University of California, Riverside **Health Sciences Surge Building**

UCR Project No. 950480

Detailed Project Program

April, 2008

SRG PARTNERSHIP INC

University of California, Riverside
Health Sciences Surge Building
Project No. 950480

Detailed Project Program

Acknowledgments

University of California, Riverside

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1.0 Executive Summary

1.1 Mission

Campus Aerial View

The mission of the proposed Health Sciences Surge Building at the University of California, Riverside (UCR), is to house an expansion of health sciences research faculty in anticipation of a new School of Medicine that is expected to begin enrolling 3rd and 4th year medical students in approximately 2012. The School of Medicine effort will expand current medical school curricula at UCR and will require new faculty to be hired beginning in 2010. The School of Medicine faculty will eventually grow to over 138 positions during the period from 2010 to 2025. The Health Sciences Surge Building will house the initial faculty hires on the East Campus while permanent facilities are developed and constructed for the School of Medicine; all medical faculty are expected to move to the new West Campus location sometime after 2015. Subsequent to the medical faculty members' move to the West Campus, the Health Sciences Surge Building will continue to provide flexible support for researchers who are hired as interdisciplinary biomedical sciences and life sciences disciplines continue to grow on UCR's East Campus.

The proposed building will provide 60,000 gsf on three floors and will be sited on the obsolete Entomology and Insectary Building sites, both of which are unoccupied as they are rated seismically poor and are scheduled for demolition. The building will be in a science research precinct of the campus which includes units from the College of Natural and Agricultural Sciences, the College of Humanities, Arts and Social Sciences, and the Division of Biomedical Sciences. The Health Sciences Surge Building will provide research laboratories, lab support space, office space, and associated space for 15-18 faculty, graduate students, postdoctoral fellows, and support staff.

1.2 Program

The Health Sciences Surge Building places an emphasis on creating working environments that support and foster synergistic relationships between faculty researchers, postdoctoral fellows, graduate students, and support staff. The following objectives add qualitative dimensions to the program and focus on encouraging intellectual interaction and collegiality.

- Create a flexible laboratory building that is fully integrated into the campus fabric, supporting campus planning guidelines and objectives.
- Create an environment that facilitates intellectual stimulation and collaboration among faculty, postdoctoral and graduate students.
- Maximize the research space given the resources available, providing Health Sciences with a facility that attracts new faculty and supports high-level research.
- Provide a flexible space to house new Medical School faculty initially and other university science researchers in the future.
- Provide the capability to change and adapt to future space and technological needs.

Space Program Summary	Net Assignable Area square footage (sf)	% of total
Research Laboratories	**16,830 sf**	**48%**
Research Support	**11,918 sf**	**34%**
Office/Admin/Support	**7,448 sf**	**18%**
	TOTAL 34,801 sf	**100%**

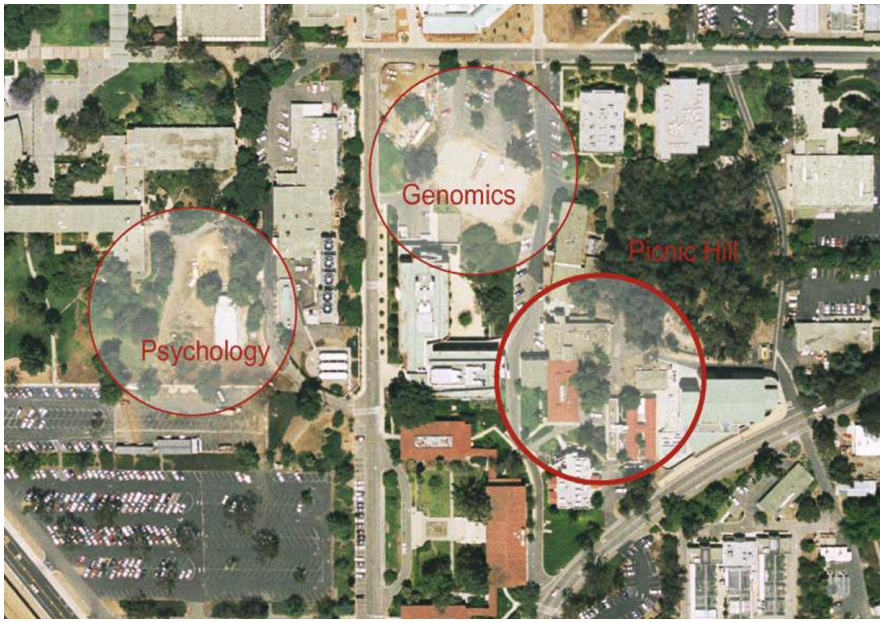
1.3 Site

The proposed site for the Health Sciences Surge Building is located on the site of the obsolete Entomology and Insectary structures, east of the new Entomology Building and southwest of “Picnic Hill”, a signature campus open space. The site area is approximately 60,000 square feet, or approximately 1.4 acres. There is a grade differential of approximately 20 feet from the high point on the east side to the low point on the west. The west side of the site is currently adjacent to a service drive. Campus master planning efforts have identified longer term goals of developing this service drive as a pedestrian oriented amenity known as “Science Walk”.

The site location was strongly influenced by the proximity to support facilities integral to Health Sciences research. A new central Vivarium is under construction as part of the new Psychology Building to the west. Bioinformatics data servers are being housed in the new Genomics Building to the northwest. Conference and meeting spaces will be available in Genomics and the existing Entomology Building to the west. Core research facilities are available in Batchelor and Biological Sciences.

Other sites were considered but would have required additional construction to provide these services.

The service zone will be shared with the Insectary & Quarantine building to the east and will utilize and maintain the existing access driveway and service/ delivery area.



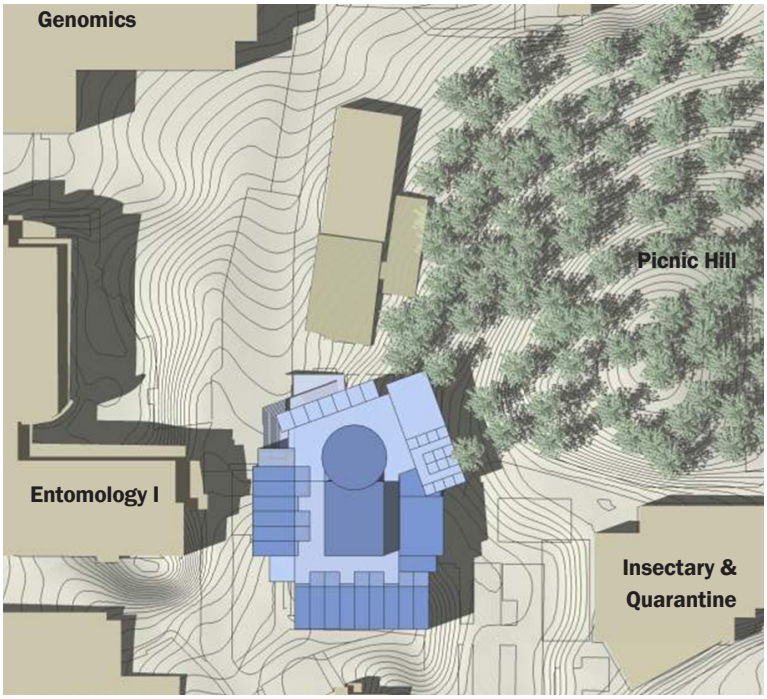
Proximity to required support facilities

1.4 Concept

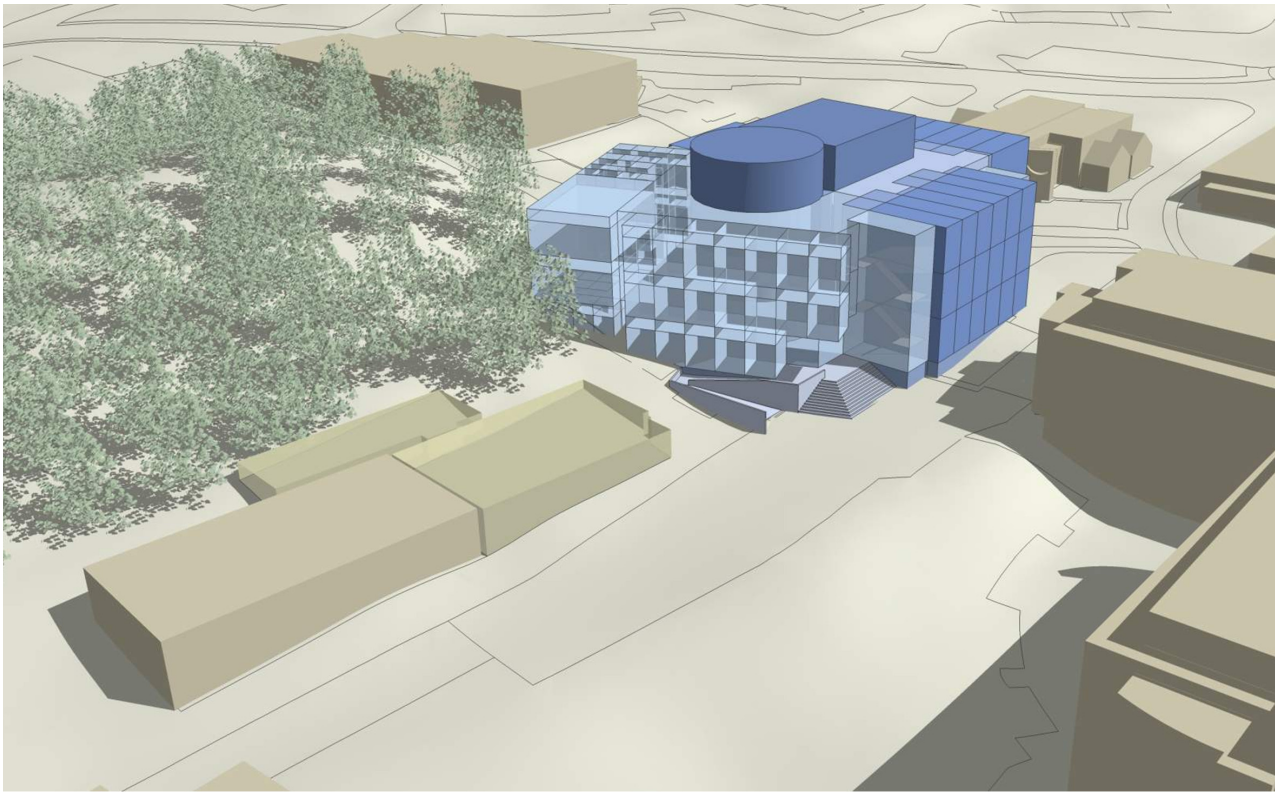
The orientation and configuration of the proposed Health Sciences Surge Building responds to the program, the topography of the site, and to key site planning issues.

Faculty offices are grouped on the north face of the building to take advantage of the views. The post-doctoral students are in shared open offices adjacent to faculty offices. Office support spaces, such as conference rooms, copy, mail, and interactive areas will be clustered nearby.

Laboratories are grouped, in multiples of three modules, on the east, south and west faces. This planning provides maximum flexibility to accommodate various size labs. They are connected with a shared circulation and equipment space. Dedicated and shared procedure rooms are located along this circulation as well.



Proposed siting of Health Sciences



View from northwest corner of site

1.5 Schedule and Budget

The Project Planning Guide will be completed in the Spring of 2008. Construction will be completed by Summer of 2010.

The direct construction cost for the Health Sciences Building is estimated to be $24,871,450, which includes escalation to the start of construction in January 2009. This initial construction will deliver a full building shell and infrastructure to support a full build out of the interior. The initial work will finish out the third floor and provide shell space on the first two floors for later fit out.

2.0 Introduction

2.1 Introduction

Campus Aerial View

The University of California, Riverside (UCR) has its roots in agricultural research. Recognizing the need for research into the methods and problems of citrus agriculture, the University of California established an experimental research facility in 1907 on 30 acres below Mt. Rubidoux. In 1918, the first citrus experiment station was dedicated on current UCR property at the foot of Box Springs mountains, utilizing 370 acres to study citrus and other southern California crops, and became the center of the citrus growing industry.

Today, the UCR campus has grown to 1,121 acres. It is located three miles east of downtown Riverside in one of the fastest growing areas of California. This growth has brought an increasingly diverse and multi-cultural population to the region, with concomitant diversity in business and industry development in the surrounding communities. UCR serves as one of the most important educational and cultural resources for this area. Most academic activities occur within the 610 acre campus area east of I-215/SR-60 freeway. The remaining 511 acres west of the freeway are used for agricultural research and support programs and are intended for expansion of the campus facilities.

UCR has experienced significant growth since the mid 1980's. Since the fall of 1984, student enrollment at UCR has grown from 4,805 to nearly 17,000 students in the fall of 2007. Current planning assumptions test UCR capacity at 25,000 students by the year 2015. This number of students will require major changes in teaching and research, development of services and programs for students, and the facilities to support these programs in a 21st century learning environment. UCR's academic programs are structured around three colleges and two professional schools: the College of Natural and Agricultural Sciences, the Bourns College of Engineering, the College of Humanities, Arts and Social Sciences, the A. Gary Anderson Graduate School of Management, the Graduate School of Education, and one division—Biomedical Science.

2.2 UCR Health Sciences

The University of California is recognized worldwide as a leader in research and education that fuels innovation and economic growth. UC faculty and students conduct research that opens doors to technological advancements that improve social, environmental, and economic characteristics of California, and that build a strong foundation for the state's future.

The mission of the proposed Health Sciences Surge Building at the University of California, Riverside, is to house an expansion of health sciences research faculty in support of the new School of Medicine that is expected to expand enrollment to include 3rd and 4th year medical students beginning in 2012. The School of Medicine effort will expand current medical school curricula at UCR and will require new faculty to be hired beginning in 2010. The School of Medicine faculty will eventually grow to over 138 positions during the period from 2010 to 2025. The Health Sciences Surge Building will house the initial faculty hires while new permanent facilities are developed and constructed for the School of Medicine; all medical faculty are expected to move to the new West Campus location sometime after 2015. Subsequent to the medical faculty members move to the West Campus, the Health Sciences Surge Building will continue to provide flexible support for researchers who are hired as interdisciplinary Biomedical and Life Sciences disciplines continue to grow on UCR's East Campus.

2.3 Long Range Development Plan

The Long Range Development Plan (LRDP) is a comprehensive plan that guides the development of future facilities in the University of California system within a given campus. The final 2005 LRDP for the University of California, Riverside, identifies the physical development needed to achieve the academic goals of the campus through the year 2015 for an anticipated student enrollment of 25,000. In addition, it describes the LRDP Vision and Goals:

The Vision For UC Riverside

- Create a state-of-the-art plan that conveys the university's excellence.
- Develop land use elements to strengthen academic, cultural, and social interaction.
- Preserve, enhance, and restore the natural environment.
- Strengthen and clarify circulation systems.
- Maintain planning flexibility.

Manifest the 2010 Vision for UCR

The four major themes that can inform physical planning for the campus are:

- World leadership in selected areas (including the environment, materials science, nanotechnology, genomics, the human condition, and Latin America).
- A culture of inquiry where all participants are engaged in the intellectual life of the university.
- Diversity and excellence in students, faculty and staff.
- A moral imperative to engage the critical issues of society such as the environment and education.

Sustainability Principles

Sustainable design and planning require the cooperation and consideration of all sectors of the institution and require a long-term, life-cycle perspective. Basic principles of sustainability that will inform future planning and design at UCR include:

- Preserving open space/conserving land resources.
- Providing alternative transportation choices.
- Minimizing site disturbance.
- Protecting natural resources.
- Reducing waste.
- Reducing energy and water use.
- Protecting the health and well-being of the campus and surrounding community.
- Protecting the health and well-being of building occupants.
- Educating the community in sustainable practices.

The LRDP presents a detailed account of past planning, existing conditions and land uses, proposed land uses, and mitigation recommendations. The proposed site for the Health Sciences Surge Building is located on the site of the abandoned Entomology and Insectary structures.

2.4 Planning and Design Guidelines

In addition to the LRDP, the building and site designs must be responsive to the campus standards. These design and planning standards are set forth in the Campus Design Guidelines (2008) and Campus Aggregate Master Plan Study (2008).

2.5 Planning Process

The DPP process began in early January 2008. The Project Steering Committee, comprised of the Vice Chancellor for Research and Biomedical Sciences faculty representative, the Office of Academic Planning and Budget, and the Office of Design and Construction, was established to provide input for and review of program and design concepts. In addition, a Health Sciences Surge Building focus group representing Biomedical Sciences, Cell Biology and Neuroscience, and Entomology, provided input regarding research environment context that this facility would need to consider. Numerous research lab models were studied and compared to evaluate ideas of how research labs, lab support, and office spaces can be distributed and how relationships are affected. As the program developed, site and building design concepts were studied and presented to the Committee. Updates and presentations were made in a series of two-day workshops that culminated in the completion of the final DPP document in March, 2008.

2.6 Key Program Assumptions

The project scope is determined by optimizing the site and building shell within the available budget. Major variables include building efficiency and cost per square foot. The result is approximately 60,000 gross square feet (gsf) and 34,801 assignable square feet (asf), at 58% efficiency. The cost of the initial critical construction is approximately $400/gsf, including building and site and excluding Type II and III equipment and partial interior fit out.

Additional sites were evaluated in the design process, and a summary critique of these sites and their location is in Appendix A.

2.7 Project Goals

In the process of developing a comprehensive program that will permit the Health Sciences Surge Building to meet its research objectives, the following project objectives and goals apply:

- Create an environment that fosters intellectual stimulation and collaboration among faculty, post-doctoral and graduate students.
- Create a building that can adapt to technological and scientific advancements.
- Maximize the research space that provides the Surge Building with a facility that supports high quality research, and is adaptable to the needs of future users.
- Create a building that establishes a generic research facility that is fully integrated into the campus fabric, supporting campus planning guidelines and objectives.
- Develop a program that encourages synergies among the various research groups.
- Pursue opportunities that emphasize sustainable design solutions.

3.0 Program

3.1 Program Overview

The project is envisioned as a highly flexible laboratory facility that will initially accommodate faculty recruited for the anticipated medical school and pursuing various research initiatives in biomedical sciences. Following its use as a health science facility, the building will continue to function as a research laboratory for University science programs.

The facility program was developed by the design team in consultation with the Project Steering Committee and Focus Group. Since the final users of the facility have not been recruited, the Focus Group has acted as a "surrogate" user group to determine program needs and adjacency requirements. The proposed space program indicates targets of 34,801 total assignable square feet and 60,000 square feet of gross building area.

3.2 Preliminary Planning Program

The primary features of the proposed program are open laboratories, shared laboratory support, enclosed offices for principal investigators, and open-office workstations for post-doctoral research staff. Open laboratory space has been programmed at an average of three 315 square-foot planning modules per principal investigator, yielding a projected 15 principal investigators. In addition, core laboratories for biological safety level 3 (BSL-3) and office space for bioinformatics research and support yields an additional 2 principal investigators for a total of 17. Each principal investigator is anticipated to lead a research team that averages 2 post-doctoral research assistants and 4 graduate students. The open laboratories are to be configured with a repetitive, modular utilities infrastructure to accommodate changing equipment requirements over time and facilitate the installation of laboratory equipment with minimal modifications. Open laboratory sinks will be located at interior walls to maximize the flexibility of the island bench areas. Write-up workstations for graduate students are to be provided at the exterior wall side of the open laboratory in lieu of dedicated office workstations elsewhere.

SPACE PROGRAM SUMMARY

February 26, 2008

ID No.	CPEC Code	SPACE TYPE	QTY	ASF	Total ASF	# Modules
RESEARCH LABORATORIES						
1.01	210W	Research Laboratories (Modules)	45	315	14,175	45.00
1.03	210C	Bioinformatics Research (refer to 3.03 Post Doc data sheets)	4	315	1,260	4.00
				Laboratory Subtotal	**15,435**	**49.00**
					44.4%	
BSL-3 SUITE						
1.02	210W	BSL-3 Research Laboratories (Modules)	1	1,395	1,395	4.43
				BSL-3 Suite Subtotal	**1,395**	**4.43**
					4.0%	
RESEARCH SUPPORT						
2.01	225E	Equipment Rooms	6	315.0	1,890	6.00
2.02	225	Fume Hood Alcove/Chemical Storage	15	105.0	1,575	5.00
2.03A	225C	Controlled Temperature Rooms	2	105.0	210	0.67
2.03B	225C	Controlled Temperature Rooms	2	210.0	420	1.33
2.04		Not Used				
2.05	225	Instrument Rooms	13	157.5	2,048	6.50
2.06	225	Cell Culture Rooms	13	315.0	4,095	13.00
2.07	225	Darkenable Support Rooms	2	105.0	210	0.67
2.08	225	Autoclave Room	1	472.5	473	1.50
2.09		Not Used				
2.10	225	Fluorescence-Activated Cell Sorting (FACS) Room	1	157.5	158	0.50
2.11	225	Confocal Microscopy Room	1	157.5	158	0.50
2.12	225	Storage Rooms (no data sheet shown)	1	157.5	158	0.50
2.13	225	Building Receiving (no data sheet shown)	1	315.0	315	1.00
2.14	225	Freezer Farm/Cryogenics Storage	1	210.0	210	0.67
				Lab Support Subtotal	**11,918**	**37.84**
					34.2%	
OFFICE/ADMIN/CONFERENCE						
3.01	310F	Faculty Office (PI)	17	132	2,244	
3.02	310V	Visiting Faculty Offices	2	132	264	
3.03	310P	Post Docs	34	60	2,040	
3.04	211	Grad Students	68	Locate within open laboratories		
3.05	320	Administrative Support	2	125	250	
3.06	335	Mail Room	1	125	125	
3.07	335	Copy/Workroom	3	125	375	
3.08	340	Seminar/Conference Room (20-24 person capacity)	1	500	500	
3.09	340	Conference Room (10-12 person capacity)	1	250	250	
3.10	340	Conference/Activity	3	250	750	
3.11	335	Coffee/Activity	3	650	650	
				Subtotal	**7,448**	
					17.4%	
				PROGRAM TOTAL ASF	**34,801**	
				Net/Gross Ratio	58.0%	
				TOTAL BUILDING GSF	**60,000**	

The laboratory support program consists of both dedicated and shared spaces. The dedicated space is dominated by a series of cell culture rooms which must have proximity to the open laboratories but may be accessed via a hallway. A dedicated instrument room and fume hood alcove are also provided at a ratio of one per 3-module open laboratory. Shared lab support includes equipment rooms, a central autoclave facility, controlled temperature rooms, a fluorescence-activated cell sorting (FACS) space, confocal microscope, and freezer farm/cryogenics storage room.

Programmed office spaces include enclosed private offices for the 17 principal investigators and open office workstations for 34 post-doctoral research staff. Two additional private offices are included for visiting faculty. Administrative support is provided via two workstations for administrative assistants, one combined copy/workroom/mail distribution center, and two copy/workrooms.

Collaboration between research groups has been emphasized in the development of the program, resulting in a series of spaces to facilitate both formal and informal interaction. A seminar room for 20-24 people and a conference room for 10-12 people are enclosed areas that allow more structured interaction. A key program component is the faculty colloquium areas that allow informal meetings, work sessions and social activity. Coffee/Activity spaces are to be located on each floor in the laboratory zone of the building to provide a space for meals, breaks, and informal interaction outside of the laboratory spaces.

3.3 Laboratory Design Considerations

The flexibility and adaptability of the open laboratories is a primary goal of the project. A laboratory planning module of 10'-6" x 30'-0" (315 square feet) has been utilized to create a modular floor plan that provides the University flexibility in assigning bench space and minimizes the need for future modifications. The open laboratory benches will be served by an overhead utility system that delivers compressed air, vacuum, power, and data services with quick-connect outlets to facilitate laboratory equipment installation.

The open laboratories will include a zone for large floor-standing equipment at the demising wall with the lab support areas. Fume hood alcoves should open directly onto this zone to allow ease of movement to and from the open laboratory. The equipment rooms in the program have been developed as an equipment corridor that provides access to spaces while accommodating large/tall equipment on both sides, where not interrupted by doors or safety equipment.

The anticipated laboratory casework system will also offer user flexibility, with portable cabinets provided below work surfaces supported from an h-frame structure. The proposed system allows the removal of both cabinets and work surfaces where necessary for large floor-standing equipment. The interchangeability of these components allows the University to develop an inventory of casework that can be proactively managed to customize bench space to meet changing user needs.

The open laboratories should be configured to provide two unobstructed means of exiting any work area, and any lab 3 planning modules or larger should be provided with two separate exit doors to the corridor. Exit doors should swing in the direction of egress and be located in alcoves; doors to smaller laboratory support spaces may swing inward. These primary access/egress doors should be a minimum of 3'-6" in width, and consideration should be given to 4'-6" wide unequal leaf door openings (3'-0" active leaf and 1'-6" inactive leaf) to accommodate the passage of larger equipment if deemed necessary. Aisles between benches should be a minimum of 5'-0" in width for movement around an individual standing or sitting at the bench.

The BSL-3 core lab is programmed to provide flexible space for research teams using multiple infectious agents, select agents, and overlap agents. The suite includes 4 procedure rooms with door access control and a shared anteroom/change room with a pass-through autoclave and waste holding room. A shower room will be provided adjacent to the anteroom to accommodate a shower-out protocol, if needed. Per discussion with the Focus Group, liquid waste will be collected below the laboratory sinks for chemical neutralization within the procedure rooms and subsequent disposal as "clean" waste. This operating protocol avoids the need for a costly central, automated steam or chemical neutralization system outside of the containment envelope. It is understood that this strategy may limit the range of select agents that the Centers for Disease Control will permit in this facility.

The bioinformatics core facility is a dedicated office space to support high-throughput computing that is commonplace in life sciences research. Per discussion with the Project Steering Committee, the bioinformatics space will be supported by the high-capacity server cluster that will be housed in the Genomics Building (under construction).

The vibration criteria for microscopy and other sensitive equipment has been identified as 2,000 micro-inches/second (mips) in the laboratory support areas and in the BSL-3 suite; and 4,000 mips in the open laboratory spaces. It may be desirable to provide the more stringent 2,000 mips in the open areas as well, and the design team will study the feasibility of doing so within available project resources during the schematic design phase. Noise control in the occupied laboratory spaces should be limited to 55 decibels to facilitate speech audibility. Potential noise sources from HVAC systems and central building systems must be identified and alternative strategies or mitigation measures incorporated where necessary. This investigation is especially critical below the anticipated rooftop penthouse where the primary air handling and plumbing equipment will be located.

Laboratory areas are required to meet the accessibility requirements of the 2007 California Building Code. This Code stipulates that a minimum of 5%, and at least one repetitive laboratory work area, be designed to be accessible. If a unique shared facility is provided it must be designed to be accessible. Fixed casework where provided may have work surfaces no higher than 34" above the floor and be configured for side-reach or forward-reach access to sinks and wrist-blade fittings. Fume hoods and chemical storage cabinets require special attention, not only for the height of work surfaces but for the location of cup sinks, utility control valves, and to provide clear unobstructed knee space that is a minimum of 30" in width. The 5'-0" clear aisle space between benches recommended above provides wheelchair turnaround space throughout the laboratories.

3.4 Room Data Sheets and Room Criteria

The following give typical layout and detailed requirements for the various types of spaces listed in the program. In part they verify the adequacy of the space allocations. In addition they give information to the design team members as they move into the next phase of laying out spaces and coordinating building systems.

The furnishings list is generic and only those items called out on each room diagram are needed.

ROOM DATA SHEET

RFD

SPACE NAME: RESEARCH LABORATORY (MODULES)
SPACE ID: 1.01

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	
MECHANICAL	
Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
8 Minimum Air Changes/Hour	
6 Minimum Air Changes/Hour	■
4 Minimum Air Changes/Hour	
100% Make-up Air	■
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	■
Air Filtration/Supply	
HOODS/ EXHAUST DEVICES	
Chemical Fume Hood	Note 1
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Student Station Exhaust	
Other	
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)	
High Purity Water (PW)	■
Chilled Water (CHW S/R)	
Steam	
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	
DC Power	
Standby Power	■
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
70 fc at bench/desk	■
60 fc at bench/desk	
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

CHEMICALS	
Bases	■
Acids	■
Solvents	■
Radioisotopes	■
Carcinogens/Regulated	■
Biological Storage	■
ARCHITECTURAL	
Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Other	
Partitions	
Gyp Board, Epoxy Paint	■
Gyp Board, Paint	
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	■
Gyp Board, Epoxy Paint	
Min. Height	9'-6"
Doors	
3' x 7'	
(3'+1'-6") x 7'	■
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	■
Sliding Door	
Card Key Access	
Natural Daylight	■
CASEWORK	
Cabinets	
St. Stl.	
Wood	■
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	■
Plastic Laminate	

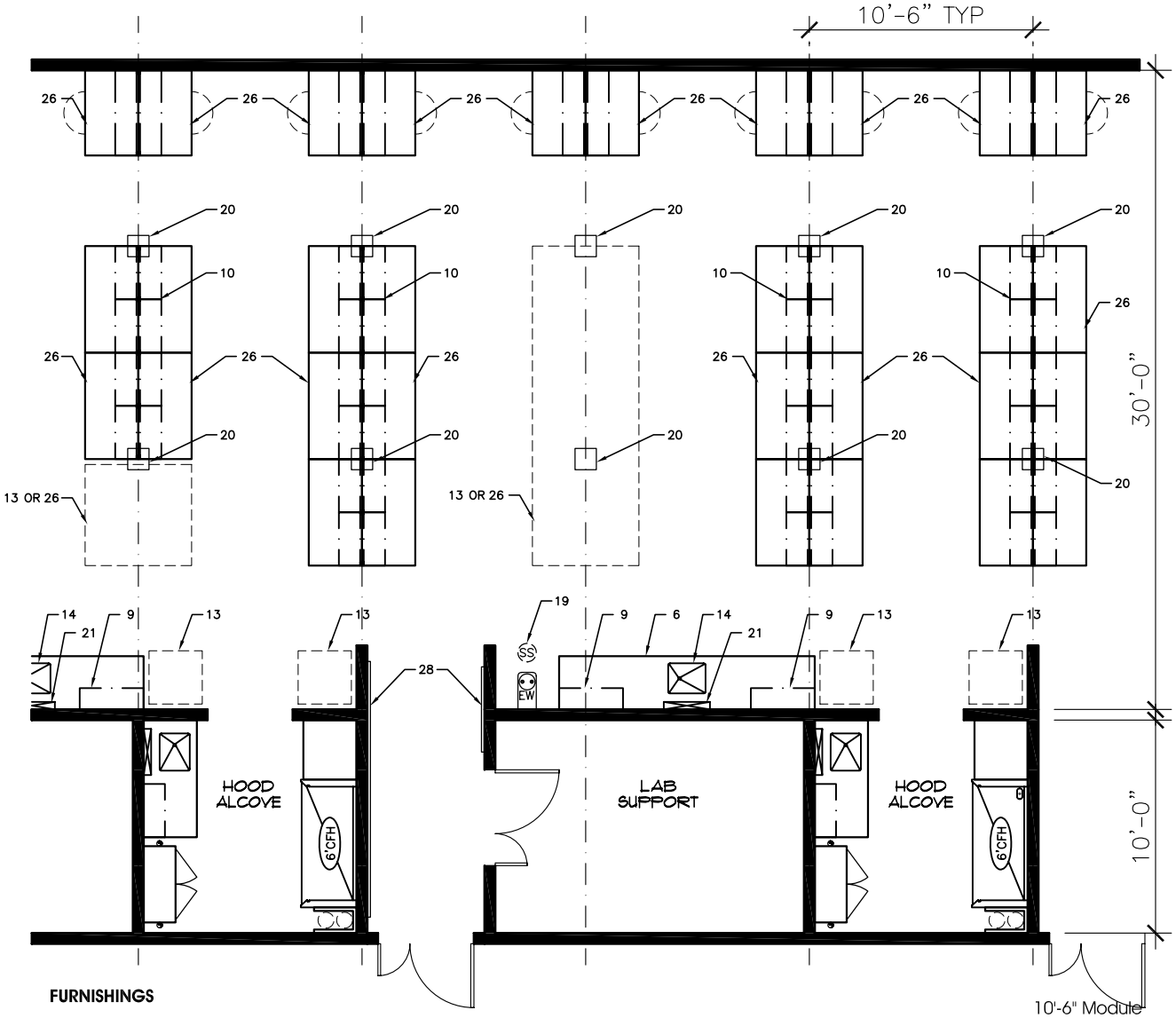
REMARKS:

1. In adjacent alcove, allow for (1) 6'-0" Chemical fume hood per three modules.

SPACE DIAGRAM

SPACE NAME: RESEARCH LABORATORY
SPACE ID: 1.01
AREA: 315 ASF/ MODULE

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



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Exhaust Port
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. Ceiling Service Panel
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'-6" Module
0 1' 2' 4' 8'

ROOM DATA SHEET

RFD

SPACE NAME: **BSL-3 RESEARCH SUITE**
SPACE ID: **1.02**

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	■
MECHANICAL	
Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
10 Minimum Air Changes/Hour	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
100% Make-up Air	■
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	■
Air Filtration/Supply	
HOODS/ EXHAUST DEVICES	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	Note 1
Snorkel	
Canopy Hood	Note 2
Student Station Exhaust	
Other	
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)	Note 3
Potable Cold Water (CW)	Note 3
High Purity Water (PW)	■
Chilled Water (CHW S/R)	
Steam	
Carbon Dioxide (CO_2)	Note 4
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	■
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	Note 5
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	
DC Power	
Standby Power	■
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
70 fc at bench/desk	■
60 fc at bench/desk	
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

CHEMICALS	
Bases	■
Acids	■
Solvents	■
Radioisotopes	■
Carcinogens/Regulated	■
Biological Storage	■
ARCHITECTURAL	
Floor	
Resilient	
Welded Seam Sheet Vinyl	■
Epoxy	
Other	
Partitions	
Gyp Board, Epoxy Paint	■
Gyp Board, Paint	
Other	
Base	
4" Vinyl	
Integral w/floor	■
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Epoxy Paint	■
Min. Height	9'-0"
Doors	
3' x 7'	
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	■
Sliding Door	■
Card Key Access	Note 6
Natural Daylight	■
CASEWORK	
Cabinets	
St. Stl.	
Wood	
Metal	Note 7
Plastic Laminate	
Countertops	
St. Stl.	■
Epoxy	
Plastic Laminate	

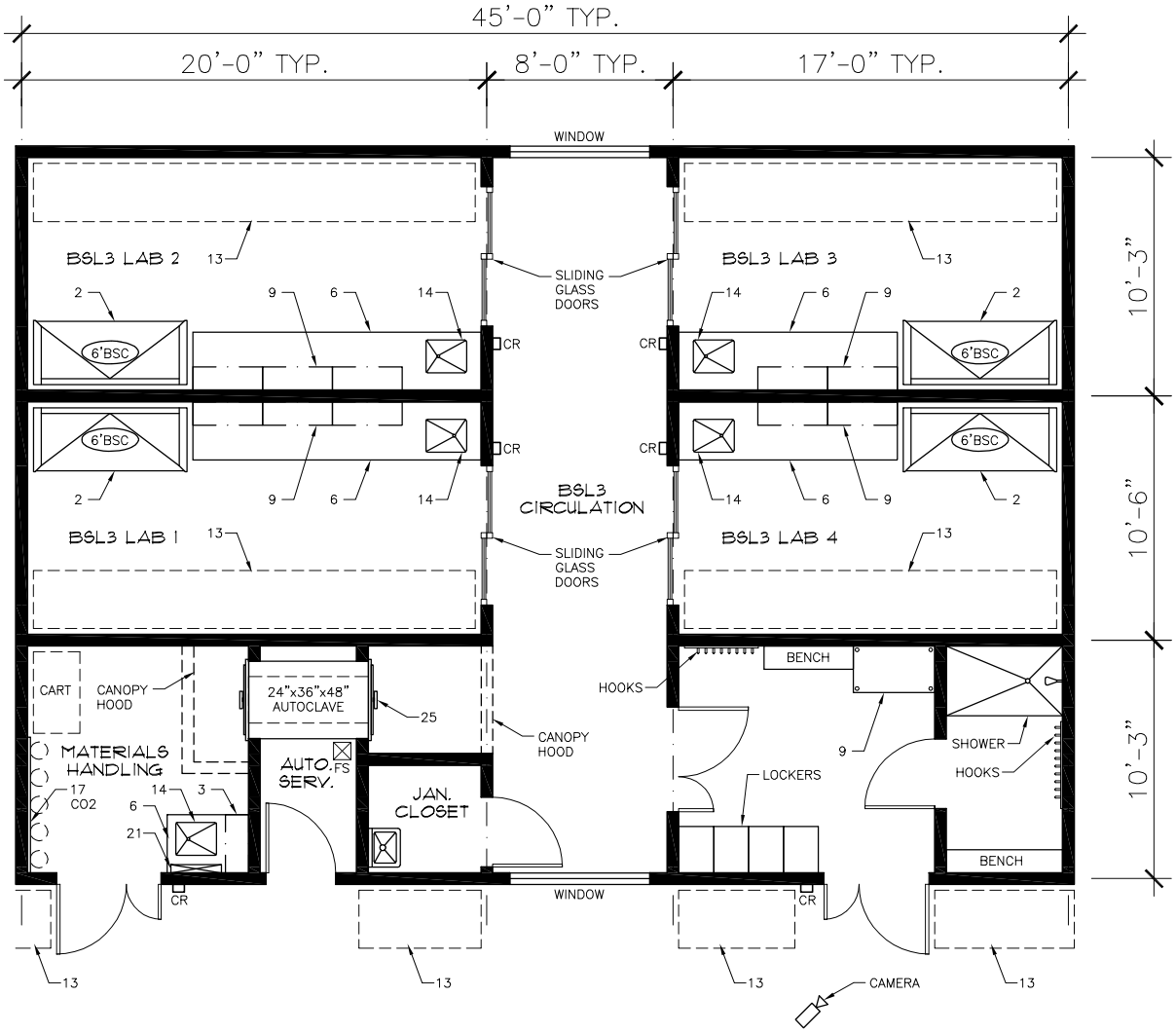
REMARKS:

1. (3)-(5) 6'-0" ClassII A2 BSCs - some ClassII B2 may be desirable.
2. Exhaust soffits at autoclave.
3. Potable water at shower.
4. CO2 manifold for suite in Materials Handling room.
5. Floor sink for autoclave (outside containment).
6. Secondary ID verification required for select agent work.
7. Mobile base cabinets.

SPACE DIAGRAM

SPACE NAME: **BSL-3 RESEARCH SUITE**
SPACE ID: **1.02**
AREA: **1,395 ASF**

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



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Exhaust Port
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. Ceiling Service Panel
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'-6" Module
0 1' 2' 4' 8'

ROOM DATA SHEET

RFD

SPACE NAME: EQUIPMENT ROOM
SPACE ID: 2.01

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	■
MECHANICAL	
Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
8 Minimum Air Changes/Hour	
6 Minimum Air Changes/Hour	■
4 Minimum Air Changes/Hour	
100% Make-up Air	■
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	■
Air Filtration/Supply	
HOODS/ EXHAUST DEVICES	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Student Station Exhaust	
Other	
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)	
High Purity Water (PW)	
Chilled Water (CHW S/R)	Note 1
Steam	
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	
DC Power	
Standby Power	■
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
70 fc at bench/desk	
60 fc at bench/desk	■
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	■
Radioisotopes	
Carcinogens/Regulated	
Biological Storage	
ARCHITECTURAL	
Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Other	
Partitions	
Gyp Board, Epoxy Paint	■
Gyp Board, Paint	
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Epoxy Paint	
Min. Height	9'-0"
Doors	
3' x 7'	
(3'+1'-6") x 7'	■
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	
CASEWORK	
Cabinets	
St. Stl.	
Wood	
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	

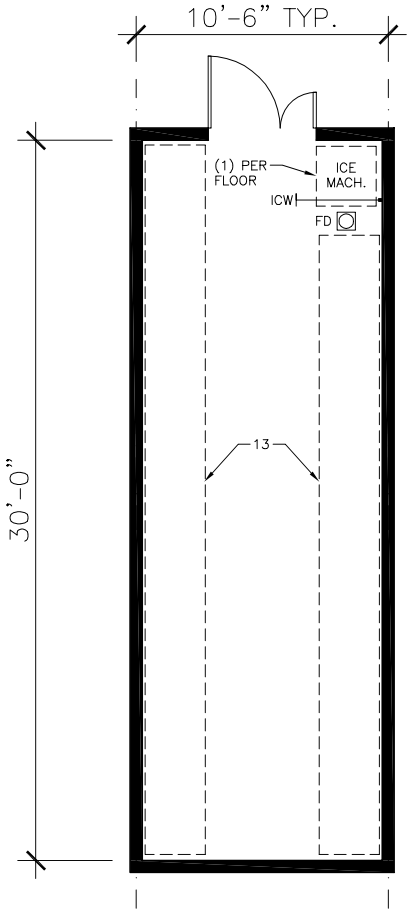
REMARKS:

1. CHW for equipment cooling.

SPACE DIAGRAM

SPACE NAME: **EQUIPMENT ROOM**
SPACE ID: **2.01**
AREA: **315 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

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Exhaust Port
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. Ceiling Service Panel
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'-6" Module
0 1' 2' 4' 8'

ROOM DATA SHEET

RFD

SPACE NAME: FUME HOOD ALCOVE/CHEMICAL STORAGE
SPACE ID: 2.02

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	
MECHANICAL	
Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
8 Minimum Air Changes/Hour	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
100% Make-up Air	■
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	■
Air Filtration/Supply	
HOODS/ EXHAUST DEVICES	
Chemical Fume Hood	Note 1
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Student Station Exhaust	
Other	
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)	
High Purity Water (PW)	■
Chilled Water (CHW S/R)	
Steam	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	■
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	Note 2
Drench Hose (DH)	
ELECTRICAL	
110V, 20A, 1 Phase	■
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
DC Power	
Standby Power	
UPS (OFOI)	
Phone	
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
70 fc at bench/desk	■
60 fc at bench/desk	
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

CHEMICALS	
Bases	■
Acids	■
Solvents	■
Radioisotopes	■
Carcinogens/Regulated	■
Biological Storage	
ARCHITECTURAL	
Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Other	
Partitions	
Gyp Board, Epoxy Paint	■
Gyp Board, Paint	
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	■
Gyp Board, Epoxy Paint	
Min. Height	9'-0"
Doors	
3' x 7'	
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	
CASEWORK	
Cabinets	
St. Stl.	
Wood	■
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	■
Plastic Laminate	

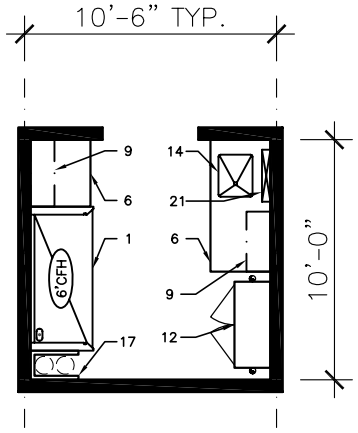
REMARKS:

1. (1) 6'-0" Chemical fume hood per alcove. Allow for one alcove per three research modules.
2. In adjacent laboratory (accessible without intervening doors).

SPACE DIAGRAM

SPACE NAME: **FUME HOOD ALCOVE/ CHEMICAL STORAGE**
SPACE ID: **2.02**
AREA: **105 NSF EACH**

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



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Exhaust Port
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. Ceiling Service Panel
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'-6" Module
0 1' 2' 4' 8'

ROOM DATA SHEET

RFD

SPACE NAME: CONTROLLED TEMPERATURE ROOM
SPACE ID: 2.03

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	■
MECHANICAL	
Temperature	
72°F ± 2°F	
68°-75° ± 2°F	
Other	Note 1
Humidity	
50% ± 20%	
Uncontrolled	■
8 Minimum Air Changes/Hour	
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
100% Make-up Air	
Recirculated Air	■
Air Pressure Positive	
Air Pressure Negative	
Air Filtration/Supply	
HOODS/ EXHAUST DEVICES	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Student Station Exhaust	
Other	
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)	
High Purity Water (PW)	
Chilled Water (CHW S/R)	
Steam	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	Note 2
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	
DC Power	
Standby Power	■
UPS (OFOI)	
Phone	
Data - Jacks	
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
70 fc at bench/desk	
60 fc at bench/desk	■
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Biological Storage	
ARCHITECTURAL	
Floor	
Resilient	
Welded Seam Sheet Vinyl	
Epoxy	
Insulated Panels	■
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	
Insulated Panels	■
Base	
4" Vinyl	
Integral w/floor	
Ceiling	
Insulated Panels	■
Acoustic Tile	
Gyp Board, Epoxy Paint	
Min. Height	
Doors	
3' x 7'	■
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	■
Sliding Door	
Card Key Access	
Natural Daylight	
CASEWORK	
Cabinets	
St. Stl.	
Wood	
Metal	■
Plastic Laminate	
Countertops	
St. Stl.	■
Epoxy	
Plastic Laminate	

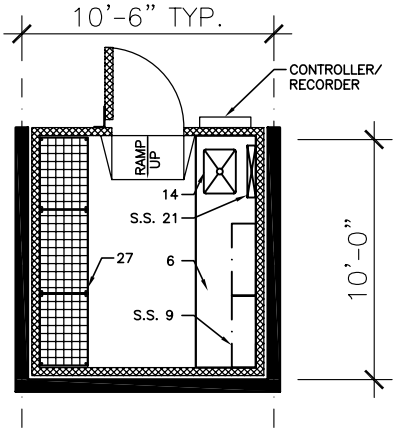
REMARKS:

1. 4°C ± 1°C
2. Floor sink for condensation drainage.

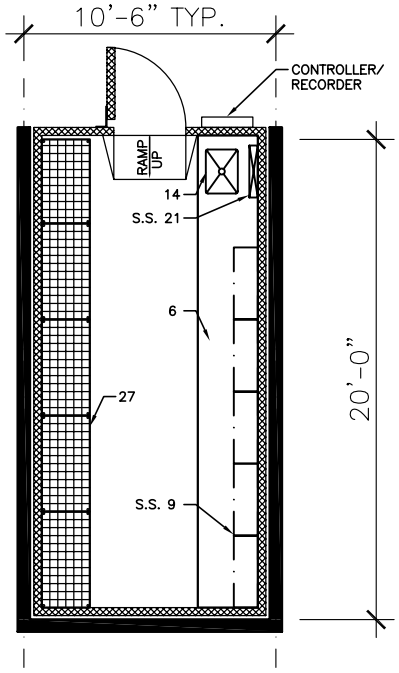
SPACE DIAGRAM

SPACE NAME: CONTROLLED TEMPERATURE ROOM
SPACE ID: 2.03 A/ 2.03B
AREA: 105 NSF EACH/ 210 NSF EACH

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



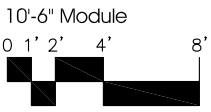
TYPE A



TYPE B

FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Exhaust Port
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. Ceiling Service Panel
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



ROOM DATA SHEET

RFD

SPACE NAME: **INSTRUMENT ROOM**
SPACE ID: **2.05**

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	
MECHANICAL	
Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
8 Minimum Air Changes/Hour	
6 Minimum Air Changes/Hour	■
4 Minimum Air Changes/Hour	
100% Make-up Air	■
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	■
Air Filtration/Supply	
HOODS/ EXHAUST DEVICES	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Student Station Exhaust	
Other	
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)	
High Purity Water (PW)	
Chilled Water (CHW S/R)	
Steam	
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	
DC Power	
Standby Power	■
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
70 fc at bench/desk	■
60 fc at bench/desk	
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

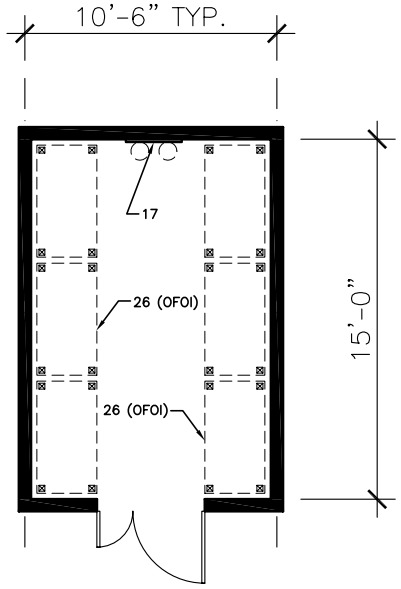
CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Biological Storage	
ARCHITECTURAL	
Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Other	
Partitions	
Gyp Board, Epoxy Paint	■
Gyp Board, Paint	
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	■
Gyp Board, Epoxy Paint	
Min. Height	9'-0"
Doors	
3' x 7'	
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	
CASEWORK	
Cabinets	
St. Stl.	
Wood	
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	

REMARKS:

SPACE DIAGRAM

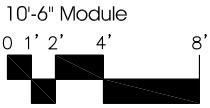
SPACE NAME: **INSTRUMENT ROOM**
SPACE ID: **2.05**
AREA: **157.5 NSF EACH**

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



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Exhaust Port
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. Ceiling Service Panel
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



ROOM DATA SHEET

RFD

SPACE NAME: CELL CULTURE ROOM
SPACE ID: 2.06

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	
MECHANICAL	
Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
8 Minimum Air Changes/Hour	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
100% Make-up Air	■
Recirculated Air	
Air Pressure Positive	■
Air Pressure Negative	
Air Filtration/Supply	HEPA
HOODS/ EXHAUST DEVICES	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	Note 1
Snorkel	
Canopy Hood	
Student Station Exhaust	
Other	
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)	
High Purity Water (PW)	■
Chilled Water (CHW S/R)	
Steam	
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	
DC Power	
Standby Power	■
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
70 fc at bench/desk	■
60 fc at bench/desk	
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	■
Carcinogens/Regulated	■
Biological Storage	■
ARCHITECTURAL	
Floor	
Resilient	
Welded Seam Sheet Vinyl	■
Epoxy	
Other	
Partitions	
Gyp Board, Epoxy Paint	■
Gyp Board, Paint	
Other	
Base	
4" Vinyl	
Integral w/floor	■
Ceiling	
Open	
Acoustic Tile	■
Gyp Board, Epoxy Paint	■
Min. Height	9'-0"
Doors	
3' x 7'	
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	■
Vision Panel	■
Sliding Door	
Card Key Access	
Natural Daylight	
CASEWORK	
Cabinets	
St. Stl.	
Wood	
Metal	■
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	■
Plastic Laminate	

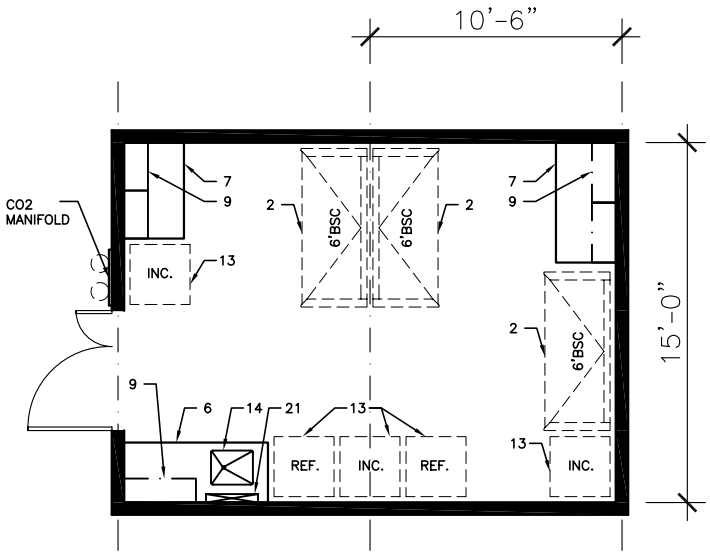
REMARKS:

1. (3) 6'-0" Biological safety cabinets - Class II

SPACE DIAGRAM

SPACE NAME: CELL CULTURE ROOM
SPACE ID: 2.06
AREA: 315 NSF EACH

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



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Exhaust Port
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. Ceiling Service Panel
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'-6" Module
0 1' 2' 4' 8'

ROOM DATA SHEET

RFD

SPACE NAME: DARKENABLE SUPPORT ROOMS
SPACE ID: 2.07

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	
MECHANICAL	
Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
8 Minimum Air Changes/Hour	
6 Minimum Air Changes/Hour	■
4 Minimum Air Changes/Hour	
100% Make-up Air	■
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	■
Air Filtration/Supply	
HOODS/ EXHAUST DEVICES	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Student Station Exhaust	
Other	
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)	
High Purity Water (PW)	
Chilled Water (CHW S/R)	
Steam	
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	
DC Power	
Standby Power	
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	■
Task Lighting	
Lighting Level	
70 fc at bench/desk	■
60 fc at bench/desk	
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	■
Zoned Lighting	
Other	Note 1

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Biological Storage	
ARCHITECTURAL	
Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Other	
Partitions	
Gyp Board, Epoxy Paint	■
Gyp Board, Paint	
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Epoxy Paint	■
Min. Height	9'-0"
Doors	
3' x 7'	
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	■
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	X
CASEWORK	
Cabinets	
St. Stl.	
Wood	
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	

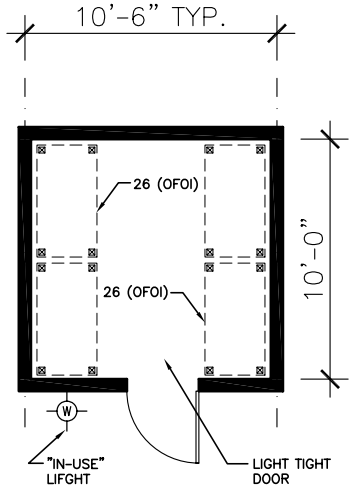
REMARKS:

1. Dimmable incandescent fixtures required.

SPACE DIAGRAM

SPACE NAME: DARKENABLE SUPPORT ROOMS
SPACE ID: 2.07
AREA: 105 NSF EACH

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



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Exhaust Port
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. Ceiling Service Panel
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'-6" Module
0 1' 2' 4' 8'

ROOM DATA SHEET

RFD

SPACE NAME: **AUTOCLAVE ROOM**
SPACE ID: **2.08**

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	

MECHANICAL

Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
8 Minimum Air Changes/Hour	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
100% Make-up Air	■
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	■
Air Filtration/Supply	

HOODS/ EXHAUST DEVICES

Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	Note 1
Student Station Exhaust	
Other	

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)	
High Purity Water (PW)	■
Chilled Water (CHW S/R)	
Steam	■
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	
DC Power	
Standby Power	
UPS (OFOI)	
Phone	■
Data - Jacks	
Data - Wireless	
In Use Light	
Task Lighting	
Lighting Level	
70 fc at bench/desk	■
60 fc at bench/desk	
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

CHEMICALS

Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Biological Storage	

ARCHITECTURAL

Floor	
Resilient	
Welded Seam Sheet Vinyl	
Epoxy	■
Other	
Partitions	
Gyp Board, Epoxy Paint	■
Gyp Board, Paint	
Other	
Base	
4" Vinyl	
Integral w/floor	■
Ceiling	
Open	
Acoustic Tile	■
Gyp Board, Epoxy Paint	■
Min. Height	9'-0"
Doors	
3' x 7'	
(3'+1'-6") x 7'	■
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	

CASEWORK

Cabinets	
St. Stl.	
Wood	
Metal	■
Plastic Laminate	
Countertops	
St. Stl.	■
Epoxy	
Plastic Laminate	

REMARKS:

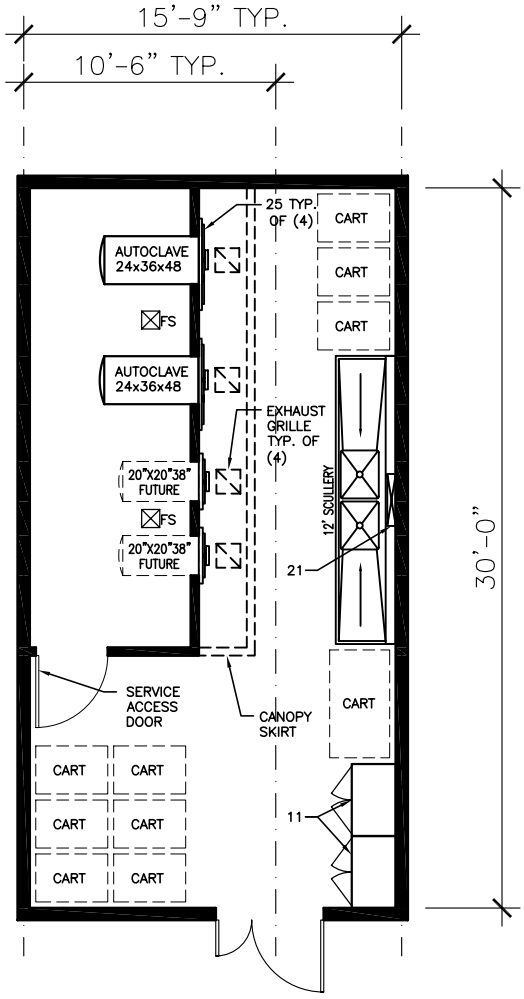
1. GWB exhaust soffit canopy over autoclaves

* Verify water quality requirements for autoclaves.

SPACE DIAGRAM

SPACE NAME: AUTOCLAVE ROOM
SPACE ID: 2.08
AREA: 472.5 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

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Exhaust Port
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. Ceiling Service Panel
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'-6" Module
0 1' 2' 4' 8'

ROOM DATA SHEET

RFD

SPACE NAME: FLUORESCENCE-ACTIVATED CELL SORTING (FACS) ROOM
SPACE ID: 2.10

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	

MECHANICAL

Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
8 Minimum Air Changes/Hour	
6 Minimum Air Changes/Hour	■
4 Minimum Air Changes/Hour	
100% Make-up Air	■
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	■
Air Filtration/Supply	

HOODS/ EXHAUST DEVICES

Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Student Station Exhaust	
Other	

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)	
High Purity Water (PW)	
Chilled Water (CHW S/R)	
Steam	
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	
DC Power	
Standby Power	■
UPS (OFOI)	■
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
70 fc at bench/desk	■
60 fc at bench/desk	
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	■
Zoned Lighting	
Other	

CHEMICALS

Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Biological Storage	

ARCHITECTURAL

Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Other	
Partitions	
Gyp Board, Epoxy Paint	■
Gyp Board, Paint	
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	■
Gyp Board, Epoxy Paint	
Min. Height	9'-0"
Doors	
3' x 7'	■
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	

CASEWORK

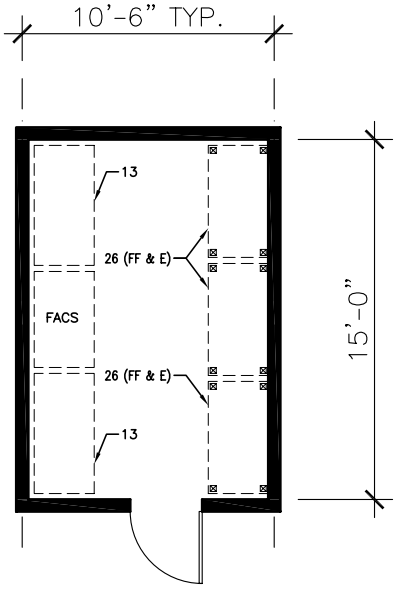
Cabinets	
St. Stl.	
Wood	
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	

REMARKS:

SPACE DIAGRAM

SPACE NAME: FACS
SPACE ID: 2.10
AREA: 157.5 NSF EACH

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



FURNISHINGS

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Exhaust Port
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. Ceiling Service Panel
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'-6" Module
0 1' 2' 4' 8'

ROOM DATA SHEET

RFD

SPACE NAME: CONFOCAL MICROSCOPY ROOM
SPACE ID: 2.11

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	

MECHANICAL

Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
8 Minimum Air Changes/Hour	
6 Minimum Air Changes/Hour	■
4 Minimum Air Changes/Hour	
100% Make-up Air	■
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	■
Air Filtration/Supply	

HOODS/ EXHAUST DEVICES

Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Student Station Exhaust	
Other	

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)	
High Purity Water (PW)	
Chilled Water (CHW S/R)	■
Steam	
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	
DC Power	
Standby Power	
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
70 fc at bench/desk	■
60 fc at bench/desk	
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	■
Zoned Lighting	
Other	

CHEMICALS

Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Biological Storage	

ARCHITECTURAL

Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Other	
Partitions	
Gyp Board, Epoxy Paint	■
Gyp Board, Paint	
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	■
Gyp Board, Epoxy Paint	
Min. Height	9'-0"
Doors	
3' x 7'	
(3'+1'-6") x 7'	■
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	

CASEWORK

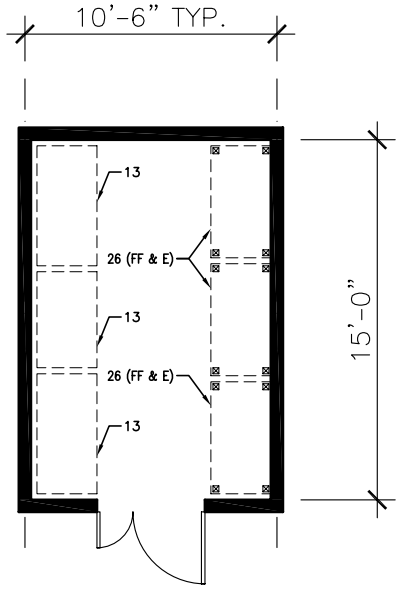
Cabinets	
St. Stl.	
Wood	■
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	■
Plastic Laminate	

REMARKS:

SPACE DIAGRAM

SPACE NAME: CONFOCAL MICROSCOPY ROOM
SPACE ID: 2.11
AREA: 157.5 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

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Exhaust Port
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. Ceiling Service Panel
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'-6" Module
0 1' 2' 4' 8'

ROOM DATA SHEET

RFD

SPACE NAME: FREEZER FARM/CRYOGENICS STORAGE
SPACE ID: 2.14

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	■

MECHANICAL

Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
8 Minimum Air Changes/Hour	
6 Minimum Air Changes/Hour	■
4 Minimum Air Changes/Hour	
100% Make-up Air	■
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	■
Air Filtration/Supply	

HOODS/ EXHAUST DEVICES

Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Student Station Exhaust	
Other	

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)	
High Purity Water (PW)	
Chilled Water (CHW S/R)	
Steam	
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	
DC Power	
Standby Power	■
UPS (OFOI)	
Phone	
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
70 fc at bench/desk	
60 fc at bench/desk	■
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

CHEMICALS

Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Biological Storage	

ARCHITECTURAL

Floor	
Resilient	
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	■
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	■
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	■
Gyp Board, Epoxy Paint	
Min. Height	9'-0"
Doors	
3' x 7'	
(3'+1'-6") x 7'	■
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	

CASEWORK

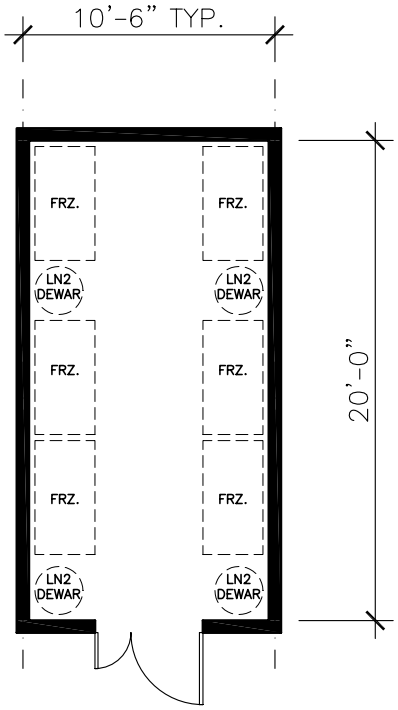
Cabinets	
St. Stl.	
Wood	
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	

REMARKS:

SPACE DIAGRAM

SPACE NAME: **FREEZER FARM/ CRYOGENICS STORAGE**
SPACE ID: **2.14**
AREA: **210 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

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Exhaust Port
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. Ceiling Service Panel
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'-6" Module
0 1' 2' 4' 8'

ROOM DATA SHEET

SPACE NAME:Faculty Office
SPACE ID: 3.01, 3.02

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	

MECHANICAL

Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
2 Minimum Air Changes/Hour	■
100% Make-up Air	
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	
Air Filtration/Supply	

PLUMBING

Potable Hot Water (HW)	
Potable Cold Water (CW)	

ELECTRICAL

110V, 20A, 1 Phase	2
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
DC Power	
Standby Power	
UPS (OFOI)	
Phone	2
Data - Jacks	2
Data - Wireless	■
In Use Light	
Task Lighting	■
Lighting Level	
60 fc at bench/desk	
30 fc at bench/desk	■
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

ARCHITECTURAL

Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Polished Concrete	
Other	
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	■
Systems furniture panels	
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	■
Acoustic Tile	
Suspended metal screen	
Gyp Board, Paint	
Min. Height	*9'-0"*
Doors	
3' x 7'	■
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	■
Natural Daylight	■

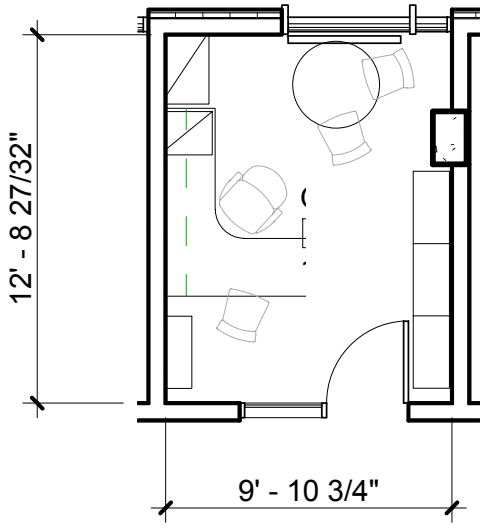
CASEWORK

Cabinets	
St. Stl.	
Wood	
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	
Solid Surface	
Tack board	
White board	

REMARKS:

ROOM DATA SHEET

SPACE NAME:Faculty Office
SPACE ID: 3.01, 3.02



ROOM DATA SHEET

SPACE NAME: Post Docs/ Bioinformatics - open offices
SPACE ID: 3.03/1.03

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	

MECHANICAL

Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
2 Minimum Air Changes/Hour	■
100% Make-up Air	
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	
Air Filtration/Supply	

PLUMBING

Potable Hot Water (HW)	
Potable Cold Water (CW)	

ELECTRICAL

110V, 20A, 1 Phase	■
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
DC Power	
Standby Power	
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	■
Lighting Level	
60 fc at bench/desk	
30 fc at bench/desk	■
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	■
Other	

ARCHITECTURAL

Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Polished Concrete	
Other	
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	
Systems furniture panels	■
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	
Suspended metal screen	■
Gyp Board, Paint	
Min. Height	*9'-0"*
Doors	
3' x 7'	
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	■

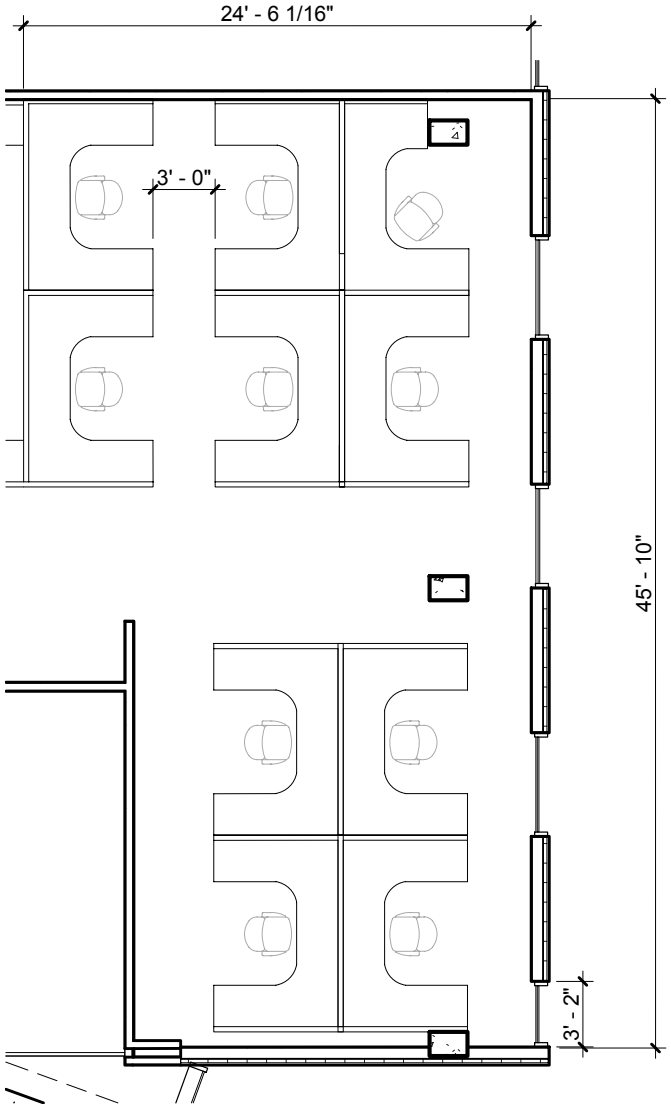
CASEWORK

Cabinets	
St. Stl.	
Wood	
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	
Tack board	
White board	

REMARKS:

ROOM DATA SHEET

SPACE NAME: Post Docs/ Bioinformatics - open offices
SPACE ID: 3.03/1.03



ROOM DATA SHEET

SPACE NAME: Administrative Support
SPACE ID: 3.05

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	

MECHANICAL

Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
2 Minimum Air Changes/Hour	■
100% Make-up Air	
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	
Air Filtration/Supply	

PLUMBING

Potable Hot Water (HW)	
Potable Cold Water (CW)	

ELECTRICAL

110V, 20A, 1 Phase	■
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
DC Power	
Standby Power	
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	■
Lighting Level	
60 fc at bench/desk	
30 fc at bench/desk	■
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	■
Other	

ARCHITECTURAL

Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Polished Concrete	
Other	
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	
Systems furniture panels	■
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	
Suspended metal screen	■
Gyp Board, Paint	
Min. Height	*9'-0"*
Doors	
3' x 7'	
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	■

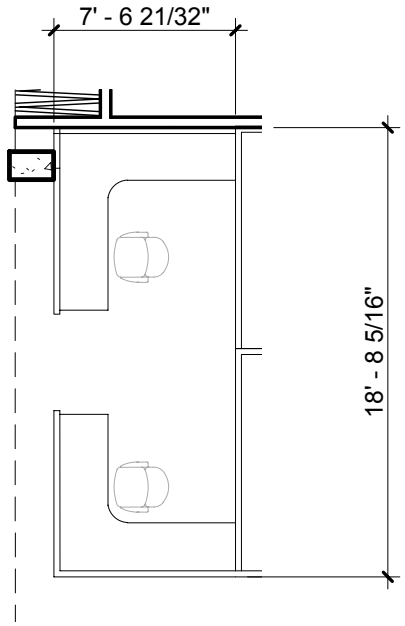
CASEWORK

Cabinets	
St. Stl.	
Wood	
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	
Tack board	
White board	

REMARKS:

ROOM DATA SHEET

SPACE NAME: Administrative Support
SPACE ID: 3.05



ROOM DATA SHEET

SPACE NAME: Mail Room
SPACE ID: 3.06

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	

MECHANICAL

Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
2 Minimum Air Changes/Hour	■
100% Make-up Air	
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	
Air Filtration/Supply	

PLUMBING

Potable Hot Water (HW)	
Potable Cold Water (CW)	

ELECTRICAL

110V, 20A, 1 Phase	■
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
DC Power	
Standby Power	
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
60 fc at bench/desk	
30 fc at bench/desk	■
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

ARCHITECTURAL

Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Polished Concrete	
Other	
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	■
Systems furniture panels	
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Paint	
Suspended metal screen	■
Min. Height	*9'-0"*
Doors	
3' x 7'	
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	

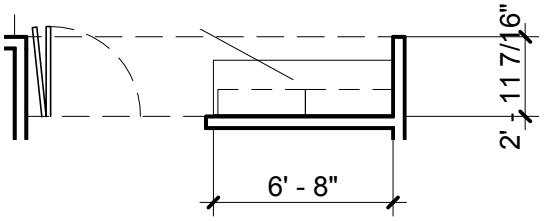
CASEWORK

Cabinets	
St. Stl.	
Wood	■
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	
Solid Surface	■
Tack board	
White board	

REMARKS:
131 adjustable mail slots

ROOM DATA SHEET

SPACE NAME: Mail Room
SPACE ID: 3.06



ROOM DATA SHEET

SPACE NAME: Copy/ Work Room
SPACE ID: 3.07

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	

MECHANICAL

Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
2 Minimum Air Changes/Hour	■
100% Make-up Air	
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	
Air Filtration/Supply	

PLUMBING

Potable Hot Water (HW)	
Potable Cold Water (CW)	

ELECTRICAL

110V, 20A, 1 Phase	■
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	■
DC Power	
Standby Power	
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
60 fc at bench/desk	
30 fc at bench/desk	■
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

ARCHITECTURAL

Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Polished Concrete	
Other	
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	■
Systems furniture panels	
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	
Suspended metal screen	
Gyp Board, Paint	■
Min. Height	*9'-0"*
Doors	
3' x 7'	
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	

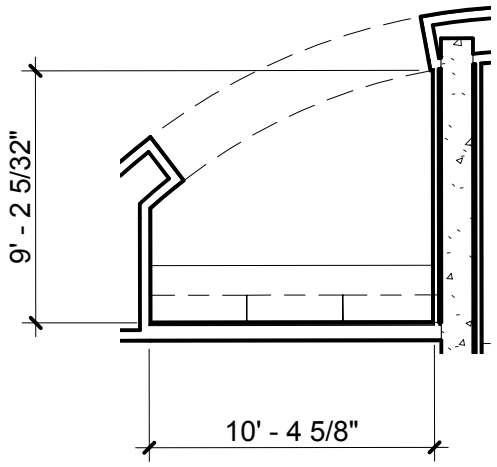
CASEWORK

Cabinets	
St. Stl.	
Wood	■
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	
Solid Surface	■
Tack board	■
White board	

REMARKS:

ROOM DATA SHEET

SPACE NAME: Copy/ Work Room
SPACE ID: 3.07



ROOM DATA SHEET

SPACE NAME: Seminar Room
SPACE ID: 3.08

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	

MECHANICAL

Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
2 Minimum Air Changes/Hour	■
100% Make-up Air	
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	
Air Filtration/Supply	

PLUMBING

Potable Hot Water (HW)	
Potable Cold Water (CW)	

ELECTRICAL

110V, 20A, 1 Phase	2
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
DC Power	
Standby Power	
UPS (OFOI)	
Phone	2
Data - Jacks	2
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
60 fc at bench/desk	
30 fc at bench/desk	■
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	■
Zoned Lighting	■
Other	*note 1*

ARCHITECTURAL

Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Other - carpet	
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	■
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	
Suspended metal screen	■
Gyp Board, Paint	
Min. Height	*9'-0"*
Doors	
3' x 7'	■
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door (Folding)	■
Card Key Access	
Natural Daylight	■

CASEWORK

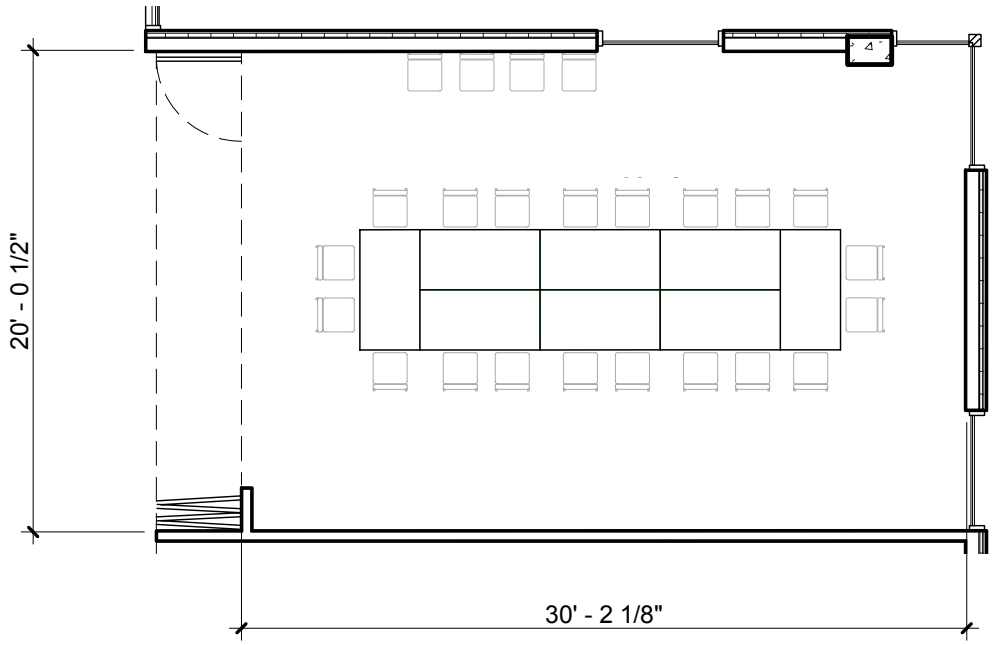
Cabinets	
St. Stl.	
Wood	
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	
Tack board	■
White board	■

REMARKS:

Note 1: Recessed electronic projection screen, ceiling mountedprojector
Table & chairs for 20-24 people

ROOM DATA SHEET

SPACE NAME: Seminar Room
SPACE ID: 3.08



ROOM DATA SHEET

SPACE NAME: Conference Room
SPACE ID: 3.09

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	
MECHANICAL	
Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
2 Minimum Air Changes/Hour	■
100% Make-up Air	
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	
Air Filtration/Supply	
PLUMBING	
Potable Hot Water (HW)	
Potable Cold Water (CW)	

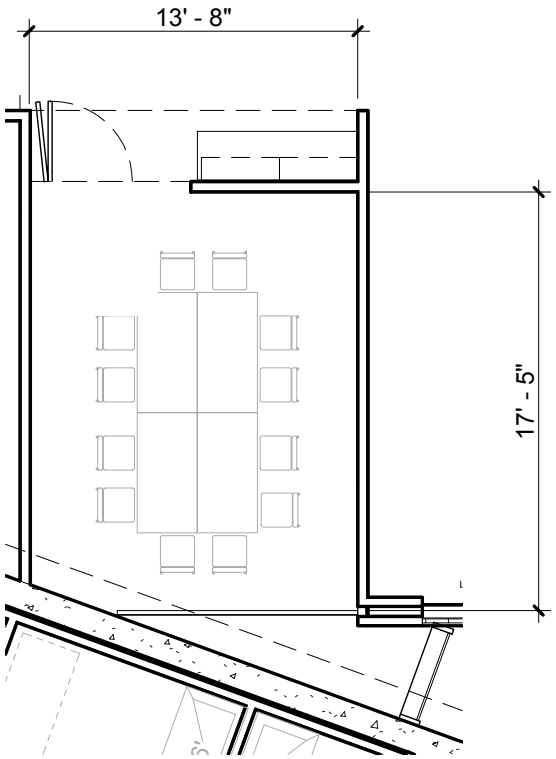
ELECTRICAL	
110V, 20A, 1 Phase	■
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
DC Power	
Standby Power	
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
60 fc at bench/desk	
30 fc at bench/desk	■
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	■
Zoned Lighting	
Other	*note 1*

ARCHITECTURAL	
Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Other - carpet	
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	■
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Paint	
Suspended metal screen	■
Min. Height	*9'-0"*
Doors	
3' x 7'	■
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	
CASEWORK	
Cabinets	
St. Stl.	
Wood	
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	
Tack board	■
White board	■

REMARKS:
Note 1: Recessed electronic projection screen, ceiling mountedprojector
Table & chairs for 10-12 people

ROOM DATA SHEET

SPACE NAME: Conference Room
SPACE ID: 3.09



ROOM DATA SHEET

SPACE NAME: Conference/ Activity Space
SPACE ID: 3.10

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	

MECHANICAL

Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
2 Minimum Air Changes/Hour	■
100% Make-up Air	
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	
Air Filtration/Supply	

PLUMBING

Potable Hot Water (HW)	■
Potable Cold Water (CW)	■
Plumbed coffee	■

ELECTRICAL

110V, 20A, 1 Phase	■
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
DC Power	
Standby Power	
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
60 fc at bench/desk	
30 fc at bench/desk	■
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

ARCHITECTURAL

Floor	
Resilient	
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Polished Concrete	
Other	■
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	
Systems furniture panels	
Other	■
Base	
4" Vinyl	
Integral w/floor	■
Ceiling	
Open	■
Acoustic Tile	
Suspended metal screen	
Gyp Board, Paint	
Min. Height	
Doors	
3' x 7'	
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	■

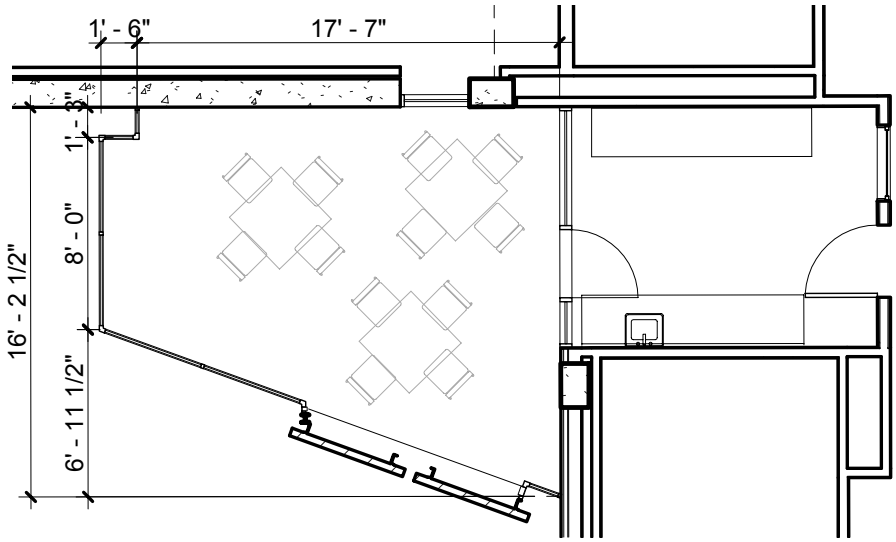
CASEWORK

Cabinets	
St. Stl.	
Wood	
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	
Solid Surface	
Tack board	■
White board	

REMARKS:

ROOM DATA SHEET

SPACE NAME: Conference/ Activity Space
SPACE ID: 3.10



ROOM DATA SHEET

SPACE NAME: Coffee/ Activity Space
SPACE ID: 3.11

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	

MECHANICAL

Temperature	
72°F ± 2°F	
68°-75° ± 2°F	■
Other	
Humidity	
50% ± 20%	
Uncontrolled	■
6 Minimum Air Changes/Hour	
4 Minimum Air Changes/Hour	
2 Minimum Air Changes/Hour	■
100% Make-up Air	
Recirculated Air	
Air Pressure Positive	
Air Pressure Negative	
Air Filtration/Supply	

PLUMBING

Potable Hot Water (HW)	■
Potable Cold Water (CW)	■
Plumbed coffee	■

ELECTRICAL

110V, 20A, 1 Phase	■
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
DC Power	
Standby Power	
UPS (OFOI)	
Phone	■
Data - Jacks	■
Data - Wireless	■
In Use Light	
Task Lighting	
Lighting Level	
60 fc at bench/desk	
30 fc at bench/desk	■
Safe Light (Darkroom Light)	
Laser Warning Lights	
Blackout Capability	
Zoned Lighting	
Other	

ARCHITECTURAL

Floor	
Resilient	■
Welded Seam Sheet Vinyl	
Epoxy	
Carpet	
Polished Concrete	
Other	
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	■
Systems furniture panels	
Other	
Base	
4" Vinyl	■
Integral w/floor	
Ceiling	
Open	
Acoustic Tile	
Suspended metal screen	
Gyp Board, Paint	■
Min. Height	*9'-0"*
Doors	
3' x 7'	
(3'+1'-6") x 7'	
(3' + 3') x 7'	
3'-6" X 7'	
Vision Panel	
Sliding Door	
Card Key Access	
Natural Daylight	

CASEWORK

Cabinets	
St. Stl.	
Wood	■
Metal	
Plastic Laminate	
Countertops	
St. Stl.	
Epoxy	
Plastic Laminate	
Solid Surface	■
Tack board	■
White board	

REMARKS:

ROOM DATA SHEET

SPACE NAME: Coffee/ Activity Space
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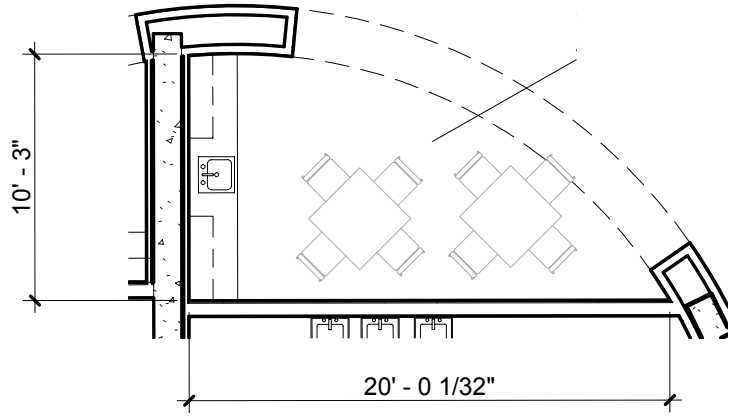


4.0 Site Analysis

4.1 Campus Planning Context

Campus Aerial View

The proposed site for the Health Sciences Surge Building is located southwest of Picnic Hill on the site of the obsolete Entomology Building and Insectary, and is within the College of Natural and Agricultural Sciences (CNAS) development zone of the East Campus Academic Core. On the north side of the site is Boyden Hall and SPI, identified to be demolished in the context of future development. On the west edge is the new Entomology Building, and on the east is the Insectary & Quarantine Facility. To the south is the Entomology Research Museum.

Building proposals must be consistent with the LRDP land use patterns and must be individually approved after review by the Design Review Board (DRB), Chancellor, the UC Office of the President, and The Regents.

4.2 LRDP Goals

The summary of the LRDP goals that apply to the Health Sciences Surge Building include the following:

- Continue to develop academic excellence in teaching, research and public service.
- Continue to develop a theme of entering main campus areas and buildings through arcades, porticos, vestibules, courtyards, and terraces.
- Maintain a cohesive framework of landscape malls and walkways to tie together campus land uses and academic precincts.
- Strengthen and clarify vehicular, bicycle, and pedestrian circulation patterns.
- Separate service and utility areas from major pedestrian entries.

4.3 Site

This site and an alternative site (Parking Lot #13) were evaluated in the design process. This site was best suited for the Health Sciences Surge Building primarily due to its proximity to the new Campus Vivarium (to be located in the new Psychology Building, under construction), Core Instrumentation Facility in Batchelor, and other research facilities (Genomics, Entomology, Biological Sciences). The site area is approximately 60,000 sf, or about 1.4 acres, and there is a grade differential of approximately 20 feet from west to east.

1 View to the South along future Science Walk with Genomics under construction on the right.

2 View to the north along future Science Walk with Anderson Hall on the left.

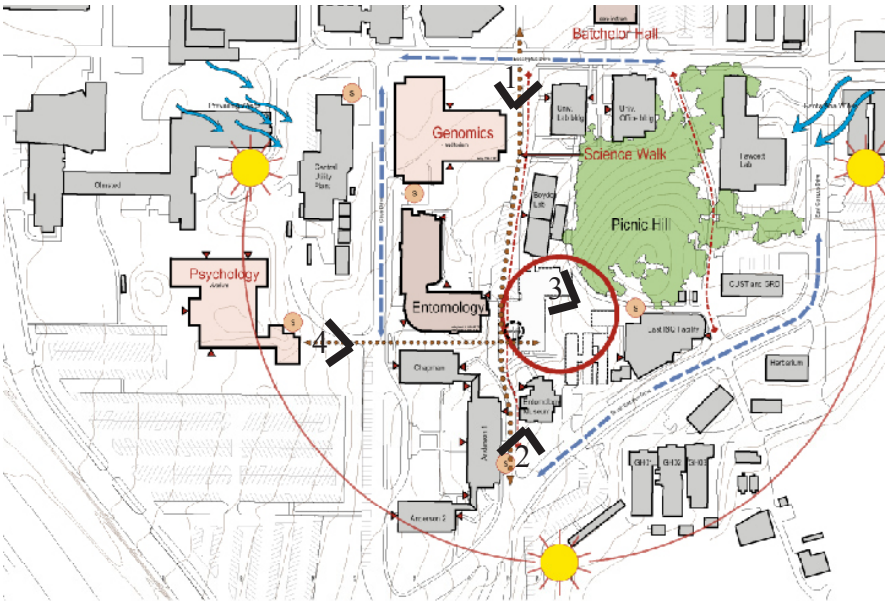
3 View to the east from the proposed site, Insectary & Quarantine service area. Small building in the foreground to be demolished.

4 View of proposed site from Psychology Building looking east.

Indicates location of proposed Health Sciences Surge Building

See following diagram for location of photographs

An air quality assessment report is being undertaken to evaluate the building exhaust in relationship to the surrounding areas. That report will be completed in conjunction with the associated California Environmental Quality Act (CEQA) review process for this project.



Site Analysis

4.4 Vehicular Circulation and Parking

The LRDP Vehicular Circulation Map shows Eucalyptus Drive as pedestrian, with limited access service in the future, providing access only for the campus shuttle, emergency and service vehicles. A portion of Citrus Drive north of the service for the Entomology and Genomics buildings is also shown to be limited access for vehicles. This agrees with a proposed traffic mitigation plan currently in draft stages. Currently, both Citrus and Eucalyptus Drives are open to all vehicular traffic, except for those portions closed for construction of the Genomics Building.

The LRDP identifies that existing parking spaces may be demolished for new buildings within the academic core, and new parking lots will be developed at the edges of the East and West Campus Academic Cores. The anticipated need for visitor parking to this building will be accommodated in the existing parking lot #6 to the west. ADA parking will be provided in the service area and/or near the building entry along Science Walk.

4.5 Pedestrian Circulation

The LRDP Pedestrian Circulation Map identifies the proposed Science Walk on the west. The new Genomics Building emphasizes this north-south pedestrian route from the Carillon Mall to new campus development to the south. The Health Sciences Surge Building will further strengthen the framework for the development of a future Science Walk as it passes to the south, past the Entomology Building. The new building will also create a more open access to Picnic Hill.

4.6 Utilities

The required services will include sewer, storm drain, potable water and fire protection. Natural gas, telecommunication, chilled water, steam and steam condensate will be served by a utility tunnel that originates from the campus central plant. The central chilled water plant was at or near capacity. The satellite chiller plant has augmented capacity.

The sanitary sewer, storm drain and water service systems shall be designed in accordance with current engineering practices and all applicable Codes, Standards and Authorities having jurisdiction, including but not limited to the Uniform Plumbing Code, Riverside County Fire Department Standards, State Marshal Standards, Campus Fire Marshal, and University Design and Construction practice.

All existing facilities in the vicinity, such as Biological Sciences Building, Entomology Building, and Boyden Labs, shall remain operational during demolition, removal, relocation and installation of all proposed site utilities.

An ongoing campus infrastructure project will extend the required utility lines from Citrus Drive or along Science Walk to an area immediately adjacent to the Health Sciences Surge Building's west side.

4.7 Soils and Grading

A soils report and foundation recommendation was prepared for the Entomology Building in 1998 by CMJ Inc. (1355 E. Cooley Dr., Colton, CA 92324-3954) and it recommends that spread footings be used. Further soils testing and study for the site should be undertaken early in the next design phase of this building to confirm specific requirements.

A new soils report is being conducted at this time and will be ready, with foundation recommendations early in the Health Sciences Surge Building design process.

An updated topographic and utility survey is also being prepared. This information will be used to guide the demolition and excavation of the vacated Entomology and Insectary structures, in order to provide a site that is graded and prepared as a working pad for the proposed new Health Sciences Surge Building design.

4.8 Campus Service Group Issues

The Campus Service Groups were given a presentation for the proposed program and pre-design concept and asked for input in the planning process. During the schematic design and design development phases of the project, the Campus Service Groups will be consulted in more detail about their areas of responsibility. The LRDP and UCR Physical Plant guidelines and the following general criteria will be met.

Physical Plant and Utilities

Systems shall follow the UCR Campus Standards, where applicable. Access should be maintained to major mechanical and electrical equipment. The design should maintain flexibility to accommodate changes in the use of the building. Utility locations and sizes should be confirmed with the Office of Design and Construction, or Physical Plant.

Materials Management

Access must be maintained for service and deliveries to the Insectary & Quarantine Building. Door widths from the dock to the building, and building corridors, should be wide enough to accommodate large pieces of equipment.

Communications (voice/data systems)

UCR Computing and Communications standards for communications will include adequate data outlets in the labs and offices. Provide four 4" conduits from the main telecom room to the point of connection developed on the west side of the site.

Emergency Vehicle Access

The campus has developed an approved plan for emergency vehicle access, and the proposed site has a designated emergency vehicle access route that must be maintained. All emergency vehicle access routes are to be kept open during and after construction. Emergency vehicle access and turnaround are to be included in the Service Area shared with the Insectary & Quarantine facility.

Parking and Circulation

Service vehicle parking is included in this DPP at the loading docks only. No parking displacement is foreseen as part of this project.

Special Services (Disabled Students and Staff)

Accessibility standards are to be met for this project (CCR Title 24). The *Americans with Disabilities Act* (ADA) provides the standard guidelines used by the campus for accessibility. Design solutions for the site and building must follow guideline requirements for accessibility. A provision for accessible parking stalls will be made on the east side of the building.

Security

Provisions for security cameras and CCTV are addressed in this DPP. The project will use the Campus Standard for controlled access throughout.

4.9 Site Planning Principles

The Project Management Team adopted the following principles for the site:

- Develop clear pedestrian connections to support facilities in Genomics, Entomology and Psychology buildings.
- Share service access with Insectary & Quarantine Building.
- Minimize the site development area and excavation.
- Utility service for the new Health Sciences Surge Building to be provided by the Campus Utility Upgrade projects.

Health Sciences Surge Building Plan

- Old Entomology and Insectary Buildings will be removed in the near future—Boyden and SPI will eventually be removed.
- Campus service drive (and future pedestrian mall) from the north will pass by on the west side and continue to the south.
- Parking within the zone will be limited to campus service vehicles and ADA parking.
- Vehicular access will be limited to emergency vehicles and campus services.

Campus

- Support the LRDP goals and principles.
- Integrate and enhance Science Walk and the campus pedestrian circulation on the west.
- Provide access and visibility to Picnic Hill as a unique campus open space.
- Enhance the special quality of the UCR Campus landscape and courtyards.
- Maintain continuity of campus architectural character, quality, scale and materials.
- Support campus infrastructure and service systems.

The key site planning principles that have been identified through the DPP process are the product of the site analysis, and establish the criteria for planning and design.

Pedestrian Access

The majority of faculty and students will approach the building from the west of the site, from parking lot #6 on East Campus Drive. University pedestrian circulation is also from the north, along the current service drive/future “Science Walk”, and to a lesser degree from Citrus Drive . The pedestrian circulation routes create opportunities for courtyards, plazas, and focal points.

Courtyards

The LRDP recommends that all new buildings incorporate courtyards or terraces, functioning as outdoor rooms for individual buildings, where people naturally gather, near active areas such as entries. The character of the courtyard should relate to the specific building and should provide seating and shelter from winter winds and summer sun. The open courtyard space can be an agricultural demonstration space for the students and faculty. In addition, there are opportunities to create a hierarchy of private space to the public, and from the courtyard out to more campus-oriented plazas that connect to the campus pedestrian path systems.

Service

The service zone will be shared with Insectary & Quarantine, and will utilize the existing access driveway and service/delivery area.

5.0 Design Concept

5.1 Project Ideals

These project ideals speak to the uniqueness of this facility, and will become inherent in the design.

Utilitarian Building

The Health Sciences Surge Building is meant to deal with a range of institutional and departmental needs. It should be seen as a building that serves as a background to other structures in this precinct of the campus.

Flexible, Open Research Laboratories

The eventual users for the building are yet to be hired. The laboratories need to be a flexible generic layout with room for later customization and optimization by these transitional users. An open plan layout can be subdivided later and by providing "open" lab modules (1 out of 3), allows for later infill.

Quality to Attract and Retain Faculty

The basic layout provides high efficiency lab and support space in close proximity to office space in a convenient area of the campus. The proximity of other support facilities and the location in a quieter area of the original campus, with the opportunity for views of the nearby mountains, are all potential inducements to prospective faculty. The inherent flexibility of the initial plan layout, with open labs and centrally located support areas, also accommodates the expected changeover in occupants.

High-efficiency Laboratory Program

With shared lab support spaces in the interior core and support space located in the interceding circulation space, the lab portion of the building is highly efficient.

Sustainable Energy Efficient Design

The design will target a LEED Silver Equivalent rating and use 20% less energy than the levels allowed by CA Title 24.

5.2 Site Concepts

Proximity to Supporting Facilities

Develop clear and convenient connections to the Vivarium in the Psychology Building, the Bioinformatics data center and conference space in the Genomics Building, and the Core Instrumentation Facility in Bachelor Hall.

Building Siting Criteria

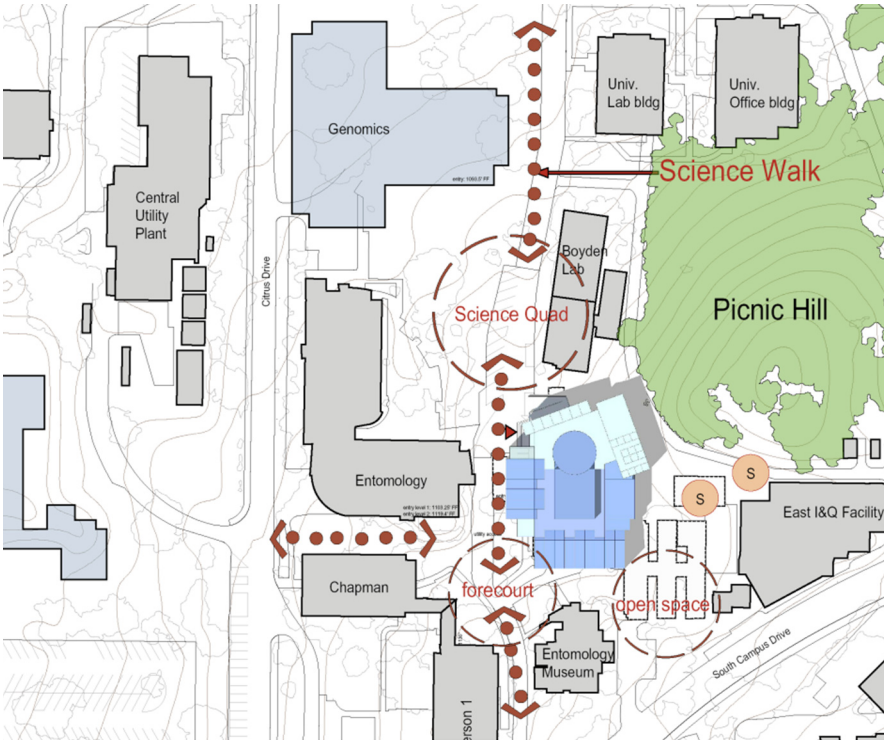
Site the building to respond to sun orientation, prevailing winds, topography and the program. Locate laboratories on the outside perimeter with views to the campus. Locate offices with views to the mountains to the north and to Picnic Hill. Use the public building functions and circulation as central organizing elements.

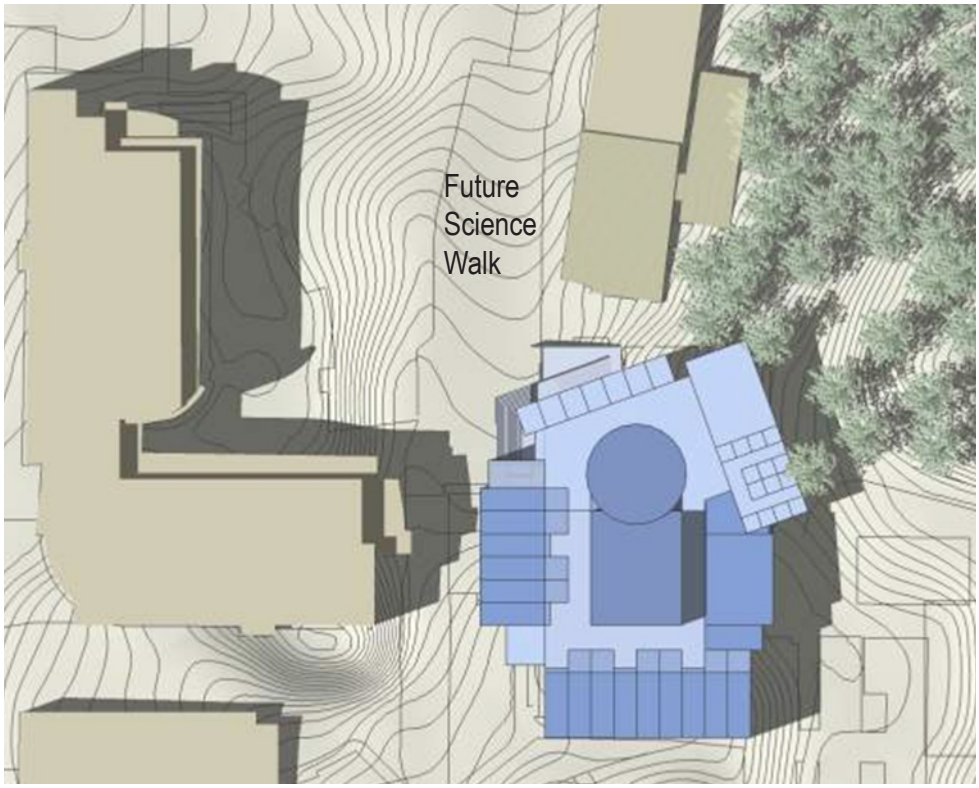
Old Entomology and Old Insectary Buildings and Block House will be removed prior to construction; Boyden and SPI will eventually be removed.

The Surge Building should respect the massing and proportions of the adjacent group of buildings and create a density that is appropriate to this site at the edge of the East Campus.

Service

Separate service from the main entries and screen the service area. Share the service area with the adjacent Insectary & Quarantine facility. Maintain emergency vehicle access from South Campus Drive.





Pedestrian and Vehicular Circulation

Reinforce the future development of a Science Walk pedestrian mall extending from the north along the east side of the Genomics Building and Entomology Building.

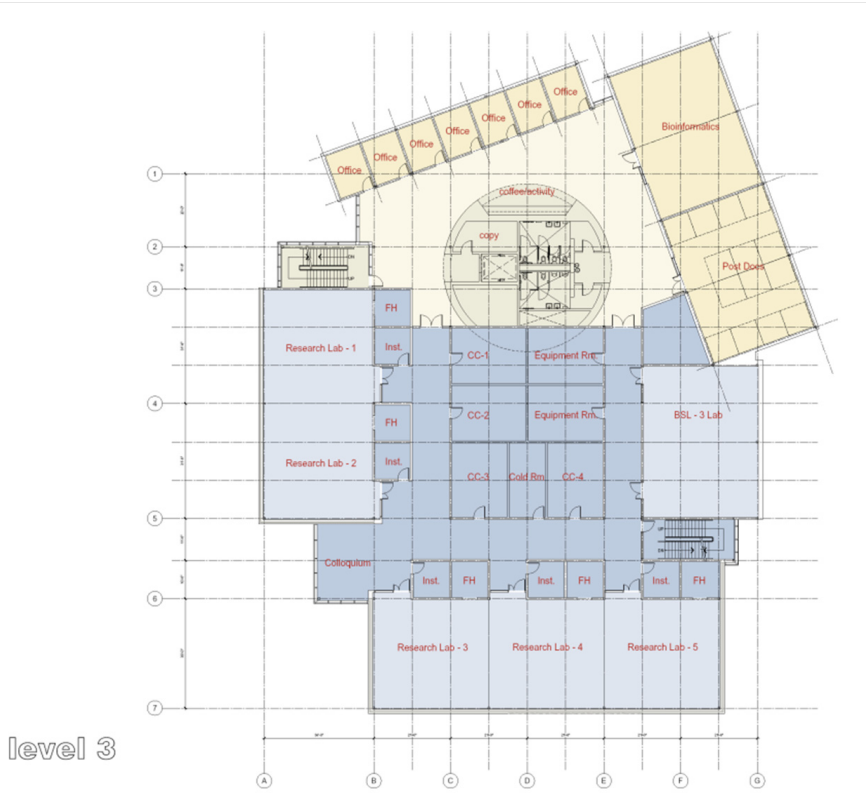
Parking and vehicular access within the project area will be limited to emergency and campus service vehicles and ADA. Enhance pedestrian circulation to the Picnic Hill area.

5.3 Building Design Concepts

Efficient Plan Layout

Maintain an efficient plan layout that maximizes future flexibility. This includes open plan laboratory suites with integral equipment corridors. Segregating core equipment and procedure spaces keeps them shared and highly utilized by the researchers.

Design interactive areas to maximize the opportunity for chance meetings and the interchange of ideas. Include elements such as places to sit, white boards and tack surfaces.



Stacking the research labs and office modules provides economies and flexibility within the building systems. Each floor should provide an average ratio of one faculty office to three research lab modules. The modules meet the need for flexibility, organization, scale and privacy. These diagrams illustrate the opportunities for modular arrangements reviewed by the DPP Project Steering Committee. The committee prefers office proximity to the labs, while maintaining the modular concept for flexibility and systems efficiencies.

Provide the capability to change and adapt to future space and technological needs. Maintain flexibility within the office zones by creating an office module that can satisfy the need for private offices, open offices and office support functions.

Create a building which supports campus planning guidelines and objectives. The Health Sciences Surge Building will, at the same time, be fully integrated into the campus through the use of colors, materials, and through building character, scale, massing and configuration.

Sustainability

Design the building to be sustainable over a long time frame. This includes providing a durable structure that is easily maintained and providing energy efficient equipment. It also includes minimizing lighting and HVAC loads by careful solar orientation of spaces.

Interior corridors should terminate at a window or glazed exit condition for access to natural light and campus views. Fenestration should be sized appropriately for solar orientation and to provide additional passive energy control.

5.4 Building Material Selection Goals

Provide a well-crafted building that respects and supports the campus context with entrances that are engaging and inviting.

Consistent with the Campus Design Guidelines, selection of building materials will be sensitive to the overall context of the campus as well as to the immediate surroundings of the building. Compatible exterior materials for site and building cladding, such as metal, concrete, and 'UCR Blend' brick, are being considered. The materials should be detailed so that the building will age gracefully, at a level of quality that meets or exceeds the campus design standards.

Compose the materials so the vision and scale of the elevations reflect the contextual patterns surrounding the project. Care should be taken to coordinate the scale of the exterior composition with the new and existing buildings.

Shield the building's mechanical features from primary view. Integrate screen walls into the massing composition.

5.5 Systems Descriptions

The Systems Descriptions (beginning in Appendix D) are the outline of the intended scope for each of the primary building systems under the general categories of Structural Engineering, Mechanical Engineering (including building plumbing), and Electrical Engineering.

6.0 Budget and Cost Plan

6.1 Basis of Cost Plan

This Cost Plan has been prepared for the purpose of developing a project budget. In certain areas, allowances have been established where the process did not allow detailed investigation. It is recommended that at the commencement of the design phase, all cost components be carefully reviewed.

Conditions of Construction

- A start date of January 2009.
- A construction period of 19 months.
- The project will be executed with a Construction Manager at Risk (CMAR) delivery method per UC guidelines.
- There will not be small business set aside requirements.
- The contractor will be required to pay prevailing wages.
- Construction will be phased as indicated.
- The general contractor will have full access to the site at regular construction hours.

6.2 Project Budget

	Build-out	**Initial Phase**
Total Construction Cost	$35,464,608	$24,871,450
Equipment	$ by UCR	$ by UCR
Indirect Construction Cost	$ by UCR	$ by UCR
TOTAL PROJECT COST	$ TBD	$ TBD

Build-out includes completion of all floors, including the BSL-3 suite (budgeted currently at a $1.2 million premium over typical open lab space). Lab benchwork is provided for 2/3 of lab modules which consists of the bench/table frames and top only. Lab casework in the lab support areas is largely user provided as illustrated on the Space Diagrams.

Initial Phase construction includes completion of the 60,000 gsf shell and core plus the completion of one floor. Two floors will remain in a “cold shell” condition, which is a raw, un-occupiable condition that can be completed with construction of interior partitions, finishes, mechanical/electrical/plumbing distribution and casework. The initial construction will include elevator and stair access to unfinished floors as well as utility services.

6.3 Inclusions

The project consists of a three-story laboratory building of approximately 60,000 gsf and 36,500 asf. The program includes research laboratories and support spaces, a BSL-3 lab, faculty offices and support spaces.

Foundations include reinforced concrete spread footings, elevator pits and subsurface drainage.

The building structure includes reinforced concrete retaining walls and shear walls, reinforced concrete columns, reinforced concrete suspended floor and roof decks, and allowances for mechanical equipment pads and miscellaneous metals and support framing.

Exterior cladding includes steel stud framing, exterior sheathing and insulation, brick veneer with precast concrete trim, interior painted gypsum board lining, aluminum framed insulated windows and curtain wall with low-e finish, aluminum glazed entry doors, hollow metal exit doors and cement plaster soffits. An allowance is also included for miscellaneous architectural trim and sun shading treatment.

Roofing and waterproofing includes waterproofing to elevator pit and retaining walls, rigid insulation under built-up roofing, roof flashings and miscellaneous sheet metal work, and an allowance for caulking and sealants.

Interior partitions include metal stud framing, batt insulation and painted gypsum board lining, wood doors in hollow metal frames, and interior glazing. The laboratory suites are open plan without demising walls.

Interior finishes include carpet, vinyl composition tile and sealed concrete floors to general areas, and ceramic tile at rest rooms. Allowances are included for bases and acoustic wall panels, with ceramic wall tile at rest rooms. Ceiling finishes include suspended acoustic tile and painted gypsum board, bulkheads and fascias.

Functional equipment to include general fixed building equipment such as toilet room accessories, signage, window blinds, fire extinguishers and cabinets, projection screens, markerboards and tackboards. Allowances are included for storage shelving and millwork, and non-laboratory cabinets and countertops. Also included are laboratory cabinets and countertops at 2/3 of the open lab modules, autoclaves, controlled temperature rooms and general laboratory

accessories. Fume hoods and bio-safety cabinets will be provided by UCR and are not included in this direct construction cost budget. (See cost plan for exclusions and special conditions).

Vertical transportation includes two interior stair flights and one hydraulic passenger/service elevator. Roof access is provided by the elevator.

Plumbing includes sanitary and institutional fixtures (installation and local connection only), floor drains, hose bibbs, water heating equipment, laboratory equipment and distribution pipework, including air, vacuum, natural gas, purified water, industrial hot and cold water, tepid water for safety stations, special gases, laboratory waste and vent and roof drainage.

Heating, ventilating and air conditioning includes campus fed chilled and steam systems, thermal expansion compensation and circulation equipment, pipework distribution including hot and chilled water, steam/condensate return, equipment cooling, air handling units, including exhaust ventilation, fan-coil units, terminal boxes and sound attenuation, as well as air distribution and return, including laboratory exhaust ventilation, building management and laboratory pressurization controls, and general/laboratory ventilation.

Electrical includes normal power generation and distribution, emergency power generation and distribution, machine and equipment and user convenience power and lighting, telephone/data, and audio/visual systems, MATV, fire alarms and security with minimal card-key access.

Fire protection includes a complete automatic wet sprinkler system to the general building and a preaction sprinkler system at the BSL-3.

Site preparation includes an allowance for general site clearing and rough grading and assumes preparation of an engineered building pad by separate contract prior to construction.

Site development includes allowances for hard and soft landscaping.

Site utilities include allowances for chilled water and steam, domestic and fire water, natural gas, sewer, power and telecommunications/signals. Allowances are based on utility connections within five feet of the building.

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. 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 a negotiated bid with a pre-selected Construction Manager at Risk (CMAR) and competitive bidding for every portion of the construction work for all subcontractors, with a minimum of 3 bidders for all items of subcontracted work. Experience indicates that a fewer number of bidders may result in higher bids, conversely an increased number of bidders may result in more competitive bids.

6.4 Exclusions

- Design, testing, inspection or construction management fees.
- Architectural and engineering 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 programs.
- Land and easement acquisition.
- Cost escalation beyond a construction start point of January 2009.
- Owner supplied and installed furniture, fixtures and equipment.
- Loose furniture and equipment, except as specifically identified.
- Chemical Fume Hoods.
- Biological safety cabinets, glassware washers and dryers.
- Hazardous material handling, disposal and abatement.
- Compression of schedule, premium or shift work, and restrictions on the contractor's working hours.
- Demolition and removal of existing building structures and preparation of building pad.

- Work to streets and sidewalks, including Science Walk improvements; site improvements outside of immediate site area.
- CCTV surveillance cameras and monitoring.
- Audio visual equipment.
- Atrium smoke evacuation.
- Hazardous material handling, disposal and abatement.
- Uninterrupted power source (UPS) - by User.
- Master antenna TV equipment and cabling.
- Sump pump and sewage ejector.
- Public address.
- Utility tunnel extensions and connections and utility upgrades to the building site.
- Underground diesel generator fuel oil storage.
- FM-200 fire suppression systems.
- Telephone/data “active” equipment, including hubs, routers, LAN, switches, servers, etc.
- Owner-sponsored mechanical and electrical commissioning.
- Additional functional furnishings and equipment will be procured through the Group II/III Budget.
- Proximity sensors on fume hoods.
- Fit-out of Cluster Farm.
- LEED Commissioning.

6.5 Overall Summary

	Build-out Model	Initial Phase
	$/sf	$/sf
Building Construction		
Shell	$135	$133
Interiors	$46	$17
Equipment and Vertical Transportation	$54	$24
Mechanical and Electrical	$166	$112
Total Building Construction	$401	$286
Site Construction		
Site Preparation	$1	$1
Paving, Structures and Landscaping	$15	$15
Utilities on Site	$3	$3
Total Site Construction	$19	$19
Building & Site Construction	$420	$305
General Conditions (11%)	$46	$33
Contractor's Overhead & Profit (5%)	$23	$17
Planned Construction Cost January 2008	$489	$355
Adjustments		
Estimating Contingency (5%)	$24	$18
Escalation to January 2009 Start (8%)	$41	$30
CMAR Contingency (3%)	$17	$12
Total Direct Construction Cost ($/sf)	**$571**	**$415**
Cost at 60,000 gsf	$34,264,608	$24,871,450
Bio-safety Lab Suite	$1,200,000	N/A
Total Direct Construction Cost	**$35,464,608**	**$24,871,450**
Network Electronics Budget	$121,295	

7.0 Schedule

7.1 Overview

Key issues to be addressed on the project that may affect the schedule include:

- Completion of a new geotechnical report and site survey.
- CEQA review and approval by The Regents prior to December 2008.
- Demolition of abandoned Entomology and Insectary buildings prior to December 2008.
- Completion of supporting utility modifications prior to December 2008.
- Successful selection of the Construction Manager at Risk (CMAR) and agreeing on a construction price in time to start construction in January 2009.

7.2 Detailed Project Program (DPP)

The purpose of the DPP phase is to prepare a program, concept, cost model and schedule to aid in preparation of the Project Planning Guide. The DPP phase began in early January 2008 with SRG Partnership, Inc. as the programming and planning consultant working with the University of California, Riverside.

7.3 Project Planning Guide (PPG)

The purpose of the PPG is to provide specific project justification based on information provided in the DPP. The PPG phase will be complete in the early spring of 2008.

7.4 Design Phases

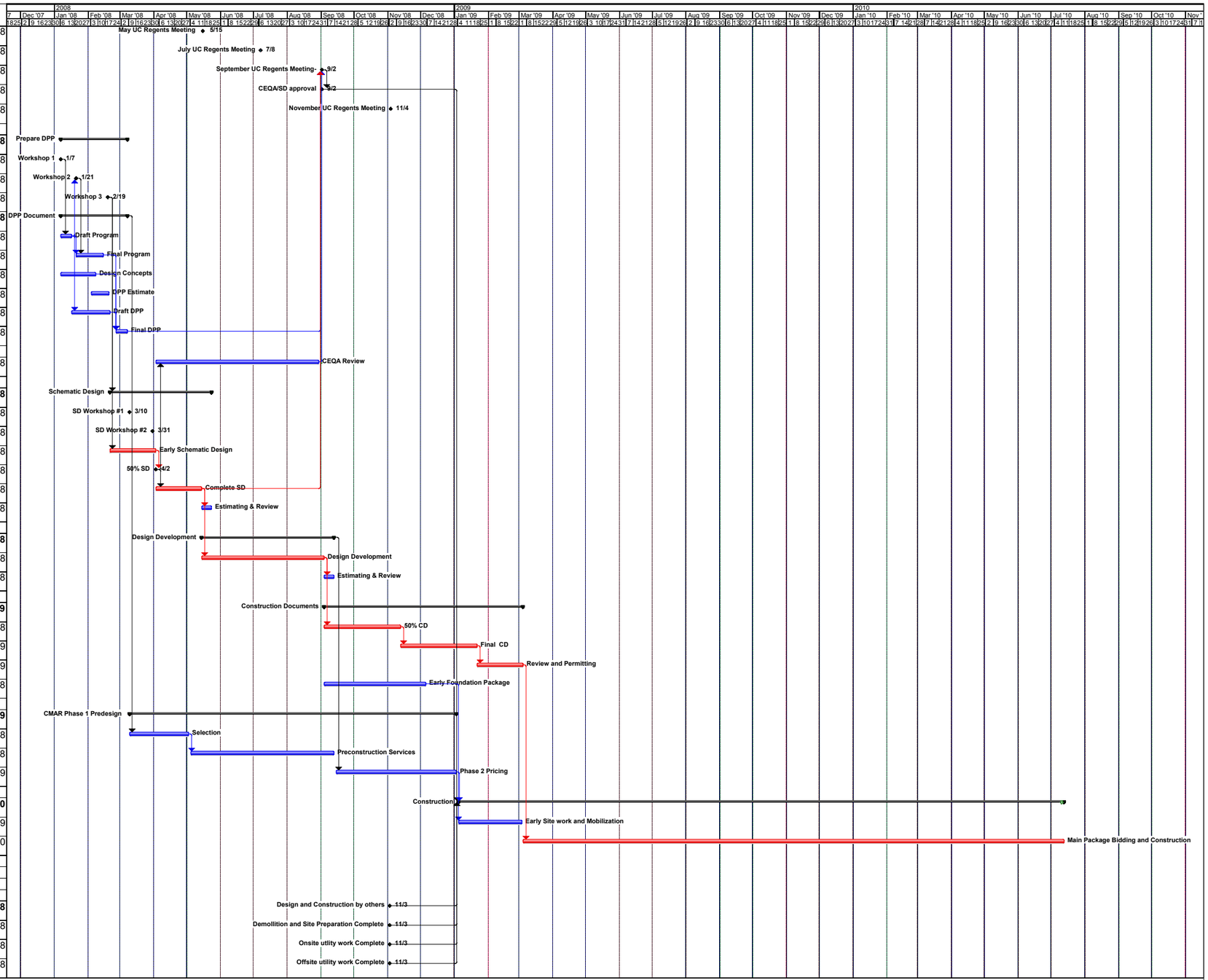
Following completion of the PPG and approval of funding for design, the University will continue with the design process. Preliminary Schematic Design work was started in late February, 2008 in order to support the CEQA review process for Regents review in September. Design and Documentation is anticipated to take approximately 12 months, overlapping early Construction. To maintain scheduled construction start, an early Foundation Package is proposed.

7.5 Construction

This schedule is based on the start of construction in January 2009. Construction is anticipated to be approximately 19 months, with completion by July 2010.

7.6 Graphic Schedule

ID	Task Name	Start	Finish
1	**May UC Regents Meeting**	Thu 5/15/08	Thu 5/15/08
2	**July UC Regents Meeting**	Tue 7/8/08	Tue 7/8/08
3	**September UC Regents Meeting-**	Tue 9/2/08	Tue 9/2/08
4	**CEQA/SD approval**	Tue 9/2/08	Tue 9/2/08
5	**November UC Regents Meeting**	Tue 11/4/08	Tue 11/4/08
6			
7	**Prepare DPP**	**Mon 1/7/08**	**Fri 3/7/08**
8	Workshop 1	Mon 1/7/08	Mon 1/7/08
9	Workshop 2	Mon 1/21/08	Mon 1/21/08
10	Workshop 3	Tue 2/19/08	Tue 2/19/08
11	**DPP Document**	**Mon 1/7/08**	**Fri 3/7/08**
12	Draft Program	Mon 1/7/08	Wed 1/16/08
13	Final Program	Mon 1/21/08	Thu 2/14/08
14	Design Concepts	Mon 1/7/08	Thu 2/7/08
15	DPP Estimate	Mon 2/4/08	Tue 2/19/08
16	Draft DPP	Thu 1/17/08	Wed 2/20/08
17	Final DPP	Tue 2/26/08	Fri 3/7/08
18			
19	**CEQA Review**	Thu 4/3/08	Fri 8/29/08
20			
21	**Schematic Design**	**Thu 2/21/08**	**Fri 5/23/08**
22	SD Workshop #1	Mon 3/10/08	Mon 3/10/08
23	SD Workshop #2	Mon 3/31/08	Mon 3/31/08
24	Early Schematic Design	Thu 2/21/08	Wed 4/2/08
25	50% SD	Wed 4/2/08	Wed 4/2/08
26	Complete SD	Thu 4/3/08	Wed 5/14/08
27	Estimating & Review	Thu 5/15/08	Fri 5/23/08
28			
29	**Design Development**	**Thu 5/15/08**	**Fri 9/12/08**
30	Design Development	Thu 5/15/08	Wed 9/3/08
31	Estimating & Review	Thu 9/4/08	Fri 9/12/08
32			
33	**Construction Documents**	**Thu 9/4/08**	**Wed 3/4/09**
34	50% CD	Thu 9/4/08	Wed 11/12/08
35	Final CD	Thu 11/13/08	Wed 1/21/09
36	Review and Permitting	Thu 1/22/09	Wed 3/4/09
37	Early Foundation Package	Thu 9/4/08	Fri 12/5/08
38			
39	**CMAR Phase 1 Predesign**	**Mon 3/10/08**	**Fri 1/2/09**
40	Selection	Mon 3/10/08	Fri 5/2/08
41	Preconstruction Services	Mon 5/5/08	Fri 9/12/08
42	Phase 2 Pricing	Mon 9/15/08	Fri 1/2/09
43			
44	**Construction**	**Mon 1/5/09**	**Mon 7/12/10**
45	Early Site work and Mobilization	Mon 1/5/09	Tue 3/3/09
46	Main Package Bidding and Construction	Thu 3/5/09	Mon 7/12/10
47			
48			
49			
50			
51	**Design and Construction by others**	**Mon 11/3/08**	**Mon 11/3/08**
52	Demollition and Site Preparation Complete	Mon 11/3/08	Mon 11/3/08
53	Onsite utlity work Complete	Mon 11/3/08	Mon 11/3/08
54	Offsite utility work Complete	Mon 11/3/08	Mon 11/3/08



Project: Draft Schedule 1
Date: Wed 3/5/08

Task · Progress · Summary · Rolled Up Critical Task · Rolled Up Progress · External Tasks · Group By Summary
Critical Task · Milestone · Rolled Up Task · Rolled Up Milestone · Split · Project Summary · Deadline

Appendix A Site Selection Criteria

Campus Criteria

Planning/LRDP

Compliance of site development to campus and district planning issues, including principles established in the 2005 LRDP, such as access, circulation, building massing and character, infrastructure, and functional use.

Infrastructure

Availability of campus service and utilities to the site, including domestic water, chilled water, sewer, steam, power, telecom and similar requirements.

Parking/Circulation

Proximity of parking for building users, assuming that limited parking will be provided on-site and all other occupants will park off-site.

Project Criteria

Buildable Zone

Ability of site to accommodate building area (60,000 gsf); constraints on building configuration and flexibility.

Program Relationships

Proximity between key programs related to Health Sciences research, including vivarium, bioinformatics, and conference and support spaces.

Site Qualities

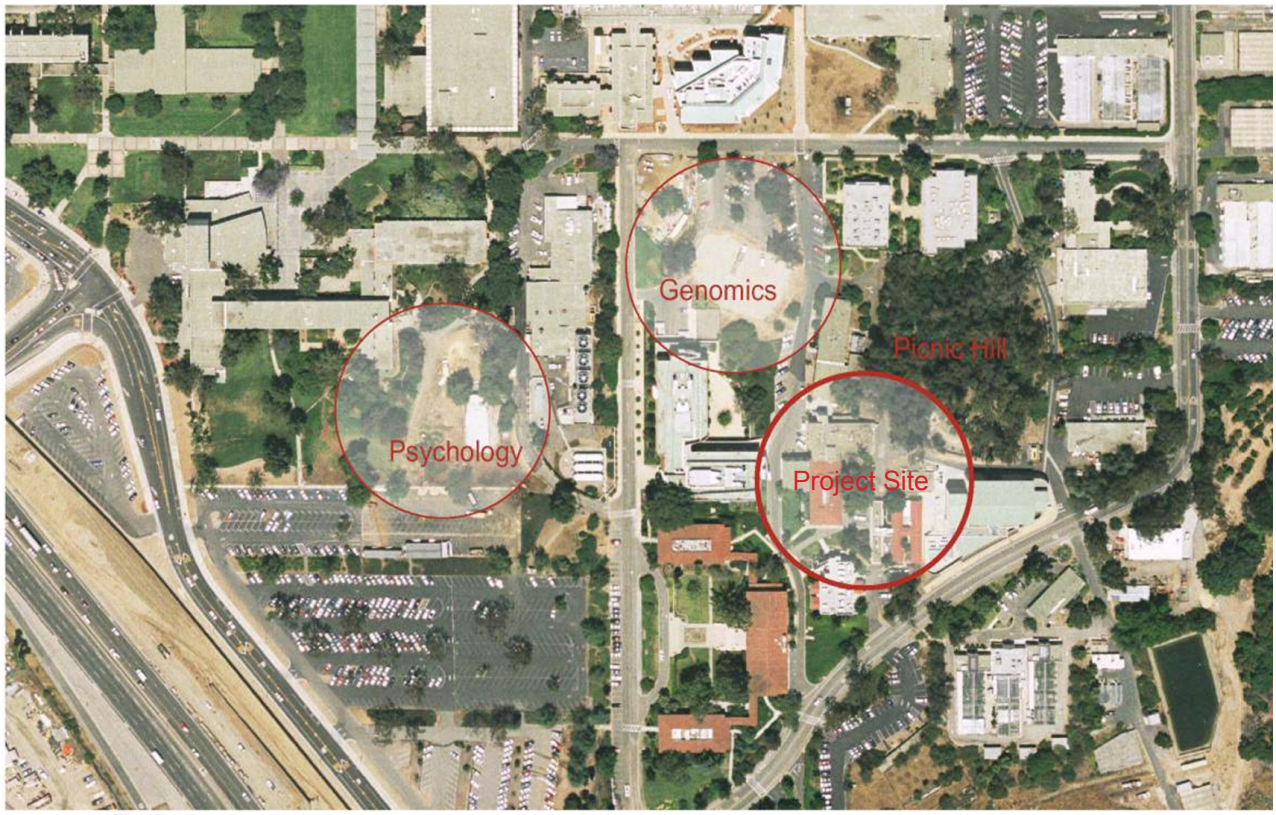
Qualitative characteristics of the site, including program image/visibility, views, natural light, vegetation, topography, and adjacent facilities.

Constructability

Site constraints on construction, including access, staging, soils, and similar issues; impact of construction on adjacent operations, including access, noise, and vibration.

Site Options

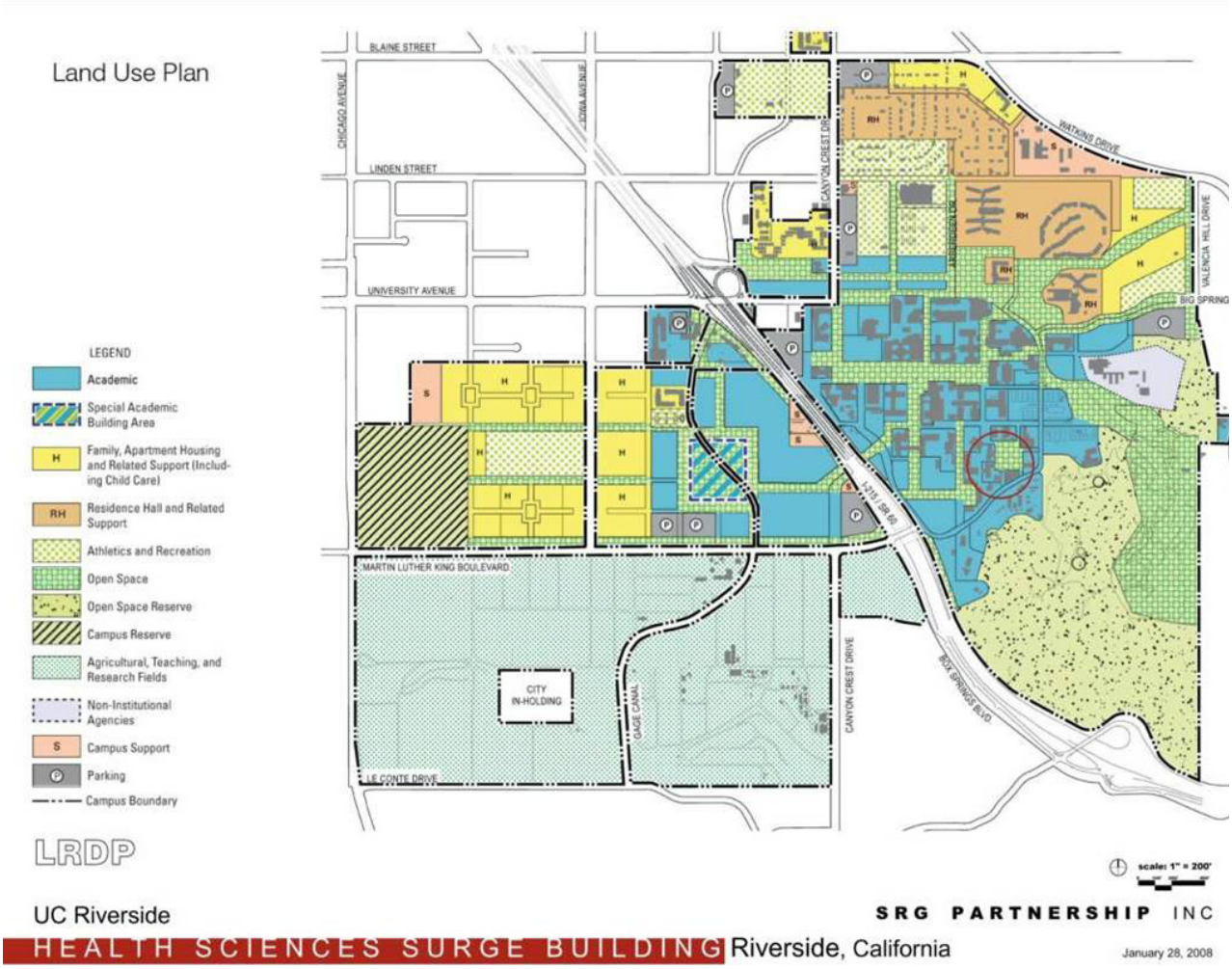
Site Proximities for Preferred Location



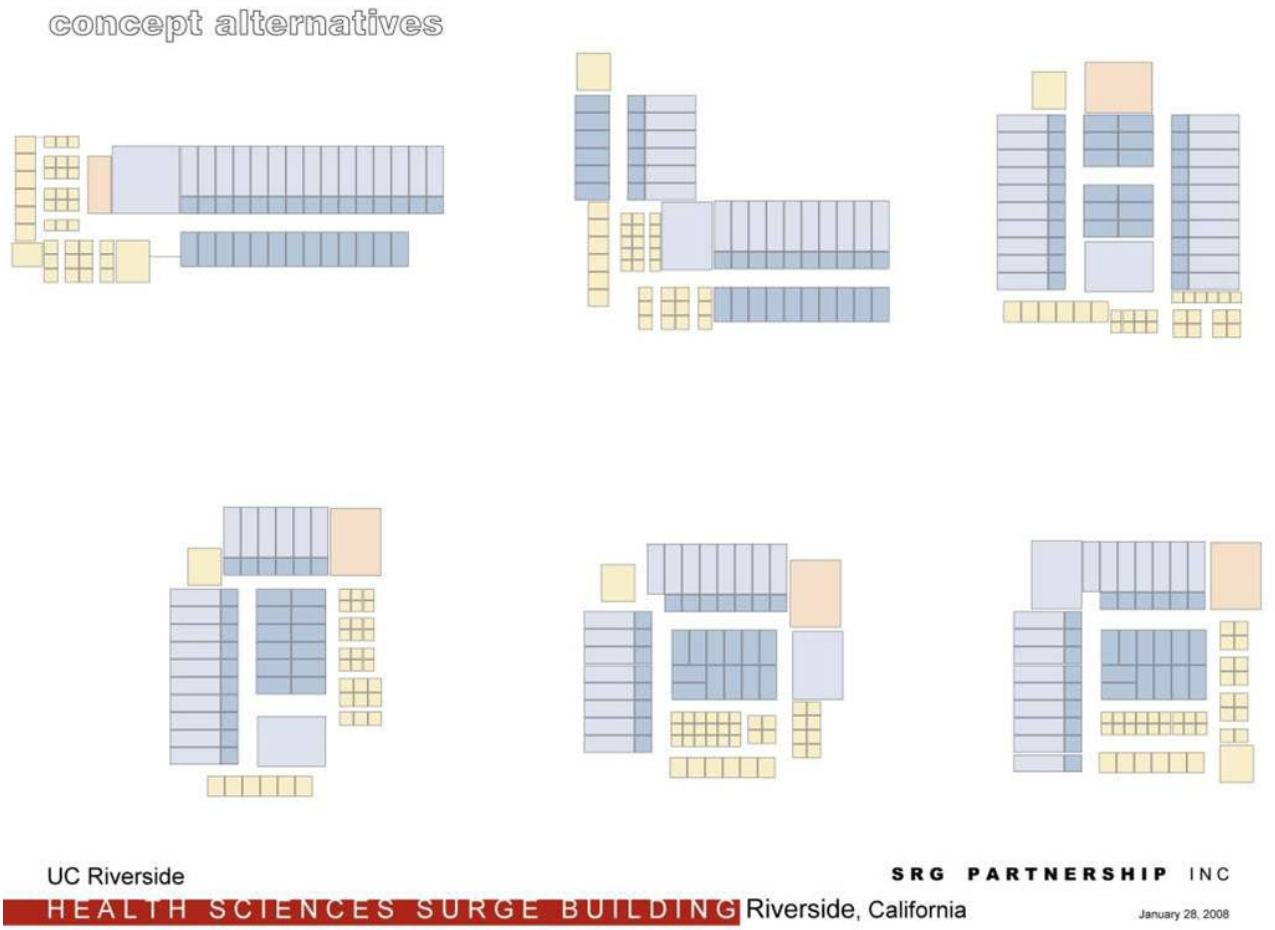
Bioinformatics facility in Genomics Building

Vivarium facility in Psychology Building

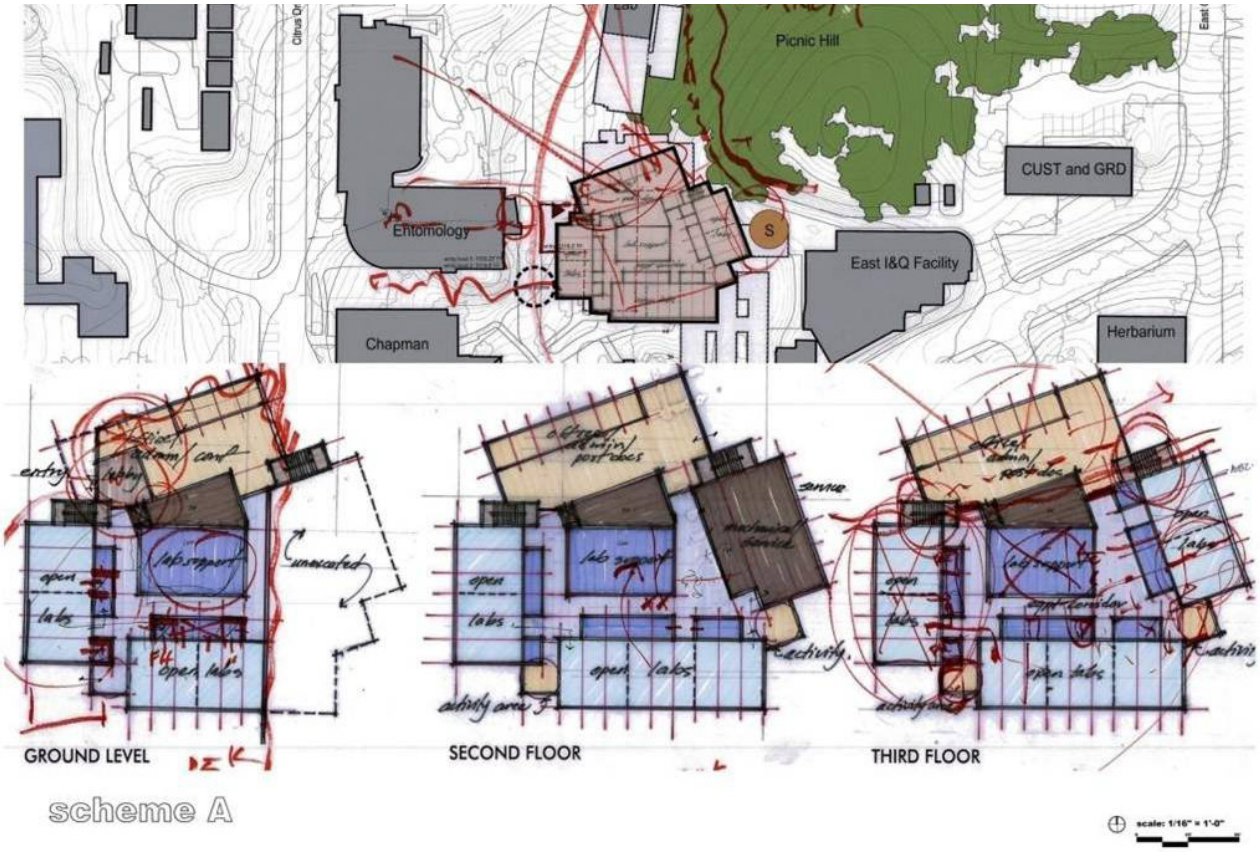
Long Range Development Plan



Appendix B Concept Development

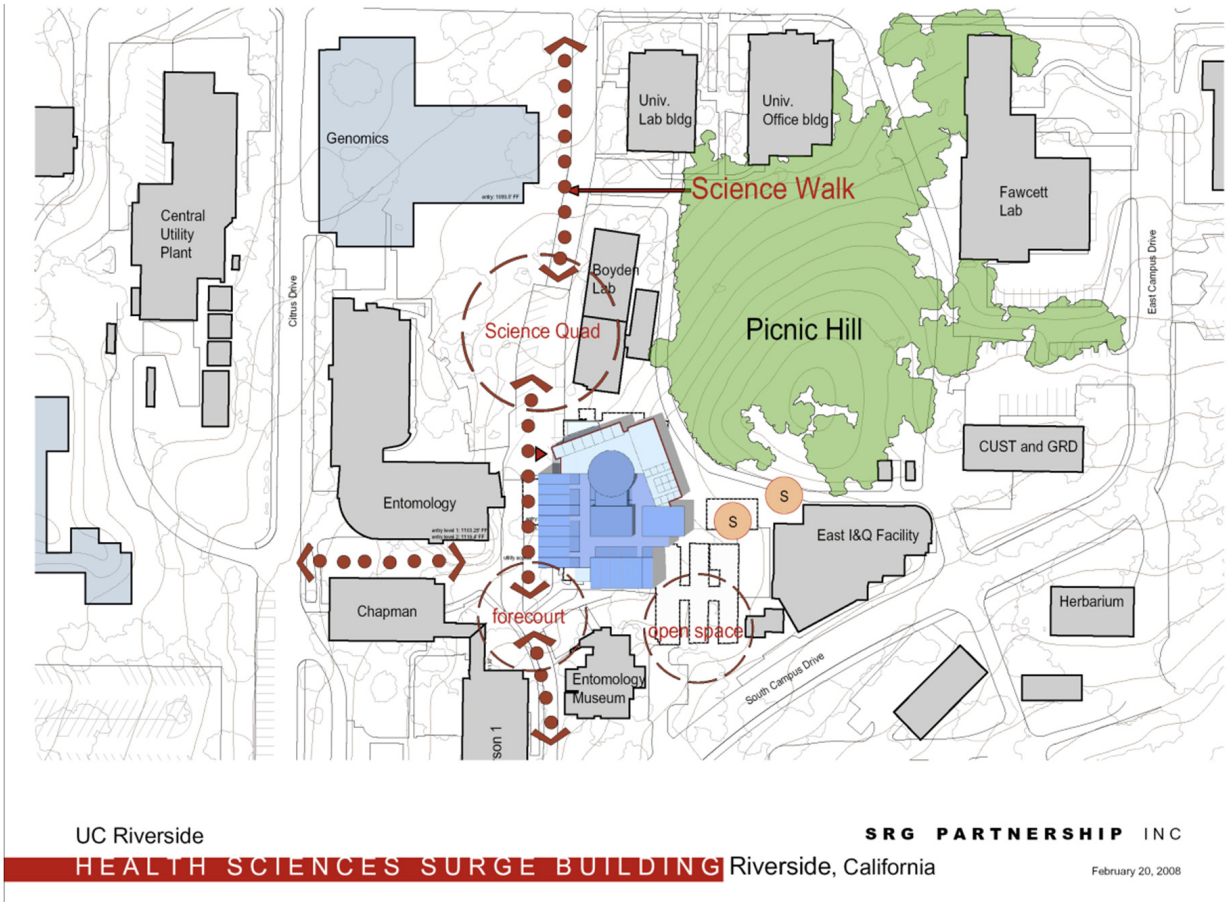


Plan Diagram Concepts

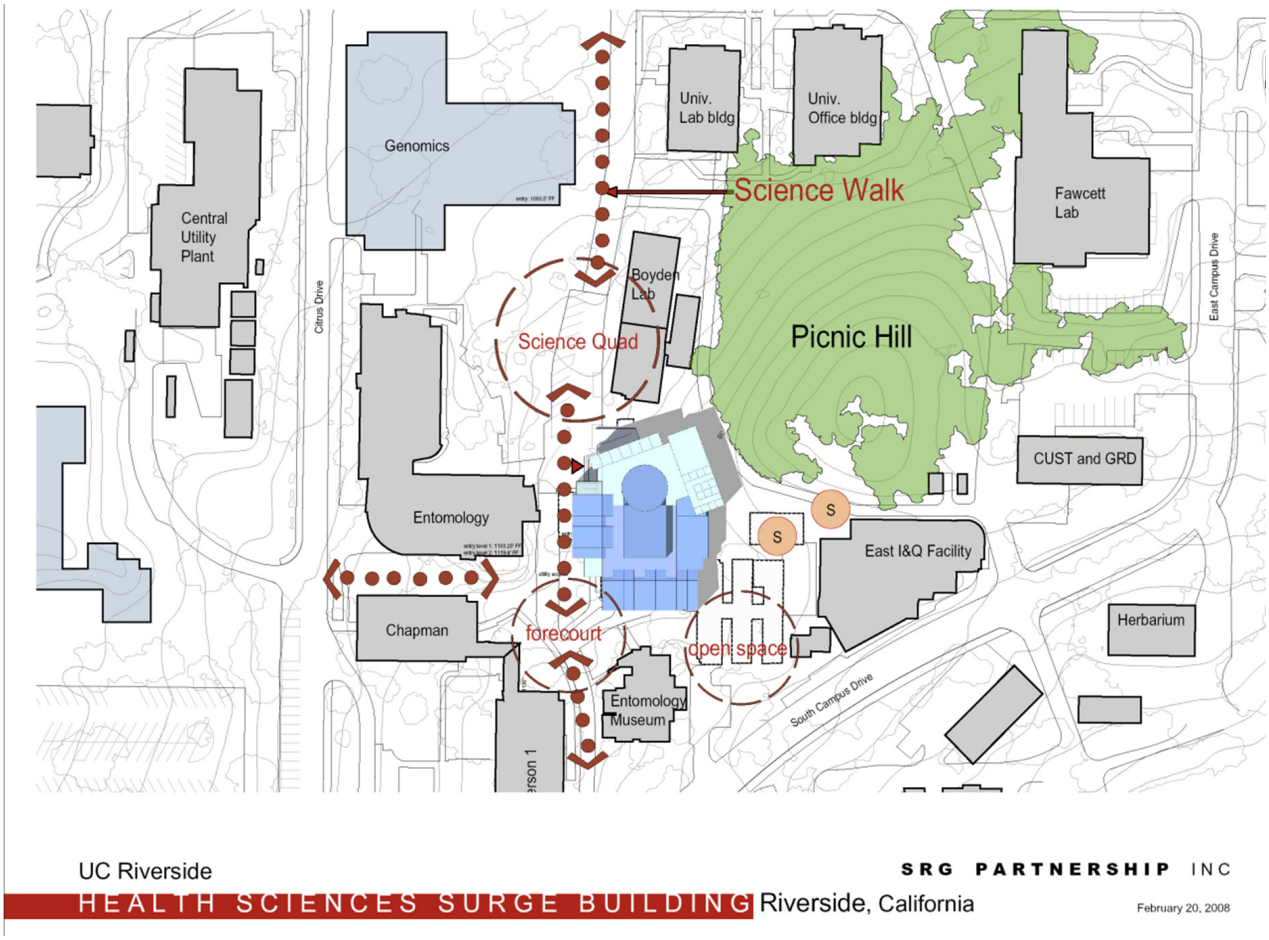


Scheme A Site Plan and Floor Plan Studies

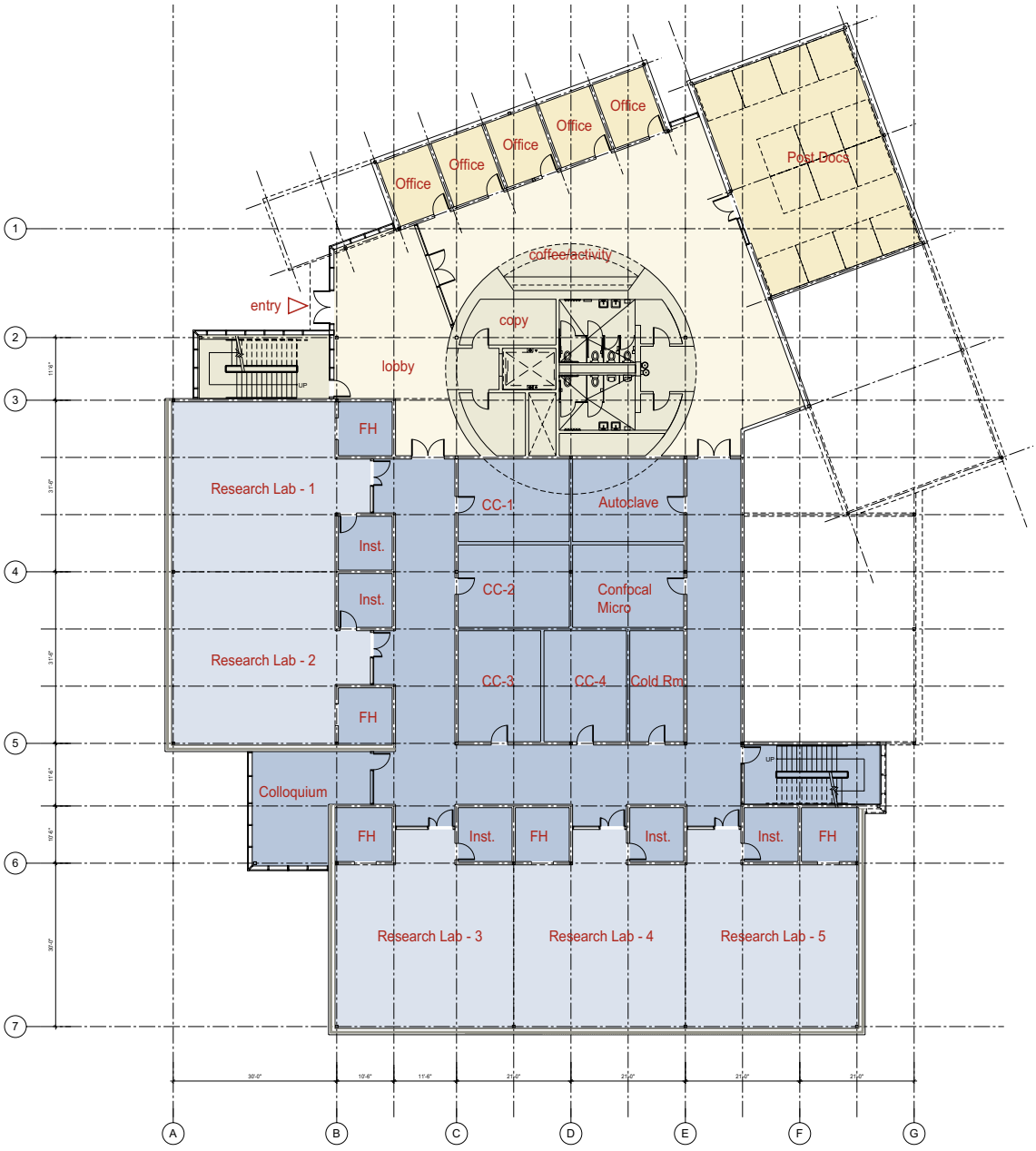
Scheme B Site Plan and Floor Plan Studies



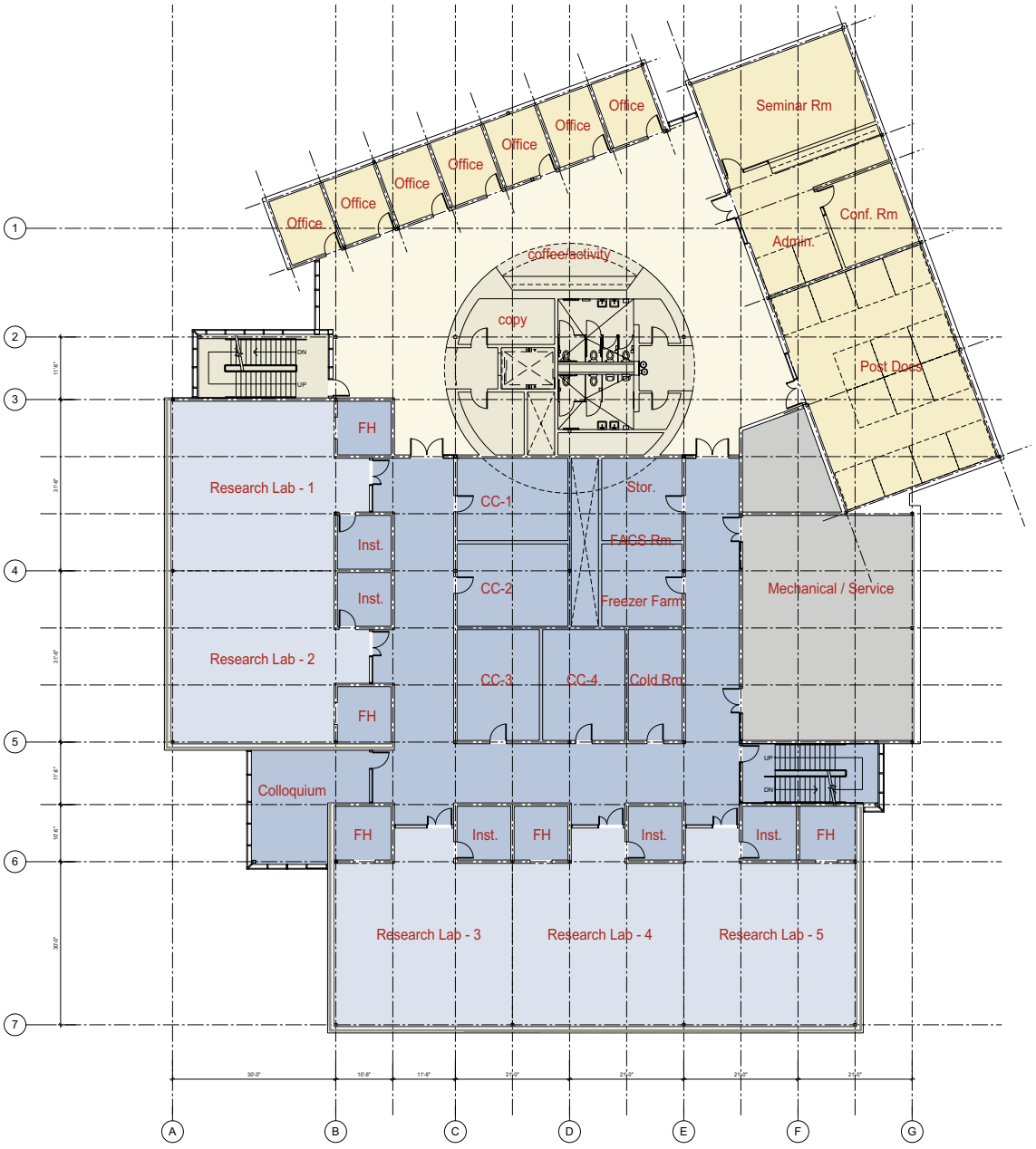
Scheme C Site Plan Study



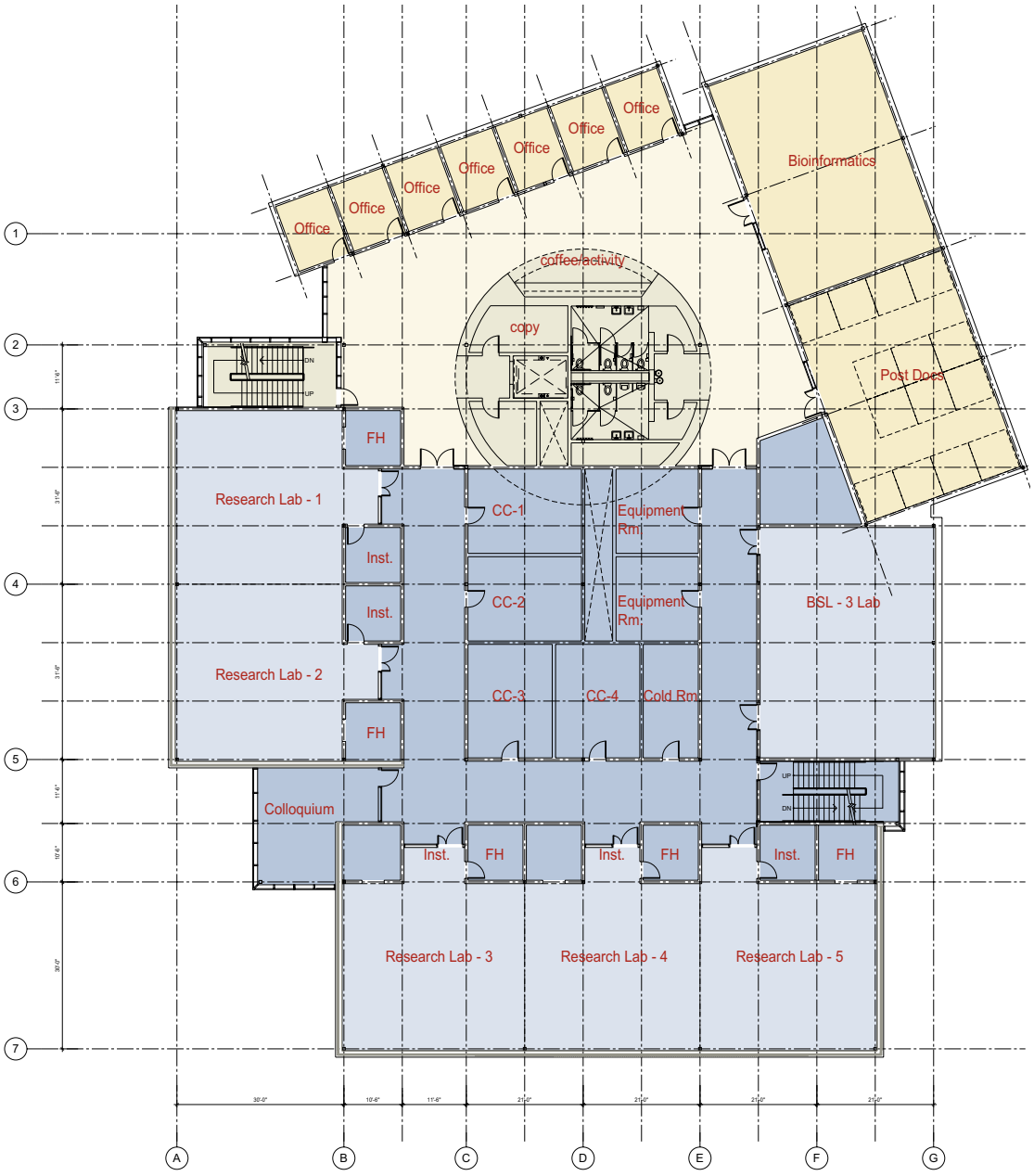
Scheme D Site Plan Study - Preferred Option



Scheme D Level 1 Floor Plan



Scheme D Level 2 Floor Plan



Scheme D Level 3 Floor Plan

Appendix C Building Systems Criteria

Applicable Codes and Guidelines

The code review presented below is intended only to highlight current applicable code issues and should not be construed as a complete review of all the codes. The Architect is responsible for verifying code issues to ensure compliance with all relevant aspects of the code, since regulations are subject to change.

2007 California Building Code, or most recent edition
2007 Title 24 California State Energy Code, or most recent edition
NFPA 45, 90, 90A and 91, or most recent edition
2007 UCR Campus Design Guidelines
2007 UCR Environmental Health and Safety Design Guide
ANSI Standards
ASME Guidelines and Standards
ASHRAE Design Guidelines
SMACNA Design Guidelines
AIHA Guidelines and Standards
CAL/OSHA, current regulations
Requirements for State Fire Marshal
Uniform Plumbing Code, [UPC] current edition
Uniform Mechanical Code, [UMC] current edition
Americans with Disabilities Act

All other local and State codes and the University of California, Riverside standards will be adhered to where applicable and available.

The applicable building code is the 2007 California Building Code, which is based on the 2006 International Building Code and is modified via the State of California amendments. In addition certain provisions of the International Fire Code apply to the project. The authority having jurisdiction is the Deputy Campus Fire Marshall, and compliance with accessibility requirements is overseen by the California Division of the State Architect (DSA).

Occupancy and Construction Classification

The building is proposed as occupancy classification "B" for research laboratories. Although the 2007 CBC permits classification of the building as an "L" occupancy (derived from the previous code's "H8" occupancy), the design team has concluded that the restrictions posed by the "L" occupancy suggest that it is in UCR's interest to maintain a "B" occupancy. This conclusion is based in part on the assurance that the quantities of hazardous materials are relatively small and thus within the "exempt" quantities permitted under the Code, and that there will be no chemical storage or use that requires "H" occupancy spaces.

Several alternative construction classifications are feasible for the proposed project. These alternatives are typically a function of required separation from adjacent buildings, proposed building area or height, and/or required fire ratings of structural elements. Preliminary analysis suggests that the driving factor for the project is the building separation requirements. The proposed site plan indicates approximately 24 feet of separation to the SPI Building to the north, 30 feet to the west to the "New" Entomology Building, and 35 feet to the south to the Entomology Museum. Table 602 of the CBC provides minimum separation distances and fire ratings for exterior walls. The code dictates that an "assumed property line" be established between adjacent buildings, with the mandated separations and fire ratings provided relative to this imaginary line. The relatively small separations imply that a Type IIB or Type VB construction classification would allow the project to avoid the cost and limitations of fire-rated exterior walls. Further evaluation of the approved construction classifications for the surrounding buildings and possibly the increase of the separations to these buildings may allow greater flexibility in the choice of construction classification for the new building. SRG thus tentatively recommends a Type IIB construction classification for the proposed building to comply with the concurrent requirements limiting building area. Although the proposed concrete structure provides substantial fire resistance, the Type IIB construction classification removes the fire rating requirements from the structure. Unfortunately a separate requirement of the code regarding control areas (see below) requires rated floor construction and thus this benefit would not be realized.

Building Area and Height

The proposed "B" occupancy classification and Type IIB construction classification provides a basic allowable area of 23,000 gross square feet (gsf). The anticipated 60,000 gsf building is feasible through an area increase permitted under Section 506.4 of the CBC, which triples the allowable area for a 3-story building to 69,000 gsf. If further increases are necessary due to penthouse area, greater area increases may be invoked via the provision of fire sprinklers throughout the building.

The building height is established by code as 4 stories and 55 feet in height. Although the number of stories is not an issue, it is possible that the base building height could be exceeded, and thus an increase of 20 feet in allowable height would be invoked per Section 504.2 for the provision of fire sprinklers.

Hazardous Materials Control Areas

The use of chemicals in the building requires compliance with Section 414 of the CBC regulating "Control Areas". Control areas may include all of the proposed program elements such as labs, offices, toilet rooms, but must be separated from each other by one-hour fire-rated walls. This section of the code also requires that the floor structure supporting control areas be one-hour or two-hour fire-rated depending on the selected construction classification (the Type IIB classification would require a two-hour fire rating). The quantities of chemicals allowed in the control areas varies by floor relative to grade, with 100% of the allowable quantities permitted on Floor 1, 75% of the allowable quantities permitted on Floor 2, and 50% of the allowable quantities permitted on Floor 3. All of these base amounts may be increased by 100% if storage is provided in approved chemical storage cabinets.

The open and flexible layout desired by the Project Steering Committee and Focus Group implies a strategy whereby each floor is designated as a control area. This decision is contingent on review of the Hazardous Materials Inventory Statement (HMIS) for the proposed building to confirm compliance with the chemical storage and use limitations. Additional control areas on each floor could be provided, though the requirement for fire barriers suggests that it is not necessarily in UCR's interest to pursue this strategy unless truly necessary.

Sustainability Criteria

The project will be designed to be a LEED Silver Equivalent building, as measured on the UC Systems LEED checklist. It will also be designed to be 20% more energy efficient than the CA Title 24 minimum energy requirements.

The following checklist is an estimate of the project's performance. This will be reviewed as the project design is developed. Many points are currently shown as "maybe" and their status will be clearer as the design develops.

The items highlighted in yellow are added to the basic USGBC checklist and are from the Labs 21/LEED for Labs Conference Draft.

LEED for New Construction v2.1
Registered Project Checklist

Project Name: **Health Sciences Surge Building**
Project Address: UC Riverside

Labs 21 standards revision/addition to LEED 2.1 for UC lab buildingevaluation.

Yes	?	No			
7	5	4	**Sustainable Sites**		16 Points
Y			Prereq 1	**Erosion & Sedimentation Control**	Required
1			Credit 1	**Site Selection**	1
0	1		Credit 2	**Development Density** (depends on extent of "site")	1
		1	Credit 3	**Brownfield Redevelopment**	1
1	0		Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1	0		Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms (200yds)	1
	0	1	Credit 4.3	**Alternative Transportation**, Alternative Fuel Vehicles	1
	1		Credit 4.4	**Alternative Transportation**, Parking Capacity and Carpooling	1
		1	Credit 5.1	**Reduced Site Disturbance**, Protect or Restore Open Space	1
	1		Credit 5.2	**Reduced Site Disturbance**, Development Footprint	1
	1		Credit 6.1	**Stormwater Management**, Rate and Quantity	1
		1	Credit 6.2	**Stormwater Management**, Treatment	1
1			Credit 7.1	**Landscape & Exterior Design to Reduce Heat Islands**, Non-Roof	1
1			Credit 7.2	**Landscape & Exterior Design to Reduce Heat Islands**, Roof	1
	1		Credit 8	**Light Pollution Reduction**	1
1			Credit 9.1	**Safety and Risk Management, Air Effluent (req comp or air tunnel model)**	1
1			Credit 9.2	**Safety and Risk Management, Water Effluent**	1

Yes	?	No			
2	5	0	**Water Efficiency**		7 Points
Y			Prereq 1	**Laboratory Equipment Use**	Required
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
	1		Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
	1		Credit 2	**Innovative Wastewater Technologies**	1
1	0		Credit 3.1	**Water Use Reduction**, 20% Reduction	1
	1		Credit 3.2	**Water Use Reduction**, 30% Reduction	1
	1		Credit 4.1	**Process Water Efficiency, Document Baseline**	1
	1		Credit 4.2	**Process Water Efficiency, 20% Reduction**	1

Yes	?	No			
6	9	10	**Energy & Atmosphere**		25 Points
Y			Prereq 1	**Fundamental Building Systems Commissioning**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**CFC Reduction in HVAC&R Equipment**	Required
Y			Prereq 4	**Assess Minimum Ventilation Requirements**	Required
4	2	4	Credit 1	**Optimize Energy Performance**	1 to 10
			1	Optimize energy Performance, 5%	1
			1	Optimize energy Performance, 10%	2
			1	Optimize energy Performance, 15%	3
			1	Optimize energy Performance, 20%	4
				Optimize energy Performance, 25%	5
				Optimize energy Performance, 30%	6
				Optimize energy Performance, 35%	7
				Optimize energy Performance, 40%	8
				Optimize energy Performance, 45%	9
				Optimize energy Performance, 50%	10
	1		Credit 2.1	**Renewable Energy**, 2%	1
	1		Credit 2.2	**Renewable Energy**, 5%	1
		1	Credit 2.3	**Renewable Energy**, 10%	1
1	0		Credit 3	**Additional Commissioning**	1
1			Credit 4	**Ozone Depletion**	1
	1		Credit 5	**Measurement & Verification**	1
	1		Credit 6	**Green Power**	1

	1		Credit 7.1	**Energy Supply Efficiency, 10%**		1
		1	Credit 7.2	**Energy Supply Efficiency, 20%**		1
		1	Credit 7.3	**Energy Supply Efficiency, 30%**		1
		1	Credit 7.4	**Energy Supply Efficiency, 40%**		1
		1	Credit 7.5	**Energy Supply Efficiency, 50%**		1
		1	Credit 8	**Improve Laboratory Equipment Efficiency (All new Energy Star Equipment)**		1
	1		Credit 9.1	**Right-size Laboratory Equipment Load: Measure Comparable Lab**		1
	1		Credit 9.2	**Right-size Laboratory Equipment Load: Metering Provision**		1
Yes	?	No				
4	3	7		**Materials & Resources**		**14** Points
Y			Prereq 1	**Storage & Collection of Recyclables**		Required
Y			Prereq 2	**Hazardous Material Handling**		Required
		1	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Shell		1
		1	Credit 1.2	**Building Reuse**, Maintain 100% of Shell		1
		1	Credit 1.3	**Building Reuse**, Maintain 100% Shell & 50% Non-Shell		1
1			Credit 2.1	**Construction Waste Management**, Divert 50%		1
1			Credit 2.2	**Construction Waste Management**, Divert 75%		1
		1	Credit 3.1	**Resource Reuse**, Specify 5%		1
		1	Credit 3.2	**Resource Reuse**, Specify 10%		1
	1		Credit 4.1	**Recycled Content**, Specify 5% (post-consumer + ½ post-industrial)		1
		1	Credit 4.2	**Recycled Content**, Specify 10% (post-consumer + ½ post-industrial)		1
1	0		Credit 5.1	**Local/Regional Materials**, 20% Manufactured Locally		1
		1	Credit 5.2	**Local/Regional Materials**, of 20% Above, 50% Harvested Locally		1
	1		Credit 6	**Rapidly Renewable Materials**		1
	1		Credit 7	**Certified Wood**		1
1			Credit 8	**Chemical Resource Mangement**		1
Yes	?	No				
12	4	2		**Indoor Environmental Quality**		**18** Points
Y			Prereq 1	**Minimum IAQ Performance**		Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**		Required
Y			Prereq 3	**Laboratory Ventilation**		Required
Y			Prereq 4	**Exterior Door Notfication System**		Required
1			Credit 1	**Carbon Dioxide** (CO_2) **Monitoring**		1
		1	Credit 2	**Ventilation Effectiveness**		1
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction		1
1			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy		1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants		1
1			Credit 4.2	**Low-Emitting Materials**, Paints		1
1			Credit 4.3	**Low-Emitting Materials**, Carpet		1
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber		1
1			Credit 5	**Indoor Chemical & Pollutant Source Control**		1
1			Credit 6.1	**Controllability of Systems**, Perimeter		1
		1	Credit 6.2	**Controllability of Systems**, Non-Perimeter		1
1	0		Credit 7.1	**Thermal Comfort**, Comply with ASHRAE 55-1992		1
	1		Credit 7.2	**Thermal Comfort**, Permanent Monitoring System		1
	1		Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces		1
	1		Credit 8.2	**Daylight & Views**, Views for 90% of Spaces		1
	1		Credit 9.1	**Indoor Environmental Safety, Air Flow Modeling**		1
1			Credit 9.2	**Indoor Environmental Safety. Fume Hood Commissioning**		1
1			Credit 9.3	**Indoor Environmental Safety, Alarm Systems**		1
Yes	?	No				
1	1	3		**Innovation & Design Process**		**5** Points
		1	Credit 1.1	**Innovation in Design**: Provide Specific Title		1
		1	Credit 1.2	**Innovation in Design**: Provide Specific Title		1
		1	Credit 1.3	**Innovation in Design**: Provide Specific Title		1
	1		Credit 1.4	**Innovation in Design**: Provide Specific Title		1
1			Credit 2	**LEED™ Accredited Professional**		1
Yes	?	No				
32	27	26		**Project Totals (pre-certification estimates)**		**85** Points
				USGBC Rating System: **Certified:** 26-32 points, **Silver:** 33-38 points, **Gold:** 39-51 points, **Platinum:**		

Structural Criteria

Project Description

The project consists of a 3-story laboratory building of approximately 60,000 gross square feet. The program includes a combination of research laboratories and support spaces, faculty and student offices.

General Design Criteria

Codes

The governing building code will be the California Building Code 2007 edition which is based upon International Building Code 2006. Other referenced design codes are anticipated to include the AISC Manual of Steel Construction (LRFD), Second Edition, ACI Building Code, Commentary, ACI 318 05, ASCE 7-05 and AWS Structural Welding Code, ANSI (AWS D 1.1 98). The governing jurisdiction is the regulatory agencies of the State of California.

Design Loads

Live Loads:

Laboratories	125 psf, fully reducible for columns and foundations
Offices	100 psf, fully reducible
General Storage	125 psf, non-reducible
Circulation Areas	100 psf, non-reducible
Main Roof (general)	20 psf, reducible
Penthouse Roof	20 psf, reducible

Dead Loads

General: Estimated weight of construction material

Mechanical Equipment: 150 psf or weight of mechanical equipment

Seismic Design

Seismic design criteria will be based on the 2007 California Building Code edition.

Occupancy Category	II
Seismic Design Category	D or E (will be established once site-specific Seismic hazard study is done)
Importance Factor	I= 1.00
Structural System Factor	Will depend on the system selected and will be based on CBC 2007.

Wind Design

Basic Wind Speed	85 miles per hour
Exposure	Exposure B
Importance Factor	I= 1.0

Vibration Criteria

Maximum vibration velocity measured on the floor slab not to exceed 4,000 micro inches per second (mips) within the research laboratory and 2,000 micro inches per second within a selective interior zone. The vibration will be calculated under moderate pace walking excitation. The faculty and student offices and general administrative support function areas and other non-sensitive areas will be designed to a different less restrictive vibration criterion (e.g., maximum acceleration less than 0.5% for a 65 lb excitation forces assuming 3% damping).

Materials

Concrete	*f'*c = 4000 psi slab on grade
	*f'*c = 3000 psi foundations
	*f'*c = 4000 psi suspended floor slabs and beams
	*f'*c = 4000 psi columns (non seismic)
	*f'*c = 5000 psi shear wall
,	
Reinforcing Steel	ASTM A615, Grade 60
	ASTM A706 in boundary elements of shear walls
Structural Steel	ASTM 992 for all structural shapes except as noted otherwise
	ASTM A500, Grade B for all structural tubes
	A490 anchor bolts
	A325 high strength bolts, except as noted otherwise

Sustainable and Energy Efficient Design

UC Riverside has expressed a desire that all future buildings be energy efficient in their design and operation. To attain this goal, the project design team shall incorporate the design procedures and practices recommended by the US Green Building Council, up to and including equivalent to LEED Silver certification for this project. Refer to Mechanical Systems Description Section for specific recommendations. The building design team shall model 2 or 3 of the following design options for utilities consumption: steam, chilled water, electricity, natural gas or city water. Current and expected utility rates shall be used along with life cycle cost calculations in the value engineering decision process. Ventilation on demand (where applicable) and variable air volume with both reheat and recool design strategies along with other options that the design team includes shall be modeled and evaluated.

Applicable Codes, Guidelines and Standards:

The latest edition of approved year of the following codes and combination codes and guidelines will govern the Mechanical Systems (wet and dry) and associated support system design. The systems will be designed to meet or exceed these standards.

ACGIH	American Conference of Governmental Industrial Hygienists "Industrial Ventilation" A Manual of Recommended Practice (Latest Edition)
AGA	American Gas Association Standards
AIHA	American Industrial Hygiene Association Guidelines and Standards (Latest Edition)
AMCA	Air Movement and Control Association, Inc. Publications 200, 201, 202 and 203 (Latest Edition)
ANSI	American National Standards Institute, Inc.
ANSI/ASME	B31.1 Code for Power Piping B31.2 Code for Pressure Piping B31.3 Code for Process Piping B31.9 Code for Building Services Piping
APHIS	Animal and Plant Health Inspection Service
API	American Petroleum Institute
ARI	Air Conditioning and Refrigeration Institute
ARS	Agricultural Research Service
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers Handbooks (Latest Editions)

ASHRAE	Standard 62-1989 Ventilation for Acceptable Indoor Air Quality
ASME	American Society of Mechanical Engineers Guidelines and Standards
AWS	American Welding Society
CAGI	Compressed Air and Gas Institute
CAL/OSHA	California Occupational Safety Hazard Authority
CBC	2007 California State Building Code (International Building Code with CA Modification)
CCR	2007 Title 24 California Code of Regulations
CDC/NIH	Biological Safety in Microbiological and Biomedical Laboratories 5th edition
CDC/NIH	Primary Containment for Biohazards
CFC	2007 California Fire Code
CGA	Compressed Gas Association
CMC	California Mechanical Code
CTI	Cooling Tower Institute
FCI	Fluid Controls Institute
IAPMO	International Association of Plumbing & Mechanical Officials
LEED	Leadership in Energy and Environment Design: Standards and Recommendations
NAFA	National Air Filter Association Guide to Air Filtration (Latest Edition)
NEBB	National Environmental Balancing Bureau Standards
NFPA	National Fire Protection Association Guidelines and Standards - as applicable to project
SFM	California State and Local Fire Marshall
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc. Guidelines and Standards (Latest Edition)
STI	Steel Tank Institute
UL	Underwriters Laboratories Inc. or equivalent testing lab approved by UC Riverside

All other local and State codes and UC Riverside standards will be adhered to where applicable.

Outdoor Design Conditions:

- Summer: Riverside per UCR Design Requirements—design will be based on:
  Dry Bulb Temperature = 110°F
  Wet Bulb Temperature = 64°F

- Winter: Riverside per UCR Design Requirements—design will be based on:
  Dry Bulb Temperature = 34°F

Indoor Temperature and Humidity Design Conditions

The design conditions will be per UCR Facilities Design Guidelines. Final design criteria will be developed during detail design.

- Public and Administrative Spaces: Lobby, Gathering Areas; Office, Conference, and Administrative Support Areas
- Dry Bulb Temp. Summer: 72°F ±2°F
  Winter: 70°F ±2°F
  Relative Humidity No requirement
- Research Laboratory and Laboratory Support
  Dry Bulb Temp. Summer: 72°F ±2°F
  Winter: 72°F ±2°F
  Relative Humidity: Not controlled
- BSL 3 suite
  Dry Bulb Temp. Summer: 70°F ±2°F
  Winter: 70°F ±2°F
  Relative Humidity: Not controlled
- Electrical, Mechanical and Fire/Security Rooms
  Dry Bulb Temp. Year Round: 85°F Maximum
  Relative Humidity: No requirement
- Unoccupied Spaces
  Dry Bulb Temp. Year Round: 65 - 95°F
  Relative Humidity: No control
- The loading dock will not be conditioned or ventilated.

No active humidity control will be provided. Relative humidity is expected to vary due to normal outdoor humidity fluctuations.

Heating and Cooling Loads

Internal

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

- Office, Conference, and Administrative Support Areas
  Lighting = 1.5 watts per square foot
  Equipment = 3 watts per square foot

- Lobby and Reception Areas
  - Lighting = 1.0 watts per square foot
  - Equipment = 0 watts per square foot
- Laboratories
  - Lighting = 2.0 watts per square foot
  - Equipment = 8 watts per square foot
- Laboratory Support Areas
  - Lighting = 2.0 watts per square foot
  - Equipment = 20 watts per square foot
- BSL 3 Laboratory Suite
  - Lighting = 2.0 watts per square foot
  - Equipment = 12 watts per square foot
- Bioinformatics
  - Lighting = 2.0 watts per square foot
  - Equipment = per equipment loads
- Electrical, and Fire/Safety Rooms
  - Lighting = 0.5 watts per square foot
  - Equipment = per equipment loads
- Unoccupied Spaces
  - Lighting = 0.5 watts per square foot
  - Equipment = 0 watts per square foot

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

Occupancy

The occupancy heat rejection will be as follows:

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

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

Infiltration

The building heat loss calculations will include an infiltration load based on 1.5 CFM of infiltration air per linear foot of exterior wall with windows and 1.0 CFM of infiltration air per linear foot of exterior wall without windows.

Ventilation Loads

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

- All Areas: 20 CFM outside air per person.
- Office, Conference, Administrative and Lobby Areas
  Occupied: Minimum air changes per hour as required by ASHRAE Standard 62-1999 for indoor air quality.
  Unoccupied: Minimum 2 air changes per hour.
- Research Laboratory and Laboratory Support
  Occupied: Minimum 4-6 air changes per hour.
  Unoccupied: Minimum 4-6 air changes per hour.
- BSL 3 Laboratory Suite
  Occupied: Minimum 8 air changes per hour.
  Unoccupied: Not applicable due to 24 hr per day building operation.
- Restrooms and Janitor Closets
  Occupied: Minimum 10 air changes per hour.
  Unoccupied: Not applicable due to 24 hr per day building operation.

The above values represent minimum values of space airflow for a particular occupancy type. Typical design airflow rates calculated to provide comfort heating/cooling for these areas exceed these minimums. Final airflow values and room air change rates to be determined during the design development phase.

Fume Hood Performance Criteria

The hoods will be constant air volume bypass type due to the low hood density in most labs and the need to maintain minimum air change rates within these rooms. The associated exhaust system will be sized with the capability to produce an average 100 FPM face velocity (measured over the entire face) at an 18" sash height at the chemical fume hoods. These criteria correspond to the following exhaust rates (at 100 FPM face velocity) at the listed fume hood types:

4' Chemical Fume Hood (18" sash height)	600 CFM
5' Chemical Fume Hood (18" sash height)	750 CFM
6' Chemical Fume Hood (18" sash height)	900 CFM
8' Chemical Fume Hood (18" sash height)	1200 CFM
Snorkel (3" or 4"N)	100-150 CFM

Biosafety Cabinets Criteria

All cabinets will be 100% recirculating type thus no connection to building exhaust system is required.

Noise Criteria

The design will target the following average noise levels. These noise levels do not include noise from equipment or personnel located within these spaces. Actual noise levels may exceed the design noise levels due to the actual type of equipment purchased, installation compromises, workmanship, etc.

Conference Rooms:	NC = 35
Private Offices:	NC = 30 - 40
Open Offices:	NC = 40 - 45
Circulation Space, Lobby:	NC = 40
Research, Support and BSL 3 Labs:	NC = 45 – 50
Laboratory Areas with Fume Hoods:	NC = 50 - 55

Pressure Relationships

Building:	Positive to ambient
Offices:	Neutral or positive to adjacent spaces
Restrooms and Janitor closets:	Negative to adjacent spaces
Corridors:	Neutral to adjacent spaces
Research and Support Labs:	Negative to adjacent spaces
Equipment Corridors:	Negative to adjacent labs and support areas
Cold Rooms:	No requirement
BSL 3 Suite:	Neutral or negative to adjacent spaces
Tissue Culture/Cell Culture Labs:	Positive to adjacent spaces

Pressure relationships will be maintained by offsets between supply and return/ exhaust airflow rates.

Indoor Air Quality Control Methods

Indoor air quality will be addressed by four principal means:

- Filtration - 30-40% prefilters and 90-95% final filters at all supply air handling units.
- Minimum ventilation rates of 4-6 air changes per hour (ACH) in labs, and 2 ACH in offices throughout the building.

- No fibrous media exposed to the airstream will be allowed in the ductwork downstream of any air handling unit's final filter bank. Sound attenuating flexible ducts at the diffusers will have woven nylon fabric type lining.

Outdoor Air Quality Control Methods

Outdoor air intakes will be located to minimize cross-contamination between supply and exhaust air streams. To accomplish this, wind tunnel micro-climate analysis shall be used to evaluate various configurations of fume hood exhaust stack height, location, and position relative to supply air intakes. Air supply exhaust interactions with adjacent buildings shall be carefully studied. Laboratory fume hoods/general exhaust fans will exhaust a variable volume of air at a stack discharge velocity of approximately 2500 to 3500 FPM assumed to be required by the wind tunnel study.

BSL-3 suite will have a HEPA filtration for exhaust system for up to 99% air filtration.

Air Handling Unit Component Sizing

Maximum allowable nominal face velocities for all air handling unit components are as follows:

Air Intake Louvers (thru free area):	800 FPM
Hot Water Coils:	600 FPM
Cooling Coils:	500 FPM
Filters: 500 FPM	
Sound Attenuators (at exhaust fan inlet):	700 FPM

Duct System Distribution Criteria

- Special Air velocity at occupied levels will be limited to:
  - General: 50 FPM
  - Laboratory and Support Spaces: 35 FPM
- Supply Ductwork Sizing (based on undiversified CFM)
  - From Air Handling Unit through Chase: 0.15"/100' when <10,000 CFM
  - Chase to Supply Main at each Floor: 2,000 FPM when ≥10,000 CFM
  - Supply Main to Air Terminal (AT) Device: 0.15”/100 when <10,000 CFM; 2,000 FPM when ≥10,000 CFM (Duct size to AT device = AT inlet size within 15’ of AT)
  - Air Terminal Device to Supply Diffuser: 0.1”/100’ when <8,000 CFM

- Miscellaneous Ventilation Systems
  All Ductwork: 0.1"/100' when <8,000 CFM; 1,600 FPM when ≥8,000 CFM
- General and Fume Exhaust, and Return Ductwork (based on undiversified CFM)
  Grille to Exhaust Valve (EV): 0.1"/100' when <8,000 CFM; 1,600 FPM when ≥8,000 CFM
  Hood or Biosafety Cabinet (BSC) to EV: Equal to air valve size if within 15' of EV
  From EV to Branch Main or Main: Equal to EV Outlet Connection size
  From Exhaust Branch Main or Main to Chase: 0.15"/100' when <10,000 CFM; 2,000 FPM when ≥10,000 CFM
  In Chase to Exhaust Air Plenum: 0.15"/100' when <10,000 CFM; 2,000 FPM when ≥10,000 CFM
- Miscellaneous Exhaust Systems
  General Exhaust Ventilation: 0.1"/100' when <8,000 CFM; 1,600 FPM when ≥10,000 CFM
- Sizing Deviations: Deviations from these criteria will be exercised as deemed necessary for proper air balancing, acoustic control, and duct routing space limitations.

Room Air Distribution

- Offices
  - Titus perforated face diffusers.
  - Perforated face return grilles.
- Laboratories, Support Spaces & BSL 3 Suite
  - Titus perforated face diffuser when cfm/ft^2 <4.5.
  - Krueger TAD diffuser when cfm/ft^2 ≥4.5.
  - Perforated face exhaust grilles.
- Others
  - Linear bar grilles or ceiling diffusers as dictated by architectural design and desired performance.

Pipe Sizing Criteria

- Steam
  - Typical: 6,000 fpm maximum velocity.
  - In Mechanical Equipment Rooms and Utility Tunnels: 10,000 fpm maximum velocity.

- Pumped Steam Condensate
  - 2.5 fps minimum velocity and 6 fps maximum velocity.
- Heating Hot Water and Chilled Water
  - 2.5 fps minimum velocity and 10 fps maximum velocity.
  - Piping 1" and larger will be sized for a maximum pressure drop of 4 ft. per 100 ft.

Seismic Criteria

Seismic design will be based on SMACNA "Seismic Restraint Manual Guidelines for Mechanical Systems", First Edition, 1991; Seismic Hazard Level "A", Connection level 1.

Equipment mounted on isolators will be seismically braced using loose cables, telescoping pipes or box sections, angles or flat plates used as limit stops or snubbers, either integral to or separate from the isolators. Non-rotating, fixed equipment will be bolted directly to the floor or structure.

Rectangular and flat oval ductwork with cross-sectional area greater than six square feet and round ductwork with a diameter of at least 28 inches will be restrained, unless suspended by hangers within 12 inches of the supporting structure.

The following piping will be braced:

- All piping in mechanical rooms 1-1/4" and larger, unless hanger length is 6" or less.
- All piping 2-1/2" and larger, unless hanger length is 6" or less.
- All pipe racks.

A seismic brace will be provided at a minimum of every second hanger where the hanger length exceeds 6".

Air Handling Unit Sizing Diversity

- General
  Airside diversity will be taken into account for variable air volume systems. Airside diversity will be applied to sizing the air handling units and other associated major equipment, but not applied to sizing any of the ductwork and diffusers. Care must be taken when selecting a diversity factor because if too much diversity is taken, the system will not operate properly and will not allow for future capacity requirements. If too little diversity is taken, first

costs increase and system efficiency decreases. Therefore, diversity factors will be discussed with the University during detailed design. Diversity can be broken down into component parts as shown below.

- Solar Heat Gain Diversity
  Solar heat gain diversity is normally considered on a variable air volume system and will be included on this project during the Design Development (DD) and Construction Document (CD) phases when a computer heat gain program is run to determine loads. This diversity considers that not all rooms will have peak airflows simultaneously due to changes in the position of the sun. East-facing rooms will peak in the morning in August, west-facing rooms will peak in the afternoon in August, and south-facing rooms will peak in the afternoon in October. The building overall peak is normally in the afternoon in August, but this can vary depending upon building window quantity and orientation.

- Equipment Heat Gain Diversity
  Additional diversity will be taken for variable air volume heat gain driven rooms such as the research labs, since not all labs will reach their design equipment heat gains simultaneously. A building overall equipment heat gain diversity multiplier of 75% will be applied during the DD and CD phase computer runs for all heat gain driven rooms.

Plumbing Systems Criteria

Sustainable and Energy Efficient Design

UC Riverside has expressed a desire that all future buildings be energy efficient in their design and operation. To attain this goal, the project design team shall incorporate the design procedures and practices recommended by the US Green Building Council, up to and including LEED Silver Equivalent certification for this project. Refer to Piping Systems Description section for specific system recommendations. The piping systems shall be modeled. The modeling and utility unit costs shall be used in life cycle cost calculations to value engineer pipe sizes and other design criteria.

Applicable Codes, Guidelines and Standards

The latest edition or approved year of the following codes or combination codes and guidelines will govern plumbing systems, fire protection, and other piping systems design. The systems will be designed to meet or exceed these standards.

AGA	American Gas Association
ANSI	American National Standards Institute
ANSI/ASME	B31.1 Code for Power Piping
	B31.2 Code for Pressure Piping
	B31.3 Code for Process Piping
	B31.9 Code for Building Services Piping
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers Handbooks (Latest Editions)
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers Databook Guidelines
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
CDC	Center for Disease Control - Microbial and Biomedical Laboratories 5th Edition
CPC	California Plumbing Code
CFC	California Fire Code
FM(x)	Factory Mutual or Other Insurance Company as used by Client
IAPMO	International Association of Plumbing & Mechanical Officials
LEED	Leadership in Energy and Environmental Design: Standards and Recommendations
NFPA	National Fire Protection Association
UL	Underwriters Laboratories Inc. or equivalent testing lab approved by UC Riverside

Noise Criteria

The design will be based on Chapter 37 of the ASPE Databook.

Seismic Criteria

Seismic design will be based on the National Uniform Seismic Installation Guidelines (NUSIG).

- The fire protection piping requiring seismic bracing, shall be installed following the non-insulated single hanger supported piping methods listed in the NFPA-13. Per the current California Code, the sprinkler system shall be braced using a factor of 1.5.
- Equipment, mounted on isolators, will be seismically braced using loose cables, telescoping pipes or box sections, angles or flat plates used as limit stops or snubbers, either integral to or separate from the isolators. Non-rotating, fixed equipment will be bolted directly to the floor or structure.
- The following piping will be braced unless hanger length is 6" or less:
  - Gas piping 1” and larger
  - All piping in mechanical rooms 1-1/4” and larger
  - All piping 2-1/2” and larger
- All pipe racks and vertical risers will be braced.
- A seismic brace will be provided at a minimum of every second hanger where the hanger length exceeds 6".
- Insulated and/or non-insulated system as applicable.
- All other local and State codes and UCR standards will be adhered to where applicable and available.

Sustainable and Energy Efficient Design

UC Riverside has expressed a desire that all future buildings be energy efficient in their design and operation. To attain this goal, the project design team shall incorporate the design procedures and practices recommended by the US Green Building Council, up to and including LEED Silver Equivalent certification for this project. Refer to Electrical Systems Descriptions section for specific recommendations.

Electrical Criteria

Applicable Codes, Guidelines and Standards

The latest edition of approved year of the following codes or combination codes and guidelines will govern the Electrical Systems and associated support system design. The systems will be designed to meet or exceed these standards.

ADA	Americans with Disabilities Act Accessibility Guidelines
ANSI	American National Standards Institute, Inc
CAL/OSHA	California Occupational Safety and Health Administration
CCR	Title 24 California Code of Regulations Energy Commission
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
CEC	California State Electrical Code
LEED	Leadership in Energy and Environmental Design: Standards and Recommendations
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
SFM	California State and Local Fire Marshal
CBC	California State Building Code
UL	Underwriters' Laboratories, Inc. or equivalent testing lab approved by UCR

All other local and State codes and UC Riverside standards will be adhered to where applicable and available.

Load Calculation Criteria

Design Voltages

- Primary Voltage - 12.47 KV, 3 phase, 3 wire
- Secondary Voltage
  - Normal - 480Y/277V, 3 phase, 4 wire
  - \- 208Y/120V, 3 phase, 4 wire
  - Emergency/Standby - 480Y/277V, 3 phase, 4 wire
  - \- 208Y/120V, 3 phase, 4 wire

Design Loads

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

Offices

Lighting	-	1.2
Receptacle	-	2.0

Seminar Room

Lighting	-	1.2
Receptacle	-	10.0

Conference Room-small

Lighting	-	1.2
Receptacle	-	5.0

Conference Room-large

Lighting	-	1.2
Receptacle	-	8.0

Corridors/Stairs

Lighting	-	0.8
Receptacle	-	0.5

Research Labs

Lighting	-	1.5
Receptacle	-	20.0

Research Support

Lighting	-	1.5
Receptacle	-	35.0

Cluster Farm (Bioinformatics)

Lighting	-	3.5
Receptacle	-	150.0

Mechanical Rooms

Lighting	-	1.5
Receptacle	-	Actual Motor H.P.

Electrical Rooms

Lighting	-	1.5
Receptacle	-	0.5

Network/Server Rooms

Lighting	-	0.7
Receptacle	-	50.0

Restrooms

Lighting	-	0.6
Receptacle	-	0.5

Telecommunications Room

Lighting	-	0.7
Receptacle	-	30.0

*Refer to Electrical Load Calculation Tables.

Equipment Sizing Criteria

Branch Circuit Load Calculations

- Lighting - Actual connected load
- Receptacles - 180 VA per outlet
- Surface Mounted Raceway - 180 VA per outlet
- Special Purpose Outlets - Actual connected load
- Fixed Equipment - Actual connected load
- Motors - 125% of full load amps

Demand Factors

- Lighting - 125% of connected load (continuous load)
- Receptacles - 100% of first 10 KVA plus 50% of remainder
- Fixed Equipment - 100% of connected load
- Specialty Outlets - 100% of connected load
- Motors - 125% of largest motor plus 100% of all other loads

Minimum Bus Sizes

480Y/277V Lighting Panelboards	-	100A
480Y/277V Equipment Panelboards	-	225A
208Y/120V Receptacle Panelboards	-	225A
480V Motor Control Centers	-	600A

Distribution panels supplied from K-rated type transformers will have neutral bus sized at 200%.

Distribution panels and branch panelboards will be sized for a minimum of 20% future capacity and space availability.

Feeder Sizes

Feeders supplying to distribution panels will be sized the same as the distribution panel bus size.

Feeders supplying branch panelboards will be sized the same as the branch panelboard bus size.

Feeders supplied from K-rated type transformers will have neutral conductors sized at 200%.

Design Lighting Levels

Average Maintained Footcandles:

Offices, Admin Support	-	50 (30 indirect)
Research Labs		
Bench & Table Top	-	70
Elsewhere	-	50
Lobby/Atrium	-	20
Conference/Seminar Room	-	50 - 60
Corridors/Stairs	-	15 - 20
Network/Server Rooms	-	35
Restrooms	-	20
Telecommunications Rooms	-	35
Electrical/Mech Rooms		
Task	-	35
General	-	10 - 20
Exterior Lighting and Pedestrian Pathways	-	1 - 2

Appendix D Systems Descriptions

Structural Systems Description

The UCR Health Sciences Surge Building is proposed as a three level structure. The building is located on a sloping site with the site sloping down from east to west. There is an elevation difference of as much as 20 feet within the footprint of the building. The total building area is approximately 60,000 gross square feet. A column free laboratory is required for the research laboratories and as a result, the columns in the labs are spaced at 31'-6" on center.

Geotechnical and Geological Condition

Geotechnical investigation report is not yet available for the site. However, based on information available from other existing buildings in close proximity to the site, it appears that the proposed building can be founded on spread footings and the lowest level slab is likely to be typical slab-on-grade.

Seismic Design

Seismic design criteria will be based on the latest edition of the California Building Code (CBC 2007). The assumption has been made that special seismic performance goals are not required for this project, and the basic seismic design criteria contained in the upcoming 2007 edition of the California Building Code will guide the design of the seismic bracing system. Accordingly, the feasibility of the structural seismic system having higher seismic performance characteristics, such as seismic isolation and energy dissipation was not explored. Those would incur high initial construction costs.

Structural Systems

The Health Sciences Surge Building is planned as a Type IIB structure, and as such, both concrete and structural steel framing systems can be considered as viable alternatives. Each scheme offers it own advantages and disadvantages.

The following sections discuss the advantages and disadvantages of viable concrete and steel systems for the Health Sciences Surge Building.

Cast In Place Concrete

Gravity System

Within the cast-in-place reinforced concrete systems, several alternate gravity structural systems are viable for this building. These include a two-way slab system, flat plate system, and one-way slab and beam system. All three systems can be made to work with the proposed functional and architectural requirements and the vibration criterion of 2,000 and 4,000 micro-inches per second.

However, if the proposed laboratory spaces are to be kept column free then a one-way slab system would yield the most cost-effective design. The concrete beams and girders will likely need to be approximately 30 inch deep to meet the 4,000 mips vibration criterion. The slab will likely be 6-inch thick. This system, however, is formwork and labor intensive and will be fairly expensive.

Typically, a less expensive structural system is a flat plate or a flat slab scheme which is less labor intensive and requires significantly less formwork. However, the slab thickness for such systems becomes excessively thick if the floor system has to be designed to restrictive vibration criterion and the columns are spaced more than 28 to 30 feet (as would be required for a column free laboratory). This would lead to a significantly heavier building, which in turn would penalize the seismic and foundation design, thus significantly adding to the construction cost.

However, a flat plate or a flat slab system becomes very cost effective and attractive, if a column free laboratory space is not a requirement. In such a scenario, columns are spaced at a maximum of 28 feet on center. This allows a flat plate scheme (with no drop panels) design that meets the restrictive vibration criterion. The slab thickness varies depending on the vibration criterion and column spacing. For the proposed column spacing of 28 feet max in one direction and 21 feet in the other direction a 14-inch thick slab would meet the required vibration criteria.

Seismic Bracing System

With regards to the seismic bracing system, either a concrete shear wall or a concrete moment frame scheme can be used. A concrete shear wall scheme will be significantly less expensive but may limit the architectural and functional layout flexibility. This concern can be mitigated somewhat by locating the shear walls around stairwells, elevator shafts and/or around the perimeter or perimeter walls.

Alternatively, concrete ductile frames could also be used to resist seismic loads. The columns and beams would be substantially larger than those needed for gravity loads, with the columns approaching 30 inches in plan dimension and girders up to 30 to 36 inches in depth. The size of these members may make it difficult to provide mechanical services to some areas of the building without increasing the floor-to-floor height. Also the concrete frame system would be significantly more expensive than the concrete shear wall system.

Steel System

As stated earlier, a steel structural system is also a viable structural system for the Health Sciences Surge Building. Steel structural systems are typically cost-effective for buildings with less stringent vibration criterion such as 4,000 mips or more while concrete systems are typically more cost effective for buildings having 2,000 mips or stricter vibration criterion. This is because concrete systems typically have generally better vibration resistance than steel structures due to their increased mass and stiffness. The vibration concern in a steel building is often mitigated by using heavier (thicker) metal deck concrete slabs and heavier and stiffer steel beams and girders. For the Health Sciences Surge Building, given the span and strict vibration requirement, a heavier deck (W3 + 4.25 inch normal weight concrete) with W21x beams and W24x girders may be used within the lab space and lab support space.

For the steel scheme, the seismic bracing system would typically be provided by eccentric steel brace frames or steel moment frames. Steel brace (eccentric) frames are generally significantly less expensive than steel moment frames.

A steel structural scheme typically offers the advantage of being lighter than the concrete schemes, which results in smaller foundations and decreased seismic demands. However, the floor-to-floor height needed for the same plenum and ceiling height is significantly more in a steel scheme as compared to a flat plate concrete scheme. This can significantly add to the building skin cost.

Recommendation

Based on the Design Team's understanding of the project needs, a concrete building with a flat plate scheme is proposed. The maximum column spacing will be limited to 28 feet in one direction and 21 feet in the other direction. A flat plate scheme is expected to be the least expensive of all the possible structural systems as it will simplify form work and allow the floor-to-floor height to be kept to a minimum.

The seismic bracing system will consist of concrete shear walls located strategically along the perimeter and stairwell shafts.

The foundation is expected to be spread footings although this would need to be confirmed once a site specific soils investigation is complete.

Mechanical Systems Description

Plant Chilled Water System:

Chilled water for the building will be provided year round from the Central Utility Plant. It will be extended from a connection point on the west side of the building, below grade, into the building by means of a pre-insulated pipe and conduit system. These pipes are anticipated to be 6" supply and 6" return. Chilled water distribution in the building will be via a tertiary piping distribution loop, with the tertiary pumps located on the ground floor. Chilled water will be utilized in the building for HVAC cooling.

A two-way control valve will be provided at each point of chilled water use. The speed of variable volume chilled water pumps will be controlled to maintain a preset minimum pressure differential in the most remote loop of the building. Each pump will be capable of providing 60% of the design flow.

Tertiary chilled water supply temperature, set at 46° F, will be maintained by modulating inflow of chilled water into the tertiary chilled water loop. The return water temperature will be 66° F. This system shall be metered for energy use and total flow. The meter shall communicate with the building's Energy Management Control System (EMCS).

Plant Steam System:

Plant steam will be generated by existing boilers in the Central Utility Plant. Plant steam will be distributed at a nominal pressure of 100 psig. It will be extended from the west side point of connection, below grade by means of a pre-insulated pipe and conduit system, into the building. This pipe size is anticipated to be 4". Plant steam will be utilized for building heating, for preheating of outside air, for autoclave equipment, and for domestic and industrial hot water heaters. Plant steam shall be metered. The meter shall communicate with the building's EMCS.

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

Steam condensate will be returned to the Central Plant by steam powered condensate pumps. This pipe size will be approximately 1-1/2". This pipe shall also be piped within a pre-insulated pipe and conduit system and metered.

Combined Preheat/Reheat System:

Combined preheat and reheat water convertors will utilize steam from the Central Utility Plant to generate both preheat and reheat water. The steam will pass through a pressure reducing station and will be supplied to the convertors at 15 psig. The preheat and reheat water system will be designed to generate water at 140° F.

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

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

A ten percent side stream water filter will be provided to remove debris from the piping system along with provisions for chemical treatment and water sampling.

Building Central Air Handling System:

The entire building, excluding the electrical rooms, loading dock, stairs and mechanical rooms will be served by two variable air volume (VAV), custom factory-fabricated, air-handling units with 2" or 4" thick double walls. The units will be manifolded together and will share common outside mixed air and discharge plenums. The units and both plenums will be located on the roof.

Air supplied to laboratories and support area will be exhausted via exhaust fans and air supplied to offices and administrative areas will be returned to the outside mixed air plenum via two remote in-line return fans.

The air handling units will be designed as heating-cooling, single duct, reheat type to provide 80% outside air (utilizing return air from the offices areas) on a variable air volume (VAV) basis. The units will be designed to provide 55° F supply air. The units will operate 24 hours per day, 365 days per year. Supply fans will be plug type. Multiple variable frequency drives will provide fan volume control in response to a signal from duct mounted static pressure sensors. Air handling unit fan speeds will be modulated simultaneously as required by building load.

Each air handling unit will house an array of smaller direct-drive fans to replace the traditional single plenum fan. This reduces the footprint of the unit, provides redundancy, allows design flexibility, simplifies maintenance, reduces low frequency noise and saves energy.

Isolation dampers shall be provided for each unit so that each air handling unit can be maintained while the other remains in operation.

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

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

Supply air will be distributed through riser duct(s) and horizontal main duct(s) on each floor. Generally, there will be one temperature control zone for each laboratory, one zone for three general offices and one zone for each private office.

Central Fume/General Exhaust System:

The entire building, excluding the BSL 3 suite, will be served by a zoned exhaust system serving fume hood exhaust, and general exhaust requirements of the building. Combined fume and general exhaust duct risers from each floor will connect at the roof level to a common plenum exhausted by at least two centrifugal fans.

The exhaust fans will be variable air volume. A static pressure sensor in the exhaust plenum will provide a control signal to the variable frequency drives (VFDs). An outside air bypass damper will also be provided that allows makeup air into the exhaust plenum during low supply airflow fire alarm conditions whenever supply fire/smoke dampers close.

The system will operate at a variable stack discharge velocity of approximately 2,500 to 3,500 feet per minute (FPM). The exhaust fan stacks will discharge at a minimum of 8 feet above the roof. The minimum stack velocity and discharge height will be determined by wind tunnel testing and OSHA regulations.

The fans are intended to operate in parallel and each is sized at 50% of design flow. The exhaust system will operate 24 hours per day, 365 days per year. Sound attenuating devices will be provided at the intake of central exhaust fans.

Pressure independent variable air volume exhaust air terminal devices will be provided to serve general exhaust grilles in lab areas. Pressure independent constant volume exhaust air terminal devices will be provided for the fume hoods. High pressure/high velocity exhaust ductwork will be utilized between the exhaust air terminal devices and the central exhaust plenum. Sound attenuators at the air terminals will not be provided. Instead, sound attenuating flexible ductwork will be provided at general exhaust grilles (but not at hoods) to control noise.

Laboratory and Fume Hood Airflow Control Systems

Fume Hood Control:

The fume hoods will be exhausted on a constant volume basis.

Laboratory Airflow Control:

The laboratories will be non-stepped variable air volume supply and general exhaust with constant volume fume hood exhaust. The control method employed for achieving laboratory air volume control will be airflow tracking type control (i.e. the exhaust rate from the fume hoods and general exhaust will be totaled for each laboratory and the associated supply air valve will be modulated to maintain a predefined offset between the supply and exhaust air quantity). The building's Energy Management Control System (EMCS) will monitor room temperature, supply air CFM, general exhaust CFM, fume hood exhaust CFM, fume hood sash height, fume hood alarm status and fume hood proximity sensor status.

BSL-3 Suite:

One BSL-3 suite will be located on the third floor. Air will be supplied to the suite from the main building supply air system and will be exhausted via a dedicated exhaust system with 100% redundancy.

The exhaust air system will be located on the roof and will consist of two exhaust fans and a bag-in bag-out filter housing which will house a pre-filter and HEPA filter. Individual HEPA filter integrity test ports shall be part of this assembly. Both fans will be sized to 100% exhaust load requirement and will operate in parallel. Both fans will be on emergency power.

BSL-3 suite air inlets and outlets will be provided with bubble tight dampers for decontamination.

Cold Room Cooling System:

Cold rooms will be designed to maintain 4° C ±2° C. Humidity levels in the cold rooms will not be actively controlled and should range from 60-90%, non-condensing.

The cold rooms will be cooled by DX type split system unit coolers which include a refrigerant DX coil and above the room condensing unit. The condensing unit will be air cooled. The cooler and condensing unit will be on emergency power.

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

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

Smoke and Fire Control System:

The building will not be provided with an engineered smoke control system. Upon smoke detection the air handling units will shutdown, but fume hood exhaust fans will continue to run at minimum capacity to maintain operation of hoods, yet still allow occupants to exit the building.

Building Automation and Control System:

The utility and environmental air systems will be controlled and monitored through a Direct Digital Control (DDC) based Energy Management Control System (EMCS) with distributed processing.

System design will be modular and flexible. The major system components of the EMCS include fully stand-alone application controllers, network controllers, and a computer workstation.

The controllers are networked to share information, and control the management function without sacrificing stand-alone reliability. An operator interface terminal may be connected to any of the controllers to operate the network.

A personal computer (PC) with printer will be tied into the networked controllers so that information can be accessed from a central location within the building.

The EMCS shall communicate with a work station in the Central Utility Plant.

Commissioning:

Each mechanical system (plumbing and HVAC) shall be commissioned. Commissioning should start with the schematic design phase and continue through construction.

Commissioning agents should review construction submittals along with engineers and work with the engineers and University to develop compliance testing of all systems and components, access verification documents and training required for operating, repair, and maintenance of all mechanical systems. The commissioning agents shall design compliance testing procedures and documentation forms. They shall schedule and oversee all testing and report the results to the University's representative.

Sustainable Design:

Systems, as mentioned above, including laboratory variable air volume (VAV), fan and pump motors employing variable frequency drives (VFDs), fan wall technology, high efficiency/high performance motors, air side economizers for air handling units returning air, etc. shall be incorporated into the mechanical design to potentially obtain LEED certification or some higher form of sustainable systems' design. The design architects and engineers shall create software models of the building and its system options. The software will predict utility consumption for each option. This information, along with current utility cost rates, will be used in all value engineering design decisions.

The following mechanical sustainable designs are incorporated into this building:

- Variable air volume supply fans for the laboratories.
- Fan wall technology.
- Variable air volume exhaust fans for the laboratories.
- Minimum 6 air changes per hour in the labs.
- Primary-secondary chilled water and heating hot water pumping.
- Digital controls and monitoring.
- Building systems commissioning.
- Wind tunnel testing to address intake air re-entrainment.

Other sustainable design options to be discussed with the University:

- Reduce AHU cooling coil and filter velocities from 500 FPM to 400FPM.
- Upsized ductwork for reduced pressure drop.
- Utilize Active chilled beams in laboratories, equipment corridors, and other spaces with high equipment loads.
- Utilize Passive chilled beams in laboratories along exterior walls.
- Utilize higher supply air temperature.
- Eliminate reheat coils in areas that utilize chilled beams.
- Eliminate sound attenuators at exhaust fans.
- Minimum 4 air changes per hour in the labs through a combination of chilled beams and displacement ventilation.

Mechanical Equipment Schedule

Equipment	Manufacturer	Size (Each)	Total Quantity	Quantity Operating During Emergency Power
Air Handling Unit	*Huntair Fan Wall	47,000 CFM @ 6" SP, 75 HP (Total)	2	1
Exhaust Fan	Greenheck Vektor-CD	34,000 CFM @ 3.5" SP, 50 HP	2	1
BSL 3 Suite Exhaust Fan	Greenheck Vektor-CD	2600 CFM @ 4" SP, 7.5 HP	2	2
Return Fan	Greenheck	12,000 CFM @ 2" SP, 5 HP	2	-
Shell and Tube Heat Exchanger for Hot Water Conversion	Bell & Gossett	2,200 MBH	2	-
Chilled Water Pumps	Bell & Gossett	350 GPM @ 100 ft. Head 20 HP	2	1
Hot Water System Pumps	Bell & Gossett	185 GPM @ 100 ft. Head 10 HP	2	1
Steam Condensate Pumps	Spirax/Sarco	Steam Powered	1 Package, Duplex Pumps	-
Air Conditioning Units at Bioinformatics Lab	Liebert	20 Tons	2	2

Mechanical Utilities:

6" Chilled Water Supply/Return in and out of building (6" CHWS&R).
4" High Pressure Steam (100 psig) into building.
1-1/2" Pumped Condensate Return out of building.
* 10 fans per unit

Plumbing Systems Description

Domestic Hot & Cold Water (Potable):

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

Once inside the building, the water service main will branch out into a potable water main, and an industrial water main via a reduced pressure backflow preventer (RPBP) to serve the laboratory water system. A water meter will be installed immediately upstream of the water service main prior to branching out. The meter will communicate to the building's EMCS to monitor consumption.

Campus water pressure is above 80 psi at the site. A hi-lo pressure reducing station will be provided upstream of the water service main to serve both potable and industrial water service. The pressure reducing station will be sized as follows: one (1) for 75% of the total design flow and one (1) for 33% of the total design flow.

A single steam to water, double-walled water heater will be provided to produce a 120 °F domestic hot water system. The domestic hot water system will be circulated back to the water heaters with the use of a circulating pump and aquastat.

The potable hot and cold water distribution piping will be sized for a maximum velocity of 4 fps and 6 fps, respectively. Water efficient fixtures and faucets will be utilized to meet and/or exceed code minimum requirements and to meet LEED Silver Equivalent Certification.

A separate potable tepid water system will supply the emergency shower/ eyewash fixtures and handheld eyewash units. This supply line to the emergency showers will be monitored by an in-line flow switch, connected to a local audible/visual alarm and building security system for 24 hour monitoring, or other location(s) as directed by the University representative.

Domestic water piping shall be copper, Type L with soldered fittings and joints.

Laboratory and Industrial Hot & Cold Water (Non-potable):

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

A single steam to water, water heater (single-walled) will be provided to produce a 140° F laboratory hot water system, as required. The laboratory hot water system will be circulated back to the water heater with the use of a circulating pump and aquastat.

Laboratory and Industrial water piping shall be copper, Type L with soldered fittings and joints.

Pure Water System (RO/DI):

The anticipated requirement for the distributed purified water system for the building is CAP Type I. This requirement shall be confirmed by the laboratory users.

There will be a centralized Reverse-osmosis/De-ionized (RO/DI) system in the building, with polishing units at points of use.

The equipment for the system will include; FDA epoxy-lined fiberglass tank; hydrophobic, 0.2 micron tank vent filter; 316L stainless steel centrifugal distribution pump; resistivity monitored mixed bed exchange columns; hydrophilic, 0.45 micron water filter; 254 nanometer and 185 nanometer ultraviolet lights and hydrophilic, 0.2 micron water filter.

Acceptable materials for the pure water distribution system will be butt-welded schedule 80, unpigmented, flame retardant polypropylene piping and fittings.

The polypropylene piping will be continuously supported in a hung "V" channel, with 1" per 4 ft slope in the direction of flow. Horizontal expansion loops will be installed in any straight run longer than 100 feet. The distribution system will employ individual loops dedicated for each floor. Dead legs in the distribution system shall be avoided. Where unavoidable, they shall not be longer than six (6) times the inner diameter of the distribution piping.

Points of use will utilize a pipe U-bend with a bottom outlet connected to a manual type - “zero” dead leg diaphragm valve with bottom outlet. The supply and return pipes will drop at wall locations.

System monitoring and/or control will be deemed acceptable by UC Riverside design guidelines by using a Programmable Logic Controller (PLC) in a local control panel. The local control panel will have indicators for the tank level, system resistivity, system total organic content (TOC) and loop flow rate. The local indicators for the tank level, resistivity, and TOC will have the capacity to send discrete alarm signals.

Velocities through the distribution system shall be limited to 3 to 7 feet per second.

Pure Water piping shall be PVDF.

Laboratory Compressed Air:

A duplex air compressor assembly with desiccant dryers will be provided in the building.

The system pressure downstream of the filter and dryer will be set at 100 psig. The 100 psig system will serve the Building at each floor level. Only one (1) laboratory compressed air main riser will rise up through the building. From this main riser, all system branches on each floor will be extended. PRV stations will be provided at each lab to reduce the pressure.

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

The system will be assumed to deliver 1 CFM per outlet (turret).

Laboratory compressed air piping shall be copper, Type L, ACR with Oxygen-cleaned brazed fittings and joints, cleaned and bagged.

Laboratory Vacuum:

A duplex laboratory vacuum pump assembly will be provided in the building.

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

The system will be assumed capable of extracting 0.5 SCFM at each lab inlet (turret) at 4" of vacuum. The piping system will be sized to maintain an approximate (constant) overall system pressure loss of 2" Hg, without exceeding a velocity of 4,000 fpm.

Laboratory vacuum piping system shall be DWV copper with drainage type soldered fittings.

Specialty Gases:

Specialty gases of types as necessary, may be furnished and maintained by the individual user groups within the laboratories under a separate service contract.

An existing bulk nitrogen tank at the site currently located next to the Pierce Hall Building will be relocated and used for this building, providing a central point for filling drawers.

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

Specialty gas piping shall be copper, Type L, ACR with Oxygen-cleaned brazed fittings and joints, cleaned and bagged.

Natural Gas:

Natural gas will be distributed centrally throughout the building at 7" W.C. (0.25 PSIG).

The natural gas will be supplied by a campus loop. It will be extended into the building. Natural gas will be metered. The meter will communicate with the building's EMCS for consumption tracking.

Natural gas piping shall be schedule 40 black steel with threaded fittings.

Fire Protection:

All areas of the building will be fully sprinklered by a total coverage, hydraulically designed automatic wet sprinkler system, and based on Ordinary Hazard, Group II coverage, with a maximum sprinkler head spacing of 130 square feet. The fire protection system will be supplied from the campus fire main distribution system, via a detector check valve and post indicating valve. The use of a fire department siamese hose connection at the building exterior wall will

also be required. The new system will be supplied by a 6" water main to the building that is part of the new 6" cold water main that will be extended from the campus main. The 6" main will serve a combination standpipe system in the building for wet sprinklers with 2-1/2" (Class I) fire hose valves and 1-1/2" adapters. Each floor will be considered a separate zone. An independent dry standpipe system will not be required since the building is less than four stories high.

Fire sprinkler piping shall be schedule 40 or schedule 10 black steel with threaded or grooved fittings.

Fire Protection - BSL 3 Suite:

This approximately 1,300 square foot suite will be provided with a preaction fire sprinkler system. The preaction sprinkler system will be supplied by the 6" water main for the automatic wet sprinkler system.

Fire sprinkler piping system shall be schedule 40 or schedule 10 black steel with threaded or grooved fittings

Sanitary Waste:

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

The building sanitary sewer system will flow by gravity to a location 5'-0" beyond the building exterior and connect to the campus sanitary sewer system.

Sanitary waste piping system shall be no-hub cast-iron piping and fittings with no-hub couplings and stainless steel bands.

Storm Water:

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

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

Storm water drainage piping system shall be no-hub cast-iron piping and fittings with no-hub couplings and stainless steel bands.

As an option for LEED certification, the storm drain system will be diverted to planters and used for irrigation.

Laboratory Waste:

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

For the BSL 3 Suite, all biologically active waste will be collected within the suite. Decontamination of all biologically active waste is expected to be performed within the BSL 3 Suite using autoclaves and properly disposed of by the researchers.

Commissioning:

Each piping system shall be commissioned. Commissioning should start with the schematic design phase and continue through construction.

Commissioning agents should review construction submittals along with engineers and work with engineers and University to develop training required for operating, repair, and maintenance of piping systems. The commissioning agents shall design compliance testing procedures and documentation forms. They shall schedule and oversee all testing and report the results to the University's representative.

Each piping system shall be commissioned. Commissioning should start with the schematic design phase and continue through construction.

PIPING AND FIRE PROTECTION EQUIPMENT SCHEDULE

Equipment	Manufacturer	Size (Each)	Total Quantity	Remarks
Domestic Water Heater	Patterson-Kelley	70 GPM	1	
Industrial Water Heater	Patterson-Kelley	50 GPM	1	
Domestic Hot Water Circulating Pump	Grundfos	≤3/4 HP	1	Aquastat control
Industrial Hot Water Circulating Pump	Grundfos	≤3/4 HP	1	Aquastat control
	AirTech	25 HP each	2	One unit is for standby
	AirTech	15 HP each	2	One unit is for standby
	Ionics	-----	3	One loop per floor
	Kidde-Fenwal	-----	1 Zone	
Preaction Sprinkler System	Viking	-----	2 Zones	

Notes:
1. Equipment size at this juncture is "roughly" estimated, based on similar size and type projects.
2. Water heaters are steam-to-water (compact) units.
3. Circulating pump(s) will be controlled by aquastat(s) to maintain service temperature.
4. Domestic (potable) hot water will serve lavatories, non-lab sinks, janitor sinks, shower stalls, etc., and will be set at 120°F.
5. Industrial (non-potable) hot water will serve lab sinks, lab equipment, etc., and will be set at 140°F.

Electrical Systems Description

Normal Power Service and Distribution System:

The new Health Sciences Surge Building will be served with electrical power from the campus 12.47 KV underground primary distribution system. A new concrete encased 4x5-inch duct bank with two active 12 KV feeders and two spare conduits will be provided to the new pad-mounted service transformer, provided by a separate campus infrastructure contract.

The new pad-mounted service transformer that is located outdoor is rated 1,500 KVA, 12.47 KV primary and 277/480-volt secondary, 3-phase.

An indoor main switchboard rated 2,500-ampere, 277/480-volt with fixed mounted circuit breakers will be fed by the pad mounted service transformer. The breakers in the switchboard are to be provided with electronic trip devices with ground fault system.

The main switchboard, emergency distribution switchboard, distribution panels and motor control centers will be provided with power monitoring system that measures the amperes, voltages, KW, KW-Hr, and KVA parameters of the power system. A dedicated computer workstation will be provided and located at the building manager's or engineer's room for the power monitoring system. The power monitoring system will communicate to the building energy management control system (EMCS) for tracking of electrical energy consumption.

The new pad-mounted service transformer is sized to provide 33% capacity for future load expansion.

Access manholes for 12 KV feeders will be provided every 400 feet.

The power distribution system is as follows:

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

Each floor is provided with 277/480-volt lighting subpanel with combination breakers and solenoid relays for programmable ON and OFF per California Energy Code Title 24.

The 120/208-volt normal power distribution will have three 300 KVA, 480-volt to 120/208-volt, 3-phase step down transformers; one transformer per floor. A 1,000-ampere, 120/208-volt, 3-phase, 4-wire distribution panel will be fed by each 300-KVA transformer for subpanels for the labs and non-lab areas such as offices.

Motor control centers or power panels rated 480-volt will serve HVAC equipment and elevators.

The laboratories will be provided with local 120/208 volt branch circuit subpanels. Main breakers will be provided for lab subpanels.

Transient voltage suppression system devices will be provided at all 208Y/120V distribution panels to limit the current and voltage surges to the branch circuit subpanels.

During the design phase, the use of photovoltaic panels for limited power generation will be investigated.

Standby/Emergency Service and Distribution System

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

Emergency Power System: One 100-ampere automatic transfer switch for life safety branch to serve emergency egress and exit lighting, fire alarm, communications systems, and telephone-data and video resources systems.

Standby Power: One 600-ampere automatic transfer switch to serve selected mechanical systems, elevators, and selected lab equipment such as incubators, freezers, and cold boxes.

The new diesel-generator system will be located outdoors and rated 500 KW/ 625 KVA, 277/480-volt, 3-phase, 4-wire with sub-base diesel fuel tank sized to run for 24 hours of full load operation.

The outdoor diesel engine generator will consist of engine generator and controls, double-wall UL listed sub-base fuel tank, exhaust system, radiator, batteries, starting system, output circuit breaker and a sound attenuated weatherproof enclosure.

Two automatic transfer switches will be provided; one 100-ampere for life safety loads and one 600-ampere for equipment branch to serve HVAC equipment, selected lab equipment and elevators.

The emergency/standby power system will have a 1,000-ampere, 277/480-volt distribution switchboard that would serve the 2 automatic transfer switches.

Emergency power distribution step down transformers will be located on floor electrical rooms to transform voltage from 480V to 208Y/120V.

The new diesel engine generator is sized to provide present loads, plus 30% spare capacity.

Central Uninterruptible Power System (UPS):

A central UPS system is not anticipated at this time. The UPS requirements for telephone and data systems and lab user selected equipment could be served by portable UPS units located at the MDF and IDF rooms and at lab benches.

Grounding System:

A building grounding system will be designed in accordance with NEC Article 250. A ground grid of #4/0 copper conductors around the building will be provided. Service grounding and water pipe grounding to the main service equipment will be provided. Main Distribution Facility (MDF) and Intermediate Distribution Facility (IDF) rooms will be provided with ground copper bars and grounded to the building ground system. System resistance to ground will be 5.0 ohms or less.

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

Lighting Systems:

Exterior light pollution reduction, photocell controlled exterior and interior lighting, solar powered exterior lighting, access to daylighting, daylight harvesting, occupancy-sensor controlled interior lighting and automated lighting control shutoff shall in some form be incorporated into the lighting design to potentially obtain LEED certification or some higher form of sustainable systems' design.

In general, indoor lighting controls will consist of low voltage switches controlled by an automated lighting control system, room occupancy sensors, and photocells controlling daylit internal spaces. Occupancy sensors shall control enclosed offices, conference rooms, restrooms, janitor closets and other enclosed areas subject to private limited use. The automated lighting control system will be integrated through the 277/480-volt lighting subpanels and receive time control inputs from the building EMCS. For example, the normal lighting circuits would be programmed to come ON at 6 AM and turn OFF at 9 PM. Outdoor lighting controls will utilize photocells and time switches with line voltage manual override switches.

Emergency lighting and exit signs will be provided by unswitched branch circuits. These unswitched branch circuits will be fed from emergency lighting panels.

Telecommunications System: Voice, Data, and Video Media Resource

Telecommunications infrastructure will comprise of empty outlet boxes, pathways consisting of conduits, cable trays, and terminal backboards for equipment mounting and cable plant installation.

Telecommunications services to the building are anticipated to be with four 4-inch underground service conduits from the Campus telecommunications manhole. The point of manhole connection and quantity of conduits required shall be verified with the University in detailed design.

The MDF room will be located on the second floor. The lower and upper floors will be provided with one IDF room each stacked.

The telephone and data systems will consist of common wall outlet boxes for use with voice and data jacks in all occupied spaces, such as offices, labs, conference rooms, etc. The outlets will be connected to the MDF and the IDF rooms via conduit and cable tray systems. The conduit from each telephone and data outlet box is 1-inch minimum trade diameter routed to the nearest cable tray.

Fire Alarm System:

The fire alarm system will be an addressable type detection and alarm system. The fire alarm system consists of manual pull stations at required exits, horn and strobe devices throughout the building, smoke detectors in lab spaces,

electrical, MDF and IDF rooms, duct smoke detectors for air handling units with 2000-cfm and above capacity, the fire sprinkler flow monitor and tamper switches, and will transmit an alarm to a 24-hour central station.

A reverse-polarity module will be provided for transfer of system alarm and trouble signals to the UCR Central Fire Alarm Console via campus fire alarm proprietary cable plant, with a connection point at the building fire alarm control panel. A new fire alarm fiber optics cable in conduit will be installed to the building from an existing fire alarm splice box. Location of existing splice box is to be verified with University during the design phase.

Security System:

The security systems will consist of card readers, closed circuit video surveillance system and head end equipment and panels.

All equipment, sensors, devices, and wiring will be provided by the University under separate contact. The project contractor will provide empty outlet boxes, conduits, cable trays, and 120-volt power circuits.

The security system requirements and configuration will be verified with the University during the detailed design phase.

Commissioning:

The electrical systems will be commissioned. Commissioning should start with the schematic design phase and continue through construction.

Commissioning agents should review construction documents consisting of drawings, specifications and calculations and work with the design engineers and University representatives to develop training required for operating, repair, and maintenance of electrical systems. The commissioning agents shall provide compliance testing procedures and documentation forms. They shall schedule and oversee all testing and report all results to the University representative.

Electrical Load Calculations

Project: UC Riverside - Health Sciences Surge Building				
By: Lito Magbitang, AEI			Date: 02-29-2008	
Load	Lab Areas		Non-Lab Areas	
	42,000	SF	18,000	SF
	Watts per SF	Wattage or KVA	Watts per SF	Wattage or KVA
Lighting	1.50	63.00	1.20	21.60
Convenience Receptacles	3.00	126.00	5.00	90.00
Lab Utilities	25.00	1050.00	0.00	0.00
HVAC	10.00	420.00	7.50	135.00
Appliances	1.50	63.00	0.50	9.00
Computers	1.00	42.00	1.50	27.00
Elevators allowance		100		
Subtotal:	42.00	1864.00	15.70	282.60
Demand Load:				**KVA Load**
1. First 10 KVA of receptacles and Lab utilities at 100%:			100%	10.00
2. Remainder of receptacles and lab utilities at 50%:			50%	669.00
3. HVAC at 80% diversity factor:			80%	444.00
4. Elevators at 70% diversity factor:			70%	70.00
5. Computer loads at 75% diversity factor:			75%	51.75
Total:				1244.75
Spare Capacity:			30%	373.43
Grand Total:				1618.18
Recommended service transformer size:				1500-KVA
Recommended emergency generator size at 40% of normal power:				500 KW / 625 KVA
Two ATS Switches:				
1. Life safety				100-ampere
2. Equipment branch and lab utilities		344.85	KVA	600-ampere

Appendix E Meeting Minutes

SRG Partnership, Inc.

Health Sciences Surge Building

University of California Riverside

WORKSHOP #1 SUMMARY January 23, 2008

Date: January 7-8, 2008

Re: DPP Phase, Workshop #1

Attending: Tim Ralston, Kieron Brunelle, Richard Luben, Nita Bullock, Kevin McCausland, Leroy Bean/Project Planning Team

Peter Atkinson, Sarjeet Gill, David Lo/Focus Group (Monday afternoon)

Dennis Cusack, Jon Schleuning, Tim Evans, Ralph Belton/SRG; Rick Heinz/RFD

This memorandum summarizes key decisions made during the first workshop:

A. OVERVIEW

1. Initial building function is bio-medical research space for first phase of new medical school researchers; length of occupancy prior to move into permanent space may be 5 years. Long term function may continue as interim research "surge" facility; potential use as entrepreneurial/incubator space may occur if alternative Parking Lot 13 site is selected.

2. As a "surge" building, the construction budget is modest and the anticipated image of the building is not as a "signature" campus building. Never the less, the building must perform in a manner that facilitates recruitment of new faculty for the proposed health sciences school.

3. The schedule for design and construction is accelerated in order to meet initial health sciences occupancy requirements as noted below.

B. SCHEDULE & PROCESS

1. DPP completion by mid-March, 2008; draft on March 4. Use Genomics DPP as format.

2. Design Review Board presentation March 4 (tentative).

3. C3 review/presentation to occur following Design Review Board presentation.

4. Submittal to Office of the President prior to Regents review in May; the goal is to receive go-ahead approval at the Regents meeting.

5. Occupancy 24 months from date of Regents approval, i.e. May 2010.

6. Workshop dates: #2 - January 28-29; #3 (optional) - February 19-20.
7. Construction Manager at Risk (CMAR) approach; goal is to select by mid-March or soon after completion of DPP; consultant to be retained to assist selection process.
8. Workshop 2 to include meetings with Physical Plant, Campus Fire Marshall and C&C.
9. Demolition of existing buildings, hazardous materials abatement, and utility infrastructure upgrades are separate projects funded through other non-project sources as well as their appropriate CEQA documentation.

C. PROGRAM

1. Assumptions: 60,000 BGSF; approximately 39,000 ASF including lab, lab support, office; see budget section for program related strategies to achieve budget; 3 story configuration is anticipated.
2. See attached Space Program Summary for additional information.
3. Open lab configuration.
4. SPF (Specific Pathogen Free) vivarium space required nearby (not in building); average cage capacity of 400-500 per P.I.; all mice. ABSL-3 space also required, with two rooms each with 6 ventilated cage racks. Serious concerns were noted regarding the use of visibility/security of modular vivarium facilities and the quality of the environment that can be achieved via this type of construction.
5. BSL-3 capability to be provided for as a future upgrade, with a minimum of two laboratory areas with shared anteroom/change rooms for work with separate select agents. It would be desirable to operate this facility as a BSL-2 lab in the interim unless shelled.
6. 12 to 15 principal investigators with varying sizes of research teams anticipated in building. Provide 16 P.I offices plus 2 visiting faculty offices. Provide an average of 2 post-docs and 4 grad students per P.I.
7. Users not currently on campus; to be recruited.
8. Imaging: no NMR or electron microscopy; use other campus facilities; darkenable rooms needed. Some small-scale MRI needed, along with a confocal microscope.
9. Dedicated bioinformatics space required with infrastructure for server equipment. This space could be provided in conjunction with lab or office space.
10. Glassware washing: decentralized in the lab; under-counter glassware washing equipment provided by user.
11. Autoclaves: one central room in building with 3 autoclaves and service area.

12. Conference rooms: 1 large (min. 20-24 occupants, preferably larger); 1 small (10-12 occupants). A reception space with access to large conference room and exterior gathering space outside of secure lab zone required.

13. Elevator: one oversized combination passenger/service (similar to Biological Sciences Bldg.)

14. Fume hoods: 1 per 3 modules of open lab located in alcoves rather than open lab.

15. Controlled temperature rooms: on each floor; varying sizes provides the greatest flexibility of use.

16. One "activity" space including coffee service at each floor accessible from lab space (similar to Biological Sciences).

17. One copy/workroom per floor with mail distribution at ground floor work area.

18. Bio-safety cabinets where provided are to be recirculating; design team to investigate problems with existing biosafety cabinets at Entomology.

19. LEED "silver" level equivalent target (campus goal); LEED "certified" level required by UC System.

20. Standby power to be provided and concentrated in lab support zones with minimal distribution in the open lab. Building generator is required.

21. Chemical storage in labs within cabinets under fume hoods and freestanding storage cabinets. EHS delivers chemicals directly to labs and remove waste chemicals.

22. Utility infrastructure for laboratory equipment to be provided throughout lab space. Portions of casework may be deferred if necessary.

23. Radioisotope lab and hood to be carried as an option separate from base project scope.

24. Central DI water system required with local polishing as needed at labs and lab support (campus DI water loop available to serve building system). Centralized lab vacuum and natural gas to be provided. Compressed air and CO_2 provided via cylinders proximate to labs served. Central liquid N_2 tank to be provided in building service area, but not piped through the building (investigate salvaging existing tank at Pierce Hall).

25. A small freezer farm and cryogenics storage space adjacent to the building service area and liquid N_2 tank should be provided for flexibility.

D. SITE

1. Picnic Hill site, which would roughly sit on the old Entomology site and Insectory, is the preferred site; confirmation anticipated by the end of this week. The preference for this site is due primarily to its proximity to the new vivarium in the Psychology Building (under

construction). This vivarium may require upgrading (including ABSL-3 capabilities) and/or expansion to accommodate Surge needs, which would be accomplished outside of project budget.

2. If the Picnic Hill site is not selected, the building will be located in and at the west end of Parking Lot 13.

3. Utility services are assumed to be available near the Picnic Hill site in the Science Walk area near the new Entomology Building. Capacities and conditions need confirmation. Utility upgrades or modifications to serve the project site will be made outside of project budget and scope (accomplished with Phase 3 of the East Campus Infrastructure project). An allowance is recommended in the construction budget to address potential unmapped existing utilities.

4. Demolition of existing Old Entomology and Insectary buildings will precede construction of the new Surge Building. The SPI building may also be demolished, however, Boyden remains occupied. The CEQA report was prepared for the demolition of both buildings (Old Entomology and Insectary) 10-12 years ago, however, the SPI demolition was not included. It may be possible to complete the CEQA process for SPI and include in demolition.

E. CONSTRUCTION BUDGET

1. $24 million direct construction budget is fixed; includes building and immediate site improvements.

2. Escalation: included in budget; to mid-point of construction (May 2009).

3. Shelling: allowed if needed to meet budget and maintain overall building size.

4. Utilities: assume available to site exist (or provided outside of budget). See item D.3.

5. Inclusions :

   - Infrastructure for typical lab fit-up
   - Infrastructure for future BSL-3 above typical lab fit-up
   - Group 1 equipment; 1 fume hood per 3 modules of open lab space
   - Fit-up of casework in lab support zones; partial fit-up of casework in open lab areas acceptable if required to meet budget

6. Exclusions:

   - Indirect/soft costs

- Site clearance; demolition of existing buildings and hazardous materials abatement
- BSL-3 fit-up beyond typical lab fit-up
- Vivarium and ABSL-3 modifications (not in building)
- Utility infrastructure upgrades and relocations including potential pedestrian/circulation pathway/sidewalk between project and Psychology loading dock to access vivarium (including night lighting).
- Group 2 and 3 equipment; bio-safety cabinets

F. NEXT STEPS/ACTION ITEMS

1. Workshop #2 – Monday, January 28 and Tuesday, January 29; see attached draft agenda.
2. **Design team** to review existing site utilities infrastructure and provide preliminary load estimates for review with Physical Plant.
3. **Design team** to identify flexible lab casework system options to Project Planning Committee for preliminary review prior to Workshop 2.
4. **Design team** to develop preliminary cost model based on initial program.
5. **Design team** to develop preliminary room criteria sheets for review with Project Planning Committee and Focus Group.
6. **Design team** to update design/construction schedule to include CEQA and updated dates for approval, etc.
7. **UCR** to provide detail of existing conditions around Picnic Hill site including site and building plans for Entomology, Genomics, utilities, topography etc.
8. **UCR** to confirm site selection by Friday, January 11.

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SRG Partnership, Inc.

Health Sciences Surge Building

University of California Riverside

WORKSHOP #2 SUMMARY Revised February 18, 2008

Date: January 28-29, 2008

Re: DPP Phase, Workshop #2

Attending: Tim Ralston, Kieron Brunelle, Richard Luben, Nita Bullock, Kevin McCausland, Leroy Bean, Daniel Vargas/Project Planning Team

Sarjeet Gill/Focus Group (Monday and Tuesday afternoons)

Dennis Cusack, Jon Schleuning, Tim Evans, Ralph Belton/SRG; Rick Heinz, Lloyd Fisk/RFD

This memorandum summarizes key decisions made during the first workshop:

A. OVERVIEW

1. Good progress was made on key DPP issues. The Picnic Hill site is under study and a preliminary design concept has been selected. The program has been refined and is in near-final form. The schedule is being further developed with particular emphasis on the construction delivery method. A key issue for investigation before Workshop 3 is the construction budget and options to meet the $24M budget.

2. Workshop 3 has been revised to be one day on Wednesday, February 20. A draft agenda is attached.

B. SCHEDULE & PROCESS

1. The Design Review Board presentation has been accelerated to Feb. 5; SRG will attend and present the preliminary recommendations for site selection and building massing.

2. A presentation to the C-3 group has been scheduled for February 21, and a pre-meeting will be held on February 20 prior to the beginning of Workshop 3.

3. No new CEQA submittal is required for demolition of the existing Old Entomology and Insectary buildings. Potential demolition of the SPI building would require CEQA, but is not considered “significant”.

4. The completion of the Design Development phase is the typical stage for Regent’s design approval and must coincide with CEQA approvals (including its public process); Regent’s approval would occur preferably in September 2008 rather than November in order to leave

more time for construction. Meetings are the middle of every other month; schedule is on-line.

5. The project schedule assumes Regent's approval of project funding in May 2008.

6. Geotechnical analysis and survey of site should proceed as soon as scope can be identified in order to allow Schematic Design to proceed as well as the CEQA submittals.

7. Discussion with Karen Compton, A3K Consulting, who is advising UCR on the selection process for the CMAR:

    - March 28, 2008 is target for selection so that the CMAR is involved early in SD phase; interviews March 26 (tentatively).

    - A Guaranteed Maximum Price (GMP) at 90% of CD phase is anticipated (100% may be acceptable); deferring the GMP as late as possible in CD phase will achieve lowest contingency by CMAR, but must be synchronized with construction schedule.

    - Currently there is little market interest in UCR bid work due to the busy market and other opportunities; the CMAR approach may alleviate this concern; other benefits of CMAR process are – prequalification of general contractor, early involvement in design, and faster completion. Design/build was not considered appropriate for this project.

    - UCR and A3K are developing CMAR selection criteria to include building type experience as well as experience in the public sector CMAR process.

    - UCR is confirming that the CMAR can be selected before Regents funding approval in May.

    - CM Multiple Prime method may be considered as an option since it may allow earlier construction start; however a price is not guaranteed by the CM, and thus risk is shifted from to UCR; UCR prefers not to pursue this approach.

    - UCR/A3K is requesting a clarification (or waiver) of certain low-bid UC requirements to allow selection of CMAR based on weighted evaluation of qualifications and cost.

    - UCR is clarifying if a GMP for the entire project must be established prior to beginning of any construction work or pre-ordering, according to UC policy; due to schedule pressures UCR prefers to bid early packages which would occur prior to establishing a GMP; this would require approval to competitively select the CMAR based on fees and qualifications; thus, UCR's preferences are: 1) select CMAR on weighted criteria including fees and qualifications; 2) select based on low bid of fees/GC's after pre-qualification; 3) CM multiple prime or possibly CMAR multiple packages with multiple GMP's.

- Completion target for construction is May 2010; however, occupancy would likely be phased in over the summer for a Fall 2010 operation; this may allow a modest time contingency for construction completion in early summer.

C. PROGRAM

1. 60,000 gsf; approximately 37,000 asf; 61% efficiency based on revised space program dated January 29, 2008 (attached).

2. The number of principal investigators was increased to 17 per UCR; average 3 lab modules per PI; 45 generic research lab modules, plus 3 modules of BSL 3 and 4 modules of Bioinformatics space; separate office space for graduate students has been deleted.

3. Utility distribution: 2 utility feeds per module preferred for flexibility, provided via overhead service panels in ceiling; preferred vs. overhead carriers due to assumption of lower costs.

4. Open lab concept 'C' is preferred; subdivision of labs is visual and functional, not physical (i.e. no walls).

5. Provide Grad student "write-up" desks in the labs on outside wall; option 'C' preferred. Office space for Grad students outside of the lab is eliminated. Decision supported by Focus Group and Project Steering Committee. Consequently, the elimination of the graduate student work space allowed the program to grow by two lab modules, two PI offices, four Post Doc workstations, and associated support space.

6. Lab casework:

    - H-frame concept is preferred due to flexibility, function and cost.

    - Added cost of flexible casework system must be offset by scope of fit-up in the base budget.

    - Several vendors are available – Collegdale, Kewaunee, Fisher Hamilton; RFD recommends asking manufacturers for 'mock-up' bench during design.

    - One manufacturer should be consistent throughout building for future compatibility, efficiency and flexibility; applies even for casework supplied by user.

    - Wood finish is preferred; plastic laminate is possible if budget requires; not metal.

    - Epoxy tops are preferred; may consider new options such as balsa/epoxy.

7. The revised plan for the BSL 3 laboratory suite (1/29/08) based on 3 lab modules is preferred (with multiple smaller laboratories); bio safely cabinets are not exhausted (verify with EH&S).

8. One sink per 3-lab modules in the open research labs, plus one sink in each fume hood alcove.

9. Activity/interaction areas – 2 small (per floor) are better than 1 large; irregular configuration is desirable.

10. Labs must be secured from public spaces and offices; office area does not need to be secured.

11. Number of lab modules per open lab block is less important than proximity of labs to lab support such as tissue culture.

12. Fume hood alcoves contiguous to lab is important; instrument rooms can be part of the general lab support even if assigned space.

13. Radio isotopes may be used in the building, e.g. on the lab bench, but not in a hot lab; dedicated radioisotope hood not required.

14. Autoclaves – 2 large provided + 2 small for future installation.

15. Thomas Girke/Bio Informatics: lab is office space in character, with open office workstations for 10-12 people. The server space should be provided with a raised floor. UCR will study the feasibility of using the server cluster in the Genomics Building to serve this building's bio-informatics space with direct I.T. pathway to the Genomics servers.

16. Russ Vernon/EH&S: airflow rates in labs can be reduced to 6 air changes per hour, but depends on nature of use and flow (the design team must demonstrate proper ventilation via CFD analysis). The Genomics Building constant volume HVAC system is not desirable (no occupancy sensors in labs to verify occupancy); energy savings measures must be reviewed with EH&S to verify safety issues; lab waste stored in lab under control of operator and picked up by EH&S; no general chemical storage space in building; vented chemical storage cabinets under or near fume hoods and within the equipment corridor will be required; no acid waste neutralization system is needed but a monitoring port should be provided (University monitors effluent); BSL-3 must have operational procedures to contain waste in the lab for appropriate removal or treatment (waste will be collected under sink in each lab and chemically treated for disposal to sanitary sewer); no house vacuum in BSL-3 (portable vacuum pumps).

17. Susan Trotta/Students with Disabilities: campus standards follow building code; labs must allow student access and use – rooms must be navigable, appropriate casework must be adaptable; 1 accessible fume hood per floor; cell/tissue culture rooms can be modified when need arises by user.

18. Scott Corrin/Fire Marshall: I&Q building has a 'Y' fire turnaround for fire access on the north side and the building is mitigated with fire alarms; science walk on the west will be one way and pedestrian oriented – prefer somewhat wider opening at point of new Entomology if

possible; two options for code – 'B' occupancy (with users working within its limitations) and proposed 'L' occupancy; most of UCR lab buildings are exempted 'B' occupancies; 'L' occupancy should be explored, though it is only in draft form (Scott will monitor its progress and forward draft requirements to the design team); UCR prefers to avoid H8 occupancy (proposed "L" occupancy similar); 'B' occupancy will be assumed pending review of 'L'; building will be fully sprinklered and alarmed (assume $3.50/sf per University contracts); fire and domestic water source be adequate; radio access within the building will be studied during design.

19. Detectives Andert and Hoffert/Campus Police: concerns about placing restrooms in dark areas of building; cameras for ingress and egress are preferred (not in building construction cost); card key and hard key access.

20. Dan Martin/Communications Services: provide pathways to each lab for fiber optics (see MS&E approach); 1 voice and 2 data outlets for 100 sf office; 2 voice and 4 data over 150 sf; wireless available throughout the building "as best they can"; connection point for fiber and copper is SE corner of Genomics in parking space; stacked communication closets – MDF/BDF at point of entry on ground floor (10'x12' room); one IDF (9'x10') on other floors; cable tray distribution in corridors and as a primary pathway through office spaces, with cable distributed by j-hooks to devices; UCR to send campus standards (draft) to SRG.

D. SITE & BUILDING

1. Existing SPI building must stay in place due to current occupants; verify impact on Surge.

2. The shed adjacent to the Insectary may be removed if needed, though it is currently used for growth rooms by Old Entomology.

3. The existing road behind SPI and Boyden should remain for pedestrian circulation and campus vehicles; it is not used for emergency vehicles.

4. Utilities will be available adjacent to the building site.

5. Building configuration concept 'A' is preferred due to the smaller grouping of lab modules and interaction spaces which are combined with circulation adjacent to lab areas.

E. CONSTRUCTION BUDGET

1. Construction costs of "comparable projects" from DLA suggest budgets considerably higher than $400/gsf; issues which may influence costs are relatively modest size of building (60,000 gsf) and high proportion of labs to total area.

2. SRG and UCR will further investigate comparables, such as BSB, Genomics and MS&E to better determine likely costs; SRG will further investigate escalation over the last 4 years which has had a major impact on costs.

3. SRG and DLA will update cost model based on revised program and site/building concept.
4. Strategies to meet $24M construction budget will be focused on shelling of space; 60,000 gsf total area is considered fixed in order to optimize the site and to accommodate research need.

F. NEXT STEPS/ACTION ITEMS

1. **Workshop #3** – Wednesday, February 20; see attached draft agenda.
2. **UCR** clarify CMAR delivery method.
3. **SRG** to update preliminary cost model based on comparable costs, revised program, design concept and strategies discussed at Workshop 2.
4. **UCR** to provide comparable construction costs for Materials Sciences, Biological Sciences and Genomics.
5. **RFD** to update preliminary room criteria sheets and space diagrams(by Feb. 8) and lab design criteria narrative.
6. **SRG** to update design/construction schedule to include CEQA and updated dates for approval, etc.
7. **UCR** to provide detail of existing conditions around Picnic Hill site including site and building plans for Psychology, Old Entomology and utilities.
8. **SRG** to submit information for contract options for DRB attendance and workshop 3.
9. **UCR** (Russell Vernon) to provide latest UC System Lab Design Guide.
10. **UCR** (Scott Corrin) to provide draft of 'L' occupancy code requirements and monitor State's progress. **SRG** and **RFD** to investigate 'L' option vs. 'B' occupancy.
11. **UCR** (Dan Martin?) to provide campus standards draft for communications requirements.
12. **UCR** and **SRG** to clarify LEED requirements.

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SPACE PROGRAM SUMMARY

January 29, 2008

ID No.	SPACE TYPE		QTY	ASF	Total ASF	# Modules
RESEARCH LABORATORIES						
1.01	Research Laboratories (Modules)		45	315	14,175	45.00
1.02	BSL-3 Research Laboratories (Modules)		3	315	945	3.00
1.03	Bioinformatics Research		4	315	1,260	4.00
				Laboratory Subtotal	**16,380**	**52.00**
					44.8%	
RESEARCH SUPPORT						
2.01	Equipment Rooms		6	315.0	1,890	6.00
2.02	Fume Hood Alcove/Chemical Storage		15	105.0	1,575	5.00
2.03a	Controlled Temperature Rooms		2	210.0	420	1.33
2.03b	Controlled Temperature Rooms		2	105.0	210	0.67
2.04	BSL-3 Anteroom/Autoclave Room		1	315.0	315	1.00
2.05	Instrument Rooms		13	157.5	2,048	6.50
2.06	Cell Culture Rooms		13	315.0	4,095	13.00
2.07	Darkenable Support Rooms		2	105.0	210	0.67
2.08	Autoclave Room		1	472.5	473	1.50
2.09	Cluster Farm (Bioinformatics)		1	472.5	473	1.50
2.10	Fluorescence-Activated Cell Sorting (FACS) Room		1	157.5	158	0.50
2.11	Confocal Microscopy Room		1	157.5	158	0.50
2.12	Storage Rooms		1	157.5	158	0.50
2.13	Building Receiving		1	315.0	315	1.00
2.14	Freezer Farm/Cryogenics Storage		1	210.0	210	0.67
				Lab Support Subtotal	**12,705**	**40.33**
					34.8%	
OFFICE/ADMIN/CONFERENCE						
3.01	Faculty Office (PI)		17	132	2,244	
3.02	Visiting Faculty Offices		2	132	264	
3.02	Post Docs		34	60	2,040	
3.04	Grad Students		68	Locate within open laboratories		
3.05	Administrative Support		2	125	250	
3.06	Mail Room		1	125	125	
3.07	Copy/Workroom		3	125	375	
3.08	Seminar/Conference Room	20-24	1	500	500	
3.09	Conference Room	10-12	1	250	250	
3.10	Coffee/Activity Spaces		3	250	750	
3.11	Faculty Colloquium/Foyer/Prefunction Area		1	250	250	
3.12	Faculty Colloquium Areas		2	200	400	
				Subtotal	**7,448**	
					20.4%	
				PROGRAM TOTAL ASF	**36,533**	
				Net/Gross Ratio	60.9%	
				TOTAL BUILDING GSF	**60,000**	

HEALTH SCIENCES SURGE BUILDING — **UNIVERSITY OF CALIFORNIA RIVERSIDE**

SRG Partnership, Inc. — **Research Facilities Design**

SRG Partnership, Inc.

Health Sciences Surge Building

University of California Riverside

WORKSHOP #3 SUMMARY March 8, 2008

Date: February 20-21, 2008

Re: DPP Workshop #3 (Feb. 20) and Schematic Design Kick-off Workshop (Feb. 21)

Attending: Tim Ralston, Kieron Brunelle, Richard Luben, Nita Bullock, Kevin McCausland, Leroy Bean, Daniel Vargas/Project Planning Team

Dennis Cusack, Jon Schleuning, Tim Evans, Ralph Belton/SRG; Rick Heinz, Lloyd Fisk/RFD; Rick Lloyd/DLA; Saiful Islam/SB; Mike Zilis, Michael Moyers/W&M; John McDonald/AEI

This memorandum summarizes key decisions made at the end of the two day workshop. It focuses on issues that are pertinent to finishing the DPP, finalizing the fee proposal for Phase 2, and moving forward on Schematic Design.

A. OVERVIEW

1. This is the final DPP workshop and the kick-off workshop for the accelerated Schematic Design Phase.
2. The DPP draft will be submitted on Tuesday, March 4.
3. Workshop 4 is scheduled for Tuesday-Wednesday, March 11-12.

B. SCHEDULE & PROCESS

1. The presentation to the Campus Coordinating Committee occurred on Feb. 20 and the project was approved.
2. UC Regents' approval of the project is anticipated at their May, 2008 meeting. Schematic Design will proceed in advance of this approval as an amendment to the current PSA agreement in order to meet the construction and completion schedule.
3. UCR is proceeding with securing services for the geotechnical analysis, survey of site and wind testing.
4. The CMAR selection process has begun and a mandatory pre-proposal conference is scheduled for Tuesday, March 4 with selection anticipated by the end of April. UCR to confirm.

5. The demolition scope for old Entomology and the Insectary will include preparation of an engineered building pad for the new Surge Building. This will allow more efficient and cost effective construction of the pad and allow earlier construction for the Surge foundations. Demolition is anticipated to be complete in July or August 2008.

6. The updated schedule anticipates start of construction in December 2008 and completion by July 1, 2010. Two bid packages are assumed – an early foundation package and the main package for the remainder of the building and site. A copy of the updated schedule, dated Feb. 23 is attached.

7. UCR will clarify the DSA review duration and timing, which is on the critical path to completion of construction documents and start of construction.

C. PROGRAM

1. Building gross area remains at 60,000 gsf; approximately 36,500 asf; 61% efficiency based on revised space program dated January 29, 2008 (Workshop 3).

2. The space program and room diagrams were reviewed with minor change, which will be incorporated into the DPP.

3. Vibration design criteria in Genomics, Biological Sciences and Materials Sciences is 2,000 mips in the labs. The Surge Building will pursue a concept that achieves 2,000 mips near lab columns and in the lab support zones, but may range up to 4,000 mips in the mid-spans of the open labs.

4. Open labs will be fit-out with casework in 2 of 3 modules. This "baseline" casework will consist of the "H" frame configuration. Additional casework will be provided by user.

5. Bio-informatics will be served by the facilities in the new Genomics Building; UCR to confirm.

6. Lab support rooms will be constructed with minimal or no casework in the initial construction to allow flexibility to respond to user requirements and reduce cost. Casework will be supplied by user as needed.

7. SRG will provide room diagrams for non-lab spaces, including offices, conference rooms etc.

D. SITE & BUILDING

1. Updated concepts for the building and site were reviewed and approved for further development in Schematic Design. The design concept has been updated based on feedback from the Design Review Board on Feb. 5.

2. A LEED checklist was reviewed which indicates that the project likely meets UC equivalent "certification" level and close to "silver" level. UCR to clarify. UCR does not anticipate applying for LEED certification.

3. Construction staging will likely occur in Parking Lot 6 where the Psychology Building is currently staged. Staging may also occur in the current Genomics staging area adjacent to Batchelor Hall (suggestion by Mike Delo). Resolution of this issue will occur after the CMAR is on board.

4. Provide disabled parking in the Surge Building service area; no specific number of spaces was identified, as many as are practical.

5. The structural frame will be concrete, in lieu of steel, to address cost and schedule requirements. Concrete will also assist with the vibration criteria.

6. Two storey open stairs in the lab wing and office wing are desirable if acceptable by code.

E. CONSTRUCTION BUDGET

1. Build-out of the 60,000 gsf building is anticipated to cost $35.5M including completion of the BSL-3 lab. These costs reflect "baseline" fit-up of the open labs and lab support areas. Revised Preliminary Construction Cost Model (dated Feb. 21, 2008) based on the workshop is attached.

2. The Design Team will complete construction documents for the build-out of the project as described above, including the BSL-3 lab and unfinished floors.

3. The initial $24M construction phase will consist of one finished floor (Floor 3) and two "cold shelled" floors (Floors 1 and 2). UCR will confirm this approach.

4. Alternates will be documented for completion of the two shelled floors, and the BSL-3 lab on Floor 3. The Design Team will provide technical drawings and specifications; the CMAR will prepare bid packages.

5. UCR's preferred initial construction scope includes one finished floor, one "warm" shell and one "cold" shell, however, this currently exceeds the $24M budget. UCR to clarify.

6. Cold shell definition: SRG to summarize definition from workshop.

7. Cold shell definition: SRG to summarize definition from workshop.

F. NEXT STEPS/ACTION ITEMS

1. **Workshop #4** – Tuesday and Wednesday, March 11-12.

2. **UCR** to proceed with site demolition and utility upgrade work, geotech report, site survey and wind studies; Design Team to provide input as needed for scope.
3. **SRG** to present draft of DPP on Tuesday, March 4, with updated program, schedule, cost and design concepts.
4. **UCR** (Dan Martin?) to provide campus standards draft for communications requirements.
5. **UCR** to clarify UC/LEED requirements.
6. **UCR** to confirm that Bio-informatics will be served by Genomics.
7. **SRG** to prepare non-lab space diagrams.
8. **UCR** to determine scope of initial construction phase, per E.5 above.

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Appendix F Detailed Program Cost Model

DETAILED PROJECT PROGRAM
COST MODEL

for

Health Science Surge Building
University of California, Riverside
Riverside, California

DAVIS LANGDON

March 10, 2008

BASIS OF COST MODEL

Cost Model Prepared From	Dated	Received
DPP design document	03.04.08	03.04.08

Discussions with the Project Architect and Engineers

Conditions of Construction

The pricing is based on the following general conditions of construction

A start date of January 2009

A construction period of 19 months

The general contract will be negotiated with one pre-selected general contractor in a CM at risk procurement scenario

There will not be small business set aside requirements

The contractor will be required to pay prevailing wages

There are no phasing requirements, though the project will be phased between an initial build out and a subsequent fit out of the balance of the shell

The general contractor will have full access to the site during normal business hours

OVERALL SUMMARY

	Gross Floor Area	$ / SF	$x1,000
Core and Shell	60,000 SF	310.27	18,616
3rd Floor Fitout	20,000 SF	235.20	4,704
1st and 2nd Floor Fitout	40,000 SF	234.86	9,394
TOTAL Building Construction	120,000 SF	272.62	32,714
Sitework			1,551
TOTAL Building & Sitework Construction	*January 2009*		*34,265*

Please refer to the Inclusions and Exclusions sections of this report

OVERALL COMPONENT SUMMARY (CORE AND SHELL AND FITOUT OF 20,000 GSF)

Gross Area: 60,000 SF

		$/SF	$x1,000
1. Foundations		15.88	953
2. Vertical Structure		13.71	823
3. Floor & Roof Structures		43.76	2,626
4. Exterior Cladding		52.83	3,170
5. Roofing, Waterproofing & Skylights		6.82	409
Shell (1-5)		133.00	7,980
6. Interior Partitions, Doors & Glazing		10.08	605
7. Floor, Wall & Ceiling Finishes		6.92	415
Interiors (6-7)		17.00	1,020
8. Function Equipment & Specialties		15.75	945
9. Stairs & Vertical Transportation		8.25	495
Equipment & Vertical Transportation (8-9)		24.00	1,440
10. Plumbing Systems		19.00	1,140
11. Heating, Ventilating & Air Conditioning		54.33	3,260
12. Electric Lighting, Power & Communications		33.33	2,000
13. Fire Protection Systems		4.83	290
Mechanical & Electrical (10-13)		111.49	6,690
Total Building Construction (1-13)		285.49	17,129
14. Site Preparation & Demolition		1.00	60
15. Site Paving, Structures & Landscaping		15.00	900
16. Utilities on Site		3.00	180
Total Site Construction (14-16)		19.00	1,140
TOTAL BUILDING & SITE (1-16)		304.49	18,269
General Conditions	11.00%	33.50	2,010
Contractor's Overhead & Profit or Fee	5.00%	16.90	1,014
PLANNED CONSTRUCTION COST	*March 2008*	354.89	21,293
Contingency for Development of Design	5.00%	17.75	1,065
Escalation to Start Date (January 2009)	8.00%	29.82	1,789
Construction Contingency	3.00%	12.07	724
RECOMMENDED BUDGET	*January 2009*	414.52	24,871

OVERALL COMPONENT SUMMARY (FULL BUILD OUT)

Gross Area: 60,000 SF

		$/SF	$x1,000
1. Foundations		15.88	953
2. Vertical Structure		13.71	823
3. Floor & Roof Structures		45.27	2,716
4. Exterior Cladding		52.83	3,170
5. Roofing, Waterproofing & Skylights		6.82	409
Shell (1-5)		134.50	8,070
6. Interior Partitions, Doors & Glazing		28.25	1,695
7. Floor, Wall & Ceiling Finishes		17.75	1,065
Interiors (6-7)		46.00	2,760
8. Function Equipment & Specialties		45.25	2,715
9. Stairs & Vertical Transportation		8.25	495
Equipment & Vertical Transportation (8-9)		53.50	3,210
10. Plumbing Systems		29.00	1,740
11. Heating, Ventilating & Air Conditioning		81.00	4,860
12. Electric Lighting, Power & Communications		50.00	3,000
13. Fire Protection Systems		6.50	390
Mechanical & Electrical (10-13)		166.49	9,990
Total Building Construction (1-13)		400.50	24,030
14. Site Preparation & Demolition		1.00	60
15. Site Paving, Structures & Landscaping		15.00	900
16. Utilities on Site		3.00	180
Total Site Construction (14-16)		19.00	1,140
TOTAL BUILDING & SITE (1-16)		419.50	25,170
General Conditions	11.00%	46.15	2,769
Contractor's Overhead & Profit or Fee	5.00%	23.28	1,397
PLANNED CONSTRUCTION COST	*March 2008*	488.93	29,336
Contingency for Development of Design	5.00%	24.45	1,467
Escalation to Start Date (January 2009)	8.00%	41.07	2,464
Construction Contingency	3.00%	16.63	998
RECOMMENDED BUDGET	*January 2009*	571.08	34,265

CORE AND SHELL AREAS & CONTROL QUANTITIES

Areas

	SF	SF	SF
Enclosed Areas			
Core and Shell	60,000		
SUBTOTAL, Enclosed Area		60,000	
Covered area	Incl.		
SUBTOTAL, Covered Area @ ½ Value			
TOTAL GROSS FLOOR AREA			60,000

Control Quantities

				Ratio to Gross Area
Number of stories (x1,000)		3	EA	0.050
Gross Area		60,000	SF	1.000
Enclosed Area		60,000	SF	1.000
Fitout Area		22,500	SF	0.375
Laboratory Assignable Area		11,250	SF	0.188
Footprint Area		20,000	SF	0.333
Volume		960,000	CF	16.000
Gross Wall Area		35,000	SF	0.583
Finished Wall Area		35,000	SF	0.583
Windows or Glazing Area	38.57%	13,500	SF	0.225
Roof Area - Flat		20,000	SF	0.333
Roof Area - Total		20,000	SF	0.333
Interior Partition Length		2,000	LF	0.033
Finished Area		22,500	SF	0.375
Elevators (x10,000)		2	EA	0.333
Plumbing Fixtures (x1,000)		20	EA	0.333
Electrical Load		1,500	KW	25.000

CORE AND SHELL COMPONENT SUMMARY

		Gross Area: 60,000 SF	
		$/SF	$x1,000
1. Foundations		15.88	953
2. Vertical Structure		13.71	823
3. Floor & Roof Structures		42.93	2,576
4. Exterior Cladding		52.83	3,170
5. Roofing, Waterproofing & Skylights		6.82	409
Shell (1-5)		132.16	7,930
6. Interior Partitions, Doors & Glazing		1.00	60
7. Floor, Wall & Ceiling Finishes		1.50	90
Interiors (6-7)		2.50	150
8. Function Equipment & Specialties		1.00	60
9. Stairs & Vertical Transportation		8.25	495
Equipment & Vertical Transportation (8-9)		9.25	555
10. Plumbing Systems		14.00	840
11. Heating, Ventilating & Air Conditioning		41.00	2,460
12. Electric Lighting, Power & Communications		25.00	1,500
13. Fire Protection Systems		4.00	240
Mechanical & Electrical (10-13)		83.99	5,040
Total Building Construction (1-13)		227.91	13,674
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)		227.91	13,674
General Conditions	11.00%	25.07	1,504
Contractor's Overhead & Profit or Fee	5.00%	12.65	759
PLANNED CONSTRUCTION COST	*March 2008*	265.62	15,937
Contingency for Development of Design	5.00%	13.28	797
Escalation to Start Date (January 2009)	8.00%	22.32	1,339
Construction Contingency	3.00%	9.03	542
RECOMMENDED BUDGET	*January 2009*	310.27	18,616

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
1. Foundations				
Excavation				
Excavation - overexcavation	3,500	CY	10.00	35,000
Disposal				
Disposal - over excavation	3,500	CY	12.00	42,000
Fill				
Fill - overexcavation	3,500	CY	20.00	70,000
Reinforced concrete including excavation				
Concrete spread footings, stepped footings, excavation, disposal and backfill	1,500	CY	500.00	750,000
Pits				
Elevator pits	2	EA	10,000.00	20,000
Subsurface drainage				
Perimeter and underslab drainage	1,500	LF	24.00	36,000
				953,000
2. Vertical Structure				
Columns and pilasters				
Concrete columns and pilasters	150	CY	2,150.00	322,500
Shear walls				
Concrete shear walls	10,000	SF	50.00	500,000
				822,500
3. Floor and Roof Structure				
Floor at lowest level				
Reinforced concrete slab on grade	20,000	SF	15.00	300,000

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
Suspended floors				
Reinforced suspended concrete slabs	40,000	SF	35.00	1,400,000
Flat roofs				
Reinforced suspended concrete slabs	20,000	SF	32.50	650,000
Equipment pads, equipment curbs, wall curbs				
Equipment pads, equipment curbs, wall curbs	60,000	SF	1.50	90,000
Miscellaneous				
Miscellaneous metals and seismic joints	60,000	SF	2.26	135,600
				2,575,600

4. Exterior Cladding

Wall framing, furring and insulation				
Steel stud framing, gypsum board sheathing, air/vapor barrier, batt insulation, blocking, steel angles	35,000	SF	20.00	700,000
Applied exterior finishes				
Brick veneer with precast trim	35,000	SF	35.00	1,225,000
Windows, glazing and louvers				
Windows	9,000	SF	65.00	585,000
Curtainwall	4,000	SF	85.00	340,000
Louvers	500	SF	65.00	32,500
Exterior doors, frames and hardware				
Glazed aluminum entrances	8	EA	3,500.00	28,000
Hollow metal entrances	4	EA	2,000.00	8,000
Fascias, bands, screens and trim				
Fascias, bands, screens and trim	35,000	SF	4.50	157,500

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
Soffits				
Soffits	2,500	SF	37.50	93,750
				3,169,750

5. Roofing, Waterproofing & Skylights

Waterproofing				
Waterproofing to elevator pits	2	EA	2,000.00	4,000
Insulation				
Roofing insulation	20,000	SF	4.00	80,000
Roofing				
Membrane roofing	20,000	SF	10.00	200,000
Roof or deck traffic surfaces				
Walkway pads	2,000	SF	15.00	30,000
Roofing upstands and sheet metal				
Flashing and accessories	20,000	SF	1.75	35,000
Caulking and sealants				
Caulking and sealants	60,000	SF	1.00	60,000
				409,000

6. Interior Partitions, Doors & Glazing

Partitions and doors				
Metal stud partitions with gyp and batt insulation, interior glazing, interior doors	60,000	SF	1.00	60,000
				60,000

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
7. Floor, Wall & Ceiling Finishes				
Floors, base, walls, ceilings and miscellaneous				
Building core and shell only	60,000	SF	1.50	90,000
				90,000
8. Function Equipment & Specialties				
General building equipment				
Building core and shell only	60,000	SF	1.00	60,000
				60,000
9. Stairs & Vertical Transportation				
Staircase flights - floor to floor				
Metal pan stairs with concrete fill, painted steel railings	8	EA	25,000.00	200,000
Ladders and fire escapes				
Elevator pit and access ladders	1	LS	10,000.00	10,000
Elevators				
Passenger elevator (3 stops)	1	EA	135,000.00	135,000
Freight elevator (3 stops)	1	EA	150,000.00	150,000
				495,000
10. Plumbing Systems				
Plumbing systems	60,000	SF	14.00	840,000
				840,000

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
11. Heating, Ventilation & Air Conditioning				
HVAC	60,000	SF	41.00	2,459,700
				2,459,700
12. Electrical Lighting, Power & Communication				
Electric, lighting, power and communication	60,000	SF	25.00	1,499,940
				1,499,940
13. Fire Protection Systems				
Fire protection systems	60,000	SF	4.00	240,000
				240,000
14. Site Preparation & Building Demolition				
			see sitework component	
				0
15. Site Paving, Structures & Landscaping				
			see sitework component	
				0
16. Utilities on Site				
			see sitework component	
				0

3RD FLOOR FITOUT AREAS & CONTROL QUANTITIES

Areas

	SF	SF	SF
Enclosed Areas			
3rd Floor Fitout	20,000		
SUBTOTAL, Enclosed Area		20,000	
Covered area	Incl.		
SUBTOTAL, Covered Area @ ½ Value			
TOTAL GROSS FLOOR AREA			20,000

Control Quantities

			Ratio to Gross Area
Number of stories (x1,000)	1	EA	0.050
Gross Area	20,000	SF	1.000
Enclosed Area	20,000	SF	1.000
Fitout Area	20,000	SF	1.000
Laboratory Assignable Area	10,000	SF	0.500
Interior Partition Length	650	LF	0.033
Finished Area	20,000	SF	1.000
Plumbing Fixtures (x1,000)	7	EA	0.350

3RD FLOOR FITOUT COMPONENT SUMMARY

Gross Area: 20,000 SF

		$/SF	$x1,000
1. Foundations		0.00	0
2. Vertical Structure		0.00	0
3. Floor & Roof Structures		2.50	50
4. Exterior Cladding		0.00	0
5. Roofing, Waterproofing & Skylights		0.00	0
Shell (1-5)		2.50	50
6. Interior Partitions, Doors & Glazing		27.25	545
7. Floor, Wall & Ceiling Finishes		16.25	325
Interiors (6-7)		43.50	870
8. Function Equipment & Specialties		44.25	885
9. Stairs & Vertical Transportation		0.00	0
Equipment & Vertical Transportation (8-9)		44.25	885
10. Plumbing Systems		15.00	300
11. Heating, Ventilating & Air Conditioning		40.00	800
12. Electric Lighting, Power & Communications		25.00	500
13. Fire Protection Systems		2.50	50
Mechanical & Electrical (10-13)		82.50	1,650
Total Building Construction (1-13)		172.75	3,455
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)		172.75	3,455
General Conditions	11.00%	19.00	380
Contractor's Overhead & Profit or Fee	5.00%	9.60	192
PLANNED CONSTRUCTION COST	*March 2008*	201.35	4,027
Contingency for Development of Design	5.00%	10.05	201
Escalation to Start Date (January 2009)	8.00%	16.90	338
Construction Contingency	3.00%	6.85	137
RECOMMENDED BUDGET	*January 2009*	235.20	4,704

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
1. Foundations				
				N/A
				0
2. Vertical Structure				
				N/A
				0
3. Floor and Roof Structure				
Miscellaneous				
Miscellaneous metals and seismic joints	20,000	SF	2.50	50,000
				50,000
4. Exterior Cladding				
				N/A
				0
5. Roofing, Waterproofing & Skylights				
				N/A
				0

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
6. Interior Partitions, Doors & Glazing				
Partitions and doors				
Metal stud partitions with gyp and batt insulation, interior glazing, interior doors	20,000	SF	27.25	545,000
				545,000
7. Floor, Wall & Ceiling Finishes				
Floors				
Sheet vinyl at laboratories and back-of-house areas, ceramic tile at restrooms, carpet at offices and administrative areas	20,000	SF	5.00	100,000
Bases				
Ceramic tile at restrooms, resilient rubber at general areas	20,000	SF	0.75	15,000
Walls				
Ceramic tile at restrooms, fabric panels at conference rooms, epoxy paint	20,000	SF	3.50	70,000
Ceilings				
Suspended acoustic tile with gypsum bulkheads and soffits at laboratory and administrative areas, painted gypsum at restrooms	20,000	SF	6.50	130,000
Miscellaneous				
Special finish	20,000	SF	0.50	10,000
				325,000

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
8. Function Equipment & Specialties				
General building equipment				
Toilet partitions and accessories, code and room identification signage, window blinds, fire extinguisher cabinets, markerboards and tackboards, projection screens	20,000	SF	2.50	50,000
Shelving and millwork				
Storage shelving, janitors' shelving and mop racks, architectural millwork	20,000	SF	2.00	40,000
Cabinets and countertops				
Laboratory spaces - base cabinets, countertops, upper cabinets, wall mounted cabinets and shelving, full height cabinets	20,000	SF	27.25	545,000
Non-laboratory spaces	20,000	SF	2.50	50,000
Special use equipment				
Laboratory spaces				
Chemical fume hood, 6'-0", Radioisotope hood, Autoclave, Steam generator, Controlled temperature rooms, cold rooms, warm rooms, sinks, emergency eyewash/showers, snorkels, pipe drops, unistrut systems, service piping fittings	20,000	SF	10.00	200,000
				885,000
9. Stairs & Vertical Transportation				
				N/A
				0

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
10. Plumbing Systems				
Plumbing systems	20,000	SF	15.00	300,000
				300,000
11. Heating, Ventilation & Air Conditioning				
HVAC	20,000	SF	40.00	800,000
				800,000
12. Electrical Lighting, Power & Communication				
Electrical, lighting, power and communication	20,000	SF	25.00	500,000
				500,000
13. Fire Protection Systems				
Fire protection	20,000	SF	2.50	50,000
				50,000
14. Site Preparation & Building Demolition				
			See site component	
				0
15. Site Paving, Structures & Landscaping				
			See site component	
				0

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
16. Utilities on Site				
				See site component
				0

1ST AND 2ND FLOOR FITOUT AREAS & CONTROL QUANTITIES

Areas

	SF	SF	SF
Enclosed Areas			
1st and 2nd Floor Fitout	40,000		
SUBTOTAL, Enclosed Area		40,000	
Covered area	Incl.		
SUBTOTAL, Covered Area @ ½ Value			
TOTAL GROSS FLOOR AREA			40,000

Control Quantities

			Ratio to Gross Area
Number of stories (x1,000)	1	EA	0.025
Gross Area	40,000	SF	1.000
Enclosed Area	40,000	SF	1.000
Fitout Area	40,000	SF	1.000
Laboratory Assignable Area	20,000	SF	0.500
Interior Partition Length	1,300	LF	0.033
Finished Area	40,000	SF	1.000
Plumbing Fixtures (x1,000)	14	EA	0.350

1ST AND 2ND FLOOR FITOUT COMPONENT SUMMARY

Gross Area: 40,000 SF

		$/SF	$x1,000
1. Foundations		0.00	0
2. Vertical Structure		0.00	0
3. Floor & Roof Structures		2.26	90
4. Exterior Cladding		0.00	0
5. Roofing, Waterproofing & Skylights		0.00	0
Shell (1-5)		2.26	90
6. Interior Partitions, Doors & Glazing		27.25	1,090
7. Floor, Wall & Ceiling Finishes		16.25	650
Interiors (6-7)		43.50	1,740
8. Function Equipment & Specialties		44.25	1,770
9. Stairs & Vertical Transportation		0.00	0
Equipment & Vertical Transportation (8-9)		44.25	1,770
10. Plumbing Systems		15.00	600
11. Heating, Ventilating & Air Conditioning		40.00	1,600
12. Electric Lighting, Power & Communications		25.00	1,000
13. Fire Protection Systems		2.50	100
Mechanical & Electrical (10-13)		82.50	3,300
Total Building Construction (1-13)		172.51	6,900
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)		172.51	6,900
General Conditions	11.00%	18.98	759
Contractor's Overhead & Profit or Fee	5.00%	9.58	383
PLANNED CONSTRUCTION COST	*March 2008*	201.06	8,042
Contingency for Development of Design	5.00%	10.05	402
Escalation to Start Date (January 2009)	8.00%	16.90	676
Construction Contingency	3.00%	6.85	274
RECOMMENDED BUDGET	*January 2009*	234.86	9,394

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
1. Foundations				
				N/A
				0
2. Vertical Structure				
				N/A
				0
3. Floor and Roof Structure				
Miscellaneous				
Miscellaneous metals and seismic joints	40,000	SF	2.26	90,400
				90,400
4. Exterior Cladding				
				N/A
				0
5. Roofing, Waterproofing & Skylights				
				N/A
				0

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
6. Interior Partitions, Doors & Glazing				
Partitions and doors				
Metal stud partitions with gyp and batt insulation, interior glazing, interior doors	40,000	SF	27.25	1,090,000
				1,090,000
7. Floor, Wall & Ceiling Finishes				
Floors				
Sheet vinyl at laboratories and back-of-house areas, ceramic tile at restrooms, carpet at offices and administrative areas	40,000	SF	5.00	200,000
Bases				
Ceramic tile at restrooms, resilient rubber at general areas	40,000	SF	0.75	30,000
Walls				
Ceramic tile at restrooms, fabric panels at conference rooms, epoxy paint	40,000	SF	3.50	140,000
Ceilings				
Suspended acoustic tile with gypsum bulkheads and soffits at laboratory and administrative areas, painted gypsum at restrooms	40,000	SF	6.50	260,000
Miscellaneous				
Special finish	40,000	SF	0.50	20,000
				650,000

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
8. Function Equipment & Specialties				
General building equipment				
Toilet partitions and accessories, code and room identification signage, window blinds, fire extinguisher cabinets, markerboards and tackboards, projection screens	40,000	SF	2.50	100,000
Shelving and millwork				
Storage shelving, janitors' shelving and mop racks, architectural millwork	40,000	SF	2.00	80,000
Cabinets and countertops				
Laboratory spaces - base cabinets, countertops, upper cabinets, wall mounted cabinets and shelving, full height cabinets	40,000	SF	27.25	1,090,000
Non-laboratory spaces	40,000	SF	2.50	100,000
Special use equipment				
Laboratory spaces				
Chemical fume hood, 6'-0", Radioisotope hood, Autoclave, Steam generator, Controlled temperature rooms, cold rooms, warm rooms, sinks, emergency eyewash/showers, snorkels, pipe drops, unistrut systems, service piping fittings	40,000	SF	10.00	400,000
				1,770,000
9. Stairs & Vertical Transportation				
				N/A
				0

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
10. Plumbing Systems				
Plumbing systems	40,000	SF	15.00	600,000
				600,000
11. Heating, Ventilation & Air Conditioning				
HVAC	40,000	SF	40.00	1,600,000
				1,600,000
12. Electrical Lighting, Power & Communication				
Electrical, lighting, power and communication	40,000	SF	25.00	1,000,000
				1,000,000
13. Fire Protection Systems				
Fire protection	40,000	SF	2.50	100,000
				100,000
14. Site Preparation & Building Demolition				
			See site component	
				0
15. Site Paving, Structures & Landscaping				
			See site component	
				0

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
16. Utilities on Site				
				See site component
				0

SITEWORK AREAS & CONTROL QUANTITIES

Areas

	SF	SF	SF
Sitework Area	60,000		
SUBTOTAL, Sitework Area		60,000	
TOTAL GROSS FLOOR AREA			60,000

SITEWORK COMPONENT SUMMARY

		Gross Area: 60,000 SF	
		$/SF	$x1,000
14. Site Preparation & Demolition		1.00	60
15. Site Paving, Structures & Landscaping		15.00	900
16. Utilities on Site		3.00	180
TOTAL BUILDING & SITE (1-16)		19.00	1,140
General Conditions	11.00%	2.08	125
Contractor's Overhead & Profit or Fee	5.00%	1.05	63
PLANNED CONSTRUCTION COST	*March 2008*	22.13	1,328
Contingency for Development of Design	5.00%	1.10	66
Escalation to Start Date (January 2009)	8.00%	1.87	112
Construction Contingency	3.00%	0.75	45
RECOMMENDED BUDGET	*January 2009*	25.85	1,551

Item Description	*Quantity*	*Unit*	*Rate*	*Total*
14. Site Preparation & Building Demolition				
Site preparation and building demolition	60,000	SF	1.00	60,000
				60,000
15. Site Paving, Structures & Landscaping				
Site paving, structures and landscaping	60,000	SF	15.00	900,000
				900,000
16. Utilities on Site				
Utilities on site	60,000	SF	3.00	180,000
				180,000

BUDGET PLANNING DOCUMENT

FOR

NETWORK ELECTRONICS

In accordance with the Interim
Communications Infrastructure Planning Guidelines

Health Sciences Surge Building

DPP

University of California, Riverside
Computing and Communications
27-Feb-08

HEALTH SCIENCES SURGE BUILDING
DPP
SUMMARY & BUDGET

FIRST FLOOR

SQ-FT	AS DESIGNED VOICE	DATA	FIBER	WRLS	GUIDELINES VOICE	DATA	FIBER	WRLS

SECOND FLOOR

SQ-FT	AS DESIGNED VOICE	DATA	FIBER	WRLS	GUIDELINES VOICE	DATA	FIBER	WRLS

THIRD FLOOR

SQ-FT	AS DESIGNED VOICE	DATA	FIBER	WRLS	GUIDELINES VOICE	DATA	FIBER	WRLS

FOURTH FLOOR

SQ-FT	AS DESIGNED VOICE	DATA	FIBER	WRLS	GUIDELINES VOICE	DATA	FIBER	WRLS

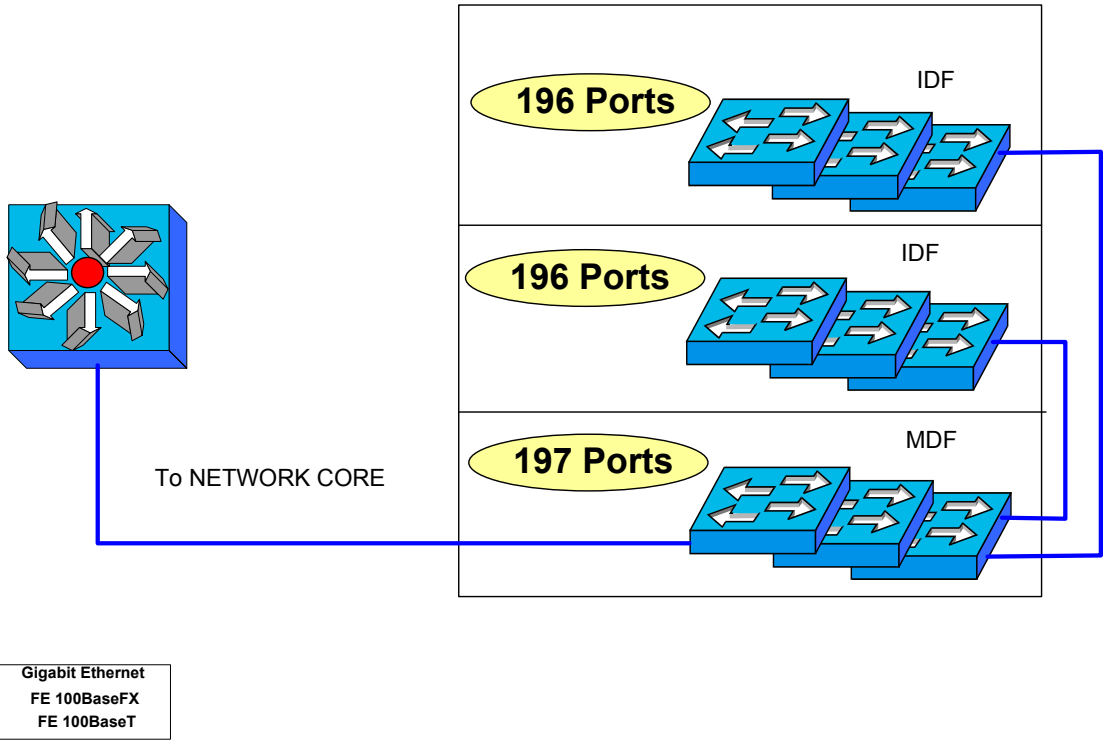
BUILDING TOTAL

SQ-FT	AS DESIGNED VOICE	DATA	FIBER	WRLS	GUIDELINES VOICE	DATA	FIBER	WRLS
TOTAL	**0**	**0**	**0**	**0**	**190**	**519**	**0**	**70**

Total Count (Ports, Fiber, Wireless,)	**589**
Amount per Port	**$155**
Sub-total	**$91,295**
Provision for Layer 3 Switch (Buildings with 300 to 600 ports	**$30,000**
Total Budget Per Guidelines	**$121,295**

UNIVERSITY OF CALIFORNIA RIVERSIDE

HSSB 100CD



NETWORK ILLUSTRATION

HEALTH SCIENCES SURGE BUILDING
DPP
PORT COUNT BY ROOM DESCRIPTION

				ON PRINTS				CAMPUS GUIDELINE			
ROOM #	**DESCRIPTION**	**TYPE OF SPACE**	**SQ-FT**	**VOICE**	**DATA**	**FIBER**	**WRLS**	**VOICE**	**DATA**	**FIBER**	**WRLS**
	CLASSROOM / INSTRUCTIONAL STATIONS (1 VOICE, 5 DATA, 1 WIRELESS)										
3.08	SEMINAR/CONFERENCE ROOM	CLASSROOM/INSTRUCTIONAL	500					1	5	0	1
	CONFERENCE/STANDARD (1 VOICE PER ROOM, 2 DATA OR 1 DATA EACH WALL FOR ROOMS LARGER THAN 100 SQ FT)										
3.09	CONFERENCE ROOM	CONFERENCE/STANDARD	250					1	4	0	0
	COPY/MAIL/SERVICE/STORAGE (1 VOICE, 2 DATA)										
2.01	EQUIPMENT ROOM (RSCH SPT)	COPY/MAIL/SERVICE/STORAGE	315					1	2	0	0
2.01	EQUIPMENT ROOM (RSCH SPT)	COPY/MAIL/SERVICE/STORAGE	315					1	2	0	0
2.01	EQUIPMENT ROOM (RSCH SPT)	COPY/MAIL/SERVICE/STORAGE	315					1	2	0	0
2.01	EQUIPMENT ROOM (RSCH SPT)	COPY/MAIL/SERVICE/STORAGE	315					1	2	0	0
2.01	EQUIPMENT ROOM (RSCH SPT)	COPY/MAIL/SERVICE/STORAGE	315					1	2	0	0
2.01	EQUIPMENT ROOM (RSCH SPT)	COPY/MAIL/SERVICE/STORATE	315					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.02	FUME HOOD ALCOVE/CHEMICAL S	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.03a	CONTROLLED TEMPERATURE RO	COPY/MAIL/SERVICE/STORATE	210					1	2	0	0
2.03a	CONTROLLED TEMPERATURE RO	COPY/MAIL/SERVICE/STORATE	210					1	2	0	0
2.03b	CONTROLLED TEMPERATURE RO	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.03b	CONTROLLED TEMPERATURE RO	COPY/MAIL/SERVICE/STORATE	105					1	2	0	0
2.04	BSL-3 ANTEROOM/AUTOCLAVE	COPY/MAIL/SERVICE/STORAGE	315					1	2	0	0

Port Count by Room Description Page 1 of 6

HEALTH SCIENCES SURGE BUILDING
DPP
PORT COUNT BY ROOM DESCRIPTION

				ON PRINTS				CAMPUS GUIDELINE			
ROOM #	DESCRIPTION	TYPE OF SPACE	SQ-FT	VOICE	DATA	FIBER	WRLS	VOICE	DATA	FIBER	WRLS
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORATE	158					1	2	0	0
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.05	INSTRUMENT ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.07	DARKENABLE SUPPORT ROOM	COPY/MAIL/SERVICE/STORAGE	105					1	2	0	0
2.07	DARKENABLE SUPPORT ROOM	COPY/MAIL/SERVICE/STORAGE	105					1	2	0	0
2.08	AUTOCLAVE ROOM	COPY/MAIL/SERVICE/STORAGE	473					1	2	0	0
2.10	FLOURESCENCE-ACTIVATED CELI	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.11	CONFOCAL MICROSCOPY ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.12	STORAGE ROOM	COPY/MAIL/SERVICE/STORAGE	158					1	2	0	0
2.14	FREEZER FAR,CRYOGENICS STOR/	COPY/MAIL/SERVICE/STORAGE	210					1	2	0	0
3.06	MAIL ROOM	COPY, MAIL, SERVICE, STORAGI	125					1	2	0	0
3.07	COPY/WORKROOM	COPY, MAIL, SERVICE, STORAGI	125					1	2	0	0
3.07	COPY/WORKROOM	COPY, MAIL, SERVICE, STORAGI	125					1	2	0	0
3.07	COPY/WORKROOM	COPY, MAIL, SERVICE, STORAGI	125					1	2	0	0
3.10	COFFEE/ACTIVITY SPACES	COPY, MAIL, SERVICE, STORAGI	250					1	2	0	0
3.10	COFFEE/ACTIVITY SPACES	COPY, MAIL, SERVICE, STORAGI	250					1	2	0	0
3.10	COFFEE/ACTIVITY SPACES	COPY, MAIL, SERVICE, STORAGI	250					1	2	0	0
	OFFICE (1 VOICE & 2 DATA PER 100 SQ FT)										
2.13	BUILDING RECEIVING	OFFICE	315					3	6	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0

HEALTH SCIENCES SURGE BUILDING
DPP
PORT COUNT BY ROOM DESCRIPTION

				ON PRINTS				CAMPUS GUIDELINE			
ROOM #	DESCRIPTION	TYPE OF SPACE	SQ-FT	VOICE	DATA	FIBER	WRLS	VOICE	DATA	FIBER	WRLS
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.01	FACULTY OFFICE (PI)	OFFICE	132					1	2	0	0
3.02	VISITING FACULTY OFFICE	OFFICE	132					1	2	0	0
3.02	VISITING FACULTY OFFICE	OFFICE	132					1	2	0	0
3.05	ADMINISTRATIVE SUPPORT	OFFICE	125					1	2	0	0
3.05	ADMINISTRATIVE SUPPORT	OFFICE	125					1	2	0	0
	OPEN/MODULAR POST DOC (1 VOICE, 2 DATA PER 60 SQ FT)										
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0

HEALTH SCIENCES SURGE BUILDING DPP PORT COUNT BY ROOM DESCRIPTION											
				ON PRINTS				CAMPUS GUIDELINE			
ROOM #	DESCRIPTION	TYPE OF SPACE	SQ-FT	VOICE	DATA	FIBER	WRLS	VOICE	DATA	FIBER	WRLS
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
3.03	POST DOCS	OPEN/MODULAR	60					1	2	0	0
	PUBLIC ACCESS AREAS, LIBRARY NON-INTENSIVE (1 VOICE, 1 DATA PER 100 SQ FT, & WIRELES COVERAGE)										
3.11	FACULTY COLLOQUIUM/FOYER/PI	PUBLIC ACCESS/LIBRARY	250					3	3	0	1
3.12	FACULTY COLOQUIUM AREA	PUBLIC ACCESS/LIBRARY	200					2	2	0	1
3.12	FACULTY COLOQUIUM AREA	PUBLIC ACCESS/LIBRARY	200					2	2	0	1
	RESEARCH LAB COMPUTER INTENSIVE (1 VOICE, 3 DATA PER 100 SQ FT, 1 FIBER PATH & WIRELESS COVERAGE PER LAB)										
2.09	CLUSTER FARM (BIOINFORMATICS	RESEARCH LAB (COMP INT)	473					5	15	0	1
	RESEARCH LAB (1 VOICE, 1 DATA PER 80 SQ FT, 1 FIBER PATH & WIRELESS COVERAGE PER LAB)										
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1

HEALTH SCIENCES SURGE BUILDING
DPP
PORT COUNT BY ROOM DESCRIPTION

ROOM #	DESCRIPTION	TYPE OF SPACE	SQ-FT	ON PRINTS VOICE	ON PRINTS DATA	ON PRINTS FIBER	ON PRINTS WRLS	CAMPUS GUIDELINE VOICE	CAMPUS GUIDELINE DATA	CAMPUS GUIDELINE FIBER	CAMPUS GUIDELINE WRLS
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.01	RESEARCH LAB (MODULE)	RESEARCH LAB	315					1	4	0	1
1.02	BSL-3 RESEARCH LAB (MOD)	RESEARCH LAB	315					1	4	0	1
1.02	BSL-3 RESEARCH LAB (MOD)	RESEARCH LAB	315					1	4	0	1
1.02	BSL-3 RESEARCH LAB (MOD)	RESEARCH LAB	315					1	4	0	1
1.03	BIOINFORMATICS RESEARCH	RESEARCH LAB	315					1	4	0	1

HEALTH SCIENCES SURGE BUILDING DPP PORT COUNT BY ROOM DESCRIPTION											
				ON PRINTS				CAMPUS GUIDELINE			
ROOM #	**DESCRIPTION**	**TYPE OF SPACE**	**SQ-FT**	**VOICE**	**DATA**	**FIBER**	**WRLS**	**VOICE**	**DATA**	**FIBER**	**WRLS**
1.03	BIOINFORMATICS RESEARCH	RESEARCH LAB	315					1	4	0	1
1.03	BIOINFORMATICS RESEARCH	RESEARCH LAB	315					1	4	0	1
1.03	BIOINFORMATICS RESEARCH	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
2.06	CELL CULTURE ROOM	RESEARCH LAB	315					1	4	0	1
	UNCLASSIFIED										
	CCTV CAMERAS	UNCLASSIFIED							6		
		TOTALS	**36542**	**0**	**0**	**0**	**0**	**190**	**519**	**0**	**70**

COMMUNICATIONS INFRASTRUCTURE PLANNING GUIDELINES

Working Version – May 24, 2006

University of California, Riverside
Computing and Communications

TABLE OF CONTENTS

Introduction and Background

The University of California, Riverside is currently developing communications standards for new building construction and major renovations. These campus standards will be based on the proposed Construction Specifications Institute (CSI) Division 27 addition to the Division 1 – 16 MasterFormat (Division 27 is a model that will allow organizations to effectively design, plan, and estimate inside and outside copper and fiber cable plants, as well as data and voice systems).

The following notes pertain to the development of this standards document:

1. Document Inputs. The document is the result of collaborative efforts involving Capital Planning, Design and Construction, Computing and Communications, and selected campus faculty (including the Chair of Computer Science and Engineering).

2. Document Oversight and Review. The standards document will be reviewed and updated AT LEAST annually. Technology changes MAY require that the document be updated more frequently than every 12 months.

3. Standards Document as an Executive Overview. This document has become an "executive overview" of UCR's communications infrastructure standards.

4. Role of the Communications Standards Document as a Budgeting Tool. Importantly, the Communications Infrastructure Planning Standards document will serve as a campus budgeting tool. Any and all items that academic departments, colleges, schools, or administrative units request that EXCEED campus standards will be funded by the departments, colleges, schools, and units that have requested them.

5. Items not Contained in this Document. Published industry standards should be followed when issues arise relating to communications infrastructures not specifically mentioned in this document.

6. Importance of Communications Infrastructure. Building designs should not be submitted for bid without provisions made for the fundamental communication infrastructures contained in this document. The costs to the University will be exorbitant when omitted infrastructures are added at a later date.

Outside Plant

Conduit

Pathways and four (4) each four (4) inch communications conduit will be supplied to each new building (at a minimum). The conduit system must be designed to meet current building needs and planned future construction as well. There will be no more than two 90-degree bends between pulling junctions, and there shall be less than 500 feet between these junctions.

Important Note: Computing and Communications (C&C), Design and Construction, and Capital Planning should interact on all decisions relating to communications conduit and pathways. Depending on UCR's building locations and construction scheduling, pathways and conduit may be deployed to meet the needs of several buildings and cut overall construction costs.

Copper

An appropriate quantity of distribution feeder cable, filled core, or equal will be supplied from the building's MDF to the nearest and most appropriate campus point of copper presence. The cable shall have no less than 100 pairs of unshielded twisted pair 24 AWG solid copper conductor and shall be suitable for installation in steam tunnels, manholes, conduits, or direct burial. The pair count actually recommended may be substantially higher depending upon the assignable square feet (ASF) and number of estimated occupants of the building.

C&C, Design and Construction, and Capital Planning should interact on all decisions relating to twisted-pair cable outside plant infrastructure. Although it is envisioned that voice services will be provided via the campus fiber infrastructure and data network, substantial savings may be realized by various buildings sharing conventional voice electronics (with dial tone delivered to the "remote building" via copper cable connecting the buildings).

If a particular building will receive voice services via shared electronics located in another building, the estimated quantity of copper pairs should be the number of planned occupants (requiring voice services, see section on Port Counts) multiplied by 2 plus 25% for growth or other services. If the number of planned occupants is not known, cables should be sized to provide 2 copper pairs for every 125 ASF.

In all circumstances for the foreseeable future, twisted-pair cable will continue to be required to provide buildings with Measured Business Service lines, ATM lines, ISDN lines, Pay Phones, etc.

Cable shall be terminated following proper bonding and grounding EIA/TIA standards.
All outside plant telephone cables shall be installed with stubbed or 110 style wall mount building entrance protector with a #6 green insulated grounding electrode conductor to the approved building grounding electrode. All protector spaces shall be populated with solid state protector modules Commscope part number 4C1S or equal.

Fiber

Air Blown Fiber Tubing

Seven (7) tube Air Blown Fiber infrastructure will be supplied from the nearest and most appropriate Tube Distribution Unit (TDU) to a new TDU located in the building's Main Distribution Facility (MDF). C&C will collaborate with Design and Construction and Capital Planning to identify appropriate TDU locations (existing and new). All Air Blown Fiber products will be Sumitomo FutureFlex System or equal, and Air Blown Fiber tube installers shall be Sumitomo certified installers.

Air Blown Fiber

Eighteen (18) strands (9 pair) of Single-mode fiber will be run from the Fiber Termination Unit (FTU) in the building's MDF to the nearest and most appropriate FTU associated with campus network and voice electronics (e.g., campus router, voice peripheral device). C&C will

collaborate with Design and Construction and Capital Planning to identify appropriate FTU locations for each project. Air Blown Fiber installers shall be Sumimoto certified installers.

Inside Plant

Horizontal Pathways

Horizontal copper and fiber will be supplied to work areas via pathways that are dedicated to voice and data cabling and shall not contain electrical wiring. Horizontal pathways will be designed to be out of the way of other services, easily accessible, and allow cabling to be loose yet contained, thus facilitating changes to cable plant.

Ceiling pathways will be used as a standard and cable supports shall be attached to the building structure and not to other fixtures (cable supports include cable trays, 'J' hooks or conduit).

Pathways will be designed for a 25-year life cycle. Conduit and cable supports will be designed to an initial 40% fill. Conduit system pathways shall be designed with no more than two ninety (90) degree bends and no more than 100 feet between pull boxes.

Under floor ducts or conduits will be used when the building construction requires it (standards are pending).

Station Cable Standards

The use of plenum-rated (CMP) cable is required in situations in which the cable is placed within a ceiling space used as an environmental air space unless it is contained within a fire-rated metal conduit or raceway. In addition, some local codes require the use of plenum cables in any ceiling space that interconnects two or more rooms. Computer floors, such as those used in computer labs, are considered air plenums. Communications cables or wires used within buildings shall be listed as being suitable for the purpose and installation, e.g. CMP, CMR, OFNP, OFNR.

Horizontal Copper

Category 6 unshielded twisted pair cable will be utilized for all voice and data horizontal station cable installations.

C&C promotes the use of cable supported by a cable tray serving-station-conduit stubbed into an accessible ceiling space as the general distribution method.

Copper and fiber will be supplied from Intermediate Distribution Facilities (IDFs or Communications Rooms) to various work areas (offices, classrooms, etc.) per port density specifications contained in this document (see Port Counts).

Horizontal Fiber

Horizontal fiber will be supplied via two (2) tube Air Blown Fiber infrastructure from the classroom or lab to the IDF or with 2 strand (1 pair) multi-mode conventional 62.5 um fiber. All fibers to be terminated on SC connectors.

Riser Pathways

An appropriate quantity of riser (vertical) copper and fiber will be supplied from the MDF to each IDF to meet voice and data services via pathways dedicated for communications services. A minimum of three four (4) inch diameter conduits must be provided between the MDF to all IDFs.

Two-inch conduit shall be installed from the top floor Communications Room (IDF) to the roof. This conduit shall be sealed until used for wireless services. An additional two-inch conduit shall be installed from the roof to the nearest electrical sub panel. This conduit shall be sealed until used.

Two three (3) inch conduits shall be installed for the purposes of multi-media technologies from control rooms of areas designated to have these applications, such as auditoriums, projection rooms, classrooms, etc., to the IDF or MDF.

Riser Copper

The copper cable from MDF to IDF shall be ARMM with 24ga. Pairs. Pair count will equal the anticipated voice ports provided by the IDF (see section on Port Counts). To support high-speed aggregate data links, the copper count from the MDF to each IDF is a minimum of five (5) Category 6 lines.

Building riser cables will be tested to insure that they meet the current requirements of EIA/TIA-568-B.2 cabling standard for the category of cable being installed, i.e., Category 3 cable shall meet Category 3 parameters within a 25-pair binder group. Documentation will include cable ID, pair ID, from and to points, pair ID marked on the punch down blocks, results of testing, and as-built information.

Riser Fiber

Two (2) tube Air Blown Fiber (ABF) infrastructure can be supplied from each IDF to the MDF or IDF to IDF, and then to the MDF. Under each configuration, there shall be an ABF “home run” from each IDF to the MDF, with eighteen (18) strands (9 pair) of Multi-mode and eighteen (18) strands of Singlemode fiber will connect each IDF to the MDF or,

18strands (9 pair) of 62.5 μm multimode and 18 strands (9 pair) single mode conventional fiber cable can be installed instead of ABF fiber from the MDF to each IDF.

Workstations (Port Counts)

The station outlet shall be designed to serve a variety of current communications needs and provide sufficient flexibility and adaptability for future technologies. Voice and data connections will be deployed for the following schedule. All copper is Category 6.

Classrooms/Instructional Stations	1 voice for wall phone located 48" from the floor near the instructors station, 5 Data (4) located at the instructors station (30" from the wall corner, 12" from floor), (1) located near the ceiling on the front wall, opposite from instructor cabinet, 1 Wireless,
Computer Teaching Facility	1 Voice, 4 Data per 100 Square Feet, 1 Wireless, & 1 Fiber Port per Facility
Conference/Computer Intensive	1 Voice per room, 2 Data each wall per 100 Square Feet
Conference/Instructional Stations	1 Voice for wall phone located 48" from floor near the instructors stations, 2 Data at the instructors station (30" from the wall corner, 12" from floor).
Conference/Standard	1 Voice per room, 2 Data or (1 Data each wall for rooms larger than 100 Square Feet)
Copy/Mail/Service/Storage	1 Voice 2 Data
Elevator	1 Voice
Offices	1 Voice 2 Data per 100 Square Feet
Open/Modular	1 Voice 2 Data per 60 Square Feet
Public Access Areas, Library (Computer Intensive)	1 Voice, 3 Data per 100 Square Feet, & Wireless per 1,000 Square Feet
Public Access Areas, Library (Non-Intensive)	1 Voice, 1 Data per 100 Square Feet, & Wireless as needed
Research Lab (Computer Intensive)	1 Voice, 3 Data per 100 Square Feet, 1 Wireless, & 1 Fiber Port per Lab
Research Lab	1 Voice, 1 Data per 80 Square Feet, 1 Wireless, & 1 Fiber Port per Lab

Port counts for room types not found on this list will be calculated on a case-by-case basis.

Station Conduits

A standard wall outlet should be served by a 1 inch conduit that either homeruns to an MDF, BDF, IDF or to a cable tray. Adherence to industry standard for conduit fill ratio shall be followed specifying the size of conduit, the number of cables installed, and room for future growth.

Station Outlets (Jacks)

Data jacks shall be terminated using EIA/TIA-568B wiring configuration at the Data Patch Panel and Station Outlet faceplate.

Voice jacks shall be terminated using EIA/TIA-568B wiring configuration at the Station Outlet faceplate. Voice cables at the MDF, BDF or IDF shall be terminated on 110 wiring blocks with 110C-4 connecting blocks.

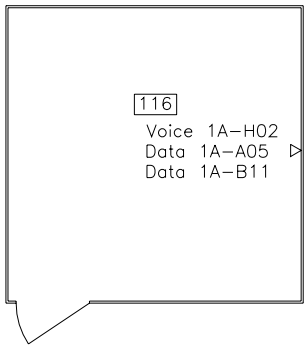
Labeling
Data & Voice Jack Layouts

Labeling of the cabling system, jack, and blocks shall be in accordance with TIA/EIA 606-A Class 3 standards.

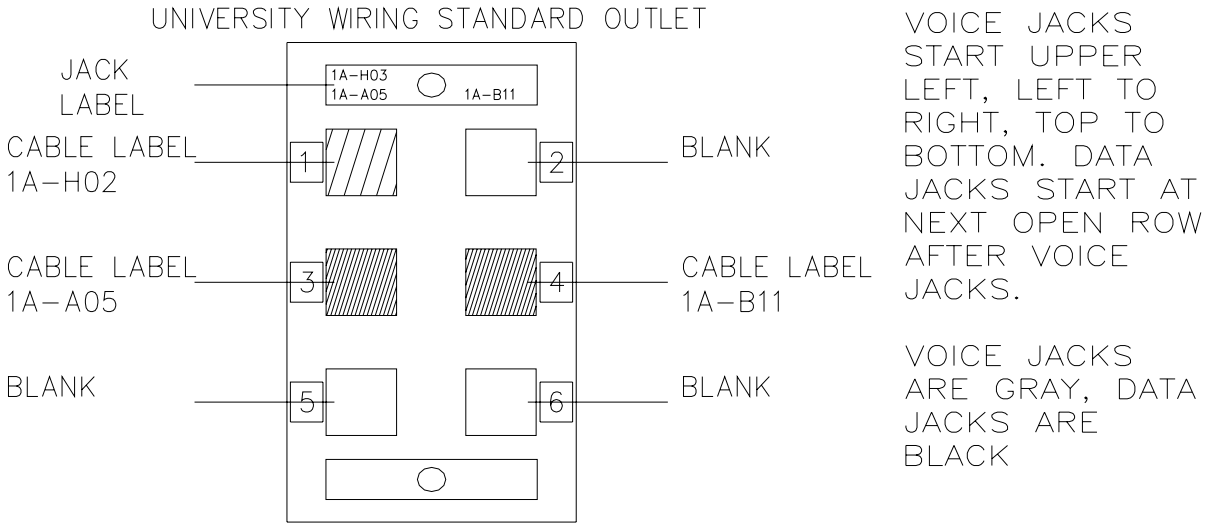
All labeling will follow the TIA 606-A Class 3 standard. Each telecommunications closet e.g. MDF, BDF or IDF will have a letter (A, B, C, etc.) assigned on each floor.

Workstation outlets fed from the various closets shall be labeled at the top of the wall plate with the floor number, telecommunications' room letter, patch panel or block identifier and port number. The format is *fs-ann* where *f* is the floor, *s* is the closet letter, *a* is the patch panel letter and *nn* is the port number of the patch panel. Voice jacks shall start at the top left position on the wall plate left to right top to bottom. Data jacks shall start at the next open lower row after all voice jack locations are populated. The voice jacks shall be gray and the data jacks shall be black.

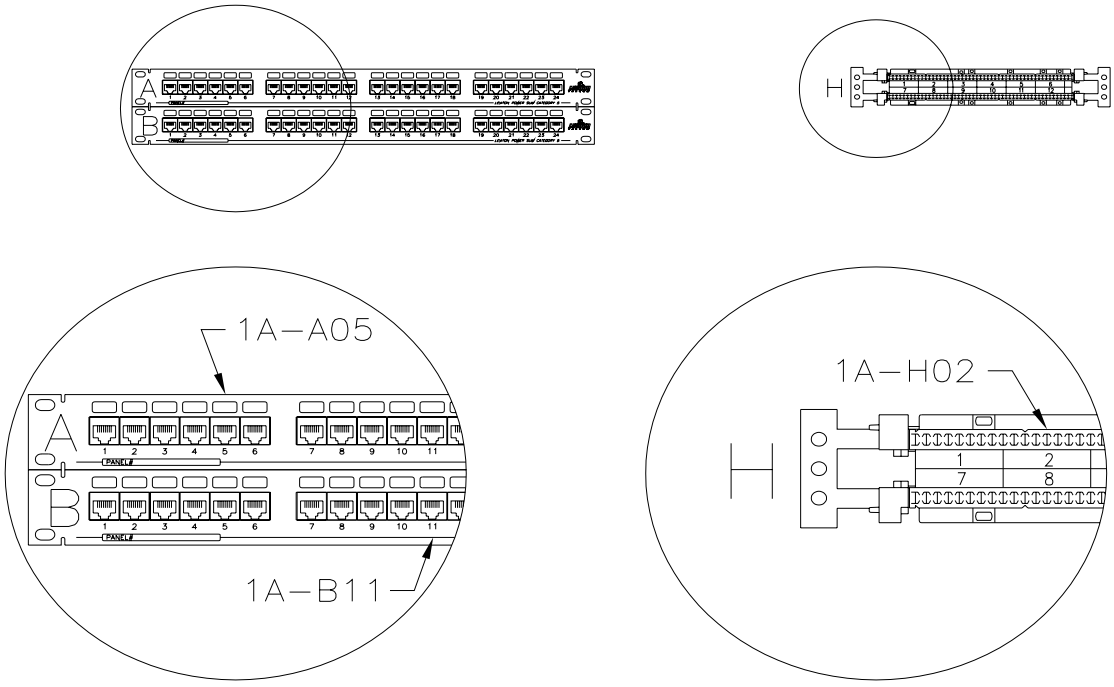
Example:
Room number 116 on the first floor with both voice and data fed from closet A. The voice is terminated on the 2nd port of a wall mounted 110 block labeled H and the first data jack is terminated on the 5th port of a patch panel labeled A and the second jack is terminated on the 11th port of a patch panel labeled B.



Room Location Labeling



Work Station Outlet Labeling



Patch Panel and 110 Block Labeling

Communications Rooms and Spaces

Quantity and Location

Communications Rooms (also referred to as Intermediate Distribution Frame (IDFs) in this document) are spaces allocated for communication backbone and horizontal pathways and cables. These rooms should be stacked one above the other in multi-floor buildings. Communications closets house voice and data electronics, uninterruptible power supplies (UPS), equipment racks, termination blocks, patch panels, fiber termination units (FTU), grounding bars, and copper and fiber patch cords. A connection point for each wire in a horizontal cable run is terminated here. There should be at least one IDF per floor located within 90 meters of all work areas served by this room. The size of the IDF and the recommended count of equipment racks are determined by the size of the work area per the following schedule:

Work Area Size	Minimum Closet Size	Rack Count
10,000 square feet	10 x 11 feet	Three (3) racks with 48 port panels with cable management
8,000 square feet	10 x 9 feet	Two (2) racks with 48 port panels with cable management
5,000 square feet	10 x 7 feet	One (1) rack with 48 port panels with cable management

Additional rooms may be required to meet the needs of high-density data use areas, such as computer labs.

Closet Environmental Specifications (Lighting, Power, Grounding, HVAC)

The following defines the common functional requirements for all spaces allocated for voice and data infrastructure and electronics (all MDF, BDF and IDFs).

- Separate temperature and humidity controls 7 days a week, 24 hours a day. The temperature shall range from 65 degrees to 75 degrees with 30% to 55% relative humidity.
- Spaces shall be free of dust and other contaminates
- Floors shall be able to be kept clean (asphalt tile, linoleum, or sealed concrete). No carpeting.
- A code-approved fire extinguishing system that does not discharge water directly on electronic equipment.
- Spaces shall be free of water and drain pipes to avoid condensation dripping on voice and data electronics.
- A minimum of four (4) dedicated 120 V AC, 20 amp duplex electrical outlets. The electrical panels serving these rooms shall be connected to the building's emergency power source.
- Proper grounding and bonding of voice and data cable, hardware, racks, raceway and equipment as specified by ANSI/TIA/EIA-607 standards for communications closets.
- Walls shall be covered with ¾ inch flame retardant treated plywood or painted with two coats of fire retardant paint.
- Spaces shall be located away from transformers, motors, power generators, and radio transmitters.

- Lighting shall be a minimum of 50-foot candles (illumination measured three (3) feet above the finished floor) and shall not be powered from the same electrical distribution panels as the voice and data equipment to prevent noise or hum.
- A locking fire door three (3) feet by 6.6 feet with no doorsill or center post.
- Communications spaces shall not be shared with other utilities or services.
- Spaces shall not have suspended or false ceilings.
- There shall be an unobstructed clearance of nine (9) feet above the finished floor.
- The floors shall have a load-carrying capacity of at least 100 pounds per square foot.
- Terminal fields and frames should have a minimum of three (3) feet clear working space in front of wall mounted equipment and front and rear of rack mounted equipment.
- Communications spaces shall not have windows.
- All riser and horizontal sleeves and conduits shall be fire stopped and sealed following code requirements.

Instructional Spaces Special Requirements (Power and Conduits)

The instructional stations are installed at the front corner of classrooms and seminar rooms, away from any doors. This station is to be installed on the side wall near the corner, adjacent to the front wall of the classroom. In addition to the communication lines specified, this area shall have the following infrastructure for technology support:

- 1 – dual duplex power outlet protected circuit (18" from floor, 12" from wall corner).
- 1 – Single duplex power outlet installed above the ceiling for use by suspended projector (15' from center of front wall).
- 1 – 1.5 inch conduit installed from a 2 inch J-box located at the instructors station (18' from floor, 24" from wall corner)to the ceiling projector location.

Network Electronics

Design Overview

UCR's standard and minimum desktop network connection is switched, Fast Ethernet (100 Mbs).

These Fast Ethernet connections will be provided by stacking or clustering an appropriate quantity of 12, 24, and 48 port network switches in one or more building closets.

The switches will be connected to a closet aggregation device via Gigabit links utilizing fiber patch cables between each switch and the aggregation device. Note: the switches will not be "daisy chained" to each other, nor should a single switch act as both an aggregation device and a desktop connectivity device. Clustering switches using technology such as Cisco's StackWise option is not considered daisy chaining.

The switches will be connected to the patch panel via Category 6 copper patch cables.

At least one switch per closet will feature Power over Ethernet functionality to support UCR's wireless network deployment.

The closet aggregation devices will be connected to a building aggregation device via Gigabit links. The building aggregation device will be connected to the campus backbone at Gigabit or greater. All buildings will have a level 3 device.

Note 1: Standards do not as yet support Power over Ethernet for VoIP deployment.

Note 2: Buildings with 300 or more ports will have a router (layer 3 switch, budget $10,000). Buildings with 600 or more ports will have a chassis-based router (budget $30,000).

Port Costs

Converged networks and the pending requirement that converged networks carry voice traffic as well as other highly sensitive data (grades, document imaging, financial data, video conferencing, etc.) require that network building electronics become increasingly "intelligent". This increased intelligence is required to adequately secure UCR's network against internal and external attacks, fraudulent use of University resources, and to ensure the privacy and confidentiality of network communications.

Intelligent switches include many, if not all, of the following capabilities:

- Support of 802.1x port authentication.
- Port-based management and monitoring.
- Port-based Access Control Lists.
- Port security based on MAC address.
- DHCP Port snooping capability.

The budget for these "intelligent" network electronics will be calculated at $155 per Fast Ethernet port. The $155 per port budget includes the following:

- All 12, 24, and 48 port switches.
- Closet aggregation switches.
- Building aggregation switch with layer 3 capability.
- Inter-switch fiber patch cables.
- Copper patch panel cables.

Voice Electronics Services

Pending.

Central Power Distribution to Campus Communications Closets

Pending.

Testing and Documentation

Telephone Outside Plant Cable

A visual inspection shall be made to insure that the cables have been terminated on the punch down block in proper color code order. An end-to-end continuity test is to be made for each pair to insure loop resistance, wire continuity, and correct tip and ring polarity. Entrance cables will be tested from the building entrance frame punch down blocks to the floor equipment room punch down blocks that the cable serves.

Outside plant will be tested to insure that they meet the current requirements of EIA/TIA-758-A or EIA/TIA-568-B.2-1 cabling standard for the category of cable being installed, i.e., Category 3 cable shall meet Category 3 parameters within a 25-pair binder group. Documentation will include cable ID, pair ID, from and to points, pair ID marked on the punch down blocks, results of testing, and as-built information.

Fiber Optic Cable

Cables will have SC connectors installed prior to testing. The tests shall be performed on inter-building, riser, and horizontal fiber cables.

Inter-building and riser fiber cable strands must be tested bi-directionally with an Optical Time Domain Reflectometer (OTDR) and Optical Power Meter/Source transmitting at 850 and 1300 nm wave length for multi-mode and 1310 and 1550 nm wave length for single mode. Determination of requirement for testing inter-building and riser strands will be based on OTDR results and at the discretion of the University representative. Horizontal fiber station cables will require Optical Power Meter/Source test only.

Maximum allowable attenuation for 62.5 µm multi-mode fiber will be 3.5 dB/km at 850 nm (typical range 2.8 to 3.4 dB/km) and 1.5 dB/km at 1300 nm (typical range 0.5 to 1.0 dB/km) in addition to no more than .75 dB for each connector mated pair.

Maximum allowable attenuation for single mode fiber will be.5 dB/km at 1310 and 1550 nm and no more than .75 dB for each connector mated pair.

Bi-directional attenuation figures in decibel (dB) will be documented.

Strands shall test good and meet current EIA/TIA-568-B.1 specifications. Dark fibers and excessive attenuation due to breaks, bends, bad splices, defective connectors, and bad installation practices will not be accepted and must be corrected.

ABF/OSP cables shall have NO bad fibers. Fiber optic OSP cables tested to have bad fibers, and determined to be non-repairable by practices acceptable to the University Representative, shall be replaced.

Documentation will include cable ID, from and to points, strand ID, bi-directional attenuation figures in dB, OTDR waveforms, and as-built information.

Station Cable

Visual inspection will be made to insure that all cables have been terminated on the patch or punch down block and on the eight-position station jack in proper color code order.

All four-pair station cables attached between station voice and data jacks and floor equipment room patch panels or punch down blocks will be link tested with a level 3 cable tester such and the Agilent Wirescope 350 or the Fluke Omniscanner 2 to insure compliance with current EIA/TIA-568-B.2-1. All pairs shall test good and meet Category 6 parameters.

Documentation will include cable ID (same as jack ID) to be marked on the patch panel or punch down block in the communication closet, station jack ID to be marked on the station jack, and results of Category 6 channel testing done with the cable analyzer. Analyzer documentation of testing shall consist of test result recorded in a ".txt" or ".csv" file on CD-ROM disks and on hard copy installed in a ring binder.

Emergency and Escort Phones

Emergency and Escort phones on campus cannot receive calls. Emergency phones automatically dial the UCR Police Department when the receiver goes off hook and cannot dial any other parties. Escort phones automatically dial Campus Safety Escort Services (Sunday-Thursday) Academic year sundown-midnight or the UCR Police Department when the receiver goes off hook. Emergency and Escort circuits are installed via the work order system. Communications Services must be supplied with a work order to install these circuits. This process is critical to the maintenance of the emergency and E911 databases. Standards for these phones are as follows:

- One Emergency phone per floor, per wing (also depends on square footage).
- One Escort phone per building, usually located near the main entrance.

Elevator Phones

Elevator emergency phones on campus cannot receive calls. Elevator phones automatically dial the UCR Police Department when the “Push for Help” button is pressed or when the receiver goes off hook and cannot dial any other parties. Elevator circuits are installed via the work order system. Communications Services must be supplied with a work order to install these circuits. This process is critical to the maintenance of the emergency and E911 databases.

Elevator phones shall be ADA compliant, UCR has standardized on the Viking, Model #E-1600-50A/52A, or equal (no known equal) for the inside panel of the elevator car. Communications Services will provide a dedicated telephone line circuit per the work order request to be terminated and demarked at the nearest IDF or MDF closet. This circuit will be terminated on a block designated for emergency and clearly labeled as an elevator telephone with the circuit ID. It shall be the Elevator Contractor’s responsibility to extend the telephone circuit from the elevator’s control box to the elevator telephone bock in the nearest IDF or MDF closet. Only authorized personnel shall enter the elevator mechanical room. Standards for these phones are as follows:

- One Elevator phone per elevator, per code requirements.

Alarm Circuits

Fire and intrusion alarm circuits are installed per customer request via a work order. These circuits shall be installed to a termination block allocated specifically for fire and intrusion alarms in the nearest MDF or IDF. It shall be the responsibility of the departments maintaining these unique alarm services to complete the circuits from this location to their control panels. The circuit numbers assigned to these vital services cannot be shared with other user lines.

Codes and Standards

Pending

Sources – remove sources Outdated ??

University of California, Riverside
Infrastructure Master Plan
Report No. 01-0533-1950
Revision I, April, 1993

University of California, Riverside
Office of Design and Construction
Campus Design Guidelines (Draft)
January, 1999

University of California, Berkeley
Construction Design Standards
April, 1994

University of California, Davis
Communication Resources Cabling Standards
December, 2000

University of California, Santa Cruz
Communications Cabling In-Building Upgrade Project Design Standards
June, 2000

University of California, Irvine
Project Planning Guidelines

California State University
Telecommunications Infrastructure Planning Guidelines
May 1999

Fullerton California State College
Building Survey Results and Recommendations

Appendix G Hazardous Chemicals List

Chemical	Qty	Units
(-)-2-OXO-4-THIAZOLIDINE CARBOXYLIC ACID	0.01	lbs
(-)-CAMPHENE, 95%	0.05	lbs
(-)-ISOPROTERENOL	0.01	lbs
(+)-CAMPHOR	0.22	lbs
(+)-CARVONE	0.03	gal
(+)-DIISOPROPYL L-TARTRATE, 99%	0.08	lbs
(+)-DIMETHYL L-TARTRATE, 99%	0.22	lbs
(+)-LIMONENE	0.03	gal
(+)-PANTOTHENATE	0.44	lbs
(+)-VERAPAMIL	0.01	lbs
(1R)-(+)-CAMPHOR	0.22	lbs
(1S)-(-)-ALPHA-PINENE	0.05	lbs
(1S,2S,3S,5R)-(+)-ISOPINOCAMPHEOL, 98%	0.05	lbs
(2-BROMOETHYL)BENZENE, 98%	0.22	lbs
(4-CHLORO-2-METHYLPHENOXY) ACETIC ACID 97%	0.01	lbs
(ETHYLENENITRILO)TETRAACETIC ACID	4.09	lbs
(P-CHLOROPHENOXY)ACETIC ACID	0.22	lbs
(S)-(+)-2-PHENYLGLYCINOL, 98%	0.05	lbs
1-(3-DIMETHYL-AMINOPROPYL)-3-ETHYLCARBODIIMIDE HYDROCHLORIDE, 98+%	0.02	lbs
1,1,1-TRICHLOROETHANE	1.06	gal
1,1,3,3-TETRAETHOXYPROPANE	0.03	gal
1,10-DECANEDICARBOXYLIC ACID, 99%	0.01	lbs
1,10-PHENANTHROLINE	0.16	lbs
1,1'-CARBONYLDIIMIDAZOLE	0.13	lbs
1,1-DIMETHYLBIGUANIDE HYDROCHLORIDE	0.28	lbs
1,1-DIPHENYLETHYLENE, 99% (GC)	0.11	lbs
1,1-DIPHENYLHYDRAZINE HYDROCHLORIDE 99%	0.02	lbs
1,2,3-TRICHLOROBENZENE	0.22	lbs
1,2,4,5-TETRACHLOROBENZENE, 98%	0.22	lbs
1,2,4-BENZENETRIOL, 99%	0.01	lbs
1,2,4-TRICHLOROBENZENE	0.05	gal
1,2,4-TRIHYDROXYBENZENE	0.22	lbs
1,2-CYCLOHEXANEDIONE	0.14	lbs
1,2-DIBROMOETHANE	2.2	lbs
1,2-DIBROMOTETRACHLOROETHANE, 97%	0.05	lbs
1,2-DICHLORO ETHANE	0.26	gal
1,2-DICHLORO ETHANE	0.13	gal
1,2-DICHLOROETHANE	0.39	gal
1,2-EPOXY-3-PHENOXYPROPANE	0.01	lbs
1,2-ETHANEDITHIOL	0.05	gal
1,2-NAPHTHOQUINONE-4-SULFONIC ACID SODIUM SALT, 99% (UV-VIS)	0.11	lbs
1,2-PROPANEDIOL	1.75	gal
1,2-TUNGSTOSILICIC ACID	0.11	lbs
1,3,5-BENZENETRICARBOXYLIC ACID, 98%	0.01	lbs
1,3,5-TRICHLOROBENZENE, 99%	0.22	lbs
1,3-BENZENEDIOL	1.1	lbs
1,3-CYCLOHEXANEDIOL (MIXTURE OF CIS AND TRANS), 98%	0.02	lbs
1,3-DIIODOPROPANE, 99%	0.52	gal
1,3-PENTADIENE	0.02	lbs
1,3-PROPANEDIOL	0.22	lbs
1,4-BENZOQUINONE	0.29	lbs
1,4-BUTANEDIOL	0.22	lbs
1,4-DIAMINOBUTANE, 99%	0.11	lbs
1,4-DIAZABICYCLO(2,2,2)OCTANE	0.1	lbs
1,4-DIBROMOBUTANE	0.03	gal
1,4-DICHLOROBENZENE	0.22	lbs
1,4-DICHLOROBUTANE	1.12	gal
1,4-DIOXANE	0.29	gal
1,4-DITHIO-DL-THREITOL	0.01	lbs
1,4-NAPHTHOQUINONE	0.57	lbs
1,4-PHENYLENE DIAMINE, DIHYDROCHLORIDE	0.05	lbs
1,4-PIPERAZINEDIETHANESULFONIC ACID	0.22	lbs
1,5-DIAMINOPENTANE, 98%	0.01	lbs
1,5-DIBROMOPENTANE, 97%	0.07	gal
1,5-DIHYDROXYNAPHTHALENE, 99%	0.24	lbs
1,5-DIIODOPENTANE, 98%	0.03	gal
1,5-DIPHENYLCARBAZIDE	0.05	lbs

1,6-DIHYDROXYNAPHTHALENE	0.11 lbs
1,7-DIAMINOHEPTANE	0.01 lbs
1,8-DIAMINONAPHTHALENE, 90-95%	0.05 lbs
1,8-DIAMINOOCTANE	0.05 lbs
12-AMINODODECANOIC ACID, 95% *** TILL DEPLETION OF STOCK ***	0.01 lbs
1-ACETYL-2-PHENYLHYDRAZINE	0.05 lbs
1-ADAMANTANAMINE HYDROCHLORIDE, 99+%	0.01 lbs
1-AMINO-1-CYCLOHEXANECARBOXYLIC ACID, 98%	0.01 lbs
1-AMINO-2-NAPHTHOL-4-SULFONIC ACID	1.88 lbs
1-ASCORBIC ACID	0.05 lbs
1-BROMO-3-CHLOROPROPANE	0.13 gal
1-BROMO-3-METHYLBUTANE, 96% (GC)	0.26 gal
1-BROMODODECANE	0.01 lbs
1-BROMOPROPANE	1.1 lbs
1-BUTANOL	32.48 gal
1-CHLORO-2,4-DINITROBENZENE	0.48 lbs
1-CHLORO-2-METHYLPROPANE, 98%	0.03 gal
1-CHLORO-4-NITROBENZENE, 99%	0.55 lbs
1-CHLORODECANE, 97-99%(GC)	0.22 lbs
1-CHLOROOCTANE, 99%	0.22 lbs
1-CHLOROPROPANE, 99%	0.22 lbs
1-CYCLOHEXYL-3-(2-MORPHOLINOETHYL)-CARBODIIMIDEMETHO-P-TOLUENESULFONATE	0.12 lbs
1-ETHYL-3-(3-DIMETHYLAMINOPROPYL)CARBODIIMIDE	0.01 lbs
1-HEPTANESULFONIC ACID SODIUM SALT	0.11 lbs
1-HEXADECANOL	0.28 lbs
1-HEXADECYLPYRIDINIUM CHLORIDE	0.22 lbs
1-HEXANESULFONIC ACID SODIUM SALT	0.05 lbs
1-HYDROXYBENZOTRIAZOLE	0.06 lbs
1-METHYL-2-PYRROLIDINONE	1.58 gal
1-METHYLIMIDAZOLE	0.03 gal
1-METHYLNAPHTHALENE	1 lbs
1-NAPHTHALENEACETIC ACID	0.5 lbs
1-NAPHTHOL	1.6 lbs
1-NAPHTHYL ACETATE, 99+%	0.27 lbs
1-NITROPROPANE	0.26 gal
1-NITROSO-2-NAPHTHOL, 98%	0.22 lbs
1-OCTANESULFONIC ACID SODIUM SALT, HPLC GRADE	0.05 lbs
1-OCTANOL	0.03 gal
1-OCTYN-3-0L, 96%	0.11 lbs
1-PENTANOL	6.39 lbs
1-PHENYL-1,2-ETHANEDIOL, 97%	0.22 lbs
1-PHENYL-2-THIOUREA	0.01 lbs
1-phenyl-2-thiourea	0.44 lbs
1-PHENYL-3-PYRAZOLIDONE	0.05 lbs
1-PHENYLDECANE	0.05 lbs
1-PROPANOL	8.29 gal
2-(2-AMINOETHYL)PYRIDINE	0.11 lbs
2-(P-CHLOROPHENOXY)-2-METHYLPROPIONIC ACID	0.05 lbs
2-(TRIFLUOROMETHYL)BENZIMIDAZOLE, 98%	0.01 lbs
2,2,2-TRIFLUOROETHANOL	0.44 lbs
2,2,6,6-TETRAMETHYL-4-PIPERIDINE HYDROCHLORIDE	0.05 lbs
2,2-BIS-(4-CHLOROPHENYL)-1,1-DICHLORO- ETHANE, 99+%	0.05 lbs
2,2-BIS-(4-CHLOROPHENYL)-1,1-DICHLOROETHY-LENE, 99%	0.05 lbs
2,2-DICHLOROPROPIONIC ACID, TECH., 90%	0.22 lbs
2,2-DIMETHOXYLPROPANE	0.13 gal
2,2-DIMETHOXYPROPANE	2.75 lbs
2,2-DIMETHYL-1,3-PROPANEDIAMINE	1.1 lbs
2,2-DIMETHYLSUCCINIC ACID, 99%	0.01 lbs
2,2'-DIPYRIDYL	0.14 lbs
2,3,4,5,6-PENTAFLUOROBENZYL ALCOHOL, 96-98%	0.01 lbs
2',3',4'-TRICHLOROACETOPHENONE, 95%	0.02 lbs
2,3,5,6-TETRAMETHYL-1,4-PHENYLENEDIAMINE	0.02 lbs
2,3,5-TRIIODOBENZOIC ACID, 98%	0.02 lbs
2,3,5-TRIPHENYL-2H-TETRAZOLIUM CHLORIDE	0.01 lbs
2,3,5-TRIPHENYLTETRAZOLIUM CHLORIDE	0.02 lbs
2,3-BUTANEDIOL	0.01 lbs
2,3-BUTANEDIONE MONOXIME	0.05 lbs
2,3-BUTANEDIONE MONOXIME	0.22 lbs

2,3-DIBROMO-1-PROPANOL	0.03 gal
2,3-DICHLORO-1-PROPANOL, 99% (GC)	0.05 lbs
2,3-DICHLOROBENZOIC ACID, 98%	0.11 lbs
2,3-DICHLOROPHENOL, 98%	0.32 lbs
2,4,5-TRICHLOROPHENOL	0.22 lbs
2,4,5-TRICHLOROPHENOXYACETIC ACID	0.57 lbs
2,4,6-COLLIDINE	0.22 lbs
2,4,6-TRICHLOROBENZOIC ACID	0.02 lbs
2,4,6-TRIMETHYLPYRIDINE	1.1 lbs
2,4-DIAMINO-6-HYDROXYPYRIMIDINE, 96%	0.23 lbs
2,4-DICHLORO-6-METHYLPHENOL	0.22 lbs
2,4-DICHLOROBENZOIC ACID, 98%	0.55 lbs
2,4-DICHLOROPHENOL	0.55 lbs
2,4-DICHLOROPHENOXYACETIC ACID	2 lbs
2,4-DICHLOROTOLUENE, 99%	0.44 lbs
2',4'-DIHYDROXYACETOPHENONE, 98%	0.26 gal
2,4-DIHYDROXYBENZALDEHYDE, 98%	0.55 lbs
2,4-DIHYDROXYBENZOIC ACID, 97%	0.44 lbs
2,4-DIMETHYLPHENOL	0.5 gal
2,4-DINITROANILINE	0.02 lbs
2,4-DINITROPHENOL	0.99 lbs
2,4-DINITROPHENYLHYDRAZINE	1.2 lbs
2,4-DI-TERT-BUTYL-6-(4-METHOXY-BENZYL)PHENOL, 99%	1 lbs
2,4-DITHIOBIURET	0.22 lbs
2,4-PENTANEDIONE	0.01 gal
2,5-DIBROMOBENZOIC ACID	0.02 lbs
2,5-DIBROMOTOLUENE, 99%	0.01 lbs
2,5-DICHLOROBENZOIC ACID, 97%	0.52 lbs
2,5-DICHLOROPHENOL	0.55 lbs
2,5-DIHYDROXYBENZOIC ACID	0.24 lbs
2,5-Dimethoxy-4-ethoxyamphetamine	1.91 gal
2,5-DIMETHOXYBENZALDEHYDE, 97%	0.05 lbs
2,5-DIMETHYLBENZOIC ACID, 98%	0.03 lbs
2,5-DIMETHYLFURAN, 99%	0.15 lbs
2,5-DIMETHYLPHENOL, 99+%	1.32 lbs
2,5-DIPHENYLOXAZOLE	1.1 lbs
2,6,10,14-TETRAMETHYLPENTADECANE	0.22 lbs
2,6-DIAMINOPURINE	0.02 lbs
2,6-DICHLOROINDOPHENOL	0.04 lbs
2,6-DICHLOROPHENOL	0.1 lbs
2,6-DICHLOROTOLUENE, 99+%	0.22 lbs
2,6-DIHYDROXYBENZOIC ACID, 97+%(GC)	0.05 lbs
2,6-DIMETHYLANILINE, 99%	0.22 lbs
2,6-DIMETHYLBENZOIC ACID, 99%	0.01 lbs
2,6-LUTIDINE	1 gal
2,6-PYRIDINEDICARBOXYLIC ACID	1.24 lbs
2,7-DIHYDROXYNAPHTHALENE, 97%	0.01 lbs
2.4-DICHLOROPHENOL	0.01 lbs
2'-ACETONAPHTHONE, 99%	0.22 lbs
2-AMINO-2-METHYL-1,3-PROPANEDIOL	0.1 lbs
2-AMINO-2-METHYL-1-PROPANOL	0.4 gal
2-AMINO-5-NITROPYRIDINE, 99%	0.02 lbs
2-AMINO-6-MERCAPTOPURINE	0.01 lbs
2-AMINOBENZOTHIAZOLE, 97%	0.07 lbs
2-AMINOBIPHENYL	0.05 lbs
2-AMINOETHANOL	0.66 gal
2-AMINOETHYL HYDROGEN SULFATE	1.1 lbs
2-AMINOPHENOL, 99%	0.23 lbs
2-AMINOPYRIDINE	0.02 lbs
2-AMINOTHIOPHENOL	0.11 lbs
2-BENZOTHIAZOLOL, 95% (TITR.)	0.05 lbs
2-BENZOXAZOLINONE, 98%	0.02 lbs
2-BENZYLAMINOPYRIDINE, 98%	0.02 lbs
2-BROMO-2-CHLORO-1,1,1-TRIFLUOROETHANE	0.55 lbs
2-BROMO-2-NITROPROPANE-1,3-DIOL(BRONOPOL)	0.05 lbs
2-BROMO-6-METHOXY-NAPTHALENE, 97%	0.01 lbs
2-BROMOACETOPHENONE, 98%	0.02 lbs
2-BROMOBENZOIC ACID, 97%	0.05 lbs

2-BROMOPROPANE 99%	0.13 gal
2-BUTANOL	1.06 gal
2-BUTANONE	0.44 lbs
2-CARBOXYBENZALDEHYDE, 99%	0.01 lbs
2'-CHLOROACETOPHENONE, 97%	0.29 lbs
2-CHLOROBENZOIC ACID	2.44 lbs
2-CHLOROETHANOL	0.01 lbs
2-CHLOROPROPANE, 96%	0.26 gal
2-CHLOROPROPIONIC ACID, 95% (GC)	0.44 lbs
2-DEOXY-D-GLUCOSE	0.29 lbs
2-DIMETHYLAMINOETHANETHIOL HYDROCHLORIDE, 95%	0.11 lbs
2-DIMETHYLAMINOETHANOL	0.22 lbs
2-ETHOXYETHANOL	2 gal
2-FLUOROBENZOIC ACID, 99%	0.05 lbs
2-FLUOROPYRIDINE, 98%	0.01 lbs
2-HEPTANONE, 98%	0.55 lbs
2-HYDROXYBENZYL ALCOHOL, 97%	0.05 lbs
2-HYDROXYETHYLMETHACRYLATE	0.05 lbs
2-HYDROXYISOBUTYRIC ACID, 98%	0.05 lbs
2-HYDROXYPYRIDINE	0.11 lbs
2-IODOPHENOL	0.03 lbs
2-MERCAPTO-1-METHYLIMIDAZOLE, 98%	0.05 lbs
2-MERCAPTOBENZIMIDAZOLE, 98%	0.55 lbs
2-MERCAPTOBENZOTHIAZOLE	0.55 lbs
2-MERCAPTOETHANESULFONIC ACID SODIUM	0.01 gal
2-MERCAPTOETHANOL	3 gal
2-MERCAPTOETHYLAMINE, FREE BASE	0.18 lbs
2-MERCAPTOPYRIDINE, 99%	0.02 lbs
2-METHOXYETHANOL	0.26 gal
2-METHOXYETHYL ACETATE, 98%	0.03 gal
2-METHYL-1-BUTANOL	0.02 lbs
2-METHYL-1-PROPANOL	0.26 gal
2-METHYL-2,4-PENTANEDIOL	0.13 gal
2-METHYL-2-BUTANOL	2.2 lbs
2-METHYL-2-PROPANETHIOL	0.03 gal
2-METHYL-6-NITROANILINE, 99%	0.01 lbs
2-METHYLALANINE	0.08 lbs
2-METHYLBENZOTHIAZOLE, 99%	0.01 lbs
2-METHYLBUTANE	2.43 gal
2-METHYLCYCLOHEXANONE, 98%	0.22 lbs
2-METHYLIMIDAZOLE	0.22 lbs
2-METHYLINDOLE, 98%	0.05 lbs
2-METHYLPROPANOIC ACID	0.11 lbs
2-NAPHTHALDEHYDE, 98%	0.07 lbs
2-NAPHTHOIC ACID, 99%	0.02 lbs
2-NAPHTHOXYACETIC ACID	0.01 lbs
2-NITROBENZOIC ACID, 85-90%,(GC)	0.31 lbs
2-NITROPHENOL	0.01 lbs
2-NONANONE, 99+%	0.01 lbs
2-OCTYNOIC ACID, 98%	0.02 lbs
2-PHENOXYETHANOL	0.32 gal
2-PHENYLBUTYRIC ACID	0.22 lbs
2-PHENYLPHENOL	0.44 lbs
2-PROPANOL	83 gal
2-PYRIDINEALDOXIME METHOCHLORIDE, 99%	0.05 lbs
2-PYRIDINECARBOXALDEHYDE-2-QUINOLYL-HYDRAZONE	0.01 lbs
2-SEC.-BUTYLPHENOL, 98%	0.22 lbs
2-SULFOBENZOIC ACID CYCLIC ANHYDRIDE, TECH	0.02 lbs
2-TERT-BUTYL-1,4-BENZO-QUINONE	0.01 lbs
2-TERT-BUTYLPHENOL	1.1 lbs
2-THIOBARBITURIC ACID	0.88 lbs
2-THIOPHENECARBOXYLIC ACID, 99%	0.05 lbs
2-THIOURACIL, 99% (TITR.)	0.27 lbs
2-YT BROTH	2.2 lbs
3-(3,4-DICHLOROPHENYL)-1,1-DIMETHYLUREA	0.22 lbs
3-(DIMETHYLDODECYL-AMMONIA)PROPANE SULFONATE	0.12 lbs
3-(METHACRYLOXYPROPYL)-TRIMETHOXYSILANE	0.01 gal
3,3-DIAMINOBENZIDINE	0.07 lbs

3,4,5,6-TETRA-BROMOPHENOL-SULFONPHTHALEIN	0.02 lbs
3,4-DICHLOROBENZOIC ACID, 99+%	0.22 lbs
3,4-DICHLOROPHENOL, 99%	0.08 lbs
3,4-DIHYDROXYBENZOIC ACID, 97%	0.55 lbs
3,4-DIHYDROXYCINNAMIC ACID	0.09 lbs
3,4-POLYETHYLENE DIOXYTHIOPHENE-POLYSTYRENESULFONATE	0.02 lbs
3,5-DIAMINOBENZOIC ACID	0.18 lbs
3,5-DICHLOROBENZOIC ACID, 99%	0.12 lbs
3,5-DIHYDROXYBENZOIC ACID, 97%	0.05 lbs
3,5-DIMETHOXY-4-HYDROXY-ACETOPHENONE	0.23 lbs
3,5-DIMETHYLPHENOL, 98%	0.22 lbs
3,5-DINITROBENZOIC ACID, 99%	0.02 lbs
3,5-DINITROSALICYLIC ACID MONOSODIUM SALT,MONOHYDRATE, 97% (TITR.)	0.22 lbs
3,5-DINITROSALICYLIC ACID, 98%	0.22 lbs
3-AMINO-1,2,4-TRIAZOLE	0.6 lbs
3-AMINO-1H-1,2,4-TRIAZOLE, 95%	0.22 lbs
3-AMINO-9-ETHYLCARBAZOLE	0.02 lbs
3-AMINO-9-ETHYLCARBAZOLE	0.09 lbs
3-AMINOBENZOIC ACID	0.11 lbs
3-AMINOBENZOIC ACID ETHYL ESTER	0.05 lbs
3-AMINOPHENOL, 99%	0.01 lbs
3-AMINOPHTHALHYDRAZIDE, 98%	0.02 lbs
3-AMINOPHTHALHYDRAZIDE, 98%	0.07 lbs
3-BROMOBENZOIC ACID	0.05 lbs
3-BROMOPYRUVIC ACID, 98% (TITR.)	0.07 lbs
3-BUTEN-1-OL, 96%	0.03 gal
3-CARENE	0.07 gal
3-CARENE	0.22 lbs
3-CHLORO-1,2-PROPANEDIOL, 98%	0.26 gal
3-CHLORO-1,2-PROPANEDIOL, 98%	0.55 lbs
3-CHLORO-1-PROPANOL	0.05 lbs
3-CHLORO-2-BUTANONE	0.01 lbs
3-CHLORO-2-METHYLANILINE, 99%	0.01 lbs
3-CHLOROBENZOIC ACID, 99+%	0.05 lbs
3-CHLOROBENZOIC ACID, 99+%	0.74 lbs
3-CHLOROPEROXYBENZOIC ACID	0.05 lbs
3-CHLOROPEROXYBENZOIC ACID	0.11 lbs
3-CHLOROPHENYL METHYL CARBINOL	0.07 lbs
3-CHLOROPROPIONIC ACID, 98%	0.44 lbs
3-CYANOPYRIDINE, 98%	0.11 lbs
3-DIMETHYLAMINOBENZOIC ACID	0.22 lbs
3-HYDROXY-4-METHOXYBENZALDEHYDE, 98%	0.05 lbs
3-HYDROXYPYRIDINE SODIUM SALT, 98%	0.01 lbs
3-HYDROXYTYRAMINE	0.03 lbs
3-INDOLEACETIC ACID	0.02 lbs
3-INDOLEACETIC ACID	0.03 lbs
3-INDOLEACRYLIC ACID, 99%	0.01 lbs
3-ISOBUTYL-1-METHYLXANTHINE	0.05 gal
3-MERCAPTOPROPIONIC ACID, 99+%	0.05 gal
3-METHOXYPHENOL, 97%	0.05 lbs
3-METHYL CATECHOL	0.22 lbs
3-METHYL-1-BUTANOL	0.03 gal
3-METHYL-4-NITROBENZYL ALCOHOL , 98%	0.02 lbs
3-METHYLBENZYL ALCOHOL, 97%	0.16 lbs
3-METHYLCATECHOL, 99%	0.05 lbs
3-METHYLINDOLE	0.23 lbs
3-METHYLPENTANE, 99+%	0.22 lbs
3-NITROBENZOIC ACID	0.23 lbs
3-NITROCINNAMIC ACID	0.11 lbs
3-NITRO-L-TYROSINE, 99%	0.01 lbs
3-NITRO-L-TYROSINE, 99%	0.03 lbs
3-NITROPHENOL, 99%	0.03 lbs
3-PENTANOL, 98%	1.1 lbs
3-TERT-BUTYLPHENOL, 99+%	0.05 lbs
4-(2-HYDROXYETHYL)-1-PIPERAZINEETHANESULFONIC ACID	1.1 lbs
4-(4-NITROBENZYL)PYRIDINE, 98%	0.03 lbs
4-(DIMETHYLAMINO)BENZALDEHYDE	0.22 lbs
4,4'-BIS(4-AMINO-1-NAPHTHYLAZO)-2,2'- STILBENEDISULFONIC ACID, INDICATOR GRADE	0.22 lbs

4,4'-BIS(DIMETHYLAMINO)THIOBENZOPHENONE	0.01 lbs
4,4-DIMETHOXYDIPHENYLMETHANE	0.02 lbs
4,5-DIHYDROXYNAPHTHALENE-2,7-DISULFONIC ACID, DISODIUM SALT DIHYDRATE, P.A.	0.05 lbs
4,5-DIHYDROXYNAPHTHALENE-2,7-DISULFONIC ACID, DISODIUM SALT DIHYDRATE, P.A.	0.13 lbs
4-ACETAMIDOPHENOL	0.22 lbs
4-AMINO-3-HYDROXY-1-NAPHTHALENESULFONIC ACID, 95%	0.11 lbs
4-AMINOANTIPYRINE	0.01 lbs
4-AMINOBUTYRIC ACID	0.28 lbs
4-AMINOPHENOL	0.01 lbs
4-AMINOPYRIDINE	0.13 lbs
4-BENZOYLBUTYRIC ACID	0.05 lbs
4-BIPHENYLMETHANOL 98%	0.02 lbs
4'-BROMOACETOPHENONE, 98%	0.05 lbs
4-BROMOBENZALDEHYDE	0.01 lbs
4-BROMOBENZOYL CHLORIDE, 98%	0.02 lbs
4-bromophenacyl bromide	0.08 lbs
4-BROMOTHIOPHENOL, 95%	0.05 lbs
4-BROMOTOLUENE, 99%	0.03 gal
4-CARBOXYBENZALDEHYDE 97%	0.03 lbs
4-CARBOXYBENZALDEHYDE 97%	0.05 lbs
4-CHLORO-1-NAPHTHOL	0.04 lbs
4-CHLOROBENZALDEHYDE	1.22 lbs
4-CHLOROBENZOIC ACID, 99%	0.11 lbs
4-CHLOROBENZOIC ACID, 99%	0.88 lbs
4-CHLORO-O-TOLYLOXYACETIC ACID	1.1 lbs
4'-CHLOROPROPIOPHENONE, 97%	0.05 lbs
4-CHLORORESORCINOL, 98%	0.22 lbs
4-CHLOROSALICYLIC ACID	0.22 lbs
4-CHLOROTHIOPHENOL, 98%	0.22 lbs
4-DIMETHYLAMINOBENZOIC ACID, 98%	0.22 lbs
4-DIMETHYLAMINOCINNAMALDEHYDE, 98%	0.07 lbs
4-DIMETHYLAMINOPYRIDINE	0.28 lbs
4-ETHYLMORPHOLINE	0.22 lbs
4'-FLUOROACETOPHENONE, 99%	0.05 lbs
4-FLUOROBENZOIC ACID, 99%	0.05 lbs
4-HYDROXY-3-METHYL-2-BUTANONE, TECH. CA. 85%	0.22 lbs
4-HYDROXY-3-NITROBENZOIC ACID. 98 %	0.05 lbs
4-HYDROXYBENZONITRILE	0.02 lbs
4-HYDROXYBENZYL ALCOHOL, 97% (TLC)	0.11 lbs
4-HYDROXYBUTYRIC ACID, SODIUM SALT, 99%	0.01 lbs
4-HYDROXYCINNAMIC ACID, 98% PREDOMINANTLY TRANS	0.05 lbs
4-HYDROXYCOUMARIN, 98%	0.02 lbs
4-HYDROXYISOPHTHALIC ACID, 98%	0.05 lbs
4-HYDROXYPHENYL THIOCYANATE MONOHYDRATE	0.22 lbs
4-METHOXY-2-NITROANILINE, 98%	0.55 lbs
4-METHOXYBENZYL ALCOHOL, 98%	0.22 lbs
4-METHYL-2-NITROANILINE, 99%	1.01 lbs
4-METHYLBENZYL ALCOHOL 98%	0.05 lbs
4-METHYLCYCLOHEXANONE, 98%	1.1 lbs
4-METHYLMORPHOLINE 4-OXIDE MONOHYDRATE, 99% (TITR.)	0.03 gal
4-METHYLUMBELLIFERONE	0.23 lbs
4-METHYLUMBELLIFERYL ACETATE	0.01 lbs
4-NITRO-1,2-PHENYLENEDIAMINE	0.02 lbs
4'-NITROACETANILIDE	0.01 lbs
4-NITROANISOLE, 99+%	0.22 lbs
4-NITROPHENOL	0.18 lbs
4-PENTENOIC ACID, 99%	0.11 lbs
4-PHENYLBUTYRIC ACID, 99%	0.61 lbs
4-PHENYLIMIDAZOLE, 99%	0.01 lbs
4-PHENYLPHENOL, 97%	0.22 lbs
4-PYRIDINECARBOXALDEHYDE, 98%	0.22 lbs
4-TERT-BUTYLBENZENESULFONYL CHLORIDE, 98%	0.02 lbs
4-TERT-BUTYLCATECHOL, 99%	0.23 lbs
4-TERT-BUTYLPHENOL	0.22 lbs
4-VINYL-1-CYCLOHEXENE, 99%,STABILIZED WITH 50-200 PPM BHT	1.1 lbs
4-VINYLCYCLOHEXENE DIOXIDE	0.55 lbs
5,5-DIMETHYL-1,3-CYCLOHEXANEDIONE	0.05 lbs
5,5'-DITHIO-BIS(2-NITROBENZOIC ACID)	0.13 lbs

5,7-DIIODO-8-HYDROXYQUINOLINE	0.01 lbs
5-AMINO-2,3-DIHYDRO-1,4-PHTHALAZINEDIONE	0.01 lbs
5-BROMOSALICYLIC ACID, 98%	0.05 lbs
5-BROMOURACIL	0.03 lbs
5-CHLOROSALICYLALDEHYDE, 98% (TITR.)	0.05 lbs
5-CHLOROSALICYLIC ACID, 98%	0.22 lbs
5-INDANOL, 99%	6.6 gal
5-METHYLSALICYLIC ACID, 98%	0.01 lbs
5-NITRO-2-FURALDEHYDE DIACETATE	0.05 lbs
5-PENYLVALERIC ACID	0.02 lbs
5-SULFONSALICYLIC ACID DIHYDRATE	0.22 lbs
5-SULFOSALICYCLIC ACID	7.13 lbs
6-AMINOCAPROIC ACID	0.66 lbs
6-AMINOHEXANOICACID	0.22 lbs
6-BENZYLAMINOPURINE , 99 %	0.0175 gal
6-BROMOHEXANOIC ACID, 98%	0.05 lbs
7-CHLORO-4-NITROBENZ-2-OXA-1,3-DIAZOLE	0.02 lbs
7-HYDROXYCOUMARIN	0.28 lbs
8-ANILINO-1-NAPHTHALENE SULFONIC ACID	0.01 lbs
8-HYDROXYQUINOLINE	3.31 lbs
8-HYDROXYQUINOLINE, P.A.	0.22 lbs
8-QUINOLINOL	0.33 lbs
9-AMINOACRIDINE	11.07 lbs
9-NITROANTHRACENE, 97%	0.01 lbs
ABIETIC ACID, TECH.	0.05 lbs
AC 200 ACID DETERGENT	0.01 gal
ACACIA	2 lbs
A-CASEIN, FROM BOVINE MILK	1.1 lbs
ACCUSTAIN	0.36 gal
ACES	0.6 lbs
ACETALDEHYDE	0.315 gal
ACETAMIDE	0.29 lbs
ACETAMINOPHEN	0.01 lbs
ACETANILIDE	1.1 lbs
ACETAZOLAMIDE	0.07 lbs
ACETIC ACID	52.495 gal
ACETIC ACID (GLACIAL)	18.92 gal
ACETIC ACID, AMMONIUM SALT, 98%	5.51 lbs
ACETIC ACID, GLACIAL ALDEHYDE FREE	0.12 gal
ACETIC ANHYDRIDE	1.29 gal
ACETIC ANHYDRIDE, 99+%(TITR.)	2.2 lbs
ACETOACETANILIDE,99%	0.22 lbs
ACETONE	88.06 gal
ACETONITRILE	68.38 gal
ACETONITRILE UV	3.06 gal
ACETONYLTRIPHENYLPHOSPHONIUM CHLORIDE, 99%	0.05 lbs
ACETOPHENONE	0.13 gal
ACETOSYRINGONE	0.01 lbs
ACETYL ACETONE	0.13 gal
ACETYL CYSTEINE	0.01 lbs
ACETYLACETALDEHYDE DIMETHYL ACETAL, 90-96%	0.22 lbs
ACETYLCHOLINE BROMIDE	0.49 lbs
ACETYLCHOLINE CHLORIDE	0.44 lbs
ACETYLENEDICARBOXYLIC ACID, 99%	1.1 lbs
ACETYLSALICYLIC ACID	0.91 lbs
ACETYLTHIOCHOLINE IODIDE	0.02 lbs
ACID FUCHSIN	0.15 lbs
aconitine	1.1 lbs
ACRIDINE ORANGE	0.31 lbs
ACRYLAMIDE	7.42 gal
ACRYLAMIDE (30%)	0.3 gal
ACRYLAMIDE (40%)	1.17 gal
ACRYLAMIDE/BISACRYLAMIDE	0.03 gal
ACRYLIC ACID	0.03125 gal
ACRYLIC CEMENT	0.25 lbs
ACTIVATED CARBON	5.76 lbs
ACTIVATED DIALDEHYDE SOLUTION	0.25 gal
ADA	0.05 lbs

Adenine	1.08 lbs
ADENINE PHOSPHATE SALT	0.05 lbs
ADENINE SULFATE	0.08 lbs
ADENOSINE	0.14 lbs
ADENOSINE 3'-,5'-CYCLIC MONOPHOSPHATE, 99+%	0.01 gal
ADENOSINE 5'-TRIPHOSPHATE	0.2 lbs
ADENOSINE 5'-TRIPHOSPHATE, DISODIUM SALT	0.05 lbs
A-D-GLUCOSE 1-PHOSPHATE DISODIUM HYDRATE	0.02 lbs
ADIPIC ACID	1.12 lbs
ADIPOYL CHLORIDE, 98%	0.05 lbs
AEROSOL	1 lbs
AFFI-GEL BLUE	0.23 gal
affi-gel heparin gel	0.05 lbs
AG 1-X2 RESIN	1.1 lbs
AG 1-X8	2 lbs
AG 1-X8 RESIN	2.42 lbs
AG 2-X10	1 lbs
AG 501-X8	5.62 lbs
AG 50W-X12	1 lbs
AG 50W-X8	1 lbs
Agar	22.43 gal
AGAR - PURIFIED	0.5 lbs
AGAR GEL	2.26 lbs
AGAR NOBLE	6.5 lbs
AGAR-AGAR	5.29 lbs
AGAROSE	8.55 gal
AGAROSE BEADS	0.4 gal
AGAROSE DNA GRADE	1.43 lbs
AGAROSE HIGH EEO	0.22 lbs
AGAROSE LOW EEO	1.32 lbs
AGAROSE LOW MELTING, FOR <1000 BASE PAIRS DNA	0.66 lbs
AIM V MEDIUM	1.45 gal
AIR (COMPRESSED)	150 lbs
ALBUMEN	0.04 lbs
ALBUMIN BOVINE FRACTION V POWDER	0.245 gal
ALBUMIN BOVINE SERUM	0.05 gal
ALBUMIN FROM EGGS SOLUBLE	1 lbs
ALBUMIN, BOVINE FRACTION V	2.19 lbs
ALBUMIN, CHICKEN EGG	0.29 lbs
ALBUMIN, HUMAN	0.14 lbs
ALBUMIN, RABBIT	0.01 lbs
ALCIAN BLUE	0.26 lbs
ALCIAN BLUE 8GX	0.1 lbs
ALCOHOL	22.03 gal
ALCOHOL DEHYDROGENASE	0.02 gal
ALGINIC ACID	0.55 lbs
ALIZARIN	0.05 lbs
ALIZARIN RED S	0.1 lbs
ALLYL ALCOHOL	0.31 gal
allyl dl glycine	0.05 lbs
ALLYLTHIOUREA, 98%	0.05 lbs
ALPHA NITRONAPHTHALENE	0.02 lbs
ALPHA, ALPHA, ALPHA-TRIFLUORO-M-TOLUIDINE	0.02 lbs
alpha-amino isobutyric acid	0.02 lbs
ALPHA-AMYLASE	0.05 lbs
ALPHACEL NON-NUTRITIVE BULK	10 lbs
ALPHA-CELLULOSE	3.3 lbs
ALPHA-CYANO-4-HYDROXYCINNAMIC ACID	0.19 lbs
ALPHA-D-(+) GLUCOSE	2.67 lbs
alpha-d(+)-glucose, anhydrous	2.2 lbs
ALPHA-D(+)-MELIBIOSE HYDRATE, 99+%	0.01 lbs
ALPHA-KETOGLUTARIC ACID	0.02 lbs
ALPHA-LACTOSE	7.16 lbs
ALPHA-L-RHAMINOSE	0.06 lbs
ALPHA-METHYL D MANNOSIDE	0.48 lbs
ALPHA-METHYLCINNAMIC ACID, 99%	0.02 lbs
ALPHA-METHYLGLUCOSIDE	0.22 lbs
ALPHA-NAPHTHALENEACETIC ACID	0.036 gal

ALPHA-NAPHTHOL	2.22 lbs
ALPHA-PHELLANDRENE	0.22 lbs
ALPHA-PINENE	0.44 lbs
ALPHA-TERPINENE, TECH. 85-90%	0.03 gal
ALPHA-TERPINEOL	0.27 gal
ALUMINA	2.58 lbs
ALUMINA (NEUTRAL)	0.81 lbs
ALUMINA ACTIVATED 98% POWDER	1 lbs
ALUMINA ADSORPTION	4.4 lbs
ALUMINUM	1.71 lbs
ALUMINUM AMMONIUM SULFATE	4.21 lbs
ALUMINUM CHLORIDE	2.42 lbs
ALUMINUM METAL DUST	1 lbs
ALUMINUM NITRATE	1.25 lbs
ALUMINUM OXIDE	6.3 lbs
ALUMINUM POTASSIUM SULFATE	4.3 lbs
ALUMINUM POTASSIUM SULFATE DODECAHYDRATE	0.22 lbs
ALUMINUM SULFATE	6.74 lbs
AMBERLITE	7.35 lbs
AMBERLITE CG-120 ION-EXCHANGE RESIN	1.1 lbs
AMBERLITE XAD-16	4.41 lbs
AMIDO BLACK 10B	0.06 lbs
amino acids solution	0.39 gal
AMINOACETIC ACID	3 lbs
AMINOBENZOIC ACID	1.12 lbs
AMINOGUANIDINE HEMISULFATE	1.1 lbs
AMINOHEXANOIC ACID	0.22 lbs
AMINOPHENOL	1.1 lbs
AMINOPHYLLINE, 99% (COMBINED MIXTURE OF THEOPHYLLINE AND ETHYLENEDIAMINE)	0.22 lbs
AMMONIA	0.03 gal
Ammonia, Cleaner	1.67 gal
AMMONIUM ACETATE	10.69 gal
AMMONIUM BICARBONATE	29.74 lbs
AMMONIUM BROMIDE	1.32 lbs
AMMONIUM CARBONATE	11.76 lbs
AMMONIUM CHLORIDE	54.55 lbs
AMMONIUM CITRATE, 98%	8.1 lbs
AMMONIUM FORMATE	3.64 lbs
AMMONIUM HYDROXIDE	18.53 gal
AMMONIUM IRON (II) SULFATE HEXAHYDRATE	2.42 lbs
AMMONIUM METAVANADATE	1.32 lbs
AMMONIUM MOLYBDATE	36.54 lbs
AMMONIUM MOLYBDATE (VI) TETRAHYDRATE	0.22 lbs
AMMONIUM NITRATE	21.91 lbs
AMMONIUM OXALATE	2.1 lbs
AMMONIUM PEROXYDISULFATE	0.22 lbs
AMMONIUM PERSULFATE	234.75 lbs
AMMONIUM PHOSPHATE	9.58 lbs
AMMONIUM PHOSPHATE (MONOBASIC)	1.22 lbs
AMMONIUM PHOSPHATE DIBASIC	2.05 lbs
AMMONIUM PYRROLIDINE DITHIOCARBAMATE	0.01 lbs
AMMONIUM SULFAMATE	0.66 lbs
AMMONIUM SULFATE	260.22 lbs
AMMONIUM SULFIDE	0.13 gal
AMMONIUM TARTRATE	1.1 lbs
AMMONIUM THIOCYANATE	2.1 lbs
AMPHOTERICIN B	0.1 gal
AMPICILLIN	2.54 lbs
AMPICILLIN SODIUM	0.09 lbs
AMPICILLIN TRIHYDRATE	0.11 lbs
AMPICILLIN, SODIUM SALT	0.81 lbs
amplify	0.42 gal
AMPSO	0.44 lbs
AMYL ACETATE	0.425 gal
AMYL ALCOHOL	2 gal
AMYLOSE	0.01 lbs
ANALYTICAL GRADE BED RESIN	0.22 lbs
ANILINE	0.29 gal

ANILINE BLUE	0.27 lbs
ANILINE HYDROGEN CHLORIDE	0.33 lbs
ANILINE, 99.8%	0.22 lbs
ANION EXCHANGE CELLULOSE	1.1 lbs
ANION EXCHANGE RESIN	3.2 lbs
ANISALDEHYDE	0.22 lbs
ANISOL	0.55 lbs
ANISOLE	0.05 gal
ANSA	0.01 lbs
ANTHRACENE	0.07 lbs
ANTHRACINE-9-CARBOXYLIC ACID	0.03 lbs
ANTHRANILIC ACID	2.88 lbs
ANTHRONE	0.45 lbs
ANTIBIOTIC ANTIMYCOTIC	0.37 gal
ANTIBIOTIC ANTIMYCOTIC SOLUTION	0.04 gal
ANTIBIOTIC MEDIUM 3	0.71 gal
ANTI-DIG FAB FRAGMENT	0.01 lbs
antifoam a emulsion	0.296 gal
ANTIFOAM B EMULSION	0.03 gal
ANTI-FREEZE COOLANT	1 gal
ANTIMONY TRICHLORIDE	0.25 lbs
ANTIMYCIN A	0.44 lbs
ANTIPYRINE	0.33 lbs
AQUACIDE	4.4 lbs
ARABINOGALACTAN	0.05 lbs
ARABINOSE	0.16 lbs
ARACHIDONIC ACID, FREE ACID	0.02 lbs
ARBETIN	0.22 lbs
ARGININE	1.87 lbs
ARGON	100 lbs
ARSENIC	0.11 lbs
ARSENIC (III) OXIDE	0.22 lbs
ARSENIC ACID	0.55 lbs
ARSENIC ACID, SODIUM SALT	1.1 lbs
ASCARITE II	1.1 lbs
ASCORBIC ACID	0.62 gal
ASPARTIC ACID	0.29 lbs
ATP	0.24 lbs
ATROPINE, 99%	0.01 lbs
AURINTRICARBOXYLIC ACID	0.18 lbs
AZODICARBONAMIDE, 97%	1.1 lbs
AZURE A	0.14 lbs
AZURE B (CERT)	0.04 lbs
AZURE II	0.05 lbs
B-5	0.01 lbs
BACITRACIN ZINC U.S.P.	0.04 lbs
BACTO AGAR	28.24 lbs
BACTO MALT EXTRACT	0.5 lbs
Bacto Peptone	13 lbs
BACTO PROTEOSE PEPTONE 3	1 lbs
BACTO TRYPTIC SOY BROTH	1 lbs
BACTO YEAST	2.2 lbs
bacto-casitone	0.25 lbs
BACTO-LACTOSE	1.1 lbs
B-ALANINE	0.01 lbs
BARBITAL	1.66 lbs
BARBITAL SODIUM	1.1 lbs
BARBITURIC ACID	0.05 lbs
BARIUM ACETATE	3 lbs
BARIUM CARBONATE	2.2 lbs
BARIUM CHLORIDE	5.73 lbs
BARIUM HYDROXIDE	1.085 gal
BARIUM HYDROXIDE OCTAHYDRATE	1.1 lbs
BARIUM HYDROXIDE SOLUTION	0.13 gal
BARIUM NITRATE	0.22 lbs
BARIUM OXIDE	1.1 lbs
Basal Salt Soln	39.07 gal
BASIC FUCHSIN	0.61 lbs

BBL GRAM SAFRANIN SOLUTION	2.2 lbs
B-D(+)GLUCOSE	0.05 lbs
B-D-GLUCOSE	0.05 lbs
BEEF EXTRACT	5.2 lbs
BENTONITE	16.6 lbs
BENZALDEHYDE	0.655 gal
BENZALKONIUM CHLORIDE	2.97 lbs
BENZAMIDE	0.78 lbs
BENZAMIDINE	0.72 lbs
BENZAMIDINE HYDROCHLORIDE	0.23 lbs
BENZENE	22.89 gal
BENZENE SULFONIC ACID	0.22 lbs
BENZENESULFONAMIDE	0.01 lbs
BENZETHONIUM CHLORIDE	0.22 lbs
BENZIMIDAZOLE	0.44 lbs
BENZOIC ACID	40.98 lbs
BENZOIC ANHYDRIDE, 98%	0.22 lbs
BENZOIN COMPOUND	0.11 lbs
BENZONITRILE	0.05 lbs
BENZOPHENONE	1.12 lbs
BENZOTHIAZOLE	2.64 gal
BENZOTRIAZOLE	0.18 lbs
BENZOYL CHLORIDE	0.44 lbs
BENZOYL PEROXIDE	1.1 lbs
BENZYL ACETATE, 99+%	0.22 lbs
BENZYL ALCOHOL	0.66 gal
BENZYL BROMIDE	0.01 lbs
BENZYL CHLORIDE	0.43 gal
BENZYL CHLOROFORMATE	0.22 lbs
BENZYL MERCAPTAN	0.22 lbs
BENZYLAMINE	0.07 gal
BENZYLKONIUM CHLORIDE	0.22 lbs
BENZYLMAGNESIUM CHLORIDE	0.21 gal
BERBERINE	0.02 lbs
BES	0.44 lbs
BETA PINENE	0.22 lbs
BETA-(2-FURYL)-ACROLEIN	0.05 lbs
BETA-(3-PYRIDYL)ACRYLIC ACID	0.22 lbs
BETA-ALANINE	7.04 lbs
BETA-CAROTENE, 99% (UV-VIS)	0.07 lbs
BETA-CYCLODEXTRIN HYDRATE, 99% (HPLC)	0.18 lbs
Beta-D-(-)-FRUCTOSE	6.6 lbs
BETA-D-FRUCTOSE (CRYSTALLINE)	0.22 lbs
BETA-ESTRADIOL-3-BENZOATE WHITE TO CREAMY-WHITE	0.01 lbs
BETAFLUOR	2 gal
BETA-GLYCEROPHOSPHATE	7.02 lbs
BETA-GLYCEROPHOSPHORIC ACID DISODIUM SALT, 5-HYDRATE, 98% (TITR.)	0.28 lbs
BETA-HYDROXYBUTYRIC ACID	0.06 lbs
BETAINE	3.59 lbs
BETAINE ANHYDROUS, 98%	6.6 lbs
BETAINE HYDROCHLORIDE, 99%	0.24 lbs
BETAINE MONOHYDRATE, 99%	1.32 lbs
BETA-LACTOSE GRADE III	0.99 lbs
betamax	2.13 gal
beta-mercaptoethanol	0.07 gal
BETA-MERCAPTOETHYLAMINE	0.03 lbs
BETA-NAD	0.24 lbs
BETA-NAPHTHOFLAVONE, 99+%	0.02 lbs
BETA-NAPHTHOXY ACETIC ACID	0.02 lbs
beta-naphthyl acetate	0.11 lbs
BETA-NICOTINAMIDE ADENINE DINUCLEOTIDE TETRAHYDRATE,CRYSTALLINE,98+%(HPLC)	0.11 lbs
BETA-SITOSTEROL	0.32 lbs
BICINCHONINIC ACID SOLUTION	0.53 gal
BICINE	0.82 lbs
BIEBRICH SCARLET	0.22 lbs
BILE ESCULIN AZIDE AGAR 0525	1.1 lbs
BIO GEL A	0.85 gal
BIO GEL HTP	0.22 lbs

BIO GEL P-10	0.44 lbs
BIO GEL P-100	0.88 lbs
BIO GEL P-150	0.22 lbs
bio gel p-2	0.88 lbs
BIO GEL P-20	0.44 lbs
BIO GEL P-30	1.1 lbs
BIO GEL P-4	0.44 lbs
BIO GEL P-6	0.94 lbs
BIO GEL P-60	0.66 lbs
BIO-BEADS SM-2	0.66 lbs
biodegradable counting cocktail	4.23 gal
bio-gel htp	0.65 gal
BIO-GEL P-2,4,6,6DG,10,30,60,100,150,200,300 AND CONCENTRATOR RESIN	0.88 lbs
BIOLOG UNIVERSAL GROWTH MEDIUM	2.1 lbs
BIO-LYTE	0.05 lbs
BIO-REX 70	3.42 lbs
BIO-SAFE COOMASSIE STAIN	0.23 lbs
bio-safe II	0.05 gal
bio-sil a	2.2 lbs
BIOTIN	0.054 gal
BIPHENYL	2.26 lbs
BIS	0.76 lbs
BIS N,N'-METHYLENE-BIS-ACRYLAMIDE	0.24 lbs
BIS TRIS PROPANE	0.02 lbs
BIS-ACRYLAMIDE	2.03 gal
BIS-ACRYLYLCYSTAMINE	0.02 lbs
BISMUTH NITRATE PENTAHYDRATE	1.05 lbs
BIS-TRIS	3.08 lbs
BIS-TRIS PROPANE	0.28 lbs
BLACK ALBUMIN HYDROLYSATE	4.4 lbs
BLEACH	67.55 gal
blocking reagent	0.15 gal
blood agar base	2.2 lbs
BLOT ABSORBENT	0.66 lbs
BLUE DEXTRAN	0.19 lbs
BOILEEZERS	2.15 lbs
BOILING CHIPS	2 lbs
BOILING STONES	2 lbs
BORAX	13.21 lbs
BORDEAUX R	0.05 lbs
BORIC ACID	23.65 gal
BORNEOL	0.02 lbs
BORON	0.02 lbs
BOUIN'S FIXATIVE	0.53 gal
BOVINE ALBUMIN	0.2 gal
BOVINE SERUM ALBUMIN	2.07 gal
B-PER BACTERIAL PROTEIN EXTRACTION REAGENT	0.11 gal
BRAIN HEART CC AGAR 0483	1.32 lbs
brain heart infusion	7.09 lbs
BRIJ 35	0.52 gal
BRIJ 58	0.22 lbs
BRILLIANT BLUE FCF	0.29 gal
BRILLIANT BLUE G	1.81 lbs
BRILLIANT BLUE G-250	0.86 lbs
BRILLIANT BLUE R	3.73 lbs
BRILLIANT BLUE R-250	0.51 lbs
BRILLIANT CRESYL BLUE	0.07 lbs
BRILLIANT GREEN	0.27 lbs
BROMCRESOL GREEN CODE 414	0.02 lbs
BROMCRESOL PURPLE	0.03 lbs
BROMIDE ISA	0.22 lbs
BROMIDE STANDARD	0.22 lbs
BROMO PHENOL BLUE	0.22 lbs
BROMOACETIC ACID	0.55 lbs
BROMOACETYL BROMIDE	0.03 gal
BROMOBENZENE	0.26 gal
BROMOCRESOL GREEN	0.035 gal
BROMOCRESOL PURPLE	0.05 lbs

BROMOCYCLOHEXANE	0.26 gal
BROMOFORM	0.09 gal
BROMOPHENOL BLUE	0.16 gal
BROMOPHENOL BLUE SODIUM SALT	0.05 lbs
BROMOTHYMOL BLUE	0.14 gal
BROMPHENOL BLUE	0.19 lbs
BRUCELLA AGAR	1.1 lbs
BRUCELLA BROTH	1.1 lbs
BSA	0.74 lbs
BUFFER N3	0.44 gal
BUFFeR PH10.00	0.12 gal
BUFFER QE	0.12 gal
BUFFER REFERENCE SOLUTION PH 4	0.13 gal
BUFFER REFERENCE SOLUTION PH 7	0.13 gal
Buffer Solution	27.05 gal
BUFFER SOLUTION PH 1	0.13 gal
BUFFER SOLUTION PH 10	3.56 gal
BUFFER SOLUTION PH 2	0.13 gal
BUFFER SOLUTION PH 4	4.36 gal
BUFFER SOLUTION PH 7	3.42 gal
BUTADIENE	0.22 lbs
BUTANE	3.19 lbs
BUTANOL	1.46 gal
BUTYL ACETATE	1.06 gal
BUTYL ALCOHOL	5.3 gal
BUTYL LITHIUM	0.03 gal
BUTYLATED HYDROXYANISOLE	0.44 lbs
BUTYLATED HYDROXYTOLUENE	4.63 lbs
BUTYLHYDROXYTOLUENE	0.22 lbs
BUTYRIC ACID	0.08 gal
BUTYROPHENONE	0.05 lbs
BUTYRYL CHLORIDE, 98%	0.01 lbs
CACODYLIC ACID	2 lbs
CACODYLIC ACID, SODIUM SALT	0.16 lbs
CADAVERINE FREE BASE	0.04 lbs
CADMIUM	0.16 gal
CADMIUM ACETATE	1.22 lbs
CADMIUM CARBONATE	0.22 lbs
CADMIUM CHLORIDE	3 lbs
CADMIUM NITRATE	1 lbs
CADMIUM SULFATE	0.685 gal
CAFFEIC ACID	0.04 lbs
CAFFEINE	1.98 lbs
CALCIUM ACETATE	0.22 lbs
CALCIUM BROMIDE DIHYDRATE, 99+%	1 lbs
CALCIUM CARBONATE	44.1 lbs
CALCIUM CHLORIDE	16.58 gal
CALCIUM CHLORIDE DIHYDRATE	2.57 gal
CALCIUM CHLORIDE, ANHYDROUS	2.32 lbs
calcium d-pantothenate	0.22 lbs
CALCIUM HYDROXIDE	4.2 lbs
CALCIUM IODIDE	1.25 lbs
CALCIUM IONOPHORE, FREE ACID	0.01 lbs
CALCIUM LACTATE	1.1 lbs
CALCIUM NITRATE	25.08 lbs
CALCIUM OXIDE	1.32 lbs
CALCIUM PHOSPHATE	22.04 lbs
CALCIUM PHOSPHATE (DIBASIC)	3.2 lbs
CALCIUM REFERENCE STANDARD SOLUTION	0.13 gal
CALCIUM SULFATE	8.3 lbs
CALCIUM SULFATE DIHYDRATE	0.22 lbs
CALCOFLUOR WHITE-M2R	0.02 lbs
CALF SERUM	0.41 gal
CALIBRATING GAS	50 lbs
CALMAGITE	0.01 lbs
CAMPHENE	1 lbs
CAMPHOR	0.02 lbs
CAPRIC ACID	0.24 lbs

CAPRYLIC ACID	0.11 gal
CAPS	7.7 lbs
CAPSO	0.05 lbs
CARBACHOL CHLORIDE	0.05 lbs
CARBAMYLCHOLINE CHLORIDE, 99%	0.1 lbs
CARBAZOLE	0.77 lbs
CARBENICILLIN DISODIUM SALT	0.23 lbs
CARBOHYDRAZIDE, 97% (TITR.)	0.55 lbs
CARBON	0.55 lbs
CARBON DIOXIDE	294.34 gal
CARBON DISULFIDE	1.88 gal
CARBON TETRACHLORIDE	20.24 gal
CARBONATE BUFFER	0.13 gal
CARBONYLDIIMIDAZOLE	0.05 lbs
CARBORUNDUM	4.4 lbs
CARBOWAX	2.31 lbs
CARBOWAX PEG 3350	6.61 lbs
CARBOWAX PEG 6000	1.1 lbs
CARBOXY METHYL CELLULOSE	9.02 lbs
CARMINE	0.1 lbs
CASAMINO ACID	16.12 lbs
CASEIN	257.32 lbs
CASEIN ACID HYDROLYSATE	7.6 lbs
CASEIN ENZYMATIC HYDROLYSATE	2.2 lbs
CASEIN HYDROLYSATE	14.92 lbs
casein-hammersten	0.22 lbs
CASITONE	0.25 lbs
CATALASE, FROM BOVINE LIVER	0.24 lbs
CATECHOL	1.99 lbs
CATECHOL-O-METHYL	0.44 lbs
cation exchange resin	3.74 lbs
CDTA	0.39 lbs
CEDARWOOD OIL	0.12 gal
CELITE	1.1 lbs
CELL LYSIS SOLN	0.52 gal
cell resuspension solution	0.38 gal
CELLOBIOSE	0.39 lbs
CELLULASE	0.95 lbs
CELLULOSE	11.52 lbs
CELLULOSE (PAPER FIBER)	0.02 lbs
CELLULOSE PHOSPHATE	9.53 lbs
CELLULOSE POWDER	2.2 lbs
CERIC SULFATE	1.1 lbs
CERIUM (III) CHLORIDE	0.49 lbs
CESIUM - 137	0.11 lbs
CESIUM ACETATE, 99%	0.11 lbs
CESIUM BROMIDE, 99.9%	0.05 lbs
CESIUM CHLORIDE	72.66 lbs
CESIUM FLUORIDE	0.27 lbs
CESIUM FORMATE	0.44 lbs
CESIUM HYDROXIDE, 99.5%, MONOHYDRATE, MAY CONTAIN VARIOUS AMOUNTS OF CARBONATE	0.22 lbs
CESIUM SULFATE	1.91 lbs
cesiummethane-sulfonate	1.17 lbs
CETYL PYRIDININUM BROMIDE	1.39 lbs
CETYL PYRIDININUM CHLORIDE	1.82 lbs
CETYLTRIMETHYL AMMONIUM BROMIDE	2.64 lbs
CETYLTRIMETHYLAMMONIUM BROMIDE 1%	0.44 lbs
CHALCONE, 97%	0.46 lbs
CHAPS	0.47 lbs
CHARCOAL	1.3 gal
CHARCOAL - ACTIVATED	38.14 lbs
CHELATING RESIN	1 lbs
CHELEX 100	4.84 lbs
CHES 98+%	0.61 lbs
CHITIN	0.12 lbs
CHLORAL HYDRATE	1.22 lbs
CHLORAMINE T	1.1 lbs
CHLORAMPHENICAL	0.44 lbs

CHLORAMPHENICOL	3.65 lbs
CHLORANIL	0.55 lbs
CHLORANILIC ACID	0.05 lbs
CHLORHEXIDINE DIACETATE	0.01 lbs
CHLORHEXIDINE HYDROCHLORIDE	0.02 lbs
CHLORIDE	0.115 gal
CHLORO HYDRATE	2.75 lbs
CHLOROACETALDEHYDE	0.13 gal
CHLOROACETIC ACID	0.22 lbs
CHLOROACETONEPHENONE, LIQUID	0.28 lbs
CHLOROAMINE	0.05 lbs
chloroamphenicol	0.06 lbs
CHLOROBENZENE	0.79 gal
CHLOROBUTANOL	0.03 lbs
CHLOROFORM	65.91 gal
CHLOROFORM - 96%: ISOAMYL ALCOHOL - 4%	0.77 gal
CHLOROFORM-D	0.11 lbs
CHLOROHYDROQUINONE	0.22 lbs
CHLOROMETHANE	0.26 gal
CHLOROPHENOL RED	0.02 lbs
CHLOROQUINE	0.88 lbs
CHLOROSULFURIC ACID	0.01 lbs
chlorothiazide	0.22 lbs
CHLORPROMAZINE, HYDROCHLORIDE	0.08 lbs
CHLORTETRACYCLINE HYDROCHLORIDE, CAN BE USED AS SECONDARY STANDARD	0.12 lbs
CHLORZOXAZONE, 98%	0.1 lbs
CHOLESTEROL	0.67 gal
cholesterol oleate	0.11 lbs
CHOLESTERYL ACETATE, 97%	0.02 lbs
CHOLESTERYL CHLOROFORMATE, 98%	0.05 lbs
CHOLIC ACID	1.57 lbs
CHOLINE (PRACT) (45% IN METHANOL)	0.44 lbs
CHOLINE CHLORIDE	10.96 lbs
CHROME AZUROL S	0.05 lbs
CHROMERGE	3.47 gal
CHROMIC ACID	0.13 gal
CHROMIUM (II) CHLORIDE ANHYDROUS	0.02 lbs
CHROMIUM (III) CHLORIDE	0.28 lbs
CHROMIUM (III) SULFATE	0.01 lbs
CHROMIUM CHLORIDE	2.32 lbs
CHROMIUM POTASSIUM SULFATE	4.12 lbs
CHROMIUM SULFATE	0.5 lbs
CHROMIUM TRIOXIDE	2.57 lbs
CHROMOSORB G	0.22 lbs
CHROMOTROPIC ACID, DISODIUM SALT	0.05 lbs
CHRYSOIDIN	0.05 lbs
CHRYSTAL VIOLET	0.26 gal
CIBACRON BLUE 3GA	0.1 lbs
CIMETIDINE	0.04 lbs
CINNAMALDEHYDE	1.1 lbs
CINNAMYL ALCOHOL, 98%	0.44 lbs
CIRCLEGROW	1 lbs
CIS-1,2-CYCLOHEXANE DICARBOXYLIC ANHYDRIDE	0.22 lbs
CIS-ACONITIC ACID, 99%	0.02 lbs
CIS-STILBENE, 97%	0.02 lbs
CITIOLONE	0.02 lbs
CITRACONIC ANHYDRIDE	0.16 lbs
CITRIC ACID	133.59 lbs
CITRIC ACID ANHYDROUS	9.02 lbs
CITRIC ACID MONOHYDRATE	1.1 lbs
CITRIC ACID TRISODIUM SALT DIHYDRATE	1.1 lbs
CITRISOLVE	14 gal
CM 52	0.345 gal
CM CELLULOSE	0.22 lbs
CM SEPHADEX	1.43 lbs
CM SEPHAROSE CL-6B	0.01 gal
COBALT	0.26 gal
COBALT (II) CHLORIDE HEXAHYDRATE	0.22 lbs

COBALT (II) PERCHLORATE	0.22 lbs
COBALT ACETATE, TETRAHYDRATE	1.1 lbs
COBALT CHLORIDE	4.89 lbs
COBALT SULFATE	3.5 lbs
COBALT(II) ACETATE TETRAHYDRATE, 97%	1.1 lbs
COBALTIC HEXAMINE CHLORIDE	0.05 lbs
COBALTOUS SULFATE	1 lbs
COLCHICINE	0.03 lbs
COLLAGENASE	0.06 lbs
COLLODION	0.22 lbs
COLLOIDAL SILICA IN L-ISO-BUTHYL KETONE	0.13 gal
COLLOIDAL SILVER PASTE	0.26 gal
COLUMBIA CNA AGAR	2.2 lbs
CONCANAVALIN A	0.06 lbs
CONGO RED	1.47 lbs
COOMASSIE BRILLIANT BLUE	0.09 lbs
COOMASSIE BRILLIANT BLUE G-250	0.26 gal
COOMASSIE BRILLIANT BLUE R-250	0.21 lbs
COPPER	0.18 gal
COPPER (I) CHLORIDE	0.05 lbs
COPPER (II) CHLORIDE	0.11 lbs
COPPER (II) HYDROXIDE	2.45 lbs
COPPER (II) SULFATE ANHYDROUS	1.1 lbs
COPPER (II) SULFATE PENTAHYDRATE	1.1 lbs
COPPER AA STANDARD	0.03 gal
COPPER STAIN	0.03 gal
COPPER SULFATE	0.02 lbs
CORN MEAL AGAR	2 lbs
CORNMEAL AGAR	1.1 lbs
COUMARIC ACID	0.01 lbs
COUMARIN	0.44 lbs
COUMARIN 4, LASER GRADE	0.05 lbs
COUNTING COCKTAIL	6.78 gal
CREATINE HYDRATE	0.19 lbs
CRESOL	0.13 gal
CRESOL RED, WATER SOLUBLE, INDICATOR GRADE	0.04 lbs
CRESYL VIOLET ACETATE	0.02 lbs
crocein scarlet 7B	0.13 lbs
CROTONALDEHYDE	1.1 lbs
CROTONIC ACID	0.16 gal
CRYSTAL VIOLET	0.82 lbs
CTAB	1.1 lbs
CUMENE HYDROPEROXIDE	0.06 gal
CUPRIC ACETATE	3.66 lbs
CUPRIC CHLORIDE	2.01 lbs
CUPRIC NITRATE	1 lbs
CUPRIC SELENATE	0.11 lbs
CUPRIC SULFATE	49.27 lbs
CUPROUS CHLORIDE	2.22 lbs
CUPROUS IODIDE	0.25 lbs
CUPROUS OXIDE	0.25 lbs
CURCUMIN	0.02 lbs
CYANAMIDE	0.28 lbs
CYANOGEN BROMIDE	0.11 lbs
CYANOGEN BROMIDE-ACTIVATED SEPHAROSE 4B	0.08 lbs
CYANURIC ACID	0.55 lbs
CYCLAMIC ACID	1.54 lbs
CYCLODEXTRIN	0.85 gal
CYCLOHEPTANONE, 98%	0.11 lbs
CYCLOHEXAMIDE	0.1 lbs
CYCLOHEXANAMINE	0.01 lbs
CYCLOHEXANE	10.63 gal
CYCLOHEXANOL	2.2 lbs
CYCLOHEXANONE	0.26 gal
CYCLOHEXIMIDE	0.12 lbs
CYCLOHEXYLAMINE	0.05 gal
CYCLOPENTANOL, 99%	0.22 lbs
CYCLOPENTANONE	0.13 gal

CYCLOPENTENE, TECH. CA 90%	0.03 gal
CYCLOPROPYL METHYL KETONE, 98%	0.05 lbs
CYSTAMINE DIHYDROCHLORIDE, 97%	0.05 lbs
CYSTEINE HYDROCHLORIDE	0.07 lbs
CYSTINE TRYPTIC AGAR	1 lbs
CYTIDINE	0.03 lbs
CYTOSCINT LIQUID SCINTILLATION FLUID	3.12 gal
CZAPEK DOX BROTH	1 lbs
D-(-)-ALPHA-PHENYLGLYCINE, 98%	0.05 lbs
D(-)-ARABINOSE	1.01 lbs
D-(-)-FRUCTOSE	0.22 lbs
D(+) GALACTOSE	2.2 lbs
D(+) GLUCOSE	17.08 lbs
D(+) MANNOSE	2.48 lbs
D(+)-CAMPHORIC ACID, 99%	0.22 lbs
D-(+)-CELLBIOSE	0.23 lbs
D-(+)-GALACTOSE	0.07 lbs
d(+)glucosamine	0.1 lbs
D(+)-GLUCOSAMINE HYDROCHLORIDE	0.22 lbs
D-(+)-GLUCOSE	13.99 lbs
D-(+)-LACTOSE	3.1 lbs
D-(+)-MALTOSE MONOHYDRATE	2.64 lbs
D(+)-MANNOSE	0.22 lbs
D-(+)-MANNOSE, 99+%	0.08 lbs
D-(+)-RAFFINOSE	0.05 lbs
D(+)-SACCHAROSE	1.1 lbs
D-(+)-TREHALOSE	0.25 lbs
D(+)TREHALOSE, DIHYDRATE	0.02 lbs
D(+)XYLOSE	1.1 lbs
D-10-CAMPHORSULFONIC ACID	0.22 lbs
dab-metal concentrate	0.07 gal
D-ALANINE	0.07 lbs
D-ALPHA-TOCOPHERYL ACID SUCCINATE, 99+% (GC)	0.01 lbs
DANSYL CHLORIDE	0.02 lbs
D-ARABINOSE	0.22 lbs
D-ARABITOL, 99%	0.02 lbs
D-ASPARAGINE	0.23 lbs
D-ASPARTIC ACID	0.05 lbs
DATD	0.27 lbs
D-BIOTIN	0.14 lbs
D-CARVONE	0.02 lbs
DDT	0.11 lbs
DE 52 ANION EXCHANGE MEDIA	7.71 lbs
DEAE BIO GEL A	0.07 gal
DEAE CELLULOSE	4.74 lbs
DEAE DEXTRAN	0.24 lbs
DEAE SEPHADEX A-25	0.44 lbs
DEAE SEPHADEX A-50	0.22 lbs
DEAE-CELLULOSE	1.1 lbs
DEAE-DEXTRAN	0.13 lbs
DEAE-SEPHACEL	0.03 gal
DEAE-SEPHAROSE	0.08 gal
DECAHYDRONAPHTHALENE	0.02 lbs
DECANOIC ACID	2.26 lbs
DECYL ALDEHYDE	0.05 lbs
DEGREASER	1 gal
DEHYDROACETIC ACID, 98%	0.22 lbs
DELTA-VALEROLACTONE, 99%	0.16 lbs
DENATURED ALCOHOL	3.17 gal
DEOXYCHOLIC ACID	6.96 lbs
DEOXYCHOLIC ACID SODIUM SALT	0.71 lbs
DEOXYRIBONUCLEIC ACID	0.04 lbs
DEPC	0.16 lbs
DER 736 RESIN	5.17 lbs
DESICOTE	0.01 gal
DESOXYCHOLATE AGAR	1 lbs
DESOXYCHOLATE CITRATE AGAR	1 lbs
DETERGENT, FL-70	0.87 gal

DEUTERIUM OXIDE	0.57 gal
DEVARDA'S METAL (ALLOY)	2 lbs
DEVELOPER STARTER	1 gal
DEXAMETHASONE	0.23 lbs
DEXTRAN	14.89 lbs
DEXTRAN SULFATE	3.06 lbs
DEXTRAN SULFATE SODIUM SALT	3.09 lbs
DEXTRAN T-40	0.44 lbs
DEXTRAN T-500	0.22 lbs
DEXTRIN	3.3 lbs
DEXTROSE	19179.9 lbs
DEXTROSE (D-GLUCOSE) ANHYDROUS	2.2 lbs
DEXTROSE ANHYDROUS CRYSTALLINE	4.2 lbs
D-FRUCTOSE	12.16 lbs
D-FRUCTOSE 6-PHOSPHATE	0.01 lbs
D-FRUCTOSE-1,6-DIPHOSPHATE, DISODIUM SALT, TECH., 80+%	0.04 lbs
D-GALACTONIC ACID	0.09 lbs
D-GALACTOSE	9.95 lbs
D-GLUCONIC ACID	12.77 lbs
D-GLUCONIC ACID LACTONE	2.26 lbs
D-GLUCOSAMINE HYDROCHLORIDE, 98%	0.05 lbs
D-GLUCOSE	60.91 lbs
D-GLUCOSE ANHYDROUS	3.1 lbs
D-GLUCOSE-6-PHOSPHATE DISODIUM SALT	0.04 lbs
D-GLUCURONIC ACID	0.13 lbs
D-GLUTAMIC ACID	0.01 lbs
D-GLYCOGEN BEEF LIVER	0.01 lbs
DIACETONE ALCOHOL	2.2 lbs
DIALYSIS TUBING, BENZOYLATED	0.29 gal
DIATOMACEOUS EARTH	1 lbs
DIAZO BLUE-B	0.05 lbs
DIAZOGEN, 99%	0.44 lbs
DIBROMOMETHANE	2.2 lbs
DIBUTYL PHTHALATE	0.56 gal
DIBUTYL POLYCARBONATE	1.1 lbs
DICALCIUM PYROPHOSPHATE	1.1 lbs
DICHLOROACETIC ACID	0.58 gal
DICHLORODIMETHYLSILANE	0.05 gal
DICHLOROMETHANE	6.66 gal
DICUMAROL	0.18 lbs
DICYCLOHEXYLCARBODIIMIDE	1.32 lbs
DIELDRIN	0.05 lbs
DIETHANOLAMINE	2.1 gal
DIETHYL CARBONATE	0.12 gal
DIETHYL ETHOXYMETHYLENEMALONATE, 99+%	0.22 lbs
DIETHYL FUMARATE, 98%	0.03 gal
DIETHYL OXALATE	2.2 lbs
DIETHYL PYROCARBONATE	0.11 gal
DIETHYL SUCCINATE, 99%	1 lbs
DIETHYLAMINE	0.53 gal
DIETHYLAMINOETHYL CELLULOSE	11.01 lbs
DIETHYLDITHIOCARBAMIC ACID SODIUM SALT	1 lbs
DIETHYLENETRIAMINE	0.01 lbs
DIETHYLENETRIAMINEPENTAACETIC ACID	0.58 lbs
DIETHYLPYROCARBONATE	0.15 gal
DIETHYLSTILBESTROL	0.08 lbs
DIGITONIN	0.02 lbs
DIHYDROCHOLESTEROL, 96%	0.02 lbs
DIHYDROXYBENZOIC ACID	0.01 lbs
DIISOPROPANOLAMINE, 99% (TITR.)	0.22 lbs
DIMETHOXYMETHANE	2.2 lbs
DIMETHYL DICHLOROSILANE	0.03 gal
DIMETHYL FORMAMIDE	0.55 gal
DIMETHYL MALEATE, 96%	0.22 lbs
DIMETHYL MALONATE	0.55 lbs
DIMETHYL PHTHALATE, 99%	1.1 lbs
DIMETHYL PIMELIMIDATE, DIHYDROCHLORIDE	0.05 lbs
DIMETHYL POPOP, SCINTILLATION GRADE	0.07 lbs

DIMETHYL SUBERIMIDATE, DIHYDROCHLORIDE	0.02 lbs
DIMETHYL SULFATE	1.27 gal
DIMETHYL SULFOXIDE	6.34 gal
DIMETHYLAMINE	1.03 gal
DIMETHYLAMINO ETHANOL	0.05 lbs
DIMETHYLDIOCTADECYLAMMONIUM BROMIDE, 99+% (TITR.)	0.02 lbs
DIMETHYLFORMALDEHYDE	1.06 gal
DIMETHYLFORMAMIDE	0.69 gal
DIMETHYLGLYOXIME	1.1 lbs
DIMETHYLMALONATE	0.01 lbs
DIMETHYLPOLYSILOXANE	1.1 lbs
dimethyl-popop	0.33 lbs
DIMETHYL-P-PHENYLENEDIAMINE	0.22 lbs
DIMETHYLSULFOXID-D6	0.13 gal
DIMETHYLSULFOXIDE	3.19 gal
DIMETHYLTHIAZOL-2-YL)-2,5-DIPHENYLTETRAZOLIUM BROMIDE	0.01 lbs
DINONYL PHTHALATE	0.05 lbs
DIOCTADECYL PHOSPHITE	0.22 lbs
DIOCTYL PHTHALATE, 98%	0.35 gal
DIOCTYL SULFOSSUCINATE SODIUM SALT	0.11 lbs
DIOXANE	6 gal
DIPENTENE	0.03 gal
DIPHENHYDRAMINE, HYDROCHLORIDE	0.01 lbs
DIPHENYL CARBAZONE	0.05 lbs
DIPHENYLACETIC ACID, 99+%	0.23 lbs
DIPHENYLAMINE	5.75 lbs
DIPHENYLAMINE SULFONATE	0.02 lbs
DIPHENYLMETHANE, 99%	0.26 gal
DIPHENYLTHIOCARBAZONE	0.13 lbs
DIPICOLINIC ACID	0.22 lbs
DIPOTASSIUM HYDROGEN PHOSPHATE	2.75 lbs
DISODIUM ETHYLENEDIAMINE TETRAACETATE	5.72 lbs
DISODIUM PYROPHOSPHATE	5.5 lbs
DITHIOERYTHRITOL	0.06 lbs
DITHIOTHREITOL	0.2 lbs
DITHIOXAMIDE	0.01 lbs
DL-2,4-PENTANEDIOL, 97%	0.02 lbs
DL-ALANINE	0.18 lbs
DL-ALPHA-AMINO ISOBUTYRIC ACID	2.23 lbs
DL-ALPHA-AMINO-N-BUTYRIC ACID	0.05 lbs
DL-ALPHA-GLYCEROPHOSPHATE	0.05 lbs
DL-ALPHA-GLYCEROPHOSPHATE HEXAHYDRATE	0.22 lbs
DL-ARGININE, HYDROCHLORIDE	0.05 lbs
DL-ASPARAGINE MONOHYDRATE, 98%	0.05 lbs
DL-ASPARTIC ACID	1.32 lbs
DL-BETA-HYDROXYBUTRYIC ACID	0.03 lbs
DL-C-ALLYLGLYCINE	0.02 lbs
DL-DITHIOTHREITOL	0.16 lbs
DL-ETHIONINE	0.12 lbs
DL-GLUTAMIC ACID	0.22 lbs
DL-HISTIDINE	0.33 lbs
DL-HOMOSERINE, 99%	0.04 lbs
DL-ISOCITRIC ACID, TRISODIUM SALT HYDRATE 98%	0.04 lbs
DL-LACTIC ACID	0.5 gal
DL-LEUCINE	0.02 lbs
DL-LYSINE, 98%	0.02 lbs
DL-MALIC ACID	1.1 lbs
DL-MATHIONINE-S-METHYL-SULFONIUM CHLORIDE	0.05 lbs
DL-METHIONINE	4.62 lbs
DL-METHIONINE SULFOXIDE, 99%	0.02 lbs
DL-OCTOPAMINE HYDROCHLORIDE, 98%	0.02 lbs
DL-PHENYLALANINE	0.11 lbs
DL-PROPANOLOL	0.01 lbs
DL-SERINE	1.24 lbs
DL-TARTARIC ACID	1.1 lbs
DL-THIOCTIC ACID, 98% (UV, ON THE DRIED SUBSTANCE)	0.01 lbs
DL-TOCOPHEROL	0.03 lbs
DL-TRYPTOPHAN	0.07 lbs

DL-TYROSINE	0.06 lbs
DMAE	0.79 lbs
D-MALTOSE	1.1 lbs
D-MANNITOL	63.26 lbs
D-MANNOSE	0.9 lbs
DMEM	11.88 gal
D-MEM/F-12	3.17 gal
D-METHIONINE, 99+%	0.01 lbs
DMSO	2.01 gal
DNA	0.29 gal
DNA ISOLATION REAGENT	0.08 gal
DNA REAGENT	0.03 gal
DNASE I	0.44 lbs
DNAZOL REAGENT	0.26 gal
DODECANE	0.05 lbs
DODECENYL SUCCINIC ANHYDRIDE	0.99 lbs
DODECYL SODIUM SULFATE	5.95 lbs
DOWEX	3.96 lbs
DOWEX -1	3.76 lbs
DOWEX 1-X2	1 lbs
DOWEX 1X2-100 ION-EXCHANGE RESIN	0.22 lbs
DOWEX 1X8-100 ION-EXCHANGE RESIN	2.22 lbs
DOWEX 50W-X12	1.21 lbs
DOWEX 50W-X4 CATION EXCHANGE RESIN	3.2 lbs
DOWEX 50X4-200R	0.29 lbs
DOWEX 50X8-200 ION-EXCHANGE RESIN	0.22 lbs
DOWEX-50W	2.44 lbs
DOWICIDE ANTIMICROBIAL	0.55 lbs
DOXYCYCLINE	0.06 lbs
D-PANTOTHENIC ACID	0.68 lbs
D-PHENYLALANINE, 99+%	0.02 lbs
dpx mountant four histology	0.08 gal
D-RIBOSE	0.33 lbs
DRICOTE	0.03 gal
DRIERITE	111.51 lbs
DRISELASE	0.03 lbs
D-SERINE	0.01 lbs
D-SORBITOL	62.09 lbs
D-SUCROSE	4.41 lbs
D-TARTARIC ACID	0.05 lbs
DTPA	0.01 lbs
D-TRYPTOPHAN	0.04 lbs
DTT	0.37 lbs
DUBECCO'S MODIFIED EAGLES MEDIUM	45.57 gal
DULCITOL, 99+%	0.22 lbs
DUST BUSTER	0.62 lbs
D-XYLOSE	2.31 lbs
E-AMINO-N-CAPROIC ACID	0.22 lbs
ecolite (+)	0.07 gal
ecolume	0.07 gal
ECOSCINT O	0.03 gal
EDC	0.02 lbs
EDTA	16.7 gal
EDTA DISODIUM SALT	10.28 lbs
EDTA TETRASODIUM SALT	2.2 lbs
EDTA, DISODIUM SALT, DIHYDRATE	4.41 lbs
EGG ALBUMIN	1 lbs
EGG SODIUM SALT	0.22 lbs
EGTA	5.03 lbs
ELECTRODE REFILL SOLUTION	0.02 gal
ELECTRODE STORAGE SOLUTION	2.25 gal
ENHANCE	0.26 gal
EOSIN B	0.02 lbs
EOSIN Y	0.58 gal
epps	0.83 lbs
EPSILON-AMINO-N-CAPROIC ACID	2.25 lbs
ERGOSTEROL	1.19 lbs
ERIOCHROME BLACK T	1.1 lbs

ERL 4206	0.17 gal
ERYTHROMYCIN	0.09 lbs
ESCULIN HYDRATE	1.11 lbs
ETHANAMINE	0.26 gal
ETHANE	0.05 lbs
ETHANESULFONIC ACID, 99%	0.38 lbs
Ethanol	3.43 gal
ETHANOLAMINE	1.41 gal
ETHER	1.11 lbs
ETHIDIUM BROMIDE	0.1 gal
ETHYL 2-METHYLACETOACETATE, 98%	0.22 lbs
ETHYL 4-BROMOBUTYRATE, 95%	0.07 gal
ETHYL 4-HYDROXYBENZOATE, 99%	0.01 lbs
ETHYL ACETATE	37.66 gal
ETHYL ACETOACETATE	2.75 lbs
ETHYL ALCOHOL	46.46 gal
ETHYL BENZENE	0.54 gal
ETHYL BENZOYLACETATE, 97%	0.03 gal
ETHYL BROMOACETATE	0.03 gal
ETHYL CHLOROACETATE	0.29 gal
ETHYL CYANOACETATE, 98+%	0.22 lbs
ETHYL ETHER	3.17 gal
ETHYL FORMATE	0.27 gal
ETHYL L-(-)-LACTATE, 97% (GC)	0.22 lbs
ETHYL L-LACTATE,95% (GC)	0.07 gal
ETHYL METHANESULFONATE	0.07 lbs
ETHYL NITRATE	0.04 gal
ETHYL P-AMINOBENZOATE	0.22 lbs
ETHYL THIOCYANATE	0.03 gal
ETHYLAMINE	0.6 gal
ETHYLENE DIAMINE	0.54 gal
ETHYLENE DICHLORIDE	0.05 gal
ETHYLENE GLYCOL	8.6 gal
ETHYLENE GLYCOL DIETHYL ETHER	1.1 lbs
ETHYLENE GLYCOL MONOETHYL ETHER	0.52 gal
ETHYLENE GLYCOL MONOMETHYL ETHER	3.26 gal
ETHYLENE GLYCOL-BIS(B-AMINOETHYL ETHER)-N,N,N',N'-	0.37 lbs
ETHYLENE GLYCOL-BIS(B-AMINOETHYL ETHER)N,N,N',N,-T	0.61 lbs
ETHYLENE TRITHIOCARBONATE	0.4 gal
ETHYLENE-BIS(OXYETHYLENENITRILLO)-TETRAACETIC ACID	0.28 lbs
ETHYLENEDIAMINE	0.43 gal
ETHYLENEDIAMINE DI(O-HYDROXYPHENYLACETIC ACID)	0.01 lbs
ETHYLENEDIAMINE TETRAACETIC ACID	1.62 lbs
ETHYLENEGLYCOL-BIS-(B-AMINOETHYL ETHER)N,N,N'N'-TE	1.1 lbs
ETHYLXANTHIC ACID	0.22 lbs
ETOPOSIDE (EPE)	2.21 lbs
E-TOXA-CLEAN	0.88 lbs
EUGENOL	0.03 gal
EVANS BLUE	0.25 lbs
FAST BLACK K	0.16 lbs
FAST BLUE	0.11 lbs
FAST BLUE BB SALT	0.13 lbs
FAST BLUE RR	0.15 lbs
FAST GREEN FCF	0.54 gal
FAST RED B SALT	0.13 lbs
FERRIC AMMONIUM CITRATE	2.54 lbs
FERRIC AMMONIUM SULFATE	2.61 lbs
FERRIC CHLORIDE	19.2 lbs
FERRIC CITRATE	7.27 lbs
FERRIC NITRATE	4.98 lbs
FERRIC SULFATE	1 lbs
FERRIC TARTRATE	0.22 lbs
FERROUS AMMONIUM SULFATE	5.3 lbs
FERROUS CHLORIDE	3.25 lbs
FERROUS SULFATE	27.77 lbs
FERROUS SULFATE, HEPTAHYDRATE	0.55 lbs
FERROZINE IRON REAGENT, MONOHYDRATE, 95+% (UV-VIS)	0.01 lbs
FERULIC ACID	0.02 lbs

FETAL BOVINE SERUM	2.56 gal
FIBRINOGEN REFERENCE	0.05 lbs
FIBROUS CATION EXCHANGE	4.4 lbs
FICOLL	1.18 gal
FICOLL 400	0.55 lbs
FICOLL-PAQUE	0.53 gal
FISHER BATH OIL	5.34 gal
FIXER REPLENISHER (IN-HOUSE) NEW LAB	1.06 gal
FIXING SOLUTION	1 lbs
FLAVIANIC ACID	0.02 lbs
FLORISIL	7.05 lbs
FLUOBORIC ACID	1 lbs
FLUORALDEHYDE	0.75 gal
FLUORENE	0.13 lbs
FLUORESCAMINE	0.07 lbs
fluorescein	0.5 lbs
FLUORESCEIN DIACETATE	0.28 lbs
FLUORESCENT BRIGHTENER 28	0.02 lbs
FLUORESCENT PIGMENT POWDER	0.01 lbs
FLUORIDE	0.05 lbs
FLUOROBENZENE	0.09 lbs
FOLIC ACID	0.29 lbs
FOLIN & CIOCALTEU'S PHENOL REAGENT	1.18 gal
FORMALDEHYDE	16.33 gal
FORMALDEHYDE 37%	0.92 gal
FORMALDEHYDE SOLUTION 10%	0.79 gal
FORMALDEHYDE SOLUTION 37%	1.32 gal
FORMALIN 10%	20 gal
FORMAMIDE	12.67 gal
FORMIC ACID	6.1 gal
FORMVAR	0.22 lbs
FORMVAR RESIN	0.36 lbs
FREON (R) TF	1.13 gal
FREUND'S ADJUVANT COMPLETE	0.21 gal
FRUCTOSE	7.92 lbs
FRUCTOSE-6-PHOSPHATE	0.02 lbs
FUCHSIN ACID	0.44 lbs
FUMARIC ACID	5.23 lbs
FUNGICIDE	2.32 gal
Furfuryl alcohol	0.01 lbs
FUROSEMIDE	0.01 lbs
G418 SULFATE	0.02 lbs
GABA	0.05 lbs
GALACTOSE	1.43 lbs
GALLIC ACID	1.22 lbs
GAMMA AMINO-N-BUTYRIC ACID (GABA)	0.05 lbs
GAMMA-AMINO-N-BUTYRIC ACID	0.33 lbs
GAMMA-OCTANOIC LACTONE, 98%	0.05 lbs
GEL LUBRICANT TM-2985	0.27 gal
GEL RITE	2.26 lbs
Gel/mount	0.79 gal
GELATIN	47.86 lbs
GELCODE BLUE STAIN REAGENT	1.24 gal
GELLAN GUM	1.98 lbs
GELRITE GELLAN GUM	0.61 lbs
GENETICIN	0.09 gal
GENTAMICIN SOLUTION	0.01 gal
GENTAMYCIN SULFATE	0.06 gal
GERANIOL, 96%	0.03 gal
GIBBERELLIC ACID	0.05 lbs
GIEMSA STAIN	0.35 gal
glasperlen	5.72 lbs
GLOSS WHITE	1.1 lbs
GLUCONIC ACID (50% IN WATER)	9.04 lbs
GLUCOSE	22.22 lbs
GLUCOSE STANDARD SOLUTION	0.06 gal
GLUCOSE-6-PHOSPHATE DEHYDROGENASE	0.06 lbs
GLUCURONIDASE	0.02 lbs

GLUTAMIC ACID	0.29 lbs
GLUTARALDEHYDE	3.78 gal
GLUTARALDEHYDE SOLUTION	0.53 gal
GLUTARIC ACID	0.02 lbs
GLUTARIC DIALDEHYDE (50% IN WATER)	0.03 gal
GLUTATHIONE SEPHAROSE	0.11 lbs
GLUTATHIONE, DISODIUM SALT	0.13 lbs
GLUTATHIONE, FREE ACID	0.11 lbs
GLUTATHIONE, OXIDIZED (GSSG), HYDRATE , 98+% (HPLC)	0.01 lbs
GLUTATHIONE, REDUCED	0.11 lbs
GLYCERIN	28.1 gal
GLYCERINE	2.58 gal
GLYCEROL	27.53 gal
glycerol phosphate	0.05 lbs
GLYCEROL TOLERANT GEL BUFFER	0.16 gal
GLYCEROPHOSPHATE	0.5 lbs
GLYCIGLYCINE	0.05 lbs
GLYCINE	323.25 lbs
GLYCINE ANHYDRIDE, 98%	0.24 lbs
GLYCINE ETHYL ESTER HYDROCHLORIDE, 99%	0.22 lbs
GLYCINE HYDROCHLORIDE, 99% (TITR.)	0.22 lbs
GLYCINE ZINC SALT	0.05 lbs
GLYCOGEN	0.11 lbs
GLYCOLIC ACID	0.06 lbs
GLYCYLGLYCINE	0.42 lbs
GLY-GLY, FREE BASE	0.38 lbs
GLYOXAL	1.09 gal
GLYOXYLIC ACID	0.02 lbs
GOAT SERUM	0.06 gal
GRADIENT BEADS	0.02 lbs
GRAM CRYSTAL VIOLET	0.07 gal
GRAM DECOLORIZER	0.07 gal
GRAM IODINE	0.07 gal
GRAM SAFRANIN SOLUTION	0.07 gal
granules	1.65 lbs
GREASE	0.33 lbs
GUAIAC GUM	1 lbs
GUAIACOL	0.22 lbs
GUANIDINE	20.73 lbs
GUANIDINE ACETATE	0.22 lbs
GUANIDINE CARBONATE	0.55 lbs
GUANIDINE HCL	2.69 gal
GUANIDINE HYDROCHLORIDE	33.93 lbs
GUANIDINE ISOTHIOCYANATE	3.3 lbs
GUANIDINE NITRATE	0.24 lbs
GUANIDINE SULFATE	0.66 lbs
GUANIDINE THIOCYANATE	27.8 lbs
GUANIDINEACETIC ACID, 99%	0.05 lbs
GUANINE	0.16 lbs
GUANOSINE 2'(3')-MONOPHOSPHATE, DISODIUM SALT MONOHYDRATE (MIXED ISOMERS)	0.03 lbs
GUANOSINE HYDRATE, 98%	0.07 lbs
GUM ARABIC	5.5 lbs
GUM GHATTI	0.22 lbs
GUM XANTHAN	1.32 lbs
GYLCINE BUTYLESTER HYDROCHLORIDE	2.11 gal
HALOTHANE	0.13 gal
HAM	0.4 gal
HAM'S F-12	0.13 gal
HANKS' BALANCED SALT SOLUTION	37.44 gal
hat supplement	0.05 gal
HBSS	0.26 gal
HCL	8.55 gal
HEART INFUSION AGAR	1 lbs
HELIUM	300 lbs
HEMATOXLIN SOLUTION PH3.3	0.13 gal
HEMATOXLYIN, SOLUTION	0.92 gal
HEMATOXYLIN	1.14 gal
HEMATOXYLIN STAIN GILL'S FORMULATION #2	2.24 gal

HEMICELLULASE	0.44 lbs
HEMIN	0.01 lbs
HEMOGLOBIN	0.66 lbs
HEPARIN	0.36 lbs
HEPARIN SODIUM	0.02 lbs
HEPES	6.89 gal
HEPES BUFFER SOLUTION (1 MOLAR)	0.46 gal
HEPTALDEHYDE, 95%, STABILIZED WITH 100 PPM HYDROQUINONE	0.03 gal
HEPTANE	1.67 gal
HEPTANOIC ACID	0.22 lbs
HEXACHLOROCYCLO-HEXANE	0.22 lbs
HEXADECANE	0.53 gal
HEXADECYL ALDEHYDE SODIUM BISULFITE	0.11 lbs
HEXADECYLTRIMETHYL AMMONIUM BROMIDE	6.93 lbs
HEXADIMETHYLENE BROMINDE	0.12 lbs
HEXAMETHYLPHOSPHOROUS TRIAMIDE, 97 %	1.1 lbs
HEXAMINE COBALT (III) CHLORIDE	0.16 lbs
HEXANAL, 96%	0.03 gal
HEXANAMIDE	0.05 lbs
HEXANE (PRACT)	7.49 gal
HEXANE FOR HPLC, (95% N-HEXANE)	7.34 gal
HEXANES	45.61 gal
HEXANOIC ACID	0.58 gal
HEXYL ACETATE, 99%	0.22 lbs
HEXYL ALCOHOL	0.29 gal
HEXYLENE GLYCOL	1.25 gal
HIPPURIC ACID	0.05 lbs
HISTAMINE DIHYDROCHLORIDE	0.15 lbs
HISTAMINE, 96% (TITR.)	0.01 lbs
HISTIDINE	0.22 lbs
HISTONE	0.01 lbs
HORSE SERUM	0.16 gal
HPLC SORBENT	1.07 gal
HUMIC ACID, SODIUM SALT, TECH	0.01 lbs
HYAMINE HYDROXIDE	0.13 gal
HYDRALAZINE	0.05 lbs
HYDRAULIC OIL AW ISO 32	1.65 lbs
HYDRAZINE	0.15 gal
HYDRAZINE ANHYDROUS	0.06 gal
HYDRAZINE HYDRATE	0.11 gal
HYDRAZINE SULFATE	0.47 lbs
HYDRINDANTIN	0.04 lbs
HYDROBROMIC ACID	1.1 lbs
HYDROCHLORIC ACID	33.14 gal
hydrochloride	0.07 lbs
HYDROCINNAMALDEHYDE	0.03 gal
HYDROCINNAMIC ACID, 99+% (GC)	0.22 lbs
HYDROCORTISONE	0.04 lbs
HYDROFLUORIC ACID	0.39 gal
HYDROGEN	100 lbs
HYDROGEN PEROXIDE	3.3 gal
HYDROGEN PEROXIDE 3%	0.13 gal
HYDROGEN PEROXIDE 30%	0.05 gal
HYDROQUINONE	5.63 lbs
HYDROXYAMINE HYDROCHLORIDE	3.22 lbs
HYDROXYAPATITE	0.58 lbs
HYDROXYBENZOIC ACID (4-)	1.44 lbs
HYDROXYETHYL STARCH	0.55 lbs
HYDROXYLAMINE	0.43 gal
HYDROXYLAMINE HYDROCHLORIDE	2.65 lbs
hydroxylapatite	0.44 lbs
HYDROXY-L-PROLINE	0.05 lbs
HYDROXYPROPYL METHYL CELLULOSE	0.05 lbs
HYDROXYUREA	0.06 lbs
HYGROMYCIN B	0.13 gal
HYPOPHOSPHOROUS ACID	0.54 gal
HYPOXANTHINE	0.47 lbs
I-BLOCK	0.12 lbs

IBUPROFEN	0.01 lbs
igepal ca-630	0.49 gal
IGEPAL CO-630 SURFACTANT	0.03 gal
IMIDAZOLE	9.95 gal
IMINODIACETIC ACID	2.2 lbs
IMMERSION OIL	0.24 gal
IMMUNO PURE ABIS TABLETS	0.03 gal
IMMUNOPURE IGG ELUTION BUFFER	0.99 gal
INDAN, 95%	0.22 lbs
INDENE	0.56 lbs
INDICATOR STOP BATH	0.32 gal
INDIGO CARMINE	0.06 lbs
INDOLE	0.11 lbs
INDOLE-3-ACETIC ACID	0.05 lbs
INDOLE-3-BUTYRIC ACID	0.04 lbs
INDOMETHACIN	0.07 lbs
INOSINE	0.03 lbs
INOSITOL	0.77 lbs
insect medium	0.53 gal
INSECTICIDE	0.96 gal
IODIC ACID	0.25 lbs
IODINE	5.76 gal
IODINE SOLUTION 0.02N (N/50)	0.03 gal
iodoacetamide	0.11 lbs
IODOACETAMIDE	0.11 lbs
IODOACETIC ACID	0.53 lbs
ION EXCHANGE RESIN, IONAC	0.01 gal
IRON	1.35 lbs
IRON (II) CHLORIDE TETRAHYDRATE	0.01 lbs
IRON (II) SULFATE HEPTAHYDRATE	1.65 lbs
IRON (III) PERCHLORATE HYDRATE	0.44 lbs
IRON CHLORIDE	0.01 lbs
IRON FILINGS	1 lbs
IRON SULFATE	2.42 lbs
IRON SULFATE HEPTAHYDRATE	0.55 lbs
IRON(III)2,4-PENTANEDIONATE	0.22 lbs
ISATIN	0.5 lbs
ISOAMYL ACETATE	0.17 gal
ISOAMYL ALCOHOL	8.36 gal
iso-amyl alcohol	1.08 gal
ISOBUTANOL	1.85 gal
ISOBUTYL ACETATE	0.26 gal
ISOBUTYL ALCOHOL	0.52 gal
ISOBUTYL CHLOROFORMATE	0.22 lbs
ISOBUTYRALDEHYDE	1.1 lbs
ISOBUTYRAMIDE, 99%	0.28 lbs
ISOBUTYRIC ACID	1.22 gal
ISOFLURANE	0.1 gal
ISOLEUCINE	0.01 lbs
ISONICOTINIC ACID	1.1 lbs
ISONICOTINIC ACID HYDRAZIDE	1.11 lbs
ISOOCTANE	3.3 gal
ISO-OCTANE	2.12 gal
ISOPENTYL ALCOHOL	0.52 gal
ISOPHTHALIC ACID	2.2 lbs
ISOPROPANOL	2.25 gal
ISOPROPANOL ANHYDROUS	0.92 gal
ISOPROPYL ACETATE	1.03 gal
ISOPROPYL ALCOHOL	44.45 gal
ISOPROPYL B-D-THIOGALACTOPYRANOSIDE	0.14 lbs
ISOPROPYL-BETA-D-THIOGALACTOPYRANOSIDE (IPTG) DIOXANE-FREE	0.09 lbs
JANUS GREEN	0.12 lbs
JANUS GREEN B	0.02 lbs
JB-4	0.01 gal
KANAMYCIN	2.37 lbs
KANAMYCIN MONOSULFATE	0.21 lbs
KANAMYCIN SULFATE	0.07 gal
KAOLIN	2.2 lbs

KERATIN AZURE	0.02 lbs
KINETIN	0.04 gal
KOJIC ACID, 99%	1 lbs
L-(-)-ORNITHINE-HYDROCHLORIDE, 99%	0.01 lbs
L-(-)-RHAMNOSE	0.11 lbs
L-(-)-SORBOSE, 99%	0.88 lbs
L-(+) LACTIC ACID	0.13 gal
L(+)ARABINOSE	2.42 lbs
L(+)-ARABINOSE	0.05 lbs
L(+)ASCORBIC ACID	0.22 lbs
L(+)-ASPARTIC ACID, 98+%	0.22 lbs
L-(+)-CYSTEINE, 99+% (TLC)	0.28 lbs
L-(+)-GLUTAMIC ACID	0.22 lbs
L-(+)-GLUTAMINE	0.02 lbs
L(+)LACTIC ACID, FREE ACID	0.05 lbs
L(+)TARTARIC ACID	1.1 lbs
L(+)-TARTARIC ACID	0.55 lbs
L-4-FLUOROPHENYLALANINE, 99+% E.E.	0.04 lbs
LACTALBUMIN	0.27 gal
LACTIC ACID	1.33 gal
LACTONITRILE	0.44 lbs
LACTOSE	2.54 lbs
laemmli sample buffer	0.05 gal
L-ALANINE	1.5 lbs
L-AMINO-2-NAPHTHOL-4-SULFONIC ACID	0.05 lbs
LANOLIN	3.3 lbs
LANOLIN ANHYDROUS	1 lbs
LANTHANUM CHLORIDE	0.5 lbs
LANTHANUM NITRATE	0.13 lbs
LANTHANUM OXIDE	1.1 lbs
L-A-PHOSPHATIDYLCHOLINE	0.22 lbs
L-ARABINOSE	0.28 lbs
L-ARGININE HCL	12.89 lbs
L-ARGININE HYDROCHLORIDE	1.16 lbs
L-ARGININE, FREE BASE	1.1 lbs
LAS REAGENT	0.13 gal
L-ASCORBIC ACID	11.42 lbs
L-ASPARAGINE	7.41 lbs
L-ASPARTIC ACID	2.84 lbs
LAURIC ACID	1.33 lbs
LAURYL SULFATE	25.57 lbs
LB broth	63.38 lbs
LB- MEDIUM	16.43 lbs
lb-agar	3.42 lbs
l-broth	2.1 lbs
L-CARVONE	0.01 lbs
L-CITRULLINE	0.29 lbs
L-CYSTEINE	4.83 lbs
L-CYSTEINE HYDROCHLORIDE, ANHYDROUS	0.22 lbs
L-CYSTEINE, HYDROCHLORIDE, MONOHYDRATE	0.05 lbs
L-CYSTINE	0.3 lbs
L-DOPA, 99%	0.07 lbs
LEAD ACETATE	6.55 lbs
LEAD CITRATE, TRIHYDRATE, 96% (TITR.)	0.49 lbs
LEAD NITRATE	5.96 lbs
lead oxide	2.22 lbs
LEAD SULFATE	1 lbs
LEAD TETRAACETATE	0.22 lbs
LEIBOVITZS L-15 MEDIUM	0.13 gal
LEVAMINSOLE	0.03 lbs
LEVULINIC ACID, 98+%	0.33 lbs
L-GLUTAMIC ACID	22.88 lbs
L-GLUTAMINE	1.65 gal
L-HISTIDINE	5.49 lbs
L-HISTIDINE, HCL	0.34 lbs
L-HOMOSERINE, 97%	0.01 lbs
LIDOCAINE HYDROCHLORIDE	0.11 lbs
LIGHT GREEN SF	0.02 lbs

LIGHT GREEN SF YELLOWISH	0.02 lbs
LIGHT MINERAL OIL	1.06 gal
LINALOOL	0.02 lbs
LINOLEIC ACID	0.25 gal
LINSEED OIL	0.43 gal
LIPOPHILIC SEPHADEX	0.22 lbs
LIQUID ENZYME	0.07 gal
LIQUID NITROGEN	31.25 gal
LIQUINOX	3 gal
liquiscint	7 gal
L-ISOLEUCINE	1.47 lbs
LITHIUM ACETATE	9.15 lbs
LITHIUM ACETATE DIHYDRATE, 98%	4.41 lbs
LITHIUM CARBONATE	1.13 lbs
LITHIUM CHLORIDE	6 gal
LITHIUM CHLORIDE, ANHYDROUS	4.41 lbs
LITHIUM DODECYHL SULFATE	0.11 lbs
LITHIUM HYDROXIDE	1.76 lbs
LITHIUM NITRATE	0.25 lbs
LITHIUM PERCHLORATE TRIHYDRATE, P.A.	0.12 lbs
LITHOCHOLIC ACID, 98%	0.02 lbs
LITMUS MILK	1.05 lbs
LIVER POWDER	1 lbs
L-LACTIC ACID, 20 WT. % SOLUTION IN WATER	0.27 gal
L-LEUCINE	2.94 lbs
L-LEUCINE METHYL ESTER HYDROCHLORIDE	0.06 lbs
L-LYSINE	16.89 lbs
L-LYSINE HYDROCHLORIDE WHITE	0.22 lbs
L-LYSINE MONOHYDROCHLORIDE	0.22 lbs
L-LYSINE, HCL	0.06 lbs
L-MALIC ACID	2.31 lbs
L-METHIONINE	2.33 lbs
LMP AGAROSE	0.11 lbs
Long Ranger gel solution	0.07 gal
L-ORNITHINE DECARBOXYLASE	0.27 lbs
L-ORNITHINE HYDROCHLORIDE	3.32 lbs
L-PHENYLALANINE	2.32 lbs
L-proline	2.21 lbs
LR WHITE RESIN	0.13 gal
L-RHAMINOSE	0.99 lbs
L-SERINE	1.8 lbs
L-SORBOSE	11 lbs
L-TARTARIC ACID	1.1 lbs
L-THREONINE	1.56 lbs
L-TRYPTOPHAN	1.97 lbs
L-TYROSINE	3.86 lbs
lubrol wx	2.22 lbs
LUBROL, TYPE PX	0.77 lbs
LUMI-PHOS 530	0.03 gal
LURIA BROTH BASE	3.42 lbs
L-VALINE	1.61 lbs
LYMPHOLYTE M	0.26 gal
LYOPHIL	0.01 lbs
LYSINE	4.66 lbs
LYSING & HEMOGLOBIN REAGENT	0.09 gal
Lysis Solution	0.09 gal
LYSOL	1 gal
LYSOZYME	0.04 gal
LYTICASE	0.01 lbs
M9 MIN MEDIUM SALT	0.77 lbs
MACCONKEY AGAR	5.1 lbs
MAGNESIUM	2.2 lbs
MAGNESIUM ACETATE	17.54 lbs
MAGNESIUM ACETATE TETRAHYDRATE	0.22 lbs
MAGNESIUM CARBONATE	3.3 lbs
MAGNESIUM CARBONATE HYDROXIDE PENTAHYDRATE 99%	2.2 lbs
MAGNESIUM CARBONATE HYDROXIDE, LIGHT 40.0-45.0% MAGNESIUM OXIDE	1.1 lbs
MAGNESIUM CHLORIDE	78.56 gal

MAGNESIUM CHLORIDE HEXAHYDRATE	5.5 lbs
MAGNESIUM HYDROXIDE	1.1 lbs
magnesium metal	1.5 lbs
MAGNESIUM NITRATE	5.84 lbs
MAGNESIUM OXIDE	3.32 lbs
MAGNESIUM SULFATE	130.1 lbs
MAGNESIUM SULFATE ANHYDROUS	4.62 lbs
MAGNESIUM SULFATE HEPTAHYDRATE	6.82 lbs
MALACHITE GREEN	0.55 lbs
MALATHION 8	0.11 lbs
MALEIC ACID	3.5 gal
MALEIC ANHYDRIDE	2.2 lbs
MALIC ACID	2.28 lbs
MALONALDEHYDE BIS(DIETHYLACETAL), 97%	0.81 gal
MALONIC ACID	3.6 lbs
MALT EXTRACT	0.22 lbs
MALTOSE	10.46 lbs
MALTOSE MONOHYDRATE	0.22 lbs
MANGANESE	0.28 lbs
MANGANESE (II) CHLORIDE ANHYDROUS	2.54 lbs
MANGANESE (II) CHLORIDE TETRAHYDRATE	2.78 gal
MANGANESE (IV) OXIDE	0.22 lbs
MANGANESE SULFATE	10.36 lbs
MANGANESE SULFATE MONOHYDRATE	3.1 lbs
MANGANESE(II) SULFATE	0.01 lbs
MANGANOUS CHLORIDE	2.65 lbs
MANGANOUS SULFATE	4.4 lbs
MANNITOL	36.85 lbs
MANNOSE	0.23 lbs
MAY-GREENWALD'S STAIN	0.02 lbs
M-BROMOBENZOIC ACID , 99%	0.13 lbs
MCDB 131	2.64 gal
M-CHLOROPHENOL	0.05 lbs
M-COUMARIC ACID	0.01 lbs
M-CRESOL	1.46 lbs
M-DINITROBENZENE	0.55 lbs
MECHANICAL PUMP OIL	1.26 gal
Medium	33.95 gal
MEDIUM 199	9.9 gal
medium eagle	0.26 gal
MEM NON ESSENTIAL AMINO ACID SOLN	0.48 gal
MENADIONE	0.44 lbs
MERCAPTOACETIC ACID	0.13 lbs
MERCAPTOETHANOL	0.22 gal
MERCAPTOSUCCINIC ACID, 97%	0.12 lbs
MERCURIC ACETATE	0.01 lbs
MERCURIC CHLORIDE	4.07 lbs
MERCURIC IODIDE	1.5 lbs
MERCURIC OXIDE RED	1 lbs
MERCURY	2.65 lbs
MERCURY (I) CHLORIDE	0.23 lbs
MERRIFIELD'S PEPTIDE RESIN, 2% CROSS- LINKED, 2-2.5 MEQ CL/G, 200-400 MESH	0.02 lbs
MERSALYL ACID	0.22 lbs
MES	21.95 lbs
MES HYDRATE 99%	0.05 lbs
MESO-TARTARIC ACID	0.11 lbs
META-PHOSPHORIC ACID	5 lbs
METAPHOSPHORIC ACID, CHIP STABILIZED WITH 56 - 60% NAPO3	0.47 lbs
METHANE	5.01 lbs
METHANESULFONAMIDE, 98% (HPLC)	0.02 lbs
METHANESULFONIC ACID	0.7 gal
METHANESULFONIC ACID ETHYL ESTER	0.03 lbs
METHANESULFONYL CHLORIDE	0.22 lbs
METHANOL	172.67 gal
METHANOL (METHYL ALCOHOL)	4.22 gal
METHENAMINE	1 lbs
METHOXY FLURANE	0.12 gal
METHOXYACETIC ACID	0.01 lbs

METHOXYBENZENE	0.01 lbs
METHOXYLAMINE HYDROCHLORIDE, 98+%	0.1 lbs
METHYL 2,4-DIHYDROXYBENZOATE, 97%	0.05 lbs
Methyl 4-hydroxybenzoate	2.2 lbs
METHYL ABIETATE	1.1 lbs
METHYL ACETATE	1.1 lbs
METHYL ACETOACETATE	2.2 lbs
METHYL A-D-MANNOPYRANOSIDE	1.1 lbs
METHYL ALCOHOL	14.87 gal
METHYL ALPHA-D-GLUCOPYRANOSIDE	0.66 lbs
methyl alpha-d-mannopyranoside	0.5 lbs
METHYL ANTHRANILATE	0.22 lbs
METHYL BENZYLTHONIUM CHLORIDE	1.1 lbs
METHYL CINNAMATE, 98%	0.01 lbs
METHYL ETHYL KETONE	1.62 gal
METHYL FORMATE	0.03 gal
METHYL GREEN	0.15 gal
METHYL GREEN (CERT)	0.05 lbs
METHYL ISOBUTYL KETONE	1 gal
METHYL MERCAPTAN	0.02 lbs
METHYL ORANGE	0.18 lbs
METHYL PARABEN	3.3 lbs
METHYL RED	0.22 gal
METHYL SALICYLATE	0.58 gal
METHYL SULFOXIDE	2.84 gal
METHYL VINYL KETONE	0.07 gal
METHYL VIOLET 2B HIGH PURITY BIOLOGICAL STAIN	0.1 lbs
METHYL VIOLOGEN	0.01 lbs
METHYL YELLOW, INDICATOR GRADE	0.04 lbs
METHYLAMINE	2.69 gal
METHYLAMINE HYDROCHLORIDE	0.22 lbs
METHYLENE BIS-ACRYLAMIDE	0.05 lbs
METHYLENE BLUE	2.51 lbs
METHYLENE CHLORIDE	29.87 gal
METHYLENE GREEN	0.07 lbs
METHYLGLYOXAL BIS-(GUANYL-HYDRAZONE) DIHYDROCHLORIDE MONOHYDRATE, 99%	0.11 lbs
METHYLGUANIDINE SULFATE	0.05 lbs
METHYLHYDROQUINONE, 99%	0.01 lbs
METHYLIMINODIACETIC ACID	0.12 lbs
METHYL-P-BENZOQUINONE, 99+%	1.01 lbs
METHYLPHOSPHONIC ACID, 98%	0.05 lbs
METHYLPROPANOL	4.41 lbs
METHYLSULFOXIDE	1.98 gal
METHYLUREA	0.05 lbs
METRIZAMIDE	0.55 lbs
MEVALONIC ACID	0.02 lbs
MICRO ASSAY CULTURE AGAR	22.77 gal
MICRO BCA REAGENT A	0.19 gal
MICRO BCA REAGENT B	0.06 gal
MICRO-CEL	0.17 gal
MINERAL OIL	7.11 gal
MINERAL OIL, HEAVY	0.24 gal
MINERAL OIL, LIGHT	2.38 gal
MINIMAL SD AGAR	3.1 lbs
minimal sd base	0.59 lbs
MINIUM ESSENTIAL MEDIUM ALPHA MEDIUM	8.15 gal
MIXED BED RESIN TMD-8	7.28 lbs
M-NITROPHENOL	0.02 lbs
mobs	0.22 lbs
MOLECULAR BIOLOGY GRADE RESIN	0.88 lbs
MOLECULAR SIEVE 5A	3.3 lbs
MOLECULAR SIEVES	24.18 lbs
MOLYBDATE SOLUTION	0.07 gal
MOLYBDENUM	0.19 gal
MOLYBDENUM BLUE TLC SPRAY REAGENT	0.05 gal
MOLYBDENUM HEXACARBONYL, 98%	0.11 lbs
MOLYBDENUM TRIOXIDE	2.33 lbs
MOLYBDIC ACID	3.3 lbs

MONOSODIUM GLUTAMATE	0.22 lbs
MONOTHIOGLYCEROL	0.08 gal
MOPS	9.91 gal
MORDANT BLUE 9	0.02 lbs
MORIN HYDRATE, 95%	0.02 lbs
MORPHOLINE	0.29 gal
MOUNTING MEDIA	0.05 gal
M-PHENYLENEDIAMINE, 99+%	0.55 lbs
M-PHENYLPHENOL	0.07 lbs
MS SALT MIXTURE	1.32 gal
M-TERPHENYL	0.22 lbs
MTT	0.14 gal
MUCOCHLORIC ACID, 99%(TITR.,DRY SUBSTANCE)	0.22 lbs
MUELLER HINTON AGAR	1 lbs
MUELLER HINTON BROTH	4.3 lbs
M-XYLENE	1.32 gal
MYCOPHENOLIC ACID	0.11 lbs
MYOGLOBIN, HORSE	0.01 lbs
MYO-INOSITOL	10.67 lbs
MYRISTIC ACID	0.06 lbs
MYRISTYL ALCOHOL	0.22 lbs
N-(1-NAPHTHYL)ETHYLENEDIAMINE DIHYDROCHLORIDE	0.36 lbs
N-(3-AMINOPROPYL)-MORPHOLINE, 98%	0.13 gal
N,N DIMETHYL FORMAMIDE	2.6 gal
N,N,N',N'-TETRAMETHYLETHYLENEDIAMINE	0.03 gal
N,N,N',N'-TETRAMETHYLETHYLENEDIAMINE, 99%	0.01 gal
N,N,N',N'-TETRAMETHYL-P-PHENYLENEDIAMINE DIHYDROCHLORIDE, 96%	0.03 lbs
N,N'-DIALLYTARTARDIAMIDE	0.05 lbs
N,N'-DICYCLOHEXYLCARBODIIMIDE	0.44 lbs
N,N'-DICYCLOHEXYLCARBODIIMIDE, 99%	0.22 lbs
N,N-DIETHYLANILINE	1.1 lbs
N,N'-DIISOPROPYLCARBODIIMIDE	0.22 lbs
N,N-DIISOPROPYLETHYLAMINE	0.1 gal
N,N-DIMETHYL FORMAMIDE	3.33 gal
N,N-DIMETHYLACETAMIDE	0.21 gal
N,N-DIMETHYLANILINE	0.53 gal
N,N-DIMETHYLBENZAMIDE	0.02 lbs
N,N-DIMETHYLFORMAMIDE	1.28 gal
N,N-DIMETHYLFORMAMIDE DIMETHYL ACETAL	0.03 gal
N,N-DIMETHYL-M-NITROANILINE	0.01 lbs
n,n'-dimethyl-p-nitrosoaniline	0.05 lbs
N,N-DIMETHYL-P-PHENYLENEDIAMINE SULFATE	0.22 lbs
N,N'-METHYLENE BIS(ACRYLAMIDE)	0.54 lbs
N,O-DIMETHYLHYDROXYAMINE HYDROCHLORIDE	0.02 lbs
N.N-HEXAMETHYLENE-BIS-ACETAMIDE	0.11 lbs
N-1-NAPHTHYLETHYLENEDIAMINE, DIHYDROCHLORIDE	0.16 lbs
N-2,4,-DNP-L-ALANINE	3530 ft3
N6,2'-0-DIBUTYRYLADENOSINE 3',5'-CYCLIC MONOPHOSPHATE SODIUM SALT MONOHYDRATE	0.01 lbs
N-ACETYL-CYSTEINE	0.02 lbs
N-ACETYL-D-GLUCOSAMINE	1.21 lbs
N-ACETYL-L-CYSTEINE	0.17 lbs
N-ACETYL-L-TRYPTOPHAN ETHYL ESTER, 99%	0.01 lbs
N-ACETYL-P-AMINOPHENOL	0.22 lbs
nadic methyl anhydride	0.99 lbs
NALIDIXIC ACID	0.09 lbs
N-AMYL ALCOHOL	0.13 gal
NAPHTHALENE	0.11 lbs
NAPHTHALENEACETIC ACID	0.22 lbs
NAPHTHANIL DIAZO RED RC	0.05 lbs
NAPHTHOL	0.03 lbs
NAPHTHOL AS	0.11 lbs
NAPHTHOL BLUE BLACK	3.15 lbs
NAPTHALENE	2 lbs
N-BROMOSUCCINIMIDE	0.5 lbs
N-BUTANOL	0.52 gal
N-BUTYL ACETATE	1.19 gal
N-BUTYL GLYCIDYL ETHER	0.05 gal
N-BUTYRIC ACID	0.71 gal

N-BUTYROPHENONE, 99%	0.22 lbs
N-CHLOROSUCCINIMIDE	0.05 lbs
NCS TISSUE SOLUBILIZER	0.92 gal
N-DECANE	0.03 gal
n-dodecane	0.13 gal
NEOMYCIN SULFATE	0.11 gal
NEOPENTYL ALCOHOL, 99%	0.05 lbs
N-ETHYL MALEIMIDE	0.14 lbs
N-ETHYL MORPHOLINE	0.17 gal
N-ETHYLMALEIMIDE	0.08 lbs
N-ETHYLMORPHOLINE	0.03 gal
NEURAL RED	0.05 lbs
NEUROBASAL MEDIUM	15.2 gal
NEUTRAL RED	0.12 gal
NEUTRAL RED (CERT)	0.05 lbs
neutralization solution	0.23 gal
NEW FUCHSIN	0.05 lbs
NEW WASH	0.33 gal
N-glycylglycine	0.48 lbs
n-heptaflorobutyric acid	0.03 gal
N-HEPTANE	0.13 gal
N-HYDROXYSUCCINIMIDE	0.55 lbs
NIACIN	1.15 lbs
NIACINAMIDE	3.54 lbs
NICKEL	0.03 gal
NICKEL (II) SULFATE HEXAHYDRATE	1.1 lbs
NICKEL CHLORIDE	2.64 lbs
NICKEL NITRATE	0.28 lbs
NICKEL SULFATE	6.4 lbs
NICOTINE	0.05 gal
NICOTINE TARTRATE	0.05 lbs
NICOTINIC ACID	3.86 lbs
NIFLUMIC ACID	0.15 lbs
NIGROSIN	0.11 lbs
nile blue a- certified (sulfate salt)	0.11 lbs
NINHYDRIN	0.43 gal
NI-NTA AGAROSE	0.05 gal
NITRATE STANDARD	0.12 gal
NITRIC ACID	18.55 gal
NITRILOTRIACETIC ACID, DISODIUM	0.66 lbs
NITRO BLUE TETRAZOLIUM	0.23 lbs
NITROANILINE	0.55 lbs
NITROGEN	400.01 lbs
NITROGEN GAS	29.31 gal
NITROMETHANE	3.3 lbs
N-LAUROYLSARCOSINE	13.53 lbs
N-LAUROYLSARCOSINE, SODIUM SALT	0.22 lbs
N-METHYLANILINE, 98%	0.11 lbs
N-METHYL-D-GLUCAMINE	5.77 lbs
N-METHYLFORMAMIDE	0.05 gal
Nonanal 97%	0.06 lbs
NONANOIC ACID, 98+%(GC)	0.55 lbs
Nonenyl Succinic Anhydride	5.17 lbs
NONIDET	0.63 gal
NONIDET P-40	1.24 gal
NORBORNANE, 98%	0.02 lbs
NORBORNYLENE, 99%, STABILIZED	0.22 lbs
NORIT A	0.06 lbs
NP-40	0.18 gal
N-PENTANE	10.26 gal
N-PHENYLANTHRANILIC ACID, 98%	0.22 lbs
N-PROPANOL	1 gal
N-PROPYL ALCOHOL	4.43 gal
n-propyl gallate	0.88 lbs
N-PROPYL P-HYDROXY-BENZOATE	0.01 lbs
N-TRIS HYDROXYMETHYL METHYL GLYCINE	0.66 lbs
nuclease-free water	0.05 gal
NUTRIENT AGAR	7.4 lbs

NUTRIENT BROTH	7.24 lbs
N-VALERIC ACID	0.01 lbs
NYCODENZ	0.01 lbs
NYSTATIN	0.21 lbs
N-Z-AMINE A	3.2 lbs
N-Z-AMINE AS	2.2 lbs
N-Z-CASE M	0.55 lbs
NZY BROTH	0.22 lbs
O,N-DIMETHYLHYDROXYLAMINE HYDROCHLORIDE, 98%	0.03 lbs
O-ANISALDEHYDE, 98%	0.22 lbs
O-ANISIDINE	0.22 lbs
O-CHLOROPHENOL	2.2 lbs
O-CHLOROTOLUENE	0.22 lbs
O-CRESOL	5.94 lbs
O-CRESOLPHTALEIN COMPLEXONE SODIUM SALT	0.22 lbs
OCTADECANE, 99+% (GC)	0.05 lbs
OCTADECYL	0.22 lbs
OCTANOIC ACID	0.26 gal
OCTANOL	0.25 gal
OCTYL ALDEHYDE, 99%	0.05 lbs
OCTYL SEPHAROSE CL-B	0.01 gal
O-DIANISIDINE	0.26 lbs
O-FLUOROTOLUENE, 99+%	0.01 lbs
O-HYDROXYACETOPHENONE	0.02 lbs
O-HYDROXYCINNAMIC ACID, 97%, PREDOMINANTLY TRANS	0.01 lbs
O-HYDROXYDIPHENYL	0.22 lbs
OIL	0.3 gal
OIL RED O	0.38 lbs
OLEIC ACID	0.12 gal
OLIGO DT-CELLULOSE	0.03 gal
O-METHYLISOUREA HEMISULFATE, 94%	0.05 lbs
OMNIFLUOR	2.2 lbs
O-NITROANILINE	1 lbs
O-NITROPHENYL B-D-GALACTOPYRANOSIDE	0.13 lbs
O-NITROPHENYL-BETA-D-GALACTOPYRANOSIDE 99+%	0.02 lbs
O-PHENANTHROLINE	0.02 lbs
O-PHENYLENEDIAMINE DIHYDROCHLORIDE	0.22 lbs
O-PHENYLENEDIAMINE, 99%	0.13 lbs
O-PHENYLPHENOL	1.32 lbs
O-PHOSPHO-L-SERINE	0.02 lbs
O-PHOSPHORIC ACID	4.39 gal
O-PHOSPHORYLETHANOLAMINE	0.11 lbs
O-PHTHALADELDEHYDE	0.1 lbs
OPTIPREP DENSITY GRADIENT MEDIUM	0.16 gal
ORANG II	0.05 lbs
ORANGE IV ACID ORANGE 5	0.05 lbs
ORCEIN	0.03 lbs
ORCINOL	0.6 lbs
ORSINOL	0.02 lbs
OSMIC ACID ANHYDRIDE	0.03 lbs
OSMIUM TETROXIDE	0.09 gal
O-TERPHENYL	0.05 lbs
O-TOLIDINE DIHYDROCHLORIDE	0.22 lbs
O-TOLYLHYDRAZINE HYDROCHLORIDE, 98%	0.01 lbs
OXALACETIC ACID, 96%	0.03 lbs
OXALIC ACID	4.97 lbs
OXALIC ACID BIS-(CYCLOHEXYLIDENEHYDRAZIDE)	0.44 lbs
OXAMIC ACID	0.02 lbs
OXAMIDE, 98%	0.11 lbs
OXOSOL	1.06 gal
OXYGEN	29.04 gal
OXYGEN COMPRESSED	5.91 gal
O-XYLENE	2.2 lbs
P 11	1.1 lbs
P,P'-BIPHENOL, 97%	0.02 lbs
PABA	0.01 lbs
P-ACETAMIDOBENZALDEHYDE	0.01 lbs
PAINT	0.84 gal

PALLADIUM	0.05 lbs
PALLADIUM ON ACTIVATED CARBON	0.02 lbs
PALMITIC ACID	0.25 lbs
P-AMINOBENZOIC ACID	0.45 lbs
P-AMINOCINNAMIC ACID HYDROCHLORIDE	0.05 lbs
P-AMINODIMETHYLANILINE OXALATE	0.1 lbs
P-AMINOPHENOL ACETATE	0.55 lbs
P-Aminosalicylic acid	0.27 lbs
p-anisaldehyde	0.22 lbs
P-ANISIDINE	0.44 lbs
PAPAIN	0.33 lbs
PARAFFIN OIL	0.91 gal
PARAFFIN WAX	4.41 lbs
PARAFORMALDEHYDE	32.38 lbs
PARAPLAST PLUS	2.2 lbs
PARAROSANILIN HYDROCHLORIDE	0.12 lbs
PARAROSANILINE	0.07 lbs
PAROMOMYCIN SULFATE	0.02 lbs
P-BENZOQUINONE	0.22 lbs
P-BROMOANILINE	0.11 lbs
P-BROMOBENZALDEHYDE	0.01 lbs
P-BROMOBENZOIC ACID	0.02 lbs
P-BROMOPHENOL	0.22 lbs
PBS 35 CONCENTRTE	0.07 gal
P-CHLOROBENZALDEHYDE	0.44 lbs
P-CHLOROPHENOL	0.22 lbs
P-CHLOROPHENOXY ACETIC ACID	0.49 lbs
P-CHLOROPHENYLACETIC ACID	0.22 lbs
P-CHLOROTOLUENE	0.22 lbs
P-COUMARIC	0.08 lbs
P-COUMARIC ACID	0.11 lbs
P-CRESOL	0.55 lbs
P-CYANOBENZALDEHYDE	0.01 lbs
P-CYMENE, 98%	0.53 gal
P-DIMETHYLAMINOBENZALDEHYDE	0.88 lbs
P-DIOXANE	0.13 gal
PECTIC ACID	0.22 lbs
PECTIN	0.88 lbs
PECTINASE	0.07 gal
PEG	2.42 lbs
PEG 1000	2.2 lbs
PEG 3350	6.61 lbs
PEG 4000	2.2 lbs
PEG 6000	0.05 lbs
PEG 8000	22.48 lbs
PELCO-BEDCAST RESIN	0.22 lbs
PENICILLIN G	0.48 gal
penicillin streptomycin	0.14 gal
PENICILLIN STREPTOMYCIN GLUTAMINE	0.05 gal
PENICILLIN STREPTOMYCIN SOLUTION	0.32 gal
PENTACHLORONITROBENZENE	2.86 lbs
PENTAFLUOROPHENOL	0.23 lbs
PENTANE	2.2 gal
PEPES	0.44 lbs
PEPSIN	0.22 lbs
PEPTONE	18.63 lbs
PEPTONE BACTERIOLOGICAL TECHNICAL	1 lbs
PERCHLORIC ACID	4.31 gal
PERCOLL	1.79 gal
PERIODIC ACID	1.8 lbs
PERMOUNT SOLUTION	1.15 gal
PEROXIDASE CONJUGATED STREPTIVIDAN	0.08 lbs
PEROXIDASE HORSERADISH	0.05 gal
Pesticide	1.1 lbs
PETERS EXCEL ALL PURPOSE FERTILIZER	30.88 lbs
PETROLEUM ETHER	4.43 gal
petroleum jelly	0.81 lbs
PH ELECTRODE	0.26 gal

PHENACETIN	1 lbs
PHENANTHRENE	0.44 lbs
PHENANTHROLINE, MONOHYDRATE	0.02 lbs
PHENAZINE METHOSULFATE	0.05 lbs
PHENETHYLAMINE, 99%	0.11 lbs
PHENOL	72.6 gal
PHENOL (WASTE)	0.07 gal
PHENOL ACID	0.03 gal
PHENOL CHLOROFORM II	0.03 gal
PHENOL PHTHALEIN	0.17 lbs
PHENOL REAGENT	0.45 gal
PHENOL RED	0.11 gal
PHENOL RED LACTOSE BROTH	1 lbs
PHENOL RED SOLUTION 0.02%	0.03 gal
PHENOL/CHLOROFORM/ISOAMYL ALCOHOL	0.69 gal
PHENOL: CHLOROFORM	0.03 gal
PHENOLPHTHALEIN	3.57 lbs
PHENOXYACETIC ACID	0.29 lbs
PHENYL ACETATE	0.44 lbs
PHENYL ACETIC ACID	0.22 lbs
PHENYL HYDRAZINE	0.22 lbs
PHENYL ISOTHIOCYANATE	0.16 lbs
PHENYL MALONIC ACID	0.05 lbs
PHENYL METHYL SULFONYL FLUORIDE	0.11 lbs
PHENYL SEPHAROSE	0.01 gal
PHENYL-2-PROPANONE	0.22 lbs
PHENYLACETIC ACID	0.79 lbs
PHENYLACETYLENE, 98%	0.01 lbs
PHENYLALANINE	0.01 lbs
PHENYLENEDIAMINE	1.12 lbs
PHENYLHYDRAZINE	0.02 lbs
PHENYLHYDRAZINE HYDROCHLORIDE	0.13 lbs
PHENYLHYDROQUINONE, 96%	0.14 lbs
PHENYLMETHYLSULFONYL FLOURIDE	1.05 lbs
PHENYL-P-BENZOQUINONE, 99% (UV-VIS)	0.01 lbs
PHENYLPYRUVIC ACID, SODIUM SALT MONO- HYDRATE, 98%	0.01 lbs
PHENYLSUCCINIC ACID	1.1 lbs
PHENYLTHIOCARBAMIDE	0.32 lbs
PHLOROGLUCINOL	0.16 lbs
PHLOXINE B	0.18 lbs
PHOSPHATASE, ACID TYPE III	0.01 lbs
phosphatase, alkaline	0.06 gal
Phosphate Saline Soln	13.23 gal
PHOSPHOCREATINE, DISODIUM SALT	0.02 lbs
PHOSPHOLIPASE A2	0.01 lbs
PHOSPHOMOLYBDIC	1.07 lbs
PHOSPHOMOLYBDIC ACID	0.53 lbs
PHOSPHORIC ACID	12.09 gal
PHOSPHOROUS ACID	6.61 lbs
PHOSPHOROUS PENTOXIDE	1.1 lbs
PHOSPHORUS ACID	1.76 lbs
PHOSPHORUS PENTOXIDE	0.16 gal
PHOSPHORYL CHOLINE CHLORIDE	0.01 lbs
PHOSPHOTUNGSTIC-PHOSPHOMOLYBDIC ACID SOL'N	0.05 lbs
PHOSPHSOTUNGSTIC ACID	0.21 gal
PHOTO-FLO 200 SOLN	0.25 gal
PHTHALDIALDEHYDE (O)	0.01 gal
PHTHALIC ACID	0.4 gal
PHTHALIC ANHYDRIDE	1 lbs
PHTHALIMIDE, 98%	1.65 lbs
PHTHALYL-SULFATHIAZOLE	0.55 lbs
P-HYDROXYACETOPHENONE	0.22 lbs
P-HYDROXYBENZALDEHYDE	0.33 lbs
P-HYDROXYBENZOIC ACID METHYL ESTER	0.44 lbs
P-HYDROXYBENZOIC ACID, N-BUTYL ESTER	0.11 lbs
P-HYDROXYMERCURIBENZOATE	0.09 lbs
P-HYDROXYPHENYLACETIC ACID	0.06 lbs
PHYTAGEL	1.43 lbs

PHYTIC ACID	0.03 lbs
PICOLINIC ACID	0.45 lbs
PICRIC ACID	0.26 gal
PICRYLSULFONIC ACID	0.12 lbs
PIMELIC ACID	0.05 lbs
PINENE	0.33 gal
PIPERAZINE	0.84 lbs
PIPERAZINE DIACRYLAMIDE	0.04 lbs
PIPERIDINE	0.72 gal
PIPES	11.71 lbs
PLASTER OF PARIS	4.4 lbs
PLURONIC F-127	0.22 gal
P-METHOXYPHENOL	1.1 lbs
P-METHOXYPHENYLACETIC ACID	0.01 lbs
P-METHYLAMINOPHENOL SULFATE	1.65 lbs
PMSF	0.09 lbs
P-NITROANILINE	0.33 lbs
P-NITROANISOL	0.44 lbs
P-NITROBENZALDEHYDE	0.02 lbs
P-NITROBENZYL ALCOHOL	0.02 lbs
P-NITROCINNAMALDEHYDE	0.01 lbs
P-NITROPHENOL	0.25 lbs
P-NITROPHENYL ACETATE	0.23 lbs
P-NITROPHENYL CHLOROFORMATE	0.01 lbs
P-NITROPHENYL PHOSPHATE	0.04 lbs
P-NITROTOLUENE	1.1 lbs
POLY(ETHYLENE GLYCOL), AVERAGE M.W 1450	2.75 lbs
Poly/Bed 812	1.1 lbs
POLYACRYLAMIDE GEL	1.1 lbs
POLYAMIDE POWDER	1.1 lbs
POLYBRENE	0.05 lbs
POLY-DL-LYSINE HYDROBROMIDE	0.16 gal
POLYETHYLENE	0.05 gal
POLYETHYLENE GLYCOL	19.73 gal
POLYETHYLENE GLYCOL 1000	0.96 gal
POLYETHYLENE GLYCOL 600	2.2 lbs
POLYETHYLENE GLYCOL 6000	2.2 lbs
POLYETHYLENE GLYCOL 6000	13.78 lbs
POLYETHYLENE GLYCOL 8000	4.41 lbs
POLYETHYLENE GLYCOL COMPOUND	2.2 lbs
POLYETHYLENEGLYCOL 200 MONOOCTYLETHER	2.2 lbs
POLYETHYLENIMINE	0.4 gal
POLYGALACTURONIC ACID, SODIUM SALT	1.76 lbs
poly-l-lysine	0.79 gal
POLY-L-ORNITHINE HYDROBROMIDE	0.12 gal
POLYOXYETHYLENE	0.46 gal
POLYOXYETHYLENE 10 LAURYL ETHER	0.29 gal
POLYOXYETHYLENE 20 CETYL ETHER	2.2 lbs
POLYOXYETHYLENE 23 LAURYL ETHER	1.1 lbs
POLYOXYETHYLENE SORBITAN MONOOLEATE	0.19 gal
POLYOXYETHYLENE-23-LAURYL ETHER	0.22 lbs
POLYOXYETHYLENESORBITAN MONOLAURATE	0.58 gal
POLYOXYETHYLENESORBITAN MONOLAURATE (TWEEN 20)	0.13 gal
POLYOXYETHYLENESORBITAN MONOPALMITATE (TWEEN 40)	0.16 gal
POLYPROPYLENE GLYCOL	1.1 lbs
POLYVINYL ALCOHOL	3.58 lbs
polyvinyl formal 15/95 powder	0.22 lbs
POLYVINYL FORMAL RESIN	0.11 lbs
POLYVINYL PYRROLIDONE	8.15 lbs
POLYVINYLPOLYPYRROLIDONE	6.38 lbs
POLYVINYLPYRROLIDONE	25.32 lbs
PONCEAU 2R	0.05 lbs
PONCEAU S	1.87 gal
POPOP	0.56 lbs
POTASSIUM ACETATE	84.79 lbs
POTASSIUM ACID PHTHALATE	0.5 lbs
POTASSIUM BICARBONATE	14.02 lbs
POTASSIUM BIPHTHALATE	1.25 lbs

POTASSIUM BISULFATE	2 lbs
POTASSIUM BROMATE	1.1 lbs
POTASSIUM BROMIDE	12.76 lbs
POTASSIUM CACODYLATE	0.05 lbs
POTASSIUM CARBONATE	19.78 lbs
POTASSIUM CARBONATE ANHYDROUS	3.2 lbs
POTASSIUM CHLORATE	1 lbs
POTASSIUM CHLORIDE	28.63 gal
POTASSIUM CHLORIDE SOLUTION	0.13 gal
POTASSIUM CHROMATE	0.48 lbs
POTASSIUM CITRATE	2.1 lbs
POTASSIUM CYANATE	1.65 lbs
POTASSIUM CYANIDE	2.5 lbs
POTASSIUM DICHROMATE	17.82 lbs
POTASSIUM DIHYDROGEN PHOSPHATE	3.97 lbs
POTASSIUM FERRICYANIDE	18.58 lbs
POTASSIUM FERRICYANIDE(III)	0.22 lbs
POTASSIUM FERROCYANIDE	1.32 lbs
POTASSIUM FERROCYANIDE	2.94 lbs
POTASSIUM FERROCYANIDE(II) TRIHYDRATE, P.A.	1 lbs
POTASSIUM FLUORIDE	3.42 lbs
POTASSIUM HEXACYANOFERRATE (III)	0.66 lbs
POTASSIUM HYDROGEN PHTHALATE	2.04 lbs
POTASSIUM HYDROXIDE	15.86 gal
POTASSIUM IODATE	1.5 lbs
POTASSIUM IODIDE	14.92 lbs
POTASSIUM META-BISULFITE	1.1 lbs
POTASSIUM METAPERIODATE	0.05 lbs
potassium methylsulfate	0.22 lbs
POTASSIUM NITRATE	23.73 lbs
POTASSIUM OXALATE	3.1 lbs
POTASSIUM OXALATE MONOHYDRATE	1.1 lbs
POTASSIUM PERCHLORATE	1 lbs
POTASSIUM PERMANGANATE	16.36 lbs
POTASSIUM PERSULFATE	1 lbs
POTASSIUM PHOSPHATE	206.26 lbs
POTASSIUM PHOSPHATE (DIBASIC)	13.01 lbs
POTASSIUM PHOSPHATE (MONOBASIC)	31.75 lbs
POTASSIUM PHOSPHATE DIBASIC ANHYDROUS	1.1 lbs
POTASSIUM PHOSPHATE MONOBASIC ANHYDROUS	0.22 lbs
POTASSIUM PHOSPHATE TRIBASIC	1.1 lbs
POTASSIUM PHOSPHATE, DIBASIC	2.2 lbs
POTASSIUM PYROPHOSPHATE	0.22 lbs
POTASSIUM SODIUM TARTRATE	27.7 lbs
POTASSIUM SULFATE	20.95 lbs
POTASSIUM SULFITE	2.2 lbs
POTASSIUM SUPER OXIDE	1.15 lbs
POTASSIUM TARTRATE	2.1 lbs
POTASSIUM TELLURITE	0.05 lbs
POTASSIUM TETRABORATE	1.22 lbs
POTASSIUM THIOCYANATE	7.01 lbs
POTASSSIUM FLUORIDE	0.05 lbs
POTATO DEXTROSE AGAR	7.5 lbs
POTATO DEXTROSE BROTH	1 lbs
P-PHENYLENEDIAMINE	0.82 lbs
P-PHENYLPHENOL	1.21 lbs
PPO	6.6 lbs
PRASEODYMIUM CHLORIDE, HEPTAHYDRATE	0.01 lbs
PRECIPITATED SULFUR	1.1 lbs
PRIMER	0.04 gal
PRISTANE	0.13 gal
PROBENECID	0.11 lbs
PROBUCOL	0.02 lbs
PROCAINE HYDROCHLORIDE	0.11 lbs
PROFLAVINE	0.41 lbs
PROGESTERONE	0.09 lbs
PRONASE	0.01 lbs
PROPANE	9.38 lbs

PROPANOL	1.06 gal
PROPIONALDEHYDE	0.16 gal
PROPIONIC ACID	1.48 gal
PROPIOPHENONE, 4-AMINO-	0.22 lbs
PROPYL ALCOHOL	1.19 gal
PROPYL GALLATE	0.66 lbs
PROPYLENE	0.38 gal
PROPYLENE GLYCOL	0.93 gal
PROPYLENE OXIDE	2.32 gal
PROSIL-28	0.03 gal
PROTAMINE SULFATE	0.4 lbs
PROTEASE INHIBITOR	0.24 lbs
PROTEASE, TYPE XI	0.02 lbs
PROTECTRNA RNASE INHIBITOR	0.01 lbs
PROTEIN A SEPHAROSE	0.02 lbs
PROTEIN ASSAY	4.32 gal
Protein Assay Reagent A	1.81 gal
Protein Assay Reagent B	0.82 gal
PROTEIN REAGENT	0.09 gal
PROTEINASE K	0.44 gal
PROTEOSE PEPTONE	10.3 lbs
PROTOCATECHUIC ACID	0.05 lbs
PROTOGEL	2.49 gal
PSEUDOMONAS AGAR	2.2 lbs
PSEUDOMONAS AGAR P	0.25 lbs
P-TERPHENYL, 99+%	0.05 lbs
P-THIOCRESOL	0.22 lbs
P-TOLUALDEHYDE	0.22 lbs
P-TOLUENESULFONIC ACID	0.22 lbs
P-TOLUIC ACID	0.05 lbs
P-TOLUIDINE	0.55 lbs
PUMP FLUID	0.53 gal
PUMP OIL	15.11 gal
pumping and trapping fluid	0.53 gal
putrescine	0.31 lbs
PUTRESCINE	0.44 lbs
P-XYLENE	0.16 gal
PYRAZOLE, 98%	0.14 lbs
PYRENE	0.02 lbs
PYRIDINE	4.57 gal
PYRIDINE-2-ALDOXIME	0.02 lbs
PYRIDINIUM CHLOROCHROMATE 98%	0.22 lbs
PYRIDINIUM DICHROMATE, 98%	0.22 lbs
PYRIDOXAL 5-PHOSPHATE	0.01 lbs
PYRIDOXAL HYDROCHLORIDE	0.06 lbs
PYRIDOXINE	1.97 lbs
PYRIDOXINE HCL	0.19 lbs
PYRIDOXINE MONOHYDROCHLORIDE	0.16 lbs
pyrogallic acid	0.25 lbs
PYROGALLOL	6.19 lbs
PYRONIN B	0.02 lbs
PYRONIN G	0.05 lbs
PYRONIN Y	0.07 lbs
PYROPHOSPHATE	6.21 lbs
PYROPHOSPHATE TETRASODIUM	5.42 lbs
PYRUVIC ACID	1.88 lbs
PYRUVIC ACID SODIUM SALT	0.02 lbs
QAE SEPHADEX	0.33 lbs
QUABAIN	0.03 lbs
QUERCETIN	0.08 lbs
QUICK DRY ENAMEL	0.26 gal
QUINACRINE DIHYDROCHLORIDE	0.16 lbs
QUINIDINE ANHYDROUS, CA.95%, REMAINDER DIHYDROQUINIDINE	0.02 lbs
QUINIDINE, HYDROCHLORIDE, MONOHYDRATE	0.01 lbs
QUININE HYDROCHLORIDE	0.2 lbs
QUININE SULFATE	0.13 lbs
QUININE SULFATE, MONOHYDRATE	0.02 lbs
QUININE, ANHYDROUS, 99% (TITR)	0.02 lbs

QUINOLINE	0.33 gal
quso g-32	0.22 lbs
RAFFINOSE	1.38 lbs
RAID FLYING INSECT KILLER FORMULA 5	1.66 lbs
rbs 35	1.06 gal
REAGENT A	0.39 gal
REAGENT ALCOHOL	2.77 gal
REFERENCE ELECTRODE FILLING SOLUTION	0.22 gal
REGENERATION BUFFER	0.11 gal
REMAZOL BRILLIANT BLUE	0.05 lbs
REPEL-SILANE	0.13 gal
RETINOIC ACID	0.01 lbs
REXYN I-300	1.1 lbs
RHODAMENE B	0.3 lbs
RHODAMINE 6G	0.33 lbs
RHODAMINE B	0.08 lbs
RHODAMINE B BASE	0.63 lbs
RIBOFLAVIN	2.43 lbs
RIBONUCLEIC ACID	0.34 lbs
RIBULOSE 1,5-DIPHOSPHATE	0.01 lbs
RIFAMPICIN	0.06 lbs
RNA	0.07 gal
RNASE AWAY	2.34 gal
RNASE ZAP	0.27 gal
ROSANILINE CHLORIDE	0.22 lbs
ROSE BENGAL	0.12 lbs
ROTENONE	0.22 lbs
RPMI MEDIUM 1640	16.91 gal
RUBBER IN A CAN	0.69 lbs
RUBIDIUM CHLORIDE	0.99 lbs
RUTHENIUM RED	0.02 lbs
SABOURAUD'S DEXTROSE AGAR	2.22 lbs
SACCHARIN	0.22 lbs
SAFRANIN O	0.5 lbs
SAFRANIN SOLUTION	0.2 gal
SALICIN	0.02 lbs
SALICYLALDEHYDE	0.33 gal
SALICYLAMIDE	0.11 lbs
SALICYLHYDROXAMIC ACID, 99%	0.22 lbs
SALICYLIC ACID	12.72 lbs
SALICYLIC ACID, 99+%	0.01 lbs
SALINE SOLUTION	0.26 gal
SAND	17.32 lbs
SANTONIN	0.11 lbs
SAPONIN	0.44 gal
SARKOSYL	28.63 lbs
saturated phenol	2.39 gal
SATURATED POTASSIUM CHLORIDE SOLUTION	0.17 gal
SCHIFFS REAGENT	0.53 gal
SCINTILLATION COCKTAIL	7.69 gal
SCINTISAFE	5.28 gal
SCINTIVERSE	14.98 gal
SDS	52.02 lbs
SDS BUFFER	0.53 gal
SEA SAND WASH	49.5 lbs
SEAKEM AGAROSE	1.1 lbs
SEBACOYL CHLORIDE, 99% (TITR.)	0.02 lbs
SEC.-BUTANOL, 99%	0.26 gal
SEC-BUTANOL	1.45 gal
SEC-BUTYL ALCOHOL	2.2 lbs
SEC-PHENETHYL ALCOHOL	1.1 lbs
SELENIOUS ACID	0.02 lbs
SELENIUM	0.06 lbs
SELENIUM DIOXIDE	0.02 lbs
SELENIUM SULFIDE	0.02 lbs
SEMICARBAZIDE	0.23 lbs
SEMICARBAZIDE HYDROCHLORIDE	0.44 lbs
SEPHACRYL S-1000	0.07 gal

SEPHACRYL S-200	0.72 gal
SEPHACRYL S-400	0.27 gal
SEPHACRYLTM S-300	0.96 gal
SEPHADEX	9.27 lbs
SEPHADEX A-50 DEAE	1.76 lbs
SEPHADEX C-50	0.11 lbs
SEPHADEX CM	1.1 lbs
SEPHADEX G-10	0.79 lbs
SEPHADEX G-100	1.73 lbs
SEPHADEX G-15	0.11 lbs
SEPHADEX G-150	1.98 lbs
Sephadex G-200	2.88 lbs
SEPHADEX G-25	5.04 lbs
SEPHADEX G-50	0.75 gal
SEPHADEX G-75	4.57 lbs
sephadex ief	0.11 lbs
SEPHADEX LH-20	1.32 lbs
SEPHAROSE	1.3 gal
SEPHAROSE 4B	0.26 gal
SEPHAROSE 6B-100	0.05 gal
SEPHAROSE CL-4B	0.03 gal
SEQUAGEL	2.01 gal
SEQUAGEL-6	0.12 gal
SERUM PLUS MEDIUM SUPPLEMENT	0.26 lbs
SERVA BLAU G	0.23 lbs
SERVA BLUE R	0.05 lbs
SESAME OIL	0.26 gal
SHINELINE SEAL THERMOPLASTIC FLOOR SEALER	1 gal
SIGMA 104 PHOSPHATASE SUBSTRATE	0.02 lbs
SIGMA 7-9	3.3 lbs
SIGMA CELL TYPE 100	1.1 lbs
SIGMA CELL TYPE 20	0.22 lbs
SIGMA CELL TYPE 50	0.11 lbs
SIGMA CLEAN WATER BATH TREATMENT	0.25 lbs
SIGMACELL	0.11 lbs
SIGMACOTE	0.56 gal
SILANE	0.01 gal
SILICA	0.66 lbs
SILICA GEL	5.68 gal
SILICA GEL DESSICANT	11.02 lbs
SILICA WOELM TSE	1.1 lbs
silicar	4 lbs
SILICAR TLC-7G	1 lbs
SILICIC ACID	2.22 lbs
SILICON	0.47 gal
SILICON CARBIDE	0.01 lbs
SILICON LUBRICANT	0.13 lbs
Silicon Oil	0.04 gal
SILICONE 2OO FLUID, 100 CST	0.11 lbs
SILICONE OIL	0.74 gal
SILVER	0.13 gal
SILVER ACETATE CRYSTALLINE OR POWDER	1.23 lbs
SILVER ACETATE, 99%	0.06 lbs
SILVER CARBONATE	0.19 lbs
SILVER CHLORIDE	0.16 lbs
SILVER ENHANCER SOLUTION A	0.05 gal
SILVER NITRATE	12.72 lbs
SILVER NITRITE, 99%	0.23 lbs
SILVER PROTEIN	0.04 gal
SILVER STAIN 10X CONCENTRATE	0.35 gal
silver stain developer	0.51 lbs
SILVER STAIN PLUS	0.35 gal
SILVER STAIN SILVER REAGENT CONCENTRATE	0.51 gal
SILVER SULFATE	0.05 lbs
SILVER(II) OXIDE	0.13 lbs
SIMMONS CITRATE AGAR	0.25 lbs
skim milk	13.01 lbs
SNYDER TEST AGAR	1 lbs

SOC	0.01 lbs
SODA LIME	2.2 lbs
SODIUM	1.35 lbs
sodium 2,6-dichlorophenolindophenol	0.26 lbs
SODIUM ACETATE	121.43 lbs
SODIUM ACETATE ANHYDROUS	10.9 lbs
SODIUM ACETATE TRIHYDRATE	12.12 lbs
SODIUM AMIDE, 95%	0.09 lbs
SODIUM AMMONIUM PHOSPHATE	7.5 lbs
SODIUM ARSENATE	3.44 lbs
SODIUM ARSENITE	3.22 lbs
SODIUM AZIDE	16.01 lbs
SODIUM BENZOATE	2 lbs
Sodium bicarbonate	20.93 gal
SODIUM BISULFATE	2.22 lbs
SODIUM BISULFITE	13.16 lbs
sodium borate	5.67 gal
SODIUM BOROHYDRIDE	1.85 lbs
SODIUM BOROHYDRIDE POWDER 98+%	0.05 lbs
SODIUM BOROHYDRIDE, 99%, POWDER	0.22 lbs
SODIUM BROMIDE	21.09 lbs
sodium butyrate	0.22 lbs
SODIUM CACODYLATE	0.19 gal
SODIUM CARBONATE	104.81 lbs
SODIUM CARBONATE ANHYDROUS	9.7 lbs
SODIUM CARBONATE MONOHYDRATE	1 lbs
SODIUM CASEINATE	0.44 lbs
SODIUM CHLORATE	7.21 lbs
SODIUM CHLORIDE	646.15 lbs
SODIUM CHROMATE	2 lbs
SODIUM CITRATE	252.15 lbs
SODIUM CITRATE DIHYDRATE	16.53 lbs
SODIUM CYANATE, 85%, REMAINDER SODIUM CARBONATE	1 lbs
SODIUM CYANIDE	2.23 lbs
SODIUM CYANOBOROHYDRIDE	0.03 lbs
SODIUM D,L-LACTATE,60 WT% SOLUTION IN WATER	0.26 gal
SODIUM DEOXYCHOLATE	0.22 lbs
SODIUM DESOXYCHOLATE	0.44 lbs
SODIUM DEUTEROXIDE	0.22 lbs
SODIUM DIATRIZOATE	0.22 lbs
SODIUM DICHROMATE	14.84 lbs
SODIUM DIETHYLDITHIOCARBAMATE	3.38 lbs
SODIUM DIHYDROGEN PHOSPHATE	2.2 lbs
SODIUM DISULFITE	2.2 lbs
SODIUM DITHIONITE	4.44 lbs
SODIUM DODECYL SULFATE	36.39 lbs
SODIUM FLUORIDE	14.92 lbs
SODIUM FORMATE	2 lbs
SODIUM HYDROGEN CARBONATE	1.1 lbs
SODIUM HYDROGEN PHOSPHATE	2.2 lbs
SODIUM HYDROGEN SULFITE	0.55 lbs
SODIUM HYDROSULFATE	1.1 lbs
SODIUM HYDROSULFITE	8.06 lbs
SODIUM HYDROXIDE	21.17 gal
SODIUM IODIDE	1.52 gal
SODIUM LACTATE	0.13 gal
SODIUM L-ASCORBATE	0.27 lbs
sodium lauroyl sarcosine	2.2 lbs
SODIUM LAURYL SULFATE	17.63 lbs
SODIUM M-ARSENITE	0.44 lbs
SODIUM META-ARSENITE	0.28 lbs
SODIUM METABISULFITE	10.6 lbs
SODIUM META-SILICATE	1.65 lbs
SODIUM METAVANADATE	0.56 lbs
SODIUM MOLYBDATE	8.39 lbs
SODIUM MOLYBDATE DIHYDRATE	1.1 lbs
SODIUM M-PERIODATE	1.22 lbs
sodium n -dodecyl sulfate	1.1 lbs

SODIUM NITRATE	21.87 lbs
SODIUM NITRITE	14.25 lbs
SODIUM NITROFERRICYANIDE	0.25 lbs
SODIUM NITROPRUSSIDE	0.27 lbs
SODIUM N-LAUROYL-SARCOSINE	0.26 gal
SODIUM ORTHOVANADATE	0.62 lbs
SODIUM OXALATE	5.2 lbs
SODIUM PERBORATE MONOHYDRATE	1 lbs
SODIUM PERCHLORATE	3.96 lbs
SODIUM PERCHLORATE MONOHYDRATE	0.22 lbs
SODIUM PERIODATE, 99%	1.06 lbs
SODIUM PERIODATE, META	0.11 lbs
SODIUM PERIODATE, REAGENT ACS	0.05 lbs
SODIUM PHOSPHATE	33.81 gal
SODIUM PHOSPHATE (MONOBASIC)	45.51 lbs
SODIUM PHOSPHATE (TRIBASIC)	1.1 lbs
SODIUM PHOSPHATE DIBASIC	8.26 lbs
SODIUM PHOSPHATE DIBASIC ANHYDROUS	19.11 lbs
SODIUM PHOSPHATE DIBASIC HEPTAHYDRATE	12.7 lbs
SODIUM PHOSPHATE MONOBASIC ANHYDROUS COLORLESS TO WHITE	1.1 lbs
SODIUM PHOSPHATE MONOBASIC MONOHYDRATE	1.1 lbs
SODIUM PHOSPHATE TRIBASIC	1 lbs
SODIUM PHOSPHATE TRIBASIC	10 lbs
SODIUM POLYPECTATE	2.2 lbs
SODIUM POTASSIUM TARTRATE	5.76 lbs
SODIUM PYROPHOSPHATE	28.18 lbs
SODIUM PYROPHOSPHATE, DECAHYDRATE	2.43 lbs
SODIUM PYRUVATE	0.58 gal
SODIUM SALICYLATE	8.26 lbs
SODIUM SALT	2.34 lbs
SODIUM SELENITE	0.18 lbs
SODIUM SILICATE	1.5 lbs
SODIUM SUCCINATE HEXAHYDRATE	4.3 lbs
SODIUM SULFATE	68.54 lbs
SODIUM SULFATE (ANHYDROUS)	8.4 lbs
SODIUM SULFIDE NONAHYDRATE	3.31 lbs
SODIUM SULFITE	38.26 lbs
SODIUM SULFITE ANHYDROUS	2.1 lbs
SODIUM TARTRATE	6.58 lbs
SODIUM TAUROCHOLATE	0.25 lbs
SODIUM TETRAPHENYL BORON	0.07 lbs
SODIUM TETRATHIONATE	0.05 lbs
SODIUM THIOCYANATE	2.97 lbs
SODIUM THIOGLYCOLATE	0.05 lbs
SODIUM THIOSULFATE	5.31 gal
SODIUM THIOSULFATE PENTAHYDRATE	2.21 lbs
SODIUM TUNGSTATE	1.25 lbs
SODIUM VANADATE	0.55 lbs
SODIUM, REFERENCE STANDARD SOLUTION 1000PPM +-1%	0.01 lbs
SOLUBLE STARCH	4.45 lbs
SOLUTION B	0.02 gal
SOLV-ALL	0.06 gal
SOLVENT BLUE 37	0.02 lbs
SOLVENT BLUE 38	0.22 lbs
SORBIC ACID	6.94 lbs
SORBITOL	24.45 lbs
SOYTONE PEPTONE	3.3 lbs
SPECTINOMYCIN	0.07 lbs
SPERMIDINE PHOSPHATE	0.17 lbs
SPERMIDINE TRIHYDROCHLORIDE, 99+%	0.09 lbs
SPERMIDINE, TRIHYDROCHLORIDE	0.04 lbs
SPERMINE, 97% .	0.1 lbs
SPHERO HYDROXYLAPATITE	0.44 lbs
SPILL-X-S	15 lbs
SPRAY DISINFECTANT	1 gal
STABLE PEROXIDE SOLUTION	0.07 gal
STAIN SEAL	0.01 lbs
stainer a, collodial blue	0.01 lbs

STAINS-ALL	1 lbs
STANNIC CHLORIDE	0.5 lbs
STANNOUS CHLORIDE	2.02 lbs
STARCH	4.65 lbs
STARCH (SOLUBLE), REAGENT ACS	1.21 lbs
STARCH SOLUBLE	223.92 lbs
STEARIC ACID	0.06 lbs
STIGMASTEROL	0.01 lbs
STREPTOMYCIN	0.09 lbs
STREPTOMYCIN SULFATE	2.8 lbs
STRONTIUM CARBONATE	0.25 lbs
STRONTIUM CHLORIDE	3.57 lbs
STRONTIUM CHLORIDE HEXAHYDRATE	0.44 lbs
STYRENE	0.05 lbs
SUBERIC ACID 99%	0.01 lbs
SUCCINAMIDE 98%	0.01 lbs
SUCCINAT	0.11 lbs
SUCCINIC ACID	26.55 lbs
SUCCINIC ACID, DISODIUM SALT	0.05 lbs
SUCCINIC ANHYDRIDE	2.42 lbs
SUCCINIMIDE	1.1 lbs
SUCCINYL CHLORIDE, CA 95 %	0.05 lbs
SUCROSE	854.25 lbs
SUDAN BLACK	0.05 lbs
SUDAN BLACK B	0.28 lbs
SUDAN III	0.02 lbs
SUDAN IV	0.13 lbs
SULFAMETHOXAZOLE	0.05 lbs
SULFAMIC ACID	3.64 lbs
SULFANILAMIDE	2.42 lbs
SULFANILAMIDE, 98%	0.02 lbs
SULFANILIC ACID	3.79 lbs
SULFATHIAZOLE	2.23 lbs
SULFONIC ACID	0.47 lbs
SULFOSALICYLIC ACID	1 lbs
SULFUR	2.2 lbs
SULFUR (PRECIPITATED)	1.22 lbs
SULFUR SUBLIMED	1 lbs
SULFURIC ACID	35.63 gal
SULFURYL CHLORIDE	0.05 lbs
SYRINGIC ACID, 97%	0.02 lbs
TALC	2 lbs
TALCUM	1 lbs
T-AMYL ALCOHOL	0.33 gal
TANNIC ACID	3.42 lbs
taps	0.88 lbs
TARTRAZINE	0.22 lbs
TAURINE	5.9 lbs
TAUROCHLOLCI ACID	0.44 lbs
TAUROCHOLIC ACID SODIUM SALT	0.05 lbs
TBQ GERMICIDAL DETERGENT	1 gal
T-BUTYL HYDROPEROXIDE	0.22 lbs
TE BUFFER	0.05 gal
TELLURIUM	1.1 lbs
TEMED	0.8 gal
TEMPO 20% WETTABLE POWDER	0.01 lbs
TEREPHTHALIC ACID	0.22 lbs
TEREPHTHALOYL CHLORIDE, 97%	0.01 lbs
TERGITOL 7	0.03 gal
TERGITOL NP-10	0.08 gal
TERPINEOL	0.44 lbs
TERPINOLENE	0.02 lbs
terrific broth II	1 lbs
TERT.-BUTYLACETIC ACID, 98%	0.05 lbs
TERT-AMYL ALCOHOL	1.85 gal
TERT-BUTYL ACETOACETATE	0.03 gal
TERT-BUTYL ALCOHOL	1.95 gal
TERT-BUTYL ISOCYANATE	0.05 lbs

TERT-BUTYL METHYL ETHER	2.38 gal
TERT-BUTYLAMINE	0.26 gal
TERT-BUTYLHYDROQUINONE, 97%	0.22 lbs
TES	9.8 lbs
TESTOSTERONE	0.04 lbs
TETRA ACETIC ACID	2.2 lbs
TETRABUTYLAMMONIUM BOROHYDRIDE, 98%	0.05 lbs
TETRABUTYLAMMONIUM CHLORIDE	0.11 lbs
TETRABUTYLAMMONIUM DIHYDROGEN PHOSPHATE	0.03 gal
TETRABUTYLAMMONIUM HYDROGEN SULFATE	0.1 lbs
TETRACHLOROCATECHOL	0.33 lbs
TETRACHLOROETHYLENE	1.06 gal
TETRACHLORO-P-BENZOQUINONE, 99%	0.12 lbs
TETRACYCLINE (INTERNAL USE)	0.43 lbs
TETRACYCLINE HYDROCHLORIDE	1.23 lbs
TETRADECYL ALDEHYDE	0.05 lbs
TETRAETHYLAMMONIUM CHLORIDE	1.21 lbs
TETRAETHYLAMMONIUM HYDROXIDE	0.34 gal
TETRAHYDROFURAN	0.88 gal
TETRAMETHYL AMMONIUM BROMIDE	0.22 lbs
TETRAMETHYL AMMONIUM CHLORIDE	6.72 lbs
TETRAMETHYLAMMONIUM HYDROXIDE	0.05 lbs
TETRAMETHYLAMMONIUM HYDROXIDE PENTAHYDRATE	0.11 lbs
TETRAMETHYLENE TETRAMIDE	0.22 lbs
TETRAMETHYLENEDIAMINE	0.03 gal
TETRAMETHYLTHIURAM DISULFIDE 97%	1.1 lbs
TETRA-N-BUTYLAMMONIUM BROMIDE	0.02 lbs
TETRAZOLIUM RED	0.04 lbs
THALLIC NITRATE	0.05 lbs
THALLIUM (III) OXIDE	0.02 lbs
THALLIUM ACETATE	0.08 lbs
THALLIUM NITRATE	0.05 lbs
THAM	2.46 gal
THEOPHYLLINE	1.54 lbs
THIAMINE	0.07 lbs
THIAMINE HYDROCHLORIDE	33.52 gal
THIANAPHTHENE, 97%	0.05 lbs
THIMEROSAL	0.34 lbs
THIOACETAMIDE	0.22 lbs
THIOACETIC ACID	1.32 lbs
THIOCARBOHYDRAZIDE	0.02 lbs
THIODIGLYCOL	0.22 lbs
THIOGLYCOLATE MEDIUM	4.4 lbs
THIOGLYCOLIC ACID	1.7 gal
THIONIN	0.11 lbs
THIOPHENOL, 97%	0.03 gal
THIORIDAZINE	0.01 lbs
THIOSEMICARBAZIDE	0.22 lbs
THIOUREA	9.21 lbs
THREONINE	0.01 lbs
THROMBIN	0.01 lbs
THYMIDINE	0.2 lbs
THYMINE	0.11 lbs
THYMOL	1.5 lbs
THYMOL BLUE	0.04 lbs
THYMOLPHTHALEIN MONOPHOSPHORIC ACID, DISODIUM SALT	0.01 lbs
TIN (IV) CHLORIDE	0.01 lbs
TINCTURE MERTHIOLATE (THIMEROSAL)	0.06 lbs
TISSUE BUILDER	0.25 gal
TISSUE SOLUBILIZER	0.46 gal
TISSUE TEK II O.C.T. COMPOUND	0.12 gal
tmb peroxide	0.08 gal
TOLBUTAMIDE	0.05 lbs
TOLUENE	29.21 gal
TOLUENE SULFONIC ACID (LIQUID/SOLID)	0.11 lbs
TOLUIDINE BLUE O	1.06 lbs
TOLUIDINE BLUE O C	0.05 lbs
TRACEABLE CONDUCTIVITY CALIBRATION STANDARD	0.05 lbs

TRANS-1,2-DIAMINOCYCLOHEXANE	0.22 lbs
TRANS-1,2-DIAMINOCYCLOHEXANEN,N,N',N'-TETRAACETIC ACID	0.22 lbs
TRANS-4-PHENYL-BUTEN-2-ONE, 99%	0.11 lbs
TRANS-ANETHOLE	0.01 lbs
TRANS-CINNAMIC ACID	1.21 lbs
TRANS-STILBENE, 96%	0.1 lbs
TRAS-1,2-DIMETHYLCYCLOHEXANE	0.03 gal
TRIBUTYLAMINE	1.1 lbs
TRIBUTYLTIN ACETATE	0.11 lbs
TRIBUTYLTIN CHLORIDE	0.44 lbs
TRIBUTYRIN, 98%	0.14 gal
TRICHLOROACETATE	1.1 lbs
TRICHLOROACETIC ACID	12.36 gal
TRICHLOROETHANE	0.22 lbs
TRICHLOROETHYLENE	0.13 gal
TRICINE	18.41 lbs
TRICINE BUFFER	0.22 lbs
TRIDECANE	0.05 lbs
TRIETHANOLAMINE	2.62 gal
TRIETHANOLAMINE HYDROCHLORIDE	2.97 lbs
TRIETHYLAMINE	1.28 gal
TRIETHYLAMINE ACETATE	0.05 gal
TRIETHYLAMINE HYDROCHLORIDE, 99+%	2.2 lbs
TRIETHYLAMMONIUM BICARBONATE BUFFER	0.03 gal
TRIETHYLENETETRAMINE	0.05 gal
TRIFLUOPERAZINE DIHYDROCHLORIDE	0.01 lbs
Trifluoroacetic acid	0.69 gal
TRIFLUOROACETIC ANHYDRIDE	0.11 lbs
TRIFLUOROMETHANE SULFONIC ACID, FREE ACID	0.02 lbs
TRIFLUOROMETHANESULFONIC ACID, 99%	0.11 lbs
TRIISOPROPYLNAPHTHALENESULFONIC ACID SODIUM SALT (PRACT), 90% (UV-VIS)	0.05 lbs
TRIISOPROPYLSILANE, 99%	0.02 lbs
TRIKETOHYDRINDENE HYDRATE	0.02 lbs
TRIMETHYL ORTHOFORMATE, 99%	0.55 lbs
TRIMETHYL PHOSPHATE	0.26 gal
TRIMETHYLAMINE	2.06 gal
TRIMETHYLAMINE HYDROCHLORIDE, 98%	0.05 lbs
TRIMETHYLAMINE-N-OXIDE DIHYDRATE	0.05 lbs
TRIMETHYLSILANE	0.05 lbs
TRIPHENYL PHOSPHATE	0.02 lbs
TRIPHENYL PHOSPHITE	0.11 lbs
TRIPHENYLACETIC ACID, 99%	0.01 lbs
TRIPHENYLPHOSPHINE	0.05 lbs
TRIPLE SUGAR IRON AGAR	1 lbs
TRIS	2681.15 gal
tris (1,10-penanthroline)-iron (II) sulfate solution	1.1 lbs
TRIS BUFFER	0.64 gal
TRIS HYDROCHLORIDE	0.32 gal
TRIS HYDROXYMETHYL AMINOMETHANE HYDROCHLORIDE	44.05 lbs
TRIS(HYDROXYMETHYL) AMINOMETHANE	0.22 lbs
TRIS-GLYCINE BUFFER	0.07 gal
TRISHYDROXYMETHYLAMINOMETHANE	2.2 lbs
TRISODIUM CITRATE	4.41 lbs
TRISODIUM PHOSPHATE	2.21 lbs
TRITON X-100	10 gal
TRITON X-114	0.16 gal
TRITON X-405, 70% SOLUTION IN WATER	0.26 gal
TRITONE	0.13 gal
TRIZMA ACETATE	6.44 lbs
TRIZMA BASE	89.19 lbs
TRIZMA CARBONATE	0.55 lbs
TRIZMA HYDROCHLORIDE	6.58 gal
Trizma maleate	0.55 lbs
TRIZOL REAGENT	0.77 gal
TRYPAN BLUE	0.24 gal
TRYPAN BLUE STAIN	0.11 gal
TRYPSIN	0.62 gal
TRYPSIN INHIBITOR	0.03 gal

TRYPSIN-EDTA	0.32 gal
TRYPSIN-EDTA SOLUTION	0.05 gal
TRYPSINOGEN	882.5 ft3
TRYPTAMINE	0.01 lbs
TRYPTIC SOY AGAR	1 lbs
TRYPTIC SOY BROTH	1.9 lbs
TRYPTICASE PEPTONE	1.1 lbs
TRYPTICASE SOY BROTH	1.1 lbs
TRYPTONE	7.19 gal
TRYPTONE PEPTONE	3.3 lbs
TRYPTOPHAN	0.28 lbs
TRYPTOPHOL, 97%	0.01 lbs
tryptose	2.35 lbs
TRYPTOSE PHOSPHATE BROTH	2 lbs
TUNGSTEN POWDER	0.66 lbs
TUNGSTIC ACID, 99+%	0.26 lbs
TWEEN	0.03 gal
TWEEN 20	1.89 gal
TWEEN 20 (POLYOXYETHYLENE SORBITAN)	0.13 gal
tween 21	0.26 gal
TWEEN 40	0.26 gal
TWEEN 60	0.05 gal
TWEEN 80	0.82 gal
TWEEN 85	0.03 gal
TYRAMINE	0.07 lbs
ULTRASONIC CLEANING SOLUTION	0.26 gal
UMBELLIFERONE	0.04 lbs
UNDECYLENIC ALDEHYDE, 97%	0.22 lbs
universol	0.26 gal
UNSYM-DIMETHYLHYDRAZINE	0.22 lbs
URACIL	2.15 lbs
URANINE CONCENTRATED, WATER SOLUBLE	0.22 lbs
URANIUM OXYACETATE	0.05 lbs
URANYL ACETATE	0.98 lbs
UREA	183.38 gal
UREA BROTH	2.1 lbs
URETHANE	0.44 lbs
URIC ACID	7.07 lbs
URIDINE	0.16 lbs
VACUM PUMP FLUID	3.17 gal
VACUUM PUMP OIL	5.54 gal
VALERAMIDE	0.05 lbs
VALERIC ACID	0.1 lbs
VALEROPHENONE, 98%	0.02 lbs
VANADIUM (III) ACTEYL ACETONATE	1.1 lbs
VANADIUM (V) OXIDE	0.55 lbs
VANCOMYCIN HYDROCHLORIDE	0.06 lbs
VANILLIC ACID	0.03 lbs
VANILLIN	0.46 lbs
VASELINE PETROLEUM JELLY	0.16 lbs
VICTORIA BLUE R	0.05 lbs
VINEGAR	0.45 gal
VINYL CYCLOHEXENE DIOXIDE	0.55 lbs
VITAMIN A	2.86 lbs
vitamin assay	2 lbs
VITAMIN B-12	0.02 lbs
VITAMIN C	0.11 lbs
VITAMIN MIXTURE	0.09 gal
WATER	24.55 gal
WATER FOR HPLC	0.13 gal
WD-40 AEROSOL OR SPRAY CANS	5.17 lbs
WET OR DRY PLASTIC CEMENT	0.22 lbs
WRIGHT STAIN	0.58 gal
XANTHENE	0.02 lbs
XANTHINE, 98%	0.04 lbs
X-CELL 401 MEDIUM	0.13 gal
XYLENE	2.39 gal
XYLENE CYANOL FF, 85% (UV-VIS)	1.25 lbs

XYLENE CYANOLE FF	0.91 lbs
XYLENES	18.42 gal
XYLITOL	0.22 lbs
XYLOSE	0.66 lbs
YEAST EXTRACT	11.72 gal
YEAST HYDROLYSATE ENZYMATIC	5.04 lbs
yeast nitrogen base	13.33 lbs
YEAST OLATE	0.46 lbs
Y-GLOBULINS	0.01 lbs
ZEPHIRAN CHLORIDE	0.03 gal
ZINC	0.37 gal
ZINC ACETATE	5.2 lbs
ZINC CARBONATE	1.1 lbs
ZINC CHLORIDE	20.54 lbs
ZINC CITRATE	0.55 lbs
ZINC DUST - ZINCGUARD #3 & 4 DUST COMPONENT	0.22 lbs
ZINC FORMATE	0.55 lbs
ZINC GLUCONATE	0.22 lbs
ZINC IODIDE, 98+%	0.22 lbs
ZINC L-LACTATE HYDRATE	0.05 lbs
ZINC METAL	2.25 lbs
ZINC NITRATE	1.1 lbs
ZINC OXALATE	0.05 lbs
ZINC OXIDE	1.1 lbs
ZINC SALICYLATE	1 lbs
ZINC SULFATE	4.02 gal
ZINC SULFATE HEPTAHYDRATE	0.22 lbs
ZINCON	0.01 lbs
ZWITTERGENT 3-14	0.02 lbs