedicated CV exhaust fan. These fans are original building equipment, with the exception of a few individual room remodels completed in the last few years.

There is an observed lack of air distribution in Webber Hall. There is also particulate matter in the supply air due to the deterioration of the interior duct lining. The steam and chilled water systems were replaced with the air handling units in 2001. The AHU, steam and chilled water controls in the mechanical room were also replaced in 2001 with direct digital controls (DDC), while the original outdated pneumatic controls from 1977 and 1974 remain for room temperature control. The existing AHU's utilize steam heating coils (there is currently no heating hot water system in the building).

Plumbing System Evaluation Summary

Installed in 1954, the building's utilities are served from the basement area where all the major equipment and distribution mains are located. From the basement, the plumbing mains rise to the floors they serve and are routed above the ceiling to the laboratories. Servicing of the distribution systems has been difficult due to the lack of isolation valves in accessible locations and, the inconvenience caused by service interruptions with laboratory functions during above ceiling repairs.

Pressure problems have resulted with the reverse osmosis (RO) system since it is piped an appreciable distance from Boyce Hall (where the main RO System is located). A new RO System is needed to meet the demands of the remolded laboratories for the purified water systems.

The useful life of the plumbing equipment and piping has been exceeded. Reports of leakages from pitting and frozen valves/faucets are common signs of system decay. The laboratory air compressors are original and need replacement. The vacuum pumps have been replaced and will adequately serve the remodeled lab space.

The building does not meet current ADA requirements. Plumbing fixtures in the laboratories, corridors and restrooms require upgrade to current standards. A cause for concern is the presence of nitrogen gas bottles and emergency showers in the corridors. This condition must be modified for all remodeled areas. The corridors must remain clear of gas cylinders and emergency eyewash/shower systems. In addition, floor drains are lacking in sterilizer areas for proper disposal of waste.

The fire protection system does not meet the current California Building Code requirements. The building has fire hose outlets in the corridors only. The current Class II standpipes are located as allowed by the codes in effect at the time of construction. Those standpipes may be omitted upon installation of automatic fire sprinklers throughout the building. If building is not fire sprinklered, the Class II standpipe system may be left as is or extended to meet current design criteria. Compliance to code will require adding wet standpipes in the stairwells. For quicker fire fighting response

(or additional safety when the building is unoccupied), a combination wet standpipe/sprinkler system would be appropriate if the entire building was to be remodeled.

Electrical Evaluation Summary

Most of Webber Hall's electrical equipment is 50 years old and antiquated. This condition causes the electrical system's reliability to be a major concern. There is no emergency power for equipment in any of the laboratories or common support spaces. Although an egress lighting system exists for the corridors, there is no emergency egress lighting system in the existing labs or common areas. A 150KW emergency power generator (located on the roof of Boyce Hall) serves the corridor egress lighting. It is incapable of providing the power required to sustain additional emergency egress lighting, code required HVAC and critical loads associated with the building. The light fixtures were replaced in 1976 and retrofitted with T-8 lamps and electronic ballasts in 1996. The lights should be replaced as areas are remodeled. Exits signs are original and in some cases are not illuminated as required by current fire codes. The only lighting controls are electronic contacts, located on each floor (used for controlling the corridor lights). Current California Energy Code requires bi-level switching, day light controls, and occupancy sensors for lighting controls.

The main point of entry (MPOE) for the telephone service is in the basement electrical room. The existing telecommunications and data systems are original and outdated. Original CAT 3 phone wire and 66 punch-down block are present. The backboards, wires and switches are open to the unconditioned, dusty and moist environment of the janitor closets in which they are presently housed. Conduit raceways (located in different janitor closets) used to interconnect backboards to the above ceiling systems, are over-filled and compacted. New raceways need to be added to extend the existing system. Current telecommunication and data standards require related equipment to be installed in environmentally controlled rooms in order to reduce overheating the wire and equipment. Currently, the system is operating at capacity and remains operative.

The existing fire alarm system is minimal. Manual pull stations, horns and strobes are only located at each stairwell. Manual pull stations are mounted above the ADA height requirement (at approximately 60"). The current Fire Code requires smoke and heat detection, as well as audible and visual annunciation in common and public areas.

Liquid nitrogen canisters in corridors

2.2.2 Boyce Hall

Structural Evaluation Summary

Boyce Hall was constructed in approximately 1974 and was designed based on the 1970 Uniform Building Code. The Boyce Hall Seismic Upgrade was designed and constructed based on the 1995 California Building Code. Our evaluation of the structure is based on a review of the original construction drawings, the seismic upgrade drawings and experience with similar building types. After a review of the available structural drawings for this project, the structure appears to be in general conformance with the original design requirements of the code and appears to meet the life-safety intent of the code. As noted above the 1998 retrofit provided additional strength and ductility to the structure. Although no formal analysis has been conducted on the retrofitted structure, the building is likely to fall into the "GOOD" category as described by the U.C. rating system.

HVAC System Evaluation Summary

Boyce Hall is served by two air handling units located in the base of the mechanical core area. Heating and cooling is accomplished via steam and chilled water supplied from the campus central plant. The original air distribution system was dual duct constant volume (CV).

The current Boyce Hall HVAC Renewal Project (to be completed in April 2005) will convert the building from CV to variable air volume (VAV) for both the supply and exhaust systems. The CV terminal units will be replaced with VAV lab air control valves with reheat coils or dual duct VAV mixing boxes. VAV lab air control valves will be installed for the fume hoods and new room general exhaust registers. This project will also replace the existing outdated controls with new direct digital controls (DDC), as well as most of the components of the steam and heating hot water system.

The balance of the HVAC equipment and systems not replaced under the Boyce Hall HVAC Renewal Project will be replaced for this project. This includes the chilled water system, the condensate return system, the supply and exhaust ductwork, and the heating and cooling coils in the air handling units. These systems have aged beyond their useful life and although well-maintained, the systems have problems functioning properly or are undersized for the new building program.

Plumbing System Evaluation Summary

Installed in 1974, the building's plumbing utilities are served from the core area where all the major equipment and distribution mains are located. From the core area the mains from the equipment on the first level to the sixth floor are running lengthwise within the core. Services to the laboratories are fed vertically and then horizontally into the ceiling space of the floor they serve. Servicing of the distribution systems have been difficult due to the lack of isolation valves in the appropriate locations. Where there are valves in the core as well as in the laboratories, they are generally "frozen" or inoperable due to corrosion or de-alloying chemical reactions such as dezincification.

Although the equipment is well maintained, the useful life of the equipment and piping has been exceeded. Reports of leakage and frozen valves/ faucets are all signs of continuing decay. Additionally, service reports point out that the air compressor is operating, but is well passed its prime. Old technology is also a consideration. Newer equipment is more efficient, takes less physical space, and requires less maintenance and energy to operate. Equipment such as the Reverse Osmosis System should be updated with the latest technologically advance equipment to meet specific demand for polishing according to the application intent. Consider addition of DI equipment to existing RO equipment.

In the laboratory floor areas, the current ADA requirements have also impacted the existing installation where new laboratory or plumbing fixtures will be required. Restrooms, drinking fountains, emergency apparatus, laboratory faucets/outlets and other devises used by the student or staff, will require upgrading for compliance to the ADA regulations making access for the physically challenged more user friendly.

In general, the building's plumbing utility services and infrastructure have served its useful life and beyond. The existing fire protection system does not meet the current NFPA and California Building Code requirements. The existing building consists of a dry standpipe system and hose outlets. The current Class II standpipes are located as allowed by the codes in effect at the time of construction. Those standpipes may be omitted upon installation of automatic fire sprinklers throughout the building. If building is not fire sprinklered, the Class II standpipe system may be left as is or extended to meet the current design criteria. The existing Class I dry standpipe is a separate system that must remain regardless of the addition of automatic fire sprinklers.

Electrical System Evaluation Summary

Most of Boyce Hall's electrical equipment is 30 years old and becoming antiquated. This condition causes the electrical system reliability to be a concern. There is very little emergency power for equipment in the laboratories, common support spaces or Vivarium (with the exception of the 5th Floor). Emergency egress lighting in the corridor, labs and Vivarium does not meet current standards. There is a 150KW emergency power generator on the roof, but it is incapable of providing the power required to sustain the complete emergency egress lighting system, code required HVAC and critical loads.

The light fixtures were retrofitted with T-8 lamps and electronic ballasts in 1996. The exit signs were also retrofitted in 1996, but do not provide the level of illumination required to direct the general public to the exits in cases of emergency when smoke or dim lighting is present. The only lighting controls are electronic contacts, located on each floor (used for controlling the corridor lights). Current California Energy Code requires bi-level switching, day light controls, and occupancy sensors for lighting controls.

The existing telecommunication and data systems are original and outdated. The backboards, wires and switches are open to the unconditioned and dusty environment of the central mechanical core. The main point of entry (MPOE) for telephone service is in the first floor telephone/data room. Current telecommunication and data standards require related equipment to be installed in environmentally controlled rooms in order to reduce over heating the wire and equipment. Currently, the system is operating at capacity and remains operative.

The existing fire alarm system is minimal. Manual pull stations, horns and strobes are only located at each stairwell entrance/exit. The current Fire Code requires smoke and heat detection, as well as audible and visual annunciation in common and public areas.

View of vertical mechanical core with catwalks running from first to fifth floors

building program

CHAPTER 3

3.1 Programming Process

Programming is a process used to formally gather space and occupancy data, related infrastructure and equipment needs, and building systems criteria of a particular university user group(s) to develop a very preliminary plan of a proposed project. Although the plans are generally very basic, in combination with the building system performance criteria, they serve as a useful basis for developing a systems-based cost model. This cost model then becomes the foundation for the PPG Budget.

The mission of the Boyce Hall and Webber Hall Renovation Project DPP is somewhat different from the process described above. Some background on the project is necessary to understand the unusual constraints and unknowns that have shaped this DPP.

Three-story Webber Hall (built in 1953) and six-story Boyce Hall (built in 1974) are considered a single project principally because the two buildings are connected by a second level bridge. However, the buildings are quite different. Besides a 21-year age difference, Boyce Hall, the younger building, is more conducive to incremental lab development because of a large "mechanical core" that runs from the 1st through 5th Floors. Although modern lab building design would use ceiling distribution and much smaller vertical chases, the "core" allows for infrastructure upgrades that would be impossible in an occupied building without this central infrastructure, since this somewhat antiquated MEP distribution system in the mechanical core is completely accessible via a series of catwalks and ship's ladders. This ability to renovate major infrastructure while occupied gives Boyce Hall a reasonable lifespan as a lab facility. In contrast, Webber Hall's structural bay size and mechanical systems are not conducive to current lab practices or upgrades. Much consideration was given to these characteristics to determine how funds should be allocated.

BUDGET PARAMETERS

Because of the age of the facilities (particularly Webber Hall), the lack of ideal bay modularity for laboratory use and building systems' conditions, the University limited the project budget to $33.5 mil, yielding a construction budget of approximately $27.6 mil. This limit meant that the DPP objective was not actually to determine the project budget; rather, to strategize how to spend the money wisely to achieve the highest benefit.

FIXED BUILDING AREA

As a renovation project, the area of the project is a given unless demolition and/or an addition or a new structure are contemplated. Demolishing Webber Hall and utilizing the funds for a replacement building was briefly considered, but quickly ruled out because of university policies toward preserving assets. The limited budget eliminated the possibility of adding-on to a building for a net increase in assignable area. This meant that the DPP was not going to determine the square footage of the project, but rather, assess the existing buildings to maximize programmatic benefit.

UNCONFIRMED USERS

During programming sessions, it became apparent that the area to be vacated in Boyce Hall by the Cell Biology Department and the Entomology Department was far less space than the amount required for the following requests:

- Consolidation of the Nematology Department
- Consolidation of Plant Pathology Labs in Fawcett Hall and other locations
- Growth Projections for existing labs
- Inclusion of research labs for the Health Sciences Initiative

While trying to determine the occupancy priorities for Boyce/Webber it was shared that a CNAS Facilities Masterplan Study is currently underway. Unfortunately, The East/Southeast Campus Area Study (inclusive of many CNAS facilities) and the CNAS Facilities Master Plan Study will not be complete in time to inform this DPP. Consequently, the labs developed are designed to meet the needs of any number of users from within CNAS which do not have highly specialized lab needs. The Boyce/Webber DPP is designed to be a useful tool to inform Area plans.

"HIGHEST AND BEST USE" DPP

When considering the constraints listed above, the team agreed that the DPP needed to focus on how best to use the available funding. The first task was to assess the inadequacies of the buildings, particularly building systems, and assign priorities. A list of issues was developed for each building and each was assigned a priority level:

- "Mandatory" was assigned to work that was crucial for code compliance, to address life safety issues or to support research and/or prevent the accidental spoiling of research caused by unreliable building systems (e.g. life safety upgrades, ADA upgrades, emergency power for critical functions like the Vivaria.)
- "Necessary" was assigned to work that would promote the programmatic needs of the college (e.g. more flexible laboratories.)
- "Desirable" was assigned to requests that would enhance the building for users but were not critical to function.

From this list, the mandatory items were costed to determine how much of the budget would remain for development of modern laboratories and other items on the "Necessary list".

3.2 Goals and Objectives

The Objective:
In concert with the CNAS Master Space Plan and DBS needs, deliver two laboratory buildings with up-to-date infrastructure. Furthermore, within the budget parameters, provide as much medium-intensity wet lab space suitable for a wide variety of CNAS and DBS users, which will meet UCR's requirement for flexibility in order to implement long range growth plans.

The Specific Goals:

1. To determine the highest and best use of the limited renovation funding.
2. To upgrade critical building infrastructure to support on-going laboratory functions.
3. To create flexibility so that departments can efficiently allocate lab space in accordance with research funding.
4. To enhance the ability to conduct interdisciplinary research via an open laboratory setting.
5. To create laboratories which are very functional and flexible in order to support any number of CNAS and DBS disciplines.
6. To maintain options for traditional closed labs for the following circumstances:
    a. Situations where security is required by funding sources for patent protection.
    b. Research that has inherent health or safety issues.
    c. Research that is sensitive to contamination.
7. To increase opportunities for departmental and interdepartmental collaboration by providing opportunities and environments for spontaneous casual interaction.
8. To minimize moves and other disruptions for occupants.
9. To consolidate the Nematology Department that is currently disbursed across the campus. This goal, raised by the current users, will ultimately be addressed in the CNAS Master Plan.
10. To perform critical infrastructure upgrades on the Vivaria in order to prevent research animals from expiring due to sharp temperature rises during power failures.
11. To upgrade access to the Vivaria so that researchers are not exposed to inclement weather and/or security breaches when accessing the Animal Quarters.

3.3 Program Overview

The Boyce Hall and Webber Hall Renovation Project consists of a renovation and modernization of their core infrastructure to extend the life of both buildings for their highest and best use, in this case, as research facilities. The renovations will address heating ventilating and air conditioning (HVAC) systems, electrical power distribution, fire protection, and piped services. Hazardous materials abatement will be performed throughout the effected areas. Code deficiencies will be corrected and Campus Standards implemented during the process.

The Program also includes tenant improvements to create 19,460 sf of flexible and efficient new lab space, 11,220 sf of lab support spaces, and 10,055 sf of office areas for faculty and student researchers. ADA accessibility deficiencies will be brought into compliance in public areas, restrooms and throughout research space on the effected floors.

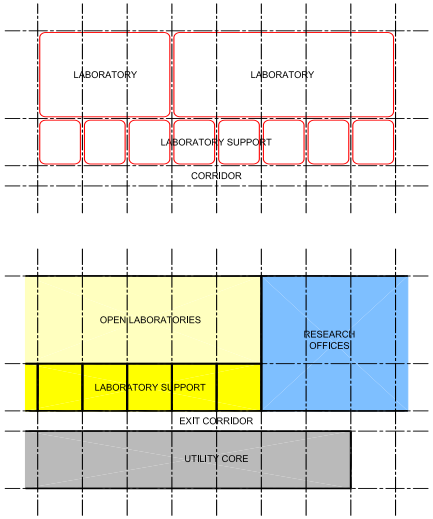
Boyce Hall will receive tenant improvements to the entire 4th and 5th floors and the west half of the 3rd floor. In order to improve the building's efficiency, the corridor on the west side of the core is being absorbed into the open laboratory to gain more functional space, with the corridor on the east side of the building serving as the required exit corridor. If the additive bid alternate is accepted, improvements to the Vivaria would be performed to improve the mechanical systems, provide emergency power for continuous operation during a power outage, and provide enclosed access from the north stair tower to the Vivaria entrances.

In Webber Hall, the tenant improvements to upgrade the laboratories, lab support spaces and offices will occur on the third floor. Webber's third floor will be converted into open labs and support space that will enhance collaboration and lab assignment flexibility. Because of Webber Hall's age and infrastructure, the design life of the improvements in Webber Hall will be slightly lower than those in Boyce Hall because the anticipated shorter lifespan of Webber as a lab building.

3.4 Modular Planning and Flexibility in Lab Design

Laboratories should be organized around modular planning principles such that they are constructed with standardized dimensions for flexibility and to support a variety of functions. Modular planning is recommended as an organizational tool to allocate space within a building. The module establishes a grid by which walls and partitions are located. As modifications are required because of changes in laboratory use, instrumentation, or departmental organization, partitions can be relocated, doors moved, and laboratories expanded into larger laboratory units or contracted into smaller laboratory units without requiring reconstruction of structural or mechanical building elements.

The planning modules may be combined to produce large, open laboratories or subdivided to produce small instrument or special-use laboratories.



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

Although a planning module width of 10'-6" to 11'-0" is generally recommended for laboratories in new construction to provide adequate space for benches, equipment and circulation, the existing structural grid in Boyce Hall is based on a 10'-0" planning module width. This existing module width should prove to be adequate for most laboratory and support functions. The module depth varies from about 24' in Webber to about 26' in Boyce. While this depth is limiting for such functions as teaching laboratories, it can work very effectively for research laboratories and laboratory support functions.

The existing plan on the east side of Boyce Hall features embedded faculty offices which can only be accessed by circulating through the research laboratories. This creates multiple problems including:

- The placement of offices within the laboratories creates an implied 'ownership' making allocation of laboratory space on the basis of grant productivity, personnel or other factors difficult to accomplish.
- Student or visitor access is difficult since the offices do not open onto the corridor or into an office suite.
- Less hazardous spaces, such as offices, should not have to exit through more hazardous spaces, such as research laboratories.

The proposed floor plan for Boyce Hall features a more open laboratory concept with clustered offices at one end of the floor. This allows for easier allocation of laboratory space on the basis of need, fosters interaction among the faculty, and provides for safe, easy access by students and other visitors. It also makes it more practical to provide separation of mechanical systems between the laboratory and office zones, improving efficiency and energy conservation by allowing for recirculated air in the office areas.

The proposed plan for the 3rd, 4th and 5th floors of Boyce Hall is based on an open laboratory concept, providing 'generic' research bench areas, but enclosed specialized laboratory support spaces as required. The east side of Boyce Hall, while designed with the open laboratory concept, is capable of being subdivided into distinct, dedicated laboratory units should the need arise for special security or environmental control in the future.

3.5 Webber Hall

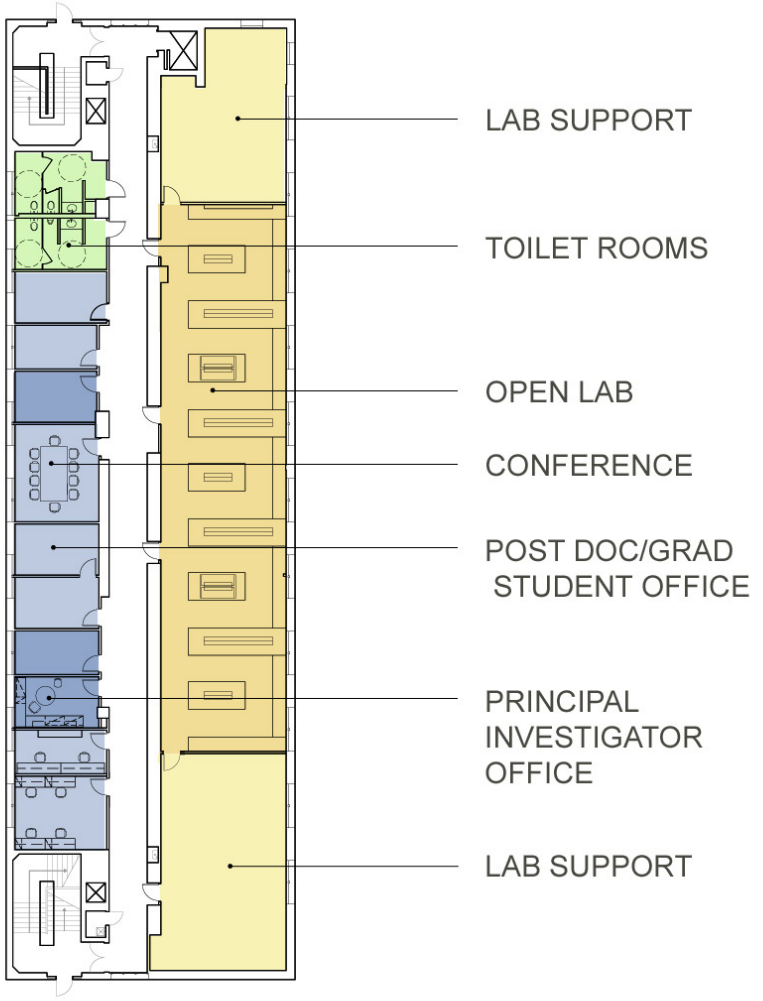
Webber Design Concept

Webber's narrow depth combined with existing piping and exhaust ducts distributed along the corridor (where walls appear thick) confined the corridor to its existing location. The Lab and Lab Support Modules are located along the east side of the corridor which is the deepest side of the building. The west side of the corridor is reserved for non-laboratory functions, which gives office space a view of the mall. The scheme provides the following amenities:

Offices
- Office space enjoys views to the Mall
- Offices are no longer buried in the laboratory allowing flexible assignment
- Principal Investigator offices are clustered with Post Docs and graduate students for easy communication

Labs/Lab Support
- Lab space is concentrated in the center of the building for convenient access, flanked by lab support at either end of the building
- Lab space could be sub-divided into closed labs if required by user
- If open labs are preferred, doors to labs could be removed to improve flow between offices and laboratories

Amenities
- New ADA accessible restrooms are provided
- Conference room and coffee bar are incorporated to encourage social interaction



RENOVATED SPACE PROGRAM SUMMARY - Webber Hall 3rd Floor

ID No.	SPACE TYPE	QTY	ASF	Total ASF
TEACHING LABORATORIES				
1.01	Teaching Laboratories (Modules)	0	0	0
			Teaching Laboratory Subtotal	**0**
RESEARCH LABORATORIES				
2.01	Research Laboratories (Modules)	10	230	2,300
			Laboratory Subtotal	**2,300**
RESEARCH SUPPORT				
3.01	Equipment Room (in laboratory support zone)	2	235	470
3.02	Fume Hood Alcove/Chemical Storage	0	110	0
3.03	Controlled Temperature Room (+4oC)	1	110	110
3.04	Radioisotope Room	0	110	0
3.05	Growth Chambers/Equipment Room	1	110	110
3.06	Instrument Room	2	110	220
3.07	Cell Culture Room	2	110	220
3.08	Imaging/Dark Room	1	110	110
3.09	Autoclave/Glasswash Room	1	260	260
3.10	Media Preparation	0	110	0
			Lab Support Subtotal	**1,500**
OFFICE/ADMIN/CONFERENCE				
4.01	Faculty Office (PI)	3	130	390
4.02	Post Docs	6	60	360
4.03	Grad Students	12	40	480
4.04	Conference/Library	1	275	275
4.05	Faculty Colloquium	1	100	100
			Subtotal	**1,605**
			PROGRAM TOTAL ASSIGNABLE SF	**5,405**
WEBBER BUILDING SUPPORT				
5.01	Men's Restroom (Floors 4 & 5)	1	160	160
5.02	Women's Restroom (Floors 4 & 5)	1	175	175
5.03	Janitor's Closet	1	30	30
			Boyce Building Support Total	**365**
			PROGRAM TOTAL NON-ASSIGNABLE SF	**5,770**

3.6 Boyce Hall

Boyce Design Concept

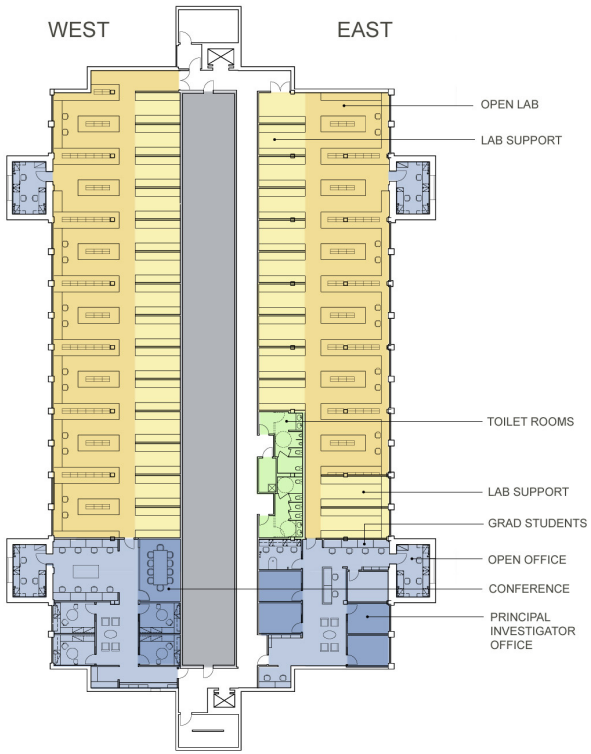
Much discussion occurred on the topic of open versus closed labs. Many users expressed concerns that open labs would not be suitable for their department's research for reasons of contamination, safety, equipment and instrumentation security, patent protection and other grant conditions. Other faculty conceded that the current condition of all closed labs in Boyce and Webber hinders spontaneous interaction, lacks flexibility and joint research space. The final scheme attempts to balance these concerns utilizing an open lab scheme on the west side of the building and a scheme that allows for either open or closed labs on the east side. The barrier created by the mechanical core is minimized by pulling all of the offices to the south end of the building and placing shared amenities on opposite sides of the core.

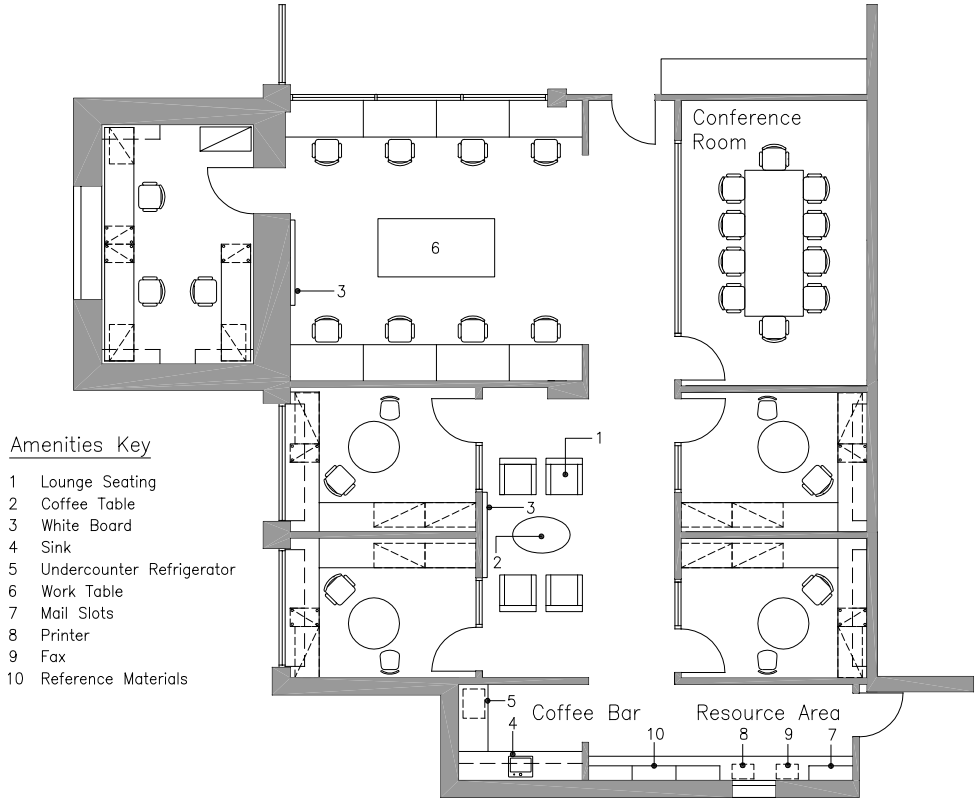
Circulation
- Loop corridor is eliminated for improved efficiency.
- Visitors can reach faculty offices without going through labs, which creates a safer condition in the laboratories.
- Day-to-day circulation for researchers is through the open lab, fostering opportunities for collaboration.
- Equipment such as refrigerators, freezers, and bottled gases are collected in the lab support zone and will no longer clutter the egress corridor.

Offices
- Office space is concentrated at the south end of the building to encourage communication among researchers.
- Offices are no longer buried in the laboratory allowing flexible assignment.
- Principal Investigator offices are clustered with Post Docs, and graduate students for easy communication.
- Principal Investigator offices have access to natural light and views or borrowed light and views.

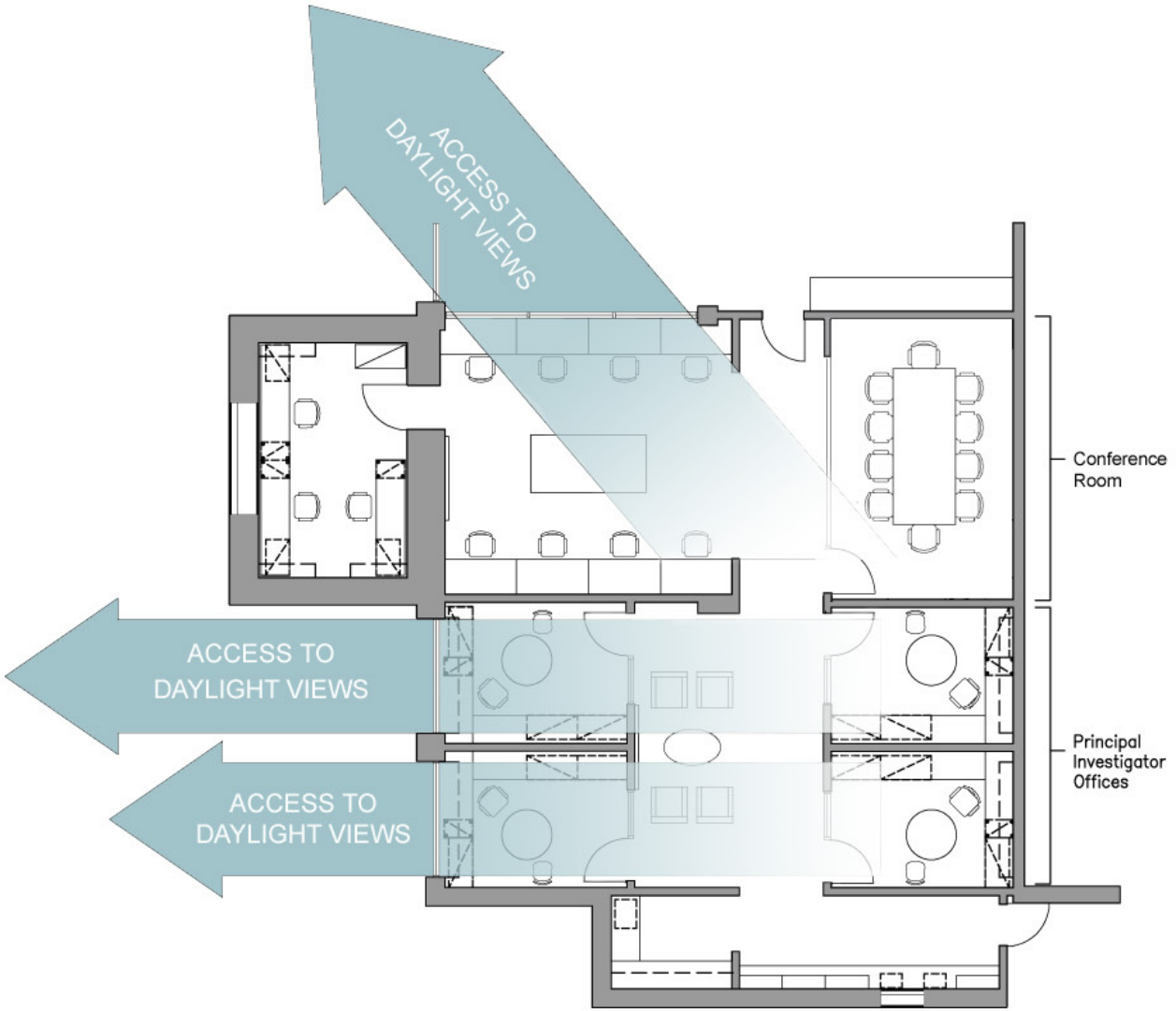
Labs & Lab Support
- Lab space is located along the fenestrated exterior walls for access to light and views.
- On the east side of the core, lab space can be sub-divided into closed labs if required by users.
- Lab benches can be assigned to Principal Investigators more flexibly depending on grant resources, number of lab personnel, and equipment.
- Labs have write-up counters at the benches along the windows.

Amenities
- New ADA accessible restrooms are provided.
- Social interaction is encouraged with concentrated amenities such as coffee rooms, casual seating around a white board, and decentralized libraries.





Boyce Hall Amenities



Boyce Hall View Corridors

RENOVATED SPACE PROGRAM SUMMARY - Boyce Hall 3rd, 4th & 5th Floors

ID No.	SPACE TYPE	QTY	ASF	Total ASF
TEACHING LABORATORIES				
1.01	Teaching Laboratories (Modules)	0	0	0
			Teaching Laboratory Subtotal	**0**
RESEARCH LABORATORIES				
2.01	Research Laboratories (Modules)	66	260	17,160
			Laboratory Subtotal	**17,160**
RESEARCH SUPPORT				
3.01a	Equipment Room (in laboratory support zone)	7	140	980
3.01b	Equipment Room (in laboratory zone)	2	520	1,040
3.02	Fume Hood Alcove/Chemical Storage	24	140	3,360
3.03	Controlled Temperature Room (+4oC)	4	140	560
3.04	Radioisotope Room	1	140	140
3.05	Growth Chambers/Equipment Room	3	140	420
3.06	Instrument Room	3	140	420
3.07	Cell Culture Room	8	140	1,120
3.08	Imaging/Dark Room	3	140	420
3.09	Autoclave/Glasswash Room	2	420	840
3.10	Freezer Farm / Cryogenics Room	3	140	420
			Lab Support Subtotal	**9,720**
OFFICE/ADMIN/CONFERENCE				
4.01	Faculty Office (PI)	20	120	2,400
4.02	Post Docs	40	60	2,400
4.03	Grad Students	55	40	2,200
4.04	Conference Room	3	250	750
4.05	Grad Students in Laboratory	25	0	0
4.06	Faculty Colloquium	5	100	500
4.07	Departmental Library	2	40	80
4.08	Coffee	2	60	120
			Subtotal	**8,450**
			PROGRAM TOTAL ASSIGNABLE SF	**35,330**
BOYCE BUILDING SUPPORT				
5.01	Men's Restroom (Floors 4 & 5)	2	200	400
5.02	Women's Restroom (Floors 4 & 5)	2	200	400
5.03	Janitor's Closet	2	58	116
			Boyce Building Support Total	**916**
			PROGRAM TOTAL NON-ASSIGNABLE SF	**36,246**

3.7 Existing and Renovated Building Space Comparisons

Boyce Hall	Existing Building		Renovated Buiilding						ASF Delta		
	Floors 1-6 Existing ASF	Lab Support : Lab Ratio Target = 1:1.5	Floors 1, 2, 6 & Partial 3rd Floor Existing ASF	Lab Support : Lab Ratio Target = 1:1.5	Floors 4-5 & Partial 3rd Floor Proposed ASF	Lab Support : Lab Ratio Target = 1:1.5	Floors 1-6 Total Proposed ASF	Lab Support : Lab Ratio Target = 1:1.5	ASF Gain	ASF Loss	ASF Net Gain
Teaching Laboratories and Support	1,838		1,838		0		1,838		0	0	
Research Laboratories	31,510	1 : 2.70	12,127	1 : 2.38	17,160	1 :1.53	29,287	1 : 1.98	0	2,223	
Research Support	11,662		5,099		9,720		14,819		3,157	0	
Office/Admin/Conference/Library	13,163		6,152		8,450		14,602		1,439	0	2,373
Classroom	740		740		0		740		0	0	
Other	716		716		0		716		0	0	
Animal Quarters & Support	5,512		5,512		0		5,512		0	0	
Total	65,141		32,184		35,330		62,002		4,596	2,223	

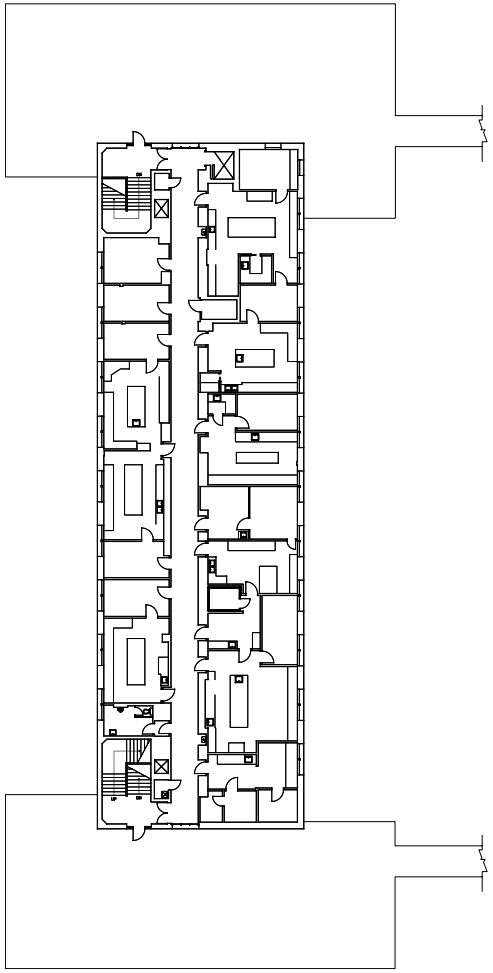
Webber Hall	Existing Building		Renovated Buiilding						ASF Delta		
	Floors 1-3 Existing ASF	Lab Support : Lab Ratio Target = 1:1.5	Floors 1-2 Existing ASF	Lab Support : Lab Ratio Target = 1:1.5	Floor 3 Proposed ASF	Lab Support : Lab Ratio Target = 1:1.5	Floors 1-3 Total Proposed ASF	Lab Support : Lab Ratio Target = 1:1.5	ASF Gain	ASF Loss	ASF Net Gain
Teaching Laboratories and Support	0		0		0		0		0	0	
Research Laboratories	16,982	1 :5.46	13,521	1 :6.24	2,300	1 :1.53	15,821	1 : 4.31	0	1,161	
Research Support	3,113		2,167		1,500		3,667		554	0	
Office/Admin/Conference/Library	7,093		5,814		1,605		7,419		326	0	-281
Other	158		158		0		158		0	0	
Total	27,346		21,660		5,405		27,065		880	1,161	

Boyce / Webber Hall Total Net Assignable Square Footage Increase	**2,092**

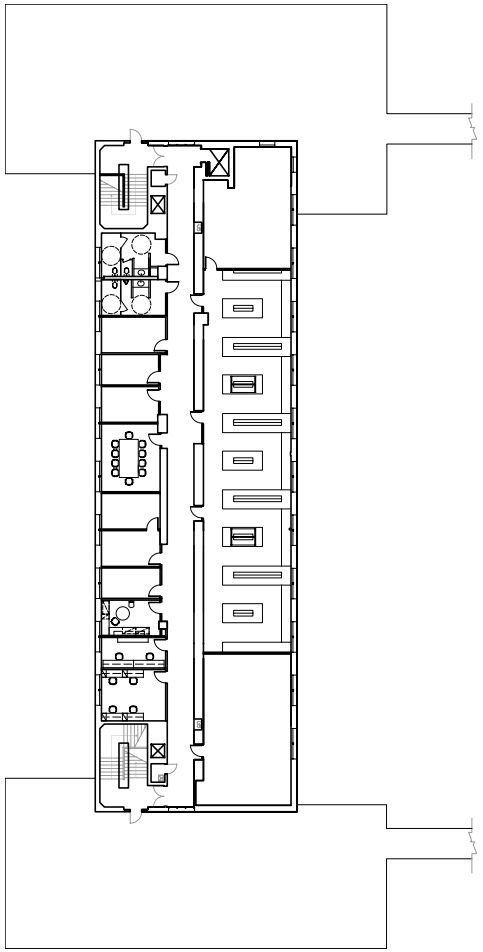
existing space utilization & floor plan comparisons

CHAPTER 4

4.1 Webber 3rd Floor Plan Comparison



Webber 3rd Floor - Existing



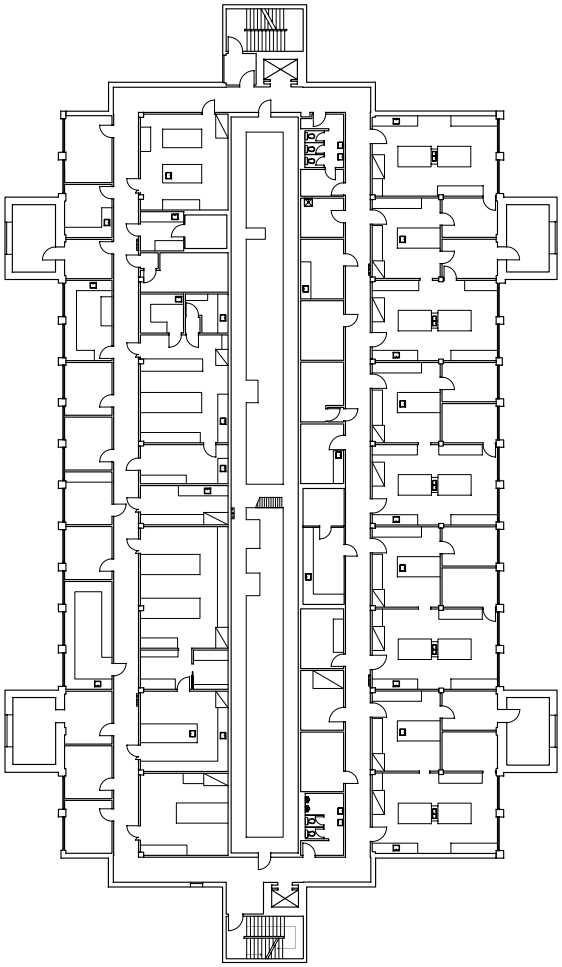
Webber 3rd Floor - Proposed

4.2 Existing Utilization Webber Hall

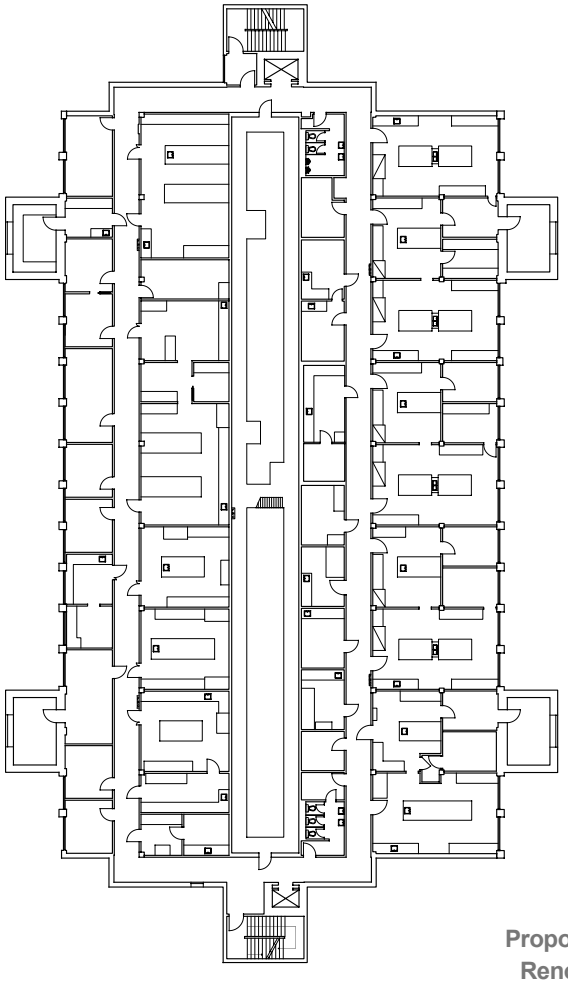
Room Use Code	Space Type	OB sf	1st Floor sf	2nd Floor sf	Subtotal Floors 1-2 sf	3rd Floor sf	PH sf	Building Total sf
Assignable Area								
210	Research Laboratory	0	6,509	7,012	13,521	3,461	0	16,982
211F	Research Office (Faculty)	0	275	447	722	0	0	722
211G	Research Office (Graduate Student)	0	0	0	0	664	0	664
211R	Research Office (Research Staff)	0	430	281	711	0	0	711
225	Research Laboratory Service	0	693	316	1,009	728	0	1,737
225C	Rsch Lab Serv (Controlled Temp. Room)	0	99	372	471	90	0	561
225D	Rsch Lab Serv (Dark Room)	0	129	0	129	128	0	257
225E	Rsch Lab Serv (Equipt. Issue/Stor./Stockroom/Supply)	0	294	264	558	0	0	558
250L	Rsch Lab Serv (Locker/Shower)	0	284	0	284	0	0	284
310C	Academic Office (Chair)	0	122	185	307	0	0	307
310F	Academic Office (Emeritus/Recall)	0	875	936	1,811	615	0	2,426
320	Other Office	0	671	643	1,314	0	0	1,314
335	Office Service	0	0	310	310	0	0	310
340	Conference	0	0	355	355	0	0	355
720	Storage-General and Research	0	75	25	100	0	0	100
722	Storage-Office	0	58	0	58	0	0	58
Total Assignable Area		**0**	**10,514**	**11,146**	**21,660**	**5,686**	**0**	**27,346**
Non-Assignable Area								
NAC	Circulation Area	0	3,887	3,425	7,312	1,985	0	9,296
NAJ	Building Service Area	0	103	34	137	35	0	172
NAM	Mechanical Area	3,441	77	70	146	61	59	3,648
NAR	Public Toilet/Restrooms	0	441	310	751	113	0	864
Total Non-Assignable Area		**3,441**	**4,507**	**3,839**	**8,346**	**2,194**	**59**	**13,980**
Total ASF + NSF - NAM		**0**	**14,945**	**14,915**	**29,860**	**7,819**	**0**	**37,678**

Area Proposed for Renovation
Area to Remain As Is

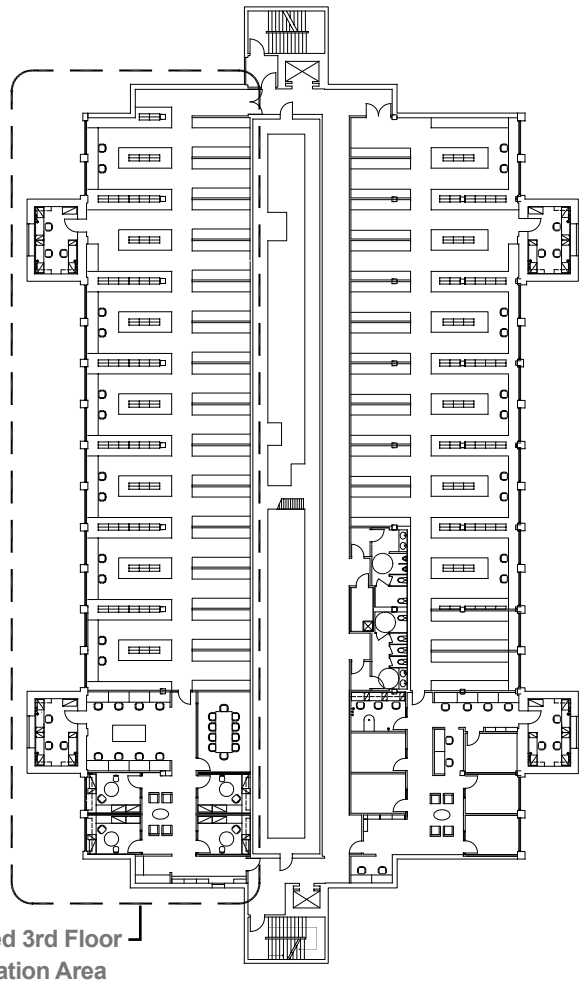
4.3 Boyce 3rd/4th/5th Floor Plan Comparison



Boyce 4th Floor - Existing



Boyce 5th Floor - Existing



Boyce 4th & 5th Floor - Proposed

4.4 Existing Utilization Boyce Hall

Boyce Hall Exisitng Utilization

Room Use Code	Space Type	L1 sf	1st Floor sf	2nd Floor sf	3rd Floor sf	4th Floor sf	5th Floor sf	6th Floor sf	Building Total sf
Assignable Area									
110	Classroom	0	740	0	0	0	0	0	740
210	Research Laboratory	0	1,646	6,193	8,450	7,249	7,972	0	31,510
211F	Research Office (Faculty)	0	0	0	0	153	0	0	153
211G	Research Office (Graduate Student)	0	0	818	550	1,059	1,208	0	3,635
211R	Research Office (Research Staff)	0	0	130	0	258	129	0	517
225	Research Laboratory Service	0	744	1,642	2,012	1,985	1,668	0	8,051
225C	Rsch Lab Serv (Controlled Temp. Room)	0	59	355	322	518	487	0	1,741
225D	Rsch Lab Serv (Dark Room)	0	86	110	89	152	212	0	649
225E	Rsch Lab Serv (Equipt. Issue/Stor./Stockroom/Supply)	0	278	0	0	290	0	0	568
225H	Rsch Lab Serv (Hall/Vesitbule)	0	0	84	0	16	0	0	100
225P	Rsch Lab Serv (Prep Room)	0	0	0	307	102	0	144	553
250L	Scholarly Activity (Library)	0	210	0	0	0	0	0	210
250S	Scholarly Activity (Study Room)	0	0	447	0	0	0	0	447
255	Scholarly Activity Service	0	0	0	134	0	0	0	134
260	Class Laboratory	0	0	1,513	0	0	0	0	1,513
265	Class Laboratory Service	0	0	325	0	0	0	0	325
310C	Academic Office (Chair)	0	171	0	0	0	0	0	171
310F	Academic Office (Emeritus/Recall)	0	154	1,019	1,156	1,333	1,201	0	4,863
310P	Academic Office (Postdoctoral)	0	0	227	189	0	0	0	416
310T	Academic Office (Teaching Assistant)	0	423	0	0	0	0	0	423
320	Other Office	0	777	81	0	0	149	203	1,210
335	Office Service	0	191	0	0	0	0	0	191
335H	Office Service (Hallway, Internal)	0	18	0	0	18	0	0	36
340	Conference	0	532	0	0	0	225	0	757
580	Animal Quarters	0	0	0	0	0	0	3,631	3,631
585	Animal Quarters Service	0	0	0	0	0	0	1,881	1,881
710	Shop-General and Research	0	0	208	0	0	0	0	208
720	Storage-General and Research	0	508	0	0	0	0	0	508
Total Assignable Area		**0**	**6,537**	**13,152**	**13,209**	**13,133**	**13,251**	**5,859**	**65,141**
								65,141	
Non-Assignable Area									
NAM	Mechanical Area (NAM)	685	7,172	1,498	2,929	2,929	2,929	199	17,656
NAC	Circulation Area (NAC)	229	4,037	4,293	4,364	3,669	3,684	2,805	22,851
NAJ	Building Service Area		42	100	48	100	0	113	403
NAR	Public Toilet/Restrooms		248	264	263	264	263	56	1,358
No Code	Room CU02		232						232
Total Non-Assignable Area		**914**	**11,731**	**6,155**	**7,604**	**6,962**	**6,876**	**3,173**	**42,501**
Total ASF + NSF - NAM		**229**	**11,096**	**17,809**	**17,884**	**17,167**	**17,198**	**8,833**	**89,986**

systems criteria

CHAPTER 5

5.1 Design Criteria and Standards

The DPP has been produced when the accepted codes are as follows, and these codes have been projected forward for the execution for this project at this time. However, prior to final execution of the design, the project must re-verify the applicable codes and standards that are to be used at that time of design.

Applicable Codes and Standards

- ANSI Standards
- ARI Standards
- ASHRAE 62-1989, Ventilation for Acceptable Indoor Air Quality
- ASHRAE Design Manuals
- ASME Standards
- ASTM Standards
- California Building Code
- California Building Standards Administrative Code
- California Electrical Code
- California Energy Code
- California Fire Code
- California Mechanical Code
- California Referenced Standards Code
- ICEA: Insulated Cable Engineers Association
- IEEE: Institute of Electrical and Electronics Engineers Color Series Handbooks
- IES: Illuminating Engineers Society Applications handbook and Reference Manual
- ILAR: Guide for the Care and Use of Laboratory Animals
- Lab 2000
- Lab Safety Design Guide of Environmental Health and Safety
- Local Ordinances, Regulations of the Local Building Department and Fire Department.
- NECA: National Electrical Contractors Association Recommendations
- NEMA: National Electrical Manufacturers Association
- NFPA
- NFPA 101: Life Safety
- NFPA 13; Sprinkler Systems
- NFPA 14: Standpipe Systems
- NFPA 37: Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
- NFPA 45: Laboratory Systems
- NFPA 72: National Fire Alarm Code
- NIH: Design Policy and Guidelines, Bethesda, MD
- SMACNA Guidelines for Seismic Restraints of Mechanical Systems
- SMACNA HVAC Duct Design Standards
- UCR Design Guidelines
- UCR Lab Design Guidelines
- UCR CAD Standards
- UCR Room Utilization Standards
- UL: Underwriter's Laboratories
- United States Green Building Council (USGBC) LEED Standards

Applicable Campus (UCR or UC) Standards

- Building Standards - From Physical Plant
- Communications Intrastructure Planning Standards - From Computing and Communications
- Lab Design Guide - From Environmental Health and Safety

5.1.1 HVAC Design Criteria

The renovation of Boyce and Webber Hall will provide energy efficient and cost effective HVAC systems that will be arranged for ease of use with future renovations and with long term maintenance.

The core system upgrades and improvements will be designed to allow future areas of the building to be built-out without interruption to other areas of the building.
The new laboratory space will have an HVAC system, which will feature the following:

- VAV Supply Air with Reheat Zone Control
- VAV General Room Exhaust (no return air)
- VAV Fume Hood Exhaust
- Room Pressurization Control with Campus Standard Phoenix Control System
- Fume Hoods Controls with Sash Position and Pressure Sensors
- DDC Control with Safety and Alarm Features

The laboratory will be 100% exhausted (no recirculated lab air). The system will operate 24/7 with night-time (or, non-occupied) volumetric set-back controls as an adjustable energy-saving feature.
The new office spaces (non-lab areas) will have the HVAC system, which will feature the following:

- VAV Supply Air with Reheat Zone Control
- Return Air ducted to new Return Fans at each Air Handler
- DDC Controls with Safety and Alarm Features

The return air from the office will be mixed with outside air at the inlet to the air handlers. This scenario will allow energy conservation with the re-use of office return air. No lab air will be recirculated. Conventional VAV terminal units will be used in the office area (in lieu of the pressure independent Phoenix VAV controllers in the lab area).
Exterior Design Temperature (Based on ASHRAE and UCR Standards)
Summer 110ºF/68ºF wb
Winter 34ºF db

Interior Design Temperatures:

	Winter	Summer
Office Spaces	71ºF	75º
Instructional Labs, Per Laboratory	Design Criteria	
Research Labs and Lab Support		
Mechanical/ Electrical Spaces	65ºF Min.	95ºF Max.

Interior Design Humidity

	Winter	Summer
Office Spaces	Uncontrolled	55% Max.
Instructional Labs,	Uncontrolled	55%
Research Labs and Lab Support		
Mechanical/Electrical Rooms	Uncontrolled	Uncontrolled

Interior Heat Loads (to be confirmed during design phase)

Areas	Equipment Load Watts/SF	Lighting Load Watts/SF	Total
Offices	4.0	1.5	5.5
Wet Labs	Per Lab Des Crit	1.5	Per Lab Des Crit
Dry Labs	Per Lab Des Crit	1.5	Per Lab Des Crit

Filtration Levels:
Offices: 30% Pre-Filers, 85% final filters
Laboratories: 30% Pre-Filters, 85% final filters
Ventilation Rates and Pressures Relationships:
The following ventilation rates are proposed. Data may be subject to change upon review by UCR and finalization of cooling load and make-up air requirements.

Offices:
O.A.: 15 CFM/occupant minimum
Air Circulation: As required by the cooling load
Pressure: Positive relative to ambient and adjacent laboratories
Laboratories: Per Laboratory Design Criteria

Toilets/Housekeeping Closets/Locker Rooms:
Air Circulation: 2 CFM/ s.f.
Pressure: Negative relative to adjacent spaces

5.1.2 Plumbing Design Criteria

The plumbing system upgrade will provide the implementation of cost effective and energy efficient strategies for systems design and arrangements, equipment selection, distribution, and overall systems integration.

Plumbing system components and distribution layouts shall have the following characteristics:

- Protection of the public water supply
- User safety and comfort
- Universal accessibility
- Modular approach
- Energy responsiveness
- Flexibility for future changes
- Durability
- Ease of maintenance
- Reliability
- Redundancy of critical components

The design, layout and installation of all equipment shall be located to encourage routine preventative maintenance by providing easy access for maintenance personnel. Manual isolation valves will be provided to enable servicing, expansion of, renovation or construction of any part of the facility without unscheduled interruption of services in adjacent areas.

Phasing of New Work: Phasing will require the isolation of the branch piping in the core areas. For systems with redundant components such as the domestic water heating, compressed air and vacuum phased change-out keep the unaffected portion of the building operational during construction.

Laboratory gases shall be provided for Boyce Hall where the mechanical core allows time upgrade to be cost effective. The upgrade in Webber Hall will provide an area for laboratory gas bottle storage for the third floor remodel.

For all remodeled areas the emergency shower/eye-wash will be relocated to the laboratory areas.

Water Supply: Water supply pressure shall be maintained between 35 psi minimum and 80 psi maximum at all points. Multiple station pressure reducing valve assembling will reduce incoming service pressure from service pressure to 80 PSI.

Potable water shall be distributed to all domestic fixtures (including wash rooms) and shall be protected from contamination by the use of code approved cross connection control devices and practices.

Hot Water Supply: Hot water shall be distributed throughout the building at a temperature of 120ºF. A hot water return system shall be provided to maintain the hot water supply temperature. A hot water recirculation pump shall be provided, to maintain hot water return at 110ºF.

Hot and Cold Water: A non-potable water sub-service will serve hot and cold water to the laboratory areas and will be protected by reduced pressure principle backflow presenters.

Protected non-potable hot water will be generated centrally by duplex semi-instantaneous steam to water heat exchangers and a master thermostatic mixing valve. This system will provide hot water to all laboratory equipment and other non-domestic facilities. Hot water will be distribution at a temperature of 120ºF. A hot water return system will be provided to maintain the hot water supply temperature.

Laboratory Drainage System: A complete laboratory waste and vent system shall be provided throughout the laboratory areas in the building and shall be separate from the building sanitary system as required by code.

Laboratory sinks, cup sinks and equipment shall be connected by gravity to the laboratory waste system, utilizing plastic piping, which will exit the building independent of the sanitary waste system. Laboratory vent piping shall also utilize plastic pipe and shall run through the roof independent of the sanitary vent system. The laboratory waste effluent will discharge through an exterior prior testing manhole prior to connection to the campus sewer.

A major issue is the upgrading of the sewer system and replacing the piping systems. Historical information by the staff indicate overloading and backups in the existing waste system.

Natural Gas: The natural gas system shall be an extension of the existing system to the building and will be equipped with a meter and regulator. The building distribution system shall be supplied from the meter through the foundation wall and distributed to the laboratories. The distribution system shall include all piping, fitting, valves, vents, regulators and connections.

The natural gas system shall be designed to provide 3 cfh per outlet with a maximum system pressure drop of 0.5 inches water column.

Compressed Air: Laboratory and clean room compressed air is generated centrally via an air compressor system with desiccant dryers, storage tank, and final filters located in the mechanical room. Air compressor intake shall be located on the roof away from all HVAC exhaust, plumbing vents, vacuum exhaust or any other equipment exhausts. The system shall provide a minimum 100 psig at the furthest clean room outlet and 50 psi at the furthest laboratory outlet. All compressed air piping and valves shall be provided washed, capped and cleaned for oxygen service. A central pressure reducing valve shall be located at the compressor to reduce the air pressure for the laboratory usage. Each outlet will supply a minimum of 1 CFM.

Central Vacuum: A central laboratory vacuum system replaced four years ago is located in the mechanical room of the building. The system shall be connected to the outlets and shall provide 1 CFM @ 24" Hg at each outlet. The central vacuum exhaust will run independently through the roof.

RODI Water: New complete central reverse osmosis and deionized water (RO/DI) system with a continuous loop will be provided throughout the laboratories. The system is intended to provide CAP type II (3 to 10 megohm/cm) water to the laboratories and electronic grade (E-1, I 8.2 megohm/cm) water to the clean room. This system shall include a common mixing valve, multi-media, duplex water softeners, carbon filters, carbon recirculation skid and skid mounted RO system with dedicated laboratory storage tank, mixed bed deionizers, controls, PLC control panel and re-pressurization pumps. Each system will include all piping, valves and filters to make a complete system. The system shall include socket fused polypropylene piping with zero static diaphragm valves.

Restrooms: Maximum water consumption of plumbing fixtures shall be as follows:

- Water closet: 1.6 gallons per flush
- Lavatory: 0.5 gpm
- Sink: 1.5 gpm
- Urinal: 1.0 gallons per flush or waterless urinals

Fire Protection: The fire protection system shall be designed as follows:

- The entire facility will be provided with a Class I dry standpipe and a ‘‘wet’’ standpipe and sprinkler system. The system will include a fire department connection, located for convenient Fire Department access.
- The standpipe/sprinkler system shall have 2-1/2" Fire Department Valves (FDVs). In general, all 2-1/2" valves will be inside fire rated stairways to allow Fire Department personnel to access a fire from the stairway. A11 valves will have the same hose thread as per the local Fire Department requirements. At the ceiling and within the stairwell of each floor, each riser shall be provided with a floor zone control valve, complete with vane type flow alarm, inspectors test station and supervised shut-off valve to serve the sprinkler system.

Class I standpipes with 2-1/2" fire department valves shall be located in all exit stairwells. Installation shall comply with NFPA 14.

- Sprinklers shall be provided throughout the building to protect all areas, including electric rooms and elevators. Sprinklers in elevator shafts shall be provided with a shutoff valve and flow switch on the branch line.
- All sprinklers shall be hydraulically designed to meet NFPA 13 and 318, and the Owner’s Insurance Underwriter etc.
- Sprinkler Densities:
  Classrooms and Offices: Ordinary Hazard Group I: 0.15 gpm per sq. ft. over the most remove 1,500 sq. ft.
  Materials Labs and Dry Labs: Ordinary Hazard Group 11: 0.18 gpm per sq. ft. over the most remote 3,000 sq. ft.

This document describes the minimum requirements that must be met for the installation of the Fire Protection work and represents the overall concept of the Fire Protection system and is not intended to present all devices that will ultimately be required to serve the building.

The following is a general system description and associated equipment, which shall be provided for the building:

- A complete fire protection system will be provided, including the new water service, double detector check valve assembly, Class I standpipes and sprinklers. The system shall be in accordance with all authorities having jurisdiction.
- The sprinkler system shall be hydraulically designed and installed as per NFPA 13 and 318.
- Zoned protection of elevator shaft and machine rooms, gas cabinets and laboratory areas shall be provided.

Flow Test:

- A flow test to verify hydraulic performance of the site system shall be conducted during the project design. Flow test will be nm at times, as directed by Owner and Local Authorities.

Pipe and Fittings:

- Sprinklers in hung ceilings shall be quick response semi-recessed type with chrome escutcheons.
- Sprinklers in areas without ceilings shall be upright quick response type with brass finish.
- All heads shall be UL listed and FM approved type.

System Installation:

- The entire facility shall be sprinkled in accordance with the Authorities having jurisdiction, including the University's Insurance Underwriter, Campus Fire Marshall, and NFPA Guidelines. The system shall be installed in accordance with these Guidelines, including all skylights, penthouses and basements.
- All piping systems and equipment shall be identified in accordance with current ANSI Standards.

5.1.3 Electrical Design Criteria

The renovation of Boyce and Webber Halls will provide energy effective and cost effective systems for everyday operations. The core system upgrades and improvements will allow future area remodels to be connected without interruption.

New laboratory space will have an electrical system, which will feature the following:

- Energy efficient lighting
- Lighting controls, which meet Title 24 requirements
- Light levels designed to meet Title 24 requirements
- Reliable power through a new emergency power system
- Flexibility for future changes
- Emergency Power for critical components
- Task lighting
- Independent 208Y/120V, 3P, 4W Distribution Panels
- Telecommunications / Data
- Card reader at main access point

All laboratory lighting will be designed for 7/24 operations. The electrical controls will be capable of automatically reducing power consumption when areas are unoccupied, on/off wall switches will be located in each Lab.

The new office spaces (non-lab areas), will have an electrical system which will feature the following:

- Energy efficient lighting
- Lighting controls, which meet Title 24 requirements
- Light levels designed to meet Title 24 requirements
- One quad outlet per person
- Telecommunications / Data
- Task lighting

The existing Vivarium space will have an electrical system which will feature the following:

- Independent emergency power generator
- Emergency power receptacles for critical loads
- Egress lighting
- Reliable power to Mechanical equipment
- 480/277V, 3P, 4W and 208Y/120V, 3P, 4W power panels

Design loads

	Equip/ Receptacles	Lighting
• Laboratory	25-30 VA/ square foot	1.6 VA/ square foot
• Office	5.0 VA/ square foot	1.3 VA/ square foot

- Normal Power System
- 480Y/120V, 3P, 4W and 208Y/120V, 3P, 4W
- Dead front switchboards and panels
- Step down transformers
- Motor control centers
- Wiring devices

All panels in the core area of Boyce Hall will be replaced.
All panels and devices in remodeled areas of Boyce Hall will be replaced.
All panels throughout Webber Hall will be replaced.
All new duplex and special purpose receptacles will be on separate power circuit.

Emergency Power System
Two standby emergency diesel engine generator sets (one existing, to be used for the Vivarium and one new for Boyce and Webber Halls), will supply electrical power in the event of loss of normal power. The new generator shall be 480/277V, 3-phase, 4-wire, 60 Hz, 0.8-power factor. The preliminary size for the standby generator, which will serve Boyce and Webber Halls, is 1500 kW. The actual capacity of the new generator will need to be verified during the design process. The base mounted storage tank shall have a minimum of 24 hours fuel capacity.

Life Safety
- Egress lighting (0.33 VA/ square foot)
- Exit Signs
- Fire Alarm Equipment (0.25 VA/ square foot)
- HVAC Controls and Combination Fire Smoke Dampers (CFSD)
- Generator Fuel Pump

Code required Stand-by System Power
- Mechanical smoke control equipment
- Fume hood exhaust system
- Building Automation Systems (BAS) and accessories

Additional Stand-by System Power
- Selected laboratory equipment (8VA/ square foot) placed on one (1) 208V, 30 amp, 1 phase (3 wires + ground) receptacle per lab
- Environmental rooms
- Additional lighting in selected areas
- Security system
- Telecommunications closets

The generator control switchgear circuit breakers and unit substations will provide power to the emergency and normal side of each transfer switch, respectively. Transfer switches will be provided in each building (Webber and Boyce Halls). The load side of each transfer switch will feed emergency distribution switchboards. A programmable microprocessor will be provided (one for each building) for automatic exercising.

Lighting Systems
Light fixtures will be replaced as each area is remodeled. All lighting shall meet or exceed the current requirements of Title 24 energy conservation standards. Lighting levels shall conform to the Illumination Engineering Society's recommendations. The targeting levels are as follows:

Lighting Levels
- Laboratory 60-80 fc
- Office 50-70 fc

Fluorescent, 2'x4' lay-in grid and recessed
- 277 volt
- T8, 2 lamp
- 4 foot rapid start
- Minimum Color Rendering Index of 75
- 3500oK color temperature
- High efficiency solid state ballast
  - High power factor
  - Class A
  - Auto-restarting built in thermal protection
  - 10% Maximum Total Harmonic distortion
  - LED Exit Signs

Emergency/Night Lighting
Lighting Control System
- Dual Level Switching
- Day Light Switching
- Outdoor Lighting – Photo Cell on / Time Clock off
- Occupancy Sensors
  - Offices
  - Equipment Rooms
  - Lounges
  - Classrooms
  - Circulation areas, etc.

Grounding
- Ground Bus in each telephone/Data room
- Provide separate ground conductor for each single or 3-phase feeder or branch circuit
- Grounding and Bonding per NEC 250

Fire Alarm System Description
- Addressable, microprocessor-based system
- Emergency Power Supply
- LED Display
- Batteries
- Solid State Control Panel
- Complete automatic and manual systems per UCR Standards.

Security System
- Designed per the UCR Standards
- Card Readers
- Exterior Building Access
- Selected Labs
  - Door Alarm Contacts
  - Electronic Door Hardware
- Wired through hinge side of door
  - Locate panels in Communications / Data rooms

Telecommunications System
Provide environmentally controlled communications (IFD) room on the fourth and fifth floors. These rooms will be connected to the MDF room on the first floor by (4)-4" conduits. All communications wire from the sixth floor Vivarium will be extended from the present backboard location to the new IFD through the use of '110 blocks'. All required wire and cabling for voice and data circuits will be provided. The system shall meet EIA/TIA-569 standards and the University Design Standards. Cabling hardware and network equipment will be included in the construction cost. The university's communications services will install the network equipment.

System to include:
- Environmentally controlled Communications/Data (IFD) rooms (Stacked for convenience)
- 4-11/16" square x 2-½" deep outlet box w/single gang mud ring per Telecommunications / Data outlet
- Locations per "Space Diagrams" located in this document
- 1-½" minimum conduit from outlet to cable tray or Communications / Data room
- 4'x8'x 3/4" Telecommunications backboard
- Ladder type Cable Tray in corridors
- Cable raceways, cables, wire
- 19" Network Racks
- Network Hubs and switches
- Multi-mode Fiber optics
- Wire and cable
- For this DPP, CAT 5e is recommended were Electro Magnetic interference (EMI) is minimal. Where EMI is High, CAT 7 might need to be used.

Where cable tray penetrates fire rated or smoke partitions, the tray will terminate into 4" conduit sleeve, quantity to be equal in area to cable tray.

5.1.4 Architectural Design Criteria

All materials and techniques shall be as suitable for Labs and Educational Spaces in B Occupancies in buildings of Type I Construction.

Materials for Exterior Additions shall be:

- Rooftop enclosure for enclosed walkway from north elevator tower to the vivarium.
- Exterior Walls: Cement Plaster on Metal Stud (load bearing) Construction with R-19 Batt insulation.
- Roof: Insulating Polyurethane Foam with Topcoat Membrane over deck.
- Ceiling: Suspended Gypsum Board or Acoustical Ceiling per interiors standards below.
- Flooring: Finish per Interior Standards below on proper floor prep on leveling slab as required.

Materials for Interior Construction shall be:

- Gypsum Wall Board on Metal Stud Partitions.
- Suspended Gypsum or Suspended Acoustical Tile Ceilings at locations indicated and/or to be determined (estimate approximately 50% of project).
- Doors and Frames: Hollow Metal Frames, Solid Core Doors.
- Flooring: Carpet with top-set base, Welded Sheet Vinyl with integral cove base, and Vinyl Tile with top-set base as applies per Detailed Room Requirements. Ceramic Tile at toilets.
- Wall Finishes: Paint throughout except with Ceramic Tile wainscot at wet areas and toilets.
- Elevator Fire/Smoke Rating (per CBC 403.7, 1004.3.4.5 and 1004.3.4.3.2.1): Won-door System or Equal (Fire and Smoke).

5.2 Systems Design Approach

5.2.1 Webber Hall Systems Design Approach

HVAC DESIGN CONCEPTS - WEBBER HALL

Although some renovations were done on the HVAC system at Webber Hall in 2001, the basic system type will be changed for better system performance and energy conservation, without having to replace any of the equipment installed in 2001. The air distribution system for the third floor will be upgraded from dual duct constant volume (CV) to variable air volume (VAV) on both the supply and exhaust side. This will be accomplished with modifications to the existing AHU to arrange the heating and cooling coils in series, and utilizing both the existing hot and cold ductwork for cold air only. This will increase the cooling capacity of the units, with an increase in the size of the chilled water coils. Lab air control valves with reheat coils will be installed to replace the current dual duct CV mixing boxes. Ductwork with internal lining (in lieu of external wrapped insulation) will be replaced. The new reheat coils will be supported by a new heating hot water system, including a steam to heating hot water heat exchanger, and hot water distribution pumps.

On the exhaust side, the small existing exhaust fans shall be replaced with redundant fans for the entire building with an exhaust manifold on the roof as stated in the Laboratory Design Criteria. A common stack on the fans will be provided, similar to the current Boyce Hall modifications. The existing vertical exhaust duct risers will be removed and manifolded per floor. Lab air control valves will installed for the fume hoods, as well as for new general exhaust registers to make the exhaust system VAV.
The existing outdated pneumatic controls system for room temperature control will be replaced with DDC controls, including room pressurization monitoring. Occupancy sensors as well as sash height sensors will be used as part of the new fume hood controls.

Core building infrastructure is any system or part of a system that affects the entire building, or multiple zones of the building. Core HVAC infrastructure includes:

- Air handling Units
- Exhaust Fans
- Supply and Exhaust Duct System (vertical duct risers)
- Chilled Water System
- Heating Hot Water System (pumps, AHU coils, vertical riser piping)

- Steam and Condensate Return System
- Building Energy Management and Controls System (operator workstation, programming and vertical communication backbone)

Tenant improvement building infrastructure is any system or part of a system that affects each room individually, and can be replaced or upgraded as part of a room or area renovation. Tenant improvement HVAC infrastructure includes:

- Supply and Exhaust Duct System (lateral duct runs, terminal units, and air control valves)
- Fume Hoods
- Heating Hot Water System (lateral piping runs and reheat coils)
- Building Energy Management and Controls System (thermostats, room controllers, horizontal control wiring and fume hood controls)

The third floor of Webber is slated for lab renovation under this project. Since there is one AHU dedicated to serving the entire third floor (and, a small part of the south end of the second floor), renovation to the supply-air side of the third floor will not affect the first two floors. Since the building exhaust is currently accomplished per room, modifications to the exhaust system on the third floor will not affect the other two floors either.
Upgrades to the core infrastructure will be installed in parallel with existing systems. At the time of system changeover, there will be a short downtime for the building, but this should not be more than a weekend. For systems that cannot tolerate any interruption, a temporary system can be arranged to keep the critical areas on-line during the changeover.

Most of the equipment that was installed in the 2001 HVAC renovation will remain. This includes both air handling units, the chilled water system, the condensate receiver and return system and the mechanical room DDC controls. However, the air handling unit that was rebuilt should be investigated for excessive vibration, possibly having the fan wheel balanced or the spring isolators and seismic restraints replaced. The coil configuration of the air handling unit serving the third floor will need to be modified as well, as described above. The remodel of the lab areas (third floor) will decrease the number of fume hoods from a total of 6 to 4; therefore the existing air handling units will have adequate capacity for the new fume hood density in renovated areas.

PLUMBING DESIGN CONCEPTS – WEBBER HALL

- Compressed Air: It is believed that the compressed air system was installed at the time the building was built. From observation at the site, it appears that the compressors are original and have exceeded their useful life. The laboratory air compressor system will be replaced.
- Vacuum System: Reports are that the vacuum pumps were replaced four years ago and therefore subject to maintenance issues only at this time.
- RO Water: Due to the different occupancies and requirements of the laboratories in Boyce and Webber Halls, and reported pressure problems in Webber, both buildings will have its own system.
- Plumbing: The plumbing system is routed through the ceiling space above and below the laboratories. Some areas have exposed ceilings where the piping is readily available. Generally, any work involving the distribution piping will require interruption of the laboratory function or experimentation.
- The industrial hot water system will require a complete upgrade due to pitting of piping, frozen valves and inoperable faucets. This is all the result of aging. A major concern is the possibility of asbestos insulation around the piping. An abatement program may be required in order to replace some of the existing piping.
- It is a concern that the autoclave areas do not have floor drains. The recommendation then should be to provide drains in each room as needed for the sterilizers to discharge their waste. In routing the discharge piping from the sterilizers, a heat sink will be required to reduce the waste temperature prior to disposal.
- Roof scuppers have been blocked off at several locations. The scuppers should be reactivated or an overflow roof drainage system should be installed to assure visible means of detecting clogged roof drains as required by code.
- The Emergency showers will require replacement or upgrading to current standards. In addition, floor drains should be provided at the same location. The fixture should be relocated to the laboratory areas for quicker access in the event of an emergency.
- As with Boyce Hall, a combination wet standpipe/sprinkler system is recommended. Sprinkler response time would be quicker and the insurance of an active fire protection system protecting the structure and content while the building is unoccupied would provide a secure feeling.

ELECTRICAL DESIGN CONCEPTS –WEBBER HALL

- Provide larger emergency service from new generator, approximately 600 kW. Extend emergency power to all labs for critical loads, which have a potential for damage during short power shutdowns. For more information on the generator, see description in Boyce Hall above.
- Replace main switchboards and 4.16KV transformer in basement. Replace all outdated motor control centers, and panel boards throughout building. Provide additional branch circuit distribution panels where spare circuits are at a minimum. Branch circuit distribution panels will be replaced as part of the infrastructure upgrade. Provide power factor correction for larger motors as required.
- An alarm system will be installed to notify the Campus Police Station, the Central Steam Plant Control Room and the Electrical Shop, of loss of electrical power to the building.
- Provide new light fixtures in all areas being remodeled under this project scope. In an effort to conserve energy, occupancy sensors will be provided in all conference rooms, storage facilities, bathrooms, assembly areas and offices. Dual level switching will be provided in all areas greater than 100 square feet and daylight switching will be provided in all areas greater than 250 square feet, with exterior windows and/or skylights. Provide LED lit exit signs throughout entire building.
- Provide egress lighting in all lab areas and restrooms.
- The fire alarm system will be upgraded and expanded to provide the required, annunciators, smoke detectors, heat detectors, manual pull stations, horns and strobes. A new fire alarm control panel with fiber optic access card shall be installed.
- Upgrades will be made to the grounding systems in the electronics laboratories.
- Security access will be provided at areas that are sensitive in nature or pose a threat to life; card readers will regulate access to these areas. Exterior door card readers shall have a key override on the exterior with cylinders compatible with door locks. Interior doors shall have “storeroom function locks” with electric strikes. Upgrade security panels. All security wiring shall be installed in conduit
- Provide one MPOE (MDF) room in the basement and one IDF room on the third floor, to house the telephone / data equipment, backboards, data racks security and fire alarm panels. The IDF room will be centrally located and as close to the center of the corridor as possible; reducing the length of the branch wiring. The MDF should be located as close to the existing communications cabinet as possible. Both rooms will be air-conditioned. The IDF and the MDF rooms will be interconnected by (4) 4" conduits. Extend new phone and data lines from MPOE (MDF) to the new BDF rooms. All older CAT 3 wire with CAT 5e wire will be replaced as areas are remodeled. Six (6) strands of Multi-mode fiber optics will be extended from the MDF rooms to the IDF room. The copper count for the telephone system from the MDF to each IDF will equal the anticipated voice ports to be supplied by the IDF room plus 25% growth. All new communication and data wire will go to these new rooms. All existing communication and data wire not being replaced as part of the tenant remodel will remain connected to the existing phone boards. All wire, cable, switches and devices necessary to produce a fully functional system will be provided. Permanent taps will be installed to all substations and a disconnect switch provided for safe and rapid connection to a portable electrical generator.
- The infrastructure contains the main electrical distribution equipment. Amongst others, these include the unit substations, secondary distribution boards, motor control centers, telephone backboards and the central fire alarm system. Most work extending beyond the walls of the first floor electrical room or equipment area will be deemed tenant improvement work. This will include power to all labs and areas, replacement of all panels in the corridors and labs, fire alarm strobe and horn installation and distribution of the emergency power.
- To allow for the installation of the new main switchboard at the unit substations, a temporary switchboard and generator will be installed to allow for minimal power interruption. This work will be planned and scheduled for the weekend when the need for power is at its lowest level. From the new primary switchboard, a new secondary system will be extended. Transfer of existing circuits to the new secondary distribution system, will take place on the weekend.
- The “Loss of Power Building Alarm”, fire alarm, exterior security system and emergency generator work will be performed during regular business hours.
- System backbones will be installed as core (infrastructure) installations. The remainder of the work shall fall under tenant improvement and will be performed as each space or floor is remodeled.

5.2.2 Boyce Hall Systems Design Concept

HVAC DESIGN CONCEPTS - BOYCE HALL

All core building infrastructure not replaced under the Boyce Hall HVAC Renewal Project shall be replaced due to the age of the equipment. In the first floor mechanical area this includes the chilled and heating coils in the AHU's, the associated heating and cooling coil control valves, VFD's for chilled water pumps, and a new condensate receiver and return pumps. In the vertical core area this includes replacing the exhaust ductwork risers. Construction budget and space constraints shall dictate the extent for manifolding the exhaust on a floor-by-floor basis. New lab programming will likely cause an increased load on the HVAC system. For this case, components installed in the Renewal Project will require replacement.

The long term goal of the new HVAC upgrade will be to convert the dual duct air system to single duct VAV. This will provide additional air to serve the laboratory space. This would involve either replacing the supply duct mains or using both the hot and cold duct for cold air. The dual duct mixing boxes will be replaced with cooling only VAV boxes with reheat coils. Arranging the heating and cooling coils in series in the AHU (as opposed to the current dual duct parallel arrangement) will also give the units more cooling capacity, possibly alleviating the need to change out the air handlers.

As part of the renovation of the fourth and fifth floors, new duct laterals, terminal units, reheat coils, lab air control valves, fume hoods and associated controls will be installed. Occupancy sensors as well as sash height position sensors will be employed with the new fume hood controls. The newly installed air control (Phoenix) valves and reheat coils will be salvaged and reused form the Boyce Hall HVAC Renewal Project. Larger heating water distribution pumps will be installed to support the additional reheat coils and piping.

Currently all areas of the building have 100% of the supply air exhausted. This includes labs where 100% exhaust is prudent, and office areas where return air systems could save energy costs. With the new layout of the 4th and 5th floors, an opportunity for energy conservation presents itself. With the offices clustered into two large adjacent areas, air can easily be returned from these areas back to the air handling units. Returning the air from office areas instead of exhausting this conditioned air unnecessarily from the building will save energy. The temperature of the return air should be close to the room temperature set point, which is 72°F and 50% RH. This return air requires substantially less cooling than the typical outside air it will replace, which can be as hot as 110°F on a design cooling day. To accomplish the addition of a return air system, new return air ductwork risers and laterals will need to be installed in the core area, bringing the return air from the office areas back to the outside air intake plenum of each unit. A total of two new return air fans with VFD's will be installed in the mechanical core area close to the outside air plenum of each unit to draw air back to the units.

The existing HVAC systems serving the east and west side of the Vivarium on the sixth floor will be replaced with a stand alone system. The equipment will be 100% redundant, and on emergency power. A dedicated exhaust system, also on emergency power, will be installed for the Vivarium, with a discharge nozzle sufficient to get the plume for above the roof deck and adjacent pedestrian areas.

The core building infrastructure is defined as systems (or, part of a system) that affects the entire building, or multiple zones of the building. Core HVAC infrastructure includes:

- Air handling Units
- Exhaust Fans
- Supply and Exhaust Duct System (vertical duct risers)
- Chilled Water System
- Heating Hot Water System (pumps, AHU coils, vertical riser piping)
- Steam and Condensate Return System
- Building Energy Management and Controls System (operator workstation, programming and vertical communication backbone)

The tenant improvement (non-core) building infrastructure is defined as systems (or, part of a system) that affects each room individually, and can be replaced or upgraded as part of a room or area renovation. Tenant improvement HVAC infrastructure includes:

- Supply and Exhaust Duct System (lateral duct runs, terminal units, and air control valves)
- Fume Hoods

- Heating Hot Water System (lateral piping runs and reheat coils)
- Building Energy Management and Controls System (thermostats, room controllers, horizontal control wiring and fume hood controls)

The tenant improvement infrastructure work associated with the proposed fourth and fifth floor lab remodel work will be able to be completed without significant distribution to the rest of the building. This is due to the modular nature and floor by floor isolation inherent to the systems design.
Upgrades to the core infrastructure will be installed in parallel with existing systems. At the time of system changeover (from old to new system operation), there will be a short downtime but this should not be more than a weekend. For areas of the building that can not tolerate interruption, a temporary system will be arranged to keep the critical areas on-line during the changeover.

Barring significant program changes, all equipment installed under the current Boyce Hall HVAC Renewal Project will be considered as existing to remain. This includes heating hot water pumps and associated VFD's, reheat coils, expansion tank, air separator, AHU supply fans and associated VFD's, Phoenix lab air control valves, large roof-mounted exhaust fans and associated exhaust manifold, and all DDC controls. The remodel of the lab areas (fourth and fifth floors) will decrease the number of fume hoods from a total of 28 to 16; therefore the existing air handling units will have adequate capacity for the new fume hood density in renovated areas.

PLUMBING DESIGN CONCEPTS – BOYCE HALL

- The core area contains the central plumbing utility distribution center including the service generating equipment. These include the hot water tanks (industrial and potable) and the air compressors and vacuum pumps. Centrally located, the core area serves as the simplest and most direct route to the laboratory facilities. Additions and modifications can be accomplished without disturbing the services to other occupied spaces. The importance here would be to assure adequate isolation valves are installed during modernization so that there will be adequate flexibility as to where a new laboratory can be served.
- A central source fort the laboratory gases shall be installed. This would ease the traffic congestion in the hallways as well as provide a convenience for the delivery of the bottles.
- Relocation of the emergency shower/eye-wash to the laboratory areas where it is most needed will improve on the access time. This is especially important where panic can be a major factor in reaction to locating the emergency fixture.
- A major issue would be the upgrading of the sewer system and replacing the piping systems and outdated equipment. Historical information by the staff indicates overloading and backups in the existing waste system.
- Phasing of New Work: Phasing would require the isolation of the branch piping in the core areas. Since there are duplicate equipment such as the domestic water heater, air compressors and the vacuum pumps, changing out one at a time would be favorable to keeping the unaffected portion of the building during construction active.
- Restrooms: Maximum water consumption of plumbing fixtures shall be as follows:
  - Water closet: 1.6 gallons per flush
  - Lavatory: 0.5 gpm
  - Sink: 1.5 gpm
  - Urinal: 1.0 gallons per flush or waterless urinals
- Compressed Air System: Laboratory Compressed Air System: Installed in 1974, the compressed air system delivers 100 CFM @ 90 psi. The compressor has a 40 horsepower and a 30"x84" receiver tank. From observation at the site, it appears that the compressors have exceeded the useful life. Outlets at the laboratories will supply 1 CFM.
- Vacuum System: Boyce Hall has two separate systems – One is a 15.9 CFM Free Air vacuum pump with a 3 horsepower motor and an 80 gallon receiver. The other system is a duplex system with capacities of 145 CFM @ 25" Hg and has a 10 horsepower motor. A single receiver size is unspecified. The vacuum pumps were replaced four (4) years ago. Life expectancy of a unit is 10,000 hours of operation and the pumps generally require a complete overhaul soon after. Inlets at the laboratories will be sized for 1 CFM minimum.
- Natural Gas: A medium pressure gas service is routed to the building where it is split into two lines having regulators with reduction to 1 psi and 8" w.g. services. Service outlets at the laboratories will be sized for 3 CFH each.

- Water: The water service to the building is 4". From there, the service is divided into a 3" industrial cold water service and a 2-1/2" potable cold water service to the system.
- RO Water: A 2" service from the equipment located in the 5th floor core area. The existing system serves both Boyce and Webber Halls. Service is routed thru the second floor ceiling space from the core area to Webber Hall.
- Laboratory Acid-Resistant Waste & Vent System: All glass piping in the core area should be replaced with polypropylene pipe (Fuseseal) as required by the Laboratory Design Criteria and per the Fire Marshal's requirements. Piping in the laboratory areas can be replaced when the facilities are modified.
- Fire Protection: The existing system consists of a separate 3" wet fire service to the hose cabinets located in the corridors and a 4" dry standpipe located in the stairwells on the north and south ends of the building. In order to meet current requirements, the existing fire protection system should be tied into the wet fire protection service. Per NFPA 14, dry standpipe systems are only acceptable in freezing climate. The hose cabinets should be replaced with a complete building sprinkler system so that activation time would be localized and at a minimum response time. This is particularly important when the building is unoccupied. The combination system then, would require that a new 6" service to the building be provided.
- Plumbing system: it was noted during a site visit that the waste system occasionally backs up. The main service apparently is very shallow and to correct this, would be to realign the service for proper flow.
- Emergency Shower/Eye Wash requires upgrading to meet with current life safety regulations – i.e. tempered water, etc.
- Steam: The piping system has been active in the building for almost 30 years and is due for replacement.

ELECTRICAL DESIGN CONCEPTS – BOYCE HALL

A new diesel standby power generator, sized to handle all life safety and critical building loads associated with Boyce Hall, Webber Hall and the Computer Statistics building, will be installed at grade level on the south side between Boyce and Keene Halls. A new automatic transfer switch will be sized and installed to handle the building loads. Emergency power will be extended to all labs, for critical loads, which have a potential for damage during short power shutdowns.

The existing 150KW diesel standby power generator located of the roof will be used exclusively for the Vivarium. A new automatic transfer switch will be sized to provide emergency power for all life safety, critical and normal power needs of the Vivarium, including mechanical loads.

All branch circuit distribution panels will be replaced as part of tenant improvements activities. Additional branch circuit distribution panels will be provided in the core area where spare circuits are at a minimum.
All light fixtures will be replaced as areas are remodeled. In order to conserve energy, occupancy sensors will be provided in all conference rooms, storage facilities, bathrooms, assembly areas and offices. Dual level switching will be provided in all areas greater than 100 square feet. Daylight switching will be provided in all areas greater than 250 square feet with exterior windows and/or skylights.

Egress lighting system will be upgraded to provide one footcandle of illumination on all exit paths. Additional egress light fixtures will be provided in the corridor areas as required. Egress lighting will be provided in all lab areas, restroom, and where main electrical equipment is located.
The fire alarm system will be upgraded and expanded to provide the required annunciators, smoke detectors, heat detectors, manual pull stations, horns, strobes and to meet today's code standards. A new fire alarm control panel with fiber optic access card will replace the existing control panel.

Upgrades will be made to the grounding systems in the electronics labs and lab support areas.

Security access will be provided at all areas that are sensitive in nature or pose a threat to life; card readers will regulate access to these areas. Exterior door card readers shall have a key override on the exterior with

cylinders compatible with door locks. Interior doors shall have “storeroom function locks” with electric strikes. All security wiring shall be installed in conduit. All security system equipment will be installed per Campus Building Standards Guide.

New dedicated IDF rooms to house the telephone/data equipment, backboards, data racks, security and fire alarm panels will be provided on the forth and fifth floors. These dedicated and air-conditioned rooms will be stacked and located as close to the central core area as possible; reducing the length of the branch wire. The telephone /data rooms (IDF) and the MPOE (MDF) will be interconnected by (4) 4" conduits. All older CAT 3 wire will be replaced with CAT 5E wire as areas are remodeled. Six (6) strands of Multi-mode fiber optics will be extended from the MDF rooms to each IDF room. The copper count for the telephone system from the MDF to each IDF will equal the anticipated voice ports to be supplied by the IDF room plus 25% growth. Since the sixth floor Vivarium is fed from the existing fifth floor communications backboard in the core area, 110 blocks will be used to extend the communications lines from the core area to the new IDF rooms. All wire, cable, switches and devices necessary to produce a fully functional system will be provided. The “Loss of Building Power Alarm”, fire alarm, interior and exterior security system and emergency generator work will be performed during regular business hours.

The system backbones will be installed as core (infrastructure) installations. The remainder of the work would fall under tenant improvement and would be performed as each space or floor is remodeled.

project implementation strategy

CHAPTER 6

6.0 Project Implementation Strategy

Implementation strategies have been studied recognizing that both buildings must remain occupied during the construction and with the goal of causing the least disturbance and least relocation for the occupants as possible. The goal is also to limit the number of construction phases and restrictions on the general contractor, which may result in higher cost.

It should be noted that although the goal during construction is to plan for the least disturbance to occupants as possible, a renovation project of this nature will, nonetheless, create disturbances. A detailed plan for coordination with the General Contractor will be included in the construction contract to set allowable limits and indicate procedures to handle these disturbances.

With this in mind, and on the basis of our current understanding of the outcomes of the College of Natural and Agricultural Science Master Space Plan, the DPP Committee recommends the following strategy.

The status of the buildings at the start of the remodel assumes that the west sides of the fourth and fifth floors of Boyce Hall and Webber third floor have been vacated prior to the start of construction of this project in October of 2008. The Boyce spaces are planned to be vacated in summer of 2006 according to current plans to move these occupants to new facilities now being built. Additionally, the DPP Committee agreed the third floor of Webber Hall could be vacated by relocating some staff and functions to new facilities and some within Webber or Boyce Halls.

The sequence of events to complete the project is outlined as follows:

Step 1

A. Occupants vacate Webber third floor and the west sides of Boyce fourth & fifth floors.
B. Complete any required hazardous material abatement of these areas and areas of core infrastructure to be renovated.

Step 2

A. Initiate the core infrastructure construction of both Webber and Boyce; this work must be coordinated with the tenant improvements and will need to reach a stage of completion that will support the TI renovation and occupancy.
B. Complete the tenant improvements of the west sides of floors four and five of Boyce Hall and third floor of Webber Hall.
C. Obtain a partial Certificate of Occupancy (CO) for the completed tenant areas.
D. Concurrently, if accepted as an alternative bid, complete the systems, improvements slated for the Vivarium Facility at the 6th floor of Boyce Hall.
E. Move the occupants of the east sides of Boyce Hall fourth & fifth floors to the west sides of Boyce Hall.
F. Move the occupants from the west side of Boyce third floor to the third floor of Webber.

Step 3

A. Complete the tenant improvements of the east sides of floors four and five and the east side of the third floor of Boyce Hall.
B. Obtain a Certificate of Occupancy (CO) for the completed construction project.

Step 4

A. On the basis of the College of Natural and Agricultural Science Master Space Plan at the time of completion, move new occupants into the east sides of floors four and five and east side of the third floor of Boyce Hall.

These steps will result in two phases of construction: The first phase includes initiation of the core infrostructure renovation in both buildigs and the ‘tenant improvement’ (TI) renovation of the third floor of Webber and the west sides of Boyce Hall’s fourth & fifth floors. The second phase includes the completion of the core infrastructure renovation in both buildings and the ‘tenant improvement’(TI) renovation of the east sides of Boyce fourth and fifth floors and west side of the the third floor. The only phasing restriction is the first phase TI construction must be completed and occupied before the second phase TI can begin.

Note that the first phase of construction is loaded to complete the most work as this will minimize the loss of ‘purchasing power’ due to escalation. It should be pointed out that in a more ideal setting, if other facilities could be found or created to temporarily house the 4th and 5th floor east occupants of Boyce Hall, the construction could be completed in a single phase allowing more maximization of value.

budget and cost plan

CHAPTER 7

7.1 Basis of Cost Plan

BASIS OF COST PLAN

Cost Plan Prepared From

Boyce Hall Interior Planning Options (Option B) dated 15 February 2005

Work Description Narrative (part of Cost Matrix Strategy Options) dated 14 February 2005

Cost Matrix Strategy Options dated 14 February 2005

Area Calculations provided by Chong Partners dated 01 March 2005

UCR Area Calculations dated 12 May 2005

Discussions with the Project Architect and Engineers

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BASIS OF COST PLAN

Conditions of Construction

The pricing is based on the following general conditions of construction

A start date of October 2008

A construction period of 24 months

The general contract will be competitively bid with qualified general and main subcontractors

There will not be small business set aside requirements

The contractor will be required to pay prevailing wages

The general contractor will have limited access to the site during normal working hours

The buildings will be in operation during construction

7.2 Scope Inclusions and Exclusions

INCLUSIONS

The project on the campus of University of California, Riverside consists of the renovation of the existing Boyce Hall and Webber Hall.

The Cost Plan is based on the assumption that the project will be procured as a single contract.

All costs provided are presented at current (2005) pricing levels with a separate allowance for escalation up to midpoint of construction calculated at 6% per year for the first year and 4% per year thereafter.

The Cost Plan is presented in four different sections; Boyce Hall - Core / Vertical, Boyce Hall - TI / Horizontal, Webber Hall - Core / Vertical, Webber Hall - TI / Horizontal.

The Core / Vertical renovation for both buildings includes the mechanical, plumbing and electrical upgrades (core and vertical), architectural upgrades to the core relative to the MEP upgrades, ADA / Code upgrades and vivarium upgrade.

The TI / Horizontal renovation includes interior fit-out for the following areas:

Third floor - Webber Hall
Third floor (half floor - west side) - Boyce Hall
Fourth floor - Boyce Hall
Fifth floor - Boyce Hall

The renovation includes the following scope of works:

ADA / Code upgrades

The ADA / code upgrades are limited to new code required signage, stairs handrails/ nosing and new ADA compliant hardware (core spaces only).

Plumbing

Includes sanitary and institutional fixtures (installation and local connection only), floor drains, laboratory process generation equipment and distribution pipework, including air, vacuum, industrial hot and cold water, special gases, acid waste and test port, animal watering systems, gas and roof drainage.

Heating, Ventilating & Air Conditioning

Includes campus fed CHW and steam, thermal expansion compensation and circulation equipment, pipework distribution including heated hot, chilled and condensate drainage, air handling units - replace and upgrade, fan-coil units, terminal boxes and sound attenuation. Air distribution and return, including laboratory exhaust ventilation, building management and laboratory pressurization controls and general ventilation.

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INCLUSIONS

Electrical

Includes normal power and distribution, emergency power generation and distribution, MEP - machine and equipment and user convenience power, lighting, lighting controls, telephone/data, CATV and audio/visual - conduit only, complete fire alarm system and an allowance for security.

Fire protection

Includes a complete automatic wet sprinkler system..

Interior fit-out

Includes new partitions, new doors, floor, wall and ceiling finishes, building specialties (including toilet partitions and accessories, signage, window treatment, fixed caseworks), allowance for laboratory caseworks, fixtures, fittings and Group I equipment.

BIDDING PROCESS - MARKET CONDITIONS

This document is based on the measurement and pricing of quantities wherever information is provided and/or reasonable assumptions for other work not covered in the drawings or specifications, as stated within this document. Unit rates have been obtained from historical records and/or discussion with contractors. The unit rates reflect current bid costs in the area. All unit rates relevant to subcontractor work include the subcontractors overhead and profit unless otherwise stated. The mark-ups cover the costs of field overhead, home office overhead and profit and range from 15% to 25% of the cost for a particular item of work.

Pricing reflects probable construction costs obtainable in the project locality on the date of this statement of probable costs. This estimate is a determination of fair market value for the construction of this project. It is not a prediction of low bid. Pricing assumes competitive bidding for every portion of the construction work for all subcontractors and general contractors, with a minimum of 4 bidders for all items of subcontracted work and 6-7 general contractor bids. Experience indicates that a fewer number of bidders may result in higher bids, conversely an increased number of bidders may result in more competitive bids.

Since Davis Langdon has no control over the cost of labor, material, equipment, or over the contractor's method of determining prices, or over the competitive bidding or market conditions at the time of bid, the statement of probable construction cost is based on industry practice, professional experience and qualifications, and represents Davis Langdon's best judgement as professional construction consultant familiar with the construction industry. However, Davis Langdon cannot and does not guarantee that the proposals, bids, or the construction cost will not vary from opinions of probable cost prepared by them.

EXCLUSIONS

Compression of schedule, premium or shift work, and restrictions on the contractor's working hours

Design, testing, inspection or construction management fees

Architectural and design fees

Scope change and post contract contingencies

Assessments, taxes, finance, legal and development charges

Environmental impact mitigation

Builder's risk, project wrap-up and other owner provided insurance program

Land and easement acquisition

Cost escalation beyond midpoint of construction

Structural upgrades

Elevator upgrades

Upgrades to existing Vivarium equipment and caseworks

Owner supplied and installed furniture, fixtures and equipment

Loose furniture and equipment except as specifically identified

Plumbing

Water heat generation equipment

Hose bibbs

Sewage ejectors and sump pumps

Natural gas service connection upgrades

Site utility upgrades

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EXCLUSIONS

Compressed air, vacuum, RO/DI and special gases to Vivarium

Pre-action sprinklers to specialty areas

Waste, vent and domestic service pipework renewal - Webber

Vivarium plumbing upgrades (excepting domestic water booster pump)

Works to Vivarium sprinklers

HVAC

Boyce Hall exhaust fan replacement

Heat exchangers, expansion tanks, HHW circulation equipment, chilled water pumps - Boyce Hall

Humidification

HEPA filtration

Independent 3rd Party Commissioning MEP systems

Phoenix valves to Webber laboratory T.I. Space

Chilled water systems to Webber

Vivarium HVAC 'fit-out' Works & replacement of chilled water, HHW generation equipment and pipework,

Electrical

CCTV surveillance cameras and monitoring

Telephone/data - "active" equipment - including hubs, routers, LAN, servers, switches and the like

Public address

Audio/visual and CATV equipment and cabling

7.3 Overall Summary

EXCLUSIONS

Vivarium generator - Existing

Vivarium 'Fit-out" Works

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OVERALL SUMMARY

	Gross Floor Area	$ / SF	$x1,000
Boyce Hall - Core/ Vertical	125,905 SF	60.10	7,567
Boyce Hall - TI / Horizontal	53,006 SF	193.13	10,237
Boyce Hall - Hazardous Material Abatement			313
TOTAL Construction (Boyce Hall)	***June 2005***		***18,117***
Webber Hall - Core/ Vertical	50,015 SF	53.36	2,669
Webber Hall - TI / Horizontal	9,318 SF	187.84	1,750
Webber Hall - Hazardous Material Abatement			313
TOTAL Construction (Webber Hall)	***June 2005***		***4,732***
Escalation to midpoint of construction	20.78%		4,748
TOTAL Building Construction	***October 2008***		***27,597***

Please refer to the Inclusions and Exclusions sections of this report

BOYCE HALL - CORE/ VERTICAL AREAS & CONTROL QUANTITIES

Areas

	SF	SF	SF
Enclosed Areas			
Basement - Sixth Floor (Vivarium)	124,087		
SUBTOTAL, Enclosed Area		124,087	
Covered area	3,636		
SUBTOTAL, Covered Area @ ½ Value		1,818	
TOTAL GROSS FLOOR AREA			125,905

Note:

The above gross floor area is based on UCR area calculation

7.4 Detailed Estimate

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BOYCE HALL - CORE/ VERTICAL COMPONENT SUMMARY

Gross Area: 125,905 SF

		$/SF	$x1,000
1. Foundations		0.00	0
2. Vertical Structure		0.17	22
3. Floor & Roof Structures		0.25	32
4. Exterior Cladding		0.26	32
5. Roofing, Waterproofing & Skylights		0.63	79
Shell (1-5)		1.31	165
6. Interior Partitions, Doors & Glazing		2.21	279
7. Floor, Wall & Ceiling Finishes		0.99	124
Interiors (6-7)		3.20	403
8. Function Equipment & Specialties		0.65	82
9. Stairs & Vertical Transportation		1.03	130
Equipment & Vertical Transportation (8-9)		1.68	212
10. Plumbing Systems		6.65	837
11. Heating, Ventilating & Air Conditioning		13.14	1,654
12. Electric Lighting, Power & Communications		15.47	1,948
13. Fire Protection Systems		2.24	282
Mechanical & Electrical (10-13)		37.50	4,721
Total Building Construction (1-13)		**43.69**	**5,500**
14. Site Preparation & Demolition		0.00	0
15. Site Paving, Structures & Landscaping		0.00	0
16. Utilities on Site		0.00	0
Total Site Construction (14-16)		**0.00**	**0**
TOTAL BUILDING & SITE (1-16)		**43.69**	**5,500**
General Conditions	18.00%	7.86	990
Contractor's Overhead & Profit or Fee	6.00%	3.09	389
PLANNED CONSTRUCTION COST	***June 2005***	**54.64**	**6,879**
Contingency for Development of Design	10.00%	5.46	688
RECOMMENDED BUDGET	***June 2005***	**60.10**	**7,567**

Item Description	Quantity	Unit	Rate	Total
1. Foundations				
				0
2. Vertical Structure				
Vivarium				
Load bearing walls				
Metal studs walls including gypsum board sheathing	1,455	SF	15.00	21,825
				21,825
3. Floor and Roof Structure				
Vivarium				
Suspended floors				
Patch existing roofslab to suit new enclosed walkway	1,125	SF	10.00	11,250
Roof				
Metal deck on metal framing	1,125	SF	18.00	20,250
				31,500
4. Exterior Cladding				
Vivarium				
Wall framing, furring and insulation				
Thermal insulation in external walls and gypsum board to interior face, painted	1,455	SF	4.25	6,184
Applied exterior finishes				
Cement plaster , painted	1,455	SF	18.00	26,190
				32,374

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Item Description	Quantity	Unit	Rate	Total
5. Roofing, Waterproofing & Skylights				
Modifications to suit MEP upgrades				
Patch existing waterproofing	22,128	SF	1.00	22,128
Patch and repair existing roofing	22,128	SF	2.00	44,256
Vivarium				
Roofing				
Demolish existing roof to suit new enclosed walkway	1,125	SF	3.00	3,375
Single ply roofing including rigid board insulation	1,125	SF	7.00	7,875
Miscelleanous flashing and sheetmetal	1,125	SF	1.50	1,688
				79,322
6. Interior Partitions, Doors & Glazing				
Interior demolition				
Core / vertical				
Selective interior demolition to suit upgrade at core	22,561	SF	5.00	112,805
Vivarium				
Selective interior demolition to suit upgrade at core	1,106	SF	15.00	16,590
Selective interior demolition to suit upgrade at Vivarium TI spaces	9,192	SF	5.00	45,960
Partition framing and surfacing				
Patch and paint existing partitions affected by MEP upgrades	22,561	SF	2.00	45,122
Allow for firestopping to floor and wall penetrations (shaft)	1	EA	15,000.00	15,000
Vivarium				
Partition framing and surfacing				

Item Description	Quantity	Unit	Rate	Total
Patch and paint existing partitions affected by MEP upgrades	1,106	SF	3.00	3,318
Allow for firestopping to floor and wall penetrations (shaft)	1	EA	5,000.00	5,000
New metal framed partitions with gypsum board on both sides, painted including insulation	795	SF	13.00	10,335
Interior doors, frames and hardware				
Remove and replace existing exterior doors with fire rated doors	2	EA	5,000.00	10,000
New single leaf door	2	EA	1,700.00	3,400
New double leaf door	2	EA	3,000.00	6,000
Allow for new hardware - ADA compliant	1	LS	5,000.00	5,000
				278,530
7. Floor, Wall & Ceiling Finishes				
Modifications to suit MEP upgrades				
Remove and replace existing ceiling to suit MEP upgrades	22,561	SF	5.00	112,805
Protect existing floor finishes	22,561	SF	0.50	11,281
				124,086
8. Function Equipment & Specialties				
Building Specialties				
New toilet signage - ADA compliant	18	EA	150.00	2,700
New code required signage	22,561	SF	1.00	22,561
Miscellaneous				
Allow for miscellaneous metals and rough carpentry (supports, backing, etc.)	112,804	SF	0.50	56,402

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Item Description	Quantity	Unit	Rate	Total
				81,663
9. Stairs & Vertical Transportation				
Staircase flights, floor to floor				
Modify existing stair handrails and nosing to comply with ADA standards	10	EA	6,500.00	65,000
Elevators				
Allow for fire doors	10	EA	6,500.00	65,000
				130,000
10. Plumbing Systems				
Sanitary fixtures and local connection piping	75	EA	1,250.00	93,750
Sanitary waste, vent and service pipework				
Floor/trench drains and sinks, < = 6"	10	EA	2,000.00	20,000
Rough-in sanitary fixtures, waste & vent pipework - upgrades re proper drainage	75	EA	1,500.00	112,500
Metering - main services and BMS hook-up	1	LS	27,500.00	27,500
Water treatment, storage and circulation				
Duplex (steam-water), double wall, heat exchangers, 120 deg. F, 1,200 #/Hr				Existing
Booster pump, triplex	1	LS	22,500.00	22,500
Sewage ejectors, duplex				Existing
Laboratory service equipment				
Compressed air, duplex, 25 hp, including receiver, dryer, valves, regulators, filters, monitors and controls	1	LS	37,500.00	37,500
Vacuum pump, duplex, receiver, valves, muffler and controls, 25 hp - overhaul existing	1	LS	15,000.00	15,000
RO/DI				
Replace obsolete system to current standards	1	LS	75,000.00	75,000

Item Description	Quantity	Unit	Rate	Total
Laboratory service piping, valves and insulation				
Including vacuum, air, laboratory gas, industrial hot and cold water, potable water, special gases, fume hood connections, accessories, monitors, valves, filters and specialties - main riser pipework	112,804	SF	1.50	169,206
Laboratory waste and vent, including sampling port - Shell & Core only	112,804	SF	1.00	112,804
Natural gas				Existing
Surface water drainage, OD and pipework, < 8"	32	EA	4,500.00	144,000
Sump pump, duplex				Existing
Vivarium				
Booster pumps re domestic water, 2 hp	1	LS	7,500.00	7,500
				837,260
11. Heating, Ventilation & Air Conditioning				
Heat generation equipment				
Heat exchanger - replace (E)	1	LS	25,000.00	25,000
Thermal storage and circulation				
Expansion tanks				Existing
Air seperators				Existing
Pumps				
Chilled water, 15 hp				By Others
Steam/condensate return, duplex	1	LS	15,500.00	15,500
Heated hot water, < 10 hp				Existing
Variable frequency drives - chilled water pumps	2	EA	5,500.00	11,000
Vibration isolation for pumps	1	EA	1,500.00	1,500
Piping, fittings, valves and insulation				
Chilled, heated hot water and condensate drainage - main riser pipework and infra-structure only (HHW risers excluded)	112,804	SF	2.00	225,608

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Item Description	Quantity	Unit	Rate	Total
Air handing equipment				
Air handling units, return fans, cooling and heating, air filters, seismic isolation - costs discounted due to recent renovation (33% discount)	150,000	CFM	3.00	450,000
Electrical room ventilation	1	LS	10,000.00	10,000
Terminal boxes - Shell & Core	20	EA	775.00	15,500
Air distribution and return				
Galvanized sheet metal ductwork - riser systems only (replace exhaust only)	17,500	LB	7.50	131,250
Specialty fumehood exhaust ductwork, stainless steel, type 316 L - cage wash & fume hood exhaust systems				TI
Flexible ductwork	500	LF	9.50	4,750
Dampers, volume	100	EA	75.00	7,500
Dampers. smoke/fire	75	EA	1,200.00	90,000
Insulation				Existing
Diffusers, registers and grilles	1	LS	15,000.00	15,000
Controls and instrumentation				
Direct digital energy management system - 67% discount due to recent renovation	125,905	SF	2.50	314,763
Test and balance air systems	800	HR	105.00	84,000
Unit ventilation/exhaust fans				
Laboratory, 25,000 cfm				Existing
Vivarium				
Roof-top heat pumps, associated pipework systems, connection ductwork & controls	10,317	SF	24.50	252,767
				1,654,137
12. Electrical Lighting, Power & Communication				
Main service and distribution				

Item Description	Quantity	Unit	Rate	Total
Including main switchboard, metering, surge suppression, motor control, distribution boards, transformers, feeder conduit and cable - replace main systems - including removal of PCBs	2,000	kVA	175.00	350,000
12 kV dual power feeders				N/A
Provide selector HV switch, 12 kV				N/A
Emergency power				
Provide emergency power generator, transfer switches, associated distribution equipment and feeders (20% spare capacity)	1,500	KW	550.00	825,000
Machine and equipment power				
Connections and switches, including conduit and cable				
Mechanical equipment - allow (Including power factor correctors)	1	LS	100,000.00	100,000
Miscellaneous connections, < 100 A	1	LS	25,000.00	25,000
User convenience power				
Panelboard breakers, 120 V	756	EA	75.50	57,078
Feeder conduit and cable	1,540	LF	22.50	34,650
Lighting				
Panelboard breakers, 277 V	420	EA	95.00	39,900
Feeder conduit and cable	1,000	LF	25.00	25,000
Fixtures/switching, including conduit and cable				
Revise corridor egress lighting and replace LED type exit fixtures	120	EA	500.00	60,000
Exterior egress lighting	1	LS	25,000.00	25,000
T-24 requirement re interior ligting, including re lamp and motion sensors	126,374	SF	0.75	94,781
Alarm and security				
Fire alarm systems - upgrades (including "loss of power")	126,374	SF	1.00	126,374
Security				
Upgrade head-end equipment	1	LS	35,000.00	35,000
Access control only (card-key)	1	LS	50,000.00	50,000

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Riverside, California — 0168-7249.110

Item Description	Quantity	Unit	Rate	Total
Telephone and communications				
Interconnect new communication rooms to the MPOE (10 x 11), (4) 4" conduit and copper / fiber including "passive" equipment, rough-in, terminations and 6th floor extension	2	EA	25,000.00	50,000
Vivarium				
Emergency power				
Vivarium emergency power, including generator, transfer switch, distribution equipment and feeders				Existing
Machine and equipment power				
Connections and switches, including conduit and cable				
Mechanical connections, < 100 A	1	LS	25,000.00	25,000
User convenience power				
User convenience power outlets/wiremold - inlcuding conduit and cable				
Lighting				
Egress/lobby lighting only	1	LS	25,000.00	25,000
Telephone and communications				
Telephone/data outlets, including conduit and cable				Existing
Alarm and security				
Fire alarm systems - upgrades re TI				Existing
Security				
Access control only (card-key)				Existing
Automatic wet sprinkler system - reconfigure existing				Existing
				1,947,783

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
13. Fire Protection Systems				
Automatic wet sprinkler system - upgrade to NFPA standards (including main risers and stand-pipes only)	112,804	SF	2.50	282,010
				282,010
14. Site Preparation & Building Demolition				
				0
15. Site Paving, Structures & Landscaping				
				0
16. Utilities on Site				
				0

BOYCE HALL - TI / HORIZONTAL AREAS & CONTROL QUANTITIES

Areas

	SF	SF	SF
Enclosed Areas			
Third floor	8,750		
Fourth Floor	22,128		
Fifth Floor	22,128		
SUBTOTAL, Enclosed Area		53,006	
Covered area			
SUBTOTAL, Covered Area @ ½ Value			
TOTAL GROSS FLOOR AREA			53,006

BOYCE HALL - TI / HORIZONTAL COMPONENT SUMMARY

Gross Area: 53,006 SF

		$/SF	$x1,000
1. Foundations		0.00	0
2. Vertical Structure		0.00	0
3. Floor & Roof Structures		4.24	225
4. Exterior Cladding		0.00	0
5. Roofing, Waterproofing & Skylights		0.00	0
Shell (1-5)		4.24	225
6. Interior Partitions, Doors & Glazing		22.44	1,189
7. Floor, Wall & Ceiling Finishes		10.81	573
Interiors (6-7)		33.25	1,763
8. Function Equipment & Specialties		44.55	2,362
9. Stairs & Vertical Transportation		0.00	0
Equipment & Vertical Transportation (8-9)		44.55	2,362
10. Plumbing Systems		11.64	617
11. Heating, Ventilating & Air Conditioning		20.86	1,106
12. Electric Lighting, Power & Communications		21.81	1,156
13. Fire Protection Systems		4.00	212
Mechanical & Electrical (10-13)		58.31	3,091
Total Building Construction (1-13)		**140.36**	**7,440**
14. Site Preparation & Demolition		0.00	0
15. Site Paving, Structures & Landscaping		0.00	0
16. Utilities on Site		0.00	0
Total Site Construction (14-16)		**0.00**	**0**
TOTAL BUILDING & SITE (1-16)		**140.36**	**7,440**
General Conditions	18.00%	25.26	1,339
Contractor's Overhead & Profit or Fee	6.00%	9.94	527
PLANNED CONSTRUCTION COST	***June 2005***	**175.56**	**9,306**
Contingency for Development of Design	10.00%	17.56	931
RECOMMENDED BUDGET	***June 2005***	**193.13**	**10,237**

Boyce Hall / Webber Hall Renovation University of California, Riverside — *Detailed Project Program Cost Plan*
Boyce Hall - TI / Horizontal — *June 3, 2005*
Riverside, California — *0168-7249.110*

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
1. Foundations				
				0
2. Vertical Structure				
				0
3. Floor and Roof Structure				
Suspended floors				
Patch existing slab to suit MEP upgrades	1	LS	50,000.00	50,000
Leveling concrete slab	43,718	SF	4.00	174,872
				224,872
4. Exterior Cladding				
				0
5. Roofing, Waterproofing & Skylights				
				0
6. Interior Partitions, Doors & Glazing				
Interior demolition				
Demolish existing interior partition, finishes, fixed furniture including protection of remaining spaces	43,718	SF	6.00	262,308
Allow for relocation of 4th and 5th floors	1	LS	125,000.00	125,000

Item Description	Quantity	Unit	Rate	Total
Partition framing and surfacing				
Non rated walls- metal studs framing, gypsum board , painted both sides; including batt insulation	19,575	SF	15.00	293,625
Ceiling height walls - metals studs framing, gypsum board, painted both sides; including batt insulation	12,600	SF	12.00	151,200
Metal furring with gypsum board lining, painted	35,100	SF	7.50	263,250
Windows walls and borrowed lights				
Allow for interior glazing	1	LS	25,000.00	25,000
Interior doors, frames and hardware				
Double leaf doors	7	EA	3,000.00	21,000
Single leaf doors	30	EA	1,600.00	48,000
				1,189,383

7. Floor, Wall & Ceiling Finishes

Floors				
Sheet vinyl flooring to lab spaces	26,284	SF	4.50	118,278
New ceramic tiles to existing toilets	1,200	SF	12.00	14,400
New carpets to offices	7,764	SF	3.50	27,174
Vinyl composition tiles to corridor and other support spaces	8,470	SF	2.75	23,293
Bases				
Allow for bases	1	LS	20,000.00	20,000
Walls				
Ceramic tiles	3,600	SF	10.00	36,000
Ceiling				
New acoustical ceiling tile	42,518	SF	4.50	191,331
New gypsum board ceiling	1,200	SF	8.50	10,200
Column, furring and finish				
Metal furring with gypsum board lining, painted	11,040	SF	12.00	132,480
				573,156

8. Function Equipment & Specialties

General building specialties				
Allow for miscellaneous building specialties including toilet partitions and accessories, window treatment, fire extinguisher cabinets, markerboards, etc.	37,546	SF	3.50	131,411
Cabinets and countertops				
Non laboratory caseworks	8,256	SF	8.00	66,048
Special use equipment of all types				
Laboratory fit-out	($82/SF)			
Laboratory fumehoods				
Chemical fumehoods- allow	20	EA	10,000.00	200,000
Radioisotopes hoods	1	EA	14,000.00	14,000
Laboratory caseworks and furnishings				
Island bench tops, epoxy resin	688	LF	180.00	123,840
Bench tops, epoxy resin	1,036	LF	90.00	93,240
Base cabinets, wood	2,412	LF	275.00	663,300
Premium for flammable and corrosives and storage cabinets	1	LS	20,000.00	20,000
Allow for full height storage cabinets	1	LS	30,000.00	30,000
Adjustable island shelving	480	LF	150.00	72,000
Adjustable wall shelving	1,036	LF	100.00	103,600
Laboratory fixtures and fittings including sinks, cupsinks, drying rack, pegboards, safety eyewash stations, service outlets	26,284	SF	20.00	525,680
Laboratory equipment				
Autoclave	2	EA	65,000.00	130,000
Glasswasher	1	EA	8,500.00	8,500
Cold rooms, 10' x 14'	2	EA	45,000.00	90,000

Item Description	Quantity	Unit	Rate	Total
Allow for laboratory equipment , 3rd floor	1	LS	60,000.00	60,000
Allow for installation of Owner furnished equipment	1	LS	30,000.00	30,000
				2,361,619
9. Stairs & Vertical Transportation				
				0
10. Plumbing Systems				
Institutional fixtures				
Installation and local connection pipework only, supply by others - upgrade/relocate eyewash/showers	1	LS	40,500.00	40,500
Sanitary waste, vent and service pipework				
Floor/trench drains and sinks, < = 6"	24	EA	2,000.00	48,000
Hose bibbs, 3/4"				N/a
Laboratory service piping, valves and insulation				
Including vacuum, air, laboratory gas, industrial hot and cold water, potable water, special gases - including CO2, Nitrogen, instrument air, fume hood connections, accessories, monitors, valves, filters and specialties	26,484	SF	14.00	370,776
Laboratory waste and vent, including sampling port	26,484	SF	5.00	132,420
Test purge and sterilize	240	Hr	105.00	25,200
				616,896
11. Heating, Ventilation & Air Conditioning				

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Item Description	Quantity	Unit	Rate	Total
Piping, fittings, valves and insulation				
Heated hot water pipework, fittings	53,006	SF	3.00	159,018
Air handing equipment				
Terminal boxes (1/700 SF)	38	EA	775.00	29,450
Humidification				N/a
HEPA filters - Vivarium				N/a
Air distribution and return				
Galvanized sheet metal ductwork - 50% due to recent renovation	30,000	LB	7.50	225,000
Specialty fumehood exhaust ductwork, stainless steel, type 316 L - (16) fume hoods to point-of-dilution only	10,000	LB	14.50	145,000
Flexible ductwork	2,000	LF	9.50	19,000
Dampers, volume	400	EA	75.00	30,000
Dampers. smoke/fire	30	EA	1,200.00	36,000
Insulation	15,000	SF	2.50	37,500
Diffusers, registers and grilles	53,006	SF	1.50	79,509
Controls and instrumentation				
Direct digital energy management system - 67% due to recent renovation	53,006	SF	1.75	92,761
Laboratory controls, variable air volume - 67% due to recent renovation	1	LS	200,000.00	200,000
Test and balance air systems	500	HR	105.00	52,500
				1,105,738
12. Electrical Lighting, Power & Communication				
Emergency power				
Laboratory emergency power and feeders	53,006	SF	1.50	79,509
Machine and equipment power				

Item Description	Quantity	Unit	Rate	Total
Connections and switches, including conduit and cable				
Miscellaneous connections, < 100 A	1	LS	32,500.00	32,500
User convenience power				
Panelboard breakers, 120 V	420	EA	75.50	31,710
Feeder conduit and cable	600	LF	22.50	13,500
User convenience power outlets/wiremold - inlcuding conduit and cable	53,006	SF	4.00	212,024
Lighting				
Panelboard breakers, 277 V	126	EA	95.00	11,970
Feeder conduit and cable	300	LF	25.00	7,500
Fixtures/switching, including conduit and cable				
Revise corridor egress lighting and replace LED type exit fixtures	100	EA	500.00	50,000
T-24 requirement re interior ligting	53,006	SF	6.50	344,539
Lighting and power specialties				
Lighting control	1	LS	20,000.00	20,000
Telephone and communications				
Telephone/data outlets, including conduit and cable	53,006	SF	4.00	212,024
Audiovisual rough-in	1	LS	15,000.00	15,000
Cable tray				Existing
Alarm and security				
Fire alarm systems - upgrades re TI	53,006	SF	2.00	106,012
Security				
Access control only (card-key)	1	LS	20,000.00	20,000
				1,156,288

13. Fire Protection Systems

Automatic wet sprinkler system - complete	53,006	SF	4.00	212,024
				212,024

14. Site Preparation & Building Demolition

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Item Description	Quantity	Unit	Rate	Total
				0

15. Site Paving, Structures & Landscaping

				0

16. Utilities on Site

				0

WEBBER HALL - CORE/ VERTICAL AREAS & CONTROL QUANTITIES

Areas

	SF	SF	SF
Enclosed Areas			
Basement - Penthouse	48,739		
SUBTOTAL, Enclosed Area		48,739	
Covered area	2,552		
SUBTOTAL, Covered Area @ ½ Value		1,276	
TOTAL GROSS FLOOR AREA			50,015

Note:

The above gross floor area is based on UCR area calculation

Boyce Hall / Webber Hall Renovation University of California, Riverside — *Detailed Project Program Cost Plan*
Webber Hall - Core/ Vertical — *June 3, 2005*
Riverside, California — *0168-7249.110*

WEBBER HALL - CORE/ VERTICAL COMPONENT SUMMARY

Gross Area: 50,015 SF

		$/SF	$x1,000
1. Foundations		0.00	0
2. Vertical Structure		0.00	0
3. Floor & Roof Structures		0.00	0
4. Exterior Cladding		0.00	0
5. Roofing, Waterproofing & Skylights		0.99	50
Shell (1-5)		0.99	50
6. Interior Partitions, Doors & Glazing		1.20	60
7. Floor, Wall & Ceiling Finishes		1.00	50
Interiors (6-7)		2.19	110
8. Function Equipment & Specialties		0.38	19
9. Stairs & Vertical Transportation		1.84	92
Equipment & Vertical Transportation (8-9)		2.22	111
10. Plumbing Systems		6.28	314
11. Heating, Ventilating & Air Conditioning		12.07	604
12. Electric Lighting, Power & Communications		12.53	627
13. Fire Protection Systems		2.50	125
Mechanical & Electrical (10-13)		33.38	1,670
Total Building Construction (1-13)		**38.78**	**1,940**
14. Site Preparation & Demolition		0.00	0
15. Site Paving, Structures & Landscaping		0.00	0
16. Utilities on Site		0.00	0
Total Site Construction (14-16)		**0.00**	**0**
TOTAL BUILDING & SITE (1-16)		**38.78**	**1,940**
General Conditions	18.00%	6.98	349
Contractor's Overhead & Profit or Fee	6.00%	2.74	137
PLANNED CONSTRUCTION COST	***June 2005***	**48.50**	**2,426**
Contingency for Development of Design	10.00%	4.86	243
RECOMMENDED BUDGET	***June 2005***	**53.36**	**2,669**

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
1. Foundations				
				0
2. Vertical Structure				
				0
3. Floor and Roof Structure				
				0
4. Exterior Cladding				
				0
5. Roofing, Waterproofing & Skylights				
Modifications to suit MEP upgrades				
Patch existing waterproofing	19,879	SF	1.00	19,879
Patch and repair existing roofing	19,879	SF	1.50	29,819
				49,698
6. Interior Partitions, Doors & Glazing				
Interior demolition				
Selective interior demolition to suit upgrade at core	9,965	SF	2.50	24,913
Partition framing and surfacing				
Patch and paint existing partitions affected by MEP upgrades	9,965	SF	1.50	14,948
Allow for firestopping to floor and wall penetrations (shaft)	1	EA	10,000.00	10,000
Allow for provision of new MDF room, 10 x 11	1	LS	10,000.00	10,000
				59,860
7. Floor, Wall & Ceiling Finishes				
Modifications to suit MEP upgrades				
Remove and replace existing ceiling to suit MEP upgrades	9,965	SF	4.50	44,843
Protect existing floor finishes	9,965	SF	0.50	4,983
				49,825
8. Function Equipment & Specialties				
Building specialties				
New toilet signage - ADA compliant	12	EA	120.00	1,440
New code required signage	9,965	SF	0.50	4,983
Miscellaneous				
Allow for miscellaneous metals and rough carpentry (supports, backing, etc.)	49,823	SF	0.25	12,456
				18,878
9. Stairs & Vertical Transportation				
Staircase flights, floor to floor				
Modify existing stair handrails and nosing to comply with ADA standards	8	EA	5,000.00	40,000

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Item Description	Quantity	Unit	Rate	Total
Elevators				
New fire doors to existing elevators	8	EA	6,500.00	52,000
				92,000
10. Plumbing Systems				
Sanitary fixtures and local connection piping	45	EA	1,250.00	56,250
Sanitary waste, vent and service pipework				
Floor/trench drains and sinks, < = 6"	6	EA	2,000.00	12,000
Rough-in sanitary fixtures, waste & vent pipework - upgrades re proper drainage				Existing
Metering - main services and BMS hook-up	1	LS	17,500.00	17,500
Water treatment, storage and circulation				
Duplex (steam-water), double wall, heat exchangers, 120 deg. F, 1,200 #/Hr				Existing
Booster pump, triplex	1	LS	17,500.00	17,500
Sewage ejectors, duplex				Existing
Laboratory service equipment				
Compressed air, duplex, 15 hp, including receiver, dryer, valves, regulators, filters, monitors and controls	1	LS	27,500.00	27,500
Vacuum pump, duplex, receiver, valves, muffler and controls, 15 hp - overhaul existing	1	LS	10,000.00	10,000
RO/DI				
Replace obsolete system to current standards	1	LS	42,500.00	42,500
Laboratory service piping, valves and insulation				
Including vacuum, air, laboratory gas, industrial hot and cold water, potable water, special gases, fume hood connections, accessories, monitors, valves, filters and specialties - main riser pipework				Existing
Laboratory waste and vent, including sampling port - Shell & Core only	50,015	SF	1.00	50,015
Natural gas				Existing
Surface water drainage, OD and pipework, < 8"	18	EA	4,500.00	81,000
Sump pump, duplex				Existing
				314,265
11. Heating, Ventilation & Air Conditioning				
Heat generation equipment				
Heat exchanger (water-steam) re lab reheat	1	LS	15,000.00	15,000
Thermal storage and circulation				
Pumps				
Chilled water, 10 hp				Existing
Steam/condensate return, duplex	1	LS	12,500.00	12,500
Heated hot water, < 10 hp - lab reheat	2	EA	3,250.00	6,500
Variable frequency drives	2	EA	4,000.00	8,000
Vibration isolation for pumps	2	EA	1,000.00	2,000
Piping, fittings, valves and insulation				
Steam,, heated hot water and condensate drainage - mian riser pipework and infra-structure only	48,739	SF	3.00	146,217
Air handing equipment				
Air handling unit - AH-1 replace cooling coils only	20,000	CFM	0.75	15,000
Electrical room ventilation	1	LS	5,000.00	5,000
Terminal boxes - S & C	10	EA	775.00	7,750

Item Description	Quantity	Unit	Rate	Total
Air distribution and return				
Galvanized sheet metal ductwork - riser systems only (replace exhaust only)	10,000	LB	7.50	75,000
Specialty fumehood exhaust ductwork, stainless steel, type 316 L - cage wash & fume hood exhaust systems				TI
Flexible ductwork	250	LF	9.50	2,375
Dampers, volume	50	EA	75.00	3,750
Dampers. smoke/fire	35	EA	1,200.00	42,000
Insulation				Existing
Modify air distribution to accommodate MDF room	1	LS	15,000.00	15,000
Diffusers, registers and grilles	1	LS	7,500.00	7,500
Controls and instrumentation				
Direct digital energy management system	48,739	SF	1.50	73,109
Test and balance air systems	400	HR	105.00	42,000
Unit ventilation/exhaust fans				
Laboratory, 25,000 cfm	2	EA	62,500.00	125,000
				603,701

12. Electrical Lighting, Power & Communication

Item Description	Quantity	Unit	Rate	Total
Main service and distribution				
Including main switchboard, metering, surge suppression, motor control, distribution boards, transformers, feeder conduit and cable - replace main systems - including removal of PCBs	750	KVA	300.00	225,000
12 kV dual power feeders				N/a
Provide selector HV switch, 12 kV				N/a
Emergency power				
Provide emergency power distribution equipment and feeders	1	LS	75,000.00	75,000

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Item Description	Quantity	Unit	Rate	Total
Machine and equipment power				
Connections and switches, including conduit and cable				
Mechanical equipment - allow (Including power factor correctors)	1	LS	35,000.00	35,000
User convenience power				
Panelboard breakers, 120 V	504	EA	75.50	38,052
Feeder conduit and cable	600	LF	22.50	13,500
Lighting				
Panelboard breakers, 277 V	210	EA	95.00	19,950
Feeder conduit and cable	300	LF	25.00	7,500
Fixtures/switching, including conduit and cable				
Revise corridor egress lighting and replace LED type exit fixtures	40	EA	500.00	20,000
Exterior egress lighting	1	LS	15,000.00	15,000
T-24 requirement re interior ligting, including re lamp and motion sensors	50,015	SF	0.75	37,511
Alarm and security				
Fire alarm systems - upgrades (including "loss of power")	50,015	SF	1.00	50,015
Security				
Upgrade head-end equipment	1	LS	15,000.00	15,000
Access control only (card-key)	1	LS	25,000.00	25,000
Telephone and communications				
Build (1) new MDF and (1) new IDF including (4) 4" conduit, copper/ fiber, "passive" equipment, rough-in and terminations	2	EA	25,000.00	50,000
				626,528

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
13. Fire Protection Systems				
Automatic wet sprinkler system - upgrade to NFPA standards (including main risers and stand-pipes only)	50,015	SF	2.50	125,038
				125,038
14. Site Preparation & Building Demolition				
				0
15. Site Paving, Structures & Landscaping				
				0
16. Utilities on Site				
				0

WEBBER HALL - TI / HORIZONTAL AREAS & CONTROL QUANTITIES

Areas

	SF	SF	SF
Enclosed Areas			
Third Floor	9,318		
SUBTOTAL, Enclosed Area		9,318	
Covered area			
SUBTOTAL, Covered Area @ ½ Value			
TOTAL GROSS FLOOR AREA			9,318

WEBBER HALL - TI / HORIZONTAL COMPONENT SUMMARY

Gross Area: 9,318 SF

		$/SF	$x1,000
1. Foundations		0.00	0
2. Vertical Structure		0.00	0
3. Floor & Roof Structures		3.80	35
4. Exterior Cladding		0.00	0
5. Roofing, Waterproofing & Skylights		0.00	0
Shell (1-5)		3.80	35
6. Interior Partitions, Doors & Glazing		37.91	353
7. Floor, Wall & Ceiling Finishes		14.96	139
Interiors (6-7)		52.88	493
8. Function Equipment & Specialties		31.51	294
9. Stairs & Vertical Transportation		0.00	0
Equipment & Vertical Transportation (8-9)		31.51	294
10. Plumbing Systems		9.11	85
11. Heating, Ventilating & Air Conditioning		17.06	159
12. Electric Lighting, Power & Communications		18.69	174
13. Fire Protection Systems		3.50	33
Mechanical & Electrical (10-13)		48.36	451
Total Building Construction (1-13)		**136.54**	**1,272**
14. Site Preparation & Demolition		0.00	0
15. Site Paving, Structures & Landscaping		0.00	0
16. Utilities on Site		0.00	0
Total Site Construction (14-16)		**0.00**	**0**
TOTAL BUILDING & SITE (1-16)		**136.54**	**1,272**
General Conditions	18.00%	24.58	229
Contractor's Overhead & Profit or Fee	6.00%	9.66	90
PLANNED CONSTRUCTION COST	***June 2005***	**170.78**	**1,591**
Contingency for Development of Design	10.00%	17.06	159
RECOMMENDED BUDGET	***June 2005***	**187.84**	**1,750**

Boyce Hall / Webber Hall Renovation University of California, Riverside — *Detailed Project Program Cost Plan*
Webber Hall - TI / Horizontal — *June 3, 2005*
Riverside, California — *0168-7249.110*

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
1. Foundations				
				0
2. Vertical Structure				
				0
3. Floor and Roof Structure				
Suspended floors				
Patch existing slab to suit MEP upgrades	1	LS	15,000.00	15,000
Leveling concrete slab	8,154	SF	2.50	20,385
				35,385
4. Exterior Cladding				
				0
5. Roofing, Waterproofing & Skylights				
				0
6. Interior Partitions, Doors & Glazing				
Interior demolition				
Demolish existing interior partition, finishes, fixed furniture including protection of remaining spaces	8,154	SF	6.00	48,924

Item Description	Quantity	Unit	Rate	Total
Allow for relocation of 3rd floor	1	LS	75,000.00	75,000
Partition framing and surfacing				
Non rated walls- metal studs framing, gypsum board, painted both sides; including batt insulation	8,370	SF	12.00	100,440
Ceiling height walls - metals studs framing, gypsum board, painted both sides; including batt insulation	4,830	SF	10.00	48,300
Metal furring with gypsum board lining, painted	6,060	SF	7.00	42,420
Windows walls and borrowed lights				
Allow for interior glazing	1	LS	10,000.00	10,000
Interior doors, frames and hardware				
Double leaf doors	3	EA	3,000.00	9,000
Single leaf doors	12	EA	1,600.00	19,200
				353,284

7. Floor, Wall & Ceiling Finishes

Floors				
Sheet vinyl flooring to lab spaces	3,800	SF	4.50	17,100
New ceramic tiles to existing toilets	365	SF	12.00	4,380
New carpets to offices	1,605	SF	3.50	5,618
Vinyl composition tile to corridors and other support spaces	2,384	SF	2.75	6,556
Bases				
Allow for bases	1	LS	10,000.00	10,000
Walls				
Ceramic tiles	1,200	SF	12.00	14,400
Ceiling				
New acoustical ceiling tile	7,789	SF	4.50	35,051
New gypsum board ceiling	365	SF	8.50	3,103

Boyce Hall / Webber Hall Renovation University of California, Riverside — Detailed Project Program Cost Plan
Webber Hall - TI / Horizontal — June 3, 2005
Riverside, California — 0168-7249.110

Item Description	Quantity	Unit	Rate	Total
Column, furring and finish				
Metal furring with gypsum board lining, painted	4,320	SF	10.00	43,200
				139,407

8. Function Equipment & Specialties

Geneal building specialties				
Allow for miscellaneous building specialties including toilet partitions and accessories, window treatment, fire extinguisher cabinets, markerboards, etc.	5,770	SF	3.00	17,310
Cabinets and countertops				
Non laboratory caseworks	1,605	SF	4.00	6,420
Special use equipment of all types				
Laboratory fit-out	($71/SF)			
Laboratory fumehoods				
Chemical fumehoods	4	EA	10,000.00	40,000
Laboratory caseworks and furnishings				
Island bench tops	114	LF	100.00	11,400
Bench tops	122	LF	70.00	8,540
Base cabinets	350	LF	200.00	70,000
Premium for flammable and corrosives and storage cabinets	1	LS	3,000.00	3,000
Allow for full height storage cabinets	1	LS	3,000.00	3,000
Adjustable island shelving	228	LF	100.00	22,800
Adjustable wall shelving	122	LF	75.00	9,150
Laboratory fixtures and fittings including sinks, cupsinks, drying rack, pegboards, safety eyewash stations, service outlets	3,800	SF	15.00	57,000
Laboratory equipment				
Cold rooms, 10' x 11'	1	EA	40,000.00	40,000
Allow for installation of Owner furnished equipment	1	LS	5,000.00	5,000
				293,620

Item Description	Quantity	Unit	Rate	Total
9. Stairs & Vertical Transportation				
				0
10. Plumbing Systems				
Institutional fixtures				
Installation and local connection pipework only, supply by others - upgrade/relocate eyewash/showers	1	LS	10,000.00	10,000
Sanitary waste, vent and service pipework				
Floor/trench drains and sinks, < = 6"	4	EA	2,500.00	10,000
Hose bibbs, 3/4"				N/a
Laboratory service piping, valves and insulation				
Including vacuum, air, laboratory gas, industrial hot and cold water, potable water, special gases - including CO2, Nitrogen, instrument air, fume hood connections, accessories, monitors, valves, filters and specialties	3,800	SF	12.00	45,600
Laboratory waste and vent, including sampling port	3,800	SF	3.75	14,250
Test purge and sterilize	48	Hr	105.00	5,040
				84,890
11. Heating, Ventilation & Air Conditioning				
Piping, fittings, valves and insulation				
Heated hot water pipework, fittings	8,154	SF	2.50	20,385
Air handing equipment				
Terminal boxes (1/700 SF)	4	EA	775.00	3,100
Humidification				N/a

Boyce Hall / Webber Hall Renovation University of California, Riverside — Detailed Project Program Cost Plan
Webber Hall - TI / Horizontal — June 3, 2005
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Item Description	Quantity	Unit	Rate	Total
HEPA filters - Vivarium				N/a
Air distribution and return				
Galvanized sheet metal ductwork	5,000	LB	7.50	37,500
Specialty fumehood exhaust ductwork, stainless steel, type 316 L - (4) fume hoods to point-of-dilution only	1,500	LB	14.50	21,750
Flexible ductwork	300	LF	9.50	2,850
Dampers, volume	60	EA	75.00	4,500
Dampers. smoke/fire	5	EA	1,200.00	6,000
Insulation	3,000	SF	2.50	7,500
Diffusers, registers and grilles	8,154	SF	1.00	8,154
Controls and instrumentation				
Direct digital energy management system - including laboratory area controls	8,154	SF	4.50	36,693
Test and balance air systems	100	HR	105.00	10,500
				158,932
12. Electrical Lighting, Power & Communication				
Emergency power				
Laboratory emergency power and feeders	8,154	SF	1.25	10,193
Machine and equipment power				
Connections and switches, including conduit and cable				
Miscellaneous connections, < 100 A	1	LS	5,000.00	5,000
User convenience power				
Panelboard breakers, 120 V	84	EA	75.50	6,342
Feeder conduit and cable	100	LF	22.50	2,250
User convenience power outlets/wiremold - inlcuding conduit and cable	8,154	SF	3.00	24,462

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
Lighting				
Panelboard breakers, 277 V	42	EA	95.00	3,990
Feeder conduit and cable	100	LF	25.00	2,500
Fixtures/switching, including conduit and cable				
Revise corridor egress lighting and replace LED type exit fixtures	1	LS	5,000.00	5,000
T-24 requirement re interior ligting, including re lamp and motion sensors	8,154	SF	6.50	53,001
Lighting and power specialties				
Lighting control	1	LS	5,000.00	5,000
Cable tray				Existing
Telephone and communications				
Telephone/data outlets, including conduit and cable	8,154	SF	4.00	32,616
Audiovisual rough-in	1	LS	2,500.00	2,500
Alarm and security				
Fire alarm systems - upgrades re TI	8,154	SF	2.00	16,308
Security				
Access control only (card-key)	1	LS	5,000.00	5,000
				174,162

13. Fire Protection Systems

Automatic wet sprinkler system - complete	8,154	SF	4.00	32,616
				32,616

14. Site Preparation & Building Demolition

				0

Boyce Hall / Webber Hall Renovation University of California, Riverside — *Detailed Project Program Cost Plan*
Webber Hall - TI / Horizontal — *June 3, 2005*
Riverside, California — *0168-7249.110*

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
15. Site Paving, Structures & Landscaping				
				0
16. Utilities on Site				
				0

appendix

CHAPTER 8

8.1 Reference Documents

REFERENCE CODES & STANDARDS FOR EXISTING BUILDING EVALUATION

Americans with Disabilities Act Accessibility Guidelines

California Building Code, 2001

California Electric Code

California Fire Code

California Mechanical Code

California Plumbing Code

COMMENTS PROVIDED BY UCR

University of California, Riverside Boyce/Webber Renovation Kick-Off Meeting Presentation

University of California, Riverside Boyce/Webber Write-up by Kieron Brunelle

University of California, Riverside Building Standards-Physical Plant

University of California, Riverside College of Natural and Agricultural Sciences Building Evaluation, 2003

University of California, Riverside DRAFT 12-15-2004 Calendar of Events October Through April, 2004

University of California, Riverside Genomics and Biological Sciences Secondardy Effects, 2003

University of California, Riverside Interim Communications Infrastructure Planning Standards, 2001

University of California, Riverside List of Acronyms

University of California, Riverside Med Tox Report

University of California, Riverside Overall Spreadsheet of Boyce Hall

University of California, Riverside General Spreadsheet of Boyce Hall and Webber Hall

University of California, Riverside Overall Spreadsheet of Webber Hall

University of California, Riverside Request for Qualification (Proposal)

University of California, Riverside Table of Current Square Footages

University of California, Riverside Webber/Boyce Drawing Set, 1971

University of California, Riverside Webber Hall East Interior Remodel Drawing Set

University of California, Riverside Webber Hall Original 30X42 Drawing Set, 1952

University of California, Riverside Webber Hall West Interior Remodel Drawing Set

University of California, Riverside Write-up by Bill Johnson- General Guidance/Philosophy of Project

University of California, Riverside 5-Year Deferred Maintenance Report (From Physical Plant)

8.2 Existing Building Evaluation

8.2.1 Webber Hall

WEBBER EXISTING ARCHITECTURAL CODE, ACCESSIBILITY, FIRE & LIFE SAFETY REVIEW

Year Built: Drawings Dated 1952

Building Area (from Gross Sq Ft reported by University documents):

Basement:	04,148
First Floor:	19,879
Second Floor:	17,751
Third Floor:	09,318
Penthouse	368
Total:	51,464

Number of Floors:
- Three Floors plus Basement

Description of Construction:
- Primary Structure: Concrete CIP Frame, Decks and Shear Walls.
- Envelope: Brick over CIP Concrete Perimeter walls.
- Partitions and General Construction: Steel Stud with Lath and Plaster at original construction with Metal stud with gypsum board at more recently improved areas.

Building Occupancy Classification:
- Original: not classified;
- Proposed and current use: Group B with options for up to four Control Areas.

Building Type Classification:
- Original: not classified
- Proposed and current Type Classification: Type I Construction (unlimited area)

Height Classification:
- 3 story, less than 75' from level of fire access to highest occupied floor, therefore not high-rise.

Set-backs:
- Clearances on all 4 sides (measure to centerline of courts)

Observed Accessibility Issues:
- Path of travel issues:
  - Handrails in Stairways non-compliant configuration
  - Elevator Controls not at accessible height/layout
  - Building Signage non-compliant
  - Clearance requirements not provided at many doorways
- Building Accessory Items:
  - Toilets not compliant for space or accessory provisions
  - Drinking Fountain non-compliant
  - Telephone non-compliant
  - Door handles are knobs; not lever type
- Internal spaces:
  - Many rooms not layed out with proper turning areas
  - Accessories such as safety showers non-compliant
  - Benches, hoods and fixed items non-compliant for heights & reach ranges

Observed Fire and Life Safety Issues:
- Open Egress Stairs
- Elevator Smoke vestibule or other smoke containment provisions not provided
- Fire Alarm: Upgrade Modifications required
- Fire Protection: Upgrade Modifications required

WEBBER EXISTING STRUCTURAL REVIEW

INTRODUCTION

Presented herein is a general structural assessment of Webber Hall located on the campus of UC Riverside in Riverside, California. KPFF Consulting Engineers performed the evaluation after a review of the available building information and structural drawings provided to us by Chong Partners via the University. This report summarizes our preliminary structural assessment of the above-mentioned structure.

Please note that the structural assessment in this report is primarily based on engineering judgement constrained by the structural information gathered at the time of this evaluation and the limited scope of our work. Detailed structural analysis and calculations were not performed for this evaluation; therefore, the assessment is based primarily on the review of the available documents provided to us.

DOCUMENT REVIEW

Our review included the original structural drawings for Webber Hall (a.k.a. Plant and Biological Sciences Building, Herbert John Webber Hall) dated June 9, 1952, sheets S-1 through S-15. Additional documents examined include the architectural drawings, sheets 1 through 21, which were also dated June 9, 1952. We also reviewed a report entitled “Detailed Structural Re-Evaluation, University of California Riverside, Webber Hall", dated July 24, 1998, prepared by Degenkolb Engineers.

BUILDING DESCRIPTION

Webber Hall is located on the eastern side of the UCR campus, off of East Campus Drive. The building consists of a 3-story central tower with 2-story wings located at the north and south ends of the structure. The building also has a partial basement level. The 3-story tower is rectangular in plan with approximate overall dimensions of 55'x176'. Beneath the central tower is the partial basement with approximate overall dimensions of 28'x70'. The 2-story wings at the north and south ends of the building each have approximate plan dimensions of 100'x40'. The typical floor-to-floor height is 12'-6" at the upper floors, 13'-0" at the first floor and 12'-0" at the partial basement.

STRUCTURAL SYSTEM DESCRIPTION

Webber Hall’s roof and floor levels consist of 5" thick (or thicker) one-way concrete slabs spanning to concrete beams at approximately 14'-0" on center. The concrete beams span to concrete bearing walls or concrete columns. Beam spans vary from 11'-0" to approximately 27'-0". The partial basement is encompassed by reinforced concrete retaining walls. A 5-inch thick slab on grade occurs at the partial basement. Other areas below the first level do not have a slab on grade, and are merely small crawl spaces.

The seismic lateral load resisting system consists of interior and exterior reinforced concrete shearwalls located at each level and in each principal direction. Lateral loads are transferred to the shearwalls through the concrete slabs at the roof and floor levels. The foundation of the building consists of drilled-and-belled caissons beneath the building columns and bearing walls. Where the caissons occur beneath continuous walls they are spaced approximately 14'-0" on center.

STRUCTURAL DESIGN REVIEW

Webber Hall appears to have been originally designed in accordance with the 1952 Uniform Building Code. After a review of the structural drawings for this project, the structure appears to be in general conformance with the original design requirements of the code and appears to meet a minimum life-safe intent of the code.

In addition to our drawing review we also reviewed a report prepared by Degenkolb Engineers dated July 24,1998. This report indicates that Webber Hall was evaluated per the University Policy on Seismic Safety, which was enacted on January 20, 1975. In 1978 Webber was categorized as a “GOOD” structure. Degenkolb Engineers evaluated Webber in 1998, following the methodology of FEMA 310, “Handbook for the Seismic Evaluation of Buildings”. The 1998 evaluation categorizes Webber Hall as a “FAIR” structure for a specific earthquake probability called “rare” (10% of exceedence in 50 years). A summary of potential deficiencies is listed on page 33 of the Degenkolb report.

The University of California rating system indicates that a “GOOD” structure will experience “some damage” and that hazard to life is “not significant”. A “FAIR” structure will experience “damage" and hazard to life is categorized as “low”. A “POOR” structure will experience “significant damage” and hazard to life is categorized as “appreciable”. The U.C. rating system and other rating systems are compared in the Degenkolb report in Figure 3.

Historically, many concrete shear wall buildings of this era have withstood significant earthquakes without collapse. However, the extent of structural and non-structural damage has been significant. The modifications that are being proposed for Webber Hall do not include structural alterations at this time (e.g. no new openings in existing shearwalls). The modifications do not alter the building’s mass or change the current performance of the lateral force resisting system. Thus any “upgrade” of the lateral force resisting system for the building would be considered an elective choice.

In order to obtain an approximate indication of the expected seismic performance of this building, a rough order of magnitude calculation was performed to determine the wall shear demand/capacity ratio of the building’s structural lateral system. The table below summarizes the results of this comparison. For this comparison, the global seismic shear was distributed to the building's shear walls in proportion to their length. Please note that a detailed analysis and rigidity distribution was not performed at this time. This rapid evaluation of the structural capacity of the shear walls revealed the shear demand/capacity ratios for the critical direction as indicated in the table below.

Timing of Comparison	Code Basis for Comparison	Global Demand on Lateral System	Global Capacity of Shear Walls (Critical Direction)	Demand to Capacity Ratio
Original Construction	1952 UBC	0.12 W	0.12 W	1.0
Current Condition	2001 CBC	0.16 W	0.12 W	1.3

Based on the above information, it appears the building is deficient relative to today’s codes. The intent of meeting the requirements of the building code is stated by the Structural Engineers Association of California as follows: “Intended to safeguard against major failures and loss of life, not to limit damage, maintain function, or provide for easy repair.” The increased demand that is now required in the building code is based on current understanding regarding probability and magnitude of seismic events to a building location, and on developments in the industry regarding performance of different classes of buildings.

Should the University wish to modify the lateral force resisting system to achieve a higher rating than “FAIR”, a seismic retrofit of the building would be required. A seismic retrofit would most likely consist of providing more shear walls in the building to assist in resisting the design earthquake forces. This could be accomplished by providing new wall lines, infill of existing window openings, thickening of existing walls with shotcrete, or a combination of all these options. It is also possible that the existing foundation below these walls would need strengthening. In order to more accurately assess these and other retrofit requirements that may be necessary, a detailed structural analysis and evaluation of the building would need to be performed similar to that required for the design of a new building.

Summary and Conclusions

Webber Hall was originally constructed in approximately 1954 and it is estimated that it was designed in accordance with the 1952 Uniform Building Code. Based on the review of available documents for Webber Hall, the structure appears to be in good structural condition and appears to be in conformance with the building design standards at the time of its original design.

The structure was evaluated in 1978 and again in 1998. Done by Degenkolb Engineers the 1998 evaluation rated Webber Hall as “FAIR” based on the University rating system. The University rating system defines a “FAIR"structure as one that will experience “damage” with hazard to life categorized as “low.” There is no evidence to suggest this rating has changed or is different today.

WEBBER EXISTING HVAC SYSTEMS EVALUATION

Air Handling Units: Webber Hall has two large (14,450 CFM and 42,000 CFM), 100% outside air handling units that serve the entire building. The remodel of the lab areas (third floor) will decrease the number of fume hoods from a total of 6 to 4; therefore the existing air handling units will have adequate capacity for the new fume hood density in renovated areas. One unit serves the first and most of the second floor of the building, and the other serves the third floor and the south end of the second floor. The units serve a constant volume, dual duct distribution system. These air handling units have a chilled water cooling coil, steam heating coil, supply fan and filter section. The unit that serves the first and second floor was completely rebuilt in 2001 with a new fan, cooling coil, steam heating coil, and filter section. The unit that serves the third floor was replaced in 2001 with a new custom unit. There are vibration issues with the rebuilt air handling unit. In a dual duct configuration, the air handling units are near capacity under the current programming. Currently the air handling units can provide up to 11 air changes per hour (ACPH) to the lab spaces. Increased load due to the lab remodel may cause them to be undersized.

Exhaust Fans: Each room or fume hood in Webber Hall currently is served by a dedicated exhaust fan located on the roof. These fans are mostly original building equipment, except for a few that have been replaced as part of individual room remodels. The originally installed fans are beyond their useful life. The fans located on the second floor roof discharge in close proximity to the pedestrian walkway between Boyce and Webber Hall.

Supply and Exhaust Air Distribution System: The supply and exhaust air distribution system includes the ductwork as well as the terminal units. As mentioned above, the current system is dual duct CV supply with constant volume exhaust. The ductwork and mixing boxes were installed in two phases in 1974 and 1977. A lack of air distribution has been observed in Webber Hall.

Fume Hoods: Webber Hall has many fume hoods of varying sizes. Most are original but functioning equipment. Performance of these dated hoods was observed to be unreliable. A few newer hoods have been added in recent years. Currently, all fume hoods are constant volume with no sash or presence controls. The system is constant volume and each hood has its own dedicated fan. In areas of lab renovation, the fume hoods will be replaced for performance and safety reasons due to current reliability.

Chilled Water System: Chilled water is delivered to the building from the campus central plant. The campus operates on a primary/ secondary/ tertiary pumping system, with the tertiary pumps being located in the building. A 2-way valve on the chilled water return is controlled by the return water temperature to only let water out of the building loop after it has reached the desired temperature. The building chilled water system includes two pumps, piping and chilled water coils in each air-handling unit. New chilled water pumps, VFD's, coils, and associated piping were installed in 2001. The capacity of the chilled water system is matched to the capacity of the air-handling units. An increase in size of the air handlers will result in the need for an increase in the capacity of the chilled water system.

Heating Hot Water System: Webber Hall currently does not have a heating hot water system. The original heating hot water system was abandoned in place when the heating coils in the air handling units were replaced with steam coils in 2001.

Steam and Condensate Return System: The campus central plant provides steam service to the building. The steam and condensate return system includes piping, steam heating coils, and condensate receiver and return equipment. New steam heating coils, condensate receiver and steam injection condensate return system and associated piping were installed in 2001. An increase in size of the air handlers will result in the need for an increase in the capacity of the steam and condensate return system. Addition of a reheat coil system for a VAV conversion may also increase the size of the steam system.

Building Energy Management and Controls System: The controls for the air handling units, chilled water system and steam system were replaced with new DDC controls in 2001. The remainder of the controls system is outdated pneumatic controls and was installed in phases in 1974 and 1977.

WEBBER EXISTING PLUMBING SYSTEMS EVALUATION

Piping: In general, the plumbing system within entire building has aged beyond their normal useful life. Not apparent may be internal erosion and blockage of the piping system due to age and usage. What is visible is the history of leakage and the problems associated with repairing a system when isolation valves are not installed or in the wrong location. In addition, many of the valves are “frozen” or simply inoperable. A complete replacement of the infrastructure within the building is recommended. This would provide better control of isolating problem areas without impacting adjacent laboratories and/or the building.

Plumbing fixtures: Since 1982, water economics has entered the picture. All plumbing fixtures such as water closets and faucets are all outdated and wasteful. Upgrading the plumbing fixtures should replace the current water closet with 1.6 Ultra Low Flow Toilets (bowl and valve), and flow restrictors for the faucets. In some cases, where the faucets are in public restrooms, the fixture must be replaced to accommodate self-closing faucets.

Laboratory Compressed Air System: Compressors generally last for 10,000 hours of operation before an overhaul is required. Regardless of the diversity used, it appears that replacement would be required soon.
Vacuum System: The vacuum pump was replaced about five years ago therefore will not require replacement.

Natural Gas – 4" MPG service dividing into a 1 psi service and an 8" service. The total building load based on the 1974 “As-Built” drawings is 2750 CFH. Final determination as to the required service size and capacity would be based on the project outlets and all equipment requiring gas service.

Soft Water: The building currently receives its supply of high purity water from Boyce Hall where the RO water is generated. The water line is routed from the second floor core area to Webber at the second floor ceiling and through the connecting overhead passageway.

Laboratory Acid-Resistant Waste & Vent System: All glass piping in the core area should be replaced with polypropylene pipe (Fuseseal) as per the Fire Marshal’s requirements. Piping in the laboratory areas can be replaced when the facilities are modified.

Nitrogen Bottles: The design must include centralizing the nitrogen supply so as to clear the hallways for emergency purposes. Relocation of the bottles to a central location or a storage room on each floor would address the issue.

Plumbing system: It was noted during a site visit that the waste system occasionally backs up. The main service apparently is very shallow and to correct this, would be to realign the service for adequate flow.

Fire Protection (Sprinklers): The existing fire protection system is antiquated and in order to comply with current life safety issues associated with the fire protection system, the building will be required to have wet standpipes at the stairwells. The upgrade would include standards to comply with NFPA 13, 14 and the campus fire marshal’s requirement. For safety in activation time and absence of anyone in the building, this would include a combination wet fire standpipe at the stairwells, and sprinklers throughout the entire building.

WEBBER EXISTING ELECTRICAL SYSTEMS EVALUATION

Installed in 1954 most of the electrical equipment is old and beyond it's useful life (51 years old). The building's power is served from the basement where all the primary equipment is located. 5KV primary (dual parallel circuits), 480Y/277-volt (225 KVA), 3P, 4W and 208Y/120-volt (300 KVA), 3P, 4W secondary unit substations are the main sources of power for the building. These substations are presently fed off the main campus 4.16KV system through an oil filled cutout switch located in a tunnel vault (TV-4) to the West. From the unit substations, feeders run horizontally to motor control centers and vertically to secondary distribution equipment, located in the corridor on each floor. Most available circuits have been utilized in the corridor (house) panels; added spare power is needed on each floor. Most laboratory panels have spare capacity for future needs.

Comments made by Physical Plant personnel suggest that this original main electrical equipment is old and the voltage level is un-correctable. Both the main load interrupters have been replaced with 15KV rated equipment and the 208Y/120V, 300 KVA transformer (located in the South electrical room), was replaced with a dual primary (12KV/4.16KV) transformer. While the primary load interrupters and the 300 KVA transformer have been replaced, the 480Y/277, 225 KVA transformer, both main switchboards, and all motor control centers, have not. It is because of the age of the equipment that Physical Plant personnel prefer to use the newer primary load interrupters, instead of the secondary main breakers, to shut down the main distribution switchboards. Further, the voltage adjustment taps on the newer dual primary transformers are on the 12 KV end of the winding, making it impossible to adjust the voltage at the substation, when supplied by 4.16 KV. These taps are used to adjust the voltage level when the loading of the system exceeds the system design parameters. With the voltage of the system dropping (due to the loading of the 5 KV system), and since the taps are not accessible at 4.16 kV, the only way the system can be brought back to it's normal level, will be to shed some load or attaching the existing substations to the 12 KV campus wide distribution system. According to University personnel, the 4.16 KV to 12 KV upgraded will be performed as part of the East Campus Infrastructure Improvement project, due to start construction this summer.

Both 480Y/277-volt and 208/120-volt emergency power is presently available through panels located in the basement. 480-volt emergency power is also fed to a 225A transfer switch from the emergency generator located on the roof of Boyce Hall. 480-volt normal power to the transfer switch is fed from the main switchboard. From the automatic transfer switch, power is supplied to a 480-volt panel and to a step down transformer; stepped down to 208Y/120V. Emergency power loads within Webber Hall include egress corridor and exit lights, fire alarm and clock systems, and some third floor hallway outlets. For more information about the emergency generator located on the roof of Boyce Hall, see the Boyce Hall description above.

The telephone main point of entry (MPOE) is in the south electrical room in the basement. One 4" conduit extends phone service to the MPOE from the existing tunnel vault "TV-4". Telephone backboards, fed from the MPOE, are located in janitor closets at each end of the corridor (two per floor). All backboards are located on walls opposite to the janitors' sinks. There are approximately 150 phone lines scattered throughout the building. Phones are directly fed from the NEC switch located in the telephone building, on University Avenue, near the freeway. It has been reported that the communications system is at capacity levels, but functioning. Original CAT 3 phone wire and 66 punch blocks are still present.A multi-mode fiber optic backbone extends data service from existing tunnel "TV-4" to the building MPOE in the electrical room in the basement. Data switches, fed from the MPOE, are located in a second floor south janitor room, where the fiber optic cable is terminated. The 24 to 48 port data switches are 5-7 years old. Expected replacement is 5 years from installation date. There are approximately 150 data ports scattered throughout the building. CAT5 or CAT5e cable is used for all data connections.

The minimal fire alarm system was installed in 1979. Manual pull stations, horns and strobes are located at each stairwell and main building exits. All manual pull stations are mounted approximately 60" above the finished floor. A newer Simplex 4020 fire alarm control panel was installed around

1995. The fire alarm control cabinet, which is located in the south basement electrical room, is connected to the campus wide fire alarm system through a copper wire connection.

All of the corridor light fixtures were replaced in 1976. All light fixtures were retrofitted with T-8 lamps and energy efficient electronic ballasts in 1996. Indoor lighting controls consist of wall switches only except in the corridors. The corridor lighting is controlled by low voltage intermittent switches located in the corridor area, which are connected to a relay and time clock.

Egress lighting was added to the corridors in 1976. Approximately very third fixture in each corridor is on an emergency power circuit. There is no emergency egress lighting in the stairwells, main electrical room or restrooms. The corridor light fixtures lenses are very dirty, but otherwise are in good shape. Lighting fixtures within the laboratories and support areas are wall switch controlled. There were no occupancy sensors visible. All exit signs are old and in some cases, are not lit.

8.2.2 Boyce Hall

EXISTING ARCHITECTURAL CODE, ACCESSIBILITY AND FIRE & LIFE SAFETY REVIEW

Year Built: Drawings Dated 1971

Building Area (External Gross Sq. Ft. per University Documents):

Basement:	1,113
First Floor:	22,929
Second Floor:	22,809
Third Floor:	22,811
Fourth Floor:	22,128
Fifth Floor:	22,128
Sixth Floor:	13,569
Unenclosed Covered Area	1,881
Total:	129,368

Number of Floors:

Six Floors, above grade

Description of Construction:

Primary Structure: Concrete CIP Frame, Decks and Shear Walls.

Envelope: Combinations of double-wythe masonry (brick) and exposed concrete panels and spandrels

Partitions and General Construction: Interior Plaster on Metal Studs

Building Occupancy Classification:

Original: “C” (in the code of the time, this was “Commercial” which roughly corresponds to what became “B-2” and then later “B”)

Proposed and current use: Group B with options for up to four Control Areas.

Building Type Classification:

Original: Type I

Proposed and current Type Classification: Type I construction

Height Classification:

6 story,

Distance from First/Ground Floor to Sixth Floor Deck (highest floor of human occupancy): 63'

Classification: not high-rise (CBC 403.11)

Set-backs:

Clearances on all 4 sides (measure to centerline of courts)

Observed Accessibility Issues:

Path of travel issues:

Handrails in Stairways non-compliant configuration

Elevator Controls not at accessible height/layout

Building Signage non-compliant

Required clearances not provided at many doors

Building Accessory Items:

Toilets not compliant for space or accessory provisions (main lobby as well as all floors)

Drinking Fountain non-compliant

Telephone non-compliant

All door handles are knobs; not lever type

Internal spaces:

Many rooms not laid out with proper turning areas

Accessories such as safety showers non-compliant

Benches, hoods and fixed items non-compliant for heights & reach ranges

Observed Fire and Life Safety Issues:

"Bridges" to Webber at Second floor create dead-end corridor conditions and/or existing doors do not provide swing in direction of egress

Elevator Smoke vestibule or other smoke containment provisions not provided

Fire Alarm: Upgrade Modifications required

Fire Protection: Upgrade Modifications required

BOYCE EXISTING STRUCTURAL REVIEW

INTRODUCTION

Presented herein is a general structural assessment of Boyce Hall located on the campus of UC Riverside in Riverside, California. KPFF Consulting Engineers performed the evaluation after a review of the available building information and structural drawings provided to us by Chong Partners via the University. This report summarizes our preliminary structural assessment of the above-mentioned structure.

Please note that the structural assessment in this report is primarily based on engineering judgement constrained by the structural information gathered at the time of this evaluation and the limited scope of our work. Detailed structural analysis and calculations were not performed for this evaluation; therefore, the assessment is based primarily on the review of the available documents provided to us.

DOCUMENT REVIEW

Our review included the original structural drawings for Boyce Hall (a.k.a. Webber Hall Addition) dated October 1971, sheets S-1 through S-28. We reviewed the architectural drawings of the same date, sheets A-1 through A-83. We also reviewed the Boyce Hall Seismic Upgrade structural drawings S1.1 through S4.4 by Saiful/Bouquet Consulting Structural Engineers dated 10/30/98.

BUILDING DESCRIPTION

Boyce Hall is located directly east of Webber Hall. The building consists of a 5-story structure with a partial basement level. The main building footprint is rectangular with approximate dimensions of 196'x107'. There is a large rectangular steel framed area in the center of the building that is approximately 90'x17'. The typical floor-to-floor height is 12'-6" at the upper floors, 13'-0" at the first floor and 12'-0" at the partial basement. Two bridges at the north and south end of the structure connect the building to the adjacent existing Webber Hall at the 2nd floor only. Four buttresses were added to the original building in the 1998 retrofit. Each buttress is approximately 20'x13' in plan and extends the full height of the existing structure.

STRUCTURAL SYSTEM DESCRIPTION

Boyce Hall's roof and floor levels consist of two-way concrete slabs spanning to concrete columns or bearing walls at approximately 20'-0" on center. The floor slabs are 10" thick. The roof slab varies in thickness from 7 ½" to 10" at the ridgeline. The center area of the building is framed with steel, but there is no diaphragm at this area. The partial basement is encompassed by reinforced concrete retaining walls. A 4-inch thick slab on grade occurs at the first floor. The partial basement has a 6-inch thick slab on grade.

The seismic lateral load resisting system consists of interior and exterior reinforced concrete shear walls located at each level and in each principal direction. The shear walls have many openings due to window and door layout. Lateral loads are transferred to the shear walls through the concrete slabs at the roof and floor levels. The foundation of the building consists of pile caps with drilled piles beneath the building columns and bearing walls. The pile caps are interconnected with tie beams.

The seismic lateral load resisting system is augmented by the 1998 addition of four buttress structures. The buttresses add shear wall in both the north-south and east-west directions and are supported on pile caps with drilled piles. The lateral loads from the existing concrete slabs are transferred into the buttresses via new drag assemblies at most locations.

STRUCTURAL DESIGN REVIEW

Boyce Hall appears to have been originally designed in accordance with the 1970 Uniform Building Code. The buttress elements that were added in 1998 are stated to be in conformance with the 1995 California Building Code on the design drawings. The buttress elements and drag assemblies serve to draw lateral load away from the existing shearwalls and thereby augment the lateral force resisting system. The buttress elements followed stricter detailing requirements than those required by the 1970 Uniform Building Code. This improved detailing will provide a more ductile structural system with the capability to absorb greater seismic demands by the yielding of the structural elements in the case that the actual forces imposed on the structure exceed the code level design forces.

After a review of the original structural drawings for this project, the structure appears to be in general conformance with the original design requirements of the code. The seismic upgrade drawings, which add four new buttresses, have added both additional strength and ductility to the original design. The current structure appears to meet the life-safe intent of the code.

Summary and Conclusions

Boyce Hall was constructed in approximately 1974 and was designed based on the 1970 Uniform Building Code. The Boyce Hall Seismic Upgrade was designed based on the 1995 California Building Code. Our evaluation of the structure is based on a review of the original construction drawings, the seismic upgrade drawings and experience with similar building types. After a review of the available structural drawings for this project, the structure appears to be in general conformance with the original design requirements of the code and appears to meet the life-safe intent of the code. As noted above the 1998 retrofit provided additional strength and ductility to the structure. Although no formal analysis has been conducted on the retrofitted structure, the building is likely to fall into the "GOOD" category as described by the U.C. rating system.

BOYCE EXISTING HVAC SYSTEMS EVALUATION

Air Handling Units: Boyce Hall has two large, 55,000 CFM, 100% outside air handling units that serve the entire building with the exception of the west half of the Vivarium. The remodel of the lab areas (fourth and fifth floors) will decrease the number of fume hoods from a total of 28 to 16; therefore the existing air handling units will have adequate capacity for the new fume hood density in renovated areas. One unit serves the north half of the building, and the other serves the south half. The units serve a constant volume, dual duct distribution system. These air handling units have a heating hot water pre-heat coil, chilled water cooling coil, heating hot water heating coil, supply fan and filter section. New supply fans with VFD's will be installed with the current Boyce Hall HVAC Renewal Project, as the system is being converted to variable air volume (VAV). The cooling and heating coils are original, but operational. The pre-heat coils are also original and operational, but they are currently not being operated (per decision of the Physical Plant). The air handling units are at the limit of capacity under the current programming. The units can provide up to 8 air changes per hour (AC/HR) to the occupied areas. Increased load due to the lab remodel may cause them to be undersized.

Exhaust Fans: As part of the current Boyce Hall HVAC Renewal Project, two large exhaust fans will be installed on the roof for almost all of the building laboratory exhaust air. These two new fans will be manifolded on the roof, with existing duct risers being tied into the new exhaust manifold. The fans will run at a constant speed to maintain stack velocity. Dampers in the manifold on the roof will modulate to dilute the exhaust and maintain pressure in the exhaust system with the operation of the VAV exhaust air valves. A few dedicated exhaust fans will remain for constant volume exhaust areas such as restrooms or special duty fume hoods. These fans are operational, but are nearing the end of their useful life and thus will be replaced. The new large, lab exhaust fans have some spare capacity for any increased load due to the lab remodel.

Supply and Exhaust Air Distribution System: The supply and exhaust air distribution system include the ductwork and terminal units. As mentioned above, the original system is dual duct constant volume supply with constant volume exhaust. As part of the current Boyce Hall HVAC Renewal Project, new VAV lab exhaust air control valves will be installed, as well as VAV supply lab air control valves (cooling only with reheat coils) for lab areas and dual duct VAV mixing boxes for office areas (the dual duct VAV remained due to the limited budget of the renewal project). Because some areas still use dual duct mixing boxes, both hot and cold supply duct needs to remain in the mechanical core. No new ductwork modifications will be made as part of the Boyce Hall HVAC Renewal Project, with the exception of new general exhaust ductwork in lab areas to compliment the VAV conversion of the fume hoods. The existing supply ductwork is original, but operational. The existing exhaust ductwork is also original, but generally undersized for most of the lab areas after the increase of exhaust during the HVAC Renewal Project.

Fume Hoods: Boyce Hall has many fume hoods of various sizes. Most of the fume hoods are original. Performance of these dated hoods was observed to be unreliable. Several new fume hoods have been added in recent years. As part of the current Boyce Hall HVAC Renewal Project, the existing fume hood exhaust system will be upgraded to VAV control based on sash height positioning sensors. However, fume hood presence sensors will not be installed with the Boyce Hall HVAC Renewal Project. Installation of presence sensors can further reduce energy use. For all lab renovations, the fume hoods will be replaced for performance and safety reasons due to current reliability.

Chilled Water System: Chilled water is delivered to the building from the campus central plant. The campus operates on a primary/ secondary/ tertiary pumping system, with the tertiary pumps being located in the building. A 3-way valve on the chilled water return is controlled by the return water temperature to return water from the building loop after it has reached the desired temperature. The main building chilled water system includes two pumps, piping and chilled water coils in each air handling unit. The fan coils that serve the west Vivarium also have chilled water coils, and two dedicated chilled water pumps. Cooling coils in the fan coils in the west Vivarium are original building equipment, and there are reports of the system not able to satisfy room temperature requirements. The chilled water piping and AHU coils are also original building equipment. One main chilled water pump was replaced recently, and the other is slated for replacement by the Physical Plant. The system as a whole is functional, but nearing the end of its useful life. The chilled water system is currently constant volume, with 3-way valves at all coils. The chilled water valves

on the AHU cooling coils are in very poor shape and can not be controlled effectively with the new DDC controls system. The capacity of the chilled water system is matched to the capacity of the air handling units. An increase in size of the air handlers will result in the need for an increase in the capacity of the chilled water system.

Heating Hot Water System: Heating hot water is generated by steam (via a steam to hot water heat exchanger) from the campus central plant. The heating hot water system includes two pumps, piping, heating coils, re-heat coils, and pre-heat coils. New pumps, reheat coils (for lab terminal valves), expansion tank, air separator and associated piping will be installed with the current Boyce Hall HVAC Renewal Project. Heating coils and pre-heat coils in the air handling units are original, but functional. The hot water valves on the AHU heating coils are in very poor shape and can not be controlled effectively with the new DDC controls system. Heating coils in the fan coils in the west Vivarium are also original building equipment. Observations and reports indicate the system is not able to satisfy room temperature requirements during the heating mode. An increase in size of the air handlers will result in the need for an increase in the capacity of the heating hot water system.

Steam and Condensate Return System: The campus central plant provides steam service to the building. The steam and condensate return system includes piping, a heat exchanger to generate heating hot water and domestic hot water, and a condensate return pump. The heat exchanger will be replaced with the current Boyce Hall HVAC Renewal Project. The condensate return pump is original building equipment and is nearing the end of its useful life. System piping is original, but in fair condition. An increase in size of the air handlers will result in the need for an increase in the capacity of the steam and condensate return system.

Building Energy Management and Controls System: The original pneumatic HVAC controls system will be completely upgraded to new Direct Digital Controls (DDC) with the current Boyce Hall HVAC Renewal Project. The lab areas will operate on the Phoenix Solaris controls system. A new operator workstation will be installed in the mechanical area and be linked to the campus-wide workstation at the central plant.

BOYCE EXISTING PLUMBING SYSTEMS EVALUATION

Compressed Air System: Laboratory Compressed Air System: Installed in 1974, the compressed air system delivers 100 CFM @ 90 psi. The compressor has a 40 horsepower and a 30"x 84" receiver tank. It appears that the compressors may have exceeded their useful life.

Vacuum System: Boyce Hall has two separate systems – One is a 15.9 CFM Free Air vacuum pump with a 3 horsepower motor and an 80 gallon receiver. The second system is a duplex system with capacities of 145 CFM @ 25" Hg and has a 10 horsepower motor. Both systems appear to have been serviced frequently and more than likely, overhauled. Life expectancy of a unit is 10,000 hours of operation and even with a generous diversity factor, 25 years usually dictates replacement.

Natural Gas: 2-1/2" mpg service with regulation down to 8" w.c. The distribution piping from the regulator is a 4" service.

Water: The water service to the building is 4". From there, the service is divided into a 3" industrial cold water service and a 2-1/2" potable cold water service to the system.

Distilled Water: A 2" service from the still located in the 6th floor equipment room. Steam from the campus central plant is used to boil the water, which condenses while removing solids, inorganics, and organic chemicals. Depending on the primary purpose and/or degree of polishing required for future laboratory requirements, it would seem that the current system of distillation is antiquated and must be upgraded.

Laboratory Acid-Resistant Waste & Vent System: A mixture of pipe material with glass being the predominant material used. Currently, it has been noted that there are leakage problems at the piping joints. All glass piping in the core area should be replaced with polypropylene pipe (Fuseseal) as required by the Laboratory Design Criteria and per the Fire Marshal's requirements. Piping in the laboratory areas can be replaced when the facilities are modified.

Fire Protection (Sprinklers): The existing system consists of a 3" fire service to the dry standpipes located in the stairwells on the north and south end of the building and hose racks throughout the building.

Sewer System: it was noted during a site visit that the waste system occasionally backs up. The main service apparently is very shallow. To correct this, the service must be realigned and sloped for adequate flow. Emergency Shower/Eye Wash requires upgrading to meet with current life safety regulations – i.e. tempered water, etc.

Steam: The piping system has been active in the building for almost 30 years and is due for replacement. Steam is used as a primary medium for several applications in addition to utilization in certain laboratories. Some of the uses include sterilizers, dishwashers, distillation, and hot water generation. Service pressures include 5 psi and 30 psi steam.

BOYCE EXISTING ELECTRICAL SYSTEMS EVALUATION

Built in 1974, the building's power is served from the first floor where all the primary equipment is located in a shared space with mechanical and pluming equipment. 4.16 KV primary (dual parallel circuits) serve the 480Y/277-volt (1000 KVA), 3P, 4W and 208Y/120-volt (750 KVA), 3P, 4W secondary unit substations, which are the main sources of power for the building. These substations are presently fed off the main campus 4.16 KV system through an oil filled cutout switch, also located on the first floor in the equipment room. Feeders run horizontally and vertically, from the unit substations to motor control centers and distribution panels located in the central core area. The second floor central distribution switchboard serves both the second and third floors, while the fourth floor central distribution panel serves the fourth, fifth and sixth floors. From the central distribution panels feeders again run horizontally to panels located in the corridors and labs on each floor. Most available circuits have been utilized in the corridor (house) panels; added spare power is needed on each floor. The 4.16 KV primary feed will be upgraded to 12 KV under the East Campus Infrastructure Improvement project, due to start construction this summer. PCB laden capacitor banks correct the power factor at one of the motor control centers on the first floor.

Although the equipment is well maintained, it is over 30 years old. The main distribution equipment on the first floor is the top most concern. Comments made by Physical Plant personnel suggest that this original main electrical equipment is unreliable. Both the main load interrupters have both been replaced with 15 KV rated equipment and the transformers with dual primaries (12KV/4.16KV). While the primary load interrupters and transformers have been replaced, the main switchboards have not. It is because of these reliability issues that Physical Plant personnel prefer to use the newer primary load interrupters, instead of the secondary main breakers, to shut down the main distribution switchboards. Further, the voltage adjustment taps on the newer dual primary transformers are on the 12 KV end of the winding, making it impossible to adjust the voltage at the substation, when supplied by 4.16 KV. These taps are used to adjust the voltage level when the loading of the system exceeds the system design parameters. With the voltage of the system dropping (due to the loading of the 5 KV system), and since the taps are not accessible at 4.16 KV, the only way the system can be brought back to it's normal level, will be to shed

some load or attaching the existing substations to the 12 KV campus wide distribution system. According to University personnel, the 4.16 KV to 12 KV upgraded will be performed as part of the East Campus Infrastructure Improvement project, due to start construction this summer.

A 150 KW emergency power generator on the roof provides minimal emergency egress power to Boyce Hall, Webber Hall and the Computer Statistics Building. Emergency power within Boyce Hall is fed to corridor and exit egress lighting, along with fire alarm and clock systems. Both 480Y/277 and 208Y/120 volt emergency power is available. The generator, automatic transfer switch and panels are located on the top floor of the equipment core area. The generator was replaced in 2002, while the transfer switch and panels are original equipment, 1974.

The main point of entry (MPOE) room is located on the first floor. Two four-inch conduits extend phone service wires from existing tunnel TV-8 to the building. Telephone backboards, fed from the MPOE, are located at a central point and open to the environment in the central core area. There are approximately 200 phone lines scattered throughout the building. It has been reported that the communications system is at capacity levels, but functioning. Original CAT3 phone wire and 66 punch blocks are still present.

A multi-mode fiber optic backbone extends data service from existing tunnel "TV-8" to the building MPOE room. Data switches, fed from the MPOE, are located in the central core area. The 24 port data switches are 5-7 years old. Expected replacement is 5 years from installation date. There are approximately 75 – 100 data ports scattered throughout the building.
The fire alarm system is minimal. Manual pull stations, horns and strobes are located at each stairwell and main building exits. The main fire alarm control cabinet, which is located in the first floor equipment area, is connected to the campus wide fire alarm system through a copper wire connection. A newer Simplex 4020 fire alarm control panel was installed around 1995.

All existing light fixtures have either been replaced or retrofitted to T-8 lamps and energy efficient electronic ballasts. Retrofitting of light fixtures occurred around 1996. Indoor lighting controls consist of wall switches only; no time clocks or motion sensors were visible. Emergency egress lighting throughout the building corridors is minimal. There is one egress light fixture located at each corner and one in the middle of each corridor. The emergency egress lighting in the stairwells, which seems adequate, consists of one light fixture on each landing. All egress lighting is on emergency power circuits, which is supplied by the generator on the roof. All exit signs are old with incandescent lamps.

Power is supplied to the Vivarium via the distribution panel located on the south end of the forth floor core area of Boyce Hall. One power panel is located in the middle of each corridor. These panels provide power for all the Vivarium needs; motor loads, lighting and power. Although the equipment is well maintained, it is nearly 30 years old. See Boyce Hall above for a detailed description of the primary power system.
The emergency power generator on the roof of Boyce Hall, next to the Vivarium, provides the Vivarium with only minimal power for emergency egress lighting. See Boyce Hall above for a detailed description of the emergency generator.

Telephone services to the Vivarium are fed from the fifth floor telephone backboards.

The Vivarium fire alarm system is minimal. Manual pull stations, horns are located at each stairwell. One fire alarm bell is located in the west portion of the Vivarium and one break glass pull and bell are located on the east side. The Vivarium devices are connected to the Simplex 4020 fire alarm control panel on the first floor, which in turn is connected to the campus system.
All existing Vivarium light fixtures have been retrofitted to T-8 lamps and energy efficient electronic ballasts. Retrofitting of light fixtures occurred in 1996. Indoor lighting controls consist of wall switches for corridor and support area lighting and time clocks for the animal rooms. Red indicator lights over the doors illuminate when the animal room lights are on.
Emergency egress lighting in the Vivarium corridors is minimal. There is one egress light fixture located at both ends and one in the middle of each corridor. All egress lighting is on emergency power circuits, which are supplied by the generator serving Boyce Hall, Webber Hall and the Computer Statistics building

8.3 Occupants by Department

Bio-Chemistry

Faculty	ASF	Faculty / Acad Coordinator	Professional Researcher	Specialists / Project Scientist	Postdoc / Fellow	Graduate Student	Visiting Scientist	SRA / Tech FTE	Undergrad Researchers	Lab Helper / Assistant	Undergrad / Workstudy Students*	Highschool Students	Other	Total
Debus	1254.0	1			1.0	1.0			1.0				1.0	5.0
Daniel Galie	1536.0	1			2.0	3.0					4.0			10.0
Dugaicyzk	726.0	1				1.0			2.0					4.0
Frank Sauer	1095.0	1		1.0	3.0	2.0		2.0			4.0			13.0
Henry	868.0	1				1.0			1.0					3.0
Justin Roberts	1357.0	1									1.0		1.0	3.0
Larsen	1338.0	1			2.0	4.0					2.0			9.0
Martinez	1331.0	1			2.0	4.0					3.0		1.0	11.0
Michael Dunn	1331.0	1		1.0	2.0	3.0		1.0	2.0	1.0				11.0
Moses (Shared)	442.0	1												1.0
Norman	1331.0	1			2.0	4.0								7.0
Spindler	1352.0	1				2.0					1.0			4.0
Traugh	2105.0	1			1.0	2.0			2.0				3.0	9.0
Wilkens	1049.0	1			1.0	4.0								6.0
Zanello	1201.0	1				1.0					1.0			3.0
Xuan Liu	1508.0	1		1.0	1.0	6.0					3.0			12.0
Zong Chen		1			2.0					1.0				4.0
Grand Total														115.0

Bio-Medical

Faculty	ASF	Faculty / Acad Coordinator	Professional Researcher	Specialists / Project Scientist	Postdoc / Fellow	Graduate Student	Visiting Scientist	SRA / Tech FTE	Undergrad Researchers	Lab Helper / Assistant	Undergrad / Workstudy Students*	Highschool Students	Other	Total
Iryna Ethell	978	1.0			2.0	5.0								8.0
Craig Byus	1,448	1.0		1.0		2.0			2.0					6.0
David Johnson	901	1.0				1.0			1.0					3.0
John Shyy	3,615	1.0		1.0	3.0	3.0			2.0					10.0
Dan Straus	1,301	1.0				2.0			3.0					6.0
Ameae Walker	1,446	1.0		1.0	1.0	5.0	2.0	1.0	3.0	1.0				15.0
Michael Stememan	1,246	1.0		1.0						1.0				3.0
Monica Carson	1,521	1.0	1.0		1.0	3.0		1.0	3.0					10.0
Christian Lytle	950	1.0				3.0								4.0
Neal Schiller	1,429	1.0				3.0			3.0	1.0				8.0
Grand Total														73.0

Nematology

Faculty	ASF	Faculty / Acad Coordinator	Professional Researcher	Specialists / Project Scientist	Postdoc / Fellow	Graduate Student	Visiting Scientist	SRA / Tech FTE	Undergrad Researchers	Lab Helper / Assistant	Undergrad / Workstudy Students*	Highschool Students	Other	Total
Baldwin	1,023	1.0				2.0					4.0		5.0	12.0
Becker	1,220	1.0			3.0						1.0		2.0	7.0
Deley	1,006	1.0			2.0	4.0								7.0
Kaloshian	1,029	1.0				2.0					4.0		1.0	8.0
Platzer	1,029	1.0			1.0						3.0			5.0
Ploeg	914	1.0			2.0								1.0	4.0
Roberts	1,484	1.0				3.0					2.0		3.0	9.0
Grand Total														52.0

Plant Pathology

Faculty	ASF	Faculty / Acad Coordinator	Professional Researcher	Specialists / Project Scientist	Postdoc / Fellow	Graduate Student	Visiting Scientist	SRA / Tech FTE	Undergrad Researchers	Lab Helper / Assistant	Undergrad / Workstudy Students*	Highschool Students	Other	Total
Judelson	1,401	1.0			5.0	2.0					2.0			10.0
Rao	1,055	1.0			1.0	2.0					1.0			5.0
Coffey	867	1.0			2.0	1.0					1.0			5.0
(CCPP Director Virologist) Recruiting		0.0						3.0						3.0
Borneman	1,079	1.0			2.0	1.0					1.0			5.0
Borkovich	1,910	1.0			2.0	3.0		1.0			2.0			9.0
Jin	1,756	1.0			1.0	1.0								3.0
Cooksey	1,540	1.0			1.0	1.0		2.0			1.0			6.0
Ding	2,084	1.0			2.0	2.0		1.0			1.0			7.0
Dodds	3,418	1.0			1.0	1.0								3.0
Focht	753	1.0												1.0
Allen	1,059	1.0			3.0	9.0		11.0			1.0			25.0
(Soil Pathologist) Recrutitng		0.0												0.0
Adkaskaveg	2,053	1.0			1.0	2.0		3.0						7.0
Stanghellini	1,625	1.0			1.0	3.0		1.0			1.0			7.0
Wegulo	851	1.0				1.0		1.0						3.0
Wong	1,037	1.0						2.0						3.0
Grand Total														102.0

APPENDIX

8

DETAILED SPACE REQUIREMENTS

SPACE NAME: RESEARCH LABORATORIES
SPACE ID NO.: 2.01
OCCUPANCY: 2-3 PER MODULE

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●
MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Uncontrolled	●
Other	
Minimum Air Changes/Hour	10
Air Recirculation	
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtration	
Additional Exhaust Air Filtration	
HOODS	
Chemical Fume Hood	Note 1.
Radioisotope Hood	
Exhausted Laminar Flow Hood	
Biological Safety Cabinet	Note 2.
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	

LABORATORY EQUIPMENT	
Vibration Sensitive	●
Light Sensitive	
Vibration Producing	
Heat Producing	●
Noise Producing	
PLUMBING	
Laboratory Gas (LG)	●
Laboratory Vacuum (LV)	●
Laboratory Air (LA)	●
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (PW)	●
Chilled Water (CHW S/R)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	●
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	●
208V, 30A, 3 Phase	?
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Emergency Power	●
UPS (OFOI)	
Phone	●
Data	●
In Use Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
CHEMICALS	
Bases	●
Acids	●
Solvents	●
Radioisotopes	●
Carcinogens/Regulated	TBD
Chemical Waste Storage	●
Biological Storage	●
Radioisotope Storage	●
Chemical Storage	●

ARCHITECTURAL	
Floor	
VCT (Chemical Resistant)	●
VCT	
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Sealed Concrete	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9'-0"
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

REMARKS:

1. (1) 6'-0" Chemical fume hood per 4 laboratory modules (average).
2. Quantity, size and type to be determined during design.

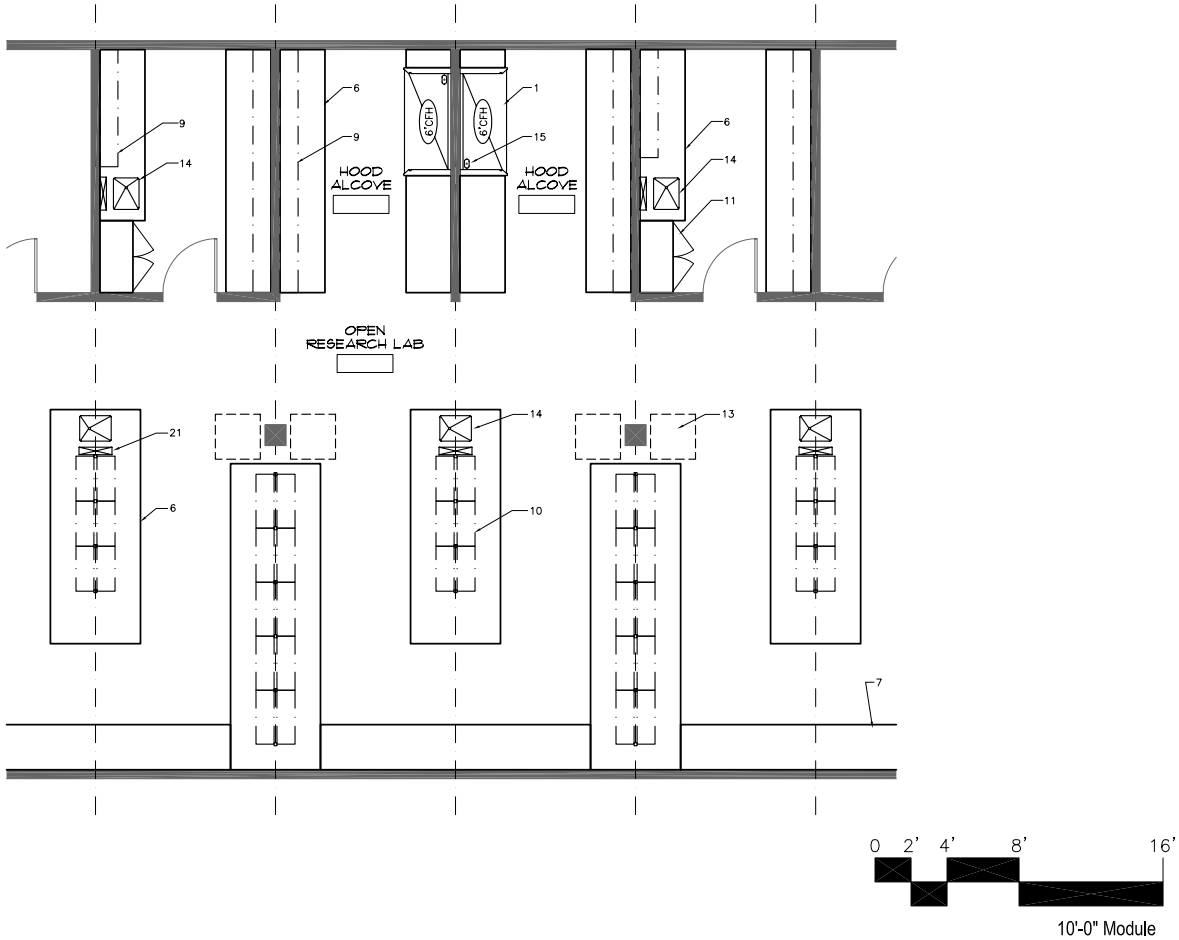
SPACE DIAGRAM

SPACE NAME: OPEN RESEARCH LABORATORY (BOYCE-WEST)
SPACE ID: 2.01
AREA:

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

FURNISHINGS KEY

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



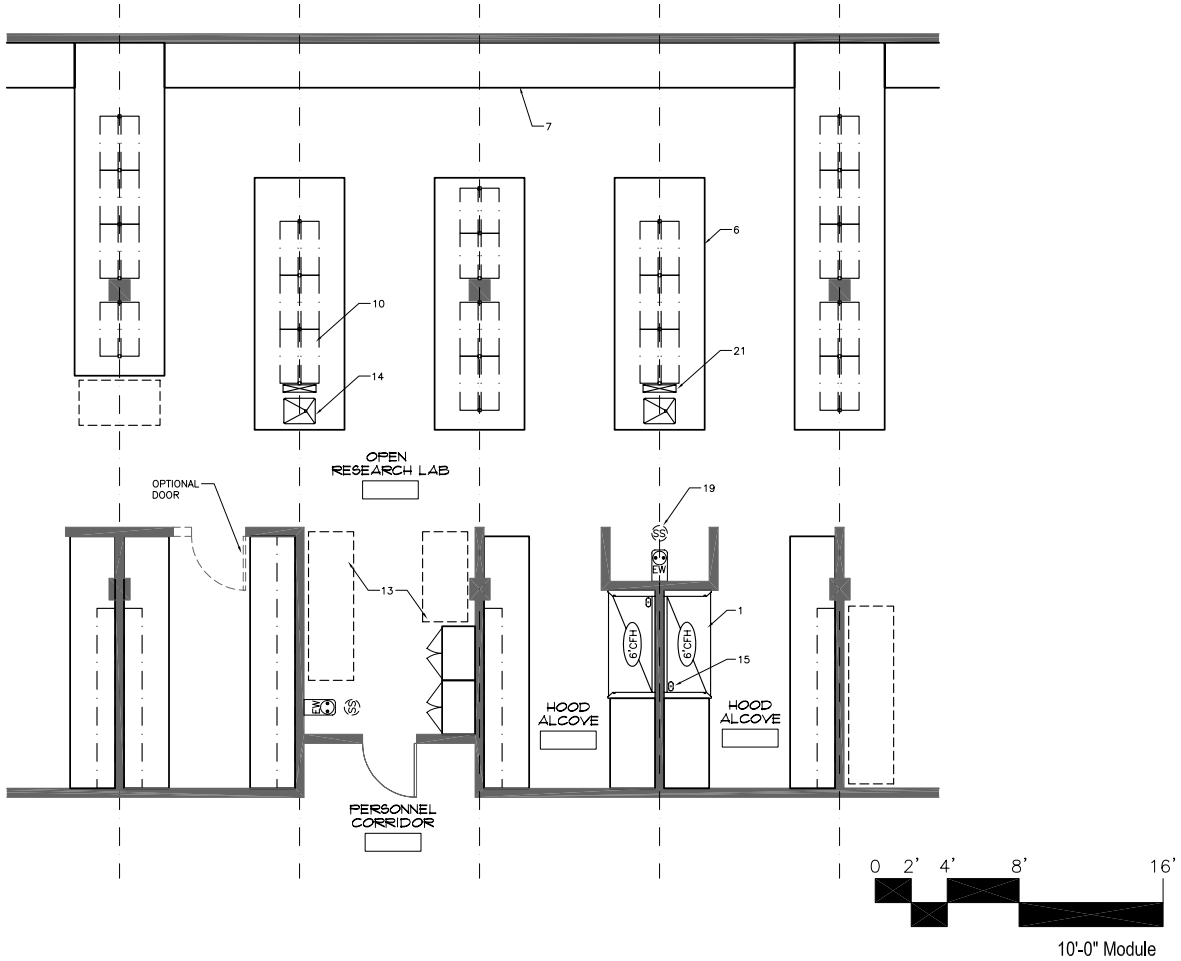
SPACE DIAGRAM

SPACE NAME: OPEN RESEARCH LABORATORY (BOYCE-EAST)
SPACE ID: 2.01
AREA:

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

FURNISHINGS KEY

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



DETAILED SPACE REQUIREMENTS

SPACE NAME: EQUIPMENT ROOM
SPACE ID NO.: 3.01
OCCUPANCY:

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●
MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Uncontrolled	
Other	●
Minimum Air Changes/Hour	10
Air Recirculation	
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtration	
Additional Exhaust Air Filtration	
HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Exhausted Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
REMARKS:	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	●
Heat Producing	●
Noise Producing	●
PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (PW)	
Chilled Water (CHW S/R)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	●
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	●
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Emergency Power	●
UPS (OFOI)	
Phone	●
Data	●
In Use Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT (Chemical Resistant)	●
VCT	
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Sealed Concrete	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9'-0"
Doors	
3'-6" x 7'	
3' x 7'	
1'-6" x 7'	
Light Tight Rotating Door	
Vision Panel	
Natural Daylight	

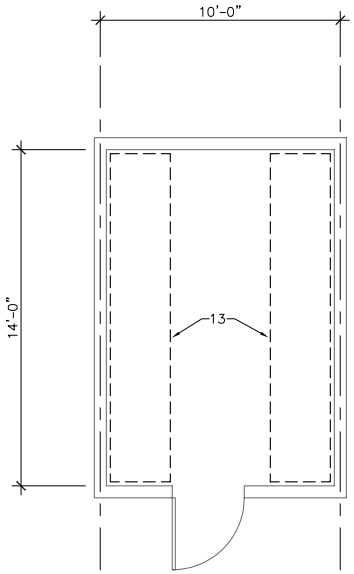
SPACE DIAGRAM

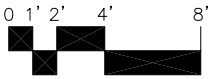
SPACE NAME: **EQUIPMENT ROOM**
SPACE ID: **3.01**
AREA: **140 NSF**

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

FURNISHINGS KEY

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





10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: FUME HOOD ALCOVE / CHEMICAL STORAGE
SPACE ID NO.: 3.02
OCCUPANCY: 1-2

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●
MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Uncontrolled	●
Other	
Minimum Air Changes/Hour	10
Air Recirculation	
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtration	
Additional Exhaust Air Filtration	
HOODS	
Chemical Fume Hood	Note 1.
Radioisotope Hood	
Exhausted Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	●
PLUMBING	
Laboratory Gas (LG)	●
Laboratory Vacuum (LV)	●
Laboratory Air (LA)	●
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (PW)	
Chilled Water (CHW S/R)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	●
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Emergency Power	
UPS (OFOI)	
Phone	●
Data	●
In Use Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
CHEMICALS	
Bases	●
Acids	●
Solvents	●
Radioisotopes	●
Carcinogens/Regulated	TBD
Chemical Waste Storage	●
Biological Storage	
Radioisotope Storage	●
Chemical Storage	●

ARCHITECTURAL	
Floor	
VCT (Chemical Resistant)	●
VCT	
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Sealed Concrete	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9'-0"
Doors	
3'-6" x 7'	
3' x 7'	
1'-6" x 7'	
Light Tight Rotating Door	
Vision Panel	
Natural Daylight	

REMARKS:

1. (1) 6'-0" Chemical fume hood.

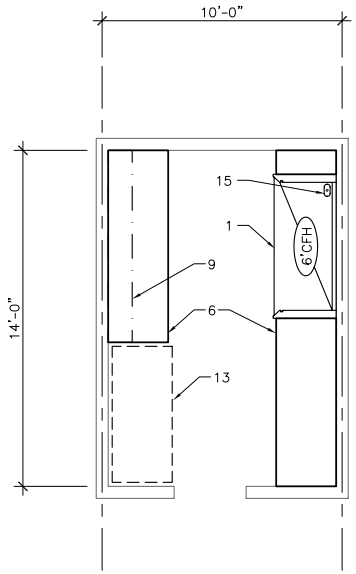
SPACE DIAGRAM

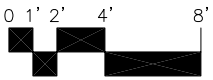
SPACE NAME: FUME HOOD ALCOVE/CHEMICAL STORAGE
SPACE ID: 3.02
AREA: 140 NSF

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

FURNISHINGS KEY

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





10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: CONTROLLED TEMPERATURE ROOM
SPACE ID NO.: 3.03
OCCUPANCY: 2-3

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●
MECHANICAL	
Temperature	
68°-75° ± 2°F	
Other	4°C±1°C
Humidity	
Uncontrolled	●
Other	
Minimum Air Changes/Hour	10
Air Recirculation	●
Air Pressure Positive	
Air Pressure Negative	
Additional Supply Air Filtration	
Additional Exhaust Air Filtration	
HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Exhausted Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	
PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (PW)	
Chilled Water (CHW S/R)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	●
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Emergency Power	●
UPS (OFOI)	
Phone	
Data	
In Use Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	Note 1.
Darkenable	
Zoned Lighting	
CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT (Chemical Resistant)	
VCT	
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Sealed Concrete	
Base	
4" Vinyl	
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	
Other	
Ceiling	
Open	●
Acoustic Tile	
Gyp Board, Epoxy Paint	
Height	
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	
Light Tight Rotating Door	
Vision Panel	Note 2.
Natural Daylight	

REMARKS:

1. Low temperature ballasts.
2. With light-tight cover.

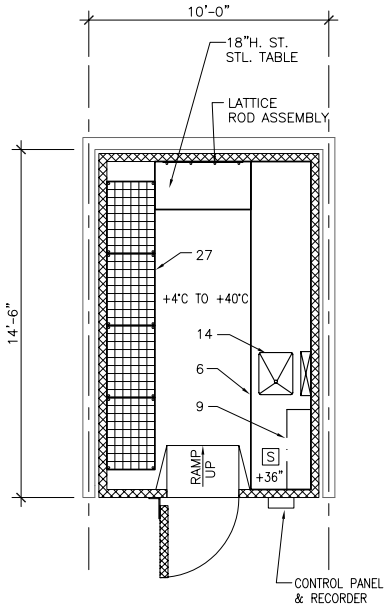
SPACE DIAGRAM

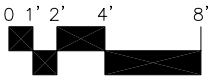
SPACE NAME: COLD ROOM
SPACE ID: 3.03
AREA: 140 NSF

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

FURNISHINGS KEY

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





10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: RADIOISOTOPE ROOM
SPACE ID NO.: 3.04
OCCUPANCY: 2-3

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Uncontrolled	●
Other	
Minimum Air Changes/Hour	10
Air Recirculation	
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtration	
Additional Exhaust Air Filtration	Note 1.

HOODS	
Chemical Fume Hood	
Radioisotope Hood	Note 2.
Exhausted Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	

REMARKS:

1. Provide filter housing for future filtration of exhaust from radioisotope hood.
2. (1) 6'-0" Radioisotope hood.

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	●
Laboratory Vacuum (LV)	●
Laboratory Air (LA)	●
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (PW)	●
Chilled Water (CHW S/R)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Emergency Power	●
UPS (OFOI)	
Phone	●
Data	●
In Use Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	●
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	●
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT (Chemical Resistant)	
VCT	
Welded Seam Sheet Vinyl	●
Epoxy	
Carpet	
Sealed Concrete	
Base	
4" Vinyl	
Integral w/floor	●
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Other	
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Epoxy Paint	●
Height	9'-0"
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	

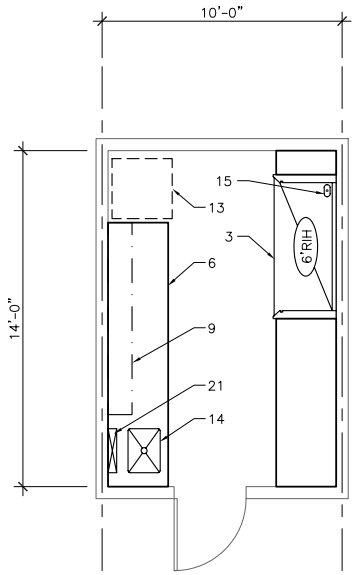
SPACE DIAGRAM

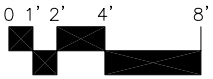
SPACE NAME: RADIOISOTOPE ROOM
SPACE ID: 3.04
AREA: 140 NSF

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

FURNISHINGS KEY

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





10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: GROWTH CHAMBER / EQUIPMENT ROOM
SPACE ID NO.: 3.05
OCCUPANCY:

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Uncontrolled	●
Other	
Minimum Air Changes/Hour	10
Air Recirculation	
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtration	
Additional Exhaust Air Filtration	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Exhausted Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	

REMARKS:

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	●
Heat Producing	●
Noise Producing	●

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	
Potable Hot Water (HW)	
Potable Cold Water (CW)	●
Purified Water (PW)	
Chilled Water (CHW S/R)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	●
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	●
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Emergency Power	●
UPS (OFOI)	
Phone	●
Data	●
In Use Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT (Chemical Resistant)	●
VCT	
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Sealed Concrete	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9'-0"
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	

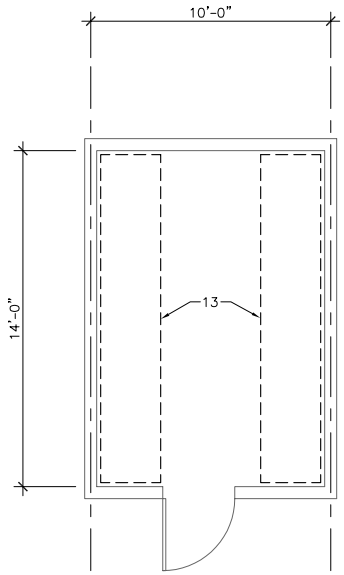
SPACE DIAGRAM

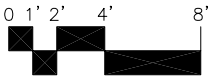
SPACE NAME: GROWTH CHAMBERS/EQUIPMENT ROOM
SPACE ID: 3.05
AREA: 140 NSF

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

FURNISHINGS KEY

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





10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: INSTRUMENT ROOM
SPACE ID NO.: 3.06
OCCUPANCY: 2-3

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●
MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Uncontrolled	●
Other	
Minimum Air Changes/Hour	10
Air Recirculation	
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtration	
Additional Exhaust Air Filtration	
HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Exhausted Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	●
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
REMARKS:	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	
PLUMBING	
Laboratory Gas (LG)	●
Laboratory Vacuum (LV)	●
Laboratory Air (LA)	●
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (PW)	●
Chilled Water (CHW S/R)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	●
Flammable	●
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	●
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Emergency Power	●
UPS (OFOI)	
Phone	●
Data	●
In Use Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT (Chemical Resistant)	●
VCT	
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Sealed Concrete	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9'-0"
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	

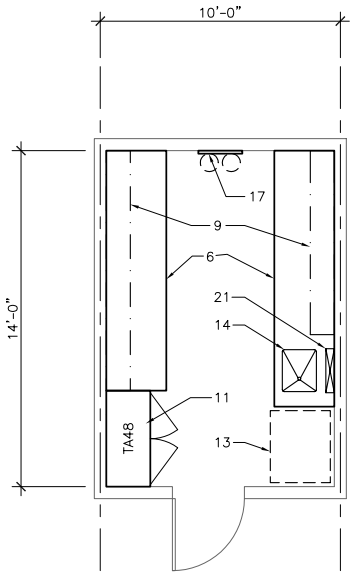
SPACE DIAGRAM

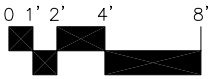
SPACE NAME: **INSTRUMENT ROOM**
SPACE ID: **3.06**
AREA: **140 NSF**

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

FURNISHINGS KEY

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





10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: CELL CULTURE ROOM
SPACE ID NO.: 3.07
OCCUPANCY: 2-3

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Uncontrolled	●
Other	
Minimum Air Changes/Hour	10
Air Recirculation	
Air Pressure Positive	●
Air Pressure Negative	
Additional Supply Air Filtration	Note 1.
Additional Exhaust Air Filtration	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Exhausted Laminar Flow Hood	
Biological Safety Cabinet	Note 2.
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	

REMARKS:

1. HEPA-filtered supply air.
2. (1) 6' Class II biological safety cabinet.

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	●
Laboratory Vacuum (LV)	●
Laboratory Air (LA)	●
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (PW)	●
Chilled Water (CHW S/R)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	●
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	●
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Emergency Power	●
UPS (OFOI)	
Phone	●
Data	●
In Use Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	●
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT (Chemical Resistant)	
VCT	
Welded Seam Sheet Vinyl	●
Epoxy	
Carpet	
Sealed Concrete	
Base	
4" Vinyl	
Integral w/floor	●
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Other	
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Epoxy Paint	●
Height	9'-0"
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	

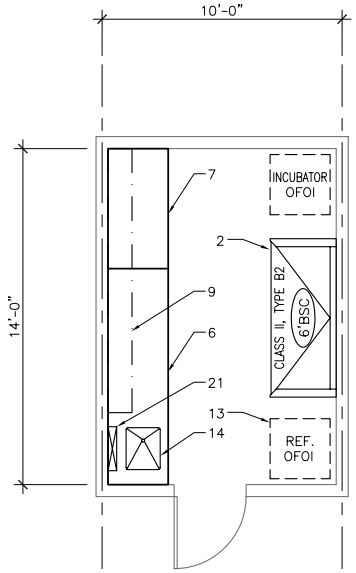
SPACE DIAGRAM

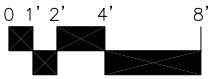
SPACE NAME: CELL CULTURE ROOM
SPACE ID: 3.07
AREA: 140 NSF

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

FURNISHINGS KEY

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





10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: IMAGING / DARK ROOM
SPACE ID NO.: 3.08
OCCUPANCY: 2-3

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●
MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Uncontrolled	●
Other	
Minimum Air Changes/Hour	10
Air Recirculation	
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtration	
Additional Exhaust Air Filtration	
HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Exhausted Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
REMARKS:	

LABORATORY EQUIPMENT	
Vibration Sensitive	●
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	
PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (PW)	
Chilled Water (CHW S/R)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Emergency Power	
UPS (OFOI)	
Phone	●
Data	●
In Use Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	●
Zoned Lighting	
CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT (Chemical Resistant)	●
VCT	
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Sealed Concrete	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Other	
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Epoxy Paint	●
Height	9'-0"
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	
Light Tight	●
Vision Panel	
Natural Daylight	

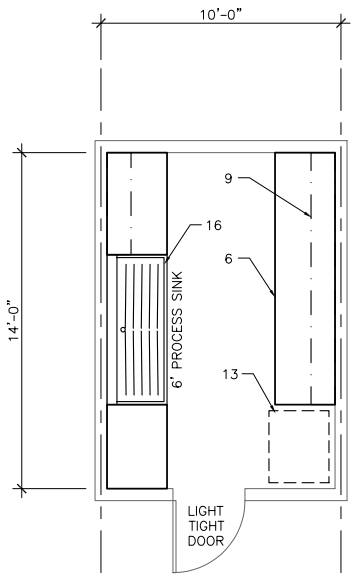
SPACE DIAGRAM

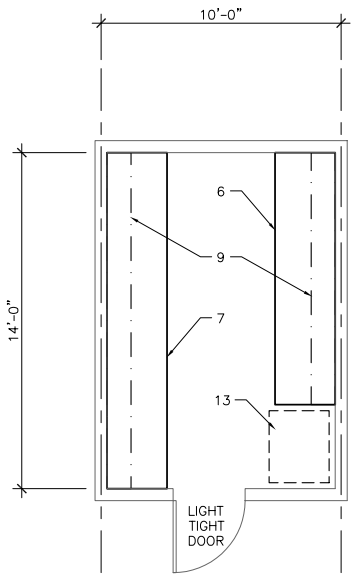
SPACE NAME: IMAGING/DARK ROOM
SPACE ID: 3.08
AREA: 140 NSF

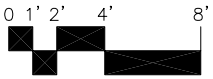
This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.

FURNISHINGS KEY

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







10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: AUTOCLAVE / GLASSWASH ROOM
SPACE ID NO.: 3.09
OCCUPANCY: 3-4

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●
MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Uncontrolled	●
Other	
Minimum Air Changes/Hour	15
Air Recirculation	
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtration	
Additional Exhaust Air Filtration	
HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Exhausted Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	Note 1.
Low Slotted Exhaust	
Equipment Exhaust	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	●
Noise Producing	
PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (PW)	●
Chilled Water (CHW S/R)	
Steam	● Note 2.
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	●
Floor Sink (FS)	●
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	●
208V, 30A, 3 Phase	●
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Emergency Power	
UPS (OFOI)	
Phone	●
Data	
In Use Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT (Chemical Resistant)	
VCT	
Welded Seam Sheet Vinyl	
Epoxy	●
Carpet	
Sealed Concrete	
Base	
4" Vinyl	
Integral w/floor	●
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Other	
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Epoxy Paint	●
Height	9'-0"
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	
Natural Daylight	

REMARKS:

1. Canopy exhaust over autoclaves.
2. Steam source to be determined during design phase.

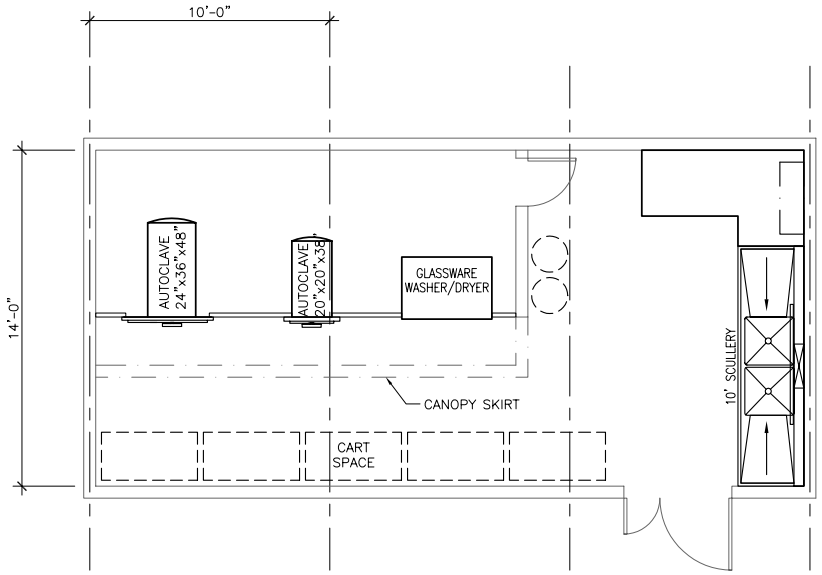
SPACE DIAGRAM

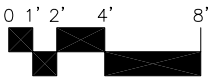
SPACE NAME: AUTOCLAVE/GLASSWASH ROOM
SPACE ID: 3.09
AREA: 420 NSF

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

FURNISHINGS KEY

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





10'-0" Module

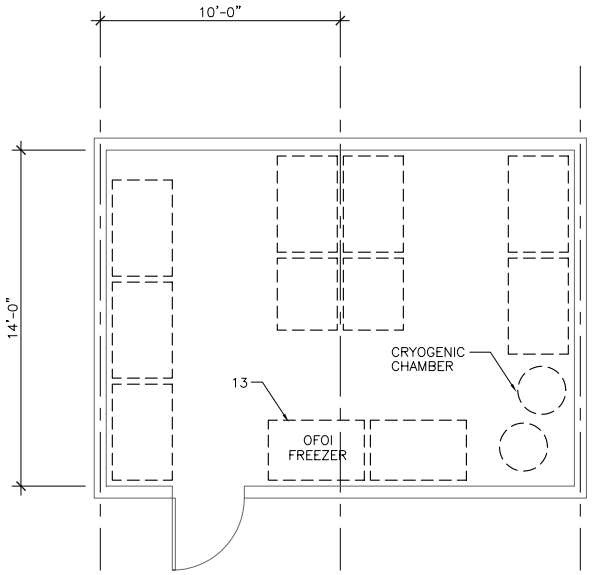
SPACE DIAGRAM

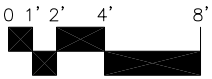
SPACE NAME: **FREEZER FARM/ CRYOGENICS ROOM**
SPACE ID: **3.10**
AREA: **280 NSF**

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

FURNISHINGS KEY

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





10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: FREEZER FARM / CRYOGENICS ROOM
SPACE ID NO.: 3.10
OCCUPANCY:

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●
MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Uncontrolled	●
Other	
Minimum Air Changes/Hour	10
Air Recirculation	
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtration	
Additional Exhaust Air Filtration	
HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Exhausted Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
REMARKS:	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	●
Heat Producing	●
Noise Producing	●
PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (PW)	
Chilled Water (CHW S/R)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	●
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Emergency Power	●
UPS (OFOI)	
Phone	●
Data	●
In Use Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT (Chemical Resistant)	●
VCT	
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Sealed Concrete	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9'-0"
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	
Natural Daylight	

DETAILED SPACE REQUIREMENTS

SPACE NAME: Principal Investigator Office
SPACE ID: 4.01
AREA: 120 sf

UTILIZATION	
Hours of Use	
	8 hours/day
●	14 hours/day
	24 hours/day
HOURS OF OPERATION	
	8 hours/day
●	14 hours/day
	24 hours/day
ROOM ENVELOPE	
●	Single Door
	Double Door
●	Sidelight
	Interior Window into
○	Exterior Window
	Glazed
	Framed Opening
CEILING FINISHES	
	Open
●	Acoustical Ceiling Tile
	Drywall Ceiling
	Metal Ceiling Tile
	Wood Ceiling
	Plaster Ceiling
	Washable Per Code
	Height
FLOOR FINISHES	
	Sealed concrete
●	Carpet
TBD	Carpet tile
	VCT
	Rubber
	Epoxy
	Sheet vinyl
	Terrazzo
	Stone
	Ceramic tile
	Sealed seams

BASE	
●	4" Rubber
	Integral with floor
	Integral with wall
WALL FINISHES	
●	Paint
	Wallcovering
	Acoustical wall panels
	Wood panels
	Decorative wainscot
	Protective wainscot
WALL ACCESSORIES	
	Tackable panels
	Whiteboard
	Chalkboard
	Chair rail
	Picture rail
	Tack rail
	Coat hook
	Corner guards
EXT. WINDOW TREATMENTS	
○	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies
INT. WINDOW TREATMENTS	
	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies
TEMPERATURE CONTROL	
○	Thermostat
	Exhaust fan
DAYLIGHT/VIEWS	
●	Desireable
	Undesireable

LIGHTING	
	Recessed ceiling
●	Pendant
	Display lighting
○	Motion detector
	Proximity detector
	Zoned lighting
	Dimmable
	Programmed controls
SIGNAGE	
●	Permanent rm number
●	Maintenance rm number
	Permanent rm name
	Changeable rm name
	Permanent occ name
○	Changeable occ name
	Statutory signage
SECURITY/ACCESS	
	No lock
●	Keyed lock
	Card key
POWER REQUIREMENTS	
●	Convenience outlets
4/user	Desktop outlets
	Appliance outlets
	Equipment outlets
DATA REQUIREMENTS	
	1 outlet per person
●	2 outlets per person
	3 outlets per person
TELECOMMUNICATIONS	
●	1 per person
	2 per person
STRUCTURAL REQUIREMENTS	
	Heavy live floor load
	Heavy dead floor load
	Heavy ceiling load
	Special backing requirement
	Special bracing requirement

A/V REQUIREMENTS	
	Projection screen
	Speakers
	Microphone
	Permanent video projector
	VCR
	CD player
	DVD player
	Audio teleconferencing
	Video teleconferencing
EQUIPMENT	
	Refrigerator
	Undercounter refrigerator
	Microwave
	Dishwasher
	Icemaker
	Garbage disposal
	Coffeemaker
	Water cooler, Countertop
	Water cooler, Freestanding
	Instant hot water
PLUMBING	
	Sink
	Toilet
	Shower
	Floor drain
	Janitor's sink
ACOUSTICAL CONDITIONS	
●	Normal
	Speech privacy
	STC rating

LEGEND	
●	Required
○	Where Occurs
TBD	To be determined

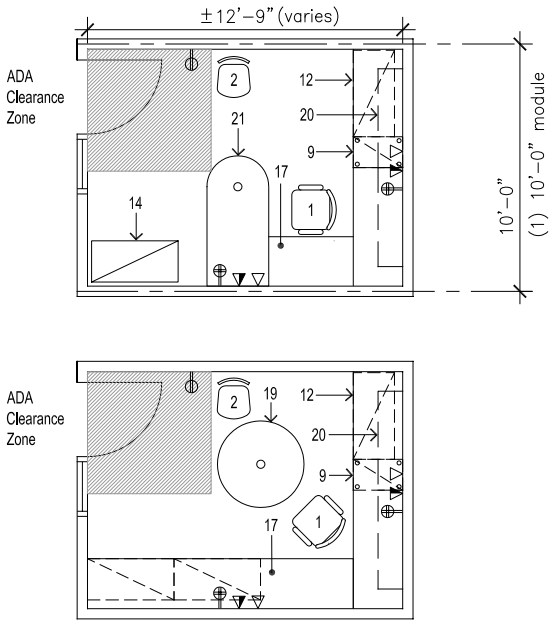
SPACE DIAGRAM

SPACE NAME: **Principal Investigator Office**
SPACE ID: **4.01**
AREA: **120 sf**

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

FURNISHINGS KEY

1. Task Chair
2. Guest Chair
3. Lounge Chair
4. Conference Chair
5. Conference Table
6. Credenza
7. Whiteboard
8. Projection Screen
9. BBF Mobile Pedestal
10. BBF Pedestal
11. FF Pedestal
12. 2H Lateral File
13. 3H Lateral File
14. 4H Lateral File
15. 5H Lateral File
16. 48 x 48 Corner Worksurface 24" depth
17. 24D Worksurface
18. 36" Dia. Meeting Table
19. 42" Dia. Meeting Table
20. 3H Wall Hung Shelving
21. Peninsula Worksurface
22. Overhead Shelving



10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: Post Doc Office For (2)
SPACE ID: 4.02A
AREA: 120 sf

	UTILIZATION
	Hours of Use
	8 hours/day
●	14 hours/day
	24 hours/day

	HOURS OF OPERATION
	8 hours/day
●	14 hours/day
	24 hours/day

	ROOM ENVELOPE
●	Single Door
	Double Door
●	Sidelight
	Interior Window into
○	Exterior Window
	Glazed
	Framed Opening

	CEILING FINISHES
	Open
●	Acoustical Ceiling Tile
	Drywall Ceiling
	Metal Ceiling Tile
	Wood Ceiling
	Plaster Ceiling
	Washable Per Code
	Height

	FLOOR FINISHES
	Sealed concrete
●	Carpet
TBD	Carpet tile
	VCT
	Rubber
	Epoxy
	Sheet vinyl
	Terrazzo
	Stone
	Ceramic tile
	Sealed seams

	BASE
●	4" Rubber
	Integral with floor
	Integral with wall

	WALL FINISHES
●	Paint
	Wallcovering
	Acoustical wall panels
	Wood panels
	Decorative wainscot
	Protective wainscot

	WALL ACCESSORIES
	Tackable panels
	Whiteboard
	Chalkboard
	Chair rail
	Picture rail
	Tack rail
	Coat hook
	Corner guards

	EXT. WINDOW TREATMENTS
○	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

	INT. WINDOW TREATMENTS
	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

	TEMPERATURE CONTROL
○	Thermostat
	Exhaust fan

	DAYLIGHT/VIEWS
●	Desireable
	Undesireable

	LIGHTING
	Recessed ceiling
●	Pendant
	Display lighting
○	Motion detector
	Proximity detector
	Zoned lighting
	Dimmable
	Programmed controls

	SIGNAGE
●	Permanent rm number
●	Maintenance rm number
	Permanent rm name
	Changeable rm name
	Permanent occ name
○	Changeable occ name
	Statutory signage

	SECURITY/ACCESS
	No lock
●	Keyed lock
	Card key

	POWER REQUIREMENTS
●	Convenience outlets
4/user	Desktop outlets
	Appliance outlets
	Equipment outlets

	DATA REQUIREMENTS
	1 outlet per person
●	2 outlets per person
	3 outlets per person

	TELECOMMUNICATIONS
●	1 per person
	2 per person

	STRUCTURAL REQUIREMENTS
	Heavy live floor load
	Heavy dead floor load
	Heavy ceiling load
	Special backing requirement
	Special bracing requirement

	A/V REQUIREMENTS
	Projection screen
	Speakers
	Microphone
	Permanent video projector
	VCR
	CD player
	DVD player
	Audio teleconferencing
	Video teleconferencing

	EQUIPMENT
	Refrigerator
	Undercounter refrigerator
	Microwave
	Dishwasher
	Icemaker
	Garbage disposal
	Coffeemaker
	Water cooler, Countertop
	Water cooler, Freestanding
	Instant hot water

	PLUMBING
	Sink
	Toilet
	Shower
	Floor drain
	Janitor's sink

	ACOUSTICAL CONDITIONS
●	Normal
	Speech privacy
	STC rating

	LEGEND
●	Required
○	Where Occurs
TBD	To be detemined

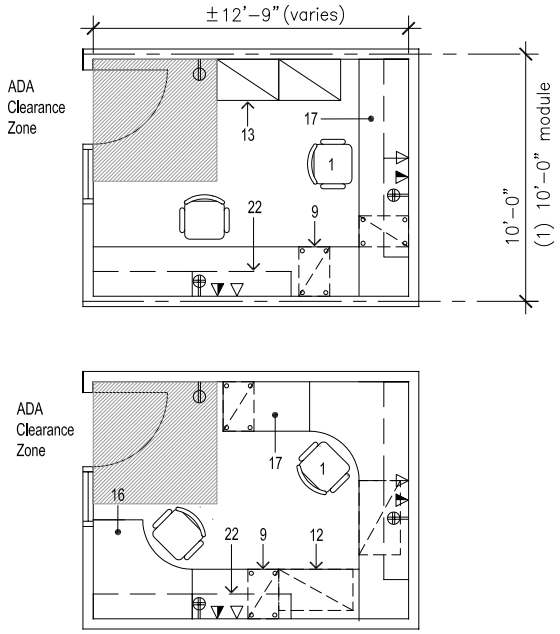
SPACE DIAGRAM

SPACE NAME: **Post Doc Office for (2)**
SPACE ID: **4.02A**
AREA: **120 sf**

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

FURNISHINGS KEY

1. Task Chair
2. Guest Chair
3. Lounge Chair
4. Conference Chair
5. Conference Table
6. Credenza
7. Whiteboard
8. Projection Screen
9. BBF Mobile Pedestal
10. BBF Pedestal
11. FF Pedestal
12. 2H Lateral File
13. 3H Lateral File
14. 4H Lateral File
15. 5H Lateral File
16. 48 x 48 Corner Worksurface 24" depth
17. 24D Worksurface
18. 36" Dia. Meeting Table
19. 42" Dia. Meeting Table
20. 3H Wall Hung Shelving
21. Peninsula Worksurface
22. Overhead Shelving



10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: Post Doc Office For (3)
SPACE ID: 4.02B
AREA: 180 sf

	UTILIZATION
	Hours of Use
	8 hours/day
●	14 hours/day
	24 hours/day

	HOURS OF OPERATION
	8 hours/day
●	14 hours/day
	24 hours/day

	ROOM ENVELOPE
●	Single Door
	Double Door
●	Sidelight
	Interior Window into
○	Exterior Window
	Glazed
	Framed Opening

	CEILING FINISHES
	Open
●	Acoustical Ceiling Tile
	Drywall Ceiling
	Metal Ceiling Tile
	Wood Ceiling
	Plaster Ceiling
	Washable Per Code
	Height

	FLOOR FINISHES
	Sealed concrete
●	Carpet
TBD	Carpet tile
	VCT
	Rubber
	Epoxy
	Sheet vinyl
	Terrazzo
	Stone
	Ceramic tile
	Sealed seams

	BASE
●	4" Rubber
	Integral with floor
	Integral with wall

	WALL FINISHES
●	Paint
	Wallcovering
	Acoustical wall panels
	Wood panels
	Decorative wainscot
	Protective wainscot

	WALL ACCESSORIES
	Tackable panels
	Whiteboard
	Chalkboard
	Chair rail
	Picture rail
	Tack rail
	Coat hook
	Corner guards

	EXT. WINDOW TREATMENTS
○	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

	INT. WINDOW TREATMENTS
	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

	TEMPERATURE CONTROL
○	Thermostat
	Exhaust fan

	DAYLIGHT/VIEWS
●	Desireable
	Undesireable

	LIGHTING
	Recessed ceiling
●	Pendant
	Display lighting
○	Motion detector
	Proximity detector
	Zoned lighting
	Dimmable
	Programmed controls

	SIGNAGE
●	Permanent rm number
●	Maintenance rm number
	Permanent rm name
	Changeable rm name
	Permanent occ name
○	Changeable occ name
	Statutory signage

	SECURITY/ACCESS
	No lock
●	Keyed lock
	Card key

	POWER REQUIREMENTS
●	Convenience outlets
4/user	Desktop outlets
	Appliance outlets
	Equipment outlets

	DATA REQUIREMENTS
	1 outlet per person
●	2 outlets per person
	3 outlets per person

	TELECOMMUNICATIONS
	1 per person
●	2 per person

	STRUCTURAL REQUIREMENTS
	Heavy live floor load
	Heavy dead floor load
	Heavy ceiling load
	Special backing requirement
	Special bracing requirement

	A/V REQUIREMENTS
	Projection screen
	Speakers
	Microphone
	Permanent video projector
	VCR
	CD player
	DVD player
	Audio teleconferencing
	Video teleconferencing

	EQUIPMENT
	Refrigerator
	Undercounter refrigerator
	Microwave
	Dishwasher
	Icemaker
	Garbage disposal
	Coffeemaker
	Water cooler, Countertop
	Water cooler, Freestanding
	Instant hot water

	PLUMBING
	Sink
	Toilet
	Shower
	Floor drain
	Janitor's sink

	ACOUSTICAL CONDITIONS
●	Normal
	Speech privacy
	STC rating

LEGEND	
●	Required
○	Where Occurs
TBD	To be determined

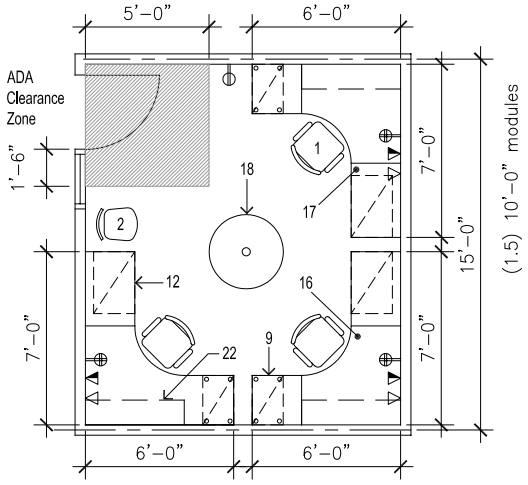
SPACE DIAGRAM

SPACE NAME: Post Doc Office for (3)
SPACE ID: 4.02B
AREA: 180 sf

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

FURNISHINGS KEY

1. Task Chair
2. Guest Chair
3. Lounge Chair
4. Conference Chair
5. Conference Table
6. Credenza
7. Whiteboard
8. Projection Screen
9. BBF Mobile Pedestal
10. BBF Pedestal
11. FF Pedestal
12. 2H Lateral File
13. 3H Lateral File
14. 4H Lateral File
15. 5H Lateral File
16. 48 x 48 Corner Worksurface 24" depth
17. 24D Worksurface
18. 36" Dia. Meeting Table
19. 42" Dia. Meeting Table
20. 3H Wall Hung Shelving
21. Peninsula Worksurface
22. Overhead Shelving



10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: Post Doc Office For (3)
SPACE ID: 4.02C
AREA: 171 sf

UTILIZATION	
Hours of Use	
	8 hours/day
●	14 hours/day
	24 hours/day

HOURS OF OPERATION	
	8 hours/day
●	14 hours/day
	24 hours/day

ROOM ENVELOPE	
●	Single Door
	Double Door
	Sidelight
	Interior Window into
●	Exterior Window
	Glazed
	Framed Opening

CEILING FINISHES	
	Open
●	Acoustical Ceiling Tile
	Drywall Ceiling
	Metal Ceiling Tile
	Wood Ceiling
	Plaster Ceiling
	Washable Per Code
	Height

FLOOR FINISHES	
	Sealed concrete
●	Carpet
TBD	Carpet tile
	VCT
	Rubber
	Epoxy
	Sheet vinyl
	Terrazzo
	Stone
	Ceramic tile
	Sealed seams

BASE	
●	4" Rubber
	Integral with floor
	Integral with wall

WALL FINISHES	
●	Paint
	Wallcovering
	Acoustical wall panels
	Wood panels
	Decorative wainscot
	Protective wainscot

WALL ACCESSORIES	
	Tackable panels
	Whiteboard
	Chalkboard
	Chair rail
	Picture rail
	Tack rail
	Coat hook
	Corner guards

EXT. WINDOW TREATMENTS	
●	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

INT. WINDOW TREATMENTS	
	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

TEMPERATURE CONTROL	
○	Thermostat
	Exhaust fan

DAYLIGHT/VIEWS	
●	Desireable
	Undesireable

LIGHTING	
	Recessed ceiling
●	Pendant
	Display lighting
○	Motion detector
	Proximity detector
	Zoned lighting
	Dimmable
	Programmed controls

SIGNAGE	
●	Permanent rm number
●	Maintenance rm number
	Permanent rm name
	Changeable rm name
	Permanent occ name
○	Changeable occ name
	Statutory signage

SECURITY/ACCESS	
	No lock
●	Keyed lock
	Card key

POWER REQUIREMENTS	
●	Convenience outlets
4/user	Desktop outlets
	Appliance outlets
	Equipment outlets

DATA REQUIREMENTS	
	1 outlet per person
●	2 outlets per person
	3 outlets per person

TELECOMMUNICATIONS	
	1 per person
●	2 per person

STRUCTURAL REQUIREMENTS	
	Heavy live floor load
	Heavy dead floor load
	Heavy ceiling load
	Special backing requirement
	Special bracing requirement

A/V REQUIREMENTS	
	Projection screen
	Speakers
	Microphone
	Permanent video projector
	VCR
	CD player
	DVD player
	Audio teleconferencing
	Video teleconferencing

EQUIPMENT	
	Refrigerator
	Undercounter refrigerator
	Microwave
	Dishwasher
	Icemaker
	Garbage disposal
	Coffeemaker
	Water cooler, Countertop
	Water cooler, Freestanding
	Instant hot water

PLUMBING	
	Sink
	Toilet
	Shower
	Floor drain
	Janitor's sink

ACOUSTICAL CONDITIONS	
●	Normal
	Speech privacy
	STC rating

LEGEND	
●	Required
○	Where Occurs
TBD	To Be Determined

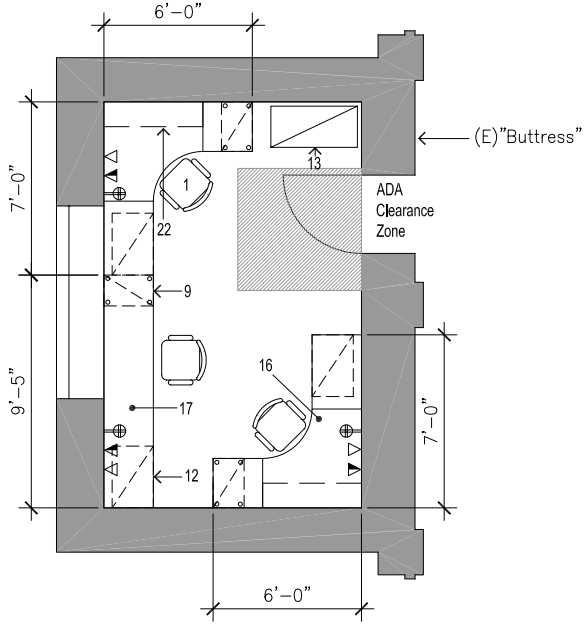
SPACE DIAGRAM

SPACE NAME: **Post Doc Office for (3)**
SPACE ID: **4.02C**
AREA: **171 sf**

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

FURNISHINGS KEY

1. Task Chair
2. Guest Chair
3. Lounge Chair
4. Conference Chair
5. Conference Table
6. Credenza
7. Whiteboard
8. Projection Screen
9. BBF Mobile Pedestal
10. BBF Pedestal
11. FF Pedestal
12. 2H Lateral File
13. 3H Lateral File
14. 4H Lateral File
15. 5H Lateral File
16. 48 x 48 Corner Worksurface 24" depth
17. 24D Worksurface
18. 36" Dia. Meeting Table
19. 42" Dia. Meeting Table
20. 3H Wall Hung Shelving
21. Peninsula Worksurface
22. Overhead Shelving



10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: Post Doc Office For (3)
SPACE ID: 4.02C
AREA: 171 sf

UTILIZATION	
Hours of Use	
	8 hours/day
●	14 hours/day
	24 hours/day

HOURS OF OPERATION	
	8 hours/day
●	14 hours/day
	24 hours/day

ROOM ENVELOPE	
●	Single Door
	Double Door
	Sidelight
	Interior Window into
●	Exterior Window
	Glazed
	Framed Opening

CEILING FINISHES	
	Open
●	Acoustical Ceiling Tile
	Drywall Ceiling
	Metal Ceiling Tile
	Wood Ceiling
	Plaster Ceiling
	Washable Per Code
	Height

FLOOR FINISHES	
	Sealed concrete
●	Carpet
TBD	Carpet tile
	VCT
	Rubber
	Epoxy
	Sheet vinyl
	Terrazzo
	Stone
	Ceramic tile
	Sealed seams

BASE	
●	4" Rubber
	Integral with floor
	Integral with wall

WALL FINISHES	
●	Paint
	Wallcovering
	Acoustical wall panels
	Wood panels
	Decorative wainscot
	Protective wainscot

WALL ACCESSORIES	
	Tackable panels
	Whiteboard
	Chalkboard
	Chair rail
	Picture rail
	Tack rail
	Coat hook
	Corner guards

EXT. WINDOW TREATMENTS	
●	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

INT. WINDOW TREATMENTS	
	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

TEMPERATURE CONTROL	
o	Thermostat
	Exhaust fan

DAYLIGHT/VIEWS	
●	Desireable
	Undesireable

LIGHTING	
	Recessed ceiling
●	Pendant
	Display lighting
o	Motion detector
	Proximity detector
	Zoned lighting
	Dimmable
	Programmed controls

SIGNAGE	
●	Permanent rm number
●	Maintenance rm number
	Permanent rm name
	Changeable rm name
	Permanent occ name
o	Changeable occ name
	Statutory signage

SECURITY/ACCESS	
	No lock
●	Keyed lock
	Card key

POWER REQUIREMENTS	
●	Convenience outlets
4/user	Desktop outlets
	Appliance outlets
	Equipment outlets

DATA REQUIREMENTS	
	1 outlet per person
●	2 outlets per person
	3 outlets per person

TELECOMMUNICATIONS	
	1 per person
●	2 per person

STRUCTURAL REQUIREMENTS	
	Heavy live floor load
	Heavy dead floor load
	Heavy ceiling load
	Special backing requirement
	Special bracing requirement

A/V REQUIREMENTS	
	Projection screen
	Speakers
	Microphone
	Permanent video projector
	VCR
	CD player
	DVD player
	Audio teleconferencing
	Video teleconferencing

EQUIPMENT	
	Refrigerator
	Undercounter refrigerator
	Microwave
	Dishwasher
	Icemaker
	Garbage disposal
	Coffeemaker
	Water cooler, Countertop
	Water cooler, Freestanding
	Instant hot water

PLUMBING	
	Sink
	Toilet
	Shower
	Floor drain
	Janitor's sink

ACOUSTICAL CONDITIONS	
●	Normal
	Speech privacy
	STC rating

LEGEND	
●	Required
o	Where Occurs
TBD	To Be Determined

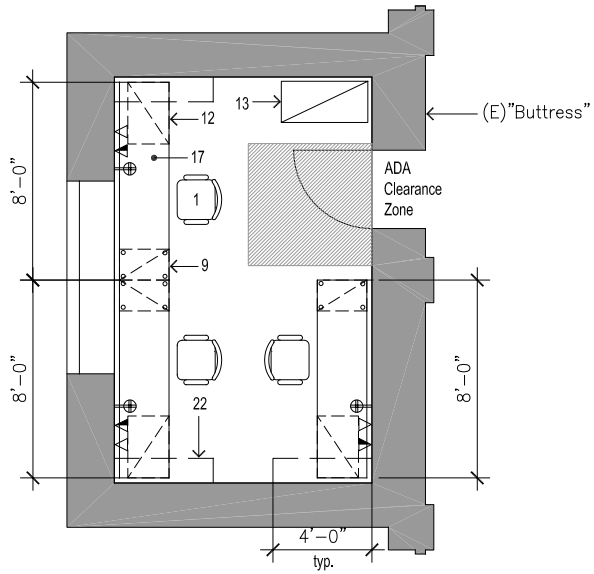
SPACE DIAGRAM

SPACE NAME: **Post Doc Office for (3)**
SPACE ID: **4.02D**
AREA: **171 sf**

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

FURNISHINGS KEY

1. Task Chair
2. Guest Chair
3. Lounge Chair
4. Conference Chair
5. Conference Table
6. Credenza
7. Whiteboard
8. Projection Screen
9. BBF Mobile Pedestal
10. BBF Pedestal
11. FF Pedestal
12. 2H Lateral File
13. 3H Lateral File
14. 4H Lateral File
15. 5H Lateral File
16. 48 x 48 Corner Worksurface 24" depth
17. 24D Worksurface
18. 36" Dia. Meeting Table
19. 42" Dia. Meeting Table
20. 3H Wall Hung Shelving
21. Peninsula Worksurface
22. Overhead Shelving



10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: Grad Student Office For (3)
SPACE ID: 4.03A
AREA: 120 sf

UTILIZATION	
Hours of Use	
	8 hours/day
●	14 hours/day
	24 hours/day
HOURS OF OPERATION	
	8 hours/day
●	14 hours/day
	24 hours/day
ROOM ENVELOPE	
●	Single Door
	Double Door
●	Sidelight
	Interior Window into
○	Exterior Window
	Glazed
	Framed Opening
CEILING FINISHES	
	Open
●	Acoustical Ceiling Tile
	Drywall Ceiling
	Metal Ceiling Tile
	Wood Ceiling
	Plaster Ceiling
	Washable Per Code
	Height
FLOOR FINISHES	
	Sealed concrete
●	Carpet
TBD	Carpet tile
	VCT
	Rubber
	Epoxy
	Sheet vinyl
	Terrazzo
	Stone
	Ceramic tile
	Sealed seams

BASE	
●	4" Rubber
	Integral with floor
	Integral with wall
WALL FINISHES	
●	Paint
	Wallcovering
	Acoustical wall panels
	Wood panels
	Decorative wainscot
	Protective wainscot
WALL ACCESSORIES	
	Tackable panels
	Whiteboard
	Chalkboard
	Chair rail
	Picture rail
	Tack rail
	Coat hook
	Corner guards
EXT. WINDOW TREATMENTS	
○	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies
INT. WINDOW TREATMENTS	
	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies
TEMPERATURE CONTROL	
○	Thermostat
	Exhaust fan
DAYLIGHT/VIEWS	
●	Desireable
	Undesireable

LIGHTING	
	Recessed ceiling
●	Pendant
	Display lighting
○	Motion detector
	Proximity detector
	Zoned lighting
	Dimmable
	Programmed controls
SIGNAGE	
●	Permanent rm number
●	Maintenance rm number
	Permanent rm name
	Changeable rm name
	Permanent occ name
○	Changeable occ name
	Statutory signage
SECURITY/ACCESS	
	No lock
●	Keyed lock
	Card key
POWER REQUIREMENTS	
	Convenience outlets
4/user	Desktop outlets
	Appliance outlets
	Equipment outlets
DATA REQUIREMENTS	
	1 outlet per person
●	2 outlets per person
	3 outlets per person
TELECOMMUNICATIONS	
	1 per person
●	2 per person
STRUCTURAL REQUIREMENTS	
	Heavy live floor load
	Heavy dead floor load
	Heavy ceiling load
	Special backing requirement
	Special bracing requirement

A/V REQUIREMENTS	
	Projection screen
	Speakers
	Microphone
	Permanent video projector
	VCR
	CD player
	DVD player
	Audio teleconferencing
	Video teleconferencing
EQUIPMENT	
	Refrigerator
	Undercounter refrigerator
	Microwave
	Dishwasher
	Icemaker
	Garbage disposal
	Coffeemaker
	Water cooler, Countertop
	Water cooler, Freestanding
	Instant hot water
PLUMBING	
	Sink
	Toilet
	Shower
	Floor drain
	Janitor's sink
ACOUSTICAL CONDITIONS	
●	Normal
	Speech privacy
	STC rating

LEGEND

●	Required
○	Where Occurs
TBD	To be determined

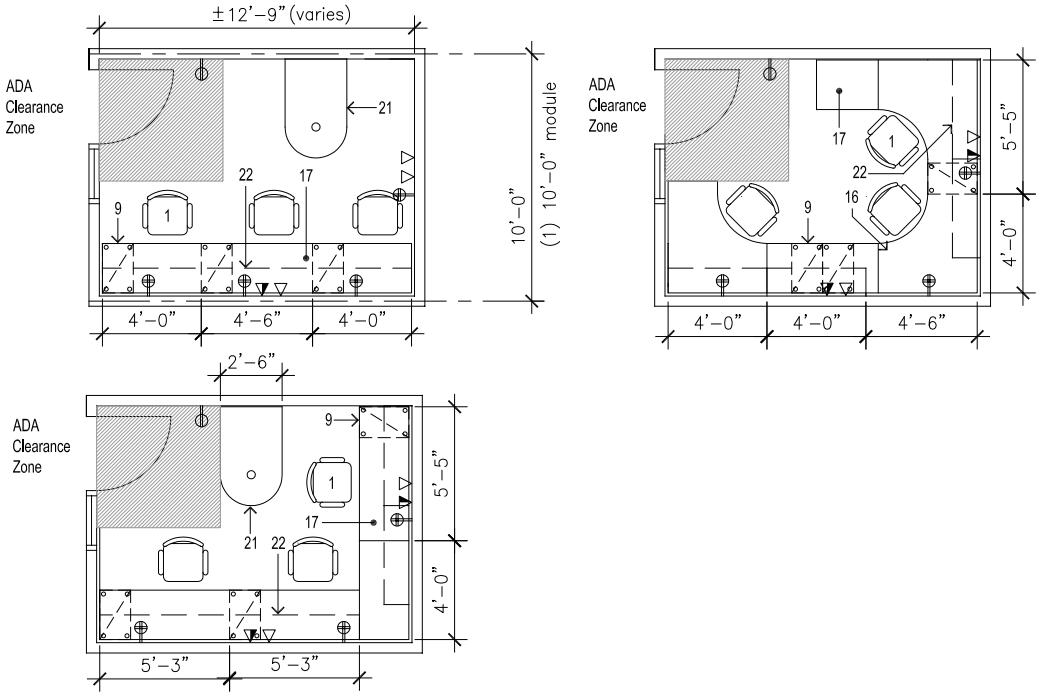
SPACE DIAGRAM

SPACE NAME: **Grad Student Office for (3)**
SPACE ID: **4.03A**
AREA: **120 sf**

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

FURNISHINGS KEY

1. Task Chair
2. Guest Chair
3. Lounge Chair
4. Conference Chair
5. Conference Table
6. Credenza
7. Whiteboard
8. Projection Screen
9. BBF Mobile Pedestal
10. BBF Pedestal
11. FF Pedestal
12. 2H Lateral File
13. 3H Lateral File
14. 4H Lateral File
15. 5H Lateral File
16. 48 x 48 Corner Worksurface 24" depth
17. 24D Worksurface
18. 36" Dia. Meeting Table
19. 42" Dia. Meeting Table
20. 3H Wall Hung Shelving
21. Peninsula Worksurface
22. Overhead Shelving



10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: Grad Student Office For (4)
SPACE ID: 4.03B
AREA: 171 sf

	UTILIZATION
	Hours of Use
	8 hours/day
●	14 hours/day
	24 hours/day

	HOURS OF OPERATION
	8 hours/day
	14 hours/day
	24 hours/day

	ROOM ENVELOPE
●	Single Door
	Double Door
	Sidelight
	Interior Window into
○	Exterior Window
	Glazed
	Framed Opening

	CEILING FINISHES
	Open
●	Acoustical Ceiling Tile
	Drywall Ceiling
	Metal Ceiling Tile
	Wood Ceiling
	Plaster Ceiling
	Washable Per Code
	Height

	FLOOR FINISHES
	Sealed concrete
●	Carpet
TBD	Carpet tile
	VCT
	Rubber
	Epoxy
	Sheet vinyl
	Terrazzo
	Stone
	Ceramic tile
	Sealed seams

	BASE
●	4" Rubber
	Integral with floor
	Integral with wall

	WALL FINISHES
●	Paint
	Wallcovering
	Acoustical wall panels
	Wood panels
	Decorative wainscot
	Protective wainscot

	WALL ACCESSORIES
	Tackable panels
	Whiteboard
	Chalkboard
	Chair rail
	Picture rail
	Tack rail
	Coat hook
	Corner guards

	EXT. WINDOW TREATMENTS
○	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

	INT. WINDOW TREATMENTS
	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

	TEMPERATURE CONTROL
○	Thermostat
	Exhaust fan

	DAYLIGHT/VIEWS
●	Desireable
	Undesireable

	LIGHTING
	Recessed ceiling
●	Pendant
	Display lighting
○	Motion detector
	Proximity detector
	Zoned lighting
	Dimmable
	Programmed controls

	SIGNAGE
●	Permanent rm number
●	Maintenance rm number
	Permanent rm name
	Changeable rm name
	Permanent occ name
○	Changeable occ name
	Statutory signage

	SECURITY/ACCESS
	No lock
●	Keyed lock
	Card key

	POWER REQUIREMENTS
●	Convenience outlets
	Desktop outlets
	Appliance outlets
	Equipment outlets

	DATA REQUIREMENTS
	1 outlet per person
●	2 outlets per person
	3 outlets per person

	TELECOMMUNICATIONS
●	1 per person
	2 per person

	STRUCTURAL REQUIREMENTS
	Heavy live floor load
	Heavy dead floor load
	Heavy ceiling load
	Special backing requirement
	Special bracing requirement

	A/V REQUIREMENTS
	Projection screen
	Speakers
	Microphone
	Permanent video projector
	VCR
	CD player
	DVD player
	Audio teleconferencing
	Video teleconferencing

	EQUIPMENT
	Refrigerator
	Undercounter refrigerator
	Microwave
	Dishwasher
	Icemaker
	Garbage disposal
	Coffeemaker
	Water cooler, Countertop
	Water cooler, Freestanding
	Instant hot water

	PLUMBING
	Sink
	Toilet
	Shower
	Floor drain
	Janitor's sink

	ACOUSTICAL CONDITIONS
●	Normal
	Speech privacy
	STC rating

	LEGEND
●	Required
○	Where Occurs
TBD	To be determined

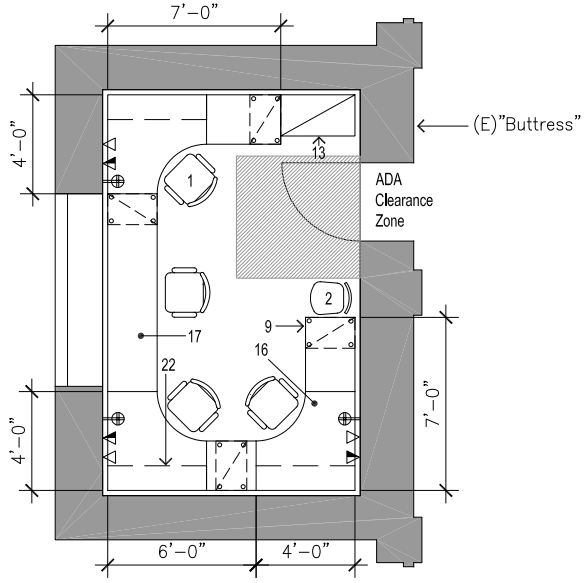
SPACE DIAGRAM

SPACE NAME: **Grad Student Office for (4)**
SPACE ID: **4.03B**
AREA: **171 sf**

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

FURNISHINGS KEY

1. Task Chair
2. Guest Chair
3. Lounge Chair
4. Conference Chair
5. Conference Table
6. Credenza
7. Whiteboard
8. Projection Screen
9. BBF Mobile Pedestal
10. BBF Pedestal
11. FF Pedestal
12. 2H Lateral File
13. 3H Lateral File
14. 4H Lateral File
15. 5H Lateral File
16. 48 x 48 Corner Worksurface 24" depth
17. 24D Worksurface
18. 36" Dia. Meeting Table
19. 42" Dia. Meeting Table
20. 3H Wall Hung Shelving
21. Peninsula Worksurface
22. Overhead Shelving



10'-0" Module

DETAILED SPACE REQUIREMENTS

SPACE NAME: Conference Room
SPACE ID: 4.04A
AREA: 300 sf

UTILIZATION	
Hours of Use	
	8 hours/day
●	14 hours/day
	24 hours/day

HOURS OF OPERATION	
	8 hours/day
●	14 hours/day
	24 hours/day

ROOM ENVELOPE	
●	Single Door
	Double Door
●	Sidelight
	Interior Window into
	Exterior Window
	Glazed
	Framed Opening

CEILING FINISHES	
	Open
●	Acoustical Ceiling Tile
	Drywall Ceiling
	Metal Ceiling Tile
	Wood Ceiling
	Plaster Ceiling
	Washable Per Code
	Height

FLOOR FINISHES	
	Sealed concrete
●	Carpet
TBD	Carpet tile
	VCT
	Rubber
	Epoxy
	Sheet vinyl
	Terrazzo
	Stone
	Ceramic tile
	Sealed seams

BASE	
●	4" Rubber
	Integral with floor
	Integral with wall

WALL FINISHES	
●	Paint
	Wallcovering
●	Acoustical wall panels
	Wood panels
	Decorative wainscot
	Protective wainscot

WALL ACCESSORIES	
●	Tackable panels
●	Whiteboard
	Chalkboard
	Chair rail
	Picture rail
	Tack rail
	Coat hook
	Corner guards

EXT. WINDOW TREATMENTS	
○	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

INT. WINDOW TREATMENTS	
	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

TEMPERATURE CONTROL	
○	Thermostat
	Exhaust fan

DAYLIGHT/VIEWS	
	Desireable
	Undesireable

LIGHTING	
	Recessed ceiling
○	Pendant
	Display lighting
○	Motion detector
	Proximity detector
	Zoned lighting
●	Dimmable
	Programmed controls

SIGNAGE	
●	Permanent rm number
●	Maintenance rm number
	Permanent rm name
	Changeable rm name
	Permanent occ name
	Changeable occ name
	Statutory signage

SECURITY/ACCESS	
	No lock
●	Keyed lock
	Card key

POWER REQUIREMENTS	
●	Convenience outlets
Note 3	~~Desktop outlets~~
	Appliance outlets
Note 4	Equipment outlets

DATA REQUIREMENTS	
Note 2	~~1 outlet per person~~
Note 5	~~2 outlets per person~~
	3 outlets per person

TELECOMMUNICATIONS	
Note 2	~~1 outlet per person~~
	2 per person

STRUCTURAL REQUIREMENTS	
	Heavy live floor load
	Heavy dead floor load
	Heavy ceiling load
Note 1	Special backing requirement

A/V REQUIREMENTS	
●	Projection screen
	Speakers
	Microphone
●	Permanent video projector
	VCR
	CD player
	DVD player
	Audio teleconferencing
	Video teleconferencing

EQUIPMENT	
	Refrigerator
	Undercounter refrigerator
	Microwave
	Dishwasher
	Icemaker
	Garbage disposal
	Coffeemaker
	Water cooler, Countertop
	Water cooler, Freestanding
	Instant hot water

PLUMBING	
	Sink
	Toilet
	Shower
	Floor drain
	Janitor's sink

ACOUSTICAL CONDITIONS	
	Normal
●	Speech privacy
	STC rating

LEGEND	
●	Required
○	Where Occurs
TBD	To be determined

NOTES	
1	Video Projector may require backing/bracing.
2	Fourplex data/tel outlet located at a flush floor outlet under table; duplex data outlet at credenza.
3	Fourplex power outlet located at a flush floor outlet under table; fourplex power outlet located at credenza; convenience power as shown
4	Provide power for ceiling-mounted video projector and projection screen.
5	Provide data/video connection between video projector and feed source (at flush floor outlet under table).

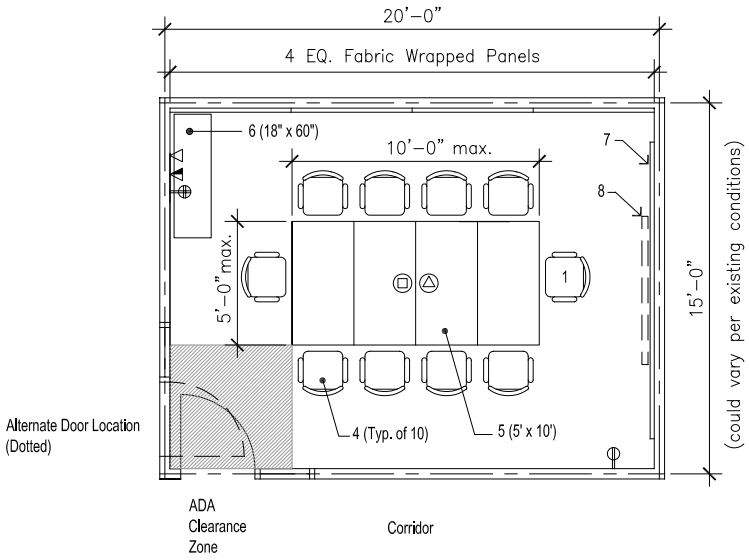
SPACE DIAGRAM

SPACE NAME: Conference Room
SPACE ID: 4.05A
AREA: 300 sf

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

FURNISHINGS KEY

1. Task Chair
2. Guest Chair
3. Lounge Chair
4. Conference Chair
5. Conference Table
6. Credenza
7. Whiteboard
8. Projection Screen
9. BBF Mobile Pedestal
10. BBF Pedestal
11. FF Pedestal
12. 2H Lateral File
13. 3H Lateral File
14. 4H Lateral File
15. 5H Lateral File
16. 48 x 48 Corner Worksurface 24" depth
17. 24D Worksurface
18. 36" Dia. Meeting Table
19. 42" Dia. Meeting Table
20. 3H Wall Hung Shelving
21. Peninsula Worksurface
22. Overhead Shelving



DETAILED SPACE REQUIREMENTS

SPACE NAME: Conference Room
SPACE ID: 4.04B
AREA: 300 sf

UTILIZATION	
Hours of Use	
	8 hours/day
●	14 hours/day
	24 hours/day

HOURS OF OPERATION	
	8 hours/day
●	14 hours/day
	24 hours/day

ROOM ENVELOPE	
●	Single Door
	Double Door
●	Sidelight
	Interior Window into
	Exterior Window
	Glazed
	Framed Opening

CEILING FINISHES	
	Open
●	Acoustical Ceiling Tile
	Drywall Ceiling
	Metal Ceiling Tile
	Wood Ceiling
	Plaster Ceiling
	Washable Per Code
	Height

FLOOR FINISHES	
	Sealed concrete
●	Carpet
TBD	Carpet tile
	VCT
	Rubber
	Epoxy
	Sheet vinyl
	Terrazzo
	Stone
	Ceramic tile
	Sealed seams

BASE	
●	4" Rubber
	Integral with floor
	Integral with wall

WALL FINISHES	
●	Paint
	Wallcovering
●	Acoustical wall panels
	Wood panels
	Decorative wainscot
	Protective wainscot

WALL ACCESSORIES	
●	Tackable panels
●	Whiteboard
	Chalkboard
	Chair rail
	Picture rail
	Tack rail
	Coat hook
	Corner guards

EXT. WINDOW TREATMENTS	
○	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

INT. WINDOW TREATMENTS	
	Metal blinds
	Wood blinds
	Draperies
	Blackout shades
	Blackout draperies

TEMPERATURE CONTROL	
○	Thermostat
	Exhaust fan

DAYLIGHT/VIEWS	
	Desireable
	Undesireable

LIGHTING	
	Recessed ceiling
○	Pendant
	Display lighting
○	Motion detector
	Proximity detector
	Zoned lighting
●	Dimmable
	Programmed controls

SIGNAGE	
●	Permanent rm number
●	Maintenance rm number
	Permanent rm name
	Changeable rm name
	Permanent occ name
	Changeable occ name
	Statutory signage

SECURITY/ACCESS	
	No lock
●	Keyed lock
	Card key

POWER REQUIREMENTS	
●	Convenience outlets
Note 3	~~Desktop outlets~~
	Appliance outlets
Note 4	Equipment outlets

DATA REQUIREMENTS	
Note 2	~~1 outlet per person~~
Note 5	~~2 outlets per person~~
	3 outlets per person

TELECOMMUNICATIONS	
Note 2	~~1 outlet per person~~
	2 per person

STRUCTURAL REQUIREMENTS	
	Heavy live floor load
	Heavy dead floor load
	Heavy ceiling load
Note 1	Special backing requirement

A/V REQUIREMENTS	
●	Projection screen
	Speakers
	Microphone
●	Permanent video projector
	VCR
	CD player
	DVD player
	Audio teleconferencing
	Video teleconferencing

EQUIPMENT	
	Refrigerator
	Undercounter refrigerator
	Microwave
	Dishwasher
	Icemaker
	Garbage disposal
	Coffeemaker
	Water cooler, Countertop
	Water cooler, Freestanding
	Instant hot water

PLUMBING	
	Sink
	Toilet
	Shower
	Floor drain
	Janitor's sink

ACOUSTICAL CONDITIONS	
	Normal
●	Speech privacy
	STC rating

LEGEND	
●	Required
○	Where Occurs
TBD	To be determined

NOTES	
1	Video Projector may require backing/bracing.
2	Fourplex data/tel outlet located at a flush floor outlet under table; duplex data outlet at credenza.
3	Fourplex power outlet located at a flush floor outlet under table; fourplex power outlet located at credenza; convenience power as shown
4	Provide power for ceiling-mounted video projector and projection screen.
5	Provide data/video connection between video projector and feed source (at flush floor outlet under table).

SPACE DIAGRAM

SPACE NAME: Conference Room
SPACE ID: 4.05B
AREA: 300 sf

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

FURNISHINGS KEY

1. Task Chair
2. Guest Chair
3. Lounge Chair
4. Conference Chair
5. Conference Table
6. Credenza
7. Whiteboard
8. Projection Screen
9. BBF Mobile Pedestal
10. BBF Pedestal
11. FF Pedestal
12. 2H Lateral File
13. 3H Lateral File
14. 4H Lateral File
15. 5H Lateral File
16. 48 x 48 Corner Worksurface 24" depth
17. 24D Worksurface
18. 36" Dia. Meeting Table
19. 42" Dia. Meeting Table
20. 3H Wall Hung Shelving
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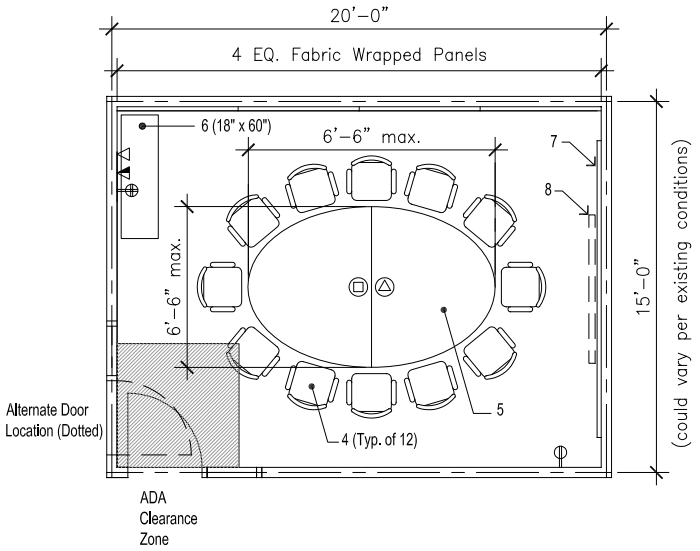


10'-0" Module

8.5 Programming Process

The programming process for the Boyce/Webber Renovation Project consisted of a series of three 1-2 day workshops with the University:

Workshop I Vision Session: Chong Partners Architecture facilitated a round table discussion with all key stakeholders to determine project goals, areas of concern and priorities. The dialogue was recorded using a white card process so that everyone's perspective is visible to all and recorded in meeting notes.

Steering Committee Meetings: The project management team, design team and CNAS project leaders met to synthesize the issues raised in the Vision Session.

Departmental Meetings: The design team met with representative(s) of each department to discuss unique issues and concerns of that group, distribute and explain the forms for collecting data (user information, growth projections, existing space utilization, equipment and lab service requirements, etc.)

Project Management Team Meetings: The project management team scheduled a series of intermittent meetings with the design team to discuss background data, concerns about the process, and filtration of user information. The conclusions of this series of discussions helped shape the approach and content of the Boyce/Webber DPP.

Workshop I Conclusions: The project management team directed the design team to focus our efforts on assessing the existing building systems to understand what portion of the budget would be required to make mandatory improvements to building systems. The remaining budget would form the basis of the scope for lab improvements. The team agreed to suspend further meetings with current Boyce/Webber users since the ultimate occupants were still unknown.

Workshop II Day 1: Project Management Team Meeting: In the morning session, the design team presented the first draft of the building systems cost analysis to the project management team. The main agenda was to determine how monies would be allocated between Boyce and Webber with the extremes framing the conversation being "Spend all the money on Webber since it is the oldest and most unsuitable building" to the opposite position of "Spend as little as possible on Webber Hall and upgrade as much of Boyce as possible". The outcome of this meeting was a decision to refine the costing methodology to price a scheme where the systems were to be capped at the mechanical canyon rather than distributed to areas that we could not afford to renovate during the course of the project. This methodology would leave more funds available for lab improvements

Steering Committee Meeting: The information was presented to the broader committee for review and feedback.

Day 2:

Strategic Planning Session: The project design team spent the morning defining alternative schemes for allocating funds between the two buildings based on information gathered in previous meetings. Our objective was to evaluate the schemes on both a long and short term basis, from both campus-wide and college perspectives. We generated seven alternatives and debated the pros and cons of each approach. The alternatives were reviewed by the project management team prior to presentation to the complete steering committee. The seven alternatives studied are shown following the Workshop Descriptions.

Steering Committee Meeting: The design team presented the alternatives for discussion. The group also reviewed a preliminary lab layout that demonstrated how Boyce could be converted to open laboratories.

Alternative Strategies:

Alternative I: Assumes the project is an infrastructure upgrade project with complete horizontal distribution of systems to existing lab configurations. (The initial cost model discussed in Workshop II was based on this approach for building system upgrades)

PROS

- Addresses infrastructure needs of both buildings equally.
- Establishes a foundation for incremental interior improvement to both buildings as funds become available.
- Scope is very clearly defined.
- Infrastructure component will be complete.
- Tenant improvement projects will likely be less disruptive to adjacent paces because services would be locally available overhead.

CONS

- Webber's infrastructure is much less accessible; current users will suffer substantial disruption.
- Additional costs will be incurred to reroute and terminate new services during future tenant improvements. Some costs may be incurred twice.
- Minimal programmatic improvement.
- No spatial or aesthetic improvement for users.

Alternative II: Decommission Webber as a lab building and provide system upgrades appropriate for office buildings or similar use. This strategy acknowledges Webber's aging infrastructure & decentralized distribution systems. The structural bay size limits Webber's capacity to provide efficient lab space without cost prohibitive alterations.

PROS

- By not improving Webber infrastructure to lab standards, the cost savings could be used for more tangible program-driven lab tenant improvements.
- Extends the life of a campus resource (Webber Hall) for non-lab uses.

CONS

- By retiring Webber as a lab facility, the current lack of lab space is exacerbated.
- Unless a sizeable portion of the lab space is converted to other uses, the cost savings would be minimal.
- Existing labs to remain would continue to be compromised due do poor infrastructure and other deficiencies.
- Safety issues will persist.
- Research may be compromised by failing infrastructure.

Alternative III: Improve infrastructure in the core of Boyce with distribution to areas of new lab improvements only. Build as much new lab as possible.
(Alternative III attempts to address as many of the user's functional issues as soon as possible.)

PROS

- Build the Boyce core infrastructure which will not have to be redone in the future.
- Build some "laboratory of the future" space in vacated areas to establish the basis for future build-outs.
- This new lab space would be helpful for recruiting and retention of faculty.
- Less disruptive to existing labs that are not being remodeled in this project.
- Additional costs will not be incurred to reroute and terminate new services during future tenant improvements.

CONS

- Infrastructure costs will have to be included in tenant improvement costs in the form of grant monies.
- Webber's lab design will be dictated by existing conditions and building systems' limitations.
- Future of Webber (for laboratory use) is limited.

Alternative IV: Minimize infrastructure improvements to both buildings and build an addition to improve Webber's lab modularity. This strategy was intended to address Webber's modular deficiencies.

PROS

- Extends the life of Webber Hall as a lab building.
- Improves the modularity and efficiency of Webber Hall as a lab building.
- Improves the image of Webber as the focal point of Carillon Mall.

CONS

- Will reduce funds for Boyce infrastructure and programmatic improvements.
- The Webber addition does not mitigate broader concerns of flexibility, safety, and infrastructure in both buildings.
- Behind the "face-lift", many infrastructure problems will remain unaddressed.

Alternative V: Focus the effort on Boyce Hall, anticipating the continuing decline and eventual replacement of Webber.

PROS

- Provides as much "Class A" lab space as possible.
- Acknowledges that Webber is not a highly compatible environment for labs.
- By focusing on Boyce, there is more opportunity to address critical needs of the Vivaria, an important shared resource, and a critical facility for health science related research.

CONS

- Funding source for Webber's conversion to office space is unknown; funding for a replacement building is unlikely.
- Webber's current condition is a problem for recruiting and retaining faculty.

Alternative VI: Make minimal improvements to Boyce to fund a +/-40,000 sf replacement building of Webber. This strategy addresses the users' perspective that with minor improvements, Boyce is pretty good lab space, but Webber is terrible.

PROS

- Provides life safety upgrades to Boyce.
- Uses bulk of the funding to make a good investment.
- Program needs for research and teaching. facilities can be better addressed.
- Faculty and student recruiting would be enhanced once the new building is complete.

CONS

- Unsure if funding can be used for new construction.
- Increased shortage of lab space during demolition and construction.
- Conflicts with University policy toward tearing down real estate assets
- Must be able to justify demolishing a real estate asset.

Alternative VII: No improvements to Boyce with a +/- 55,000 sf replacement of Webber. This strategy addresses the users' perspective that Boyce as OK is, but that as much additional 'Class A' lab space as possible is needed.

PROS

- Provides 55,000sf of state of the art lab space.
- Boyce users will not be displaced or disturbed by renovation work.
- Webber could be retained and the new building could be located on another site.
- CNAS could create a new image.

CONS

- Leaves both Boyce and Webber in their current condition.
- Funding justification is difficult when existing real estate needs improvement.

Workshop II Conclusions: Conclusion:

At the conclusion of the workshop, the steering committee selected Alternative III as the primary direction for allocating funds and directed the design team to develop schemes for Boyce. Alternative II discussion prompted the decision to improve only the labs on Webber's 3rd Floor (the least complicated area to renovate being just below the roof and therefore not affecting other floors.) as well as Webber's infrastructure. A cost matrix was developed for Alternatives II & III with two options for Alternative III. Although the cost matrix was not a final estimate, it provided a comparative understanding for the cost of the three options. On the basis of this cost matrix and by virtue of the fact that Alternative II could not be achieved without relocating all non-lab functions to Webber, increasing the need for more tenant improvements than the budget would allow, Strategy III (Option 1) with minor modifications was selected.

The selected strategy is to develop all infrastructure core (vertical) elements in both Webber Hall and Boyce Hall and core elements of the Vivaria. In addition this selected strategy develops the 4th and 5th floors of Boyce Hall with modern, open laboratories and do the same for the 3rd floor of Webber Hall.

Workshop III

Project Management Team Meeting: Five options for Boyce Hall, shown in Section 4.1, were reviewed with the Project Management Team and the Campus Fire Marshall. Option E was eliminated due to exiting concerns.

Steering Committee Meeting: The design team presented the remaining options to the entire Steering Committee for review and discussion.

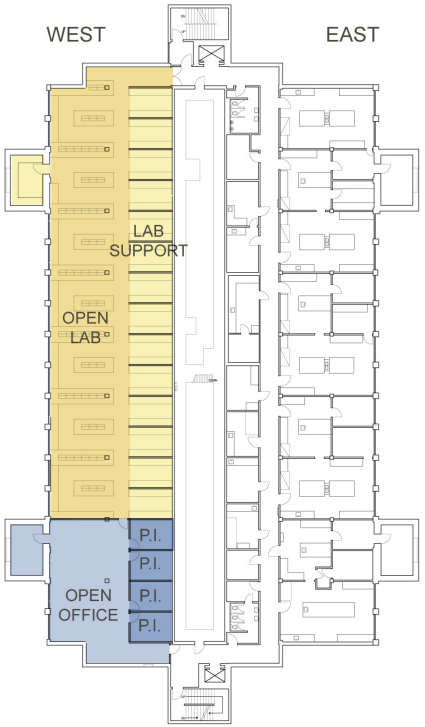
Workshop III Conclusions:

The steering committee selected Option B, with staff areas collected at the south end of Boyce, as the approach that would provide the most lab flexibility and foster collaborative research. This scheme was to be further developed to refine the ratio and arrangement of lab, lab support and office areas.

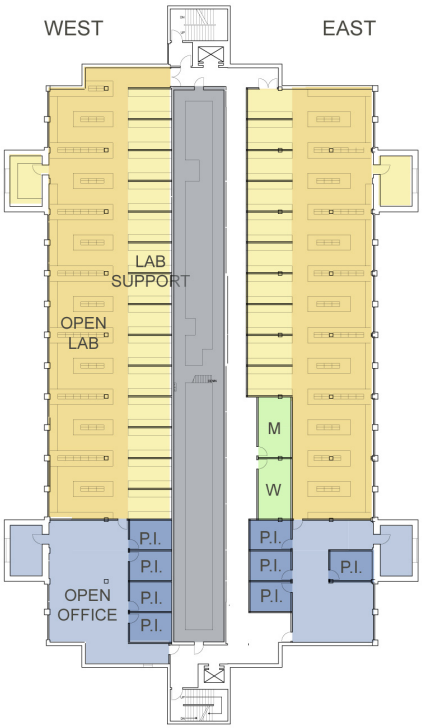
The five alternative layouts developed for Boyce are shown here as Options A through E. Option A is a half floor development option and will be employed for the 3rd Floor of Boyce Hall as the budget allows. Option E, upon further analysis, proved to be impossible due to code exit requirements and was eliminated. Option D demonstrates how option C could be subdivided into closed labs. With D & E eliminated, the strengths and weaknesses of Option B and C were considered. Option B consolidates the Principal Investigator offices together, while Option C distributes them along the corridor of the east side of Boyce Hall. The DPP Committee selected Option B as the preferred conceptual planning option for its ability to concentrate the offices on both sides of the mechanical core to promote collaboration.

Webber Hall's structural bay size and mechanical systems do not provide the opportunity to change the location of the existing corridor so alternative layouts were not developed for Webber.

OPTION A

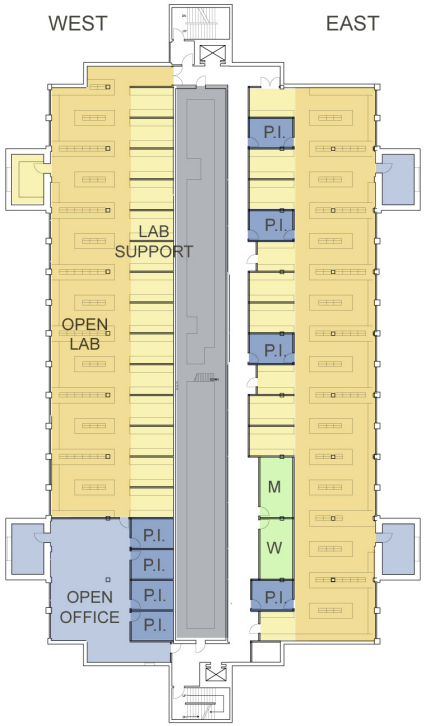


OPTION B

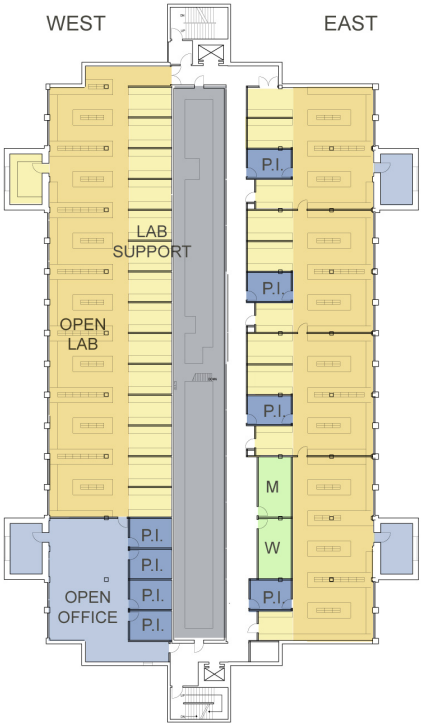


selected option

OPTION C



OPTION D



OPTION E