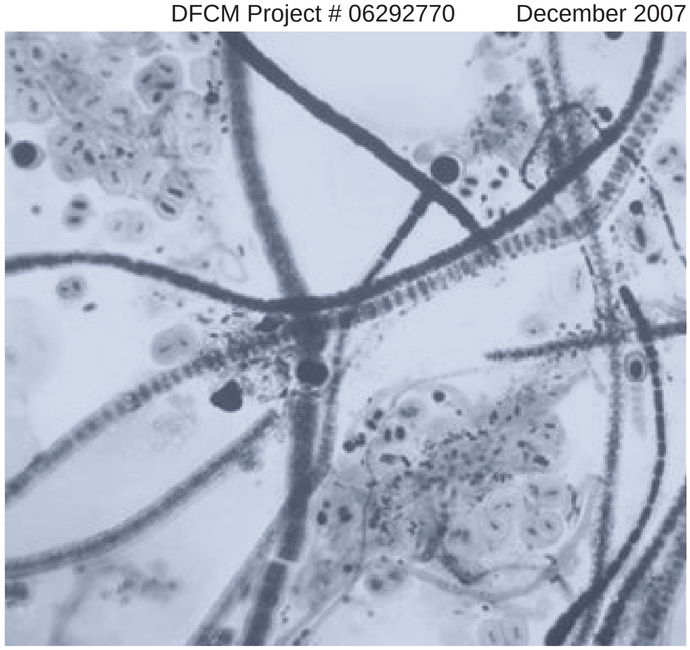
USTAR program document

DFCM Project # 06292770 December 2007



UTAH STATE UNIVERSITY
INNOVATION CAMPUS

ajc architects

PAYETTE

Program Document

USU USTAR BUILDING
Utah State University
Innovation Campus
Logan, Utah
DFCM Project # 06292770

Utah State University
Review Signatures

We have reviewed the program and warrant that it adequately represents our requests for a facility to fulfill our mission and programmatic needs. All appropriate parties in the agency have reviewed it for completeness and accuracy.

Stan L. Albrecht
President, Utah State University

Raymond T. Coward
Executive Vice President & Provost

Brent C. Miller
USU Vice President for Research

Jeff R. Broadbent
USU Associate Vice President for Research

Ned M. Weinshenker Ph.D.
Vice President for Strategic Ventures & Economic Development

Program Document

USU USTAR BUILDING
Utah State University
Innovation Campus
Logan, Utah
DFCM Project # 06292770

USTAR
Division of Facilities Construction and Management, State of Utah
Review Signatures

We have reviewed the program, jointly prepared with the agency, for completeness and accuracy. These signatures do not necessarily represent an endorsement for the need of this requested space at this time.

Ted McAleer
Executive Director, USTAR Governing Authority

Dave McKay
Program Director, DFCM

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The following is a list of individuals and groups represented during the programming process.

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Ned M. Weinshenker Ph.D. Vice President for Strategic Ventures & Economic Development
Jeff R. Broadbent, USU Associate Vice President for Research
Brett Fritz, Senior Commercialization Associates
Steve Reed, Utah Technology Council

Vision Committee
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Dr. Lisa Berreau, Assoc. Dean, College of Science
Dr. Ken White, Professor, College of Agriculture Representative
Dr. Don Sinex, Professor, College of Education Representative
Dr. Bart Weimer, Director, Center for Integrated Biosystems

Steering Committee
Dr. David York, Center for Advanced Nutrition
Dr. Tim Gilbertson, Center for Advanced Nutrition
Dr. Mike Lefevre, Center for Advanced Nutrition
Dr. John Morrey, Institute for Antiviral Research
Dr. Dale Barnard, Institute for Antiviral Research
Dr. Lance Seefeldt, Biofuels and Bioremediation
Dr. Ron Sims, Biofuels and Bioremediation
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Dr. Gail Bingham, DEST 620
Aaron Olsen, Director, Laboratory Animal Research Center
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Ron Munger, Director, Center for Epidemiologic Studies
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01

executive summary

executive summary

In order to solidify Utah's role in world-wide high-tech economic growth, the State Legislature introduced the **Utah Science, Technology, and Research Economic Development Initiative (USTAR).** USTAR aims to expand the State's high-tech industry through an increase in its universities' research capacity. USTAR includes two key areas of development: programmatic investment in research; and new facilities.

USTAR Development at Utah State University

Utah State University (USU) has an extensive history of successful research in the natural sciences, attracting more than $168 million in contracts and grants in 2004. USU is among the top 25 most innovative colleges in the nation. USU's recent success in hiring promising researchers and research teams that accent the University's strengths, and meet USTAR criteria, is evidence that USU is striving toward the Legislature's goals. Furthermore, USU is equipped with a powerful research infrastructure, including a Microscopy Facility, a Nuclear Magnetic Resonance Facility, and the Center for Integrated Biosystems, a multi-faceted core facility which currently serves University investigators as well as off-campus academic and industrial collaborators. Yet previous investigations conducted by USU have concluded that many of the existing research laboratory facilities on USU's main campus are at capacity, or are obsolete. It is clear that more state-of-the-art research laboratory space will be required to fully implement the USTAR initiative, accommodate additional research teams, and expand USU's research capacity.

In January 2007, the State Legislature earmarked $60 million (total project costs) for the initial USTAR facility development at USU. The USTAR Governing Board and the Executive Appropriations Committee of the Legislature have accepted the donation of Building 620, a recently constructed lab facility on USU's Innovation Campus, as an in-kind equivalent to the $10 million match as required under S.B. 75.

In March 2007, DFCM commenced the programming phase for the proposed USTAR development at USU. ajc architects and Payette were contracted to lead the Programming Team in a visioning and programming effort. ajc and Payette were tasked to: organize committees and define their responsibilities; assist in defining USU's long-range strategic research plan with respect to USTAR; refine the vision for new USTAR facilities; interview potential users; summarize program spaces and document their related requirements and adjacencies; analyze the proposed site and investigate possible site options; provide a preliminary cost estimate; provide costs for comparable projects; and make recommendations for the proposed development.

Early in the programming process, the Programming Team established criteria and recommendations for sciences and engineering research at USU, with focus on USTAR funded programs. These criteria and recommendations were based on data from USU existing conditions and future outlook, forecasting on state and national funding, and benchmarking of peer and target institutions. The USTAR Building Visioning Report, generated by ajc architects and Payette, documents these criteria and recommendations (see Section 6, Appendix A).

Vision & Principles

Over the course of several visioning meetings, interviews, and case studies, the Core Committee and Vision Committee identified the following project objectives:

- **Research programs in the USTAR Building will...**
  - ...Promote interdisciplinary research and support collaboration between research and industry.
  - ...Lead to commercial applications and economic development opportunities.
  - ...Accent the strengths of Utah State University and the Governor's Office of Economic Development clusters.

- **The USTAR Building will...**
  - ...Support the development of technology transfer oriented research at USU, by providing state-of-the-art labs and equipment, high level security and protocol for equipment and ideas, technology and commercialization outreach, and strategic planning/meeting rooms.
  - ...Increase links between the Main Campus and the Innovation Campus.
  - ...Seek efficiencies and avoid redundancies with existing core facilities.

- **The architecture of the USTAR Building will...**
  - ...Express the state-of-the-art research it houses.
  - ...Embody environmentally friendly design by embracing the USTAR Governing Board's mandate to aim for USGBC LEED Gold level of certification.

Guided by these objectives, the Programming Team evaluated a series of program scenarios to determine the short-term/long-term benefits to USU. It was determined that a preferred option would: 1. Immediately accommodate existing USTAR research programs, and address the needs of new USTAR research programs already at USU; 2. Provide maximum flexibility for the foreseeable future of USTAR research program growth at USU; 3. Group research program types with the greatest likelihood of interdisciplinary collaboration; 4. Provide a core facility that would facilitate the research of the USTAR researchers and simultaneously link USU Main Campus researchers. Each option included cost-to-total square-foot ratios, depending on the differences in the space types required, and alternative uses of Building 620 (see Section 6, Appendix C). Based on this exercise, it was determined that a new laboratory building devoted primarily to life-sciences oriented research will provide the University with the maximum value.

The preferred program scenario will provide the University with a new 100,648 Gross-Square-Foot (GSF) research facility. The program includes wet-labs and related non wet-lab support and office spaces. A Vivarium will expand the University's total Vivarium capacity, and will serve as the core facility in the proposed building. A biocontainment area with ABSL 3 and ABSL 3+ suites (with Select Agents) will share support spaces with, and be adjacent to, the Vivarium. Formal meeting rooms, informal gathering spaces, along with general building support spaces, will provide the balance of the program.

USTAR Building Program Summary (See Section 4 for detailed building requirements)

Generic Life Sciences*		
(offices, labs and support spaces)	22,805 NASF /	38,008 GSF
Biocontainment Research**		
(offices, ABSL suites, and support)	3,545 NASF /	14,180 GSF
Vivarium***		
(offices, holding rooms, and support; including surgery rooms and cage wash)		
	17,244 NASF /	34,488 GSF
Shared Building Support****	9,780 NASF /	13,971 GSF
TOTAL NEW	**53,374 NASF /**	**100,648 GSF**

GSF numbers listed above are based on efficiency factors as indicated:
*60% **25% ***50% ****70% (average = 53%)

The proposed facility, in combination with Building 620 (32,000 GSF), will bring the total USTAR development on USU's Innovation Campus to approximately 132,000 GSF of modern research lab facilities. Future growth has been accommodated within the proposed facility, and additional opportunities for future USTAR building/complex expansion have been identified (see Section 2 for detailed site options).

The proposed facility program will initially foreground the Advanced Nutrition research program, while Building 620 will continue to house USTAR-funded physical science research programs, specifically, the Directed Energy Sensor Technology (DEST, now called CASI) program and the Biofuels program. Funding used to build-out and remodel the existing spaces in Building 620 will come from a separate source (see Section 6, Appendix B for DEST and Biofuels program).

Based on the proposed program requirements, the Programming Team evaluated a series of stacking options and site options (see Section 6, Appendix D and E). The Programming Team selected Site Option 2 as the Preferred Site Option (see Section 2.8). Site Option 2 provides opportunities to link to Building 620, and other USU, government, and private-industry research buildings on Innovation Campus, by placing the main entry and building common space on the west end of the building, on Innovation Campus's Grand Avenue. Site Option 2, oriented along Grand Avenue, provides opportunities to link to Industry and future commercial development as suggested in the Innovation Campus Master Plan. Site Option 2 allows for parking to be located at the center of the block organization, as suggested in the Master Plan.

Scheme 2 was selected as the Preferred Stacking Scheme. Scheme 2 illustrates a 3-story, L-shaped building (see Section 4.2.4). The labs/offices are located in the east-west leg of the "L," providing opportunity for sustainable daylighting practices as well as a physical and visual connections to Grand Avenue. The Vivarium component is located in the north-south leg, with the Biocontainment Research component located on the top level. This scheme follows the Innovation Campus Master Plan guidelines: providing opportunities for connections with proposed pedestrian pathways and green space, moderating building height and mass, and maximizing space for future expansion.

The construction budget for the proposed USTAR Building is $48,000,000 (“hard costs” only). The current construction cost estimate for the proposed USTAR Building program (100,648 GSF) is $48,660,441. This estimate affords $453 per square-foot (building only) which is in line with construction costs for comparable wet-lab facilities which are currently averaging around $500 per square foot (escalated to 2009 dollars). In order to align the construction costs within available funds, accurate cost modeling will continue to be required throughout subsequent design phases. During design, with the teaming effort of a CM/GC (construction manager/general contractor), and possible bid packages to curb inflation, it is expected that the Design Team will be able to meet the $48,000,000 budget.

Proposed USTAR Building Construction Cost Summary

Proposed USTAR Building Cost Model Line Items

Structural	$ 6,019,093*
Architectural	$11,524,782*
Mechanical	$10,356,280*
Electrical	$ 3,802,868*
SUBTOTAL (building only)	$31,703,023*
Site Work - Civil/Landscaping	$ 2,088,950*
SUBTOTAL (building & site)	$33,791,973*

*cost before mark-ups: General Conditions (8.0%), Bonding (1.0%), Overhead & Profit (7.0%), and Design Contingency (10.0%) & Inflation to Spring 2009 (18.0%). See Section 5 for mark-up details.

TOTAL CONSTRUCTION COST (including mark-ups) $48,660,441**

**LEED Gold design requirements are included. Project Soft Costs are not included.

See Section 5 of this document for a detailed cost summary (including a list of exclusions, items affecting opinion of probable costs, assumptions, escalation, and contingencies), as well as comparable project cost analysis.

02 site analysis

2.1 site analysis

2.1 site analysis

The Site Analysis component of the Program identifies the affects of the site on the program, project cost and schedule. It also describes the physical characteristics of the proposed site and vicinity. The Site Analysis incorporates maps, photographs, and diagrams, illustrating the location, functional uses adjacent to the site, vehicular and pedestrian circulation, physical boundaries of the site, existing and proposed utilities, as well as local climate considerations. This section concludes with options illustrating potential siting of the building. The Site Analysis information is programmatic and should serve as an outline for a more detailed site analysis to be done in the design phase.

2.1.1 site location

Utah State University is located in Logan, Utah, about 90 miles north of Salt Lake City. Logan lies in Cache Valley, at the foot of the Bear River Range in the Wasatch Mountains. The USTAR Building will be located on Utah State University's research park, Innovation Campus, at the northern edge of the main campus. The proposed site is less than 2 miles from the center of the main campus, where existing research and education lab buildings, campus services, and student housing are located. Campus shuttle service along 800 East connects the two campus centers. Agricultural land is scattered throughout the vicinity. Single-family developments border the north and east edges of Innovation Campus, and a combination of single and multi-family units are on 1400 North, at the southern edge of Innovation Campus. Several retail and industrial businesses form the western edge of Innovation campus. The proposed site is less than one mile east of Main Street (Highway 91), the area's major commercial and institutional artery. The proposed site is two miles from Logan/Cache airport.

The mission of Innovation Campus is to offer its tenants a community where collaboration and alliances among tenants, faculty, students, businesses, industry and government are cultivated. Founded nearly 20 years ago, Innovation Campus hosts USU's Technology Commercialization Office, small and start up companies, and government institutions. Innovation Campus spreads over 170 acres of land area, including 40 acres of agricultural research field. Several research facilities are located at the core of Innovation Campus, including the Space Dynamics Laboratory, the Biomolecular Building, as well as the USU Research Foundation Administrative Offices. Many agricultural research facilities are located at the geographical center of Innovation Campus. In April of 2004, Sasaki and Utah State University completed the Innovation Campus Master Plan, which established guidelines for a high-density, mixed-use walkable community with sustainable land development principles.

The proposed site is located near the southwestern corner of Innovation Campus, and is currently bounded by the Biomolecular Building 620 to the north, agricultural structures and fields to the east and south, and by 600 East Street on the west. Two agricultural structures currently exist on the site, which will be removed or relocated as site development expands in the future. An existing dirt road divides the parcel. The Master Plan, which continues the grid of the existing urban fabric, proposes additional boundaries to be considered: intermediate streets 1550 North and 1500 North (on the south side of the proposed site), and a north/south pedestrian alley in the middle of the site, running north/south.

2.1.2 site summary

The site is relatively flat terrain, with an average slope of less than 2%, from 4,590 feet elevation on the southeast corner, to 4,580 feet elevation on the northwest corner. Average high temperature in the summer is 87°F while average low temperature in the winter is 16°F. Summertime daylight is long and covers a wide range of angles from sunrise to sunset. Wintertime daylight is relatively short, and covers a narrower range of angles. Monthly average precipitation is between 0.5 and 2 inches, with 18 inches total average annual rainfall, and 32 inches of average annual snowfall. No major water bodies exist on the immediate site; however, a water feature (designed by Sasaki) runs the length of Grand Avenue (1600 North) to a pond at the core of the development. Prevailing wind at the site comes from the southwest. The site offers an excellent view of the Bear River Range toward the east, as well as the backside of the Wasatch Front in the distance to the west.

As the proposed site has an extensive agricultural history (the longest running soil irrigation records in America), native vegetation is virtually non-existent. No major trees are on the site. Alien weeds cover the ground where agricultural vehicles and farm animals are not permitted. However, small deciduous trees rhythmically line 600 East. Also, the Master Plan calls for Grand Avenue to be lined with trees. The Master Plan generally defines the development of the site's interior open space, including landscaping strategies, and should be consulted during the planning and design phases.

All necessary utilities (natural gas, power, water, storm drains, sewer lines, communication lines, etc.) currently exist in close proximity to the proposed site, and are generally available for connection. The Innovation Campus Master Plan defines proposed utility corridors and should be consulted in subsequent planning and design phases.

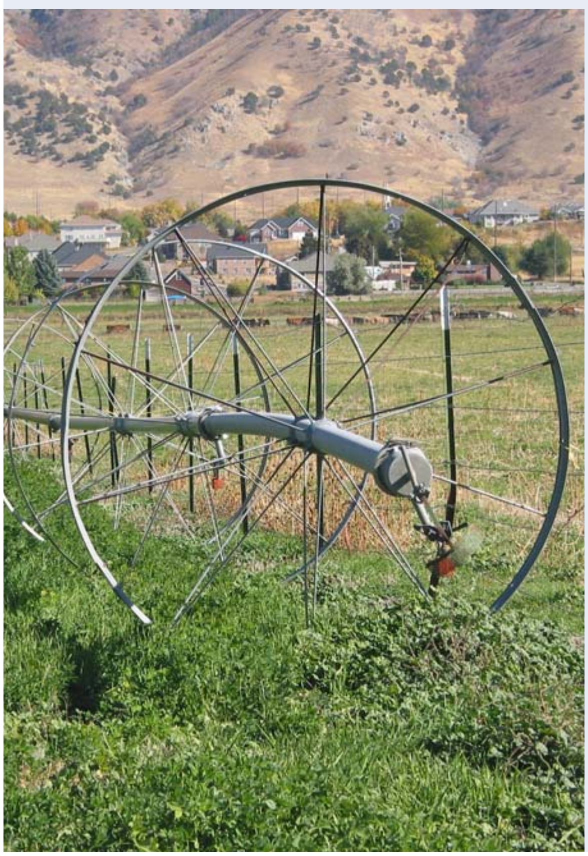
The proposed site is currently accessed from 600 East, but access can also be considered from proposed streets 1550 North and 1500 North (per the Master Plan). The dirt road that is to the south of the proposed site should not be considered as permanent. To adhere to the Master Plan, the building will be located on the perimeter of the site, while parking should be located at the center of the site. Existing bus/campus shuttle service currently provides another transit option for accessing Innovation Campus. The Master Plan suggests enhancing this service, including increased frequency between the main campus and Innovation Campus. A shuttle stop near the USTAR building should be proposed to take advantage of this option. Adhering to the Master Plan guidelines will enhance the walkable community aspect of Innovation Campus.

An ALTA survey, soils analysis and geotechnical report are underway for use during future design phases. The survey documents existing topographic slope and drainage characteristics of the site. The survey will also provide more reliable locations of existing utilities and existing improvements such as fences, ditches, curbs, etc. Related civil and structural calculations and assumptions included in this Program Document are based on a draft of the Soils Report, dated December 3, 2007 (see Appendix H). The finalized soils analysis will be required to guide the Design Team when developing structural options and drainage strategies. The geotechnical report documents seismic characteristics of the site, groundwater presence and depth, and any other subsurface hazards that will need to be considered during the planning and design phases.

Based on the Site Analysis provided in this section, the Programming Team believes that the proposed site can support the 100,648 GSF building, open/green spaces, and required parking. The proposed site provides a very desirable location for the USTAR Building. It has advantageous physical and intellectual connectivity to the University's main campus, the research institutions/services on Innovation Campus, and agricultural farmlands, as well as proximity to the commercial and industrial center of the valley, and various single and multi-family housing options. Accessibility and available utilities further the advantages of the proposed site. Excellent mountain views from the site are an additional asset.

The maps, photographs, and diagrams on the following pages illustrate the information outlined above. The Selected Site Planning Option, at the conclusion of this section, suggests possible siting strategies to maximize daylight, views, vehicular and pedestrian connectivity, and adherence to the Innovation Campus Master Plan.

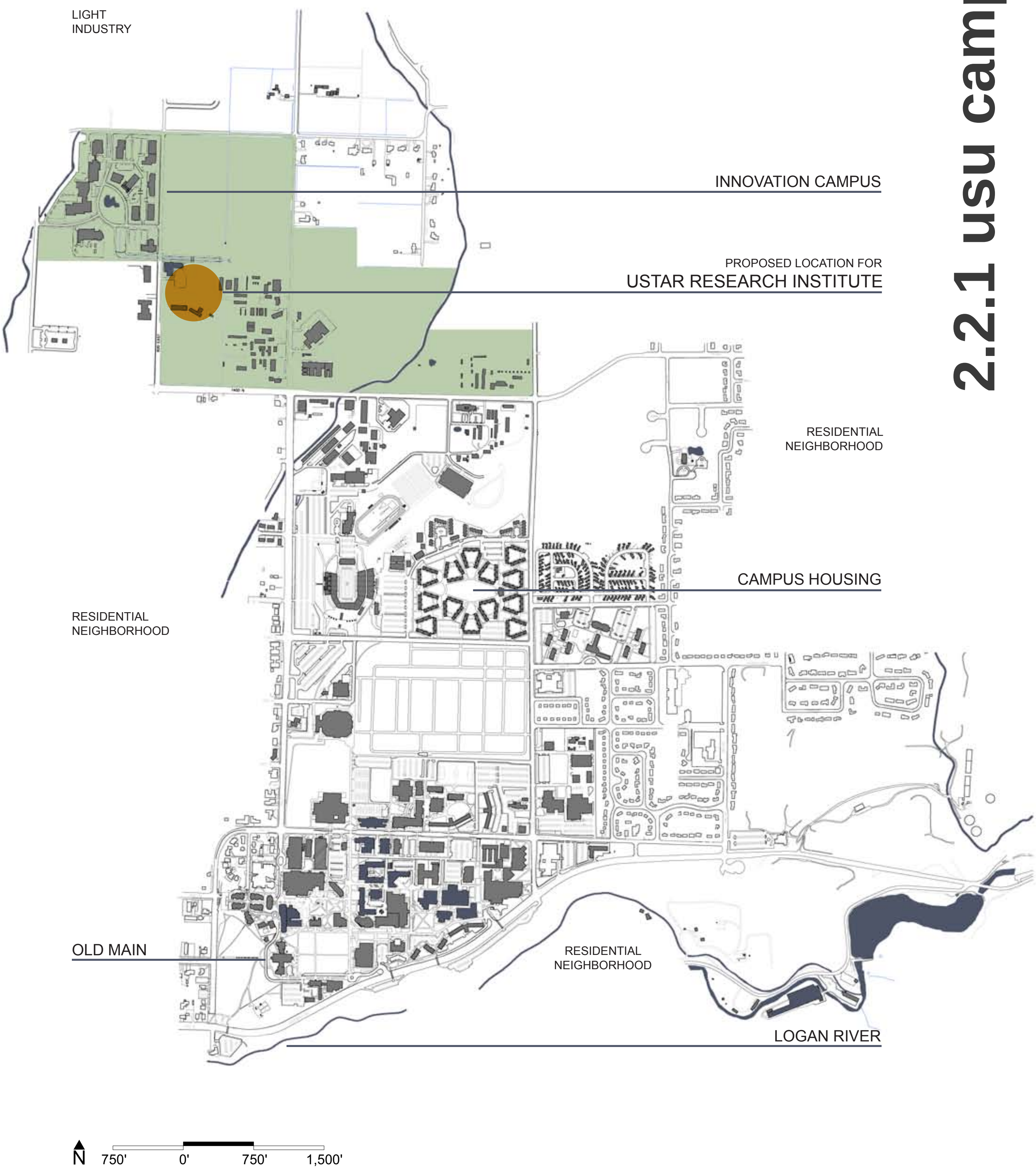
2.1.3 site context



The physical context surrounding the proposed site on Utah State University's Innovation Campus, ranges from large-scale three and four-story academic and institutional buildings, to one and two-story single-family residences, apartments, banks, light industrial and small retail developments. In contrast, and significant to this university with an agricultural legacy, are the vernacular rural and agricultural structures and equipment that undulate on the city's loosely defined edges. These highly functional and minimal forms are typically low and horizontal, semi-open structures that stretch across the landscape. Brick and wood-siding, commonly used materials in academic and residential construction, contrast with concrete, steel, and rusting corrugated metal siding of the agricultural structure.

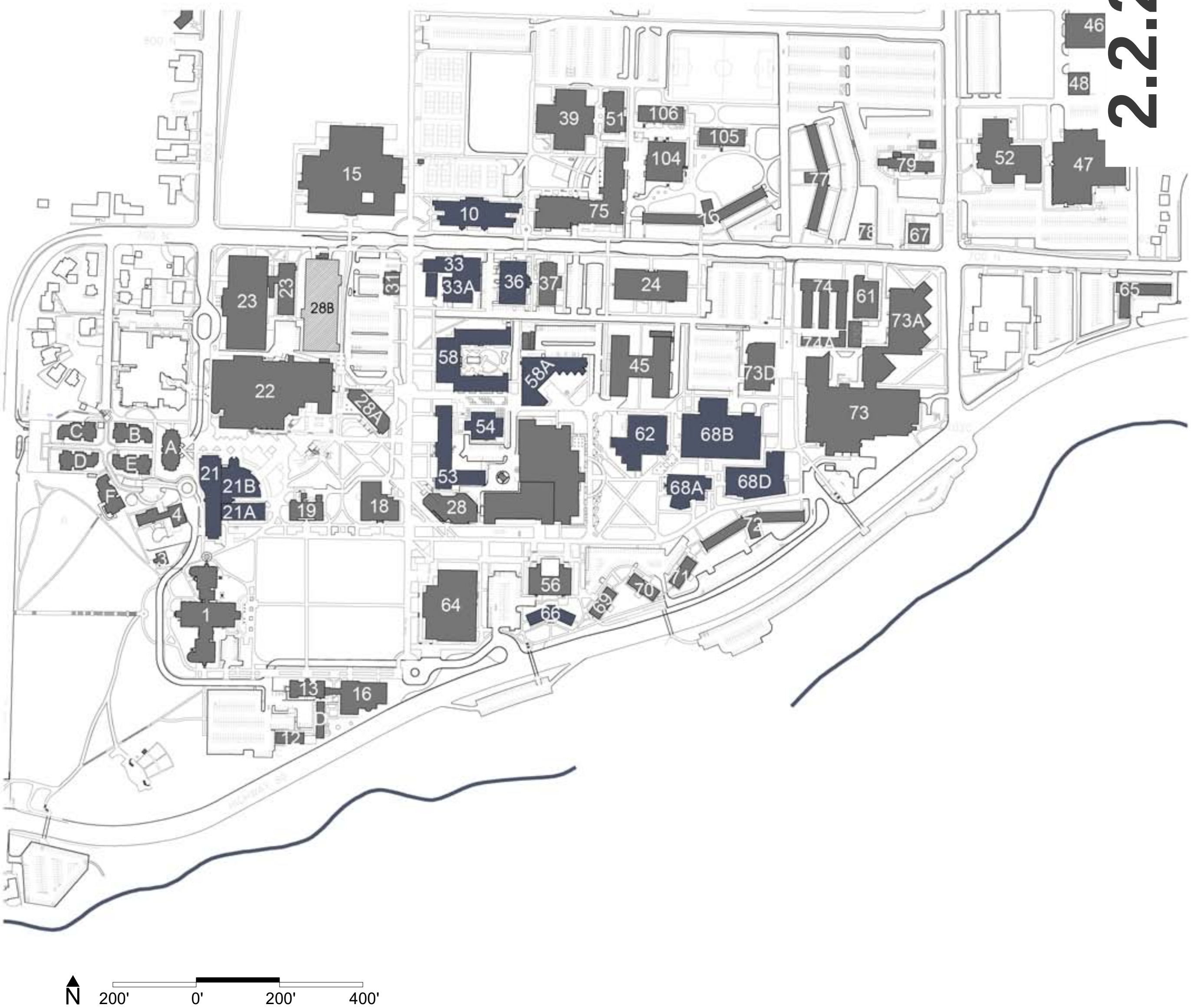
2.2 maps

2.2.1 usu campus



2.2.2 main campus

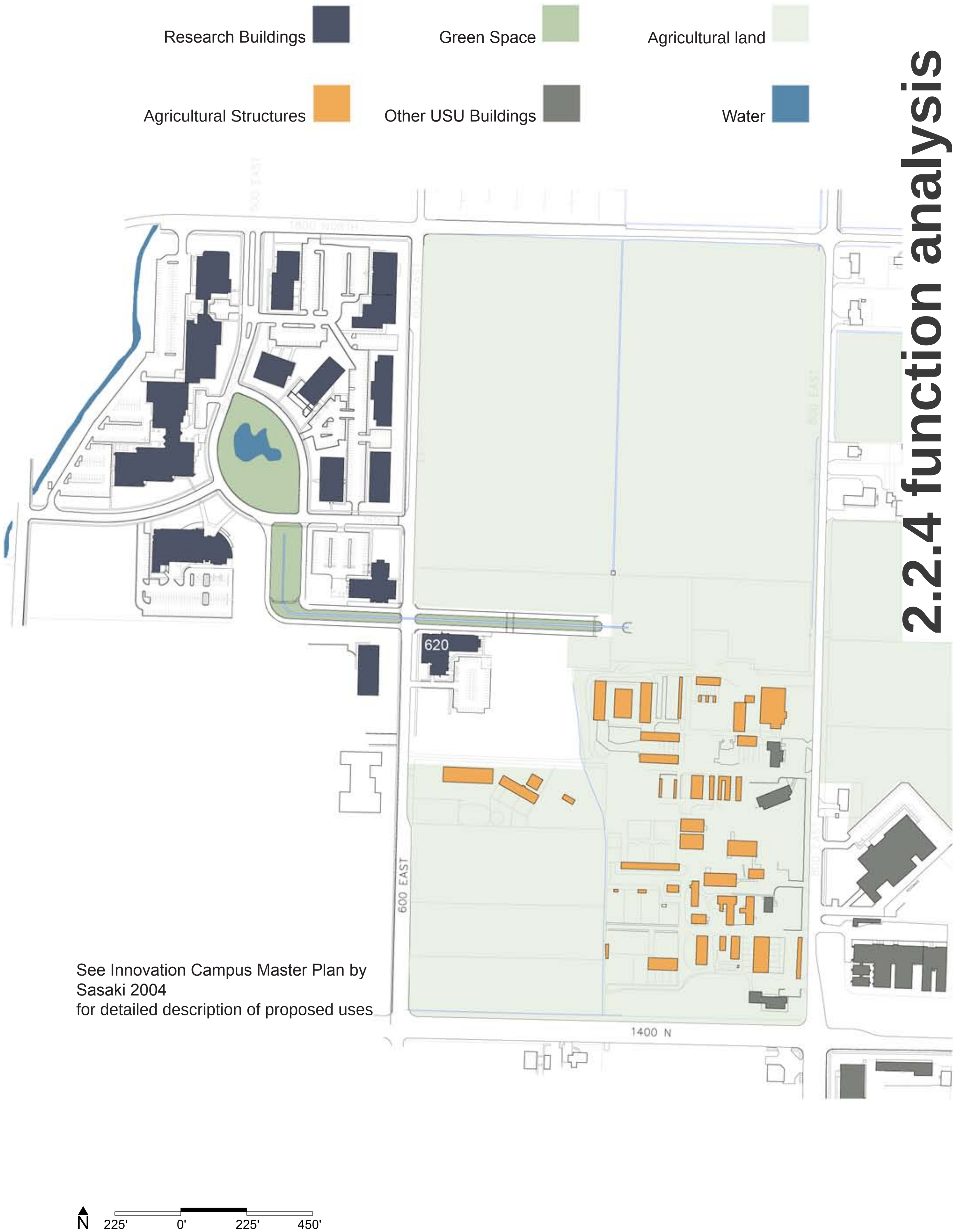
1	Old Main
10	Education, Emma Eccles Jones
21, 21A, 21B	Widtsoe Hall, Maeser Lab, Eccles Science Learning Center
22	Taggart student Center
28B	Parking Structure
33 & 33A	Veterinary Science and Bacteriology Lab, Animal Research Center
36	Janet Quinney Lawson Building
53	Peterson Agricultural Science Building
54	Center for Integrated BioSystems
58	Biology-Natural Resources Building
58A	Natural Resources Building
62	Science Engineering Research Building
66	Luna Hall
68A, B, D	Engineering Building



2.2.3 innovation campus

USU Experimentation Station	59
USU Meats & Physiology Facilities	110
Agricultural Systems Tech. & Education	116
National Center for the Design of Molecular Function	173
Space Dynamics Calibration & Optical Research Lab	489
Technology Commercialization Office	570
USU Research Foundation Administration Office	575
Information Alliance	595
Information Connections	595
Space Dynamics Laboratory	1695
Space Dynamics Laboratory	1747
USU Conference Services	1750
Innovation Campus Administration Office	1770
USU Aggie Connection	1770
USU Distance Education	1780
Utah Division of Forestry, Fire, and State lands	1780
Utah Division of Water Rights	1780
Space Dynamics Laboratory	1787

2.2.4 function analysis

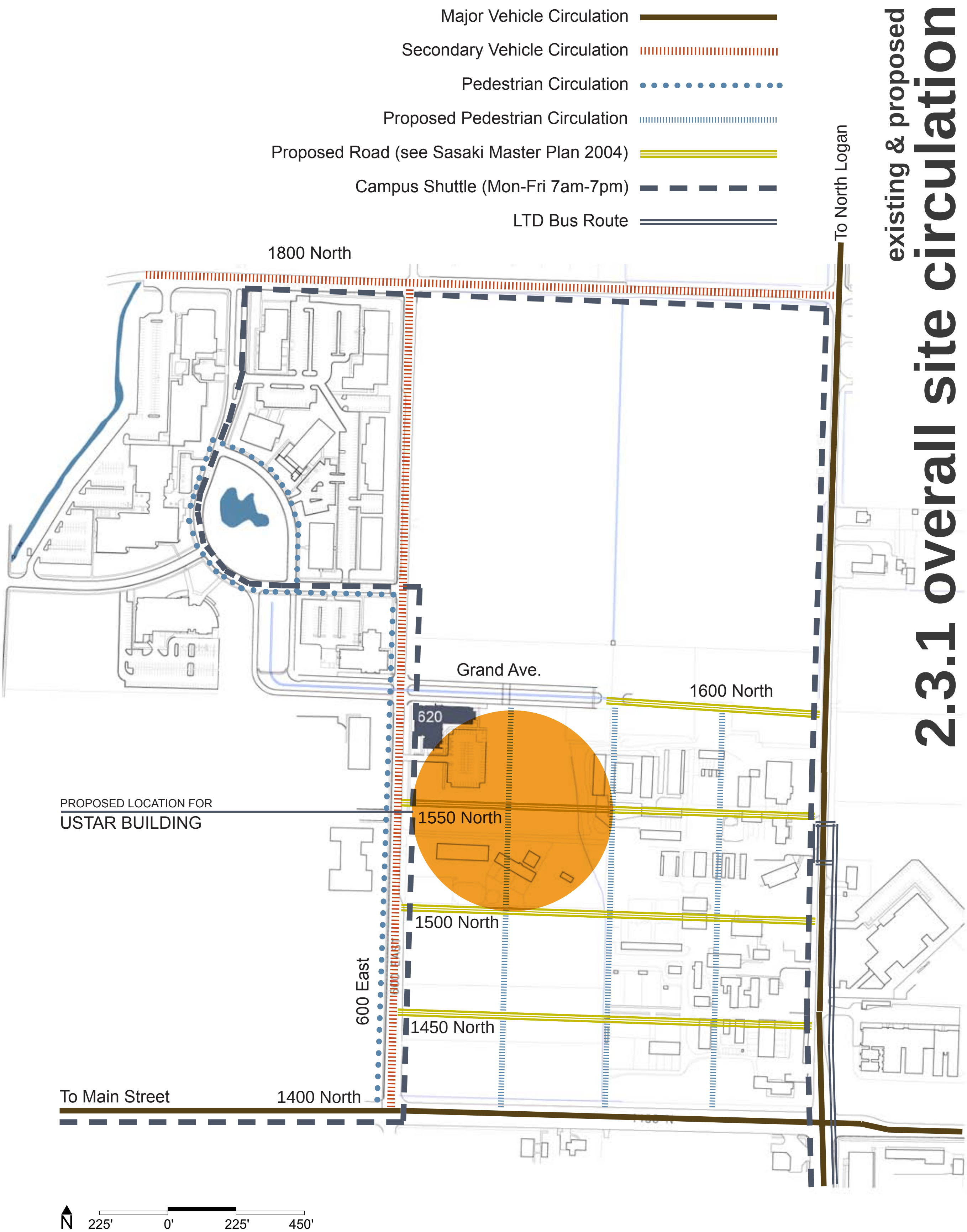


See Innovation Campus Master Plan by Sasaki 2004
for detailed description of proposed uses

2.3 site circulation

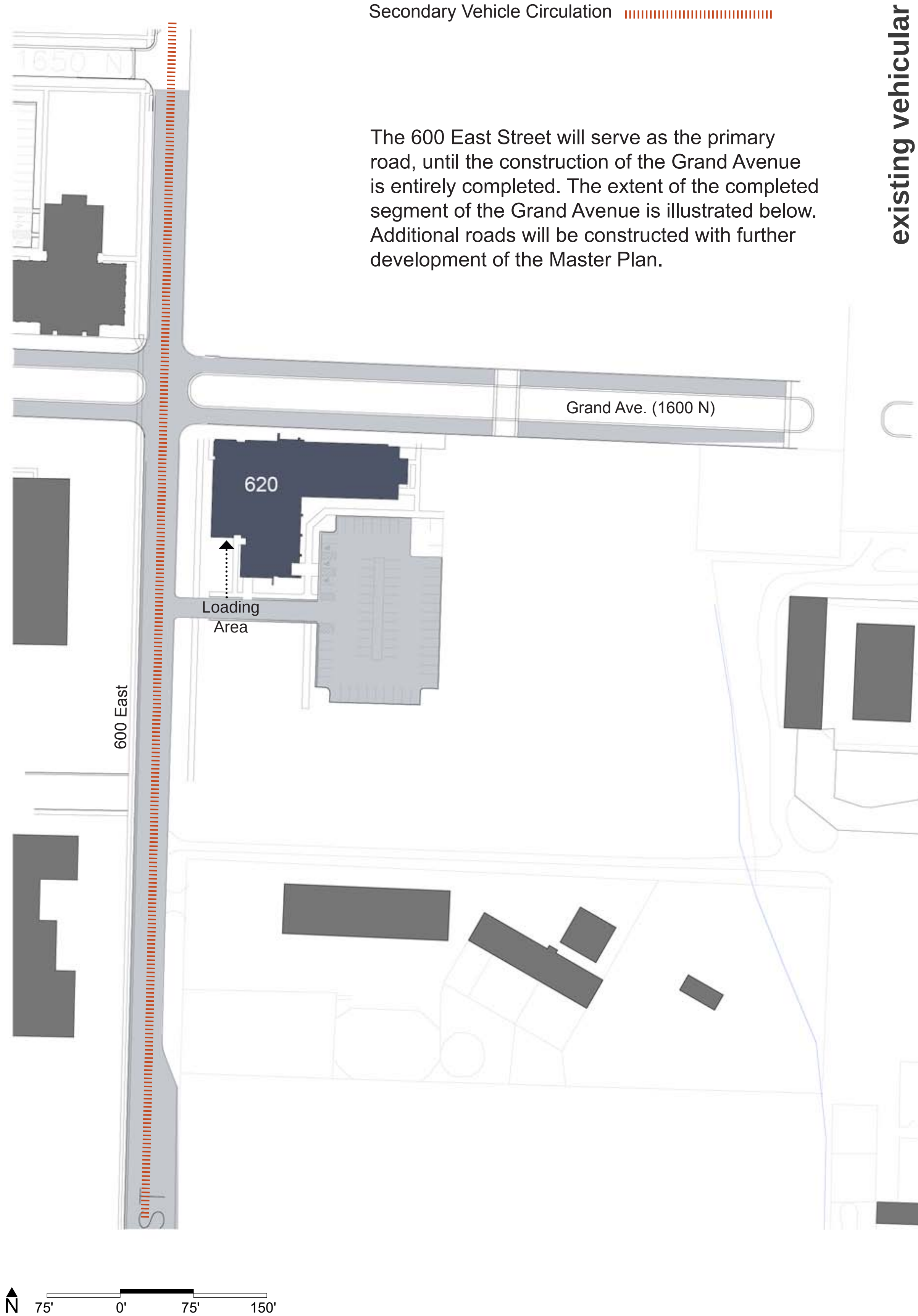
2.3.1 overall site circulation

existing & proposed



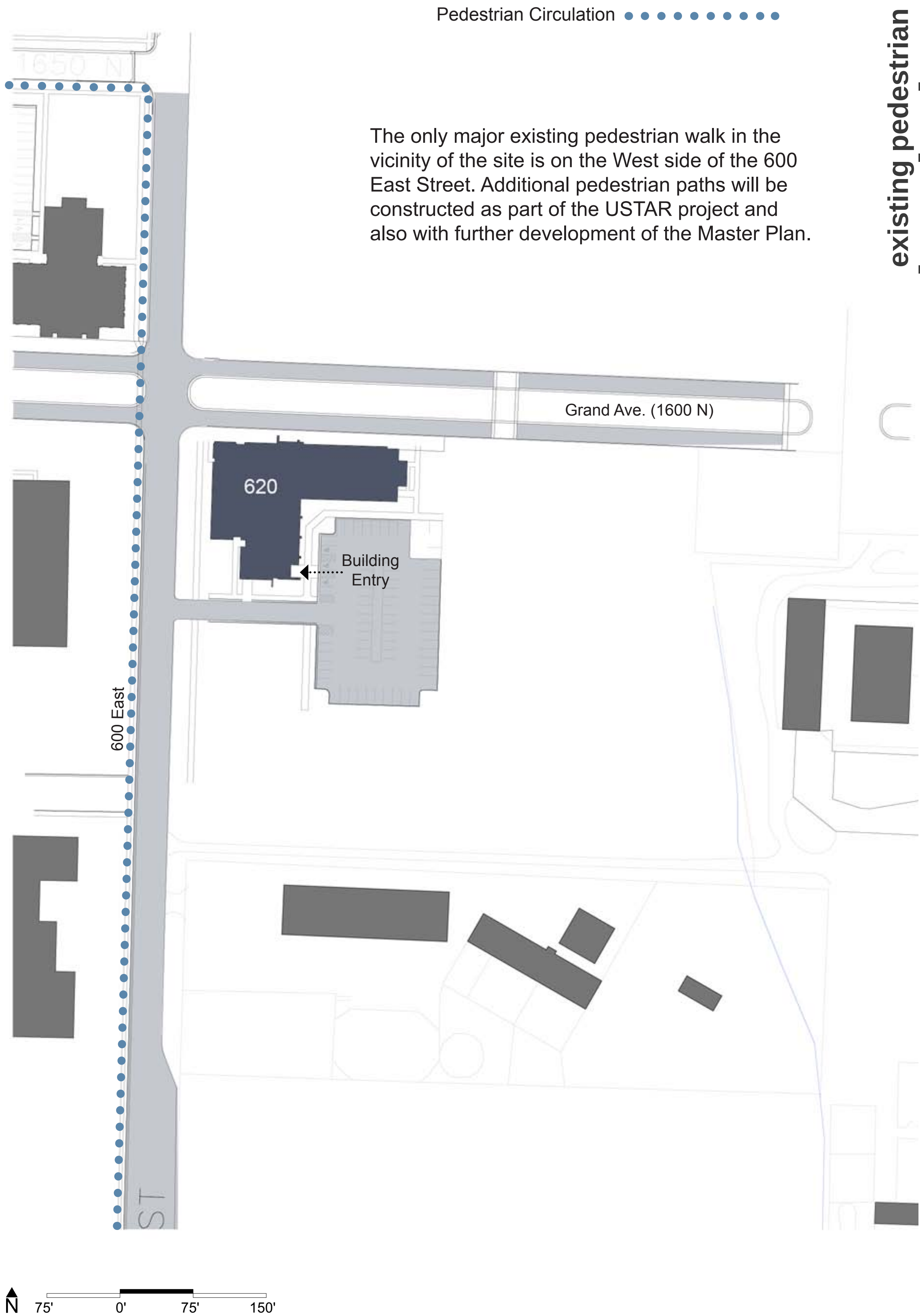
existing vehicular
2.3.2 circulation

The 600 East Street will serve as the primary road, until the construction of the Grand Avenue is entirely completed. The extent of the completed segment of the Grand Avenue is illustrated below. Additional roads will be constructed with further development of the Master Plan.

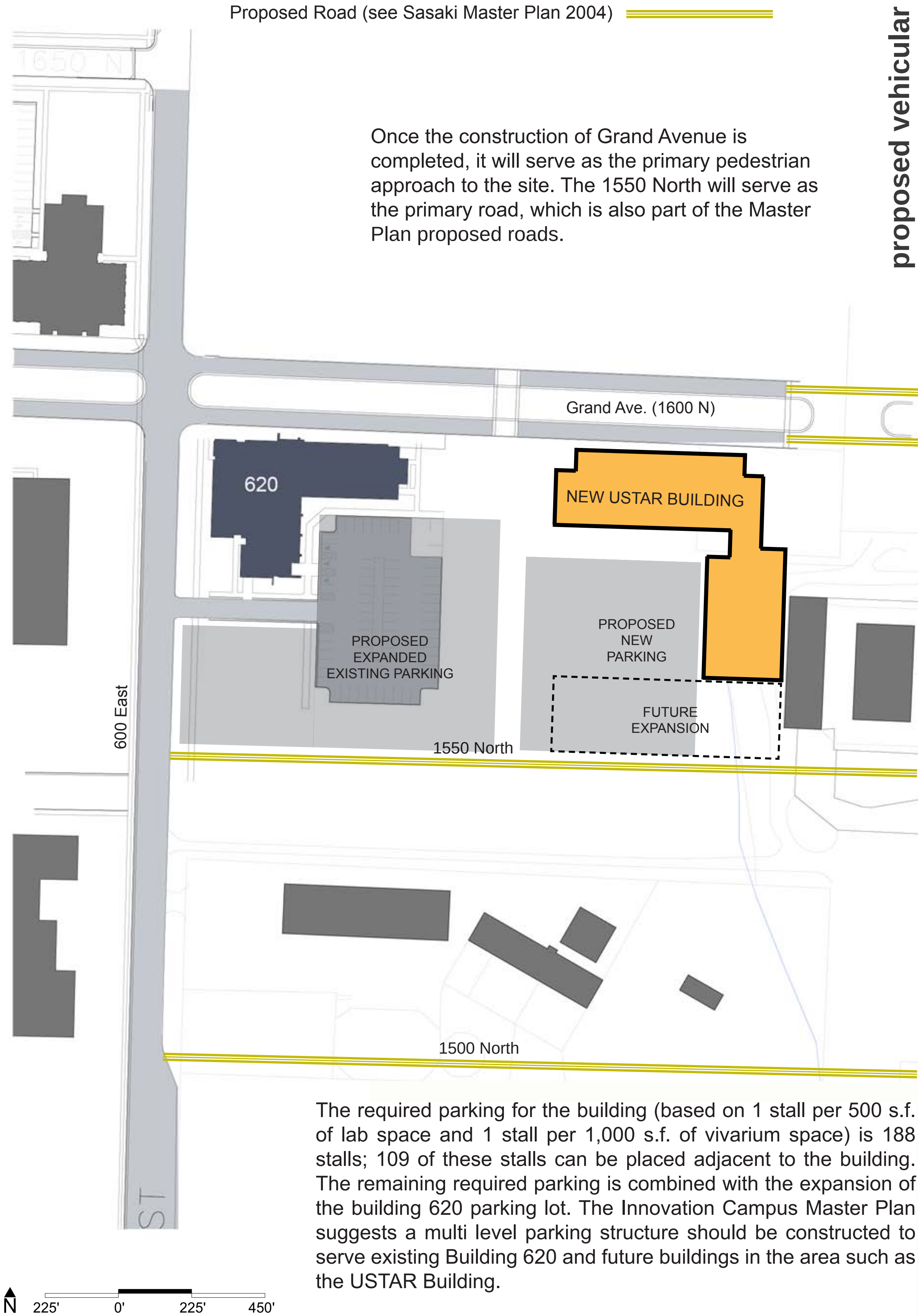


2.3.3 circulation
existing pedestrian

The only major existing pedestrian walk in the vicinity of the site is on the West side of the 600 East Street. Additional pedestrian paths will be constructed as part of the USTAR project and also with further development of the Master Plan.



2.3.4 circulation
proposed vehicular

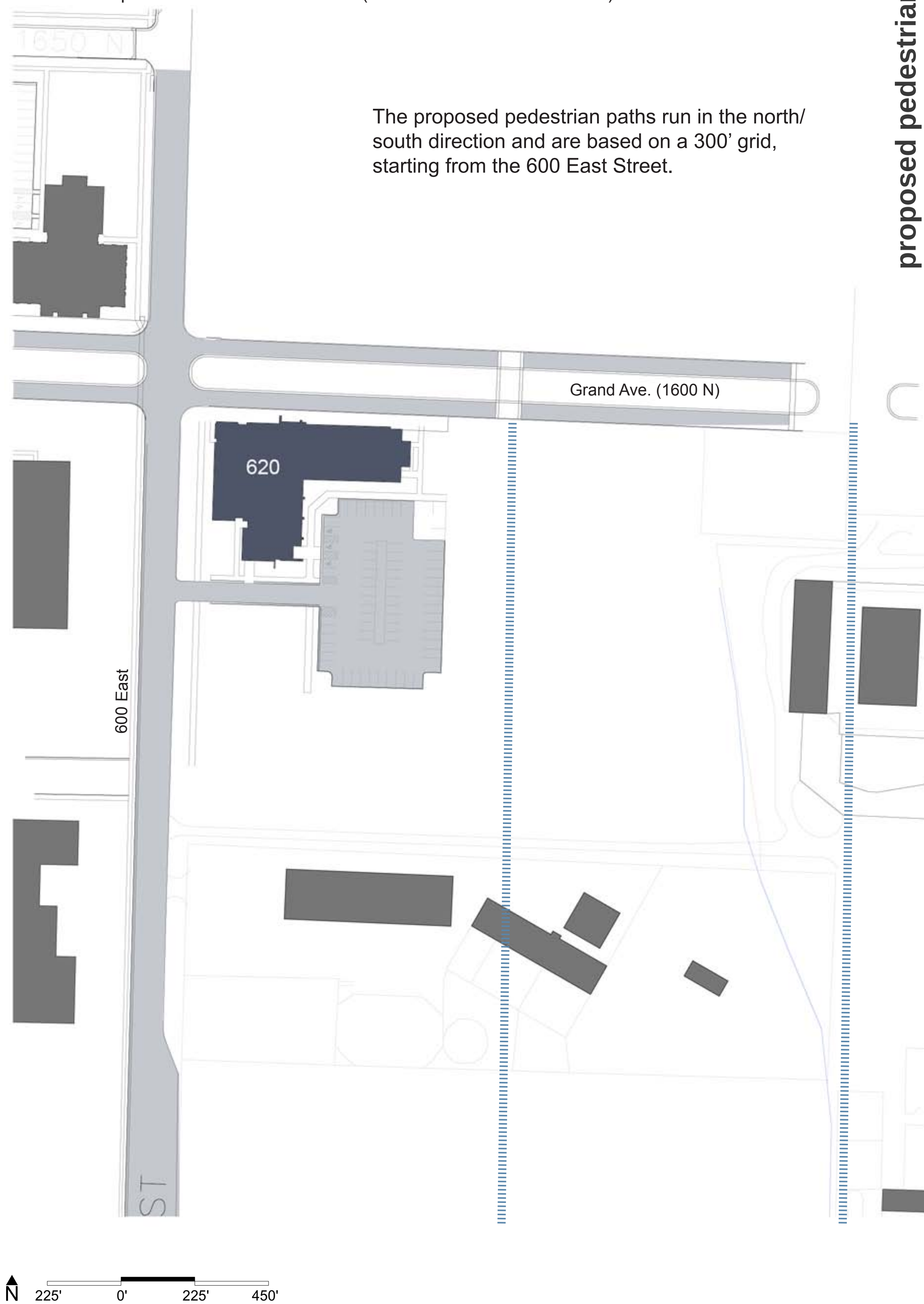


Once the construction of Grand Avenue is completed, it will serve as the primary pedestrian approach to the site. The 1550 North will serve as the primary road, which is also part of the Master Plan proposed roads.

The required parking for the building (based on 1 stall per 500 s.f. of lab space and 1 stall per 1,000 s.f. of vivarium space) is 188 stalls; 109 of these stalls can be placed adjacent to the building. The remaining required parking is combined with the expansion of the building 620 parking lot. The Innovation Campus Master Plan suggests a multi level parking structure should be constructed to serve existing Building 620 and future buildings in the area such as the USTAR Building.

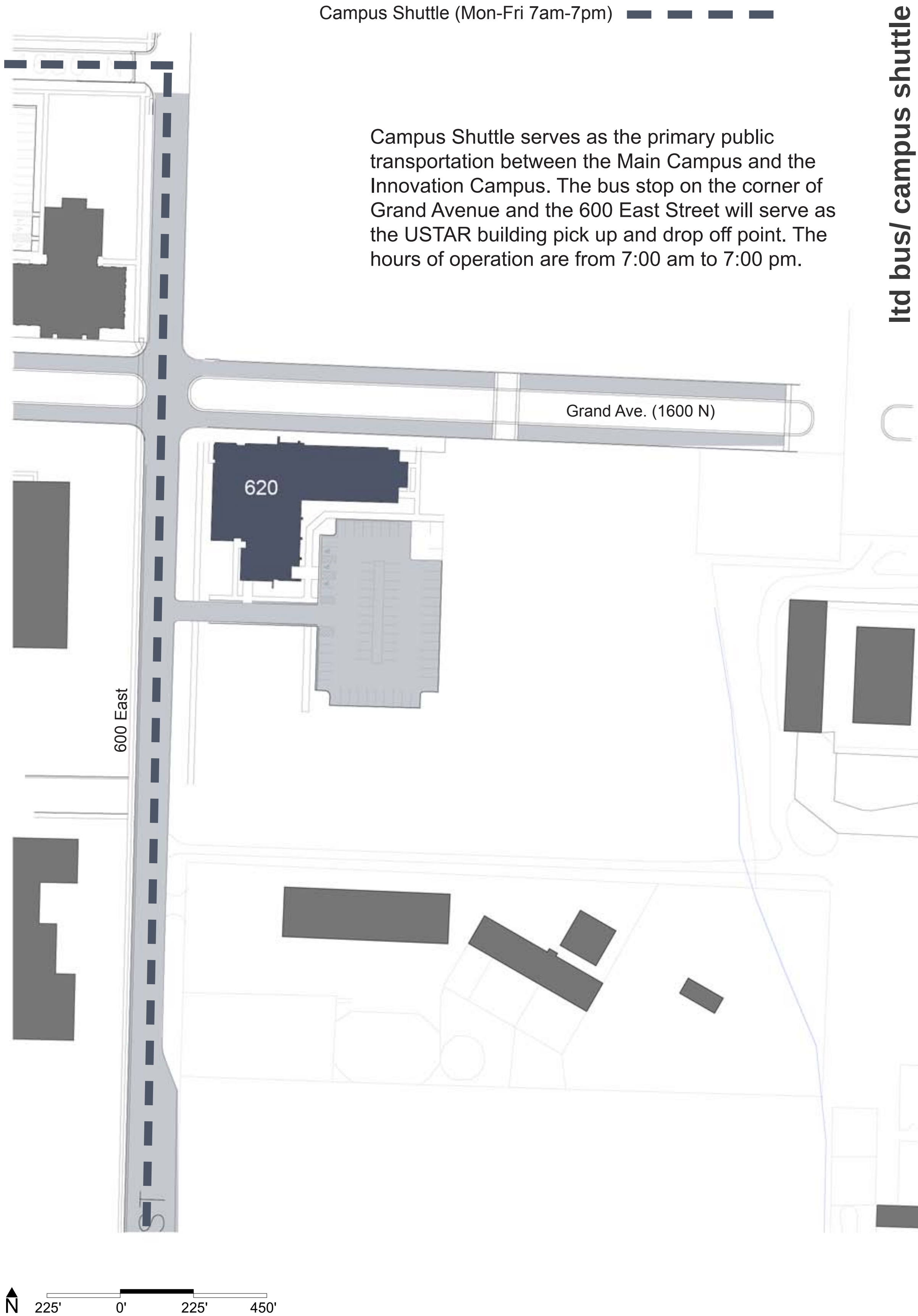
2.3.5 circulation
proposed pedestrian

Proposed Pedestrian Circulation (see Sasaki Master Plan 2004)



2.3.6 circulation
ltd bus/ campus shuttle

Campus Shuttle serves as the primary public transportation between the Main Campus and the Innovation Campus. The bus stop on the corner of Grand Avenue and the 600 East Street will serve as the USTAR building pick up and drop off point. The hours of operation are from 7:00 am to 7:00 pm.



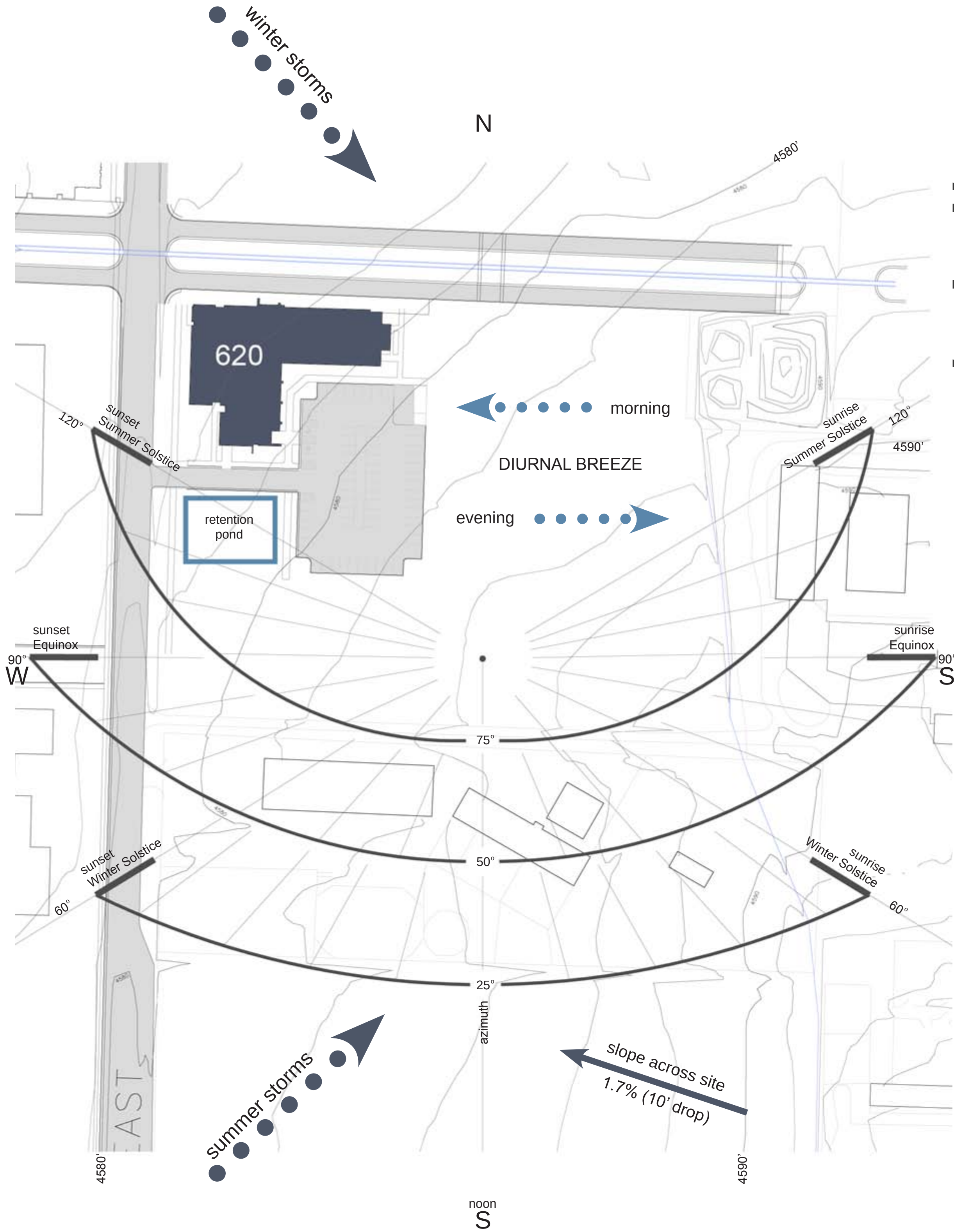
2.4 physical characteristics of the site

2.4.1 climate

The climate of this site (Logan) ranges from winter low temperatures of 10-17 degrees F to summer lows of 52 degrees F to highs of lower 87-91 degrees F. In general, the prevailing winds will come from the west, summer storms from southwest and winter storms from northwest. Morning breeze comes from Logan Canyon to the east of the site and evening breeze from west towards the canyon. There are several months during the year where the micro-climate on the site is not conducive to outdoor activity. Located on the Wasatch Front, the site will typically see substantial snow. There are also canyon winds from the east that create very cold conditions during winter. These conditions, require exterior spaces to be protected from extreme conditions of the area.

See the Sun, Wind, and Water map.

2.4.2 sun/ wind/ water

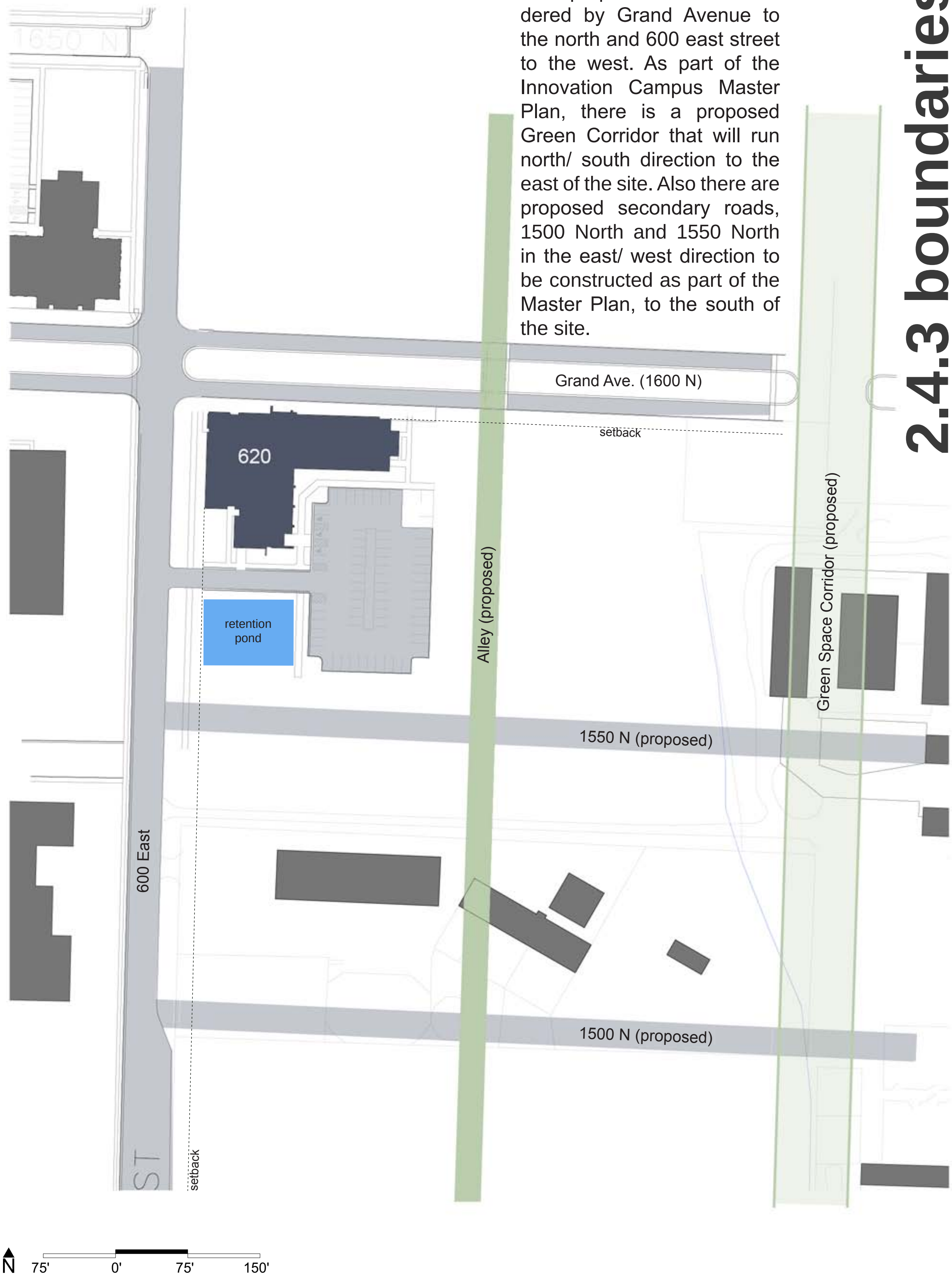


Latitude	41.769
Longitude	-111.803
Annual Precipitation	19.8 inches

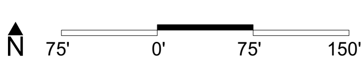
N 75' 0' 75' 150'

2.4.3 boundaries

The proposed site is bordered by Grand Avenue to the north and 600 east street to the west. As part of the Innovation Campus Master Plan, there is a proposed Green Corridor that will run north/ south direction to the east of the site. Also there are proposed secondary roads, 1500 North and 1550 North in the east/ west direction to be constructed as part of the Master Plan, to the south of the site.



2.4.4 proposed development



The proposed parcels, buildings, roads, and the green spaces illustrated above are based on the Innovation Campus Master Plan by Sasaki 2004.

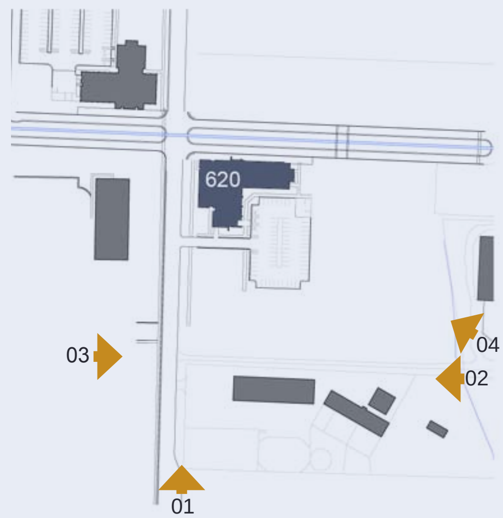
2.4.5 views of project site

looking north - 01

looking west - 02

looking east - 03

looking northwest - 04



2.4.6 innovation campus buildings

biomolecular building - 01

usu research foundation admin. building - 02

calibration & optical research lab - 03

looking northwest - 04

2.4.7 usu main campus buildings/ structures

experimentation station greenhouse bldg. 59 - 01

agri. sys. technology & education bldg. 116 - 02

poultry farm bldg. 83 - 03

skaggs dairy research lab bldg. 84A - 04

2.4.8 agricultural buildings


01


02


03

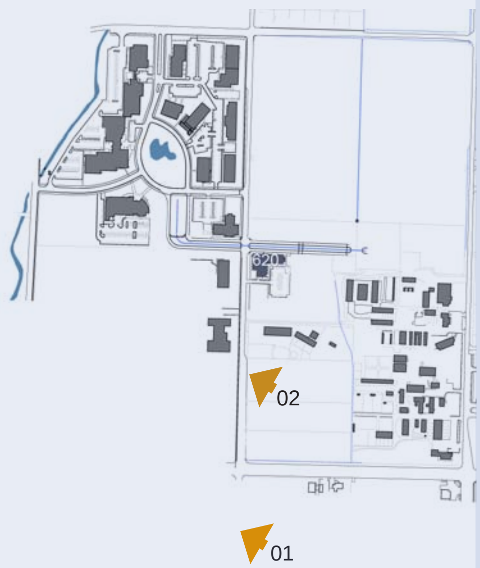

04

The agricultural buildings on and around the proposed site create a very strong visual connection to the cultural life of the Cache Valley. These buildings will be demolished and the functions will be moved to a new location in the valley. These photographs are meant to document the character and history of the site, which includes utilitarian agricultural buildings.

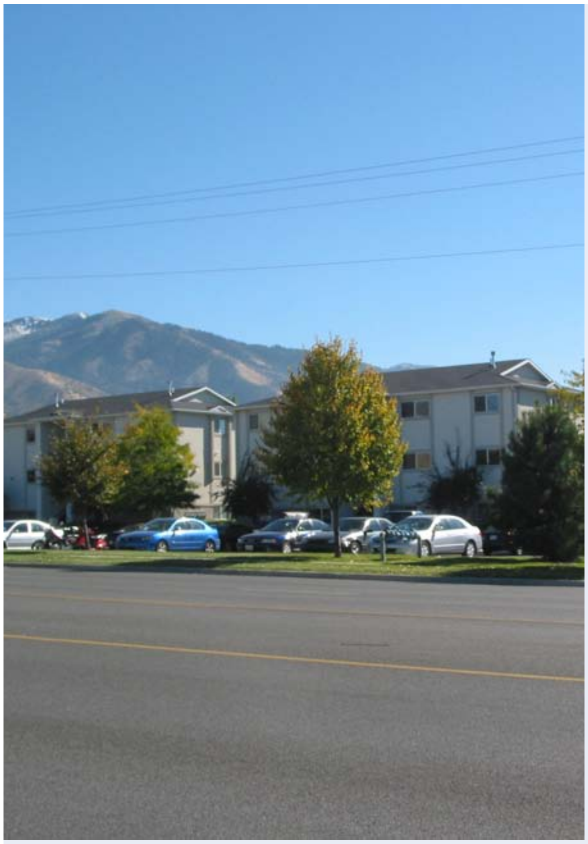
2.4.9 vicinity views


health care facility south of project south - 01

shopping development west of project site - 02

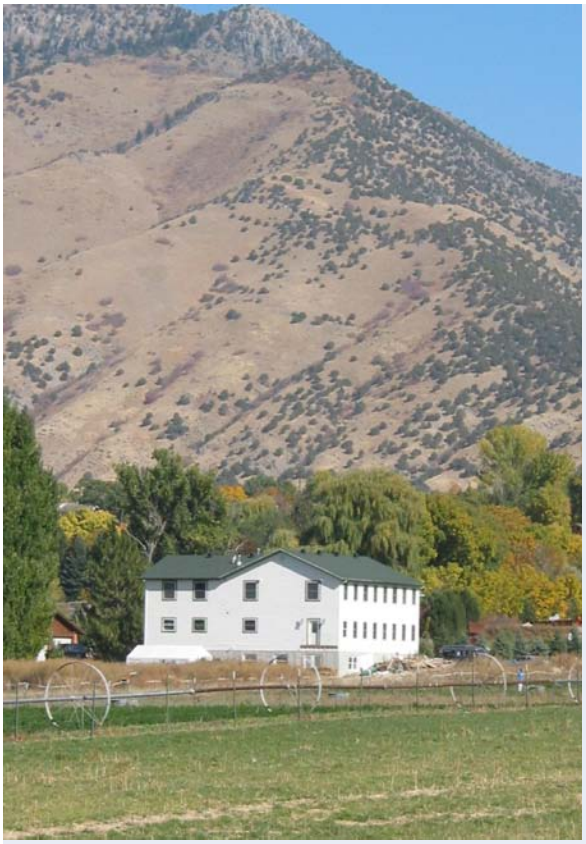


vicinity views



apartments south of project site - 01

view of project site from upper campus - 02



view of neighborhood east of site - 01

view of neighborhood north of site - 02

2.4.10 key open spaces

Site Options developed for the USTAR Building have identified a key open space between the USTAR Building and existing Building 620. This open space creates not only a visual connection between the two buildings, but also a functional connection as well.

Even with Utah's snowy winter climates outdoor gathering spaces can be quite pleasant in the spring-summer-autumn months. If designed appropriately, small areas of hardscape combined with landscaped areas with overhead protection from the summer sun, should be provided for outdoor gathering.

2.4.11 geotechnical investigation report

A geotechnical analysis is underway, and will be available prior to the start of design. A draft Soils Report (December 3, 2007) is included in Appendix H.

Based on the draft report, the water table of this area is high. The project geotechnical consultant shall provide guidance on the following design criteria:

- Soil bearing capacity
- Structural fill requirements
- Potential differential settlements
- Potential for expansion or collapse of soils due to moisture changes
- Liquefaction potential
- Groundwater characteristics and restrictions
- Seismic considerations, coefficients, fault traces, etc.
- Lateral bearing pressures - active and passive
- Alternate foundation systems
- Pavement sections

See Section 3.3.3 Geotechnical Criteria and Section 3.3.4 Structural Basis of Design for additional information.

2.4.12 topographic survey

An ALTA survey of this site is underway, and will document all existing conditions of the site, including topography, utilities, surface and subsurface improvements. This survey will be made available for use prior to the design and construction phases of the project.

Utah State University has provided existing topography for use in the Program Document. In general, the site slopes from southeast (high side) to northwest (low side), with approximately 10' of slope across the site.

2.4.12 topographic survey

2.5 existing utilities

Summary of Existing Utilities

Culinary Water
An existing 6" ductile iron pipe water line runs north/south along the site's 600 East Street frontage. This line has approximately 90 – 100 psi water pressure. North Logan city has stated that this pipe line does not have the flow capacity to provide for the water needs for a new building. The nearest water line that has capacity is a 12" pipe in 1800 North Street approximately 1350 feet north of the project site.

Sanitary Sewer
An existing 8" sewer line runs north in 600 East Street adjacent to the site. It is approximately 7' deep and is on the downhill side of the site. It is expected that it has adequate capacity to serve the new building.

Storm Drain
The general lay of the land slopes down hill northwest from the site to the existing storm drain system. City records show a 12" storm drain runs to the east along Grand Avenue (1600 North Street) beginning at the intersection of Grand Avenue and 600 East. This storm drain may need to be extended to reach the new USTAR site. Stanley Consultants is currently working on a storm drain master plan study for this area which is not yet finished. Two possible options for storm drainage are under consideration with the master planning:

(1) Each parcel/ building will have its own detention. This will eliminate the need to up size the regional detention. Individual building maintenance will need to maintain its respective detention.
(2) Increase the size of the existing regional detention. No individual lots would need to detain storm water.

Regardless of the option, sustainability requirements will dictate that storm water is detained on-site. See the following sustainability discussion.

Ground water is expected to be in the range of 4 to 5 feet below existing grade. This shallow water may require the use of foundation drains to drain the water away from the building.

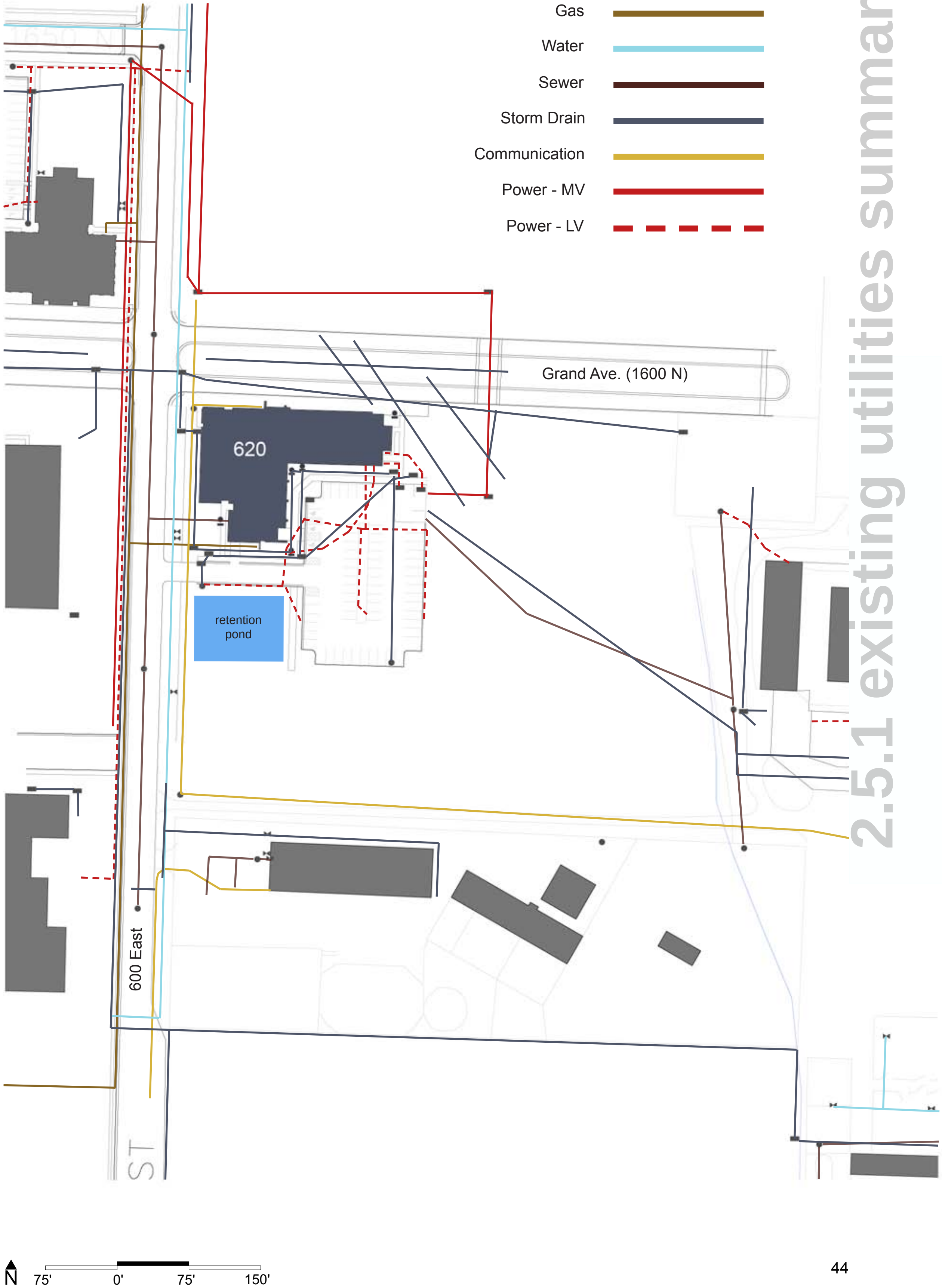
The Master Plan for the Innovation Campus calls for drainage to be transported through storm water "canals." These canals are laid out in a in a grid which is approximately 300' X 300'. This grid concept may not be suitable for the larger research buildings proposed for this campus.

There is an existing retention pond in the south-west corner of the adjacent Building 620. This is a temporary pond serving only this existing building. Depending on the University's decision on the above drainage options, this pond may be removed. The pond will need to remain in place until a substitute drainage system is determined.

Secondary Water
A secondary water line of undetermined size runs north/south along 600 East Street. The existing adjacent Building 620 has connected to this line.

Gas
A 2” gas line runs north/south in 600 East Street adjacent to the site. It is on the west side of the existing street.

2.5.1 existing utilities summary



2.5.2 existing utilities
gas

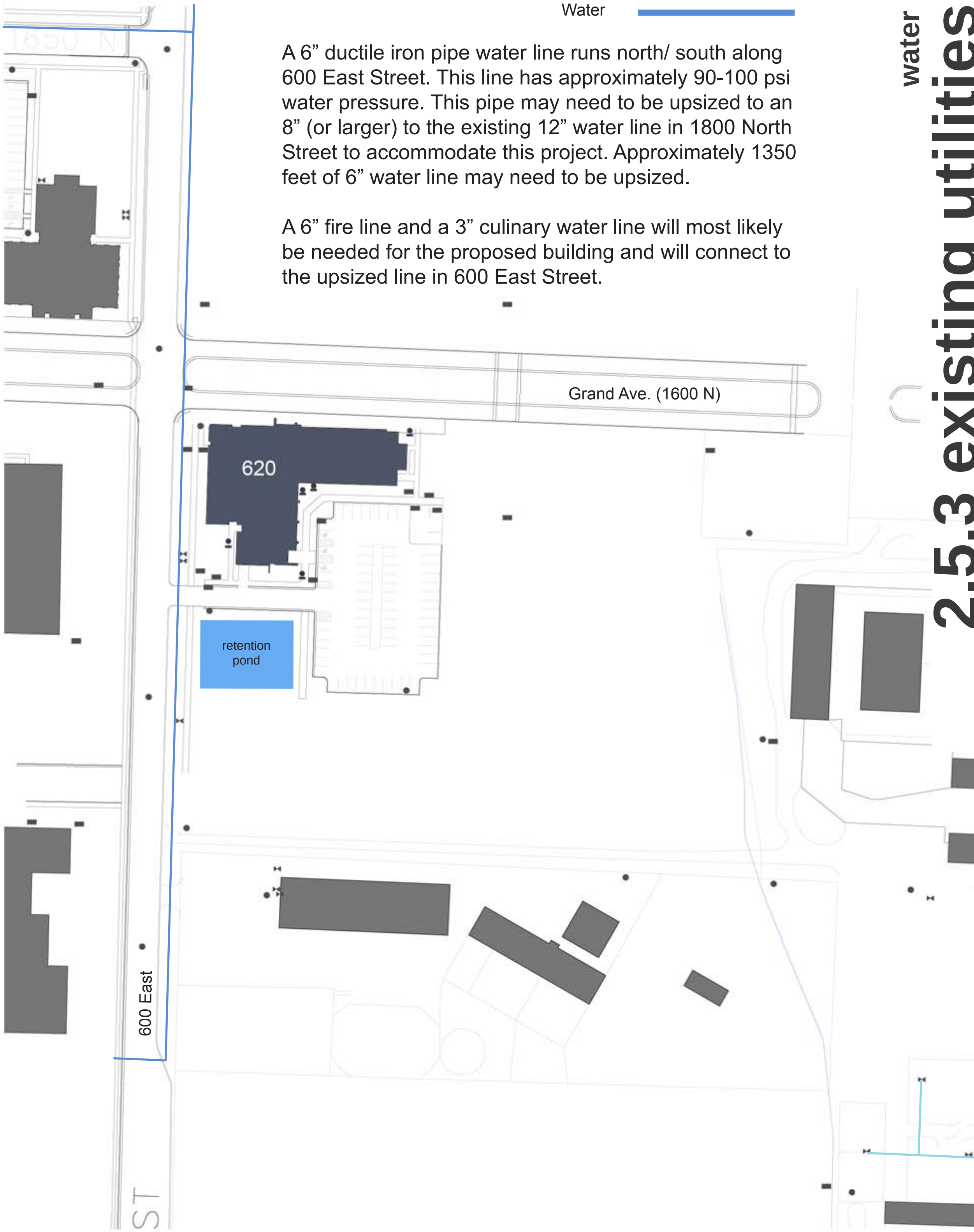
A 2" gas line runs north/ south in 600 East Street adjacent to the site and is expected to provide gas for the proposed building.

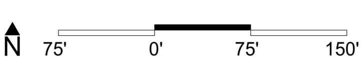
2.5.3 existing utilities

water

A 6” ductile iron pipe water line runs north/ south along 600 East Street. This line has approximately 90-100 psi water pressure. This pipe may need to be upsized to an 8” (or larger) to the existing 12” water line in 1800 North Street to accommodate this project. Approximately 1350 feet of 6” water line may need to be upsized.

A 6” fire line and a 3” culinary water line will most likely be needed for the proposed building and will connect to the upsized line in 600 East Street.





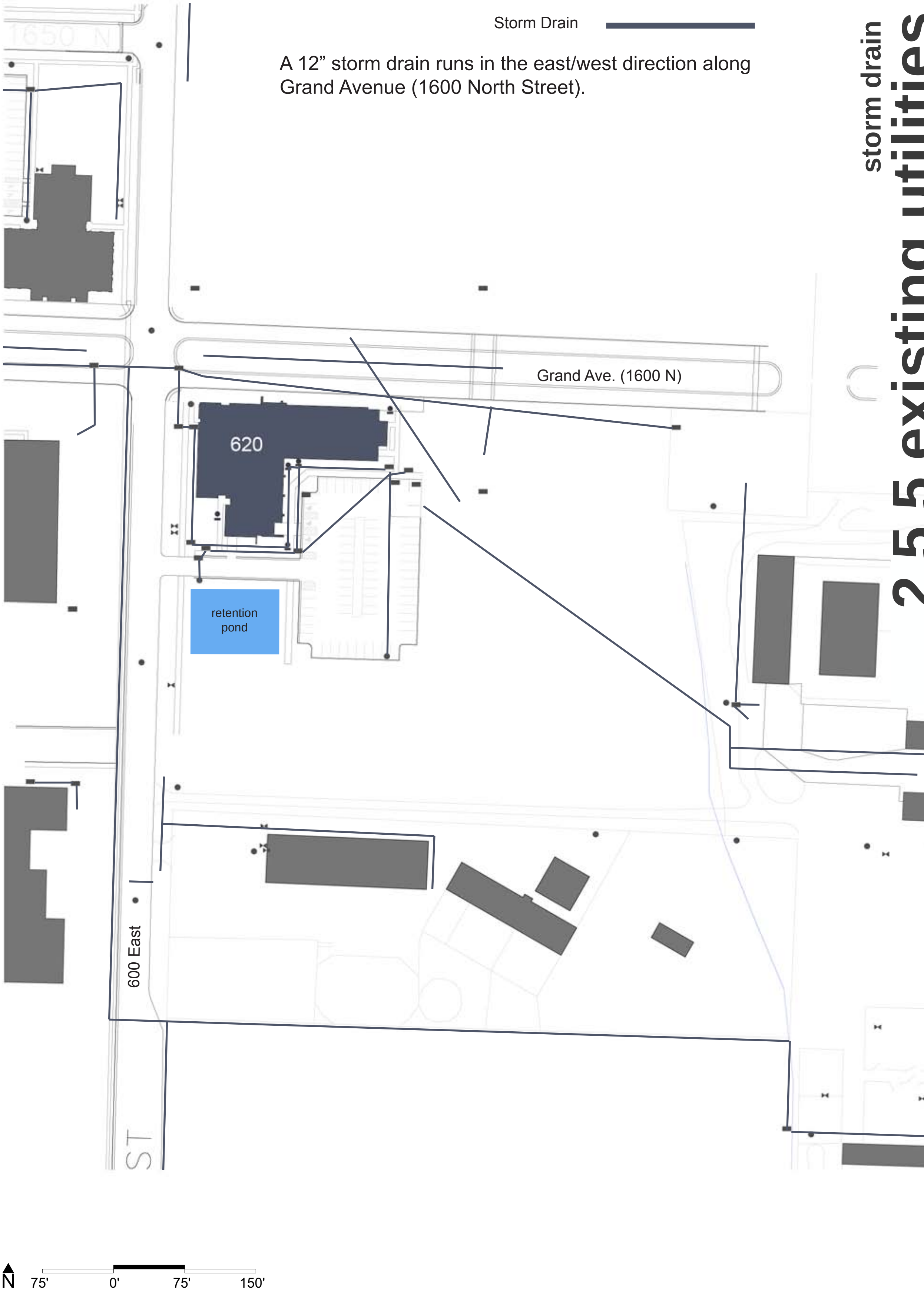
2.5.4 existing utilities
sewer

An 8” sewer line runs north in 600 East Street.

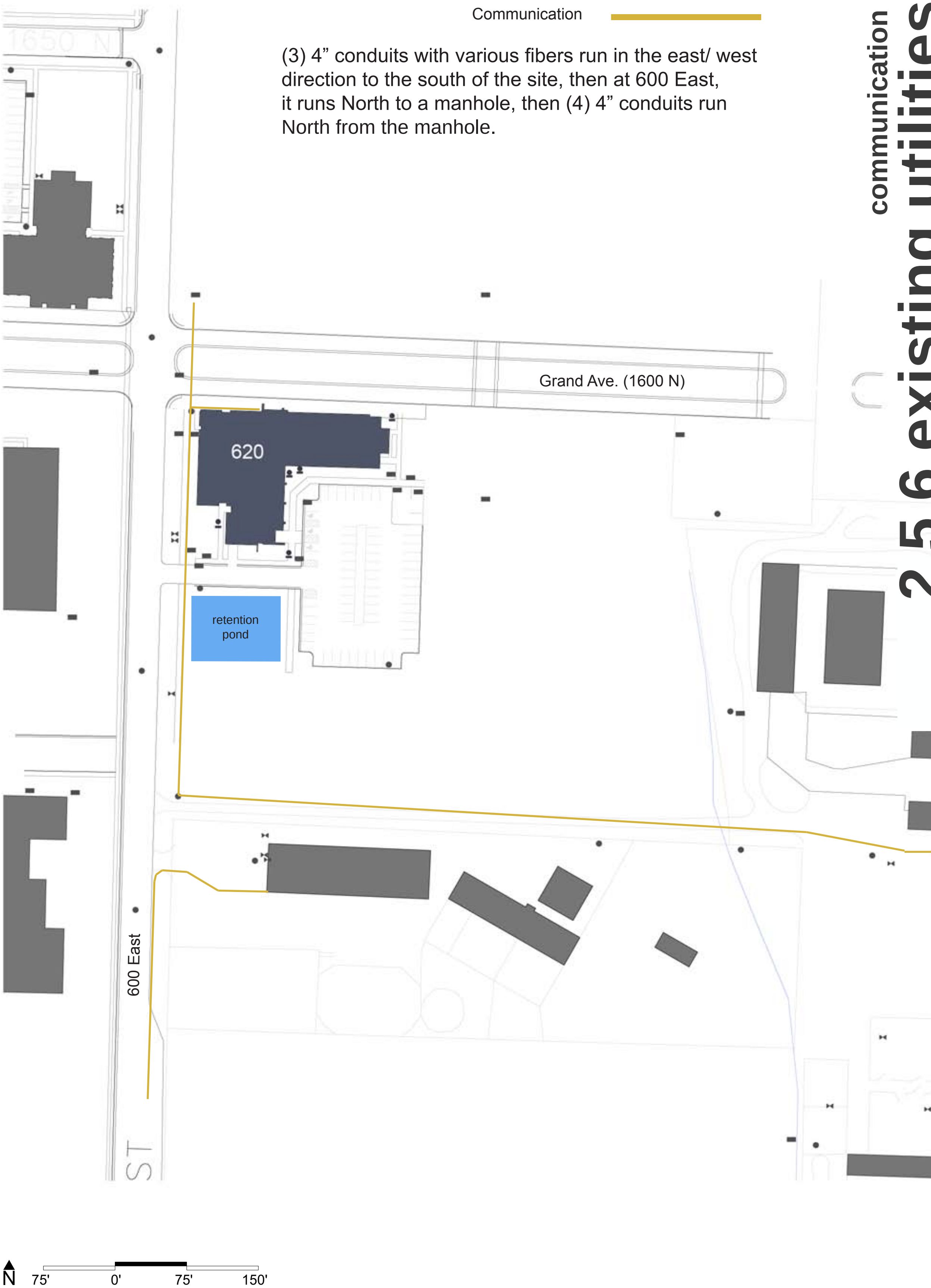
2.5.5 existing utilities

storm drain

A 12” storm drain runs in the east/west direction along Grand Avenue (1600 North Street).

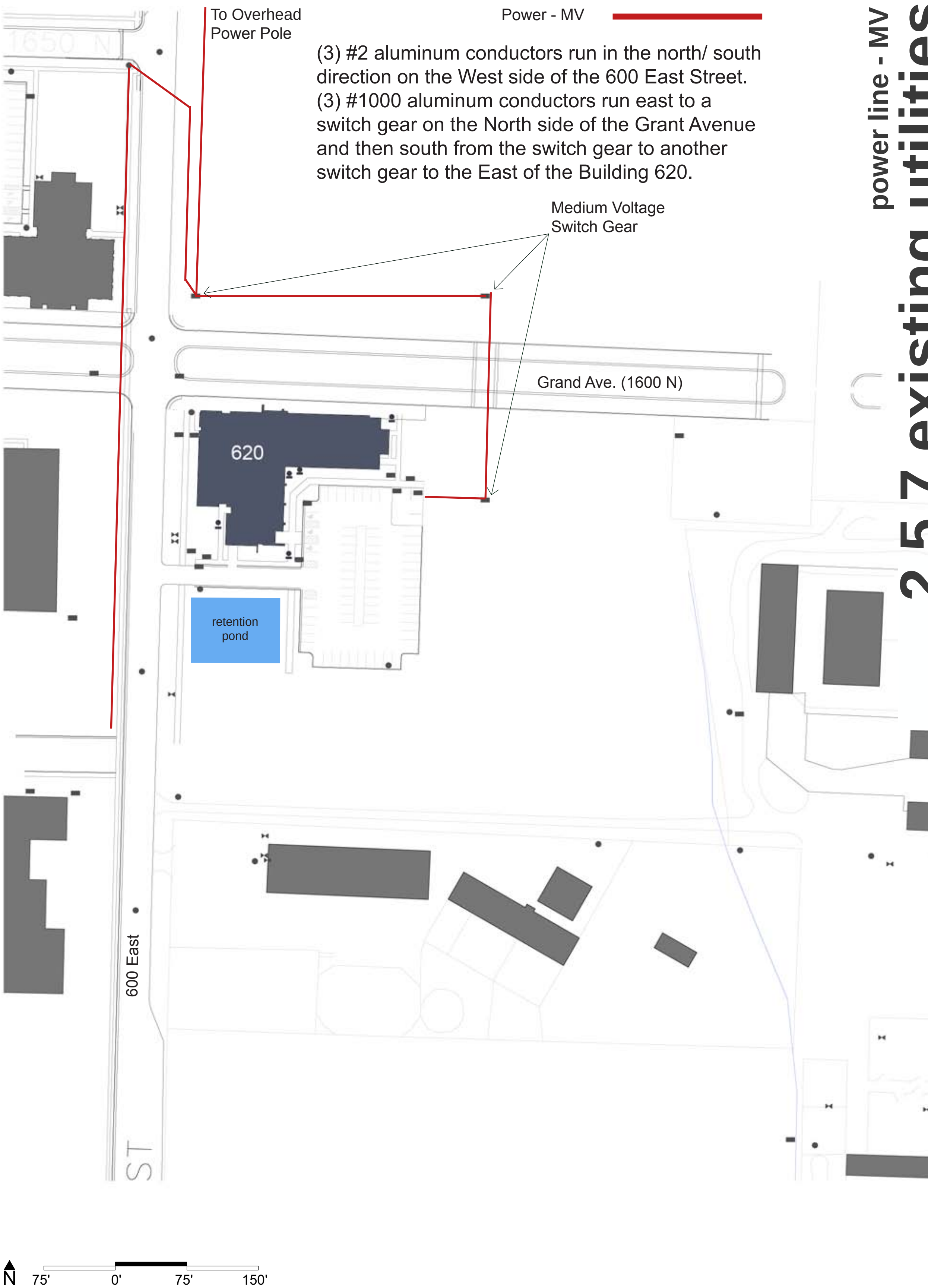


2.5.6 existing utilities
communication



2.5.7 existing utilities

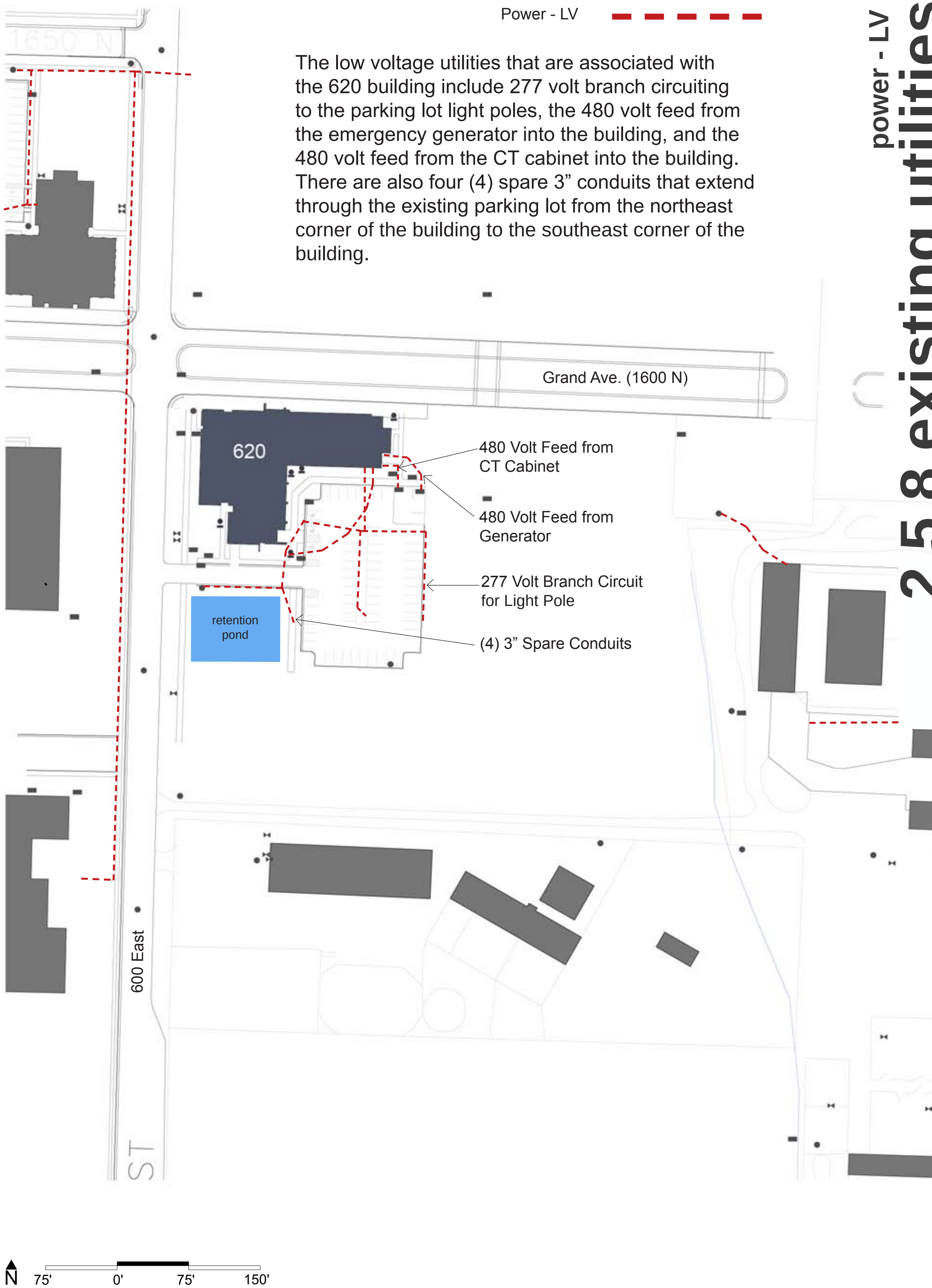
power line - MV



2.5.8 existing utilities

power - LV

The low voltage utilities that are associated with the 620 building include 277 volt branch circuiting to the parking lot light poles, the 480 volt feed from the emergency generator into the building, and the 480 volt feed from the CT cabinet into the building. There are also four (4) spare 3” conduits that extend through the existing parking lot from the northeast corner of the building to the southeast corner of the building.



2.6 proposed site utilities

Summary of Proposed Utilities

Culinary Water
In order to provide water capacity to the project site, the existing 6” water line will need to be replaced with a larger 8” to 12” size pipe. This pipe replacement would need to extend to the existing 12” water line in 1800 North Street approximately 1350 feet to the north. From this new replaced water line, new building laterals for a 8” fire line and a 3” culinary water line will most likely be needed. Depending on the building location on the site, one or two fire hydrants will also be needed.

Sanitary Sewer
A 6” sewer lateral is expected to sewer the building and would connect to the existing sewer main in 600 East Street. There is not expected to be a problem with the depth of the existing sanitary sewer if no building basement is constructed. If a basement becomes part of the project, careful study of the relative elevations of the basement and existing sewer will need to be done to verify gravity flow to the existing sewer. We do not anticipate the need for a grease trap since the new building has no food preparation. A vivarium is planned for the building which will require a vivarium waste line. This vivarium waste will need to enter some form of grinder/digester before entering the city’s main line.

Storm Drain
Determination of the on-site storm drainage system will need to take into the account the recommendations of the storm drain master plan being prepared by Stanley Consultants. The requirements of sustainable design will also influence the drainage design. It is likely that on-site storm water detention will be required. Detention storage facilities will need to accommodate the shallow ground water. This may require shallow surface storage (ponds) or shallow buried storage.

Storm water detention should at a minimum restrict the rate and volume of runoff to the pre-development rate and volume. The on-site storm drainage system will consist of inlets and pipes connected to the storm water detention storage. The discharge from the detention storage can then connect to the existing storm drain pipes around the existing adjacent Building 620. Minimum pipe size should be 12” for ease of maintenance.

Secondary Water
New irrigation lateral for the building will connect to the existing secondary water line in 600 East Street.

Gas
New gas service for the building will come from the existing gas line on the west side of 600 East Street and a new gas meter will be required.

Electrical Utilities
Electrical service to the USTAR building will be provided by Rocky Mountain Power's existing 12470 volt medium voltage distribution system that is existing in Innovation Campus. Rocky Mountain Power has existing medium voltage underground cables running adjacent to the site of the proposed building. Power will be brought into the building using two different voltages (277/480 volt and 120/208 volt). These transformers shall be carefully screened to create the most aesthetically pleasing views.

Communication Utilities
Communication utilities will employ both a feed from Qwest and a feed from Utah State University. Because the building is a mixture of both commercial and Utah State University entities, a need for both services will be required. There is currently infrastructure in place to feed communication service to the project. The infrastructure that is in place is under the jurisdiction of the University. Qwest uses that infrastructure to distribute to commercial/private entities that are located on the campus.

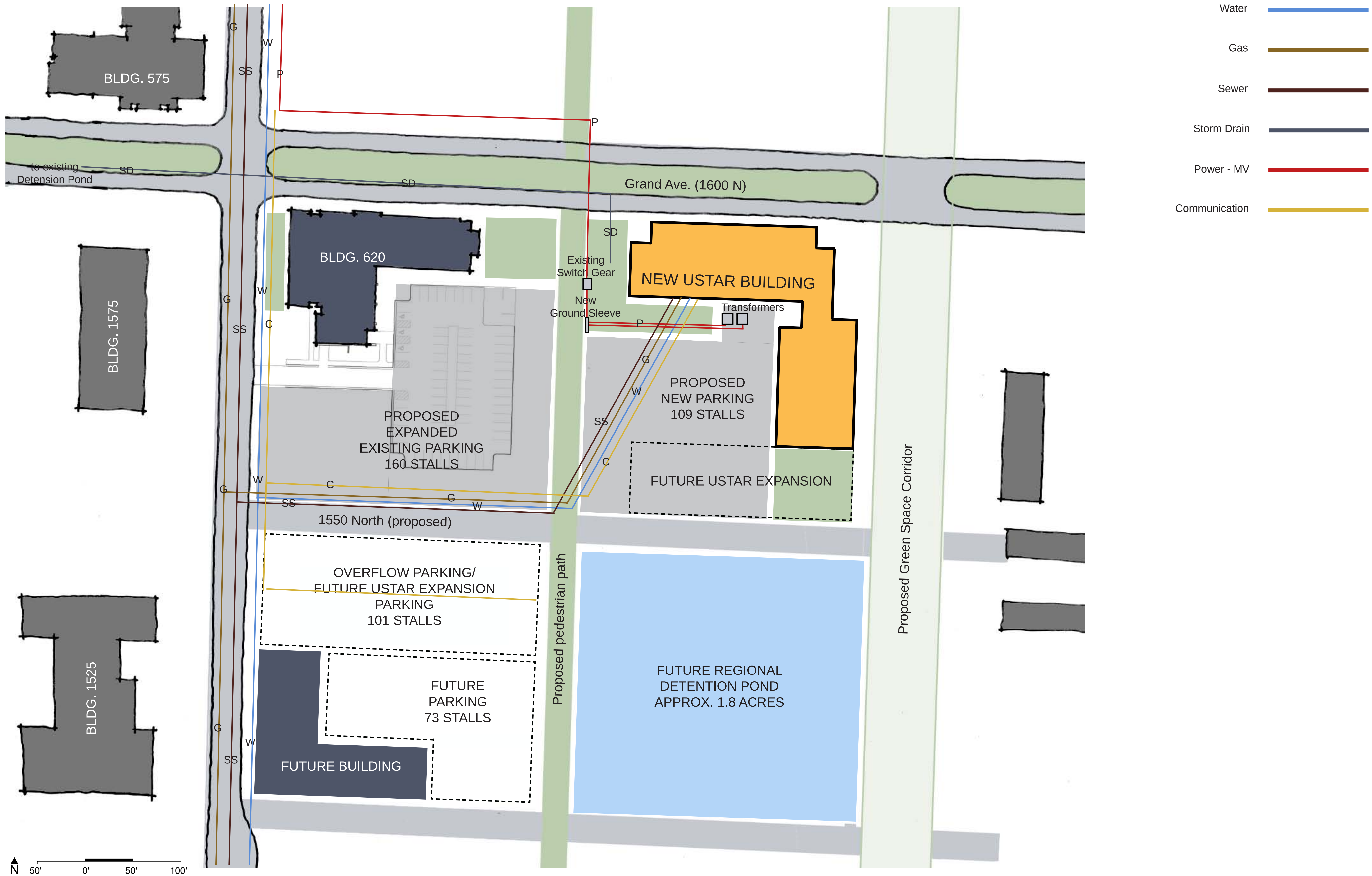
Communication utilities for the proposed building will utilize the existing communication network that exists at Innovation Campus. In order to bring communication utilities to the building, new conduits will be installed from the existing manhole that is located at the northwest corner of Building 620 south to a new manhole that will be located on the northeast corner of the proposed street which is shown in the Master Plan. Conduits will then extend west to another new manhole which will be located on the northeast corner of the proposed street and proposed pedestrian path. The conduits will continue to extend to the east where they will eventually be connected into the existing infrastructure that extends back to Main Campus. Four (4) 4" conduits will extend from the manhole located on the southwest corner of the proposed site and into the new building. A new fiber optic hybrid cable consisting of 24 single mode and 12 multimode fibers and a 200 pair 24 AWG. copper cable will be ran from Building 575 (Node 8) through the conduit system to the new building. The 200 pair copper shall tie onto the existing 600 pair copper cable that Qwest has at Building 575. The fiber optic cable shall be used to tie into the campus network as well as to provide Comcast service to the new building.

Sustainable Design
The goal of this project is to obtain USGBC Gold Level Certification. There are two storm drain related credits which can be earned for Gold Level Certification.

Credit 6.1 requires that the post-developed storm water rate and quantity not exceed that of the pre-developed site. Examples of this would be using a vegetated roof and pervious pavement to minimize the amount of impervious area. Detention ponds and percolating the water into the ground are also acceptable methods however the high water table may make these difficult. Capturing and storing storm runoff for irrigation purposes can help earn this credit.

Credit 6.2 calls for improving the quality of the storm water before it leaves the site. Removing the total suspended solids (TSS) can be performed using acceptable best management practices (BMPs). These include vegetated roofs, vegetated swales, wetlands as well as mechanical treatment systems. NOTE: Any water run-off from new parking areas will be required to enter an oil separator before entering detention ponds or leaving the site.

2.6.2 proposed site utilities plan



2.7 site planning

SITE PLANNING PRINCIPLES

The proposed USTAR Building will be the virtual core of the USTAR program physically, functionally and symbolically. The new USTAR Building must have an open, shared character to express the interdisciplinary and collaborative goals of its cutting-edge research programs. It is also important to respond to the existing context and character of the proposed site and USU's Innovation Campus, specifically including adjacent Building 620. Similarly, the site development adjacent to the building should extend this character into the exterior campus spaces. Environmental sustainability is imperative in both the building and site design (see Section 3.10). The text below should serve as a principles for design in subsequent phases of the project.

Any development proposals will need to be reviewed and approved by the Innovation Campus Facility Advisory Council. For additional reference, see the Innovation Campus Site Development and Landscape Guidelines for detailed descriptions and requirements for road, curb and gutter, and sidewalk construction standards, as well as landscape design, irrigation, street and site lighting, site furnishing, and signage guidelines.

Building, Street, and Pedestrian Corridor Relationship

There is no setback along Grand Avenue. The face of the new USTAR Building should be built to the street right-of-way line. Also the new USTAR Building should not protrude into the pedestrian corridors defined in the Innovation Campus Master Plan. The main pedestrian entry to the building should be accessible from Grand Avenue. The building should provide direct access to pedestrian corridors. Vehicular access to parking and service areas shall not occur on Grand Avenue.

Building Orientation

The new USTAR Building should be oriented to maximize frontage on Grand Avenue (90% minimum as required by the Innovation Campus Site Development and Landscape Guidelines) and the proposed green space/pedestrian circulation corridor.

Building orientation should be consistent with sustainable practices and should make use of natural light to the greatest extent possible. This should conserve energy and provide a healthy environment for the users. The building orientation should account for solar conditions to optimize daylight harvesting and minimize glare and thermal gain. It is preferable that no part of the building with large exterior openings is oriented to the west, in order to minimize difficult to control solar gain.

Offices and other controlled environments can be oriented to the south, if sufficient solar control devices are provided. Workspaces that are continuously occupied should be placed at or near a window. When this is not possible, every effort should be made to provide "borrowed" daylight. Open labs and other spaces with larger windows should be oriented to the north to minimize thermal gain. Transparent and low partitions should be used where possible to allow natural light penetration as deep into the building as possible.

Relationship to Building 620 (also a USTAR building)

Locate the new USTAR Building to integrate with the existing Building 620. This integration might happen at the exterior key open spaces. Establish building concept, volume, materials and look to allow for future buildings to be unique to their functions, and at the same time well integrated with the new USTAR Building.

Views

Preserve/enhance existing view opportunities to west, north and east. Prioritize views from very public outdoor and public indoor spaces over those from private spaces. Create "viewing platforms" as well as peripheral views out of the campus open spaces. Link campus spaces together with selective views from one to the other. Planting should encourage view corridors or direct views away from undesirable views, such as the service/dock area.

Outdoor Spaces
Create linked outdoor spaces or “outdoor rooms,” with both spatial closure and views outward. Create a variety of campus space-types: quiet--active, green--paved, open--closed, shaded--sunny, etc. Limit hardscape areas to those which will attract large gatherings; in principle most outdoor spaces should not be hardscape. The building site offers an opportunity to create additional outdoor activity areas. Provide fixed and movable site furniture at strategic quiet and busy locations to accommodate both quiet lounging and interactions. Also provide connections, links, and other methods of integration to the Innovation Campus and Building 620 utilizing open spaces and pathways. Planning should consider the future pedestrian links described in the Master Plan.

Shade and Shadow
Minimize building shadowing of habitable outdoor spaces in winter, spring and fall--maximize shade in summer. Utilize mature deciduous tree canopies as much as possible to achieve this end. Allow areas of un-shaded seating areas to extend the useful seasons into the late fall and early spring.

Landscape
All areas not covered by building, parking, or other hard surfaces, including pedestrian corridors, shall be landscaped and irrigated. Trees, shrubs, and groundcovers, turf and earth mounding have been designated as the dominant materials for landscape development. Proposed development must be subtle, uncluttered, and convey a horizontal quality in overall effect. Plant selections should be well-adapted to the site, and emphasize the use of native plants with low water use requirements. Plant selections should be easily maintained, and not susceptible to diseases and pests. Plant selections shall not contain fruit that may stain sidewalks or cause walking hazards. See the Innovation Campus Landscape Guidelines for specific plant species, sizes and spacing.

Areas surrounding parking lots shall be landscaped in such a manner as to interrupt or screen said areas from view from access streets and adjacent properties. Such planting shall not impede the view of pedestrians and/or drivers at all intersections and crosswalks. Parking strip plantings may include turf or low-growing permanent ground cover. All parking lot islands shall include trees.

The new USTAR Building project will be responsible for development of the landscape and streets that border the site. Development is to include landscape/road/curb and gutter/sidewalks to the centerline of the Grand Avenue and 1550 North. Some of the development of Grand Avenue is existing. Additional development needs to be coordinated with the Innovation Campus Facility Advisory Council.

Irrigation
Secondary water shall be the first choice for irrigation, if feasible. Controllers shall be compatible with Rainbird Maxicom system, including radios and antennae. All drip equipment and connections shall be Netafirm. All irrigation equipment shall be manufactured by Rainbird.

Parking
Parking is to be accessed from 600 East or 1550 north (access from Grand Avenue is discouraged, but may need further study during design). Exact parking stall counts shall be determined according to Innovation Campus and USU standards, and should take occupancy type and building use into account. Parking areas adjacent to pedestrian corridors must have a buffer of 15 feet of landscaping and berms. All parking areas shall be designed with ample space for snow storage, and for efficient snow removal.

Lighting
Adequate lighting shall be provided for all pedestrian areas, parking lots, and building entrances. Minimum foot-candle requirements must be considered with respect to safety and environmental sustainability. All exterior light fixtures shall be concealed source fixtures and shall meet requirements for night sky protection and additional requirements of the local municipality or authority having jurisdiction. Exterior wall-mounted floodlights are prohibited.

Site Furnishings and Signage
Building signage that helps to identify the new USTAR Building, and the research taking place within, is encouraged. Site signage must meet Innovation Campus guidelines. Site furnishings, including benches, flagpoles, bicycle racks, trash receptacles, etc., must be consistent with Innovation Campus standards. See the Innovation Campus Site Development and Landscape Guidelines for detailed information.

Accessibility
Wherever possible, all site paths shall meet ADA criteria for slope and landings. If this is unfeasible in a particular location, provide elevator access within the new USTAR Building that will allow wheelchair users to transition the non-compliant grade condition. All usable outdoor campus spaces shall be fully accessible.

Building Access
Express the public shared nature of this building by connecting internal circulation to external circulation through multiple entries, with extensive views in and out. Provide strong functional connections between interior program spaces (particularly social spaces, meeting rooms, informal collaboration/ gathering spaces, etc.), and exterior spaces. Main entry to be accessible from Grand Avenue.

Emergency and Non-Routine Service Access
In accordance with Utah State University's management and maintenance practices, design paths and walkways to accommodate emergency vehicles and occasional non-routine service access. Utilize Utah State University's Design Standards to prevent private vehicles from using these paths.

Bicycle Access
Provide for bicycle usage along the north-south pedestrian corridor, and secure bicycle storage adjacent to the new USTAR Building entrances. Bicycle racks, rather than bike lockers, should be located conveniently near building entrances.

Loading and Service
It is recommended to locate the loading and service area away from the main entry with easy access from the road. The loading and service area should be fully screened. It should be located to be a shared area between Lab and Vivarium functions, with separate loading docks and dumpster areas. Loading and service areas shall not be accessed from Grand Avenue or pedestrian corridors.

Miscellaneous Enclosures
All transformers, generators, and other electrical/mechanical equipment shall be enclosed within the building. Outdoor refuse collection areas shall be gated and visually screened from access streets and adjacent property by a complete opaque screen. Outdoor storage structures/areas are prohibited.

Future Buildings & Growth to the South

The next phase of the project is envisioned to the south of the Vivarium wing. It is likely that more Vivarium space will be needed as lab functions expand, which can be accommodated by extending the wing to the south. It is important that the Vivarium can expand without having to expand the labs as well. In addition or subsequent to a Vivarium expansion, lab expansion can be housed in a new east-west wing, with connections to the Vivarium as required. The lab wing will define the third side of the quadrangle, and along with Building 620 will form the common outdoor space of the complex. The limits of the lab wing will be the alley to the west and the canal to the east. A third phase wing can be added to the west of the alley, with a potential overhead connection to the second phase wing.

The location of the vehicular service road (1550 N) shown on the master plan may need to be constructed further to the south, to accommodate the lab expansion wing. As per the Innovation Campus Master Plan, the 300’ by 300’ blocks will need to be re-evaluated for the needs of larger research building complexes. They may be combined into “superblocks,” or enlarged by relocating some streets. The north-south alley and the canal locations are not in conflict with future expansion.

Surface parking areas for the future expansion must be considered during design. In the future, it is envisioned that surface parking on the quadrangle will be replaced by parking structures elsewhere on the Innovation Campus, as shown on the Master Plan.

Lastly, the expansion to the south will have to be coordinated with the University’s plan for a water detention feature that will serve eastern expansion of Innovation Campus. See the Alternate Preferred Site Option in Appendix D for alternate locations of the Detention Pond and parking areas.

2.8 selected site planning option

2.8.1 selected site option summary

Principles and Advantages

- Supports Innovation Campus Master Plan, and Site Development and Landscape Guidelines:

  - Strong orientation to Grand Avenue, providing opportunity to link to industry and future commercial development
  - Parking, access and service areas located in center of block
  - Working within 300’ x 300’ grid

- Main facade facing Grand Avenue.

- Lab offices located in the east-west direction, providing opportunity for sustainable day light practice.

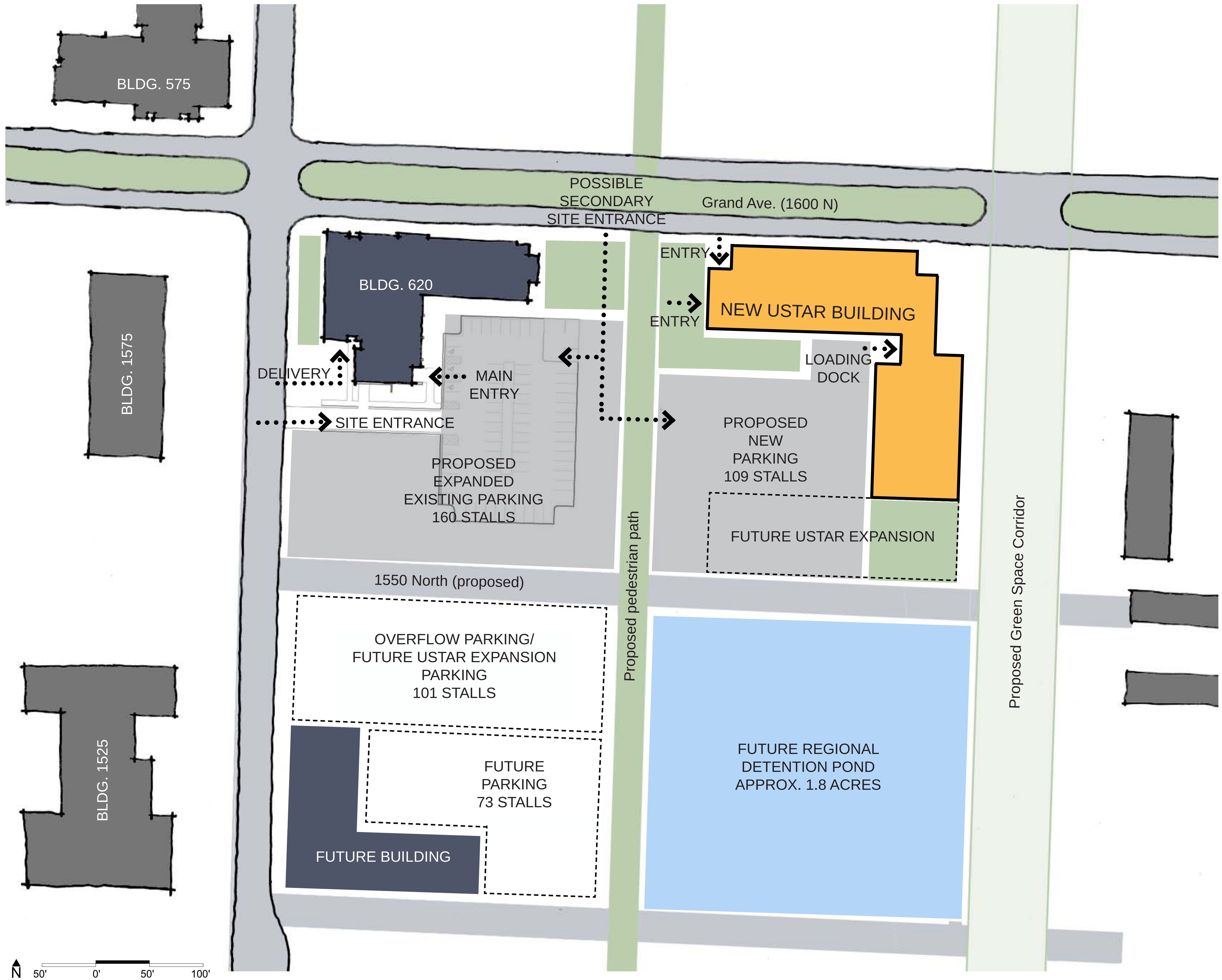
- Maximizes potential for future expansion.

- Strong relationship to Building 620 (also utilized by USTAR teams) by placing main entry on west side, oriented toward Building 620’s east side main entrance.

- Do not need to relocate any existing major utilities.

- The required parking for the building (based on 1 stall per 500 s.f. of lab space and 1 stall per 1,000 s.f. of vivarium space) is 188 stalls. 109 of these stalls can be placed adjacent to the building. The remaining required parking is combined with the expansion of the building 620 parking lot. The Innovation Campus Master Plan suggests a multi level parking structure should be constructed in the future to serve existing building 620 and buildings in the area such as the USTAR building.

2.8.1 selected site option plan



Advantages:

- Allows for future pedestrian path and road through center of the block, proposed by the Innovation Campus Master Plan.

- Existing and proposed building footprints do not interfere with existing and proposed utilities, through center of the block.

- Regional detention pond is in a more central location to the future buildings and growth, per Innovation Campus Master Plan.

- Allows for more open space in the middle of the block.

- Allows for parking areas to be close to buildings.

- Proposed parking calculations have included pedestrian paths and landscaping.

03

building requirements

3.1 building vision & planning

3.1 Building Vision and Planning

The USTAR building will be a new state-of the art research facility for life sciences on the Innovation Campus of Utah State University in Logan, Utah. The goal of the project is to optimize the opportunity of the USTAR funding in order to advance research in sciences and engineering at USU.

The long term vision for the building is to become the foundation for establishing the Innovation Campus at USU as a research center at the forefront of high technology transfer. As such, the project will have a long term effect on the development of the sciences on the Innovation Campus and at USU in general. The Steering Committee and the Design Team expended significant time and effort to ensure that the decisions on the project will encourage rather than inhibit future growth in research at USU. These decisions also need to be in line with the vision and expectations of the University Administration and the State. To that end, the planning effort for the USTAR building started with a visioning process, described below.

The first goal of visioning was to develop a sustainable model for research on the Innovation Campus with recommendations on the following:

- Optimize USTAR funding as seed money for sustainable long term growth, with or without USTAR support.
- Guidelines on the organizational and operational functions of technology transfer research at USU.
- Conditions for mutually supportive relationships between USTAR and the University, between the Main Campus and the Innovation Campus, and between academic research and commercial applications.

The recommendations on these issues were included in the Visioning Report issued by the Design Team on July 12, 2007 and were developed jointly with the Steering Committee. (See Section 6, Appendix 6.1)

The second goal of the visioning effort was to apply the recommendations identified above on the USTAR building, develop requirements for its use and identify criteria for the selection of resident research teams.

3.1.1 Identification

The following requirements were identified during the visioning process for the goals and use of the USTAR building:

- The building should be flexible in order to accommodate a wide spectrum of research programs.
- The new facility should provide state of the art research spaces to entice both world class faculty and existing USU faculty.
- The building will function as an economic engine through income from technology transfer. To some degree, user groups will be part of the market economy cycles and should be able to move in and out easily.
- The financial governance should be structured so that research teams are not unduly burdened by overhead requirements.
- The building will house interdisciplinary research groups with the goal of cultivating relationships that will lead to scientific discovery. Social interaction spaces are critical for the exchange of ideas and free-flow communication among all groups.
- The building will be focal point on the Innovation campus; however its expression should not be ostentatious - it should communicate the mission of the building and its benefit to the public.
- Core facilities (such as a vivarium, special instrumentation or imaging facilities) become drivers for determining building use because of their high cost and unique function. Their utility should be maximized to ensure a high return on initial investment and ongoing operating costs. Whether planned for shared or proprietary use, there should be no duplication of core facilities with others that can serve the same purpose.
- The building should be designed according to sustainable design guidelines, consistent with the mission of the University for improving the health of people and the environment.
- Security and safety are of primary importance.
- Service access should be coordinated with the Innovation Campus Master Plan, landscaping, building use, and security.
- The building should have sufficient capacity for utilities to adapt to future infrastructure requirements for different uses.

The above requirements were used as guidelines during the programming phase, in order to provide the best fit between the use of the building and the goals of USU and USTAR.

3.1.2 **Justification**

Once the decision was made to dedicate the new building to life sciences research, the question arose if it should be planned specifically for Center for Advanced Nutrition (CAN) or in a more generic manner. Two Space Programs were generated by the Design Team; one addressed the needs of CAN while the other was a more generic life sciences program. This exercise showed that there is no significant difference between the two program versions. As a result, it was decided to use the generic Space Program for flexibility if the prospect for CAN as the main tenant is revised. The program quantities were determined as follows:

- The quantities for laboratories, support spaces, specialty spaces and offices are based on the projected population count of a generic life sciences research facility, and are generally consistent with the requirements of CAN. Two areas were adjusted by the Design Team in order to be in line with national metrics and current evolution in lab design:
    - The ratio of support spaces to labs was increased.
    - The number of faculty offices was increased to accommodate more researchers.

  This brings the ratio of research space per faculty closer to national averages for this building use.
- Sufficient conference rooms, meeting rooms and a library were provided to meet the needs of the projected population.
- There are three sizes of animal holding rooms (small, medium, and large), in order to accommodate different needs, including the housing of larger animals in pens. There is sufficient quantity and size of animal holding rooms for the faculty to have dedicated, rather than shared holding rooms.

3.1.3 Vision and Principles

During the programming phase, the resolution of three critical tasks was the key to setting the right direction for the project:

- Identify the program for the building.
- Identify potential user groups.
- Determine the contribution to the project of Building 620.

As a first step for resolving these tasks, the Design Team interviewed several research groups that were identified by the Steering Committee. All groups with USTAR funding were interviewed, as well as groups with USTAR potential or vital links to the USTAR groups. While USTAR funding is not a prerequisite for tenancy, the USTAR groups were natural candidates for selection, not least because most are newly formed and temporarily housed. The following groups were interviewed:

1. Microbe Biotechnology (Bio-fuels, Bio-remediation, Fermentation)
2. Center for Advanced Nutrition (CAN)
3. Infectious Diseases – Institute for Antiviral Research
4. Directed Energy Sensor Technology (DEST), (recently changed to Center for Active Sensing and Imaging or CASI)

Information on the nature of research, the current and projected population and the space needs of the research teams was collected during the interviews. Their potential for contributing to the goals of the project was evaluated by using selection criteria identified during visioning. A brief summary of the interview data is provided below:

1. Microbe Biotechnology Group:

- The research goal of the group is to convert organic matter into commercially viable bio-fuel technologies, renewable energy sources and other renewable products.
- Research takes place primarily in wet labs and bioreactor labs. A shop is required for the fabrication of the bioreactors by the group, as well as a test engine lab. The bioreactor lab and fabrication shop need to be located in high bay spaces because of equipment size and access needs.
- The Bio-fuels group is scheduled to move to building 620 this year.
- The commercialization potential of this research is significant.

2. Center for Advanced Nutrition (CAN):

- The Center is focused on understanding aspects of nutrition on the molecular and genomics level. They conduct basic science research and animal behavioral studies with a current focus on dietary fat. The human nutritional program uses human subjects to investigate how gene linkages respond to diet interventions.
- The current population is 3 principal investigators and a staff of 34 which includes faculty and post doctoral researchers (this includes ten staff from Dr. Lefevre). The Center plans to double in size in five to seven years from forty to eighty people.
- Research takes place in wet labs and support spaces, as well as in an outpatient type of environment for metabolic research with human subjects.
- Most research relies on the use of laboratory animals; CAN currently uses animal holding rooms at LARC.
- There is high potential for translational medicine and other technology transfer opportunities.

3. Infectious Diseases – Institute for Antiviral Research:

- IAR has contracts with the NIH and the pharmaceutical industry for drug testing. This includes in-vetro drug screening and in-vivo drug discovery.
- Their space needs are 20 conventional animal rooms, 10 BL3 rooms, 10 BL2 rooms, 5 support labs, and other support areas.
- Because of DOD related research, certain areas will need to meet very high clearance security requirements.
- The commercial transfer potential for this group is low.
- IAR is currently housed at LARC. The group is skeptical about moving to the new facility because of their need of BL3 environments, their use of USU students and their desire to be close to the amenities of the main campus. On the other hand, reasons to move are the outdated state of the current facilities and the risk of infectious agents on the main campus.

4. Directed Energy Sensor Technology (DEST):

- The DEST group is affiliated with the Space Dynamics Laboratory and conducts research on laser based sensor systems and their use on environmental and other applications.
- Their current population is 4 principal investigators, 25 FTEs, and 30 students. They are committed to hiring 25 additional staff in the near future.
- Research mainly takes place in optics labs which have specific vibration isolation criteria. A shop for equipment calibration, a clean room and a vehicle bay for the mobile sensor lab are also required.
- DEST is currently housed in Building 620.
- Some research conducted by DEST is already commercially viable.
- The DEST group expressed their reluctance to move to the USTAR building because of their concern for high overhead recovery rates.

The Design Team and Steering Committee had the following preliminary observations and concerns after the interviews:

- CAN meets most selection criteria for tenancy at the USTAR building. Microbe Biotechnology and DEST meet fewer criteria and Infectious Diseases meets the fewest.
- There is a wide disparity among the types of spaces required by different groups. There are several specialty environments for proprietary use which will reduce the options for expanding the groups into spaces vacated by others.
- Only CAN and Infectious Diseases will use the vivarium, which is the most expensive component of the proposed building.
- A vivarium is required for both CAN and Infectious Diseases – they are both currently housed in LARC. LARC is approximately a 15,000 GSF facility built in 1972, and is in need of an update. The LARC representatives feel that there is enough need for animal housing to fill the space vacated by the departure of CAN and Infectious Diseases.
- In order to meet the space requirements of DEST and Microbe Biotechnology, Building 620 needs infrastructure and structural modifications.

3.1.4 History and Growth

Based on the data collected during the interviews, the Design Team compiled a Space Program in order to test possible space allocation models. The Space Program included the groups described above (Microbe Biotechnology, Advanced Nutrition, DEST, Infectious Diseases), as well as vivarium space and shared support space. Several models were developed and presented to the Steering Committee for allocating the program in the USTAR Building (including Building 620) described below. Preliminary cost and efficiency figures were used based on benchmarking metrics and published data of national averages, adjusted for the local market. A maximum height of 3 floors above grade and a possible basement were assumed for new construction. Five options were studied (See Section 6, Appendix C 6.3):

- Option 1 – accommodates all program groups in the Space Program. DEST and Microbe Biotechnology are housed in Building 620, while the other programs are housed in the new USTAR Building. In this option, only a portion of the required DEST space can be accommodated, and there is no unassigned space program growth.
- Option 2 – The entire USTAR Building (including Building 620) is dedicated to life sciences research. Microbe Biotechnology and DEST are not included, and unassigned space for program growth in life sciences is provided.
- Option 3 - The entire USTAR Building (including Building 620), is dedicated to physical sciences research. Center for Advanced Nutrition, Infectious Diseases, and the Vivarium are not included, and unassigned space for program growth in physical sciences is provided.
- Option 4 – This is a hybrid option which includes physical sciences in Building 620 (Microbe Biotechnology) and life sciences in the new USTAR Building (Center for Advanced Nutrition, Infectious Diseases, and the vivarium). Unassigned space is provided in both Building 620 and the new USTAR Building.
- Option 5 – This is a second hybrid option with physical sciences in Building 620 (DEST) and life sciences in the new USTAR Building (Center for Advanced Nutrition, Infectious Diseases, and the vivarium). Unassigned space is provided in both Building 620 and the new USTAR Building.

These options were discussed extensively with the Steering Committee and the following observations and conclusions were made:

- The Steering Committee expressed preference for the hybrid schemes 4 and 5 because they include unassigned space for program growth and they can accommodate a wider range of programs than options 2 and 3. It was critical to the Committee to accommodate as many research groups on the Space Program as possible, because they all face pressing space needs.
- The Steering Committee was also very concerned about the high costs of retrofitting Building 620 for the special needs of DEST or Microbe Biotechnology (high bays, vibration requirements for optical equipment, solar collector installation, etc.). The Committee was reluctant to commit a significant portion of the construction budget to Building 620 – it is a new building and money has already been spent to accommodate the move of DEST and Microbe Biotechnology.
- The Design Team discussed the implications of building construction that can accommodate both life and physical sciences, and can switch between the two uses:

Advantages:
- Maximum flexibility for future use.
- Building use able to adapt to shifting funding climate, market conditions and other factors that affect strategic decisions on research.
- Opportunity to host a wider spectrum of interdisciplinary groups.

Disadvantages:
- Higher construction cost: the functional requirements of environments for life sciences often differ from physical sciences, especially for specialty spaces. The main areas that are affected by these differences are floor to floor heights, structural bay spacing, vibration isolation, utilities infrastructure, ventilation requirements and bio-containment conditions. A building that meets all these needs will have increased floor to floor heights, higher redundancy of utilities pathways (including space above ceiling, shafts, penthouses and other mechanical areas), a heavier structural system and hence higher construction cost.
- Less sharing of core facilities: Life and physical sciences may share some, but not all core facilities, which are often the most expensive components of the building. A typical example is animal facilities which are predominantly used for life sciences research.
- When the program is dispersed among too wide a spectrum of research areas, it is less likely that a critical mass of related research will be formed, with the momentum required to make a larger impact. The momentum is often carried by research centers that have the ability to attract like-minded researchers from several disciplines.

- In further discussions, the benefits of dedicating the new construction to life sciences became more apparent. This implies a long term commitment of USU to life sciences research with technology transfer potential. Under this scenario, the Center for Advanced Nutrition is the best fit for the new building. The engine of the building will be a state-of-the art vivarium to support life sciences research.
- A higher level bio-containment environment will be part of the vivarium, where future research in infectious pathogens will take place.

- Since DEST and Microbe Biotechnology are both housed in Building 620 (at least temporarily) it was decided that they remain there until their future development and requirements become clearer. Building 620 will not be further retrofitted for the time being. This allows the entire project budget to be allocated to the new and consequently larger USTAR Building. The new USTAR Building may not necessarily require a connection to Building 620.
- The new USTAR Building should be planned to have expansion potential to house more research and vivarium space as programs grow in size and number. This project is seen as the first phase of a significant research center for USU, the State of Utah, and beyond.

3.1.5 master plan reconciliation

3.1.5 Master Plan Reconciliation

The decisions made during the visioning and programming phases are consistent with the intent of the Innovation Campus Master Plan by Sasaki and the Bio Innovations Research Institute Feasibility Study (December 2005) by ajc architects. However, it was noted that the size of the USTAR Building, especially when expanded may not fit on the 300' by 300' square lots proposed in the master plan. As a result, some tertiary or service roads will need to removed or relocated in order to provide "superblocks" for larger buildings required for research environments.

3.1.6 Function

The planning principles for the USTAR Building were based on user input, site conditions, sustainable design guidelines, and national trends in the evolution of laboratory design. The following trends were considered:

- Increased open lab to support open space ratio
- More specialty lab spaces, some with continuous staffing
- More computational work in dry areas
- Emphasis on energy efficiency and sustainability
- Increased interaction among interdisciplinary research teams
- Increased capacity for utilities to accommodate expansion
- Higher vibration isolation requirements
- Higher need for core facilities (e.g. animal facilities, imaging)

A 21’ structural bay modular lab layout was used in order to increase adaptability for different uses. The modular layout, in combination with an open lab concept, can adapt to the shifting target of different size groups as they expand and contract. The benefits of using reconfigurable case work, flexible utilities and moveable partitions will have to be weighed against their cost implications.

The vivarium is anticipated as a separate wing from the lab wing. This provides the advantage and possible cost savings of a dedicated structural system and other infrastructure components, tailored to the needs of the vivarium for function, space sizes and vibration isolation. Similar to the modular lab lay-out, the holding rooms were configured in modules of two sizes to house different size animals.

3.2 architectural planning principles

3.2 Architectural Planning Principles

The Design Team in collaboration with the Steering Committee has developed the following planning principles for the new USTAR Building:

- The USTAR Building will command a significant presence as a focal point on the Innovation Campus, especially in its expanded phase. As such, its architectural expression needs to convey purpose rather than image; utility rather than indulgence; quality rather than extravagance and permanence rather than speculation.
- The exterior expression of the building should reflect its function and diverse inner life. The building will establish an architectural identity for future buildings on the Innovation Campus which should be consistent with the Innovation Campus Master Plan guidelines, as well as local conditions.
- The design, construction and use of the building should be guided by principles of sustainability, energy conservation/generation and restoration of the environment.
- The site orientation of the building will respond to solar exposure and predominant breeze direction.
- The building massing will form courtyards and public spaces which will extend its use and social life outdoors, and can become generators for future growth.
- The building should be planned to make future expansion possible for all programs, including the vivarium which should be expandable without having to add lab spaces.
- Material selection should be based on durability, ease of maintenance, value, compatibility with design intent, and meeting the sustainable goals of the project.
- Building planning should optimize efficiency by incorporating critical adjacencies, multiple function spaces and shared facilities. A condensed, rather than ample social environment will incite closer relationships and communication among users.

3.2.1 building form and mass

3.2.1 Building Form and Mass

It is anticipated that the USTAR Building will be three stories high, plus a mechanical penthouse. A three story height is consistent with the Master Plan and the context, and can offer a walk-up condition which is beneficial for social interaction and health. Due to a high water table it is very unlikely that a basement will be affordable or practical.

The building massing should be deliberate in defining exterior spaces and uses, and setting the pattern for future development. It is also anticipated the massing will define two wings of approximately equal height. Each wing can be dedicated to a specific programmatic function – such as labs and a vivarium, as recommended in the selected stacking option (see Section 4).

3.2.2 Internal Relationships

The Design Team presented several options as test fits for the program (see Section 6, Appendix E 6.5). The Steering Committee expressed preference for Scheme 2, because of better site utilization and the ability to expand the Vivarium without having to expand the lab areas. The more public areas, café and non-wet research will be located on the first or lower levels. Wet lab spaces will be located above the first level. The Vivarium has to be as separate from all areas as possible; yet it needs to have access to the labs on every floor, and requires a dedicated loading facility.

Generally, the building will be planned as an open environment where maximum interaction among its users is encouraged and accommodated. However, certain program functions have specific privacy and security needs:

- The human subjects' area should have a welcoming entrance with a receptionist. The clinical area should be accessible to the public only through the receptionist area. The dining area for the human subjects can be shared with the open café area.
- The building's main entrances, café and other public areas should be separated as much as possible from the Vivarium, both physically and visually. A CCTV system should be employed throughout the Vivarium.
- The Bio-Containment Research Suite BSL-3, where work with select agents will take place, will be designed as an isolated zone from the Vivarium and the rest of the building. This area is intended to function as a "box within a box", and should have strictly controlled access and special security measures.
- The access to the lab floor areas will be regulated by function and all applicable guidelines. To that end, some control is required at the entrance to the lab floors, which could be provided by locating the office support areas near the elevators.

3.2.3 natural light and views

3.2.3 Natural Light and Views

Consistent with sustainable guidelines, the building should make use of natural light to the greatest extent possible. This should conserve energy and provide a healthy environment for the users.

- Workspaces that are continuously occupied should be placed at or near a window. When this is not possible, every effort should be made to provide “borrowed” daylight.
- Transparent partitions should be used where possible to allow natural light penetration as deep into the building as possible.
- Operable windows at the non-lab areas contribute to the quality of the environment.

The building should follow the guidelines included in USU’s document “Optimizing the Learning Environment”, issued by Facilities Planning, Design & Construction. The guidelines state that daylight should be used as the “primary lighting system for at least 74% of the space, excluding copy rooms, storage areas, mechanical... and other low occupancy support areas.” The building orientation should account for solar conditions to optimize daylight harvesting and minimize glare and thermal gain.

- Open labs and other spaces with larger windows should be oriented to the north to minimize thermal gain.
- Offices and other controlled environments can be oriented to the south, if sufficient solar control devices are provided.
- It is preferable that no part of the building with large exterior openings is oriented to the west.

3.2.4 circulation

3.2.4 Circulation

Internal circulation flow shall be generally open, with control points at the entry, human subjects' area and lab access. The following are specific internal circulation requirements:

- There will be dual access from the Vivarium to all lab floors. One access will be dedicated to animal transport directly to the labs. The other access will be for staff authorized to enter and exit the Vivarium. The two access routes need to be separated from each other in order to prevent cross contamination. The dual access layout will require two adjacent elevators on each floor of the Vivarium.
- Two internal service docks are required, one for the Vivarium, and one for building services. The two docks can share a common exterior area, but their internal facilities need to be separate and dedicated.

External circulation shall accommodate safe and accessible (ADA) travel from pathways, open green spaces and open parking areas to the building entrance points. The system of pedestrian pathways should encourage the use of outdoor spaces and should be part of the larger network of pedestrian circulation planned in the master plan. This includes outdoor seating areas, shade trees, water and other natural features.

3.2.5 personal interaction

3.2.5 Personnel Interaction

As discussed previously, maximizing the interaction among users is a goal for the planning of the building. It may not suffice that the users come in contact with each other in public spaces such as the lobby, atrium or café. This may happen two a three times a day and only for short instances. The building lay-out should encourage more contact in the workspaces as well. A more traditional, hierarchical internal layout will often separate different “classes” of users, such as faculty, staff and students. Different options should be investigated that dissolve the barriers between these groups and place them in closer access to each other for their mutual benefit. The same is true for the interaction among users of different groups.

The Design Team investigated several lab floor layouts with varying degrees of personnel interaction. They were discussed with the Steering Committee and decisions were deferred for future design phases. It is expected that several lab layout models will be developed by the Design Team and tested by the users. The Design Team will solicit input from all lab user groups, not only principal investigators. Lab layout options are included in Section 4.

3.2.6 approach to materials and finishes

3.2.6 Approach to Materials and Finishes

Materials and finishes for the building should be seen in the general context of the Innovation Campus and the O&M practices of USU. In addition, sustainability and the environment should be guidelines in material selection. While it is not required that the look and materials of the new building emulate the adjacent buildings on the Innovation Campus, a certain measure of continuity is desired. More importantly, materials and finishes should set a precedent for next building phases, in order to form a cohesive environment which is also convenient to service and maintain.

3.2.7 building security

3.2.7 Building Security

The main concern areas for building security are:

- The Vivarium should be virtually impenetrable, except for authorized personnel. To that end, there needs to be very strict entry requirements at all access points, which should be as concealed and remote from public areas as possible. This will include an advanced security system at all entry points, including the loading dock. Access points on the lab floors should have similar high security measures.
- Security requirements for the rest of the building will be consistent with operations and policies of USU and the Innovation Campus.

3.2.8 Codes, Regulations, and Safety

The governing codes for this project are listed below. The Design Team and Architect of Record will need to be verify at the beginning of the design phase all required codes and regulations. It is the Design Team and Architect of Record's responsibility to utilize all latest revisions, editions and adopted versions. The following list presents current applicable code issues and is not a complete list of applicable codes.

- International Building Code (IBC) 2006 with Amendments
- International Plumbing Code
- International Mechanical Code
- International Fire Code
- Life Safety Code NFPA 101 with Utah Amendments
- National Electrical Code (NEC) with Utah Amendments
- Laws, Rules and Regulations of the Utah State fire Marshall
- Planning and Design Criteria to Prevent Architectural Barriers for Aged and Physically Handicapped (Fourth Revision, with lever hardware amendment)
- Americans with Disability's Act Title III, 1991 (ADA)
- Utah Division of Facilities and Construction Management Design Criteria
- Utah State University's OSHA Lab Standards
- Utah State University High Performance Design Standards
- Utah State Facilities Design and Construction Design Guidelines
- ANSI A117-119-1968 Accessibility Design Standards
- American Society of Heating, Refrigeration and Air Conditioning ASHRAE
- Sheet Metal and Air conditioning contractor National Association (SMACNA)
- Underwriters Laboratory (UL)
- American Society of Testing Materials (ASTM)

In addition, the design Team and Architect of Record will be required to coordinate their efforts with the Campus Design and Construction Department and DFCM.

Recommended additional codes, standards and guidelines include:

- ANSI/ASHRAE Z9.5
- Innovation Campus Master Plan
- Utah State University Campus Plan
- State of Utah Building Board Polices
- See Structural, Mechanical, and Electrical sections in this document for related codes and regulations.

Occupancy Classification:

The University Fire Marshall and the Architect of Record must confirm the occupancy and the Construction Type.

The Utah State University's Facilities Design and Construction is the representative of the University with authority over all aspects of the design and construction processes. All contact should be directed through the Project Manager from Facility design and Construction.

Code Analysis:

Programmed area of 98,668 gross square footage – 3 to 4 stories

International Building Code
- 2006

Occupancy classification – IBC Chapter 3

• B	Section 304.1	Business Group; offices, education occupancy for students above the 12th grade, Animal hospitals, Laboratories: testing and research.
• A-3 (accessory) Not a separate occupancy	Section 508.3.1 And exception 1	Conference, Waiting Areas (less than 10% of the area; accessory assembly area if less than 750 sq. ft.
• H-4 (control areas) Not a separate occupancy	Section 307.1 Exception 2	Building or portion thereof that contains Health Hazards including toxic substances (lethal chemicals) and/or highly toxic substances (chemicals that are lethal in smaller dose than toxic substance).

Mixed Occupancy – IBC Chapter 5

• Accessory Occupancies	Section 508.3.1	Aggregate accessory occupancies less than 10 percent of the area of the story is subsidiary to the main occupancy. No separation is required between accessory occupancies or the main occupancy and (exception 1) – if the area of an accessory assembly occupancy is less than 750 sq. ft. it need not be considered a separate occupancy.

Control Areas – IBC Chapter 3

• Control Areas	Section 307.1	Control areas complying with defining limits of Hazardous Material posing a Health Hazard see IBC Table 307.1 (2) For percentage of
	Table 414.2.2	the maximum allowable quantity per control area per building floor, allowable control areas per building floor, required fire resistance rating

Type of Construction – IBC Chapter 6

• Type II-B, (sprinkled)	Section 602.2	Building elements are noncombustible; exceptions as listed in section 603

Building Height – IBC Table 503

• Allowable height	=	55 feet
• Allowable stories Group B	=	4 stories

Height – Automatic Sprinkler Increase – IBC Section 505.5.1

• Allowable height may be increased by 20 ft.	55 feet + 20 feet = 75 feet
• Allowable number of stories may be increased by 1	4 + 1 = 5 stories

Building Area – IBC Table 503

• Allowable table area (per story) Group B	=	23,000 sq. ft.

Area modification – IBC Chapter 5

• Frontage Increase	Section 506.2	Assuming a minimum access of 30 feet to a public way or open space, the square footage may be increased by 75%
Group B	=	23,000 x 0.75 = 17,250 sq. ft.
• Auto. Sprinkler increase	Section 506.3	Equipped throughout with an approved Automatic sprinkler system the square footage may be increased by 300%
Group B	=	23,000 x 3 = 69,000 sq. ft.
• Area Modification	Section 506.1	Table area + frontage increase + Auto sprinkler increase
Group B	23,000+17,500 +69,000	**TOTAL = 109,250 sq. ft./story**

- Area Determination — Section 506.4 excpt. 2 — The maximum area of a building equipped throughout with an automatic sprinkler system shall be determined by multiplying the allowable area modification per story by the number of stories

Group B = (three levels) 109,250 sq. ft. x 3 story = 327,750 sq. ft.

High Hazard Group-IBC Chapter 3 and Chapter 4

- Defining limits of Hazardous Material posing a Health Hazard see IBC Table 307.1 (2) below.
- For percentage of the maximum allowable quantity per control area see IBC Table 414.2.2 below.

[F] TABLE 307.1(2)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIAL POSING A HEALTH HAZARD[a, b, c, j]

MATERIAL	STORAGE[d]			USE-CLOSED SYSTEMS[d]			USE-OPEN SYSTEMS[d]	
	Solid pounds[e, f]	Liquid gallons (pounds)[e, f]	Gas (cubic feet at NTP)[e]	Solid pounds[e]	Liquid gallons (pounds)[e]	Gas (cubic feet at NTP)[e]	Solid pounds[e]	Liquid gallons (pounds)[e]
Corrosive	5,000	500	810[f, g]	5,000	500	810[f, g]	1,000	100
Highly toxic	10	(10)[i]	20[h]	10	(10)[i]	20[h]	3	(3)[i]
Toxic	500	(500)[i]	810[f]	500	(500)[i]	810[f]	125	(125)[i]

For SI: 1 cubic foot = 0.028 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

a. For use of control areas, see Section 414.2.

b. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs, consumer or industrial products, and cosmetics, containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.

c. For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 414.2.4, see Table 414.2.4(1).

d. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.

e. Quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note f also applies, the increase for both notes shall be applied accumulatively.

f. Quantities shall be increased 100 percent when stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in the *International Fire Code*. Where Note e also applies, the increase for both notes shall be applied accumulatively.

g. A single cylinder containing 150 pounds or less of anhydrous ammonia in a single control area in a nonsprinklered building shall be considered a maximum allowable quantity. Two cylinders, each containing 150 pounds or less in a single control area, shall be considered a maximum allowable quantity provided the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

h. Allowed only when stored in approved exhausted gas cabinets or exhausted enclosures as specified in the *International Fire Code*.

i. Quantities in parenthesis indicate quantity units in parenthesis at the head of each column.

j. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 2703.1.2 of the *International Fire Code*.

[F] TABLE 414.2.2
DESIGN AND NUMBER OF CONTROL AREAS

FLOOR LEVEL		PERCENTAGE OF THE MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA[a]	NUMBER OF CONTROL AREAS PER FLOOR	FIRE-RESISTANCE RATING FOR FIRE BARRIERS IN HOURS[b]
Above grade plane	Higher than 9	5	1	2
	7-9	5	2	2
	6	12.5	2	2
	5	12.5	2	2
	4	12.5	2	2
	3	50	2	1
	2	75	3	1
	1	100	4	1
Below grade plane	1	75	3	1
	2	50	2	1
	Lower than 2	Not Allowed	Not Allowed	Not Allowed

a. Percentages shall be of the maximum allowable quantity per control area shown in Tables 307.1(1) and 307.1(2), with all increases allowed in the notes to those tables.

b. Fire barriers shall include walls and floors as necessary to provide separation from other portions of the building.

- Section 414.1.3: Separate floor plans identifying the location of anticipated contents and processes shall be prepared and submitted. A report identifying hazardous materials representing hazards, including quantities) and methods of protection from such hazards is to be prepared and submitted.
- Section 414.2.1: Control areas shall be separated form each other by fire barriers
- Table 414.2.2; See table for number of control areas allowed on each floor
- Section 415.2: Floors in H-4 group shall be noncombustible liquid-tight construction
- Highly Toxic solids and liquids are to be stored in approved hazardous materials storage cabinets.

Fire Resistive Requirements – IBC Chapter 6, table 601

- Structural Frame — 0 hour rating
- Bearing Walls
  - Exterior — 0 hour rating
  - Interior — 0 hour rating
- Exterior Non-bearing Walls — 0 hour rating
- Interior Non-bearing Walls — 0 hour rating
- Floor (including supporting beam and joists) — 0 hour rating
- Roof (including supporting beam and joists) — 0 hour rating
- Corridor (table 1017.1) — 0 hour rating
- Stairs (section 1020.1) — 2 hour rating if connection 4 or more stories
1 hour rating if connection less than 4 stories
- Occupancy separation
From H-4 group to A group — 2 hour rating
From H-4 group to B group — 1 hour rating
- Control area Fire Barrier
Floor levels 1,2 and 3 — 1 hour rating
Floor level 4 — 2 hour rating
Basement — 1 hour rating

Number of Exits – IBC Chapter 10, table 1015.1 and 1019.2

- Load that exceeds 49 will require two exits
- Two exits required if the travel distance is over 75 feet

Travel Distance – Chapter 10, table 1016.1

- 'A' occupancy (sprinkler) = 250 feet
- 'B' occupancy (sprinkler) = 300 feet

Exit Separation – IBC Chapter 1015.2.1

- Exit separation in buildings = one third (1/3) the diagonal dimension of the building or area

Plumbing Fixtures required – IBC Chapter 29

- B occupancy, table 2902.1

Water Closets Male / Female	Lavatories Male / Female	Drinking Fountains	Service Sinks
1/25 for the first 50 and 1/50 for the remainder exceeding 50	1/40 for the first 80 and 1/80 for the remainder exceeding 80	1/100 **	1

**Minimum of two Drinking Fountains with one Accessible Section 1109.5.1

Accessible – IBC Chapter 11

- Section 1109.2.1 and 1109.2.1.4 –A unisex toilet room is not required..
- Section 1109.2.2 – Toilet facilities require that a minimum of one wheelchair accessible water closet compartment be provided. If six or more water closet compartments and urinals are provided in toilet room at least one ambulatory-accessible water closet compartments shall be provided in addition the wheel-chair compartment.
- Section 1109.3 – each restroom will need to have 5% of the sinks but not less than one to comply with ICC A117.1
- Section 1109.5.2 – 50 percent of the drinking fountains to be accessible

The Utah State Building Board has adopted the following additional requirements:

- All public entries to the building will be ADA compliant with automatic door operators including required vestibule doors.
- One set of accessible restroom doors shall be equipped with automatic operators including vestibule doors if applicable.
- ADA compliant parking shall be addressed.

Interior Finishes – (Table 803.5)

- For non-sprinkled Buildings in A occupancy
  Exit enclosures and exit passageways = Class 'B' fire spread
  Corridors = Class 'B' fire spread
  Rooms and enclosed spaces = Class 'C' fire spread

- For non-sprinkled Buildings in B occupancy
  Exit enclosures and exit passageways = Class 'B' fire spread
  Corridors = Class 'C' fire spread
  Rooms and enclosed spaces = Class 'C' fire spread

Roof Covering Fire Classification – IBC Table 1505.1

- Type of Construction II-B = Minimum of a 'C' Cover Fire Classification

Testing And Inspections

The Architect of Record and selected design team shall perform periodic construction observations, testing and special inspections as outlined in Section 4.6 of the DFCM Design Criteria for Architects and Engineers. The design engineer shall list all required special inspections on the contract drawings, and perform periodic observations as required by the A/E agreement. Costs for testing and special inspections services will be paid directly by the University.

3.3 structural design criteria

3.3 structural design criteria

3.3 Structural Design Criteria

The structural design for this project should provide a building system which will integrate with the program requirements for space layout, as well as with the architectural and building service needs, while meeting current code standards for vertical and horizontal load carrying capacity. User needs in terms of current flexibility of the spaces and future adaptability of use should be considered. The level of user comfort and the ability to complete motion sensitive tasks as determined by the acoustic and vibration sensitivity of the structure should also be addressed.

3.3.1 structural service coordination

3.3.1 Structural/Service Coordination

Layout of the structural grid will need to respect the planning modules established for the various building and laboratory functions. During the design phase, a completely integrated approach to building systems is recommended. Distribution of HVAC, plumbing and electrical services must be carefully coordinated with the structural elements, particularly at framing intersections and major crossover points. This close coordination must be achieved in order to avoid conflicts between building systems and limit penetrations of major structural members.

3.3.2 structural codes and standards

3.3.2 Structural Codes and Standards

The building structure shall be designed in accordance with the 2006 International Building Code (IBC 2006).

Codes and standards that apply to the design of this building are:

- 2006 International Building Code
- American Institute of Steel Construction (AISC) with Commentary
- ACI 318 Building Code Requirements for Reinforced Concrete
- American Iron and Steel Institute (AISI) Specifications for the design of Cold-Formed Steel Structural Members
- American Welding Society (ANSI/AWS) D1.1 Structural Welding Code
- Steel Joist Institute (SJI) for open web Joists and Girders
- Steel Deck Institute (SDI) for Metal floor and roof Decks

3.3.3 Geotechnical Criteria

AMEC Earth & Environmental has completed a geotechnical report dated Dec. 3, 2007 for the USTAR Building. Subsurface conditions disclosed by the test holes drilled by the geotechnical consultant consisted of surficial lean clay one to five feet thick underlain by layered silts and clays to the maximum depth explored, approximately 45 feet at boring 8. Silty gravel layer 3 to 4 feet thick were encountered in some of the borings. Three feet of fill material was present at the far eastern part of the site.

Groundwater was initially encountered 6 to 8.5 feet below the ground surface. After the water table stabilized, the groundwater was measured 8 to 9.5 feet below the ground surface. The location of the water table relative to the ground surface will need to be considered in the design of the foundation system of the building. A vapor retarder membrane will probably be necessary below the slab on grade. The need for a foundation drainage system and other moisture control measures shall be considered during the design phase of the project and coordinated with the final geotechnical report.

Due to soil characteristics at the site, it is anticipated that heavy foundation loads will require the use of footing systems other than typical spread footings. Mat foundations, rammed aggregate piers, and driven piles are potential alternate foundation systems that will need to be considered for heavier foundation loads. The geotechnical report indicates that spread footing systems are appropriate for column loads up to about 430 kips.

If the building is concrete framed to limit vibration in the suspended floors, it is likely that the column loads will exceed 430 kips, and alternate foundation systems will need to be used. The column loads are primarily dependent on the weight of the structural system, magnitude of live load on the suspended floors, bay size, and number of suspended floors. If the building is steel framed, a spread footing system may be appropriate for the building depending on the column loads resulting from the number of floors, bay size, etc. The added cost of alternate foundation systems shall be considered in conjunction with the cost of potential structural systems that will provide vibration performance appropriate for the function of the building.

The seismic spectral accelerations of the ground at the site are high as indicated in the Earthquake Design section of this program. The nearest known potentially active fault of concern is the Utah East Cache Fault located about one mile to the east of the site. It does not appear that active mapped faults pass through the site. The geotechnical report indicates that the site is classified as a Site Class E for calculating earthquake loads on the building.

The geotechnical reports indicates that laboratory analyses confirm that highly susceptible liquefiable soils are present below the site, and estimated settlement due to liquefaction could be as high as 3 to 4 inches during a major earthquake. The risk of lateral spread occurring in the soils during an earthquake is present at the site, but is generally considered to be low according to the geotechnical report. Potential foundation systems shall be evaluated considering the relative cost of different systems, the risk of liquefaction and lateral spread in the soils during an earthquake, and the effectiveness of the foundation systems in mitigating these risks.

3.3.4 Structural Basis of Design

Loading Criteria

The structural systems in the facility shall be designed to meet the requirements of the 2006 International Building Code (IBC), Minimum Design Loads for Buildings ASCE 7-05 and the Design Requirements Manual adopted by the Utah State Building Board. Copies of the Design Requirements Manual can be obtained from the Division of Facilities Construction Management (DFCM). Section 3.1 deals with enhancements of building code requirements and section 3.4 lists general design requirements. The following minimum requirements should be anticipated:

- Wind Velocity: 90 mph, Exposure "B" or "C", for the building structure, as appropriate to the site. Exposure "C" shall be used for elements and components including the exterior window wall system
- Seismicity: 2006 IBC and ASCE 7-05 Seismic requirements with a "Seismic Importance Factor" of I = 1.00 for an occupancy category II building.
- Roof Load: 37 psf minimum plus snow drift where appropriate.
  Snow Load Importance Factor I = 1.0 in accordance with Table 7.4, ASCE 7-05.
- Floor Design Live Loads: Floor design live loads shall be in accordance with the latest edition of the DFCM Design Criteria Manual and as follows:

1. 125 to 165 psf, unreduced at lab areas, except for column and footing designs. Further evaluation of the appropriate live load capacity shall take place during the schematic design phase of the project.
2. 80 psf plus 20 psf movable partition load at office areas
3. Areas of concentrated standard file storage - 125 psf
4. Floor areas supporting high density rolling files – 225 psf
5. Paper storage areas – 250 to 350 psf as appropriate
6. UPS Battery Storage areas – 250 to 450 psf as appropriate
7. Mechanical Equip. Rooms – 125 psf, minimum, or more as required by the final design.

Areas where heavy load concentrations exceed the normal loading requirements shall be designed for the specific load case.

The more stringent requirement between the 2006 IBC, the DFCM Design Criteria Manual and the loads given above shall govern.

Structural System Selection Cost Comparison

The structural system chosen for the building shall be selected based upon the following criteria:

- A cost comparison of at least two structural systems shall be investigated. The comparison should be broken down in detail with each component of cost significance being listed separately. The overall cost impact of alternate foundation systems as they relate to the foundation load magnitudes from different structural systems (i.e. steel versus concrete) shall be considered as part of this investigation.

- Various structural systems comparing building construction time, material availability, coordination of various trades, lead times for ordering materials, appearance, owner preference, maintenance costs, flexibility for future remodeling, and compatibility with surrounding buildings should be considered when choosing the final structural systems for the building.

- The structural system comparison shall include considerations of vibration performance of the finished structural system to provide the vibration environment needed for the proposed research endeavors that are to be undertaken within the facility for the near and distant future.

- Damage to the building structure and its contents due to lateral earthquake and/or wind loads should be evaluated between various structural systems. Damage control to building non-structural systems is a pertinent and important consideration when selecting the building structural system.

A more rigid shear wall and/or braced frame lateral force resisting systems provide greater damage control to a building's non-structural systems and contents than does a more flexible moment frame type lateral force resisting system. On the other hand, a moment frame lateral force resisting system provides almost unlimited programmatic and planning flexibility initially and during the life of the building.

Cast in place reinforced concrete shear wall lateral systems usually work most economically with a cast in place reinforced concrete structural floor framing system while diagonally braced steel lateral systems are usually most economical in conjunction with composite steel floor framing systems.

All cost comparisons between structural systems should include interface costs between other building components such as architectural finishes, exterior enclosure systems, mechanical systems, and electrical systems. Life cycle costing methods should be used where applicable.

Future Building Expansion

- Future vertical expansion is not anticipated because of the significant amount of mechanical equipment located above the rooftop, but this topic must be discussed and decided upon by the design team in the early phases of the design process.
- Future horizontal expansion of the structure is a design requirement, which will be further developed during Schematic Design. It is anticipated that any future horizontal expansion of the building will be separated from the building by an expansion/seismic joint.

Earthquake Design
The proposed structure shall be designed according to the requirements of the 2006 International Building Code and "Minimum Design Loads for Buildings" ASCE 7-05. According to the preliminary project geotechnical report, the closest distance to a known seismic source for this facility is about one mile to the east of the site. Spectral acceleration values for the site taken from the 2006 IBC maps are Ss = 0.903 and S1 = 0.318. These spectral acceleration values shall be verified during the design process.

Laboratory buildings are classified as Occupancy Category II buildings. An Earthquake Importance Factor, "IE" of 1.00 shall be used in earthquake design analysis according to Table 11.5-1 of ASCE 7-05.

Wind Design
Laboratory buildings are classified as Occupancy Category II buildings. A Wind Importance Factor, "IW" of 1.00 shall be used in wind design analysis according to Table 6-1 of ASCE 7-05.

Roof Snow Load Design
Laboratory buildings are classified as Occupancy Category II buildings. A Snow Load Importance Factor, "IS" of 1.00 shall be used in snow load design analysis according to Table 7-4 of ASCE 7-05.

Testing and Inspections
The Architect/Engineer, and the selected testing lab, shall perform periodic construction observations, testing, and special inspections, as outlined in Chapter 17 of the International Building Code. The design engineer shall list all required special inspections on the contract drawings, and perform periodic construction observations as required by the A/E agreement. Costs for special inspections and testing services will be paid for directly by the owner.

3.4 vibration/acoustical design criteria

3.4 vibration/acoustical design criteria

3.4 Vibration/Acoustical

The following recommendations for vibration, noise and acoustical design considerations for Administration Areas and Research Areas are based on accepted and documented criteria for the limitation of vibration and the control of noise.

This Section includes the following:

1. Suggest criteria for the limitation of vibration,
2. Identifies major vibration sources and transportation paths, and
3. Recommends measures to reduce source levels and impede transmission paths.

3.4.1 vibration sensitive people & equipment

3.4.1 Vibration Sensitive People & Equipment

All people and laboratory equipment have a threshold above which they will be disturbed by vibration. The source of these vibrations are (1) impact testing equipment, (2) mechanical equipment, (2) people moving within the building, and (3) external sources such as vehicular traffic. The sensitivity threshold for any person or piece of equipment is determined by its purpose, the mechanisms involved and, to some extent, the person using it.

Control of Suspended Floor and Roof Structure Vibrations
Control of suspended floor and roof structure vibrations due to human and mechanically induced excitation forces shall be considered in the selection of the building's structural floor and roof framing systems. Generally accepted vibration performance guidelines for structural systems are as follows:

1. Floors supporting office and administrative functions shall be designed to provide a maximum floor framing vibration velocity of 16,000 micro-inches per second at 100 paces per minute.

2. Floor framing systems that will exhibit barely perceptible vibrations and be suitable for computer equipment, semiconductor probe test equipment of low sensitivity shall be designed to provide a maximum floor framing vibration velocity of 8,000 micro inches per second at 100 paces per minute.

3. Floors framing systems will exhibit vibration non-perceptible characteristics and be suitable in most instances for surgical suites, microscopes to 100x and for other equipment of low sensitivity shall be designed to provide a maximum floor framing vibration velocity of 4,000 micro inches per second at 100 paces per minute.

4. Floor framing systems suitable for optical microscopes to 400x, microbalances, optical balances, proximity and projection aligners, mass spectrometers other than MALDI and quadruple or high-resolution, conventional spectrometers, etc. shall be designed to provide a maximum floor framing vibration velocity of 2,000 micro inches per second at 100 paces per minute (Class VC-A).

5. Floor framing systems suitable for optical microscopes greater than 400x, inspection and lithography equipment (including steppers) to 3 micro-meter line widths, microtomes and cryotomes for 5-10 micron slices, most tissue and cell culture except as noted below shall be designed to provide a maximum floor framing vibration velocity of 1,000 micro inches per second at 100 paces per minute (Class VC-B).

6. Floor framing systems suitable for standard optical microscopes to 1000x, lithography and inspection equipment (including moderately sensitive electron microscopes) to 1 micro-meter detail size, TFT-LCD stepper/scanner process, digital imaging and/or fluorescence with optical microscope, high-precision balances measuring quantities less than 1 mg, MALDI mass spectrometer, nano-drop spectro photometers, microtomes and cryotomes for slices less than 5 microns, tissue and cell culture of the following types: hanging drop, unstirred layers, embryonic stem cells, weakly adherent cells, very long-term cultures, chemotaxis, invasion assays except as noted below shall be designed to provide a maximum floor framing vibration velocity of 500 micro inches per second at 100 paces per minute (Class VC-C).

7. Floor framing systems suitable in most instances for demanding equipment, including many electron microscopes (SEMs and TEMs) and E-Beam lithography systems working at nanometer scales, and other systems requiring extraordinary dynamic stability shall be designed to provide a maximum floor framing vibration velocity of 250 micro inches per second at 100 paces per minute (Class VC-D).

8. Floor framing systems assumed to be adequate for the most demanding of sensitive systems including microscopy, imaging, nano-fab floor, long path, laser based small target systems, E-Beam lithography systems working at nanometer scales, and other systems requiring extraordinary dynamic stability shall be designed to provide a maximum floor framing vibration velocity of 125 micro inches per second at 100 paces per minute (Class VC-E).

Vibrations from a roof structure supporting rooftop mounted mechanical equipment have interfered with the use of inhabited spaces below on many facilities. Careful consideration in the design of roof framing systems shall be given so as to isolate and dampen all mechanical equipment vibrations. Ceiling mounted equipment is very susceptible to vibrations emanating from floor and roof framing systems above.

Isolation Air Tables have been used effectively by researchers to conduct highly sensitive research functions on existing building floor framing systems not suitable for the highly sensitive research otherwise.

Vibrations from a roof structure supporting rooftop mounted mechanical equipment have interfered with the use of inhabited spaces below on many facilities. Careful consideration in the design of roof framing systems shall be given so as to isolate and dampen all mechanical equipment vibrations. Ceiling mounted equipment is very susceptible to vibrations emanating from floor and roof framing systems above.

For reference, the estimated cost for the following vibration performance levels for a 30 ft. x 30 ft. bay size is as follows:

1. 16,000 micro-inches per second vibration velocity - Baseline cost of $0.00 Based on a structural steel framed floor system
2. 2,000 micro-inches per second vibration velocity - Additional cost of approx. $7.00 to $8.00/sq.ft. for a reinforced concrete pan joist floor system. Additional cost of $20.00/sq. ft. for a structural steel floor system.
3. 1,000 micro-inches per second vibration velocity - Additional cost of approx. $8.00 to $9.00/sq.ft. for a reinforced concrete pan joist floor system. Additional cost of $35.00/sq. ft. for a structural steel floor system.

These estimated costs are based on current local cost of construction.

The Owner/Design Team will ultimately need to decide:

1. Whether to design the entire new building to the most stringent vibration performance level so as to provide ultimate use flexibility for the life of the structure.
2. Whether to design different areas or floors within the structure for varying vibration performance levels to match projected types of use. The second option will save initial construction dollars but will limit the types of uses that can accommodated within the new structure because of the varying floor framing system vibration performance levels.
3. The appropriate vibration design criteria for the anticipated laboratory functions in the building.

There is a significant cost impact on the structural system framing cost to achieve very high vibration performance levels. Based on the information received to date, the following vibration design criteria appear to be appropriate for the anticipated laboratory functions in the building. These design criteria shall continue to be evaluated during the design process, and coordinated with the anticipated laboratory functions that will be housed in the building.

Administrative Areas
The suspended levels of Administrative Areas shall be designed to provide a maximum floor framing vibration velocity of 16,000 micro inches per second at 100 paces per minute.

Research Areas
The suspended levels of Research Areas shall be designed to provide a maximum floor framing vibration velocity of 1,000 to 2,000 micro inches per second at 100 paces per minute unless noted otherwise. This is a Class "VC-B" or "VC-A" vibration environment. Consideration shall be given to providing an area at the floor level at grade where very sensitive equipment may be located. The slab on grade at this area will likely need to be thicker than the typical concrete slab on grade.

Vibration Sources
There are three common primary sources of vibration in buildings as follows:

1. Ambient site vibration including those generated by traffic.
2. Building occupant foot traffic
3. Building services plant and mechanical equipment.
4. Laboratory equipment (vacuum pumps, centrifuges, shakers, etc.) and machinery in the building.

Buildings also experience intermittent vibration from the following sources; door slams, movement of service carts and equipment, and loading/unloading impacts. Of the above, control of intermittent vibration produced by people activities depends almost entirely upon the characteristics of the building structural design. The adequate control of vibration from mechanical equipment and systems is much more straight forward and relatively simple to accomplish through judicious choice of appropriate vibration isolation hardware.

Transmission Paths
Vibration is transmitted through, and is attenuated or amplified by elements of the structure and the internal fittings of the building. Common transmission paths are the structural walls and \ columns. In addition, vibration is transmitted efficiently via ducted and piped services. The amplification occurs in floor slabs and often in the laboratory furniture.

Recommendations for Schematic Design Phase - Building Planning
Many potential problems associated with vibration sources and their transmission paths can be overcome by considering them at the programming stages of the building design. The general guiding principles are as follows:

1. Identify vibration producing and vibration sensitive activities in the building.
2. Locate vibration producing areas remote from vibration sensitive areas.
3. Establish vibration limits for each area where vibration sensitive tasks or equipment may be in use, grouping together tasks and equipment with similar sensitivities wherever possible.
4. Select a building design which minimizes the response of the structure to vibration.

Sources of Vibration - External Environment
The design of the building must act to control vibration that exists on the site. A survey of the site has been conducted to assess vibration levels of traffic on adjacent roadways and from heavy machinery or loading dock areas.

Sources of vibration located within the building are best dealt with at the source. This is done by providing careful vibration isolation measures to all machinery and services, and good laboratory planning. As a general policy, powerful sources of vibration should be located:

1. As far as possible from the more vibration sensitive tasks and laboratory areas.
2. On a ground slab, and/or carried independently to grade.
3. Possibly in a structurally separate part of the building.

Parking Below Vibration Sensitive Buildings
Currently, the building program cost model does not include, and no automobile parking is planned below the proposed building structure. Structured parking is convenient but much more expensive than parking on grade and for this reason is not planned for on this facility.

Traffic Vibrations
There are potential concerns associated with vibrations from roadways near the Proposed USTAR site. This is generally an issue only with facilities with vibration performance criteria more stringent than 500 micro-inches per second. In those cases, traffic within 100 feet might be an issue. Since the USTAR vibration performance criteria are most likely less stringent than 500 micro-inches per second vibration velocity, traffic related vibration problems are not anticipated.

Research Laboratory Planning
Research Laboratories areas should be planned to minimize the risk of vibration disturbance to sensitive tasks or instruments. This planning can be achieved by the following:

1. Keeping sources and receivers of vibration separate (as described above).
2. Locating both sources and receivers of vibration on the least responsive parts of the structure. The least responsive parts of the structure are likely to be on the slab on grade, and within a seven-foot radius of column locations on suspended slabs. The most responsive parts of the structure are likely to be in the center of structural bays.
3. Installing a good standard of laboratory benching.
4. Utilizing optical or vibration isolation tables and other passive dampening systems where highly vibration sensitive tasks and experimental techniques are in use.

Massive (marble or concrete) balance tables are very useful in limiting the amplification of vibration between the floor and balances. Small vibration sensitive experimental setups are best mounted on vibration isolation tables to prevent vibration disturbances. The floor loading should take account of these mounting arrangements.

Electromagnetic Interference
In order to mitigate EMI problems, it is recommended that fiberglass reinforcing bars be used in concrete areas surrounding the most sensitive characterization spaces such as TEM's and SEM's if this type of equipment may be located in the facility.

Architectural Treatments and Finishes
With attention to general architectural finishes and details, significant benefits can be achieved in reducing sources of impact vibration. This is accomplished by the following:

1. Reducing the impact from slamming doors by appropriate measures, such as:
    a. Minimizing the mass of the door leaf.
    b. Installing damped closure mechanisms.
    c. Fitting door jambs with soft resilient seals.
2. Incorporating resilient flooring surfaces wherever possible.
3. Minimizing floor joints and raised door sills to prevent impacts as wheels pass over them.

3.4.2 noise control

3.4.2 Noise Control - Introduction

Control of noise in laboratories is achieved by the following:

1. Appropriate building planning.
2. Noise and vibration control in building services design.
3. Appropriate acoustic treatment of laboratory spaces.

Building Planning
Many noise control problems can be overcome in the initial stages of the building planning by locating noise producing areas remote from noise sensitive areas, or by providing a non sensitive buffer zone (i.e., a storage area) between them. The alternative is to provide walls with a high standard of sound insulation and upgrade the performance of doors and duct work attenuation, etc.

Likely noise producing areas are as follows; mechanical rooms and penthouses, equipment rooms, glassware washing areas and receiving / service dock area.

Building Service Noise
Noise from building services are controlled by:

1. Isolating the major mechanical and electrical plant from vibration sensitive areas, as described above.
2. Providing a high standard of vibration isolation for major plant equipment and its associated piping and duct work.
3. Designing the building ventilation system to achieve an acceptable noise level criterion.

Vibration from the mechanical and electrical plant may be re-radiated as noise. Vibration must be controlled at the source, by installing central plant equipment on anti vibration mounts and ensuring that it is correctly balanced and maintained.

During the Schematic Design phase, appropriate noise criteria should be established for the different spaces. The recommended criteria for various spaces as established using the guidelines set forth in Figure 4.2 are tabulated below:

Space Category	Criterion
Research Laboratories	PNC 50-60
Laboratory Instrument Labs	PNC 50-60
Electron Microscope Suite	PNC 50-60
Conference Rooms	PNC 30-35
Private Offices	PNC 35-40
Reception Areas, Lobbies, Open Offices	PNC 50
Corridors, Stairways (non-sensitive listening)	PNC 50

In general, duct work should be designed as round or flat oval shapes to result in a laminar flow of air through the whole system, providing minimum pressure drops. Where possible, fan noise is to be controlled at source by allowing sufficient attenuation and acoustic duct lagging at the fan outlet and where the duct work crosses the mechanical room wall.

Air Regenerated Noise
Turbulence of air in ductwork and duct fittings causes air regenerated noise. This is predominantly at high frequencies, where the noise criteria are more stringent. To control air noise, the following points must be considered:

1. Avoid sharp turns and branches near the terminals.
2. Separate duct fittings from each other by several duct diameters.
3. Avoid large pressure drops through elements.
4. Design self balancing ductwork wherever possible to limit the use of volume control dampers.
5. Limit air velocities.
6. Add acoustic control measures close to air valves.

Breakout and Cross-talk Noise
Routing main distribution ducts through quiet areas gives rise to noise breakout from the ducts and should be avoided. Similarly, the ductwork should not pass through noisy areas before entering quiet areas that it serves. Cross-talk, which occurs when noise is transmitted via the ductwork, must be avoided in the same way. It must also be avoided where two noise sensitive spaces are served by the same ductwork (i.e., in adjacent meeting rooms) and speech from one room must not be audible in the other. This can be accomplished by installing an attenuator or acoustic duct lining in the ductwork between the two rooms or by rerouting the ductwork to increase the path between the room terminals.

Plumbing and Utility Piping

Vibrations generated by plumbing and utility piping systems may be minimized by several means: Judicious equipment selection, limitation of fluid flow velocities, and isolation of key mechanical and piping systems.

Vibration isolation systems should be provided on rotating mechanical equipment greater than ½ hp located within the critical area, greater than 5 hp elsewhere in the building, and greater than 10hp outside the building within 20 feet. Reciprocating equipment (other than emergency equipment) should not be used.

Concrete inertia bases should be used with rotating mechanical equipment handling liquids (e.g. pumps with compressors). Steel frames should be used for air handling equipment. Flexible pipe connectors (e.g., twin-sphere connectors) should be used on piping connecting to isolated equipment and where piping exits the mechanical room.

Passive piping is that piping which is at a great distance from its energy source and which has low flow rates and/or infrequent use, such as sprinkler water, gases, waste water, etc. Conversely, active piping is close to energy source (e.g., a pump), has continuous or frequent use, with high flow rate or velocity of air or liquid. Active piping and ducting can be major source of vibration, and isolation is required in some instances.

Whenever possible, flow velocities in significant active piping should be sized for maximum flow velocities of 8 feet/second. Systems that require higher velocities for proper function call for more stringent isolation.

In summary, the following guidelines apply for piping supported from the structure within the critical areas:

1. Passive piping (waste water, city water, etc.) need not be isolated unless it is racked with piping requiring isolation.
2. Active piping of diameter 2 inches to 6 inches should be supported using spring supports sized to a static deflection of 1 inch.
3. Active piping of diameter exceeding 6 inches should be supported using spring supports sized to a static deflection of greater than 1 inch.

Acoustic Treatment - Laboratories

The surface finishes of laboratories are required to be hard wearing, chemically resistant, and easily cleaned. This usually results in surfaces that are hard and nonporous. These surfaces in turn are highly sound reflecting and result in rooms that are excessively reverberant. Reverberant rooms have the following characteristics:

1. High ambient noise level.
2. Limited decrease in the noise level with distance from the noise source.
3. Poor intelligibility of speech.

Surface Finishes

Sound absorbing surfaces are usually porous, soft or fibrous, making them unsuitable for laboratory walls and floors. It is recommended that acoustical panels suspended in a grid between the mechanical services be utilized for the ceiling of the laboratory.

Floor Covering

Footfalls on hard floor surfaces in sensitive building areas produce noise and excite the floor framing system, creating vibration. It is recommended that vibration effects be minimized by providing a resilient floor covering. Research Laboratory floor surfaces are commonly vinyl tiles or seamless sheet vinyl.

3.5 mechanical design criteria

3.5 mechanical design criteria

3.5 Mechanical Design Criteria

General

The lab will require careful control of temperature, humidity, relative space pressures, air cleanliness, odor control, air motion and sound. A primary concern will be the safety of personnel and the safety of the animals. Comfort of the personnel and the animals is also important. Since lab facilities typically consume about three times the energy of a classroom or office building, energy efficient design is crucial. Laboratory mechanical systems are complex and maintenance intensive. Mechanical systems must be kept as simple as possible and must be accessible for proper maintenance. Laboratory space requirements are constantly evolving and changing. The mechanical systems must be flexible to accommodate future requirements.

3.5.1 mechanical codes & standards

3.5.1 Mechanical Codes & Standards

Codes

- International Building Code, 2006
- International Mechanical Code, 2006
- International Plumbing Code, 2006
- International Fire Code, 2006
- International Energy Conservation Code, 2006
- National Fire Protection Association 13
- Utah State Boiler Code

Standards

- Utah Division of Facilities and Construction Management Design Criteria
- Utah State University Architect & Engineer Manual
- Utah State University Planning & Design for High Performance Facilities
- American Industrial Hygiene Association (AIHA). ANSI/AIHA Z9.5 National Standard for Laboratory Ventilation.
- American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE). Laboratory Design Guide
- ASHRAE Fundamentals Handbook, HVAC Applications Handbook, Systems and Equipment Handbook.
- Centers for Disease Control (CDC) and National Institute of Health (NIH). Biosafety in Microbiological and Biomedical Laboratories.
- Institute of Laboratory Animal Research (ILAR), Commission on Life Sciences, National Research Council. Guide for the Care and Use of Laboratory Animals. Washington DC: National Academy Press.
- National Institute of Health. NIH Design Policy and Guidelines – Design Criteria. Bethesda, Maryland.
- National Institute of Health. Reference Materials for Design Policy and Guidelines – Mechanical.
- National Institute of Health. Office of Research Services. NIH Vivarium Design Policy and Guidelines.
- National Fire Protection Association (NFPA). NFPA 15 Fire Protection for Laboratories Using Chemicals.
- Occupational Safety and Health Administration (ASHA). 29 CFP Part 1910.1450.
- Scientific Equipment & Furniture Associates (SEFA). Laboratory Fume Hood Recommended Practices.

3.5.2 Mechanical Design Parameters

1. Temperature:

	Winter	Summer
Outdoor Temperature	-20° F	94° DB/65° WB
Indoor Temperature – Typical Labs	72° F	72° F
Indoor Temperature – Animal Rooms	64° F Min	85° F Max (Winter & Summer)

2. Chemical Fume Hood Exhaust

   Occupied Mode Face Velocity - 100 feet/minute

   Unoccupied Mode Face Velocity – 60 feet/minute

   Use of proximity sensors to reduce air flow when hood is not in use.

3. Minimum Air Change Rates

   Typical Lab Space, Occupied Mode – 4 ACH (Air Changes per Hour)

   Vivarium – 10 ACH

   Typical Lab Space, Unoccupied Mode – None

4. Air Handler Pressure Drop/Velocity – 4" W.G..400 ft/min

5. Duct Pressure Drop/Velocity – 2.2" W.G./2500 ft/min

6. Heat Recovery:
   Provide heat recovery from general exhaust.
   Provide heat recovery from fume hood exhaust.

7. Laboratory plug load design
   For preliminary design purposes use 10 watts/square foot
   Final loads to be determined during design process.

8. Means to reduce cooling air flow in rooms with high plug loads will be Fan Coil Units

9. Humidification Requirements
   Typical Laboratories

Summer	50% RH Max.
Winter	NA

   Vivarium

Summer	50% RH Max.
Winter	30% RH Min.

Heat Source
The heat source will be gas fired hot water boilers. There will be a minimum of two boilers for redundancy. Each boiler will be sized for 50% of the load. The boilers will have capacity to heat the building if the heat recovery system fails. Provide a small summer boiler, the high efficiency condensing type. Consideration shall be given to a low temperature (130ºF) hot water system with all high efficiency condensing boilers.

A central heat pump system should also be considered, in lieu of gas fired boilers. This would include a minimum of two heat recovery chillers and a ground-coupled well water system.

Cooling Source
The cooling source will be a minimum of two water cooled chillers for redundancy. Each chiller will be sized for 50% of the load. The chillers will have capacity to cool the building if the heat recovery system fails. At least one chiller shall be the variable flow type for improved efficiency. There will be a cooling tower for each chiller.

Heat recovery chillers should also be considered, in lieu of the standard chillers. This system would include a ground-coupled well water system.

Ventilation
Ventilation will be provided in compliance with the 2006 IMC.

Classrooms – 15 CFM/person
Office Space – 20 CFM/person
Typical Lab – 100% Outside Air
Vivarium – 100% Outside Air

Steam System
A central high pressure (80 psi) steam system will be provided to serve sterilizers, cage washers, animal room washdown and the Vivarium humidification. Provide two gas fired boilers for redundancy.

Heating Hot Water Piping System
Primary standby pumps each sized at 100% flow. Variable flow, VFD's on each pump.

Chilled Water Piping System
Chilled water supply temperature - 42º F
Chilled water return temperature - 55º F
Primary – Standby pumps, each sized at 100% flow. VFD's on each pump.

HVAC Systems
Typical Laboratories: General - The design of the HVAC system for a laboratory should maintain a safe working environment for the users. All laboratory areas shall be served by 100% outside air systems.

Rooms should be maintained at a negative pressure with respect to adjacent areas. High air discharge velocities should be avoided (not more than 50 feet per minute) in the immediate vicinity of the fume hood. Fume hood face velocity should be maintained at 100 fpm all sash positions in the occupied mode. The system design shall be based on 100 feet per minute hood face velocity when the fume hood sash is opened to a height of 18 inches. Fume hood shall be equipped with a motion sensor which will reduce face velocity to 60 FPM when the area around the hood is unoccupied.

The HVAC system should have features that enable control of supply and exhaust air flow, laboratory pressurization control, hood face velocity and hood air flow, energy consumption, and room temperature.

Laboratories will be provided with variable volume fume hoods, variable volume supply air and variable volume general exhaust air. Room supply and exhaust air will be controlled through linear or nonlinear air terminal devices utilizing either a volumetric or pressure differential room control device. The recommendation to use such as system will be dependent upon the results of the engineering analysis.

Vivarium:
General - The design of the HVAC system will maintain a stable environment for the animals and safety and comfort for animals and personnel.

The HVAC system for the Vivarium will be similar to the Typical Laboratories. The Vivarium systems will be 100% outside air. Rooms will be designed such that they can be positive pressure or negative pressure.

The HVAC system will have features that enable control of supply and exhaust air flow, room pressurization control (positive or negative), energy consumption, room temperature, and room humidity.

The ventilated cage racks will require individual supply air and exhaust air control with filters.

HVAC redundancy is required. The HVAC system will have redundant supply fans and exhaust fans which will provide operation of the facility at a reduced level in the event of a fan failure. HVAC equipment serving the Vivarium will be on emergency power. This includes chiller, boiler, pumps, supply fans, exhaust fans and controls.

Biosafety Level 3 and Animal Biosafety Level 3 Labs
The ventilation system shall be 100% outside air. The BSL 3 and ABSL3 Lab shall be negative pressure in relationship to adjacent spaces. There will be audible and visual alarms to notify personnel on loss of pressure control. Gastight dampers will be provided in the supply and exhaust ductwork to allow for decontamination of the BSL3 and ABSL3 Lab. The ductwork will be gastight. Exhaust air will be HEPA filtered.

Air Handlers
The supply air handlers will be located indoors to accommodate servicing and piping and to avoid freezing problems. The exhaust air handlers may be located outdoors. The air handlers will have multiple fans for redundancy.

Outside Air Intakes And Exhaust Air Discharge
Air intakes shall be positioned to avoid short-circuiting of exhaust air back into the building. Exhaust from laboratories must be discharged to the atmosphere through stacks at the top of the building with a minimum velocity of 3000 fpm. If variable volume systems are employed for supply and exhaust, then design provision must be made to assure that the 3000 fpm exhaust velocity is maintained at all times at all conditions.

Exhaust Air System
There will be several sources of exhaust air: (1) General Lab Exhaust (Typical Labs and Vivarium) (2) Chemical Fume Hood Exhaust (3) Biological Safety Cabinet Exhaust (4) General Building Exhaust (Toilet Rooms, Photocopy areas, Janitor’s closets, etc.). (5) Special Chemical Fume Hood Exhaust (Radioisotope hoods, Perchloric acid hoods, Digester hoods).

The General Lab Exhaust, Chemical Fume Hood Exhaust and Biological Safety Cabinet Exhaust should commit to a central manifolded variable air volume (VAV) system. A central system provides redundancy, flexibility to add future hoods, diversity and heat recovery capability. Another advantage is that central exhaust systems reduce the noxious and hazardous substance levels through dilution.

Biological Safety Cabinets with HEPA filters in the exhaust air connection will be ducted to independent fans where required. General Building Exhaust will be ducted to separate exhaust fans to preclude contamination. Special Chemical Fume Hood Exhaust Hoods (Radioisotope, Perchloric acid, Digester) will be ducted to independent exhaust fans.

Automatic Temperature Control System
The ATC system will be a Direct Digital Control (DDC) type. The system will be compatible with the USU Campus Control System. The approved ATC manufacturers/installers are Johnson Controls/Johnson Controls and TAC/Utah Controls.

3.5.3 Mechanical Sustainability

Mechanical sustainable design features will be considered and incorporated where appropriate. The project goal is to achieve a USGBC LEED Gold certification.

Water Use Reduction will incorporate duel flush water closets with 0.9 gal/flush and 1.6 gal/flush. The Urinals with be the waterless type. The Lavatory faucets will be Low Flow, 1.8 GPM sensor type. The water closets in the women's toilet rooms will be dual flush type.

Energy Conservation will include computer modeling to verify compliance with ASHRAE Standard 90.1 Energy Standard. Commissioning of mechanical systems will be done. Hot Water System will be variable flow with VFD. Chilled Water System will be variable flow with VFD. Occupancy control on VAV boxes (combined with lighting control) will be provided. Direct Evaporative Cooling will be included. Indirect Evaporative Cooling will be considered. Heat Recovery System will be provided on exhaust air systems. High Efficiency Boilers will be used.

In compliance with the USU "Planning & Design for High Performance Buildings," the energy efficiency rate will be 50% greater than the ASHRAE Standard 90.1-2004,

To protect the Atmosphere, only non-CFC and non-HCFC Refrigerants will be used.

Indoor Environmental Quality will include the monitoring and control CO2 levels in all densely occupied spaces. Follow SMACNA Guidelines to protect HVAC system during construction. Ventilate the building prior to occupancy to flush out contaminants. Exhaust Janitors closets and photocopy areas. Provide individual thermostatic controls for exterior offices, corner offices, unique spaces, each classroom, Lab, Animal Room, etc. Provide baseboard radiation in areas with a high proportion of exterior glass, for comfort and energy savings.

3.6 plumbing design criteria

3.6 Plumbing Design Criteria

General
Properly designed plumbing systems are critical to the operation of the Lab facility. Due to the large number of piped utilities, the piping must be carefully organized and properly labeled. Safety of the personnel and the animals is a primary concern. Care must be taken to protect the water supplies to the building and the public sewer system which serves the building. Care must be taken to prevent the domestic water systems within the building from contamination. The plumbing system must be flexible to allow for future changes as the needs change.

Pure Water System
A central pure water system will be provided. Pure water will be piped throughout the building. The pure water system will be capable of generating type II or type III water. Pure water will be recirculated through a storage tank with ultraviolet light to keep the system free of bacteria. Point-of-use water stations will be provided where ultra pure water is required.

Water Softening System: A duplex water softener will be provided. The domestic hot water, pure water, and steam make-up water will be softened.

Acid Waste And Vent System
Provide a dedicated acid waste and vent system with an automatic central wastewater PH control system with acid and caustic injection.

Biological Waste System
Provide a dedicated biological waste system. System will be piped to kill tank.

Laboratory Vacuum System
Provide a central system with two vacuum pumps for redundancy.

Laboratory Air System
Provide a central system with two compressors for redundancy.

Medical Gases
Central medical gas system will be provided for use in Surgery, Pre-Op and Post-Op Rooms. Medical gases include oxygen, vacuum and air.

Domestic Hot And Cold Water Systems
There will be two separate hot and cold water systems: (1) Potable hot and cold water (2) Industrial (Non-potable) hot and cold water, the Industrial hot and cold water will be piped to lab spaces. The Industrial water will be served by parallel reduced pressure backflow preventers.

Water Heaters
There will be separate Industrial and Potable water heaters. There will be two Industrial water heaters and two Potable water heaters, for redundancy in each system.

Fire Sprinkling
Automatic wet-pipe sprinkler system with a Class I standpipe in two stairways. Piping will be standard weight black steel with mechanical couplings, threaded joints or welded joints. Comply with NFPA 13.

3.7 electrical design criteria

3.7.1 electrical codes & standards

3.7.1 **Electrical Codes & Standards**

The codes, standards, and guidelines that are applicable to the design of the electrical systems are listed below (adhere to the latest adopted publications):

- ADA, Americans with Disabilities Act
- International Energy Conservation Code - IECC 2006
- EIA/TIA, Electronics Industries Association/Telecommunications Industry Association.
- International Building Code - IBC 2006
- IEEE 1100-1999, Recommended Practice for Power and Grounding Electronic Equipment
- IESNA, Illuminating Engineering Society of North America
- NFPA, National Fire Protection Association (applicable sections including but not limited to):
  - NFPA 70, National Electrical Code - 2005
  - NFPA 72, National Fire Code
- UL, Underwriter's Laboratories
- Utah State Fire Marshal Laws, Rules and Regulations
- Division of Facilities Construction and Management, Design Criteria
- Utah State University Design Standards for Electrical Engineering
- National Institute of Health. Office of Research Services. NIH Vivarium Design Policy and Guidelines.

3.7.2 Electrical Distribution

For the building, there shall be both a 480/277 volt main distribution system and a 208/120 volt distribution system. The 480/277 volt distribution system shall be used to provide power to lighting panelboards, 480 volt motors, elevators, and large mechanical equipment such as air handlers, pumps, chillers, and fans. The 208/120 volt distribution system shall provide power to lighting and appliance branch panelboards. Two (2) current transformer cabinets (CT Cabinets), which are in compliance with Rocky Mountain Power standards and include the main building disconnects, shall be provided for the two services. The main building disconnects included in the cabinets shall be specified as electronic breakers, complete with available features such as long and short term pick-up and ground fault provisions, among others.

All conductors shall be copper and are to be installed in conduit with the minimum size of 3/4”. Any conduit that is installed in areas subject to damage shall be galvanized rigid conduit. Additionally, for feeders and branch circuits that are ran below grade, rigid Schedule 40 PVC conduit should be used. In the situation of short runs and connections to equipment, flexible metal or seal tight conduit shall be used.

Because of the potentially critical nature of work conducted at this facility, conductors shall be sized to limit total voltage drop to 3% with an 80% circuit breaker load. This voltage drop shall be measured from the utility transformers to the farthest branch circuit.

Mechanical equipment requiring variable frequency drives (VFDs) shall comply with DFCM and Utah State University Standards. All VFDs that are installed in the facility must comply with USU standards. Starters for fans and pumps shall be soft start and include hand-off-auto switches. Larger motors that are not provided with provisions to maintain unity power factor shall be equipped with capacitors to ensure efficient use of energy. Variable frequency drives shall be provided with input filters to limit the amount of harmonic distortion into the system.

Distribution Panels and Branch Panelboards

The 480/277 volt main distribution panel shall be a free-standing switchboard equipped with a USU-approved multi-meter that can display the characteristics of the load on the switchboard. This switchboard shall be provided with transient voltage surge suppression, housed external to the switchgear. This gear should be located in the main electrical room, located as close as possible to the exterior mounted CT cabinet. It is also recommended that the main electrical room be situated on grade level with the incoming service feeders running below grade.

The 208/120 volt main distribution panel shall also be a free-standing switchboard equipped with a USU-approved multi-meter that can display characteristics of the load on the switchboard. This switchboard shall be provided with transient voltage surge suppression, housed external to the switchgear. Like the 480/277 volt main switch board, this switchboard should be located in the main electrical room with the incoming serving feeder running below grade.

The 208/120 volt lighting and appliance panelboards shall be utilized to provide power to incandescent lighting, computer equipment, owner-furnished equipment, lab benches, duplex outlets, small mechanical equipment, and other similar equipment and devices. However, separate branch panelboards shall be used for computers and associated accessories to provide separation between sensitive and non-sensitive equipment. These separate panelboards shall be equipped with externally mounted transient voltage surge suppression to help ensure added protection for sensitive electronic equipment from internally generated noise and voltage transience. These panelboards shall be provided with 200% neutral conductors to handle harmonic currents that are commonly found in high-use computer environments.

To accommodate future growth, expansion, and potential need for flexibility, all main distribution panels should be sized with 25% spare capacity and lighting and appliance branch panelboards shall have 50% extra capacity.

Due to the size and rating of the two electrical services, the main electrical room in which they will be housed shall have two (2) entrances/exits with doors that swing out of the room and that are provided with panic hardware. In addition to the main electrical room, each floor should have an electrical room located central to the building to distribute power out to the loads. It is highly recommended that these accessory electrical rooms be stacked to allow for ease of power distribution. For laboratory spaces, panelboards shall be located in the hallway walls outside of laboratories to allow for ease of use and flexibility. It is also recommended that all electrical rooms have a 1-hour fire rating. All penetrations through fire rated walls shall be fire caulked. All conduits extending from the electrical rooms shall be fire caulked. All electrical rooms shall contain only electrical equipment and no other systems (i.e. mechanical, plumbing, and others). Mechanical ducts and plumbing pipes shall not run through electrical rooms, nor shall they be run over the tops of electrical panels and other electrical equipment. All electrical rooms shall be supplied with emergency lighting. Provide thermostatically controlled ventilation for electrical rooms. Where possible, make-up air shall be obtained directly from the outside. Coordinate with the mechanical engineer.

Testing and Coordination

A fault current and arc flash study should be performed to ensure that the equipment supplied to the project is rated for the available fault current. Additionally, a breaker coordination study should be performed to ensure that fuses and circuit breakers limit system power outages caused by overloads and faults. Circuit breakers with adjustable long time, short time, instantaneous, and/or ground fault settings shall be set at levels that allow for optimum system coordination. Documentation containing all information relevant to system coordination for future expansions and changes should be provided to the building owner. Two levels of ground fault should be provided to insure selectivity and continuity of service.

Electric and Magnetic Fields

Nearly all buildings can experience problems with the existence of EMF or electromagnetic fields. Because of the sensitive equipment that can be present in this facility (i.e. SEM, TEM, etc.) care must be taken on how and where electrical systems are installed. Electrical equipment should be kept away from rooms and areas that have sensitive electronic equipment susceptible to EMF interference. An EMF survey should be conducted of the area or areas of concern. This can include areas within the facility as well as areas associated with the site. The EMF survey will help identify potential problems and allow for the use of mitigation techniques to help alleviate interference problems. Possible shielding techniques may be necessary to totally isolate sensitive equipment from EMF interference.

Standby Power Distribution System

Provide a diesel engine generator to supply emergency standby power to the building. The generator shall be specified with an under-skid mount fuel tank with the capacity to provide 24 hours of emergency power at full load. It is also important for there to be an emergency fuel storage (properly protected) for 8 hours of emergency back-up. To allow for future growth and flexibility, the standby generator shall have approximately 25% spare capacity. A concrete foundation that extends below the frost line shall support the 12" concrete pad for the generator, with a minimum of two (2) ground rods connected exothermically to the steel rebar within the pad for grounding purposes. Whether the generator is located inside our exterior to the building, the exhaust vents shall be continuous welded pipe enclosed in a fire rated shaft and terminated above the roof, and placed away from the building fresh air intake vents. The location of the generator should be placed in a secured area out of high risk areas to insure maximum reliability. An evaluation should be made during the design process to determine the specific needs for emergency power and redundancy required and the safe keeping of the system.

Preferably, the generator will be installed inside of the building. It must be housed in a 2-hour-rated room. This room can hold only equipment that is part of the emergency power system. A means to fuel the generator will need to be supplied to the room.

If the generator is located exterior to the building, it must be in a sound-attenuated enclosure and shall be screened to ensure that an aesthetically pleasing environment is maintained. It is important that the location of the generator be carefully chosen, so as to guarantee that it is not placed near the building's fresh air intake vents. During the design of the project, this option shall be explored further.

There shall be a minimum of two (2) automatic transfer switches (ATS) provided for the emergency standby power system. The first ATS shall feed emergency power to the life safety systems, including egress lighting, fire alarm system, and other systems that are part of the life safety system. The second ATS shall be used to feed owner-furnished equipment that requires critical power, such as the UPS system, refrigerators, freezers, cold rooms, vivarium and cell culture facilities (biocontainment suites), chemical hood exhaust systems, supply and exhaust air systems, alarm systems, and any other important loads or areas. All branch circuits and feeders associated with the emergency standby power system shall be run in conduit that is separate from the normal power system. The exact nature of systems requiring emergency standby power shall be fully developed during the project design.

For Vivarium areas, the following are specifically required to be connected to emergency power:

- Operating Rooms
- Animal ventilation fans
- Ventilated animal cages and cage systems
- CCTV cameras and equipment
- Security System
- Switch controlled minimal lighting in animal holding rooms

Uninterruptible Power System (UPS)
Provide an uninterruptible power supply system (UPS), backed up by the emergency standby power system, to supply power to both critical equipment and the anticipated central data center that will be used by building tenants. UPS power shall be available, as well, for office, laboratory spaces, and biocontainment suites. This system should be designed as an N+1 system to provide redundancy. The exact requirements for UPS power will be determined during the design process; at that time, the use of smaller, local UPS setups may be deemed feasible.

The UPS shall be installed using water-tight construction methods. Furthermore, in the data center, power to equipment should be routed underneath a computer raised floor system if provided.

Grounding Systems
Provide a grounding system that includes a cold water pipe, building steel, UFER, and two ground rods, in accordance with NEC requirements. All grounding systems shall be connected together, including those for the building, the generator pad, and the communication system.

Grounding conductors shall be installed with all feeders and branch circuits. Provide additional isolated grounding conductors in all 208/120 volt branch panelboards that are used for computer equipment and any panels that are supplied by the UPS.

Provide a grounding riser system throughout the telecommunication rooms with grounding bus bars mounted on the wall of each room. In data centers, raised floors and equipment shall be grounded to bus bars installed under the raised computer floor.

Wiring Devices and Branch Circuiting
The location and number of outlets for each space should be coordinated with users to ensure that their needs are met. Thus, the following recommendations for power receptacles should be used as a general guideline, not as an exhaustive list of requirements. EMT conduit with copper conductors shall be used throughout most spaces unless specifically noted otherwise.

Offices
For each work station, provide two duplex outlets dedicated to computer terminals. Also provide one additional normal duplex outlet for every 6' of wall space.

Conference Rooms
Provide one duplex outlet for every 6' of wall space. Provide a minimum of two dedicated duplex outlets, located on opposite walls, for computer use.

Lounge/Break Rooms
Provide dedicated GFCI duplex outlets every 4' along the counter. Provide dedicated GFCI outlets for refrigerators, freezers, microwaves, and disposals (this last appliance shall be switched at the counter). For larger equipment requiring GFCI protection, such as vending machines, GFCI breakers should be used to allow for easy reset.

Counter tops (in general)
One dedicated duplex outlet every 4' on counter tops

Food Service/Prep

Provide GFCI outlets for all 20 amp, 120 volt outlets that are located in the kitchen area. All power receptacles that are located below kitchen hoods equipped with an ansul system shall be connected to shunt-trip breakers to allow for the equipment to be shut-off in case of a fire. The ansul system shall be integrated into the fire alarm system. For all kitchen areas, provide both stainless steel disconnects and stainless steel coverplates. In dining areas, locate outlets approximately 12' on walls.

General Laboratories

Provide a two compartment, aluminum or stainless steel wiremold mounted above the lab bench to provide power and communication requirements at lab benches. Outlets that are fed by emergency power shall be kept separate from the normal power system. Outlets shall be spaced 24" on center in the wiremold and those outlets that are within 6' of any sink shall be GFCI.

Biocontainment Suites (Vivarium)

In biocontainment suites (vivarium), there shall be no exposed conduit and all penetrations into those areas shall be permanently sealed using approved materials and methods. If exposed conduit is required, that conduit shall be intermediate galvanized rigid or galvanized rigid conduit with threaded couplings and connectors. Conduits in biocontainment suites shall be sealed with conduit sealer at each device/junction box. Surface metal boxes shall be cast metal. Conduits entering or leaving device boxes, junction boxes, pull boxes, etc. shall be sealed at each box with a non-hardening sealant. An alternative is to use seal-off fittings in conduits penetrating vivarium walls. A potting compound shall be poured into the fitting after the wires are installed. Junction boxes serving biocontainment suites should be of cast metal and airtight construction. Wiremold with snap on covers should not be used for these spaces due to cleaning and decontamination requirements.

Operating rooms associated with vivariums shall have isolated power panels with ungrounded secondary's and line isolation monitors. Branch circuiting in operation rooms shall have type XHHW insulation and #10 AWG ground conductors. Isolated power branch circuits shall have conductors with orange- and brown-color XHHW insulation to reduce leakage current.

Telecommunication Rooms

Provide UPS duplex outlets and outlets on emergency power for communication equipment. Provide one duplex outlet on normal power for general purpose use.

Electrical Rooms

Provide at least one duplex on emergency power and at least one duplex outlet on normal power. For large electrical rooms, such as the main electrical room, provide at least two duplex outlets on normal power.

Corridors/Hallways/Stairs/Lobbies

Provide at least one duplex outlet every 25' along the corridor. Provide one duplex outlet at each landing of each level of the building. Provide a least one duplex outlet every 6' on alternating sides of the lobby.

Building Exterior

Provide one weatherproof GFCI outlet near each entrance/exit. Provide additional outlets at locations of student interaction.

3.7.3 Lighting System

Lighting design shall comply with the illumination levels and uniformity criteria of IESNA and its recommended practices, including RP1-93 “Office Lighting” and RP-33-99 “Lighting for Exterior Environments.” Lighting design shall also strive to meet the USU High Performance Design Goals. These design goals included:

a. And energy efficiency rate that exceeds Ashrae Std. 90.1-2004 by 50%.
b. Limit energy consumption for lighting to 1.0 watts/SF. Provide daylight harvesting controls to further decrease energy consumption to 0.5 watts/SF.
c. Utilize computer modeling and life cycle cost analysis to estimate building performance.

Additionally, lamps should be specified to comply with the EPA TCLP requirements. Specific lamp/ballast combinations shall be used to ensure the lowest energy consumption.

With the exception of specialized applications, lighting should be designed with a minimum efficacy of 64 lumens per watt. Specify a maximum of 10% total harmonic distortion (THD) for electronic ballasts. In addition, design the lighting plan to consist of lamps characterized by a color rendering index (CRI) exceeding 82, except in storage, mechanical, electrical, and similar non-public spaces. In these non-public applications, use 4’ fluorescent T-8 lamps with a CRI of 86, or greater, and with a ballast lamp combination designed to have an efficacy of 75 or higher wherever possible. Where appropriate, differing lamp types shall be kept to a minimum for ease of maintenance.

To meet the requirements of the International Energy Conservation Code, a lighting control system, complete with manual switches that can be used to override the automated settings, shall be provided to automatically switch off the interior lights of the building, in addition to controlling all exterior lighting.

Interior Lighting

In general, low-glare fluorescent lighting with electronic ballasts should be utilized. Pendant indirect/direct (75% up and 25% down) lighting should be strongly considered, as it is preferred for office and laboratory environments. Standard lay-in or surface-mount type fixtures can be used for control room spaces, hallways, storage, and other similar areas.

The base line for the amount of energy and foot candle levels for each defined area is indicated below. With the use of sustainable practices, USU High Building Performance Design Goals and daylight harvesting techniques, actual energy usage per square foot should be less than what is specified below. It should be noted that the energy usages shown below must be substantially less in order to get points when trying to achieve LEED Gold certification. Foot candle levels for interior spaces shall provide a 4:1 maximum to minimum uniformity level. However, foot candle requirements vary based upon the type of interior space in which the fixtures are installed; foot candle levels for each category of interior space should be designed to match the recommendations outlined in the following table. However, it is important to work with the end user to ensure that adequate light levels are provided:

Defined Space	Foot Candle Levels	Watts/SF (Ashrae 90.1-2004)
Office	30-50 Fcd.	1.1
Conference Room	50-80 Fcd.	1.2
Corridors & Lobbies	5-15 Fcd.	0.9
Laboratory	75 Fcd.	1.4
Surgery Rooms	80-100 Fcd.	1.5 (Ambient lighting only)
Locker/Restrooms	30 Fcd.	0.9
Vivarium Areas	30 Fcd. (Variable)	1.0

Conference rooms shall be provided with dimming provisions to allow for the light levels to be reduced during power point presentations, note taking, etc.

Special consideration should be taken when designing lighting for vivarium spaces. Lighting in the vivarium environment is important because it has the potential to directly impact both the quality and validity of research, for, as it has been well-established, light can affect the physiology, morphology, reproductive cycle, and behavior of animals. Thus, multiple levels of light are required and the intensity, photoperiod, and spectral content of vivarium lighting need to be checked for compatibility with both the specific animal housed, and nature of research conducted, in the space.

A light intensity of 30 Fcd is generally considered the necessary level for vivariums. However, spaces containing stacked cages may prove to be problematic, as cages can be subject to uneven levels of light intensity based upon the position of each cage in the stack. In this situation, the light fixture layout for vivarium spaces should be based upon the content and layout of the cages they house. To ensure accurate data gathering, all Vivarium lighting shall be backed up with emergency power so the environment is not affected by power outages.

Additional thought should be put into the design of lighting controls for vivariums, as lights installed in these spaces may need to be adjusted for research purposes. The lighting controls should address the needs of research in two ways: first, by controlling the photoperiod and second, by employing light sensors to monitor and adjust light levels. If precise control is wanted, the use of dimming can be employed. Furthermore, higher light levels will be needed for cleaning purposes. To achieve this, manual controls should be installed to allow users to increase lighting levels in the space. Thus, it is important that the designer work very closely with the end user when designing the lighting system for dedicated vivarium spaces.

Light fixtures in biocontainment suites should be surface mounted to help maintain the seal of the room and allow for easy cleaning and decontamination. The fixtures shall be of watertight construction and rated for high pressure spray down applications.

Beyond the requirements of these specialized laboratory spaces, all interior lighting shall be connected to a control system, which will allow for greater precision in the management of lighting levels and functions. The lighting control system shall be a simple, user-friendly, and easily understood, while also having the flexibility to allow users to program lights to turn on and off based on each user's schedule. As a minimum, controls shall include an occupancy sensor and two switches to allow for dual-level switching and manual override. Controls for interior lights shall allow for the levels to be varied over the values specified above, while also permitting the fixtures to be adjusted based upon occupancy and according to programmable scheduling, as relevant to the application.

Daylight harvesting controls, used in conjunction with the lighting control system, shall be provided, where practical, to decrease energy consumption and shall be in compliance with the International Energy Conservation Code, except that overall energy target requirements shall be exceeded by 15%. To achieve the goals of effective daylight harvesting, light level sensors should be used with dimmable ballasts to decrease the light output of a fixture when daylight levels are high. These sensors shall be integral to the fixtures to allow for accurate and precise control of lighting.

Exterior Lighting

All exterior lighting should be designed in compliance with RP-33-99. As an additional requirement, only Utah State University standard light fixtures compatible with the campus surroundings should be used for walkways and plaza areas. For parking lot lights, full cut-off, metal halide light fixtures shall be used with a minimum of 1 Fcd and a maximum uniformity ratio of 20:1.

Care should be taken when designing the illumination levels and type for the outside of the building. As there shall be no up-lighting of the building, exterior, building-mounted lights must be full cut-off fixtures. Furthermore, the number of exterior building mounted fixtures shall be kept to a minimum, near entrance and exit locations only, to ensure that the perceived brightness of the building is low. However, care should be taken to ensure that there are adequate light levels around the perimeter of the building to allow the proper use and operation of closed circuit television cameras (CCTV).

Exterior lighting shall be controlled by a lighting control system that uses a photocell and hands-off auto switch. Exterior security lighting shall be programmed to be switched on at dusk and timed off as directed by Utah State University.

3.7.4 Special Safety Systems

Fire Alarm System

The fire alarm system shall be designed in compliance with the Utah State Fire Marshal's "Rules and Regulations" and Utah State University Design Standards. Only Notifier fire alarm systems are acceptable on campus. Coordinate the location of the building fire alarm control panel and annunciator panel with the campus fire marshal.

An addressable fire alarm system shall be provided with the capability of networking with the USU campus system and reporting back to the central campus fire alarm system via data network cards. Speaker/strobes shall be installed in all public spaces, conference rooms, restrooms, large open office areas, laboratory spaces, and mechanical and electrical control rooms. Install additional notification appliance circuit panels on each floor to provide power to the. Every level of the building shall have a fire alarm junction box in which all cabling going to the particular level shall be routed through prior to extending out to pick-up fire alarm devices.

Smoke detectors shall be installed in all public corridors and hallways. Pull stations shall be installed at all building exits in the direct path of egress. Pull stations shall also be provide on individual floors at the entrance to the exit stair. Provide duct smoke detectors and fan shutdown where required by the NFPA and the IMC, including detection of smoke at all return air shafts that serve multiple floors. The fire alarm wiring shall be installed in a Class A loop configuration in metal conduit.

Building Card Access System
A building wide card access system shall be provided to control access in and out of the building. The system shall have total flexibility to allow for multiple users, to add and subtract doors at any time, and to program the system to permit or prevent access by the public or other building users. The card access system shall have the capability of being monitored by a remote monitoring station or campus police. Verify with the end user and USU how and who shall monitor the system. Regardless of the specific nature of the card access/security system designed, it should adhere to USU standards. There are many types of devices that support security including card readers, biometric devices, motion sensors, etc. Care must be taken in the selection of security devices and protocol development for some security devices may not work well in biocontainment laboratories due to contamination concerns such as some biometric devices. Considerations should be taken to design the security system to be as inconspicuous as possible especially on the exterior of the building to ensure that the security concerns are not advertised unnecessarily.

The card access equipment needed for this system shall be installed at all entrances/exits of the building, with the exception of emergency-only access doors, where such equipment is not required. Each exterior door shall be equipped with a contact switch to allow for the system to monitor doors that are accessed illegally or left ajar. Furthermore, the card access system shall interface with the fire alarm system so that, on alarm, doors that are in the path of egress are bypassed and allowed to open.

Because of the type of research, processes, and facilities that will be present at this building, enhanced security is required. Motion sensors shall be installed in all perimeter areas to ensure added protection from break-ins. Further, a zoned security access design, progressing from least restricted to more secure should be implemented. Security devices shall be installed internal to the building in biocontainment suites (vivarium areas), etc. Card access or keyed locks should be used to further limit access to 'select agents'. During the design stage, determine specific areas that require this enhanced security with the end users and USU.

Closed Circuit Television System (CCTV)
Due to the specific nature of this facility and the need for enhanced security, a CCTV system shall be provided to monitor entrances/exits and the perimeter of the building. Additional cameras can be added to monitor parking lots or pathways leading away from the building. The system shall consist of cameras, video displays, and digital video recording devices with internal storage capability. The system shall record events when motion is sensed at a camera location. This CCTV should also be integrated with the card access system to allow for a flexible, user-friendly setup. All USU standards should be followed when designing CCTV systems.

Closed circuit television cameras will also be required throughout the vivarium areas. They are to provide surveillance of animals under study. These cameras should be protected by plastic bubbles in biocontainment area, and installed in locations where staff can gain access to the camera from outside the containment barrier.

Alarm Indicating Systems
Due to the inherent risk associated with this type of facility, an alarm annunciation system must be in place to alert personnel of an impending possible incident. This alarm system shall monitor the mechanical systems of biocontainment suites (vivariums) to insure that correct pressurization is being maintained. It shall monitor freezers, equipment, and other spaces that may contain critical research material and ongoing processes. The alarm system should interface with the building automation system to allow for greater flexibility and use. Coordinate with the mechanical engineer during the design process to fully develop this system and ensure that all systems that require monitoring are included.

3.7.5 Communication Systems

The communication systems shall consist of two main categories: 1) Pathways and spaces to support the voice and data system and 2) The structured cabling system.

Pathways and Spaces
There shall be one main communication room, sized to be a minimum of 150 square feet and located on the ground level, that shall house the main computer and phone equipment that serves the building. Extending from this room, there shall be two separate routes, which may share a common wall but must have separate access. A total of six (6) 4” conduits shall run from this room to Utah State University’s existing communication infrastructure.

Each additional floor shall contain at least one communication room that is 110 square feet in size. A minimum of two (2) 3” conduits shall be run from the communication room situated on the top level of the building to the roof for roof-mounted external wireless communications. Extra rooms may be required if the horizontal cable length exceeds 100 meters. Each room shall have a minimum of two 7’-0” high, 19” floor standing racks. If possible, all communication rooms shall be placed in a stacked configuration and shall be interconnected with at least four (4) 4” sleeves.

Each floor shall be covered by a dedicated cable tray system. This system shall connect to the communication room(s) located on the same floor. Generally, the cable tray shall be routed in corridors/hallways and coordinated with ducts, piping, and electrical conduits to ensure easy access. It is anticipated that a 12" wide by 6" deep tray should be sufficient; however, this should be carefully evaluated during design. The tray shall be trapeze-hung and seismically braced; center-hung trays are not allowed. Mechanical fire stop systems should be utilized where the cable tray passes through fire-rated partitions so as to allow for moving, additions, and changes in a flexible and easy manner.

Each telephone/data outlet shall utilize a 4" square by a minimum 2-1/8" deep junction box with a single-gang or double-gang mudring. One (1) 1" conduit with nylon pull rope shall be run from each junction box to the nearest cable tray and a protective bushing and strap should be provided to secure the conduit to the cable tray. Conduit to tray clamps shall be employed.

In office locations, provide a minimum of two (2) telephone/data jack locations. During the design, this should be closely coordinated with the users to make sure that their needs are met. Where telephone/data or power is needed in open areas of suspended floors, provide floor boxes only; poke-through devices are not allowed.

Structured Cabling System
The structured cabling system shall be designed to support both present high-speed voice/data/video transmission and future high bandwidth applications. The system should be planned following Utah State University Design Standards.

Both the campus network service entrance cable and backbone cable shall be fiber optic, while the horizontal cabling to each telephone/data outlet shall be unshielded twisted pair plenum rated cable. All backbone cables shall be coiled in a rack-mounted fiber break-out enclosure and all horizontal cabling shall be terminated in rack-mounted patch panels.

Provide telephone outlets for payphones, elevator panels, fire alarm panels, building automation system, security system, wall phones, and other required equipment. Each telephone outlet shall have one Category 6 RJ-45 4-pair ports with a dedicated horizontal Category 6 cable run from the floor communication room to each port.

Wireless
Provide data jacks in key areas of the building to allow for a wireless network. Design wireless access points with one category 6, RJ-45 data jack mounted in a 4" X 4" X 2-1/8" deep junction box with cover plate, to be located in an accessible ceiling space.

Due to the nature of the building, the communication/network systems should be secured. Provisions and procedures should be implemented to ensure security of the information contained within the system.

3.7.6 audio/video systems

3.7.6 Audio/Video Systems

Audio and video systems shall be specified as part of the building construction work. Audio and video systems in large meeting and conference rooms shall be specified in full compliance with established campus standards. To assure that their needs will be met, it is important to work with the end users during the design of these systems.

3.7.7 Electrical Sustainability

The University desires that this new USTAR building demonstrate sustainable design, construction, and operation principals. High performance electrical systems are central to this vision, not only because they directly affect energy consumption, but because they also influence indoor air quality, work performance, and thermal comfort. Utah State University High Performance Design Goals should be followed to ensure sustainable design is achieved. Additionally, those systems, in order to function at their highest level, require commissioning in addition to on-going measurement and verification. Utah State University has High Performance Design Goals

There are many strategies that can be employed in the design electrical systems to ensure that sustainability is achieved. One such strategy is the use of high energy efficient light fixtures, which employ lamp and ballast combinations that achieve the highest efficacy possible (lumens/watt). The energy-saving properties that these fixtures provide are further fomented by the installation of controls that use energy only when it is required (i.e. when a space is occupied). When these controls are put into use during normal business hours and are combined with daylight harvesting, energy usage will be lowered even more. To encourage the use of this control system and thus maximize its benefits, controls should be easy to understand and operate, while also providing visual comfort to the end user – a comfort that can be made even more flexible through the use of step-switching or dimming in high-use areas.

Another important strategy that can be used to increase sustainability is the election of the most efficient transformers for installation in the building. The federal government currently requires transformers that meet TP-1 energy efficiencies; however, transformers with higher efficiencies should be considered. When these transformers are loaded to the greatest extent possible, efficiency will be further increased, because the use of lightly loaded transformers does not allow for an easy conservation of energy. Furthermore, careful thought should be put into the sizing of conductors and the selection of dedicated neutrals, as upsized electrical conductors are more energy efficient than their smaller counterparts, while dedicated neutrals, which are less energy efficient, may wisely be kept to a minimum.

To additionally support sustainability, electrical control equipment should be used for mechanical systems to ensure that they are energy efficient, consuming power only when required. Variable frequency drives and capacitors can be utilized to achieve this aim by ensuring that mechanical systems use only the specific amount of energy they need, and that this energy is utilized efficiently.

Beyond a desire to create a design marked by general sustainability, it is a goal of this project to achieve USGBC LEED Gold Level certification. In order to obtain this certification, the following strategies should be incorporated into the building design as it pertains to electrical systems:

1. Sustainable Sites - Credit 8. Light Pollution: Under this strategy, interior lighting shall be located so that the maximum candela from each fixture does not exit through the windows. Furthermore, all non-emergency interior light fixtures shall turn off during non-business hours, with manual override.

   Exterior area, landscaping, and building lighting should be selected and employed so as not to exceed 80% of the lighting power densities for the exterior area and 50% for the building facades and landscaping features, as defined in ASHRAE/IESNA Standard 90.1-2004.

2. Energy & Atmosphere - Prereq. 1. Fundamental Building System Commissioning: The electrical systems of the building shall be commissioned to ensure that the systems are operating and performing as designed.

3. Energy & Atmosphere - Prereq. 2. Minimum Energy Performance: The electrical systems shall comply with the minimum requirements of ASHRAE 90.1-2004.

4. Energy & Atmosphere - Credit 1. Optimize Energy Performance: By using lighting control systems, occupancy sensors, dimming, the amount of electrical energy usage can be reduced. Dimming of light fixtures can also help reduce the over all heating load into the building so that energy used by the mechanical systems will also be reduced.

5. Energy & Atmosphere - Credit 2. On-site Renewable Energy: Under this strategy, the use of alternative energy sources should be explored. There are several technologies available, including wind, photovoltaic, hydro, wave, tidal, and bio-fuel based electrical production systems. Although these systems can be cost prohibitive, they should be considered, as one or more may be required in order to achieve the goal of LEED Gold certification. The use of one or more of these technologies may, in fact, enhance the acceptance and use of this facility. The use of photovoltaic cells integrated into the building glazing system is becoming more and more popular and can really enhance and define a building.

6. Energy & Atmosphere - Credit 5. Measurement & Verification: This credit provided for ongoing accountability and optimization of building energy and water consumption performance over time. Caution should be taken when pursuing this credit. If the measured energy and water consumptions fall short of the expected goad, changes to building system are required to bring those system into compliance. Lighting control systems are available with provisions to allow for energy measurements. If this credit is pursued, systems of that type should be considered.

7. Energy & Atmosphere - Credit 6. Green Power: Encourage the development and use of grid-source energy technologies on a net-zero pollution basis, 35% of the building’s “regulated” electricity for two years. Rocky Mountain Power’s Blue Sky program offers wind power at a relatively low cost of $.0195/kWh above the standard rate.

8. Materials & Resources - Credit 5.1. Local/Regional Materials, 20% Manufactured Locally: Consider this credit when procuring electrical supplies for this project. It may be difficult for electrical equipment. However, it should be considered during the design.

9. Indoor Environmental Quality - Credit 6. Controllability of Systems (Perimeter & Non-Perimeter): Provide lighting controls for 90% of occupants and controllability for all shared spaces that meets group needs or preferences both for perimeter spaces as well as non-perimeter spaces.

10. Indoor Environmental Quality - Credit 8. Daylight & Views: Lighting control systems should be designed to work together with daylight strategies to reduce lighting when daylight is available. As daylight diminishes, lighting levels should be increased. All light fixtures that are within 15 feet of exterior windows should be dimmed or controlled in some fashion. Work closely with the Architect for this credit.

3.8 systems commissioning

3.8 systems commissioning

3.8 Systems Commissioning

Commissioning of building mechanical and electrical systems is a systematic process of ensuring that all systems perform in accordance with the design intent as documented in the project drawings and specifications and the owners and occupants expectations and operational needs. These expectations and operational needs should be discussed in length during the design process. It is critical that the commissioning process begin early during the design stage, carry through to the completion of construction, and should continue through the life of the facility. Commissioning helps to uncover deficiencies in the mechanical and electrical designs or installation of mechanical and electrical systems using peer review and field verifications.

As part of the USGBC LEED-NC rating system, building systems must undergo commissioning. At the minimum level required by the LEED-NC rating system, a commissioning agent, responsible solely to the owner, is contracted to provide the documentation, produce the commissioning plan, coordinate commissioning requirements with the design team, and verify installation and performance of the mechanical and electrical systems.

Due to the LEED-NC Gold certification requirement of this facility and due to system complexity, this additional commissioning is recommended.

Benefits of Commissioning:

1. Improved building performance and indoor air quality.
2. Ensure that all mechanical and electrical equipment and systems are installed according to the final plans and specifications, per manufacturer recommendations, and to the industry accepted minimum standards.
3. Improved operator and maintenance knowledge and training. Improved documentation.
4. Reduced cost - both first costs and life-cycle costs - related to construction, energy efficiency, and maintenance.
5. Smoother building turnover, reduced warranty callbacks, and fewer occupant interruptions.
6. More useful operation and maintenance manuals.
7. Ensure that all mechanical and electrical equipment and systems receive operational checkout, as well as detailed testing, calibration, and adjustment by the installing contractor.

Commissioning during the early stages of design aims to identify potentially costly problems before anything is built. This is the time when the project's goals for quality, efficiency, and functionality are determined, commissioning specifications are developed, and testing and inspection procedures are set up.

There are three principals in the commissioning process that should begin at the start of the project and continue through occupancy and operations:

A. Determining project performance requirements:

1. Understand the needs of the specific building in determining which mechanical and electrical systems will be required and are needed.
2. Define threats, risks, and consequences from using the specified mechanical and electrical systems.
3. Determine key program goals and objectives for the mechanical and electrical systems that will be employed.
4. Recognize systems critically to achieve real goals. Evaluate the purposed mechanical and electrical systems that will be used.
5. Conduct key commissioning programming activities. Determine the testing and measurement methods that will be used to measure mechanical and electrical systems to ensure expectations and goals are realized.

B. Plan the commissioning process:

1. Establish goals for quality, efficiency, and functionality that mechanical and electrical equipment and systems specified for this project must meet.
2. Establish a commissioning approach and scope. How will and what mechanical and electrical equipment and systems be specified to ensure that expectations and goals are met.
3. Establish commissioning budgets that will be available to commission the mechanical and electrical systems.
4. Establish commissioning plans.
5. Establish commissioning schedules.
6. Establish testing and inspection plans (review acceptance procedures and documentation requirements.
7. Develop commissioning specifications outlining what mechanical and electrical systems require commissioning as well as the methods of testing, measuring, and acceptance of the equipment and systems.

8. Determine special testing needs for mechanical and electrical equipment and systems that are used on the project.

C. Document compliance and acceptance:

1. Document all levels of project development and acceptance as it relates to mechanical and electrical equipment and systems.
2. Emphasize inspection, testing, and training on commissioned mechanical and electrical systems.
3. Compile key commissioning documentation with all relevant information concerning mechanical and electrical equipment and systems.

Commissioning Authority
The Commissioning Authority is responsible for developing and coordinating the execution of the commissioning plan, observing and documenting performance, and ensuring that mechanical and electrical equipment and systems are functioning in accordance with the plans and specifications.

The LEED-NC rating system awards a point for expanding the responsibilities of the Commissioning Authority to include review of project design prior to 50% construction documents, review of project submittals associated with commissioned systems, development of a systems manual, verification of completion of training requirements, and review of building system operation after 10 months of occupancy.

The Commissioning Authority is responsible for the following tasks:

1. Obtaining and reviewing design documents for overall design intent and overall required system configurations. This should be ongoing through that design process.
2. Reviewing shop drawings and submittals for installation criteria and construction details.
3. Coordinating and directing commissioning activities in a logical, sequential, and efficient manner using standard forms and documentations. Holding periodic commissioning related meetings.
4. Providing all field technical services, tooling, equipment, instrumentation, and technical supervision to perform all tests and inspections.
5. Providing specific power requirements for test equipment.
6. Reviewing and approving operation and maintenance materials, control sequences, interlocks, contractor start-up procedures, and checkout procedures for completeness and accuracy.
7. Developing and distributing the required mechanical and electrical pre-function test forms.
8. Site visits, as necessary, to observe mechanical and electrical equipment and system installations.
9. Coordinating, witnessing, reviewing, and approving functional performance tests performed by the installing contractor(s).
10. Maintaining a commissioning schedule, that is available to the owner's representative and other parties. Providing information to the owner's representative of deficiencies and follow-up services to correct deficiencies.
11. Compiling detailed reports of all test records, testing, results, acceptance documentation, and recommendations.
12. Coordinating the training process for the facility's staff.

The Commissioning Authority should have several years of experience in commissioning techniques and practices as they pertain to electrical equipment and systems. The Commissioning Authority should have expertise in the following:

1. All commissioning functions and the work associated with mechanical and electrical systems.
2. Operation and maintenance requirements of mechanical and electrical equipment and systems.
3. Construction management.
4. Building codes and standards, including those applicable to the mechanical and electrical industries.
5. Design specification and installation of mechanical and electrical systems and equipment.
6. Writing functional performance test plans and directing mechanical and electrical system tests, including working with testing instrumentation.
7. Developing and managing project documentation.
8. Planning and delivering operation and maintenance training.
9. Total quality for successful project performance.

Proper commissioning of building mechanical and electrical systems requires coordination between all trades and entities. The roles and responsibilities of the Commissioning Authority, design team and consultants, and all contractors should be included in the contract documents and Commissioning Plan.

Testing Requirements

Commissioning of electrical and mechanical equipment requires the use of proper test equipment. All electrical test equipment should be of sufficient quality and accuracy to test or measure the system performance with tolerance levels specified in the manufacturer's specifications and design documents. All test equipment should be calibrated to ensure accuracy of data. Data logging instruments should be used to measure systems performance over a specified time, to ensure they are functioning in accordance with the design intent and specifications.

Verification and pre-functional performance testing should be done to ensure that the specified electrical equipment and systems are installed correctly, start ups are complete, and they are ready for functional performance tests. It is recommended that a checklist format be created to ensure that the following minimum requirements are met:

1. All mechanical and electrical equipment and systems have been started up and have been approved for functional testing.
2. Testing, balancing, and calibration is complete and has been accepted by the commissioning authority.
3. All control system functions and all interlocking systems are programmed and operable per contract documents.
4. All engineering punch list items for this mechanical and electrical equipment and systems have been completed.
5. Functional test procedures have been reviewed and approved by the installing contractor.
6. Safety, operating ranges, and functions have been reviewed by the commissioning authority.
7. Sufficient clearance around equipment is provided for servicing and maintenance.
8. A record has been made of all values for pre-test set points that where changed to accommodate testing.
9. Other operational, safety, alarm checks, and start-up reports have been completed successfully.

Functional Performance and Condition Monitoring Tests

Pre-functional and functional performance tests determine if the mechanical and electrical system is providing the required services in accordance with the design intent. Each functional performance test should be performed under conditions that simulate actual operating conditions. Upon satisfactory completion of all verified tests, the building mechanical and electrical equipment and systems should be returned to the condition required by the contract documents as a complete and operational system. Deficiencies should be corrected and systems retested as required.

Proper safety procedures and the use of personal protective equipment shall be used while performing any tests as called out in the commissioning process.

Mechanical Systems Requiring Commissioning

The following mechanical systems are required to be commissioned. They shall be inspected and tested to ensure that they are operating so as to meet the design intent as specified in the contract documents:

1. Heating systems
2. Ventilating systems
3. Air conditioning systems
4. Refrigeration systems (passive and active)
5. Plumbing systems
6. All respective controls

Electrical Equipment Requiring Commissioning

The following electrical equipment and systems are required to be commissioned. They shall be inspected and tested to ensure that they are operating so as to meet the design intent as specified in the contract documents:

1. Low Voltage Power Cables (600 volts and below).
2. Electrical Feeders and Branch Circuits (600 volts and below).
3. Dry-Type Transformers.
4. Switchgear and Switchboard Assemblies rated 1200 Amps or Greater.
5. Motor Control Centers.
6. Molded Case Circuit Breakers.
7. Electronic Circuit Breakers.
8. Service Ground.
9. Ground-Fault Protection Systems.
10. Panelboards.
11. Receptacle and Devices.
12. Engine Generators.
13. Automatic Transfer Switches.
14. Variable Frequency Drives.
15. Rotating Machinery that is applicable to electrical systems.
16. Uninterruptible Power Supply Systems (UPS).
17. Lighting.
18. Lighting Control and Relay Systems.
19. Fire Alarm Systems and Devices.
20. Communication/Data Cabling.
20. Communication/Data System Equipment.
21. CCTV System Equipment and Devices.
22. Card Access System Equipment.

The following references can be utilized as guides for the commissioning of the electrical systems of this facility:

a. NECA 90-2004 - Commissioning Building Electrical Systems
b. ASHRAE Guideline 0-2005: The Commissioning Process
c. ACG Commissioning Guideline - 2005
d. NFPA-2005: Commissioning Fire Protection Systems.

Recording and Documenting Performance

Commissioning documentation is a critical aspect of the commissioning process. All information, data, test procedures, test results, etc. should be collected and recorded.

Commissioning documentation should include:

1. Approved submittals.
2. Shop drawings.
3. Pre-functional performance checklists.
4. Functional Performance test and results.
5. As-built drawings.
6. O&M manuals.
7. Non-conformance forms and retests forms.

Operation and Maintenance (O&M) Manuals

Once electrical and mechanical system acceptance has been accomplished, O&M manuals should be neatly organized in three ring binders. Equipment warranties shall also be included and should be checked to ensure that the warranties are kept valid.

Training

Once electrical and mechanical equipment and systems have been accepted, and O&M manuals have been completed, training shall be conducted for owner's personnel. Vendors are responsible for providing qualified instructors. They should submit a proposed training plan for approval by the Commissioning Authority.

3.9 landscape design criteria

3.9 Landscape Design Criteria

The landscape design should complement the character of the proposed USTAR Building, expressing the interdisciplinary and collaborative goals of its cutting-edge research programs. The landscape design should also consider the broader vicinity of Utah State University, North Logan, Logan, and Cache Valley, specifically materials, plant species, climate, hydrology, solar orientation and potential views. The design must provide a universally accessible, pedestrian friendly, and environmentally sensitive landscape. Pedestrian paths and vehicular paths, including private, delivery and other large-scale vehicles, will be designed to link the new USTAR Building with Building 620, and the USTAR development with Innovation Campus. Future growth for the immediate site as well as Innovation Campus should be considered.

The landscape design shall adhere to the Innovation Campus Site Development and Landscape Guidelines as well as the Innovation Campus Master Plan. All development proposals will need to be reviewed and approved by the Innovation Campus Facility Advisory Council. The Design Team should review these documents as well as Section 2.7.1 of this document for additional reference. Additionally, see Section 3.10 for sustainability information.

Views

Preserve/enhance existing view opportunities to west, north and east. Prioritize views from very public outdoor and public indoor spaces over those from private spaces. Create “viewing platforms” as well as peripheral views out of the campus open spaces. Link campus spaces together with selective views from one to the other. Planting should encourage view corridors or direct views away from undesirable views, such as the service/dock area.

Outdoor Spaces

Create linked outdoor spaces or “outdoor rooms,” with both spatial closure and views outward. Create a variety of campus space-types: quiet--active, green--paved, open--closed, shaded--sunny, etc. Limit hardscape areas to those which will attract large gatherings; in principle most outdoor spaces should not be hardscape. Exterior designated smoking areas should be provided that offer shelter from the elements. Provide fixed and movable site furniture at strategic quiet and busy locations to accommodate both quiet lounging and interactions. Also provide connections, links, and other methods of integration to the Innovation Campus and Building 620 utilizing open spaces and pathways. Planning should consider the future pedestrian links described in the Master Plan.

Shade and Shadow
Locate habitable outdoor spaces so as to avoid building and tree shadows in winter, spring and fall, and maximize shade in summer. Utilize mature deciduous tree canopies as much as possible to achieve this end. Allow areas of un-shaded seating areas to extend the useful seasons into the late fall and early spring.

Landscape
All areas not covered by building, parking, or other hard surfaces, including pedestrian corridors, shall be landscaped and irrigated. Trees, shrubs, and groundcovers, turf and earth mounding have been designated as the dominant materials for landscape development. Proposed development must be subtle, uncluttered, and convey a horizontal quality in overall effect. Plant selections should be well-adapted to the site, and emphasize the use of native plants with low water use requirements. Plant selections should be easily maintained, and not susceptible to diseases and pests. Plant selections shall not contain fruit that may stain sidewalks or cause walking hazards. Deciduous trees are encouraged along pedestrian walks and in plaza areas to provide shade. Mass shrub planting should avoid creating areas of security hazard (i.e. along pedestrian walks and entryways). See the Innovation Campus Landscape Guidelines for specific plant species, sizes and spacing.

Areas surrounding parking lots shall be landscaped in such a manner as to interrupt or screen said areas from view from access streets and adjacent properties. Such planting shall not impede the view of pedestrians and/or drivers at all intersections and crosswalks. Parking strip plantings may include turf or low-growing permanent ground cover. All parking lot islands shall include trees.

The new USTAR Building project will be responsible for development of the landscape and streets that border the site. Development is to include landscape/road/curb and gutter/sidewalks to the centerline of the Grand Avenue and 1550 North. Some of the development of Grand Avenue is existing. Additional development needs to be coordinated with the Innovation Campus Facility Advisory Council.

Irrigation
Irrigation should not be considered as the primary sources of plant vitality. Limited focal areas may be considered for irrigation, with consideration of minimal water consumption. Secondary water shall be the first choice for irrigation, if feasible. Controllers shall be compatible with Rainbird Maxicom system, including radios and antennae. All drip equipment and connections shall be Netafirm. All irrigation equipment shall be manufactured by Rainbird.

Large, expansive lawns are to be avoided due to the limited water availability. High drought tolerant grass species should be specified. Alteration of the topography to concentrate water in plant beds and lawn areas instead of storm drains should be considered. Xeriscape design concepts should be incorporated and coordinated with USU Grounds Department, and State Building Board Standards.

Parking
Parking is to be primarily accessed from 600 East or 1550 north. Parking areas adjacent to pedestrian corridors must have a buffer of 15 feet of landscaping and berms. All parking areas shall be designed with ample space for snow storage, and for efficient snow removal.

Retention Ponds
Currently, a small retention pond exists just south of, and serves the site of Building 620. A large retention pond is being planned in the vicinity of the proposed USTAR Building site to serve a considerable portion of Innovation Campus development. Refer to the Innovation Campus Utility Master Plan for detailed information. While these retention ponds are not included in the scope of work described by this Program Document, they may be considered as part of

Campus-wide common green space. Pedestrian links to these areas should be considered in conjunction with the landscape design for the proposed USTAR Building.

Paving and Alternatives
Paving materials and construction must adhere to the standards set forth in the Innovation Campus Site Development and Landscape Guidelines. Consider using permeable pavements in areas of low pedestrian concentration or tertiary circulation patterns. Permeable pavements potentially reduce the amount of storm water run-off.

Site Lighting
Adequate lighting shall be provided for all pedestrian areas, parking lots, and building entrances. Minimum foot-candle requirements must be considered with respect to safety and environmental sustainability. All exterior light fixtures shall be concealed source fixtures and shall meet requirements for night sky protection and additional requirements of the local municipality or authority having jurisdiction. Exterior wall-mounted floodlights are prohibited.

Site Furnishings and Signage
Building signage that helps to identify the new USTAR Building, and the research taking place within, is encouraged. Site signage must meet Innovation Campus guidelines, specifically placement, square-footage and height limitations.

Site furnishings, including benches, flagpoles, bicycle racks, trash receptacles, etc., must be consistent with Innovation Campus standards. Locate trash receptacles near building entrances and in areas where people are encouraged to congregate. Recycle bins should be located adjacent to trash bins to encourage use. See the Innovation Campus Site Development and Landscape Guidelines for detailed information.

Accessibility
Wherever possible, all site paths shall meet ADA criteria for slope and landings. If this is unfeasible in a particular location, provide elevator access within the new USTAR Building that will allow wheelchair users to transition the non-compliant grade condition. All usable outdoor campus spaces shall be fully accessible.

Emergency and Non-Routine Service Access
In accordance with Utah State University's management and maintenance practices, design paths and walkways to accommodate emergency vehicles and occasional non-routine service access. Utilize Utah State University's Design Standards to prevent private vehicles from using these paths.

Bicycle Access
Provide for bicycle usage along the north-south pedestrian corridor, and secure bicycle storage adjacent to the new USTAR Building entrances. Bicycle racks, rather than bike lockers, should be located conveniently near building entrances.

3.10 sustainable design

3.10 Sustainable Design

The U.S. Green Building Council's (USGBC) core purpose is to transform the way buildings and communities are designed, built and operated, enabling an environmentally and socially responsible, healthy, and prosperous environment that improves the quality of life.

In trying to achieve these goals USGBC has developed the LEED Green Building Rating System®. LEED (Leadership in Energy and Environmental Design) is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. The LEED process provides a complete framework for assessing building performance and meeting sustainability goals.

LEED Certification distinguishes building projects that have demonstrated a commitment to sustainability by meeting the highest performance standards. Based on well-founded scientific standards, LEED emphasizes state of the art strategies for sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

It is the goal of the USTAR Governing Board for the new USU USTAR Building to be planned designed, and constructed to achieve a LEED GOLD level of certification. The following pages include sustainable design measures that should be considered, along with potential technologies and strategies that can be employed during the design and construction process.

Sustainable Sites

Construction Activity Pollution Prevention:
Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation. **Potential Technologies & Strategies Include:** Create an Erosion and Sedimentation Control Plan during the design phase of the project. Consider employing strategies such as temporary and permanent seeding, mulching, earth dikes, silt fencing, sediment traps and sediment basins.

Site Selection:
Avoid development of inappropriate sites and reduce the environmental impact from the location of a building on a site. **Potential Technologies & Strategies Include:** During the site selection process, give preference to those sites that do not include sensitive site elements and restrictive land types. Select a suitable building location and design the building with the minimal footprint to minimize site disruption of those environmentally sensitive areas identified above.

Development Density & Community Connectivity:
Channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources. **Potential Technologies & Strategies Include:** During the site selection process, give preference to urban sites with pedestrian access to a variety of services.

Brownfield Redevelopment:
Rehabilitate damaged sites where development is complicated by environmental contamination, reducing pressure on undeveloped land. **Potential Technologies & Strategies Include:** During the site selection process, give preference to brownfield sites. Identify tax incentives and property cost savings. Coordinate site development plans with remediation activity, as appropriate.

Alternative Transportation/Public Transportation:
Access Reduce pollution and land development impacts from automobile use. **Potential Technologies & Strategies Include:** Perform a transportation survey of future building occupants to identify transportation needs. Site the building near mass transit.

A**lternative Transportation/Bicycle Storage & Changing Rooms:**
Reduce pollution and land development impacts from automobile use. **Potential Technologies & Strategies Include:** Design the building with transportation amenities such as bicycle racks and showering/ changing facilities.

Alternative Transportation/Low-Emission & Fuel-Efficient Vehicles:
Reduce pollution and land development impacts from automobile use. **Potential Technologies & Strategies Include:** Provide transportation amenities such as alternative fuel refueling stations. Consider sharing the costs and benefits of refueling stations with neighbors.

Alternative Transportation:
Parking Capacity: Reduce pollution and land development impacts from single occupancy vehicle use. **Potential Technologies & Strategies Include:** Minimize parking lot/garage size. Consider sharing parking facilities with adjacent buildings. Consider alternatives that will limit the use of single occupancy vehicles.

Site Development:
Protect or Restore Habitat: Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity. **Potential Technologies & Strategies Include:** On

greenfield sites, perform a site survey to identify site elements and adopt a master plan for development of the project site. Carefully site the building to minimize disruption to existing ecosystems and design the building to minimize its footprint. Strategies include stacking the building program, tuck-under parking and sharing facilities with neighbors. Establish clearly marked construction boundaries to minimize disturbance of the existing site and restore previously degraded areas to their natural state. For previously developed sites, utilize local and regional governmental agencies, consultants, educational facilities, and native plant societies as resources for the selection of appropriate native or adapted plant materials. Prohibit plant materials listed as invasive or noxious weed species. Native/adapted plants require minimal or no irrigation following establishment, do not require active maintenance such as mowing or chemical inputs such as fertilizers, pesticides or herbicides, and provide habitat value and promote biodiversity through avoidance of monoculture plantings.

Site Development/Maximize Open Space:
Provide a high ratio of open space to development footprint to promote biodiversity. **Potential Technologies & Strategies Include:** Perform a site survey to identify site elements and adopt a master plan for development of the project site. Select a suitable building location and design the building with a minimal footprint to minimize site disruption. Strategies include stacking the building program, tuck-under parking and sharing facilities with neighbors to maximize open space on the site.

Stormwater Design:
Quantity Control: Limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, and managing stormwater runoff. **Potential Technologies & Strategies Include:** Design the project site to maintain natural stormwater flows by promoting infiltration. Specify vegetated roofs, pervious paving, and other measures to minimize impervious surfaces. Reuse stormwater volumes generated for non-potable uses such as landscape irrigation, toilet and urinal flushing and custodial uses.

Stormwater Design:
Quantity Control: Reduce or eliminate water pollution by reducing impervious cover, increasing onsite infiltration, eliminating sources of contaminants, and removing pollutants from stormwater runoff. **Potential Technologies & Strategies Include:** Use alternative surfaces (e.g., vegetated roofs, pervious pavement or grid pavers) and nonstructural techniques (e.g., rain gardens, vegetated swales, disconnection of imperviousness, rainwater recycling) to reduce imperviousness and promote infiltration, thereby reducing pollutant loadings. Use sustainable design strategies (e.g., Low Impact Development, Environmentally Sensitive Design) to design integrated natural and mechanical treatment systems such as constructed wetlands, vegetated filters, and open channels to treat stormwater runoff.

Heat Island Effect/Non-Roof:
Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat. **Potential Technologies & Strategies Include:** Shade constructed surfaces on the site with landscape features and utilize high-reflectance materials for hardscape. Consider replacing constructed surfaces (i.e., roof, roads, sidewalks, etc.) with vegetated surfaces such as vegetated roofs and open grid paving or specify high-albedo materials to reduce the heat absorption.

Heat Island Effect/Roof:
Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat. **Potential Technologies & Strategies Include:** Consider installing high-albedo and vegetated roofs to reduce heat absorption.

Light Pollution Reduction:
Minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments. **Potential Technologies & Strategies Include:** Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Minimize site lighting where possible and model the site lighting using a computer model. Technologies to reduce light pollution include full cutoff luminaires, low-reflectance surfaces and low-angle spotlights.

Water Efficiency

Water Efficient Landscaping/Reduce by 50%:
Limit or eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation. **Potential Technologies & Strategies Include:** Perform a soil/climate analysis to determine appropriate plant material and design the landscape with native or adapted plants to reduce or eliminate irrigation requirements. Where irrigation is required, use high-efficiency equipment and/or climate-based controllers.

Water Efficient Landscaping/No Potable Water Use or No Irrigation:
Eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation. **Potential Technologies & Strategies Include:** Perform a soil/climate analysis to determine appropriate landscape types and design the landscape with indigenous plants to reduce or eliminate irrigation requirements. Consider using stormwater, graywater, and/or condensate water for irrigation.

Innovative Wastewater Technologies:
Reduce generation of wastewater and potable water demand, while increasing the local aquifer recharge. **Potential Technologies & Strategies Include:** Specify high-efficiency fixtures and dry fixtures such as composting toilet systems and non-water using urinals to reduce wastewater volumes. Consider reusing stormwater or graywater for sewage conveyance or on-site wastewater treatment systems (mechanical and/or natural). Options for on-site wastewater treatment include packaged biological nutrient removal systems, constructed wetlands, and high-efficiency filtration systems.

Water Use Reduction/20% Reduction:
Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems. **Potential Technologies & Strategies Include:** Use high-efficiency fixtures, dry fixtures such as composting toilet systems and nonwater using urinals, and occupant sensors to reduce the potable water demand. Consider reuse of stormwater and graywater for non-potable applications such as toilet and urinal flushing and custodial uses.

Water Use Reduction/30% Reduction:
Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems. **Potential Technologies & Strategies Include:** Use high-efficiency fixtures, dry fixtures such as composting toilet systems and waterless urinals, and occupant sensors to reduce the potable water demand. Consider reuse of stormwater and graywater for non-potable applications such as toilet and urinal flushing, mechanical systems and custodial uses.

Energy and Atmosphere

Fundamental Commissioning of the Building Energy Systems:
Verify that the building's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design, and construction documents. **Potential Technologies & Strategies Include:** In order to meet this prerequisite, owners are required to use qualified individuals to lead the commissioning process. Owners are encouraged to consider including water-using systems, building envelope systems, and other systems in the scope of the commissioning plan as appropriate. The building envelope is an important component of a facility which impacts energy consumption, occupant comfort and indoor air quality. While it is not required to be commissioned by LEED, an owner can receive significant financial savings and reduced risk of poor indoor air quality by including building envelope commissioning.

Minimum Energy Performance:
Establish the minimum level of energy efficiency for the proposed building and systems. **Potential Technologies & Strategies Include:** Design the building envelope, HVAC, lighting, and other systems to maximize energy performance.

Fundamental Refrigerant Management:
Reduce ozone depletion. **Potential Technologies & Strategies Include:** When reusing existing HVAC systems, conduct an inventory to identify equipment that uses CFC refrigerants and provide a replacement schedule for these refrigerants. For new buildings, specify new HVAC equipment in the base building that uses no CFC refrigerants.

Optimize Energy Performance:
Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use. **Potential Technologies & Strategies Include:** Design the building envelope and systems to maximize energy performance. Use a computer simulation model to assess the energy performance and identify the most cost-effective energy efficiency measures. Quantify energy performance as compared to a baseline building.

On-Site Renewable Energy:
Encourage and recognize increasing levels of on-site renewable energy self-supply in order to reduce environmental and economic impacts associated with fossil fuel energy use. **Potential Technologies & Strategies Include:** Assess the project for non-polluting and renewable energy potential including solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies. When applying these strategies, take advantage of net metering with the local utility.

Enhanced Commissioning:
Begin the commissioning process early during the design process and execute additional activities after systems performance verification is completed. **Potential Technologies & Strategies Include:** Although it is preferable that the Commissioning Agent be contracted by the Owner, for the enhanced commissioning credit, the Commissioning Agent may also be contracted through the design firms or construction management firms not holding construction contracts.

Enhanced Refrigerant Management:
Reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to global warming. **Potential Technologies & Strategies Include:** Design and operate the facility without mechanical cooling and refrigeration equipment. Where mechanical cooling is used, utilize base building HVAC and refrigeration systems for the refrigeration cycle that minimize direct impact on ozone depletion and global warming. Select HVAC&R equipment with reduced refrigerant charge and increased equipment life. Maintain equipment to prevent leakage of refrigerant to the atmosphere. Utilize fire suppression systems that do not contain HCFCs or Halons.

Measurement & Verification:
Provide for the ongoing accountability of building energy consumption over time. **Potential Technologies & Strategies Include:** Develop an M&V Plan to evaluate building and/or energy system performance. Characterize the building and/or energy systems through energy simulation or engineering analysis. Install the necessary metering equipment to measure energy use. Track performance by comparing predicted performance to actual performance, broken down by component or system as appropriate. Evaluate energy efficiency by comparing actual performance to baseline performance.

Green Power:
Encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis. **Potential Technologies & Strategies Include:** Determine the energy needs of the building and investigate opportunities to engage in a green power contract. Green power is derived from solar, wind, geothermal, biomass or low-impact hydro sources.

Materials and Resources

Storage & Collection of Recyclables:
Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills. **Potential Technologies & Strategies Include:** Coordinate the size and functionality of the recycling areas with the anticipated collection services for glass, plastic, office paper, newspaper, cardboard and organic wastes to maximize the effectiveness of the dedicated areas. Consider employing cardboard balers, aluminum can crushers, recycling chutes and collection bins at individual workstations to further enhance the recycling program.

Building Reuse/ Maintain 75% of Existing Walls, Floors & Roof:
Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport. **Potential Technologies & Strategies Include:** Consider reuse of existing, previously occupied buildings, including structure, envelope and elements. Remove elements that pose contamination risk to building occupants and upgrade components that would improve energy and water efficiency such as windows, mechanical systems and plumbing fixtures. Quantify the extent of building reuse.

Building Reuse:
Maintain 95% of Existing Walls, Floors & Roof: Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport. **Potential Technologies & Strategies Include:** Consider reuse of existing, previously occupied buildings, including structure, envelope and elements. Remove elements that pose contamination risk to building occupants and upgrade components that would improve energy and water efficiency such as windows, mechanical systems and plumbing fixtures. Quantify the extent of building reuse.

Building Reuse/Maintain 50% of Interior Non-Structural Elements:
Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport. **Potential Technologies & Strategies Include:** Consider reuse of existing, previously occupied buildings, including structure, envelope and interior non-structural elements. Remove elements that pose contamination risk to building occupants and upgrade components that would improve energy and water efficiency, such as mechanical systems and plumbing fixtures. Quantify the extent of building reuse.

Construction Waste Management/Divert 50% from Disposal:
Divert construction, demolition and land-clearing debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites. **Potential Technologies & Strategies Include:** Establish goals for diversion from disposal in landfills and incinerators and adopt a construction waste management plan to achieve these goals. Consider recycling cardboard, metal, brick, acoustical tile, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Designate a specific area(s) on the construction site for segregated or comingled collection of recyclable materials, and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials. Note that diversion may include donation of materials to charitable organizations and salvage of materials on-site.

Construction Waste Management/Divert 75% from Disposal:
Divert construction and demolition debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites. **Potential Technologies & Strategies Include:** Establish goals for diversion from disposal in landfills and incinerators and adopt a construction waste management plan to achieve these goals. Consider recycling cardboard, metal, brick, acoustical tile, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Designate a specific area(s) on the construction site for segregated or comingled collection of recyclable materials, and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials. Note that diversion may include donation of materials to charitable organizations and salvage of materials on-site.

Materials Reuse 5%:
Reuse building materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources. **Potential Technologies & Strategies Include:** Identify opportunities to incorporate salvaged materials into building design and research potential material suppliers. Consider salvaged materials such as beams and posts, flooring, paneling, doors and frames, cabinetry and furniture, brick and decorative items.

Materials Reuse 10%:
Reuse building materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources. **Potential Technologies & Strategies Include:** Identify opportunities to incorporate salvaged materials into building design and research potential material suppliers. Consider salvaged materials such as beams and posts, flooring, paneling, doors and frames, cabinetry and furniture, brick and decorative items.

Recycled Content 10% (Post-Consumer + ½ Pre-Consumer):
Increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials. **Potential Technologies & Strategies Include:** Establish a project goal for recycled content materials and identify material suppliers that can achieve this goal. During construction, ensure that the specified recycled content materials are installed. Consider a range of environmental, economic and performance attributes when selecting products and materials.

Recycled Content 20% (Post-Consumer + ½ Pre-Consumer):
Increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials. **Potential Technologies & Strategies Include:** Establish a project goal for recycled content materials and identify material suppliers that can achieve this goal. During construction, ensure that the specified recycled content materials are installed. Consider a range of environmental, economic and

performance attributes when selecting products and materials.

Regional Materials 10% Extracted, Processed & Manufactured Regionally: Increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation. **Potential Technologies & Strategies Include:** Establish a project goal for locally sourced materials, and identify materials and material suppliers that can achieve this goal. During construction, ensure that the specified local materials are installed and quantify the total percentage of local materials installed. Consider a range of environmental, economic and performance attributes when selecting products and materials.

Regional Materials 20% Extracted, Processed & Manufactured Regionally:
Increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation. **Potential Technologies & Strategies Include:** Establish a project goal for locally sourced materials and identify materials and material suppliers that can achieve this goal. During construction, ensure that the specified local materials are installed. Consider a range of environmental, economic and performance attributes when selecting products and materials.

Rapidly Renewable Materials:
Reduce the use and depletion of finite raw materials and long-cycle renewable materials by replacing them with rapidly renewable materials. **Potential Technologies & Strategies Include:** Establish a project goal for rapidly renewable materials and identify products and suppliers that can support achievement of this goal. Consider materials such as bamboo, wool, cotton insulation, agrifiber, linoleum, wheatboard, strawboard and cork. During construction, ensure that the specified renewable materials are installed.

Certified Wood:
Encourage environmentally responsible forest management. **Potential Technologies & Strategies Include:** Establish a project goal for FSC-certified wood products and identify suppliers that can achieve this goal. During construction, ensure that the FSC-certified wood products are installed and quantify the total percentage of FSC-certified wood products installed.

Indoor Environmental Quality

Minimum IAQ Performance:
Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants. **Potential Technologies & Strategies Include:** Design ventilation systems to meet or exceed the minimum outdoor air ventilation rates as described in the ASHRAE standard. Balance the impacts of ventilation rates on energy use and indoor air quality to optimize for energy efficiency and occupant health. Use the ASHRAE 62 Users Manual for detailed guidance on meeting the referenced requirements.

Environmental Tobacco Smoke (ETS) Control:
Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke (ETS). **Potential Technologies & Strategies Include:** Prohibit smoking in commercial buildings or effectively control the ventilation air in smoking rooms. For residential buildings, prohibit smoking in common areas, design building envelope and systems to minimize ETS transfer among dwelling units.

Outdoor Air Delivery Monitoring:
Provide capacity for ventilation system monitoring to help sustain occupant comfort and well-being. **Potential Technologies & Strategies Include:** Install carbon dioxide and airflow measurement equipment and feed the information to the HVAC system and/or Building Automation System (BAS) to trigger corrective action, if applicable. If such automatic controls are not feasible with the building systems, use the measurement equipment to trigger alarms that inform building operators or occupants of a possible deficiency in outdoor air delivery.

Increased Ventilation:
Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity. **Potential Technologies & Strategies Include:** For mechanically ventilated spaces: use heat recovery, where appropriate, to minimize the additional energy consumption associated with higher ventilation rates. For naturally ventilated spaces: follow the eight design steps described in the Carbon Trust Good Practice Guide 237: 1) Develop design requirements, 2) Plan airflow paths, 3) Identify building uses and features that might require special attention, 4) Determine ventilation requirements, 5) Estimate external driving pressures, 6) Select types of ventilation devices, 7) Size ventilation devices, 8) Analyze the design. Use public domain software such as NIST's CONTAM, Multizone Modeling Software, along with LoopDA, Natural Ventilation Sizing Tool, to analytically predict room-by room airflows

Construction IAQ Management Plan During Construction:
Reduce indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants. **Potential Technologies & Strategies Include:** Adopt an IAQ management plan to protect the HVAC system during construction, control pollutant sources and interrupt contamination pathways. Sequence the installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile and gypsum wallboard. Coordinate with EQ Credits 3.2 and 5 to determine the appropriate specifications and schedules for filtration media. If possible, avoid using permanently installed air handlers for temporary heating/cooling during construction. Consult this LEED-NC v2.2 Reference Guide for more detailed information on how to ensure the well-being of construction workers and building occupants if permanently installed air handlers must be used during construction.

Construction IAQ Management Plan Before Occupancy:
Reduce indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants.
Potential Technologies & Strategies Include: Prior to occupancy, perform a building flush-out or test the air contaminant levels in the building. The flush-out is often used where occupancy is not required immediately upon substantial completion of construction. IAQ testing can minimize schedule impacts but may be more costly.

Low-Emitting Materials/ Adhesives & Sealants:
Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants. **Potential Technologies & Strategies Include:** Specify low-VOC materials in construction documents. Ensure that VOC limits are clearly stated in each section of the specifications where adhesives and sealants are addressed. Common products to evaluate include general construction adhesives, flooring adhesives, fire-stopping sealants, caulking, duct sealants, plumbing adhesives, and cove base adhesives.

Low-Emitting Materials/Paints & Coatings:
Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants. **Potential Technologies & Strategies**

Include: Specify low-VOC paints and coatings in construction documents. Ensure that VOC limits are clearly stated in each section of the specifications where paints and coatings are addressed. Track the VOC content of all interior paints and coatings during construction.

Low-Emitting Materials/Carpet Systems:
Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants. **Potential Technologies & Strategies Include:** Clearly specify requirements for product testing and/or certification in the construction documents. Select products that are either certified under the Green Label Plus program or for which testing has been done by qualified independent laboratories in accordance with the appropriate requirements.

Low-Emitting Materials:
Composite Wood & Agrifiber Products: Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.
Potential Technologies & Strategies Include: Specify wood and agri.ber products that contain no added urea-formaldehyde resins. Specify laminating adhesives for field and shop applied assemblies that contain no added urea-formaldehyde resins.

Indoor Chemical & Pollutant Source Control:
Minimize exposure of building occupants to potentially hazardous particulates and chemical pollutants. **Potential Technologies & Strategies Include:** Design facility cleaning and maintenance areas with isolated exhaust systems for contaminants. Maintain physical isolation from the rest of the regularly occupied areas of the building. Install permanent architectural entryway systems such as grilles or grates to prevent occupant-borne contaminants from entering the building. Install high-level filtration systems in air handling units processing both return air and outside supply air. Ensure that air handling units can accommodate required filter sizes and pressure drops.

Controllability of Systems/ Lighting:
Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (i.e., classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants. **Potential Technologies & Strategies Include:** Design facility cleaning and maintenance areas with isolated exhaust systems for contaminants. Maintain physical isolation from the rest of the regularly occupied areas of the building. Install permanent architectural entryway systems such as grilles or grates to prevent occupant-borne contaminants from entering the building. Install high-level filtration systems in air handling units processing both return air and outside supply air. Ensure that air handling units can accommodate required filter sizes and pressure drops.

Controllability of Systems/Thermal Comfort:
Provide a high level of thermal comfort system control by individual occupants or by specific groups in multi-occupant spaces (i.e., classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants. **Potential Technologies & Strategies Include:** Design the building and systems with comfort controls to allow adjustments to suit individual needs or those of groups in shared spaces. ASHRAE Standard 55-2004 identifies the factors of thermal comfort and a process for developing comfort criteria for building spaces that suit the needs of the occupants involved in their daily activities. Control strategies can be developed to expand on the comfort criteria to allow adjustments to suit individual needs and preferences. These may involve system designs incorporating operable windows, hybrid systems integrating operable windows and mechanical systems, or mechanical systems alone. Individual adjustments may involve individual thermostat controls, local diffusers at floor, desk or overhead levels, or control of individual radiant panels, or other means integrated into the overall building, thermal comfort systems, and energy systems design.

Thermal Comfort/Verification:
Provide for the assessment of building thermal comfort over time. **Potential Technologies & Strategies Include:** ASHRAE Standard 55-2004 provides guidance for establishing thermal comfort criteria and the documentation and validation of building performance to the criteria. While the standard is not intended for purposes of continuous monitoring and maintenance of the thermal environment, the principles expressed in the standard provide a basis for design of monitoring and corrective action systems.

Daylight & Views/Daylight 75% of Spaces:
Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building. **Potential Technologies & Strategies Include:** Design the building to maximize interior daylighting. Strategies to consider include building orientation, shallow floor plates, increased building perimeter, exterior and interior permanent shading devices, high performance glazing and automatic photocell based controls. Predict daylight factors via manual calculations or model daylighting strategies with a physical or computer model to assess footcandle levels and daylight factors achieved.

Daylight & Views/Daylight 90% of Spaces:
Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building. **Potential Technologies & Strategies Include:** Design the space to maximize daylighting and view opportunities. Strategies to consider include lower partition heights, interior shading devices, interior glazing, and automatic photocell-based controls.

Innovation and Design Process

Innovation in Design: To provide design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set by the LEED-NC Green Building Rating System and/or innovative performance in Green Building categories not specifically addressed by the LEED-NC Green Building Rating System. Potential Technologies & Strategies Include: Substantially exceed a LEED-NC performance credit such as energy performance or water efficiency. Apply strategies or measures that demonstrate a comprehensive approach and quantifiable environment and/or health benefits.

LEED Accredited Professional: To support and encourage the design integration required by a LEED-NC green building project and to streamline the application and certification process. Potential Technologies & Strategies Include: Educate the project team members about green building design & construction and application of the LEED Rating System early in the life of the project. Consider assigning the LEED AP as a facilitator of an integrated design & construction process.

While the USTAR Governing Board has mandated Gold Level of certification, some sustainable design initiatives are not appropriate or feasible for this project. For instance, studying/implementing district heating and cooling will not be pursued for this project.

Sustainable planning, design, and construction strategies should continue to be evaluated throughout subsequent design phases. A LEED Project Checklist should be completed early in the next design phase to determine potential “points” and the feasibility of achieving Gold level of certification.

04 individual space outline

4.1 space program & area summary

Overall Program Summary	Vivarium + Generic Life Science Space			
Group / Function	**NASF**	Efficiency	**GSF**	**Notes**
Generic Life Sciences	22,805	0.60	38,008	
Biocontainment Research	3,545	0.25	14,180	
Vivarium	17,244	0.50	34,488	
Shared Support	9,780	0.70	13,971	
TOTAL	**53,374**	0.53	**100,648**	

Generic Life Sciences	Vivarium + Generic Life Science Space

	NASF		Quantity	Subtotal NASF	Notes
Laboratory Offices					
Private Office	150		16	2,400	16 FTEs (10 PI's +6 extra offices)
Shared Office	150		0	0	
Office Cube	75		18	1,350	18 FTEs (Postdocs)
Admin Space	100		4	400	4 FTEs. Combine 2 into suite
Lab Desk					4 FTEs per wet lab bay = 96
SUBTOTAL				**4,150**	134 FTEs (wet lab)
					8 FTEs (non wet lab, *see below*)
					142 FTEs total at full growth
Office Support					
Printer/Copy/Fax Area	120		2	240	
Supply Closet	30		3	90	
File Storage	25		2	50	
Library/Journal Room	450		1	450	
Kitchenette/Coffe/Break Area	185		2	370	
Coat Closet	40		2	80	
SUBTOTAL				**1,280**	
Laboratory					
Wet Lab Bay	330		24	7,920	(2) 12LF benches per 11' x 30' bay: 4 tech sta.
SUBTOTAL				**7,920**	(lab to support ratio: 1.5)
Laboratory Support					
Freezer Farm	330		1.5	495	space for (30) -80 freezers
Darkroom	75		1	75	
Controlled Temperature Room	75		4	300	cold, warm or freezer type
Tissue Processing Room	154		1	154	
Imaging / Microscopy Room	154		2	308	
Instrument / Equipment Room	154		9	1,386	
Other Lab Support Room	308		2	616	
Cell Culture Room	308		3	924	
Fume Hood Alcove	75		4	300	(1) 4' FH + (1) 6 LF bench &/or flam cab each
Radioisotope Room	230		1	230	shared between PI's (inc ioddinations)
Solution Prep Room	154		2	308	(1) 4' FH per room + balances
Lab Supplies Storage Room	80		3	240	
Autoclave Room	75		1	75	
SUBTOTAL				**5,411**	

Generic Life Sciences Vivarium + Generic Life Science Space

	NASF	Quantity	Subtotal NASF	Notes
Non-Wet Lab Offices				
Private Office	150	8	1,200	Coord., Dietitian, Physician, Research Diet. 3 Pis, Support
SUBTOTAL			**1,200**	
Non-Wet Lab Support				
Reception Waiting Area	200	1	200	
Records Room	150	1	150	
Support Room	100	7	700	Exam, phlebotomy, interview
Support Lab	154	1	154	
Storage Room	80	1	80	
Temporary Office	100	1	100	
Dining area	400		400	Included as part of "Shared Support"
SUBTOTAL			**1,784**	
Non-Wet Lab Support: Production				
Cooking Bay	130	2	260	
Large Prep Area	400	1	400	
Food Service/Dishwashing	100	1	100	
Walk-in Freezer	100	1	100	
Walk-in Cold Storage	100	1	100	
Dry Storage	100	1	100	
Dining Area	0	1	0	400 SF of "Shared Support" allocated for tables
SUBTOTAL			**1,060**	
Animal Spaces - See "Vivarium"				
Other Support				
Hazardous Waste Holding			0	See "Shared Support"
Glass Washing & Sterile Prep			0	See "Shared Support"
Building Lobby & Waiting			0	See "Shared Support"
SUBTOTAL			**0**	
TOTAL			**22,805**	

Biocontainment Research [spaces are subset of vivarium Vivarium + Generic Life Science Space

	NASF		Quantity	Subtotal NASF	Notes
ABSL Offices					
Private Office	150		0	0	
Shared Office	150		0	0	
Office Cube	75		0	0	
Admin Space	75		0	0	
SUBTOTAL				**0**	
ABSL Suites [ABSL 3 and ABSL 3+]					design both suites as ABSL 3+
Common Ante Room	250		1	250	includes space for autoclave
Gowning	80		1	80	
Locker/Shower Out	150		2	300	
Personnel Airlock	40		2	80	
Materials Airlock	125		2	250	include space for decon / autoclave?
Holding Room	220		3	660	1@ABSL 3 & 2@ABSL 3+
Holding Room	220		2	440	1@ABSL 3 & 1@ABSL 3+
Procedure Room	150		2	300	1 procedure room per suite
Support Lab	330		2	660	1@ABSL 3 & 1@ABSL 3+
Carcass Disposal/Digester	120		1	120	
Supply Storage Room	120		2	240	1 per suite
SUBTOTAL				**3,380**	
ABSL Support					
Supply Room	100		1	100	
Janitors Closet	25		1	25	
Waste Decon / Holding	40		1	40	
SUBTOTAL				**165**	
TOTAL				**3,545**	

[mechanical space for ABSL 3 space requires about 4 SF per every 1 SF of ABSL 3]

Vivarium [see also "Biocontainment Research" spaces list]	Vivarium + Generic Life Science Space				
	NASF		Quantity	Subtotal NASF	Notes
Vivarium Offices					
Private Office	150		2	300	2 FTEs (Manager +1)
Shared Office	150		0	0	
Office Cube	75		0	0	
Admin Space	75		1	75	
Reception	150		1	150	
SUBTOTAL				**525**	
Holding Rooms					
Breeding Rooms	220		2	440	Rats, mice
Small Holding Room	165		10	1,650	140+/- rodent cages per room max
Medium Holding Room	220		10	2,200	420+/- rodent cages per room max
Large Holding Room	330		4	1,320	560 +/- rodent cages or 5 pens per room max
SUBTOTAL				**5,610**	
Vivarium Support					
Holding Suite Ante Room	120		5	600	Subcorridor: 264 act. NSF offset by gen. corridor
Behavior Testing Room	165		5	825	
Surgery- Large Animal OR	250		1	250	
Surgery- Small Animal OR	150		1	150	
Surgery- Pre Op Room	120		1	120	
Surgery- Post Op/Recovery Room	120		1	120	
Surgery- Scrub & Gown Room	95		1	95	
Surgery- Prep Lab & Supply	145		1	145	
Animal Receiving/Examination	150		1	150	
Quarantine Room	230		4	920	3 isolation cubicles per room
Support Lab	165		1	165	Animal health monitoring
Multi Purpose/Necropsy Room	175		1	175	
Carcass Holding				0	carcasses in freezer in necropsy rm.
Carcass Disposal/Digester	145		1	145	
Cage Wash: Dirty	1,800		1	1,800	bedding disposal
Cage Wash: Clean	1,800		1	1,800	bedding dispensing, bottle fill, autocl
Cage Wash: Detergent Storage	100		1	100	
Feed Storage	400		1	400	includes 100 sf walk in cooler
Bedding Storage	400		1	400	
Clean Cage Storage	1,500		1	1,500	
Clean Bottle Storage	200		1	200	includes sipper tube storage
Staff Lockers / Restrooms	150		2	300	6 FTE's / techs
Staff Break Room	200		1	200	
Animal Imaging	154		1	154	future requirement?
Supplies Storage	300		1	300	
Laundry Room	70		1	70	
Janitors Closet	25		1	25	
SUBTOTAL				**11,109**	

Vivarium [see also "Biocontainment Research" spaces list] Vivarium + Generic Life Science Space

	NASF		Quantity	Subtotal NASF	Notes
Other Support					
Hazardous Waste Holding				0	See "Shared Support"
Glass Washing & Sterile Prep				0	See "Shared Support"
Building Lobby & Waiting				0	See "Shared Support"
SUBTOTAL				**0**	
TOTAL				**17,244**	17519

[Single corridor circulation. All doors to be 4' x 8']

Shared Support	Vivarium + Generic Life Science Space

	NASF	Quantity	Subtotal NASF	Notes
Building Support Offices				
Reception/Security Desk	100	1	100	
Security Office	200	1	200	
Loading Dock/Receiving Office	150	1	150	
SUBTOTAL			**450**	
Building Support				
Lobby / Waiting Area	1,000	1	1,000	Segregate 400 SF for café dining area
50 P. Large Conference Room	1,000	1	1,000	20 SF/ person
15 P. Break Out Meeting Room	300	4	1,200	20 SF/ person
10 P. Break Out Meeting Room	200	3	600	20 SF/ person
Break Room / Lounge	250	3	750	1 per floor 25 SF / person
Mail Room	200	1	200	
Glass Ware Washing	800	0	0	
Loading Dock- 2 Bays General	1,360	1	1,360	1 bay for dumpster
Loading Dock- 2 Bay Vivarium	1,360	1	1,360	segregated with bay for dedicated dumpster
Chemical Storage	300	1	300	
Waste Storage- Flammable	120	1	120	
Waste Storage- Biological	120	1	120	
Waste Storage- Radioactive	80	1	80	
Cylinder Storage- Full	120	1	120	
Cylinder Storage- Empty	120	1	120	
Locker/Shower	200	2	400	
Computer Server Room	200	1	200	
Maintenance Equipment Storage	400	1	400	
SUBTOTAL			**9,330**	
TOTAL			**9,780**	

4.2 building organization

4.2.1 building organization

4.2.1 Building Organization

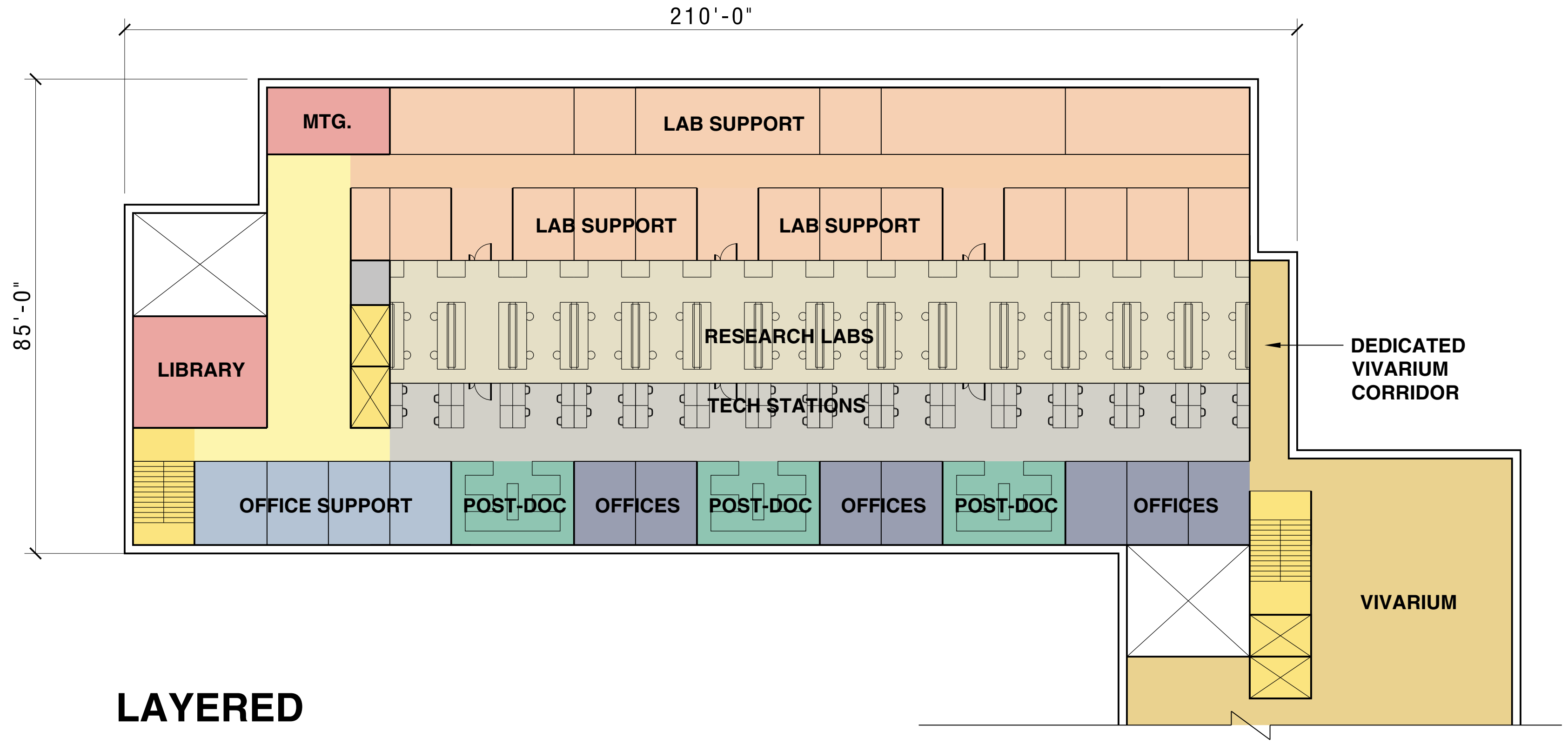
The building organization will be the result of a synthesis of a number of forces operating upon the project. The primary forces affecting the building organization will be:

- Access to natural light and views
- The social goals of the program
- Internal circulation and connections to Building 620 and other buildings on Innovation Campus
- Internal adjacencies
- Internal building utilities distribution
- The result of site forces that will shape the building:

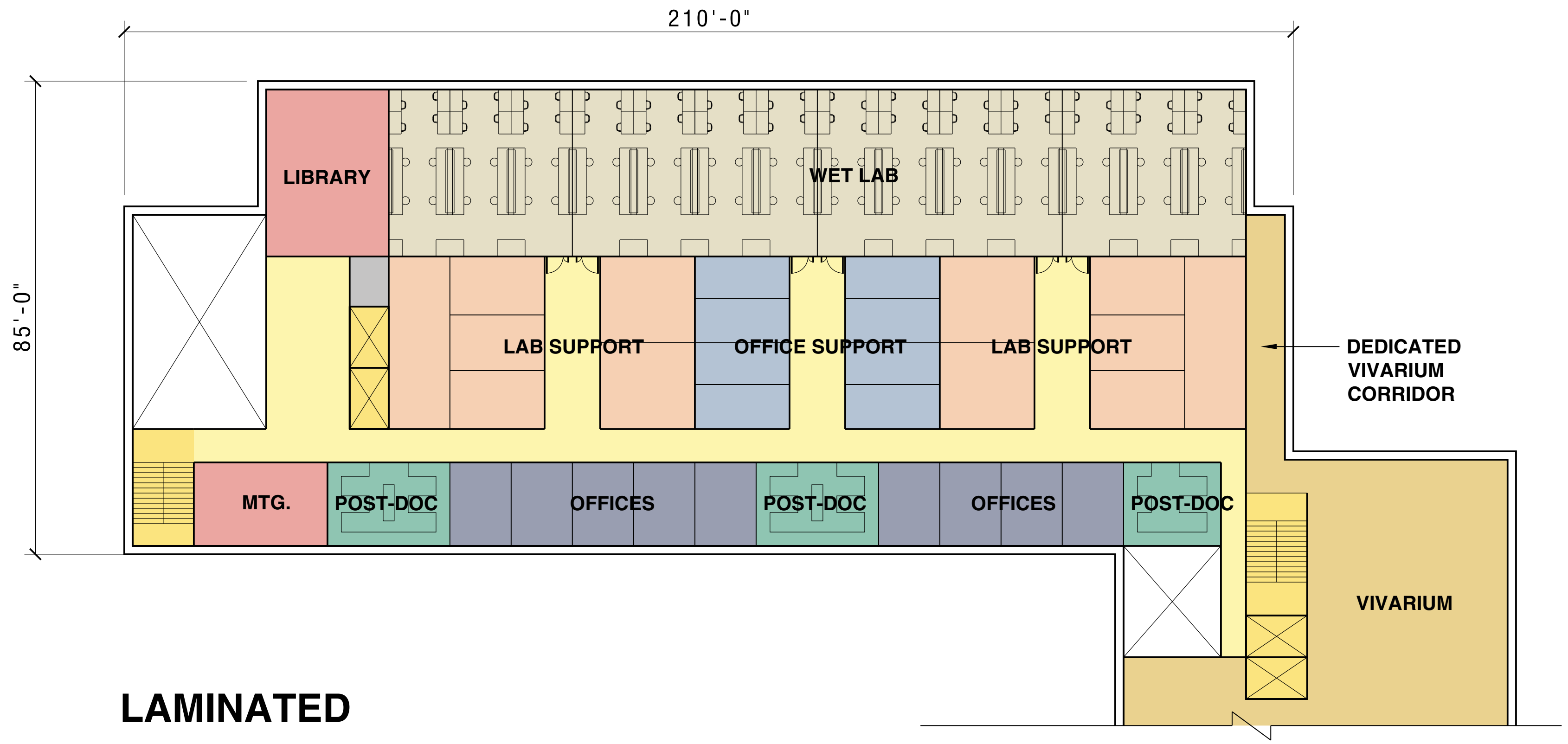
  - Innovation Campus Master Plan proposed development
  - Orientation to Grand Avenue
  - Vehicular access and Parking
  - Green spaces (at the block interior and at the block perimeter)
  - Storm water control
  - Phasing of the site development with existing structures

The major components of the USTAR Building are the labs and the Vivarium. In order to maximize security, safety, and structural, mechanical, and electrical efficiencies, these two individual components are stacked separately, but connected with internal circulation.

4.2.2 lab layout options



LAYERED



LAMINATED

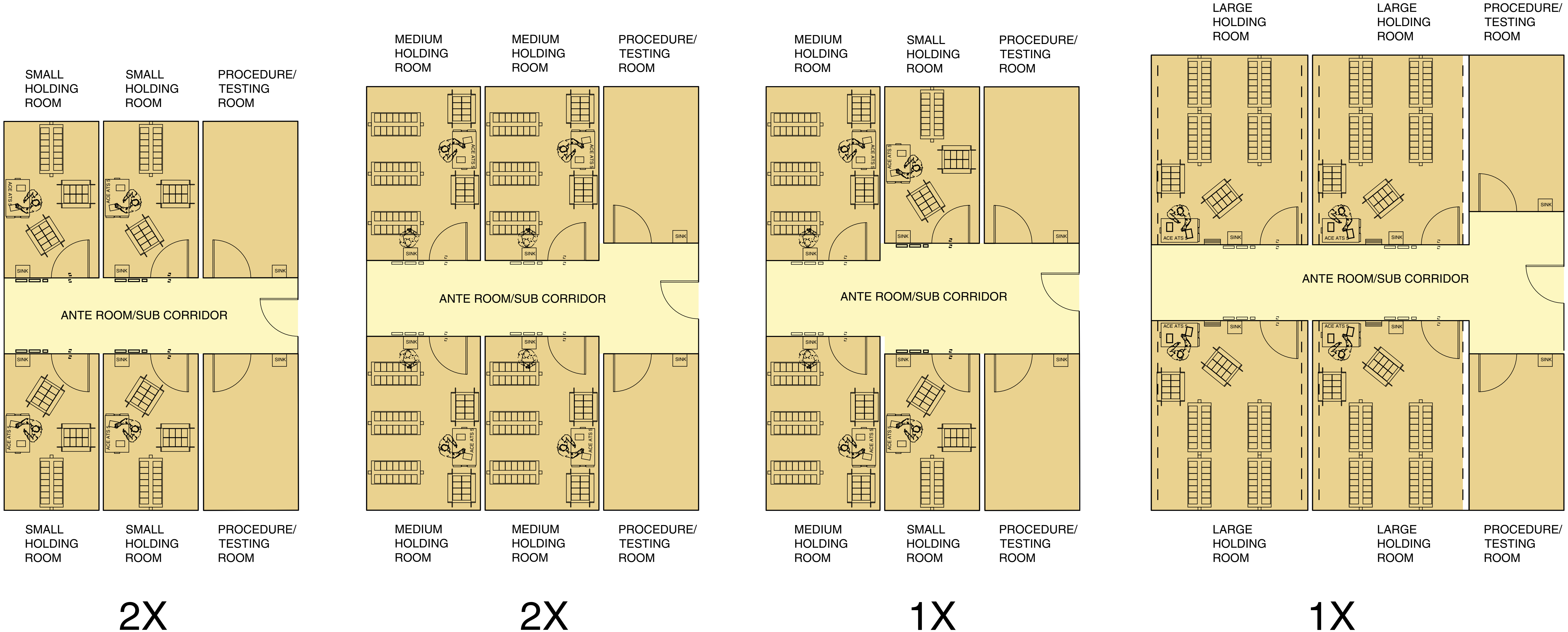
LEGEND

CIRCULATION	OFFICE
BUILDING SUPPORT	POST DOC STUDENTS
ASSEMBLY	OFFICE SUPPORT
WET LAB	VIVARIUM
LAB SUPPORT	CAGE WASH & SUPPORT
NON-WET LAB	BIOCONTAINMENT RESEARCH

LAB LAYOUT STUDIES

UTAH STATE UNIVERSITY
USTAR BUILDING

4.2.3 vivarium layout options



VIVARIUM HOLDING ROOM SUITES

4.2.4 selected stacking scheme & test fit

4.2.4 Selected Stacking Scheme & Test Fit

Scheme 2 was selected as the Preferred Stacking Scheme. Scheme 2 illustrates a 3-story, L-shaped building. The main entry, vertical circulation points, gathering areas (formal and informal), and shared building support space are located in the east-west leg of the “L”. Also, the wet labs, lab support spaces, and offices, are located on the 2nd and 3rd level, in the east-west leg of the “L”. The non-wet labs and offices, and support spaces, are located on the main level, along Grand Avenue. The Vivarium component is located in the north-south leg, with the Vivarium Cage Wash area on the main level, close to dock access. The Biocontainment Research component is located on the top level to maximize efficiency of air exhaust systems. This scheme follows the Innovation Campus Master Plan guidelines; providing opportunities for connections with proposed pedestrian pathways and green space, moderating building height and mass, and maximizing space for future expansion to the south.

4.2.4 preferred stacking scheme 2

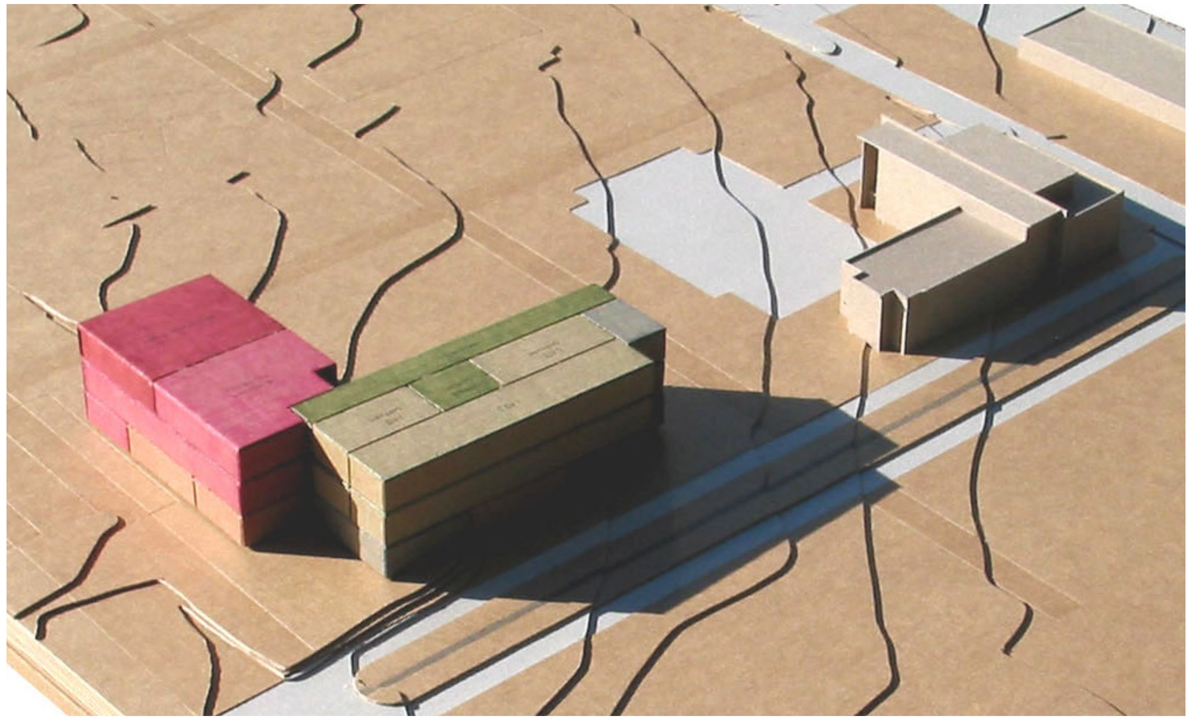
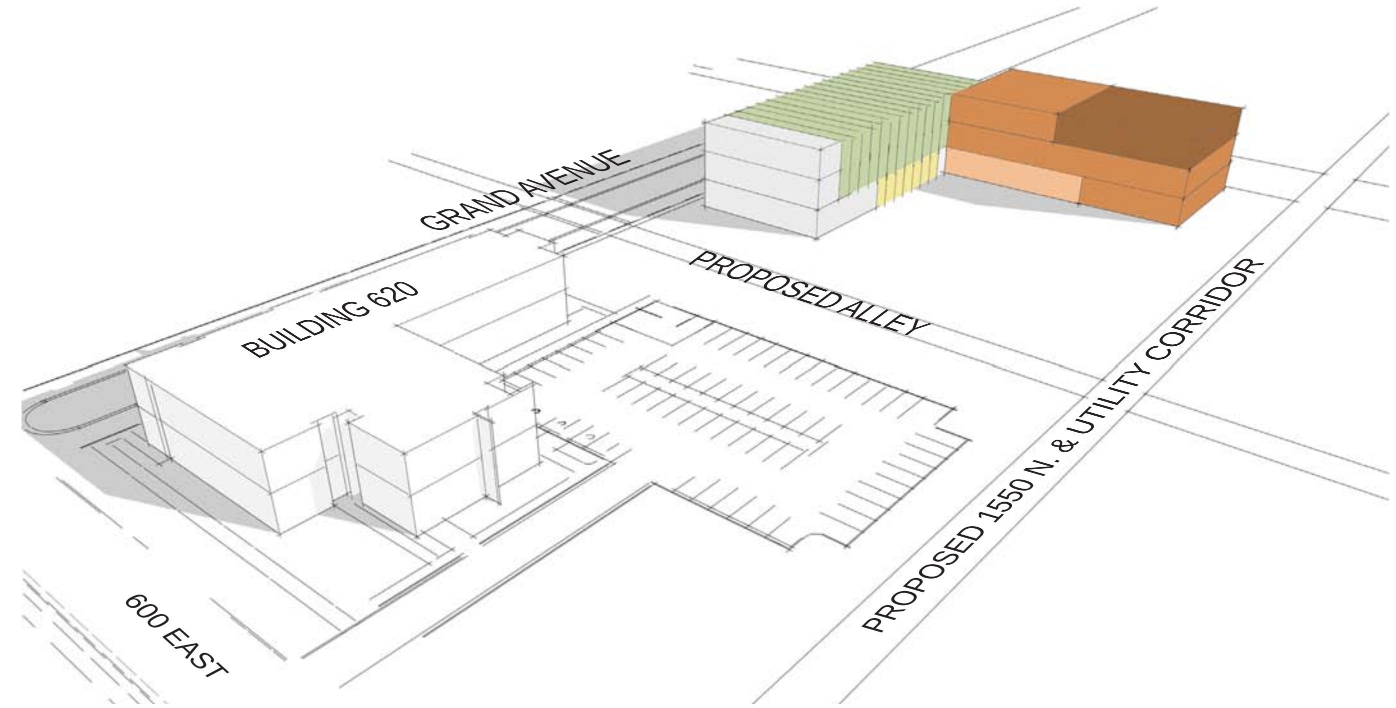


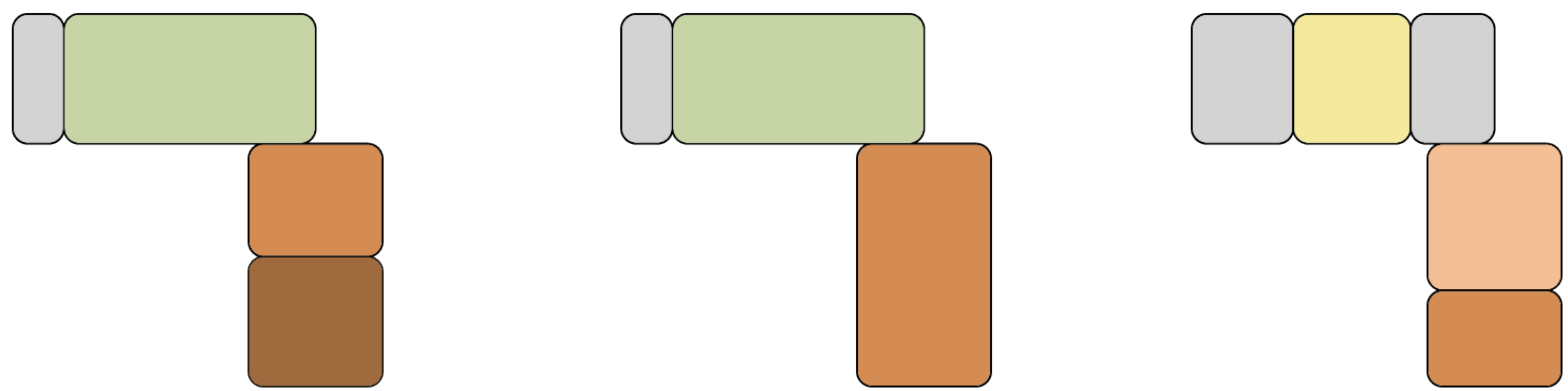
PHOTO OF STUDY MODEL
VIEW TO THE SOUTHWEST



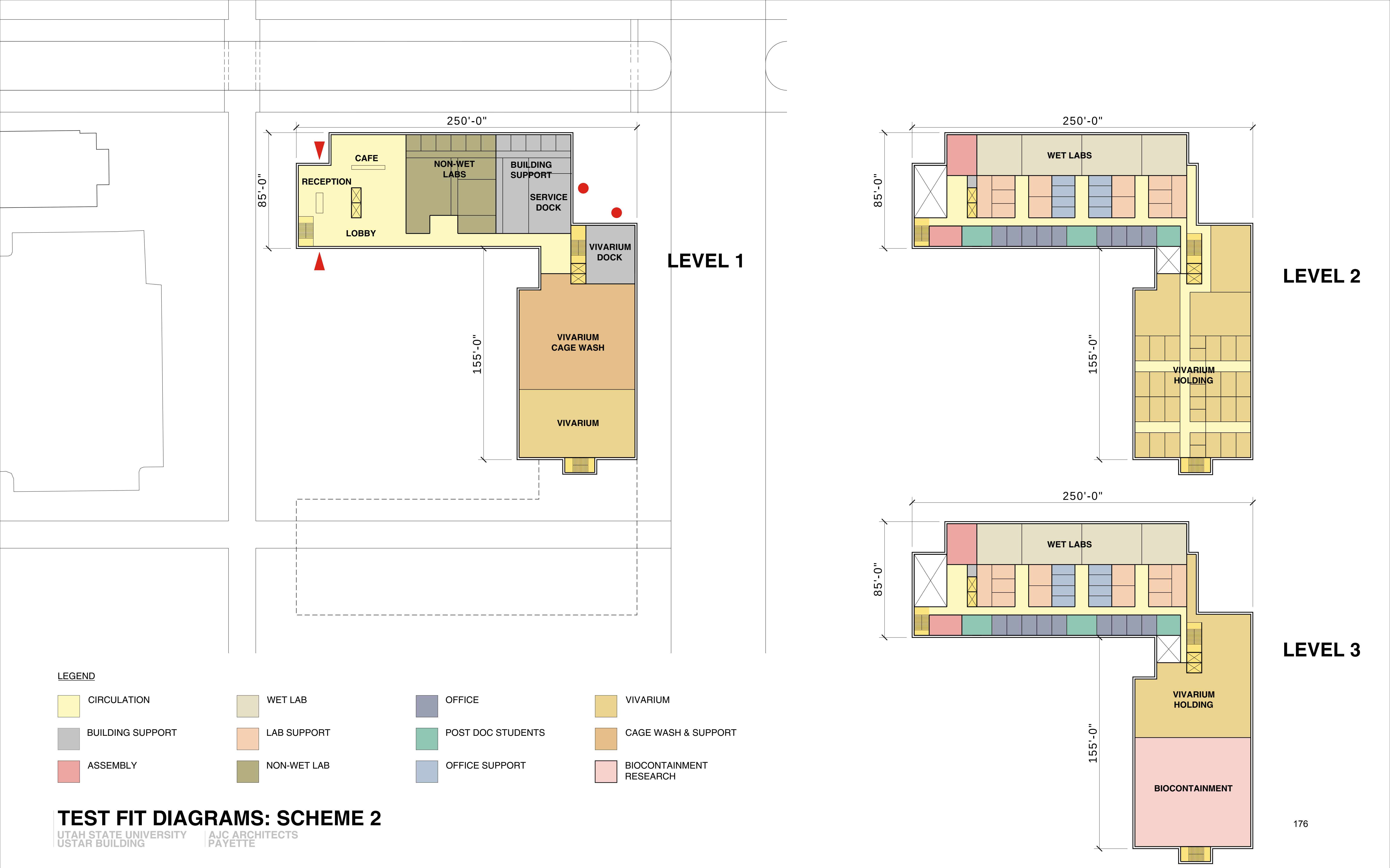
COMPUTER MODEL
VIEW TO THE NORTHEAST

LEGEND

- WET LABS, LAB SUPPORT OFFICES, & OFFICE SUPPORT
- NON-WET LABS, NWL OFFICES & NWL OFFICE SUPPORT
- VIVARIUM
- VIVARIUM - CAGE WASH & SUPPORT
- BIOCONTAINMENT RESEARCH (ABSL3 & ABSL3+ SUITES)
- CIRCULATION & BUILDING SUPPORT



LEVEL 3 LEVEL 2 LEVEL 1



TEST FIT DIAGRAMS: SCHEME 2

4.3 room data sheets

1.01.01 Private Office

Department	Generic Life Sciences	Researcher	# of Occupants	1
Function			Area	150 NASF
Adjacencies				

Architectural

Floor: Carpet
Base: Rubber
Walls: Gypsum Wall Board
Wall Finish: Paint
Ceiling: Accoustic Ceiling Tile
Ceiling Height: 8'-0"
Door Size: 3'-0"

Casework

Wall Cabinets:
Base Cabinets:
Bench Top:
Bench Height:
Desktop: Wood- Certified
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: Yes
Proj. Screen: No
Desks: Yes
Chairs: Yes
Tables: Yes
Files: Yes
White Boards: Yes
Tack Boards: Yes
Other Furn.:

Plumbing

Sinks: None
Pure Water: NA
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste: NA
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum:
Other Gas:

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: Office Standard
Fresh Air Changes: Office Standard
Pressure: Not Critical
Temperature: Office Standard
Relative Humidity: Office Standard
Local Exhaust: None
Air Filtration: Office Standard
CO2 Sensor: No
Other HVAC:

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: Office Standard
Fixtures: Fluorescent
Fixture Mounting: Pendant
Occupancy Sensors: Yes
Dimming Sensors: Yes
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets: 1
Data Outlets: 2
Network:
Clocks: No
Paging Systems: No
Monitors/Alarms:

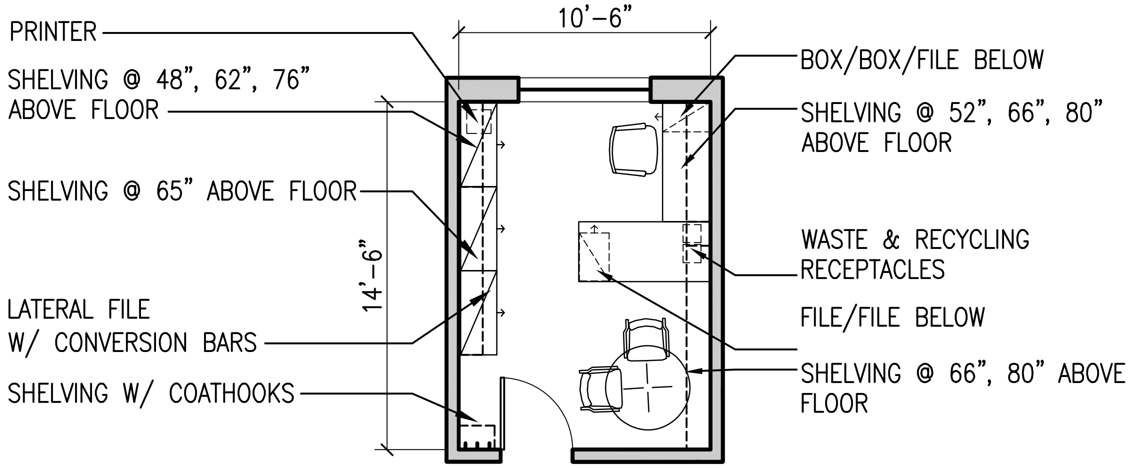
Special Requirements

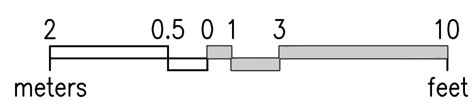
Light Controls: Requires Natural Light
Visual Controls: Visual Privacy Req.
Acoustic Controls:
Structural Controls:
Security: Lockable
Shielding:
Other Spec Req:

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.01.01 - Private Office - 150 nasf





1.01.03 Office Cube

Department	Generic Life Sciences	Researcher	# of Occupants		
Function			Area	75	NASF
Adjacencies	Cluster multiple cubes together				

Architectural

Floor: Carpet
Base: Rubber
Walls: NA
Wall Finish: NA
Ceiling: NA
Ceiling Height: NA
Door Size: NA

Casework

Wall Cabinets:
Base Cabinets:
Bench Top:
Bench Height:
Desktop: Plastic Laminate
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: Yes
Chairs: Yes
Tables: No
Files: Yes
White Boards: No
Tack Boards: Yes
Other Furn.:

Plumbing

Sinks: None
Pure Water:
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Office Standard
Fresh Air Changes Office Standard
Pressure Not Critical
Temperature Office Standard
Relative Humidity Office Standard
Local Exhaust
Air Filtration
CO2 Sensor No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Surf. Mount. Raceway
Illumination: 50fc
Fixtures: Fluorescent
Fixture Mounting: Pendant
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets 1
Data Outlets 1
Network
Clocks No
Paging Systems No
Monitors/Alarms

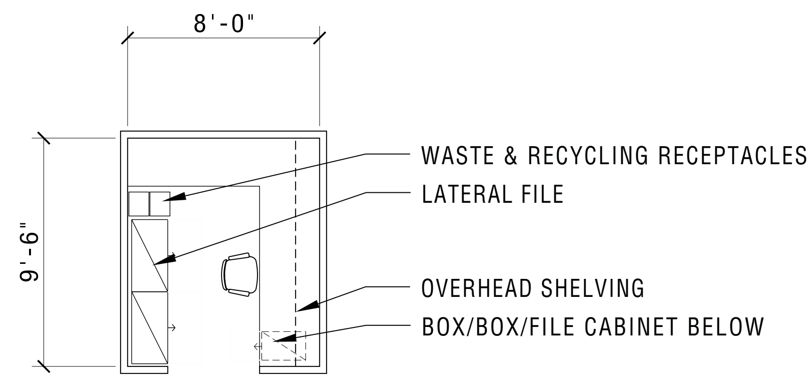
Special Requirements

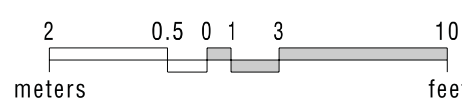
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.01.03 - Office Cube - 75 nasf





1.01.04 Admin Space

Department	Generic Life Sciences	Researcher		# of Occupants	
Function				Area	100 NASF
Adjacencies	Cluster multiple cubes together				

Architectural

Floor: Carpet
Base: Rubber
Walls: NA
Wall Finish: NA
Ceiling: NA
Ceiling Height: NA
Door Size: NA

Casework

Wall Cabinets:
Base Cabinets:
Bench Top:
Bench Height:
Desktop: Plastic Laminate
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: Yes
Chairs: Yes
Tables: No
Files: Yes
White Boards: No
Tack Boards: Yes
Other Furn.:

Plumbing

Sinks: None
Pure Water:
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Office Standard
Fresh Air Changes Office Standard
Pressure Not Critical
Temperature Office Standard
Relative Humidity Office Standard
Local Exhaust
Air Filtration
CO2 Sensor No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Surf. Mount. Raceway
Illumination: 50fc
Fixtures: Fluorescent
Fixture Mounting: Pendant
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets 1
Data Outlets 1
Network
Clocks No
Paging Systems No
Monitors/Alarms

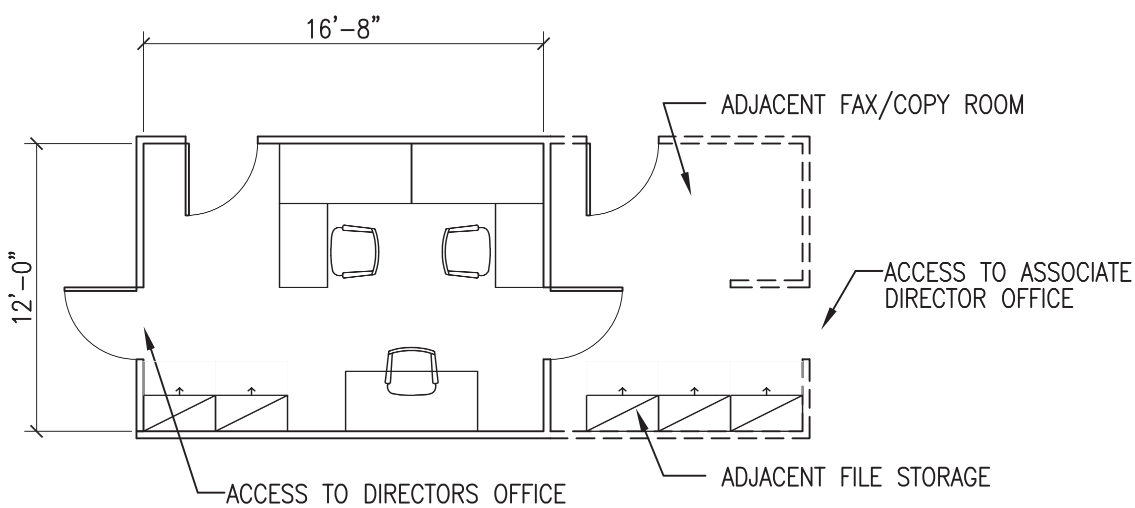
Special Requirements

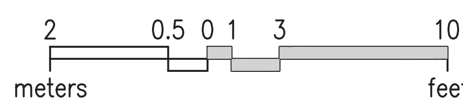
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.01.04 - Admin Space - 100 nasf
Diagram combines two admin. spaces into single room





1.01.05 Lab Desk

Department	Generic Life Sciences	Researcher	# of Occupants
Function		Area	NASF
Adjacencies			

Architectural

Floor:
Base:
Walls:
Wall Finish:
Ceiling:
Ceiling Height:
Door Size:

Casework

Wall Cabinets:
Base Cabinets:
Bench Top:
Bench Height:
Desktop:
Shelving:
Drawer Units:

Furnishings

Window Treat:
Proj. Screen:
Desks:
Chairs:
Tables:
Files:
White Boards:
Tack Boards:
Other Furn.:

Plumbing

Sinks:
Pure Water:
Hot / Cold Water:
Floor Drain:
Hose Bib:
Waste:
Eyewash:
Emerg Shower:

Gases

Air
Lab Gas
CO2
Nitrogen
Vacuum
Other Gas

Fire Protection

FP System
FP Detection

HVAC

Total Air Changes
Fresh Air Changes
Pressure
Temperature
Relative Humidity
Local Exhaust
Air Filtration
CO2 Sensor
Other HVAC

Electrical

Power:
Features:
Elec. Outlets:
Illumination:
Fixtures:
Fixture Mounting:
Occupancy Sensors:
Dimming Sensors:
Switching:
Task Light:
Em. Power:
UPS:

Communications

Phone Outlets
Data Outlets
Network
Clocks
Paging Systems
Monitors/Alarms

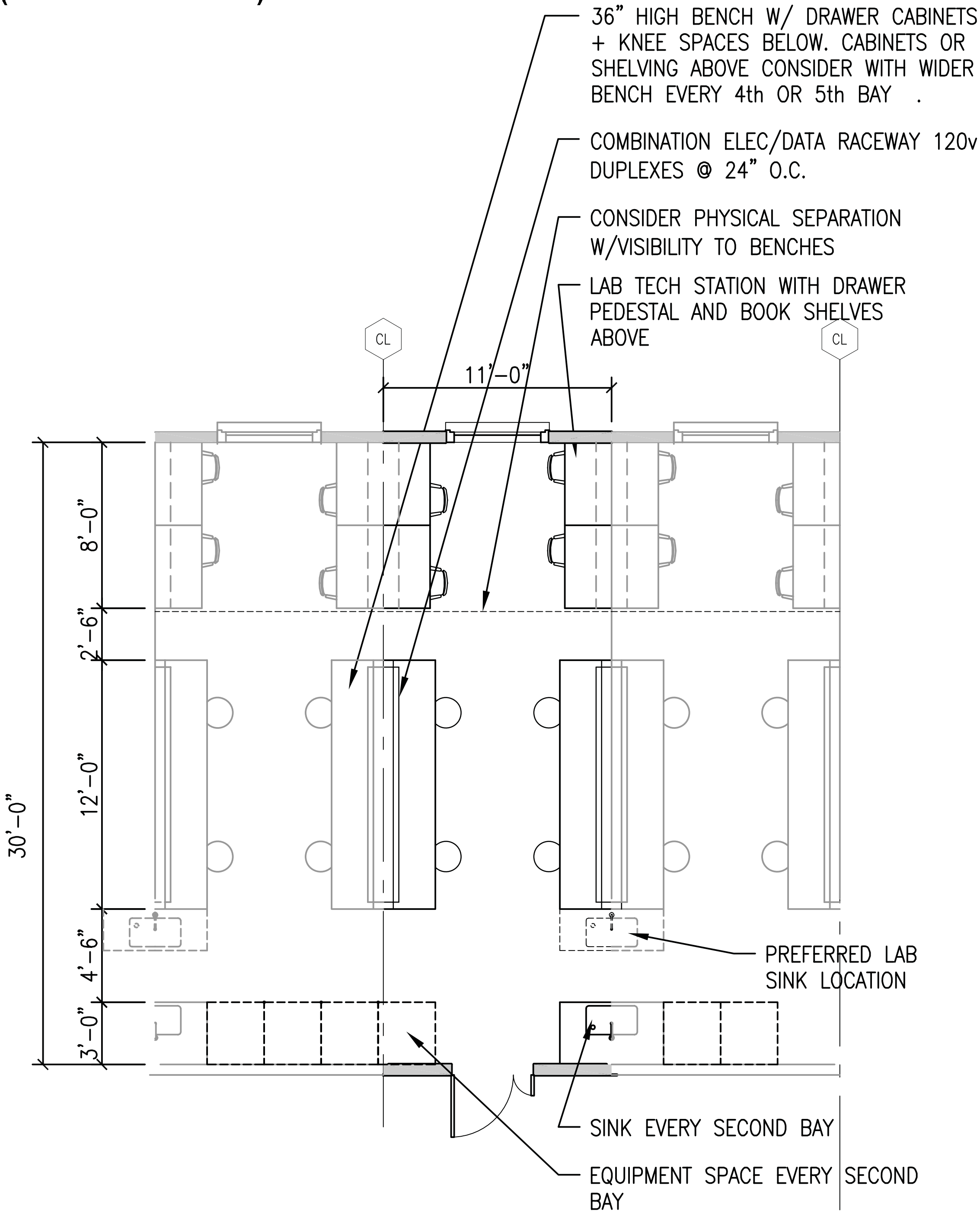
Special Requirements

Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

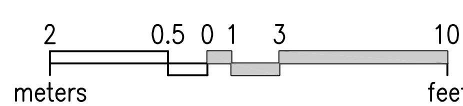
Notes Lab desks integrated with laboratory- refer to description of "Wet Lab Bay", space number 1.03.01.

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.03.01 - Wet Lab Bay and Lab Desk (1.01.05) - 300 nasf
(1.01.05 - LAB DESK)



SEE VARIATIONS / ADAPTATIONS OF LAYOUT IN APPENDIX



1.02.01 Printer/Copy/Fax Area

Department	Generic Life Sciences	Researcher		# of Occupants	
Function				Area	120 NASF
Adjacencies					

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	3'-0"

Casework

Wall Cabinets:	Plastic Laminate
Base Cabinets:	Plastic Laminate
Bench Top:	Plastic Laminate
Bench Height:	3'-0"
Desktop:	
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Negative
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

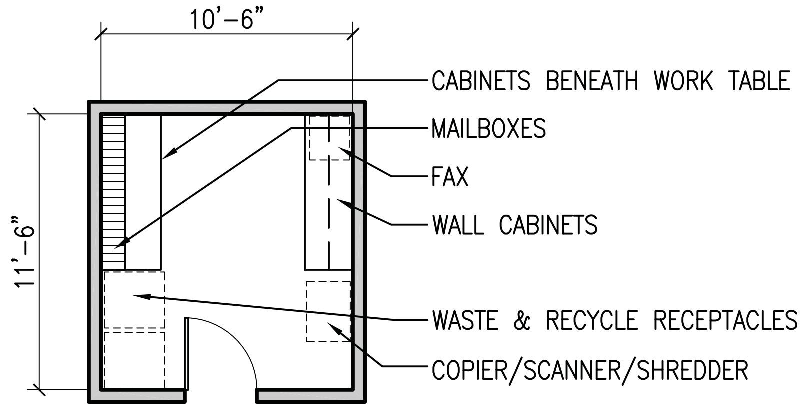
Special Requirements

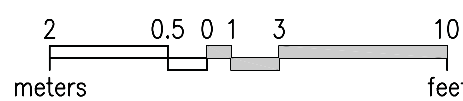
Light Controls	
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Lockable
Shielding	No
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.02.01 - Printer/Copy/Fax Area - 120 nasf





1.02.02 Supply Closet

Department	Generic Life Sciences	Researcher		# of Occupants		
Function				Area	30	NASF
Adjacencies						

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	
Door Size:	3'-0"

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	Yes
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	
Other HVAC	

Electrical

Power:	
Features:	
Elec. Outlets:	
Illumination:	30fc
Fixtures:	Fluorescent
Fixture Mounting:	
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

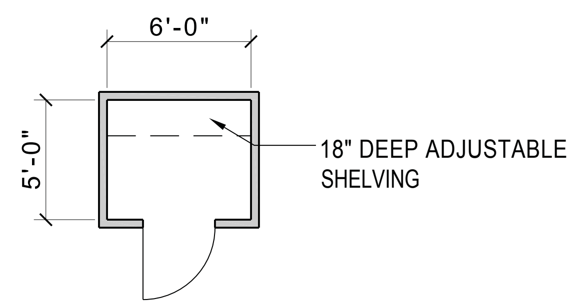
Special Requirements

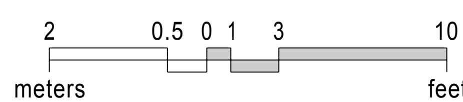
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.02.02 - Supply Closet - 30 nasf





1.02.03 File Storage

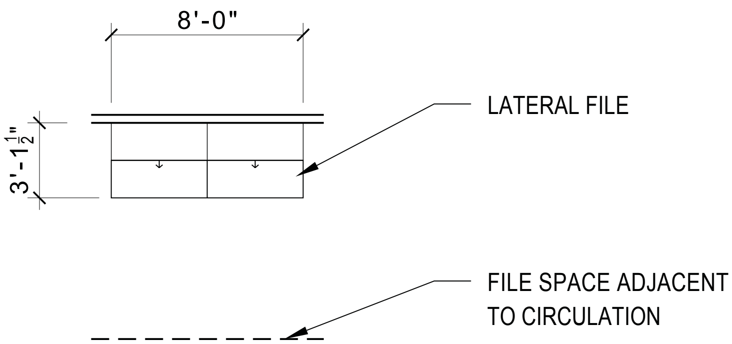
Department	Generic Life Sciences	Researcher		# of Occupants		
Function				Area	25	NASF
Adjacencies						

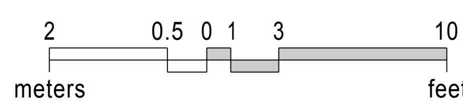
Architectural		***Plumbing***		***Electrical***	
Floor:	Carpet- Low VOC	Sinks:	None	Power:	
Base:	Rubber	Pure Water:	None	Features:	
Walls:	NA	Hot / Cold Water:	No	Elec. Outlets:	
Wall Finish:	NA	Floor Drain:	No	Illumination:	30fc
Ceiling:	Accoustic Ceiling Tile	Hose Bib:	No	Fixtures:	Fluorescent
Ceiling Height:		Waste:		Fixture Mounting:	
Door Size:	NA	Eyewash:	No	Occupancy Sensors:	
		Emerg Shower:	No	Dimming Sensors:	No
		Gases		Switching:	Yes
		Air	No	Task Light:	No
Casework		Lab Gas	No	Em. Power:	No
Wall Cabinets:	None	CO2	No	UPS:	No
Base Cabinets:	None	Nitrogen	No	***Communications***	
Bench Top:	None	Vacuum	No	# Phone Outlets	
Bench Height:	None	Other Gas		# Data Outlets	
Desktop:	None	***Fire Protection***		Network	
Shelving:	No	FP System	Wet System	Clocks	No
Drawer Units:	No	FP Detection	Rate of Rise	Paging Systems	No
Furnishings		***HVAC***		Monitors/Alarms	
Window Treat:	No	Total Air Changes	Office Standard		
Proj. Screen:	No	Fresh Air Changes	Office Standard	***Special Requirements***	
Desks:	No	Pressure	Not Critical	Light Controls	
Chairs:	No	Temperature	Office Standard	Visual Controls	
Tables:	No	Relative Humidity	Office Standard	Acoustic Controls	
Files:	Yes	Local Exhaust		Structural Controls	
White Boards:	No	Air Filtration		Security	
Tack Boards:	No	CO2 Sensor	No	Shielding	
Other Furn.:		Other HVAC		Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.02.03 - File Storage - 25 nasf





1.02.06 Library/Journal Room

Department	Generic Life Sciences	Researcher	# of Occupants
Function			Area 450 NASF
Adjacencies			

Architectural

Floor:	Carpet
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	3'-0"

Casework

Wall Cabinets:	Wood- Certified
Base Cabinets:	Wood- Certified
Bench Top:	
Bench Height:	
Desktop:	Wood- Certified
Shelving:	Yes
Drawer Units:	No

Furnishings

Window Treat:	Yes
Proj. Screen:	Maybe
Desks:	Yes
Chairs:	Yes
Tables:	Yes
Files:	No
White Boards:	Maybe
Tack Boards:	Yes
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	
FP Detection	

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	Yes
Dimming Sensors:	Yes
Switching:	Yes
Task Light:	Yes
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	2
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

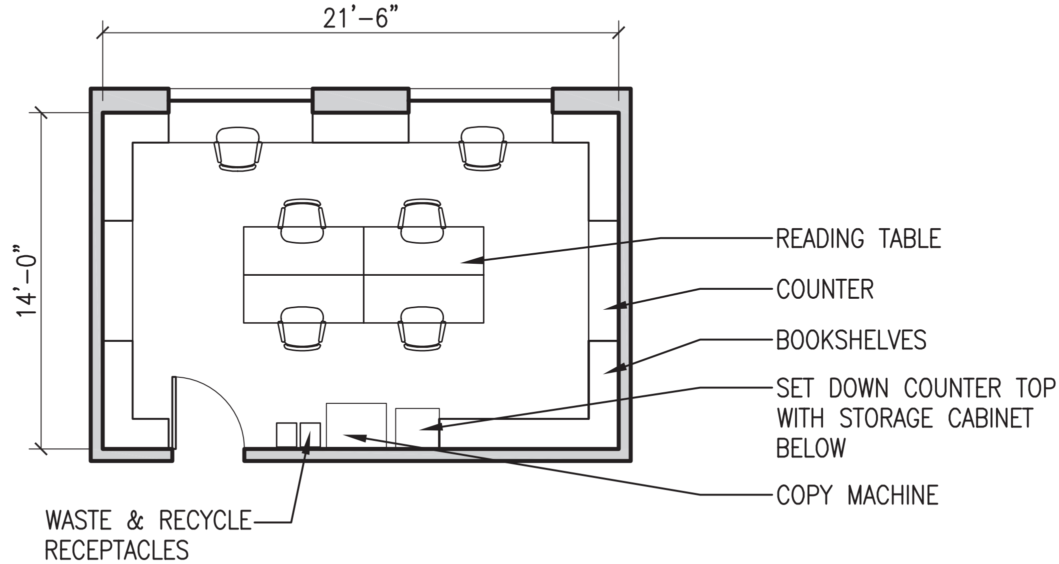
Special Requirements

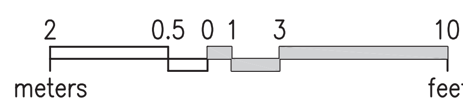
Light Controls	
Visual Controls	
Acoustic Controls	Noise Sensitivity
Structural Controls	
Security	Lockable
Shielding	No
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.02.06 - Library/Journal Room - 300 nasf





1.02.07 Kitchenette/Coffee/Break Area

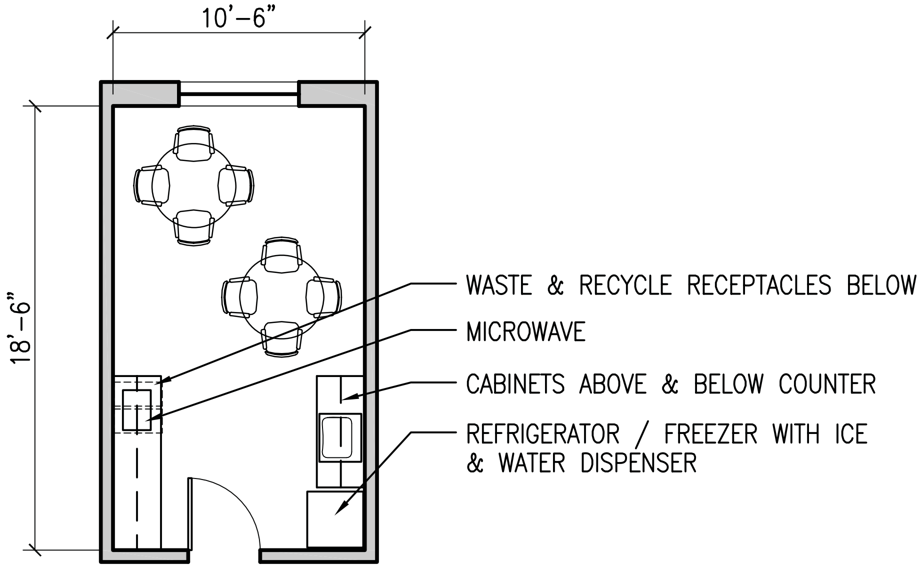
Department	Generic Life Sciences	Researcher		# of Occupants		
Function				Area	185	NASF
Adjacencies						

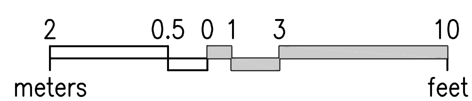
Architectural		***Plumbing***		***Electrical***	
Floor:	Linoleum	Sinks:	Stainless Steel	Power:	120v + 208v
Base:	Rubber	Pure Water:		Features:	
Walls:	Gypsum Wall Board	Hot / Cold Water:	Yes	Elec. Outlets:	Wall Receptacle
Wall Finish:	Paint	Floor Drain:	No	Illumination:	
Ceiling:	Accoustic Ceiling Tile	Hose Bib:	No	Fixtures:	Fluorescent
Ceiling Height:	9'-6"	Waste:		Fixture Mounting:	Recessed
Door Size:	3'-0"	Eyewash:	No	Occupancy Sensors:	Yes
		Emerg Shower:	No	Dimming Sensors:	Yes
		Gases		Switching:	Yes
		Air	No	Task Light:	No
Casework		Lab Gas	No	Em. Power:	No
Wall Cabinets:	Plastic Laminate	CO2	No	UPS:	No
Base Cabinets:	Plastic Laminate	Nitrogen	No	***Communications***	
Bench Top:	Plastic Laminate	Vacuum		# Phone Outlets	1
Bench Height:	2'-10"	Other Gas		# Data Outlets	1
Desktop:	Wood	***Fire Protection***		Network	
Shelving:	Yes	FP System		Clocks	No
Drawer Units:	Yes	FP Detection		Paging Systems	No
Furnishings		***HVAC***		Monitors/Alarms	
Window Treat:	Yes	Total Air Changes	Office Standard		
Proj. Screen:	No	Fresh Air Changes	Office Standard	***Special Requirements***	
Desks:	No	Pressure	Not Critical	Light Controls	
Chairs:	Yes	Temperature	Office Standard	Visual Controls	
Tables:	Yes	Relative Humidity	Office Standard	Acoustic Controls	Noise Generator
Files:	No	Local Exhaust		Structural Controls	
White Boards:	No	Air Filtration	Office Standard	Security	Lockable
Tack Boards:	No	CO2 Sensor	No	Shielding	No
Other Furn.:		Other HVAC		Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.02.07 - Kitchenette/Coffee/Break Area - 200 nasf





1.02.08 Coat Closet

Department	Generic Life Sciences	Researcher		# of Occupants	
Function				Area	40 NASF
Adjacencies					

Architectural

Floor:	Carpet
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	
Door Size:	3'-0"

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	Yes- one shelf
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	
Features:	
Elec. Outlets:	
Illumination:	30fc
Fixtures:	Fluorescent
Fixture Mounting:	
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

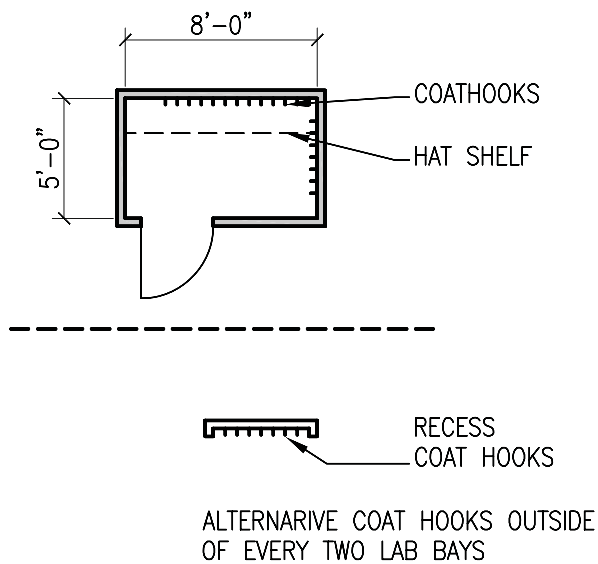
Special Requirements

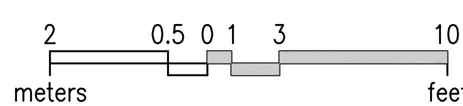
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.02.08 - Coat Closet - 40 nasf





1.03.01 Wet Lab Bay

Department	Generic Life Sciences	Researcher		# of Occupants	4	
Function				Area	330	NASF
Adjacencies						

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	12'-0"
Door Size:	3'-0" double w/light

Casework

Wall Cabinets:	Wood- Certified
Base Cabinets:	Wood- Certified
Bench Top:	Epoxy Resin
Bench Height:	3'-0"
Desktop:	Wood- Certified
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	Yes
Proj. Screen:	No
Desks:	Yes
Chairs:	Yes & stools
Tables:	No
Files:	No
White Boards:	Yes
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stainless Steel
Pure Water:	RO/DI
Hot / Cold Water:	Yes
Floor Drain:	No
Hose Bib:	No
Waste:	Lab/pH Neutralization
Eyewash:	Yes
Emerg Shower:	Yes

Gases

Air	Yes
Lab Gas	On selected benches
CO2	No
Nitrogen	No
Vacuum	2 per side
Other Gas	No

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Positive
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	Elephant Trunk
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v + 208v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	80-100fc
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	No
Dimming Sensors:	Yes- at exterior perim'ter
Switching:	Yes
Task Light:	No- but allow for add'n
Em. Power:	Yes
UPS:	Yes

Communications

# Phone Outlets	1
# Data Outlets	2 / bench + 1 / desk
Network	
Clocks	Yes
Paging Systems	No
Monitors/Alarms	

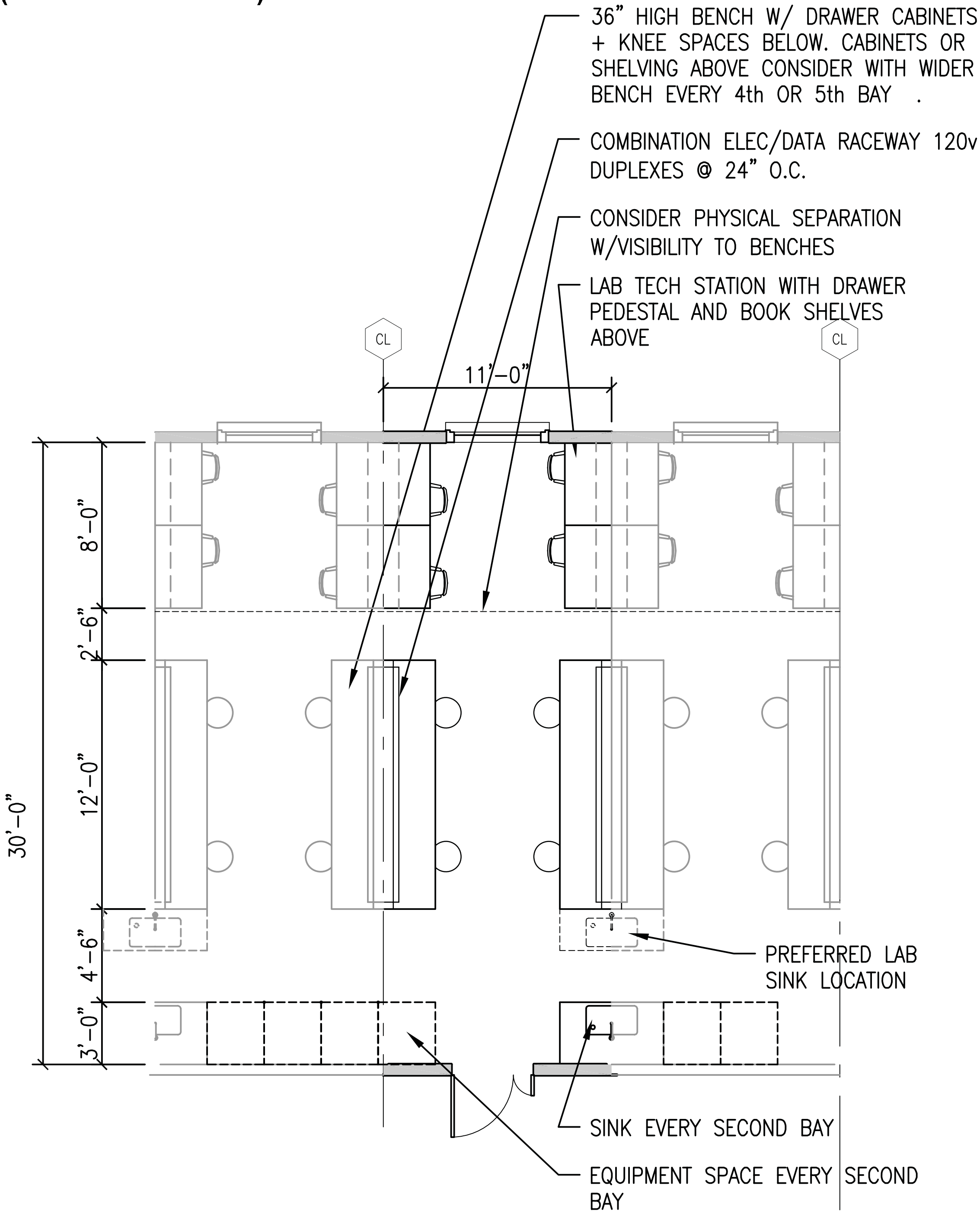
Special Requirements

Light Controls	Requires Natural Light
Visual Controls	Views Desireable
Acoustic Controls	Noise Generator
Structural Controls	
Security	Keypad Access
Shielding	No
Other Spec Req	

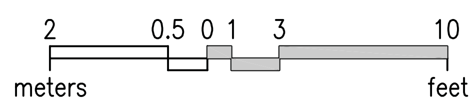
Notes SEE APPENDIX FOR ALTERNATIVE LAYOUTS FOR THIS SPACE TYPE.

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.03.01 - Wet Lab Bay and Lab Desk (1.01.05) - 300 nasf
(1.01.05 - LAB DESK)



SEE VARIATIONS / ADAPTATIONS OF LAYOUT IN APPENDIX



1.04.01 Freezer Farm

Department	Generic Life Sciences	Researcher		# of Occupants	
Function				Area	330 NASF
Adjacencies					

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	double 3'-0" leaf

Casework

Wall Cabinets:	
Base Cabinets:	
Bench Top:	
Bench Height:	
Desktop:	
Shelving:	
Drawer Units:	

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Equip Rm Standard
Fresh Air Changes	Equip Rm Standard
Pressure	Not Critical
Temperature	
Relative Humidity	
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	see notes

Electrical

Power:	120v + 208v
Features:	
Elec. Outlets:	Wall Receptacles
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	Yes
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	0
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	Central monitor to BMS

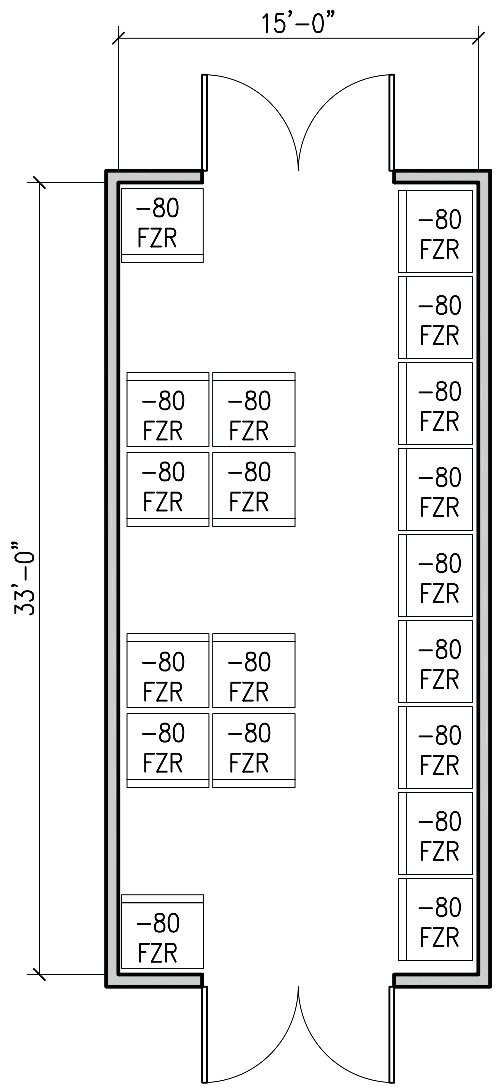
Special Requirements

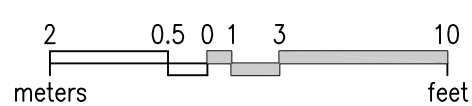
Light Controls	
Visual Controls	
Acoustic Controls	Noise Generator
Structural Controls	
Security	Lockable
Shielding	No
Other Spec Req	

Notes 1. Room will have high heat load from freezer compressors

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				
-70 deg freezer		16					120					Cryo Backup

1.04.01 - Freezer Farm - 495 nasf





1.04.02 Darkroom

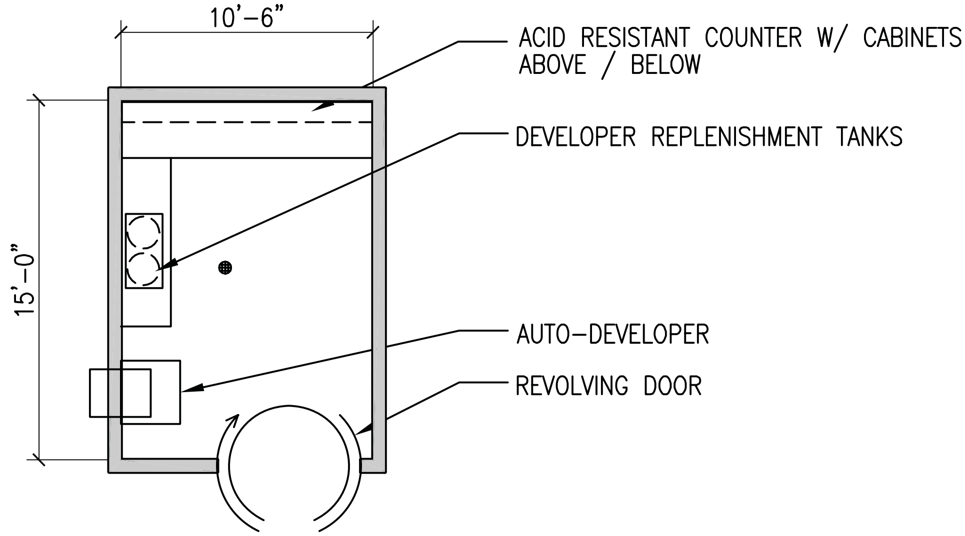
Department	Generic Life Sciences	Researcher	# of Occupants	2	
Function			Area	75	NASF
Adjacencies					

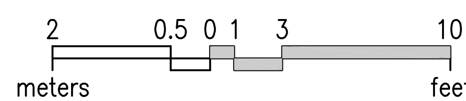
Architectural		***Plumbing***		***Electrical***	
Floor:	Linoleum	Sinks:	Stainless Steel	Power:	120v
Base:	Integral	Pure Water:		Features:	
Walls:	Gypsum Wall Board	Hot / Cold Water:	Yes-mixing valve	Elec. Outlets:	Surf. Mount. Raceway
Wall Finish:	Paint- Low VOC	Floor Drain:	Yes-at developer	Illumination:	
Ceiling:	Accoustic Ceiling Tile	Hose Bib:	No	Fixtures:	Dark room light
Ceiling Height:		Waste:	Lab/pH Neutralization	Fixture Mounting:	Recessed
Door Size:	4'-0" Revolving Door	Eyewash:	Yes	Occupancy Sensors:	No
		Emerg Shower:	No	Dimming Sensors:	No
		Gases		Switching:	Yes
		Air	No	Task Light:	No
Casework		Lab Gas	No	Em. Power:	No
Wall Cabinets:		CO2	No	UPS:	No
Base Cabinets:	Plastic Laminate	Nitrogen	No	***Communications***	
Bench Top:	PLam - Acid resistant	Vacuum		# Phone Outlets	1
Bench Height:	3'-0"	Other Gas		# Data Outlets	1
Desktop:		***Fire Protection***		Network	
Shelving:	No	FP System	Wet System	Clocks	No
Drawer Units:	No	FP Detection	Rate of Rise	Paging Systems	No
Furnishings		***HVAC***		Monitors/Alarms	
Window Treat:	No	Total Air Changes	Lab Standard		
Proj. Screen:	No	Fresh Air Changes	Lab Standard	***Special Requirements***	
Desks:	No	Pressure	Negative	Light Controls	Light-tight door seal
Chairs:	No	Temperature	Lab Standard	Visual Controls	
Tables:	No	Relative Humidity	Lab Standard	Acoustic Controls	
Files:	No	Local Exhaust	Ceiling port at developer	Structural Controls	
White Boards:	No	Air Filtration	Lab Standard	Security	
Tack Boards:	No	CO2 Sensor	No	Shielding	
Other Furn.:		Other HVAC		Other Spec Req	"In Use" light

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				
Kodak X-Omat	1	1	43	30	50		120	25	TW, FD	yes	2,800 W	

1.04.02 - Dark Room - 154 nasf





1.04.03 Controlled Temperature Room

Department	Generic Life Sciences	Researcher	# of Occupants	2 occasional
Function			Area	75 NASF
Adjacencies	Two per research floor			

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	prefab insulated metal
Wall Finish:	anodized
Ceiling:	
Ceiling Height:	
Door Size:	3'-0"

Casework

Wall Cabinets:	No
Base Cabinets:	Stainless Steel
Bench Top:	Stainless Steel
Bench Height:	3'-0"
Desktop:	No
Shelving:	Yes - Stainless Steel
Drawer Units:	No

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Provisions for
Pure Water:	
Hot / Cold Water:	Provisions for
Floor Drain:	No
Hose Bib:	No
Waste:	NA
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Env. Room Standard
Fresh Air Changes	Env. Room Standard
Pressure	Negative
Temperature	4ºC
Relative Humidity	Env. Room Standard
Local Exhaust	
Air Filtration	Env. Room Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Surf. Mount. Raceway
Illumination:	75fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	Yes
UPS:	No

Communications

# Phone Outlets	0
# Data Outlets	0
Network	None
Clocks	No
Paging Systems	No
Monitors/Alarms	

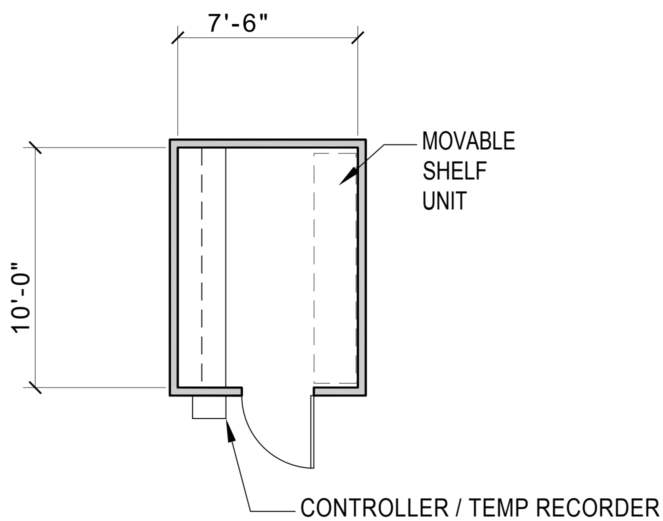
Special Requirements

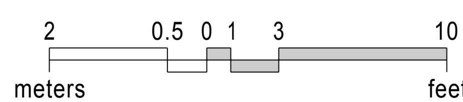
Light Controls	
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Lockable
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.04.03 - Controlled Temperature Room - 75 nasf





1.04.04 Tissue Processing Room

Department	Generic Life Sciences	Researcher		# of Occupants		
Function				Area	154	NASF
Adjacencies						

Architectural

Floor: Linoleum
Base: Rubber
Walls: Gypsum Wall Board
Wall Finish: Paint- Low VOC
Ceiling: Accoustic Ceiling Tile
Ceiling Height: 9'-6"
Door Size: 3'-0"

Casework

Wall Cabinets: Plastic Laminate
Base Cabinets: Plastic Laminate
Bench Top: Plastic Laminate
Bench Height: 3'-0"
Desktop:
Shelving: Yes
Drawer Units: No

Furnishings

Window Treat: No
Proj. Screen: No
Desks: No
Chairs: Yes- stools
Tables: No
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water:
Hot / Cold Water: Yes
Floor Drain: No
Hose Bib: No
Waste: Lab/pH Neutralization
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum: Yes
Other Gas

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: Lab Standard
Fresh Air Changes: Lab Standard
Pressure: Negative
Temperature: Lab Standard
Relative Humidity: Lab Standard
Local Exhaust: Elephant Trunk
Air Filtration: Lab Standard
CO2 Sensor: No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 75fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No- but allow for add'n
Em. Power: No
UPS: No

Communications

Phone Outlets: 1
Data Outlets: 1
Network
Clocks: No
Paging Systems: No
Monitors/Alarms

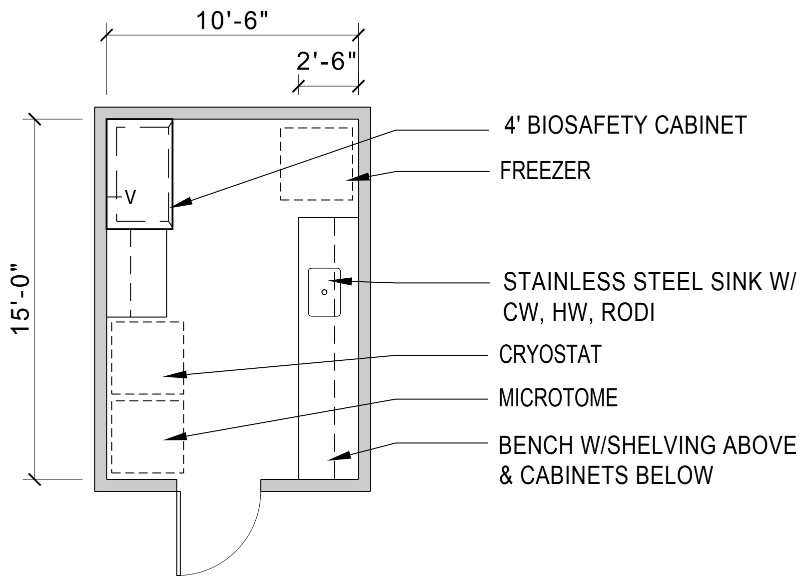
Special Requirements

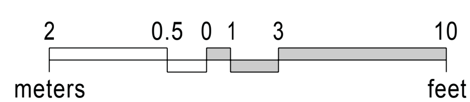
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security: Lockable
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.04.04 - Tissue Processing - 154 nasf





1.04.05 Imaging / Microscopy Room

Department	Generic Life Sciences	Researcher	# of Occupants	1
Function			Area	154 NASF
Adjacencies				

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	3'-0"

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	NA
Desktop:	None
Shelving:	None
Drawer Units:	None

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	Yes
Tables:	Yes-vibration absorbing
Files:	No
White Boards:	Yes
Tack Boards:	Yes
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	Yes
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Instrument Room Std
Fresh Air Changes	Instrument Room Std
Pressure	Positive
Temperature	Instrument Room Std
Relative Humidity	Instrument Room Std
Local Exhaust	No
Air Filtration	Instrument Room Std
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v + 208v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	75fc
Fixtures:	Fluorescent
Fixture Mounting:	indirect
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	0
# Data Outlets	2
Network	
Clocks	No
Paging Systems	
Monitors/Alarms	

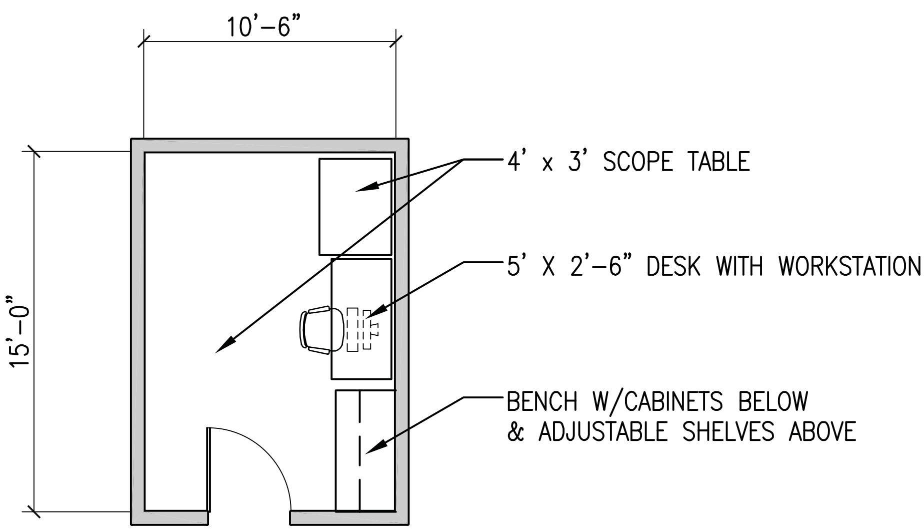
Special Requirements

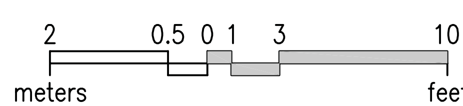
Light Controls	Avoid Natural Light
Visual Controls	
Acoustic Controls	
Structural Controls	Vibration Sensitivity
Security	
Shielding	No
Other Spec Req	Light w/manual dimming

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.04.05 - Imaging Microscopy - 154 nasf





1.04.06 Instrument / Equipment Room

Department	Generic Life Sciences	Researcher	# of Occupants	2 occasional
Function	Flow Cytometry, Electrophysiology		Area	154 NASF
Adjacencies				

Architectural

Floor: Linoleum
Base: Rubber
Walls: Gypsum Wall Board
Wall Finish: Paint- Low VOC
Ceiling: Accoustic Ceiling Tile
Ceiling Height: 9'-6"
Door Size: 3'-6" (single leaf)

Casework

Wall Cabinets: Wood- Certified
Base Cabinets: Wood- Certified
Bench Top: Epoxy Resin
Bench Height: 3'-0"
Desktop:
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: Yes, if at exterior
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Epoxy
Pure Water: RO
Hot / Cold Water: Yes
Floor Drain: No
Hose Bib: No
Waste: Lab/pH Neutralization
Eyewash: Yes
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum: Yes
Other Gas

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: Equip. room standard
Fresh Air Changes: Equip. room standard
Pressure: Negative
Temperature: Equip. room standard
Relative Humidity: Equip. room standard
Local Exhaust: None
Air Filtration: Equip. room standard
CO2 Sensor: No
Other HVAC

Electrical

Power: 120v + 208v
Features:
Elec. Outlets: Surf. Mount. Raceway
Illumination:
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: Yes
UPS: No

Communications

Phone Outlets: 1 wall phone jack
Data Outlets: 2
Network
Clocks: No
Paging Systems: No
Monitors/Alarms

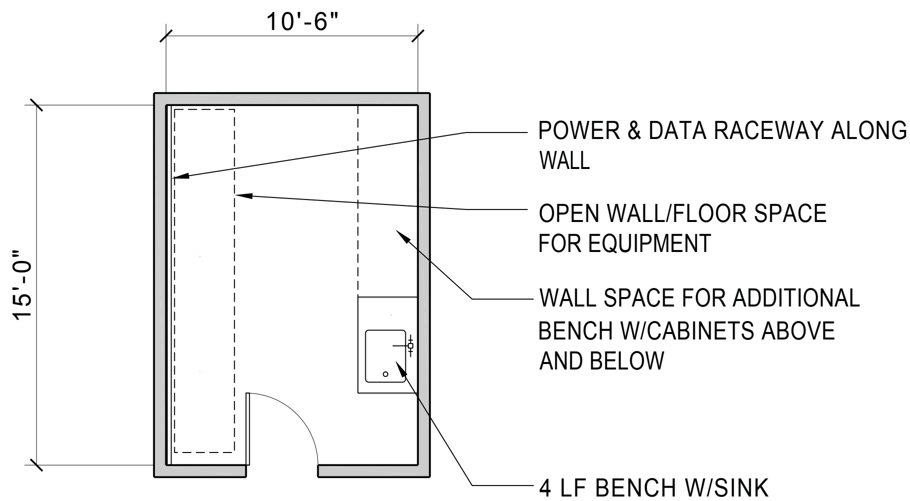
Special Requirements

Light Controls: Avoid Natural Light
Visual Controls
Acoustic Controls
Structural Controls
Security: Lockable
Shielding
Other Spec Req: Dimmers on all lights

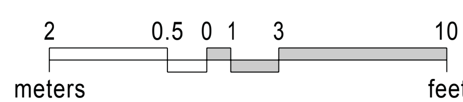
Notes SEE APPENDIX FOR ALTERNATIVE LAYOUTS FOR THIS SPACE TYPE.

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.04.06 - Instrument/Equipment Room - 154 nasf



SEE ADDITIONAL DIAGRAMS IN APPENDIX FOR ALTERNATE LAYOUTS



1.04.07 Other Lab Support Room

Department	Generic Life Sciences	Researcher		# of Occupants	2 occasional
Function	Microbiology, Bioinformatics			Area	308 NASF
Adjacencies					

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	Wood- Certified
Base Cabinets:	Wood- Certified
Bench Top:	Epoxy Resin
Bench Height:	3'-0"
Desktop:	
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	Yes, if at exterior
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Epoxy
Pure Water:	RO
Hot / Cold Water:	Yes
Floor Drain:	No
Hose Bib:	No
Waste:	Lab/pH Neutralization
Eyewash:	Yes
Emerg Shower:	Yes

Gases

Air	No
Lab Gas	Yes- at microbio lab
CO2	No
Nitrogen	No
Vacuum	Yes
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Equip. room standard
Fresh Air Changes	Equip. room standard
Pressure	Negative
Temperature	Equip. room standard
Relative Humidity	Equip. room standard
Local Exhaust	None
Air Filtration	Equip. room standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v + 208v
Features:	
Elec. Outlets:	Surf. Mount. Raceway
Illumination:	
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	Yes
UPS:	No

Communications

# Phone Outlets	1 wall phone jack
# Data Outlets	2
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

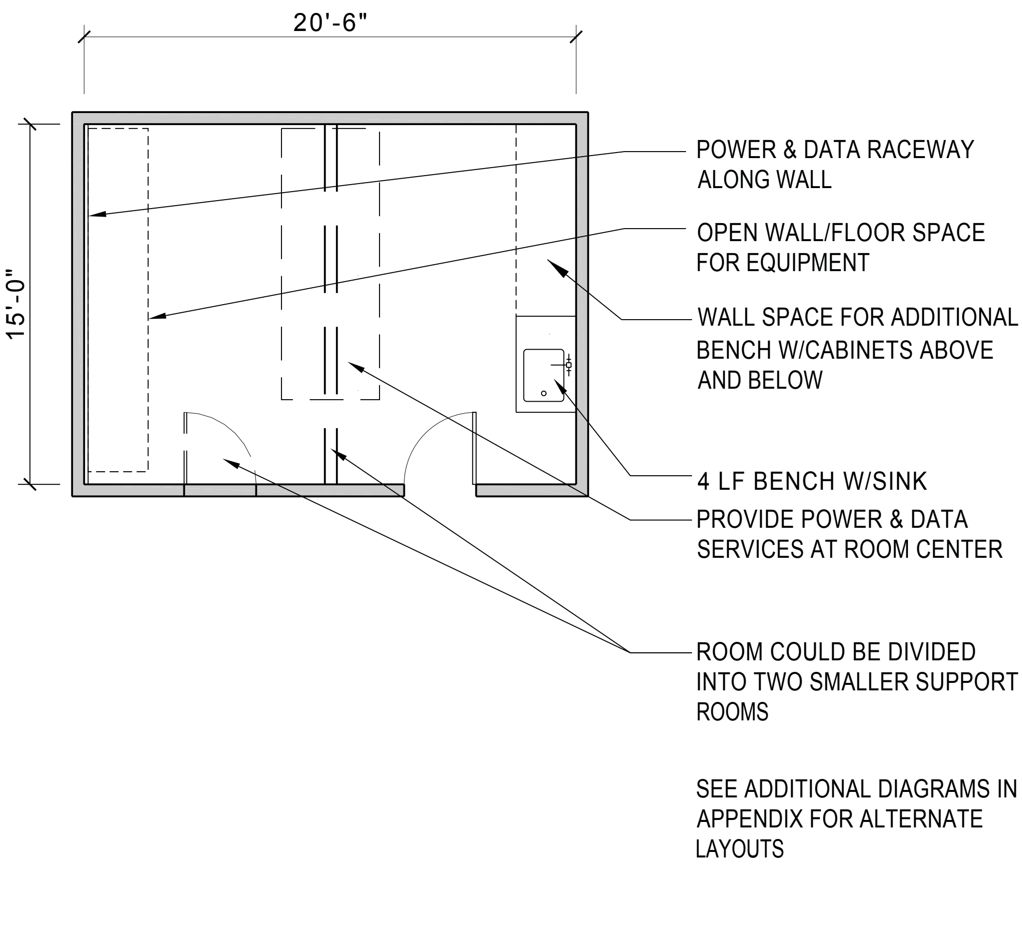
Special Requirements

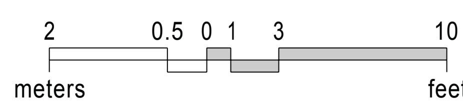
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes SEE APPENDIX FOR ALTERNATIVE LAYOUTS FOR THIS SPACE TYPE.

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.04.07 - Other Lab Support Room - 308 nasf





1.04.08 Cell Culture Room

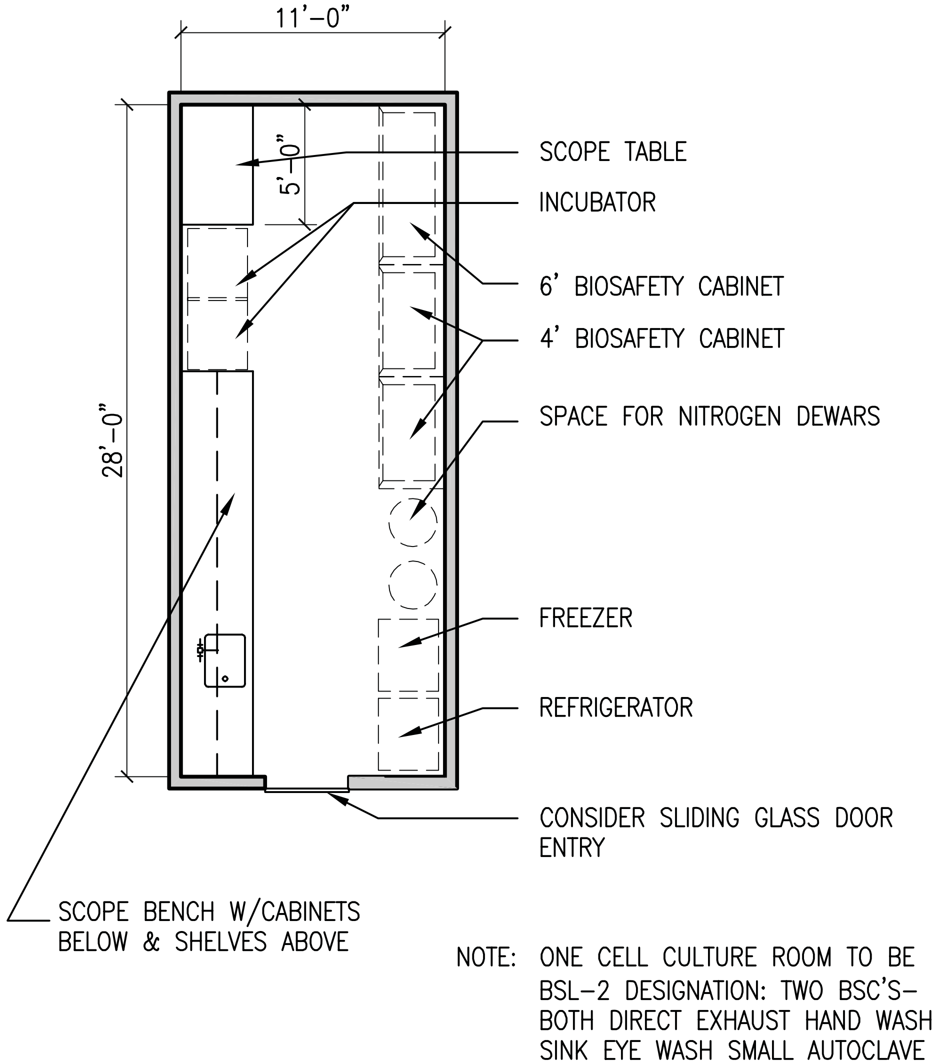
Department	Generic Life Sciences	Researcher		# of Occupants	
Function				Area	308 NASF
Adjacencies					

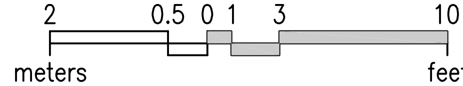
Architectural		***Plumbing***		***Electrical***	
Floor:	Seamless Sheet Vinyl	Sinks:	Epoxy	Power:	120v
Base:	Rubber	Pure Water:	RO	Features:	
Walls:	Gypsum Wall Board	Hot / Cold Water:	Yes	Elec. Outlets:	Surf. Mount. Raceway
Wall Finish:	Paint- Low VOC	Floor Drain:	No	Illumination:	
Ceiling:	Accoustic Ceiling Tile	Hose Bib:	No	Fixtures:	Fluorescent
Ceiling Height:		Waste:	Lab/pH Neutralization	Fixture Mounting:	Recessed
Door Size:	4'-0" (sngl lf)	Eyewash:	Yes- at BSL-2	Occupancy Sensors:	Yes
		Emerg Shower:	No	Dimming Sensors:	No
		Gases		Switching:	Yes
		Air	No	Task Light:	No
Casework		Lab Gas	No	Em. Power:	Yes - for incubators
Wall Cabinets:	Wood- Certified	CO2	Yes-local	UPS:	No
Base Cabinets:	Wood- Certified	Nitrogen	No	***Communications***	
Bench Top:	Epoxy Resin	Vacuum	Yes	# Phone Outlets	1
Bench Height:	3'-0"	Other Gas		# Data Outlets	2
Desktop:	None	***Fire Protection***		Network	
Shelving:	Yes	FP System	Wet System	Clocks	No
Drawer Units:	Yes	FP Detection	Rate of Rise	Paging Systems	No
Furnishings		***HVAC***		Monitors/Alarms	
Window Treat:		Total Air Changes	Lab Standard		
Proj. Screen:	No	Fresh Air Changes	Lab Standard	***Special Requirements***	
Desks:	No	Pressure	Positive	Light Controls	
Chairs:	Yes - stools	Temperature	Lab Standard	Visual Controls	
Tables:	No	Relative Humidity	Lab Standard	Acoustic Controls	
Files:	No	Local Exhaust	None	Structural Controls	
White Boards:	No	Air Filtration	Lab Standard	Security	Lockable
Tack Boards:	No	CO2 Sensor	No	Shielding	
Other Furn.:		Other HVAC	see notes	Other Spec Req	

Notes
1. One Cell Cult. Rooms to be BSL-2: BSC's need to be exhausted directly to outdoors
2. Consider sliding glass door for access door

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				
Bio Safety Cabinet		3	6'				120		V, G			
Incubator		2					120					Dbl stck chmbr, Em pwr
Freezer		2					120					
4 C Refrigerator		1					120					

1.04.08 - Cell Culture - 308 nasf





1.04.09 Fume Hood Alcove

Department	Generic Life Sciences	Researcher	# of Occupants	2	
Function			Area	75	NASF
Adjacencies	1.03.01 Wet Lab Bay				

Architectural

Floor: Linoleum
Base: Rubber
Walls: Gypsum Wall Board
Wall Finish: Paint- Low VOC
Ceiling: Accoustic Ceiling Tile
Ceiling Height:
Door Size:

Casework

Wall Cabinets: No
Base Cabinets: Wood- Certified
Bench Top: Epoxy Resin
Bench Height: 3'-0"
Desktop: No
Shelving: No
Drawer Units: No

Furnishings

Window Treat: No
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: No
Tack Boards: No
Other Furn.:

Plumbing

Sinks: None
Pure Water: NA
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste: Lab/pH Neutralization
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum Yes
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Lab Standard
Fresh Air Changes Lab Standard
Pressure Negative
Temperature Lab Standard
Relative Humidity Lab Standard
Local Exhaust
Air Filtration Lab Standard
CO2 Sensor No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 80-100fc
Fixtures: Fluorescent
Fixture Mounting: Pendant
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: Yes (fume hood exh'st)
UPS: No

Communications

Phone Outlets 0
Data Outlets 0
Network
Clocks No
Paging Systems No
Monitors/Alarms

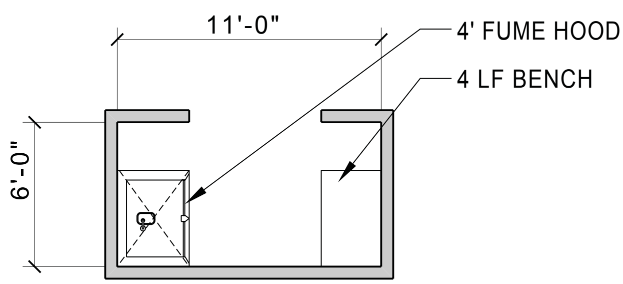
Special Requirements

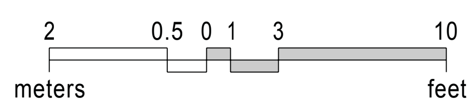
Light Controls
Visual Controls
Acoustic Controls Noise Generator
Structural Controls
Security Keypad Access
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.04.09 - Fume Hood Alcove - 66 nasf





1.04.10 Radioisotope Room

Department	Generic Life Sciences	Researcher	# of Occupants	2 occasional
Function			Area	230 NASF
Adjacencies				

Architectural

Floor:	Seamless Sheet Vinyl
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	Wood- Certified
Base Cabinets:	Wood- Certified
Bench Top:	Epoxy Resin
Bench Height:	3'-0"
Desktop:	
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	Yes, if at exterior
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Epoxy
Pure Water:	RO
Hot / Cold Water:	Yes
Floor Drain:	No
Hose Bib:	No
Waste:	Lab/pH Neutralization
Eyewash:	Yes
Emerg Shower:	Yes

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	Yes - hood
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Equip. room standard
Fresh Air Changes	Equip. room standard
Pressure	Negative
Temperature	Equip. room standard
Relative Humidity	Equip. room standard
Local Exhaust	None
Air Filtration	Equip. room standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Surf. Mount. Raceway
Illumination:	
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	0
# Data Outlets	2
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

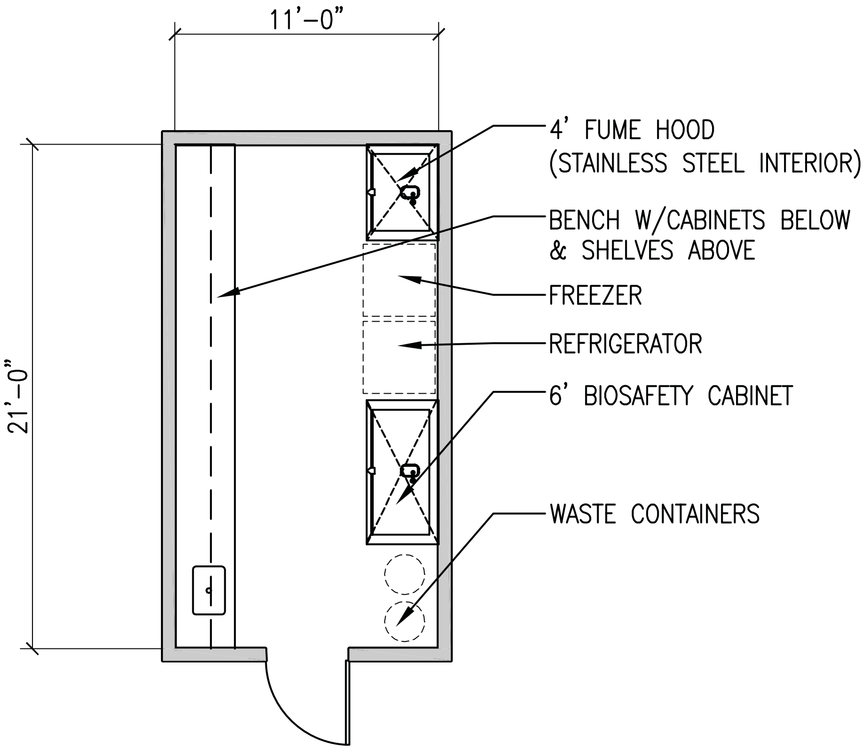
Special Requirements

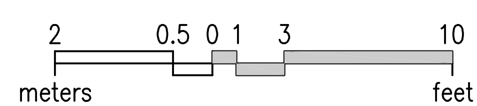
Light Controls	
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Lockable
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				
Fume Hood		1	4'				120					
Refrigerator		1					120					
Bio Safety Cabinet		1	6'				120					
Freezer		1					120					

1.04.10 - Radioisotope Room - 230 nasf





1.04.11 Solution Prep Room

Department	Generic Life Sciences	Researcher	# of Occupants	2 occasional
Function			Area	154 NASF
Adjacencies				

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	3'-0"

Casework

Wall Cabinets:	None
Base Cabinets:	Plastic Laminate
Bench Top:	Epoxy Resin
Bench Height:	3'-0"
Desktop:	Epoxy Resin
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stainless Steel
Pure Water:	RO
Hot / Cold Water:	Yes
Floor Drain:	No
Hose Bib:	No
Waste:	Lab/pH Neutralization
Eyewash:	Yes
Emerg Shower:	Yes

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	Yes
Other Gas	

Fire Protection

FP System	
FP Detection	

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Positive
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	75 fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

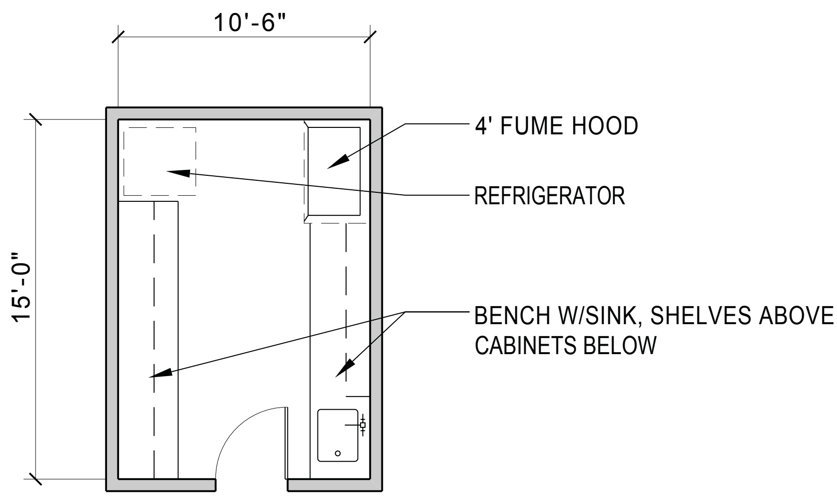
Special Requirements

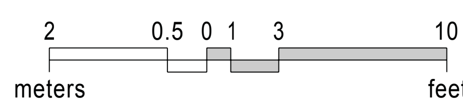
Light Controls	
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Lockable
Shielding	No
Other Spec Req	

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes
Refrigerator		1					120					
Fume Hood		1	4'									

1.04.11 - Solution Prep - 154 nasf





1.04.12 Lab Supplies Storage Room

Department	Generic Life Sciences	Researcher	# of Occupants		
Function			Area	80	NASF
Adjacencies					

Architectural

Floor:	Vinyl Composition Tile
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	8'-0"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	Yes
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	30fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

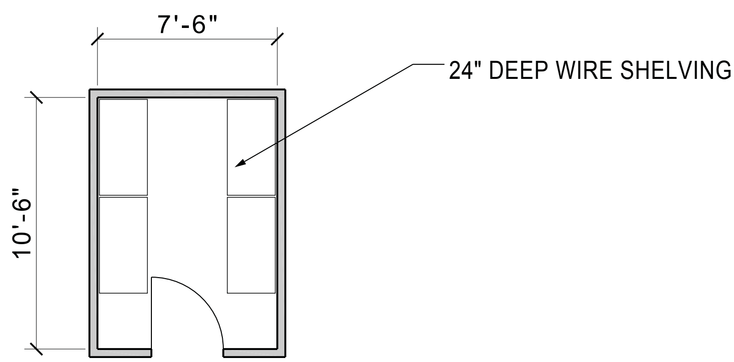
Special Requirements

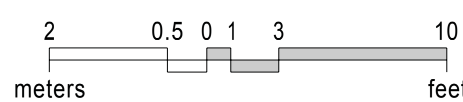
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.04.12 - Lab Supplies Storage Room - 80 nasf





1.04.13 Autoclave Room

Department	Generic Life Sciences	Researcher		# of Occupants		
Function				Area	75	NASF
Adjacencies						

Architectural

Floor:	Vinyl Composition Tile
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	8'-0"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	None
Floor Drain:	Yes
Hose Bib:	No
Waste:	Lab/pH Neutralization
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	
Vacuum	No
Other Gas	Steam

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Negative
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	Canopy Hood
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v + 208v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed, Sealed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

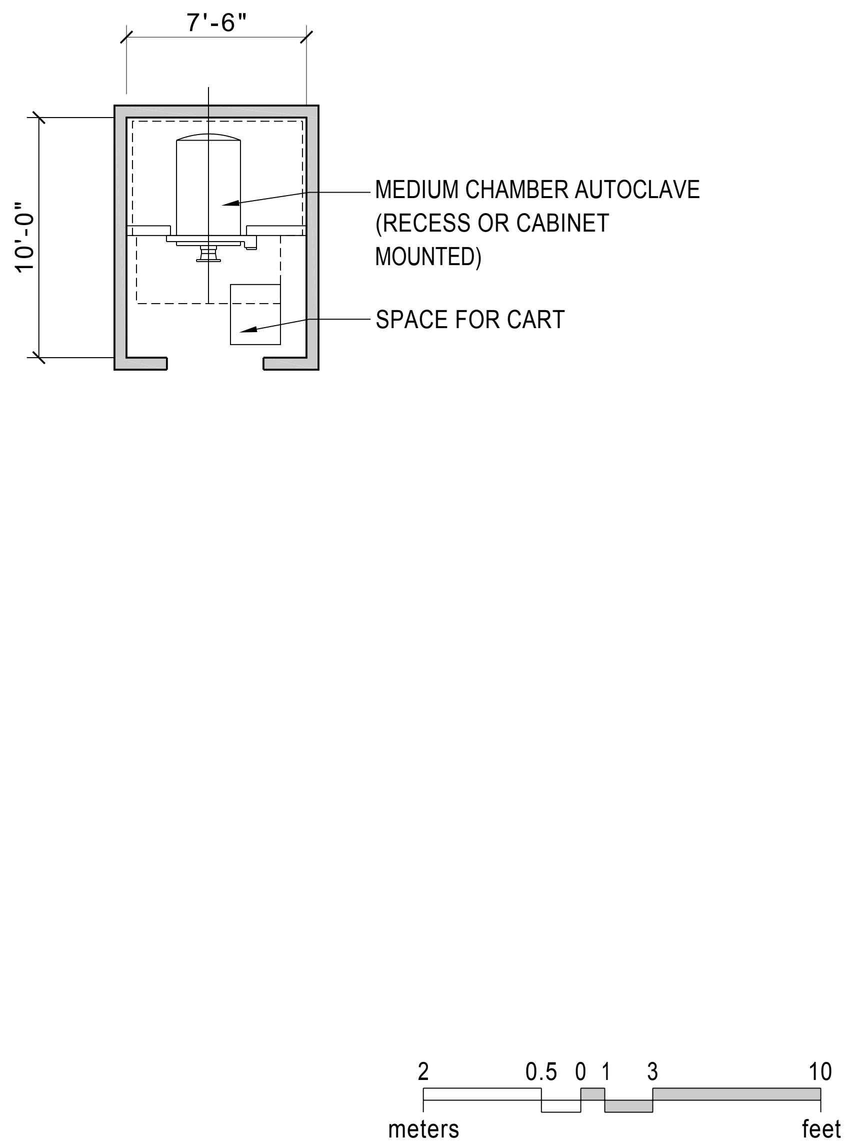
Special Requirements

Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.04.13 - Autoclave Room - 75 nasf



1.05.01 Private Office

Department	Generic Life Sciences	Researcher	# of Occupants	1
Function			Area	150 NASF
Adjacencies				

Architectural

Floor:	Carpet
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	8'-0"
Door Size:	3'-0"

Casework

Wall Cabinets:	
Base Cabinets:	
Bench Top:	
Bench Height:	
Desktop:	Wood- Certified
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	Yes
Proj. Screen:	No
Desks:	Yes
Chairs:	Yes
Tables:	Yes
Files:	Yes
White Boards:	Yes
Tack Boards:	Yes
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	NA
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	NA
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	None
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	Office Standard
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	Yes
Dimming Sensors:	Yes
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	2
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

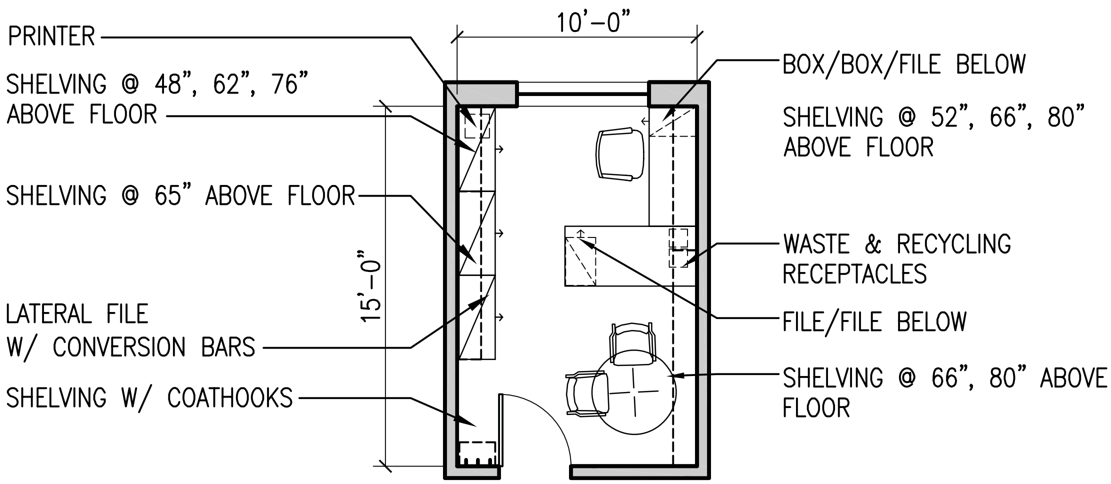
Special Requirements

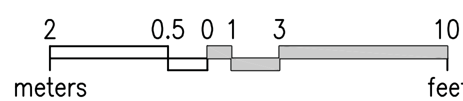
Light Controls	Requires Natural Light
Visual Controls	Visual Privacy Req.
Acoustic Controls	
Structural Controls	
Security	Lockable
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.05.01 - Private Office - 150 nasf





1.06.01 Reception Waiting Area

Department	Generic Life Sciences	Researcher	# of Occupants	1	
Function			Area	200	NASF
Adjacencies	Ground Floor				

Architectural

Floor:	Carpet
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	8'-0"
Door Size:	3'-0"

Casework

Wall Cabinets:	
Base Cabinets:	
Bench Top:	
Bench Height:	
Desktop:	Wood- Certified
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	Yes
Proj. Screen:	No
Desks:	No
Chairs:	Yes
Tables:	Yes
Files:	Yes
White Boards:	No
Tack Boards:	Yes
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	NA
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	NA
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	None
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	Office Standard
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	Yes
Dimming Sensors:	Yes
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

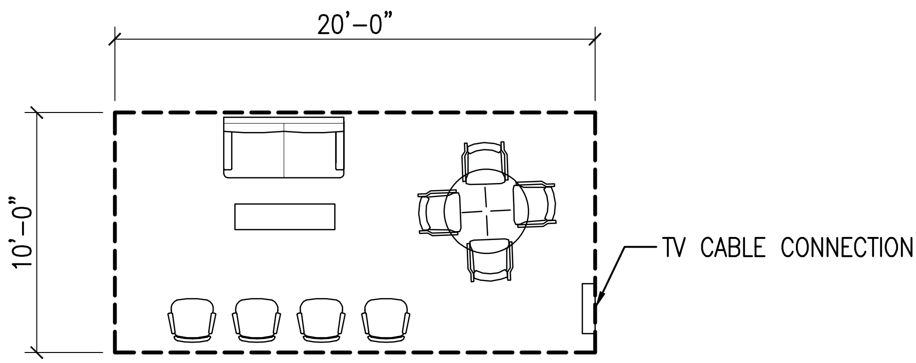
Special Requirements

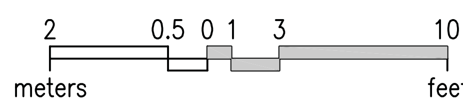
Light Controls	Requires Natural Light
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Lockable
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.06.01 - Reception Waiting Area - 200 nasf





1.06.02 Records Room

Department	Generic Life Sciences	Researcher		# of Occupants	
Function				Area	100 NASF
Adjacencies					

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	
Door Size:	3'-0"

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	Yes
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	Yes
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1 wall phone
# Data Outlets	1 wall jack
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

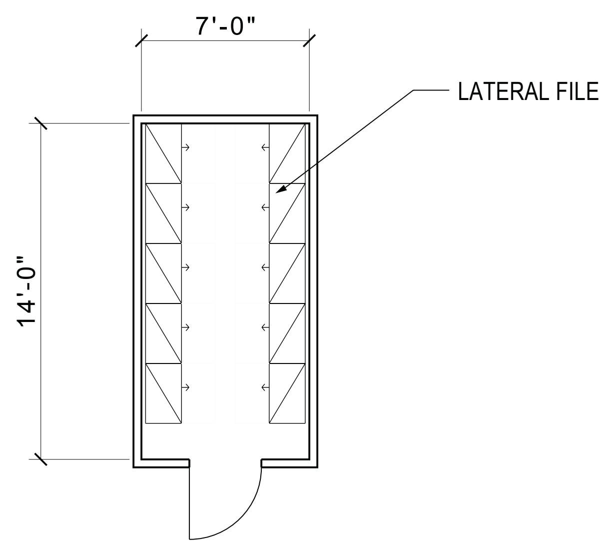
Special Requirements

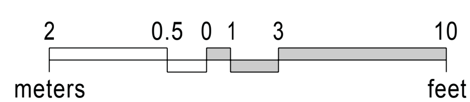
Light Controls	
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Lockable
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.06.02 - Records Room - 100 nasf





1.06.03 Support Room

Department	Generic Life Sciences	Researcher	# of Occupants		
Function	Exam room, phlebotomy room, interview room		Area	100	NASF
Adjacencies	near Reception 1.06.01				

Architectural

Floor:	Rubber
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	8'-0"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	Wood- Certified
Base Cabinets:	Wood- Certified
Bench Top:	Plastic Laminate
Bench Height:	3'-0"
Desktop:	None
Shelving:	None
Drawer Units:	None

Furnishings

Window Treat:	Yes
Proj. Screen:	No
Desks:	Maybe 1
Chairs:	desk chair + 2 guest
Tables:	No
Files:	
White Boards:	
Tack Boards:	
Other Furn.:	see notes

Plumbing

Sinks:	Stainless Steel
Pure Water:	None
Hot / Cold Water:	Yes
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	Yes- exam light
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1 wall phone
# Data Outlets	1
Network	
Clocks	Yes
Paging Systems	No
Monitors/Alarms	

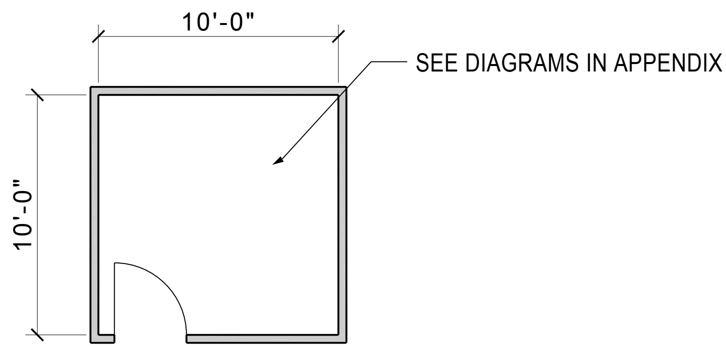
Special Requirements

Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

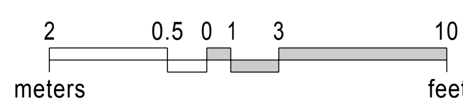
Notes furnishings could include: 2 phlebotomy chairs, or 1 exam table & cubicle curtain, or desk and chairs
SEE APPENDIX FOR ALTERNATIVE LAYOUTS FOR THIS SPACE TYPE.

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.06.03 - Support Room - 100 nasf



NOTE: POWER AND DATA OUTLETS ON EACH WALL
SEE ADDITIONAL DIAGRAMS IN APPENDIX FOR
ALTERNATE LAYOUTS



1.06.04 Support Lab

Department	Generic Life Sciences	Researcher	# of Occupants	2
Function	Clinical lab		Area	154 NASF
Adjacencies				

Architectural

Floor: Linoleum
Base: Rubber
Walls: Gypsum Wall Board
Wall Finish: Paint
Ceiling: Accoustic Ceiling Tile
Ceiling Height: 12'-0"
Door Size: 3'-6" (single leaf)

Casework

Wall Cabinets: Wood- Certified
Base Cabinets: Wood- Certified
Bench Top: Epoxy Resin
Bench Height: 3'-0"
Desktop: Wood- Certified
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: Yes
Proj. Screen: No
Desks: Yes
Chairs: Yes & stools
Tables: No
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: RO/DI
Hot / Cold Water: Yes
Floor Drain: No
Hose Bib: No
Waste: Lab/pH Neutralization
Eyewash: Yes
Emerg Shower: Yes

Gases

Air Yes
Lab Gas No
CO2 No
Nitrogen No
Vacuum Yes
Other Gas No

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Lab Standard
Fresh Air Changes Lab Standard
Pressure Positive
Temperature Lab Standard
Relative Humidity Lab Standard
Local Exhaust Elephant Trunk
Air Filtration Lab Standard
CO2 Sensor No
Other HVAC

Electrical

Power: 120v + 208v
Features:
Elec. Outlets: Surf. Mount. Raceway
Illumination: 80-100fc
Fixtures: Fluorescent
Fixture Mounting: Pendant
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: Yes
UPS: Yes

Communications

Phone Outlets 1
Data Outlets 4
Network
Clocks Yes
Paging Systems No
Monitors/Alarms

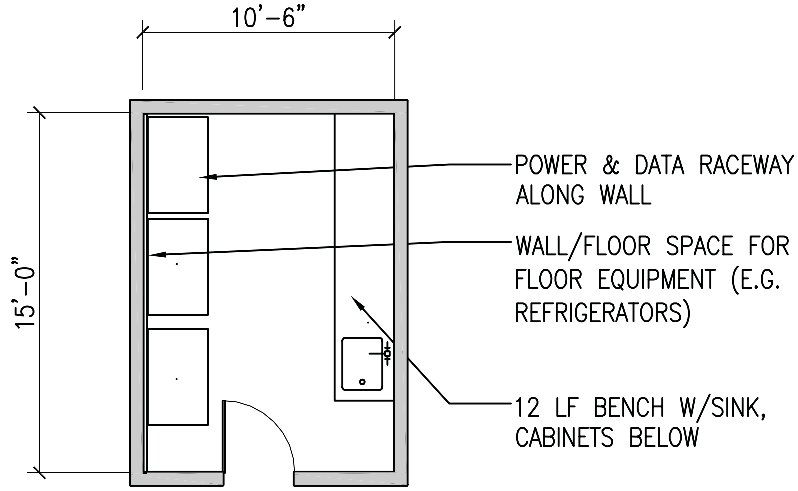
Special Requirements

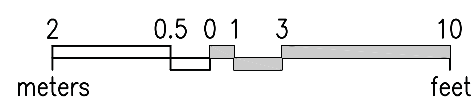
Light Controls Requires Natural Light
Visual Controls Views Desireable
Acoustic Controls
Structural Controls
Security Keypad Access
Shielding No
Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

1.06.04 - Support Lab - 154 nasf





1.06.05 Storage Room

Department	Generic Life Sciences	Researcher		# of Occupants	
Function				Area	80 NASF
Adjacencies					

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	
Door Size:	3'-0"

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	Yes- as furniture
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	Shelving units

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

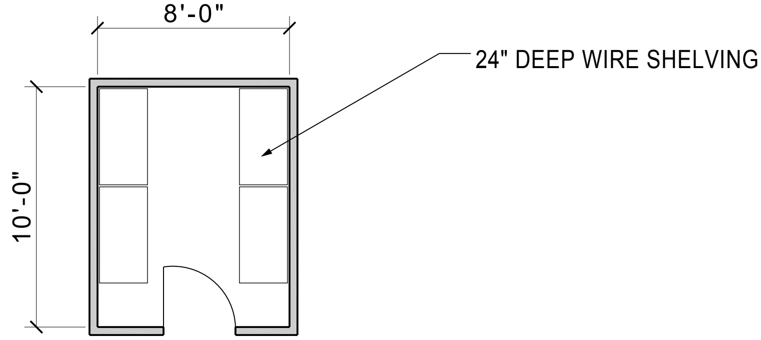
Special Requirements

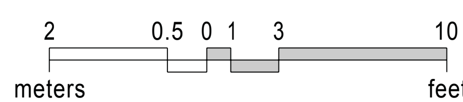
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.06.05 - Storage Room - 80 nasf





1.06.06 Temporary Office

Department	Generic Life Sciences	Researcher	# of Occupants	1
Function			Area	100 NASF
Adjacencies				

Architectural

Floor:	Carpet
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	8'-0"
Door Size:	3'-0"

Casework

Wall Cabinets:	
Base Cabinets:	
Bench Top:	
Bench Height:	
Desktop:	Wood- Certified
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	Yes
Proj. Screen:	No
Desks:	Yes
Chairs:	Yes
Tables:	Yes
Files:	Yes
White Boards:	Yes
Tack Boards:	Yes
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	NA
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	NA
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	None
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	Office Standard
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	Yes
Dimming Sensors:	Yes
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	2
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

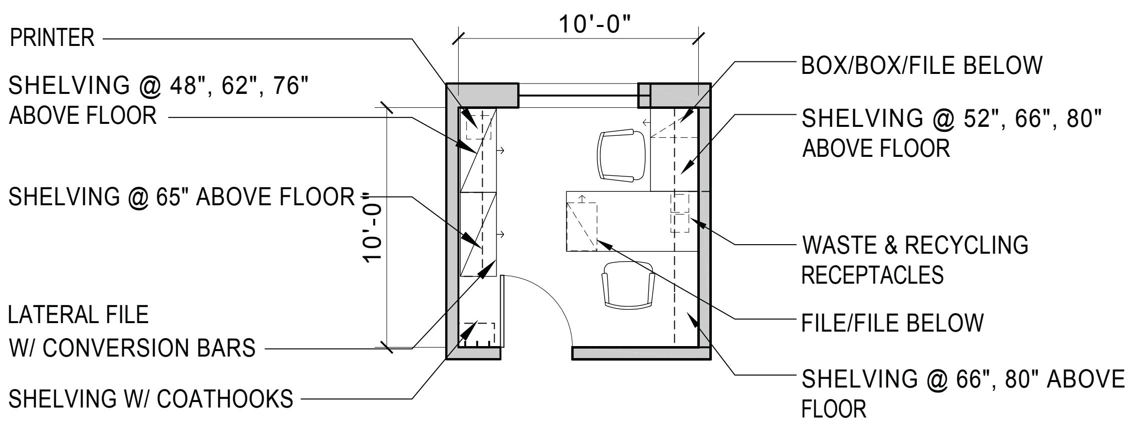
Special Requirements

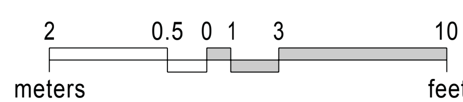
Light Controls	Requires Natural Light
Visual Controls	Visual Privacy Req.
Acoustic Controls	
Structural Controls	
Security	Lockable
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.06.06 - Temporary Office - 100 nasf





1.06.07 Dining Area

Department	Generic Life Sciences	Researcher	# of Occupants	15	
Function			Area	400	NASF
Adjacencies	Ground floor, integrate with cafe seating				

Architectural

Floor: Tile/stone
Base: Tile/stone
Walls: Gypsum Wall Board
Wall Finish: Paint- Low VOC
Ceiling: Gypsum Board / Painted
Ceiling Height:
Door Size:

Casework

Wall Cabinets: None
Base Cabinets: None
Bench Top: None
Bench Height: None
Desktop: None
Shelving: None
Drawer Units: None

Furnishings

Window Treat: Yes
Proj. Screen: No
Desks: No
Chairs: Yes- cafe type
Tables: Yes- cafe type
Files: No
White Boards: No
Tack Boards: No
Other Furn.:

Plumbing

Sinks: None
Pure Water: None
Hot / Cold Water: None
Floor Drain: No
Hose Bib: No
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum No
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Office Standard
Fresh Air Changes Office Standard
Pressure Negative
Temperature Office Standard
Relative Humidity Office Standard
Local Exhaust
Air Filtration Office Standard
CO2 Sensor
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets:
Illumination: 50fc
Fixtures: Fluorescent/decorative
Fixture Mounting: Pendant
Occupancy Sensors: No
Dimming Sensors: Yes
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets
Data Outlets
Network
Clocks No
Paging Systems No
Monitors/Alarms

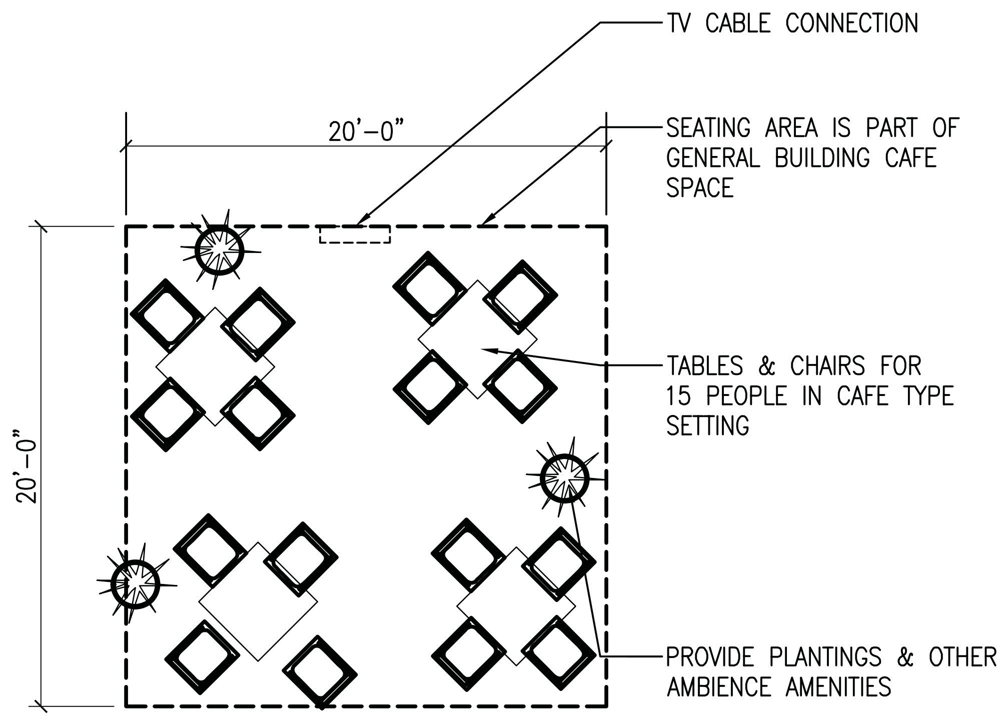
Special Requirements

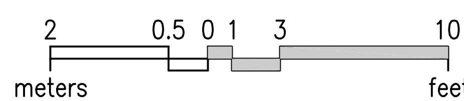
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.06.07 - Dinning Area - 400 nasf





1.07.01 Cooking Bay

Department	Generic Life Sciences	Researcher	# of Occupants	2-4
Function	Food production		Area	130 NASF
Adjacencies	Prep area 1.07.02			

Architectural

Floor: Slip resistant quarry tile
Base: Tile
Walls: Cement board
Wall Finish: FRP
Ceiling: Susp. Vinyl Coated Tile
Ceiling Height: 10'-0"
Door Size: 3'-6" (single leaf)

Casework

Wall Cabinets: None
Base Cabinets: None
Bench Top: Stainless Steel
Bench Height: 3'-0"
Desktop: None
Shelving: Yes- Stainless steel
Drawer Units: No

Furnishings

Window Treat: Yes
Proj. Screen: No
Desks: No
Chairs: No
Tables: Yes- stainless steel
Files: No
White Boards: No
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: None
Hot / Cold Water: Yes
Floor Drain: Yes
Hose Bib: Yes
Waste:
Eyewash:
Emerg Shower:

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum: No
Other Gas

Fire Protection

FP System: Wet chemical (for grease)
FP Detection: Rate of Rise

HVAC

Total Air Changes: Kitchen Standard
Fresh Air Changes: Kitchen Standard
Pressure: Negative
Temperature: Kitchen Standard
Relative Humidity: Kitchen Standard
Local Exhaust: Canopy hoods
Air Filtration: Kitchen Standard
CO2 Sensor
Other HVAC

Electrical

Power: 120v + 208v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 75fc
Fixtures: Gasketed/WP Fluor.
Fixture Mounting: Recessed
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets
Data Outlets
Network
Clocks
Paging Systems
Monitors/Alarms

Special Requirements

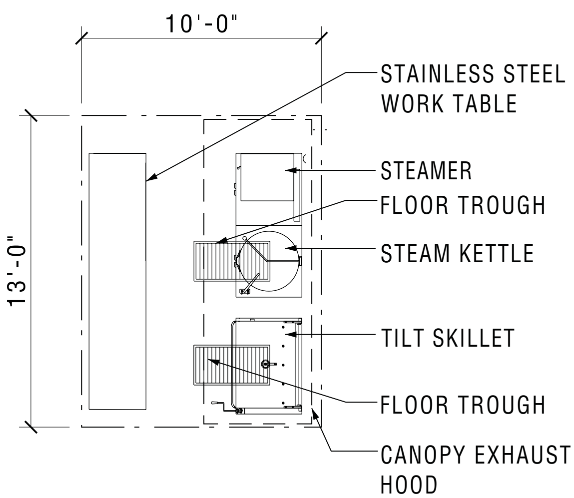
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.07.01 - Cooking Bay - 130 nasf

TYPE 1



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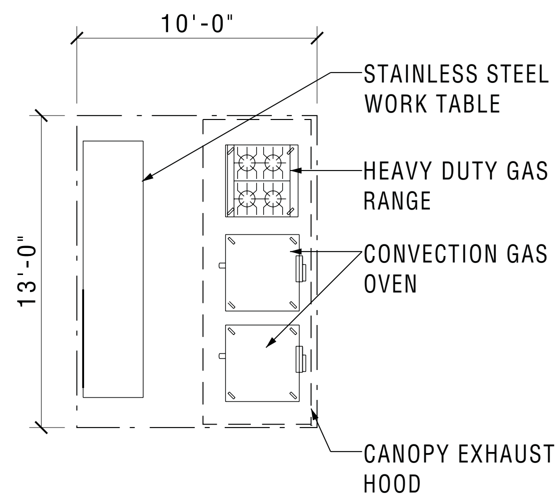
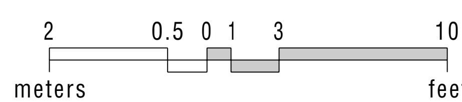




1.07.02 Large Prep Area

Department	Generic Life Sciences	Researcher	# of Occupants	2
Function	Food production		Area	400 NASF
Adjacencies	Cooking bay 1.07.01			

Architectural

Floor:	Slip resistant quarry tile
Base:	Tile
Walls:	Cement board
Wall Finish:	FRP
Ceiling:	Susp. Vinyl Coated Tile
Ceiling Height:	10'-0"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	Stainless Steel
Bench Height:	3'-0"
Desktop:	None
Shelving:	Yes- Stainless steel
Drawer Units:	No

Furnishings

Window Treat:	Yes
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	Yes- stainless steel
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stainless Steel
Pure Water:	None
Hot / Cold Water:	Yes
Floor Drain:	Yes
Hose Bib:	Yes
Waste:	
Eyewash:	
Emerg Shower:	

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet chemical (for grease)
FP Detection	Rate of Rise

HVAC

Total Air Changes	Kitchen Standard
Fresh Air Changes	Kitchen Standard
Pressure	Negative
Temperature	Kitchen Standard
Relative Humidity	Kitchen Standard
Local Exhaust	Canopy hoods
Air Filtration	Kitchen Standard
CO2 Sensor	
Other HVAC	

Electrical

Power:	120v + 208v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	75fc
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	1
Network	
Clocks	Yes
Paging Systems	Yes
Monitors/Alarms	

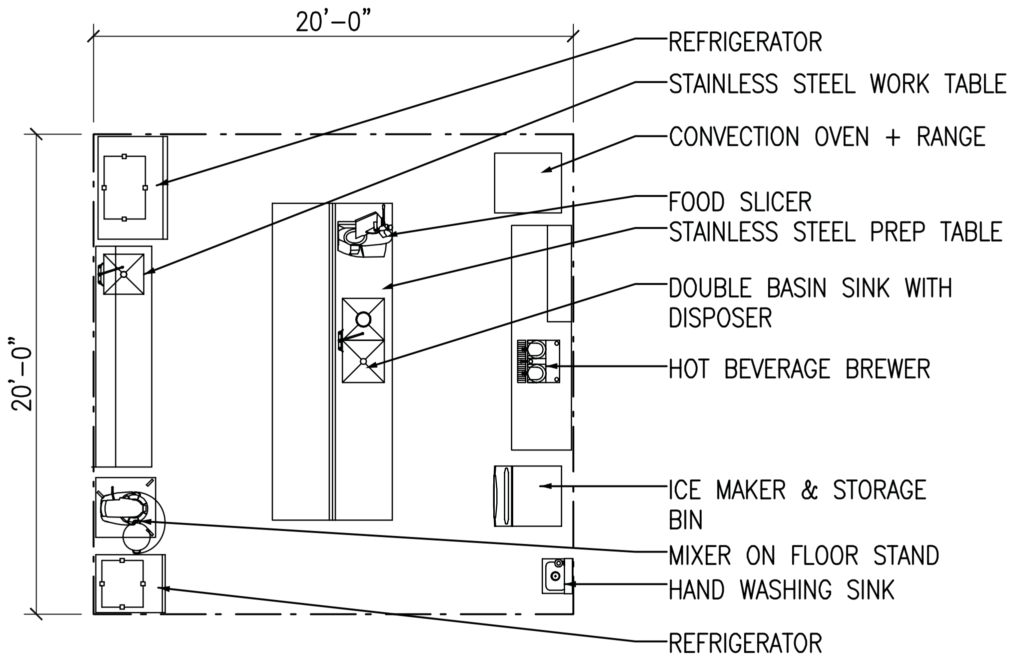
Special Requirements

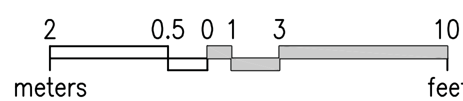
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.07.02 - Large Prep Area - 400 nasf





1.07.03 Food Service / Dishwashing

Department	Generic Life Sciences	Researcher	# of Occupants	2	
Function	Food production		Area	100	NASF
Adjacencies	Cooking bay 1.07.01 & Prep area 1.07.02				

Architectural

Floor:	Slip resistant quarry tile
Base:	Tile
Walls:	Cement board
Wall Finish:	FRP
Ceiling:	Susp. Vinyl Coated Tile
Ceiling Height:	10'-0"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	Stainless Steel
Bench Height:	3'-0"
Desktop:	None
Shelving:	Yes- Stainless steel
Drawer Units:	No

Furnishings

Window Treat:	Yes
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	Yes- stainless steel
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stainless Steel
Pure Water:	None
Hot / Cold Water:	Yes
Floor Drain:	Yes
Hose Bib:	Yes
Waste:	
Eyewash:	
Emerg Shower:	

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Kitchen Standard
Fresh Air Changes	Kitchen Standard
Pressure	Negative
Temperature	Kitchen Standard
Relative Humidity	Kitchen Standard
Local Exhaust	Canopy hoods
Air Filtration	Kitchen Standard
CO2 Sensor	
Other HVAC	

Electrical

Power:	120v + 208v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	75fc
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

Phone Outlets
Data Outlets
Network
Clocks
Paging Systems
Monitors/Alarms

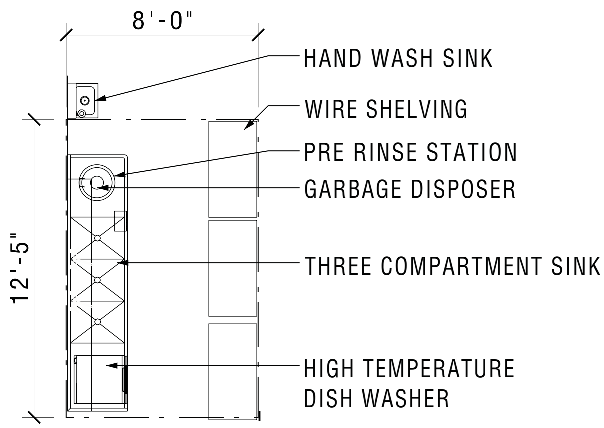
Special Requirements

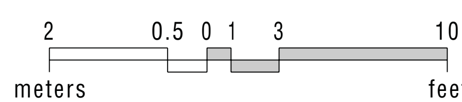
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.07.03 - Food Service / Dishwashing - 100 nasf





1.07.04 Walk-in Freezer

Department	Generic Life Sciences	Researcher	# of Occupants	2 occasional	
Function			Area	100	NASF
Adjacencies	Cooking bay 1.07.01 & Prep area 1.07.02				

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	prefab insulated metal
Wall Finish:	anodized
Ceiling:	
Ceiling Height:	
Door Size:	3'-0"

Casework

Wall Cabinets:	No
Base Cabinets:	Stainless Steel
Bench Top:	Stainless Steel
Bench Height:	NA
Desktop:	No
Shelving:	Yes - Stainless Steel
Drawer Units:	No

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	Wire shelving units

Plumbing

Sinks:	Provisions for
Pure Water:	
Hot / Cold Water:	Provisions for
Floor Drain:	No
Hose Bib:	No
Waste:	NA
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Env. Room Standard
Fresh Air Changes	Env. Room Standard
Pressure	Negative
Temperature	-10ºC
Relative Humidity	Env. Room Standard
Local Exhaust	
Air Filtration	Env. Room Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Surf. Mount. Raceway
Illumination:	75fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	Yes
UPS:	No

Communications

# Phone Outlets	0
# Data Outlets	0
Network	None
Clocks	No
Paging Systems	No
Monitors/Alarms	

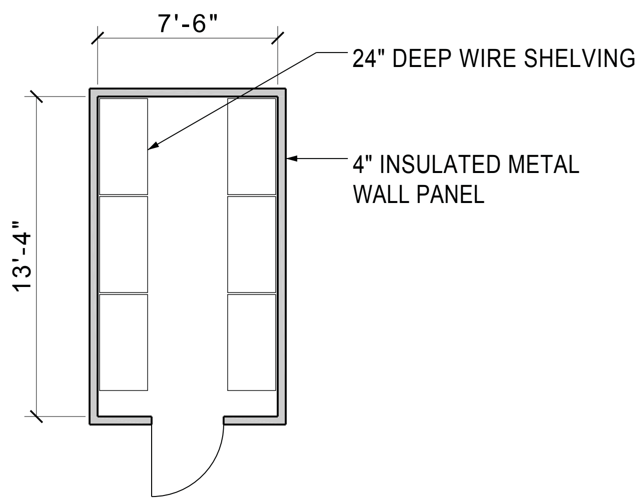
Special Requirements

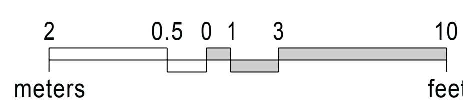
Light Controls	
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Lockable
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.07.04 - Walk-In Freezer - 150 nasf





1.07.05 Walk-in Cold Storage

Department	Generic Life Sciences	Researcher		# of Occupants	2 occasional
Function				Area	100 NASF
Adjacencies	Cooking bay 1.07.01 & Prep area 1.07.02				

Architectural

Floor: Linoleum
Base: Rubber
Walls: prefab insulated metal
Wall Finish: anodized
Ceiling:
Ceiling Height:
Door Size: 3'-0"

Casework

Wall Cabinets: No
Base Cabinets: Stainless Steel
Bench Top: Stainless Steel
Bench Height: NA
Desktop: No
Shelving: Yes - Stainless Steel
Drawer Units: No

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: No
Tack Boards: No
Other Furn.: Wire shelving units

Plumbing

Sinks: Provisions for
Pure Water:
Hot / Cold Water: Provisions for
Floor Drain: No
Hose Bib: No
Waste: NA
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Env. Room Standard
Fresh Air Changes Env. Room Standard
Pressure Negative
Temperature 4ºC
Relative Humidity Env. Room Standard
Local Exhaust
Air Filtration Env. Room Standard
CO2 Sensor No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Surf. Mount. Raceway
Illumination: 75fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets 0
Data Outlets 0
Network None
Clocks No
Paging Systems No
Monitors/Alarms

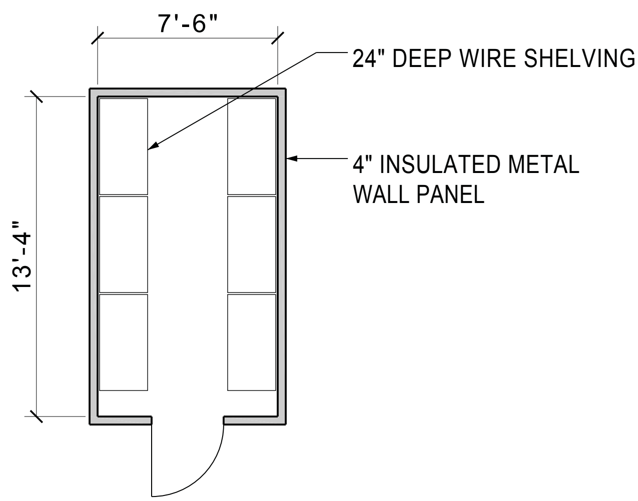
Special Requirements

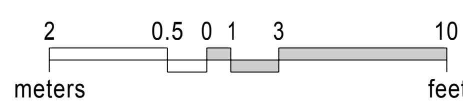
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security Lockable
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.07.05 - Walk-In Cold Storage - 150 nasf





1.07.06 Dry Storage

Department	Generic Life Sciences	Researcher		# of Occupants	
Function				Area	100 NASF
Adjacencies					

Architectural

Floor: Slip resistant quarry tile
Base: Rubber
Walls: High Impact Wall Board
Wall Finish: FRP
Ceiling: Susp. Vinyl Coated Tile
Ceiling Height:
Door Size: 3'-6" (single leaf)

Casework

Wall Cabinets: None
Base Cabinets: None
Bench Top: None
Bench Height: None
Desktop: None
Shelving: No
Drawer Units: No

Furnishings

Window Treat: No
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: No
Tack Boards: No
Other Furn.: Wire shelving units

Plumbing

Sinks: None
Pure Water: None
Hot / Cold Water: None
Floor Drain: No
Hose Bib: No
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum: No
Other Gas

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: Kitchen Standard
Fresh Air Changes: Kitchen Standard
Pressure: Not Critical
Temperature: Kitchen Standard
Relative Humidity: Kitchen Standard
Local Exhaust
Air Filtration: Kitchen Standard
CO2 Sensor: No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 50fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets
Data Outlets
Network
Clocks: No
Paging Systems: No
Monitors/Alarms

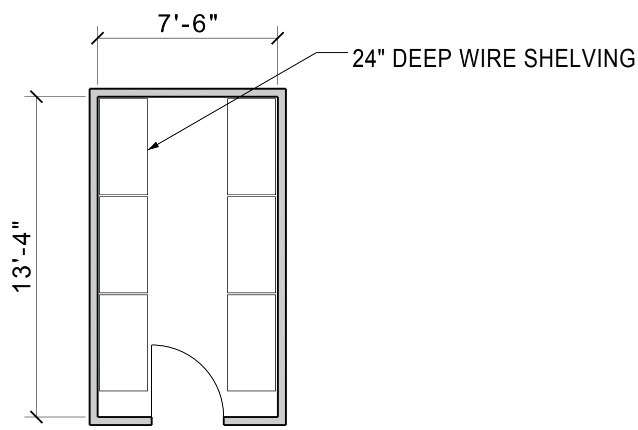
Special Requirements

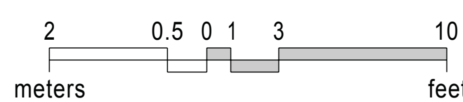
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

1.07.06 - Walk-In Dry Storage - 150 nasf





2.05.01 Common Ante Room

Department	Biocontainment	Researcher		# of Occupants	
Function				Area	250 NASF
Adjacencies					

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	High Impact Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	No
Base Cabinets:	No
Bench Top:	No
Bench Height:	NA
Desktop:	No
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	Yes
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	No

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Negative
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	1
Network	
Clocks	No
Paging Systems	
Monitors/Alarms	

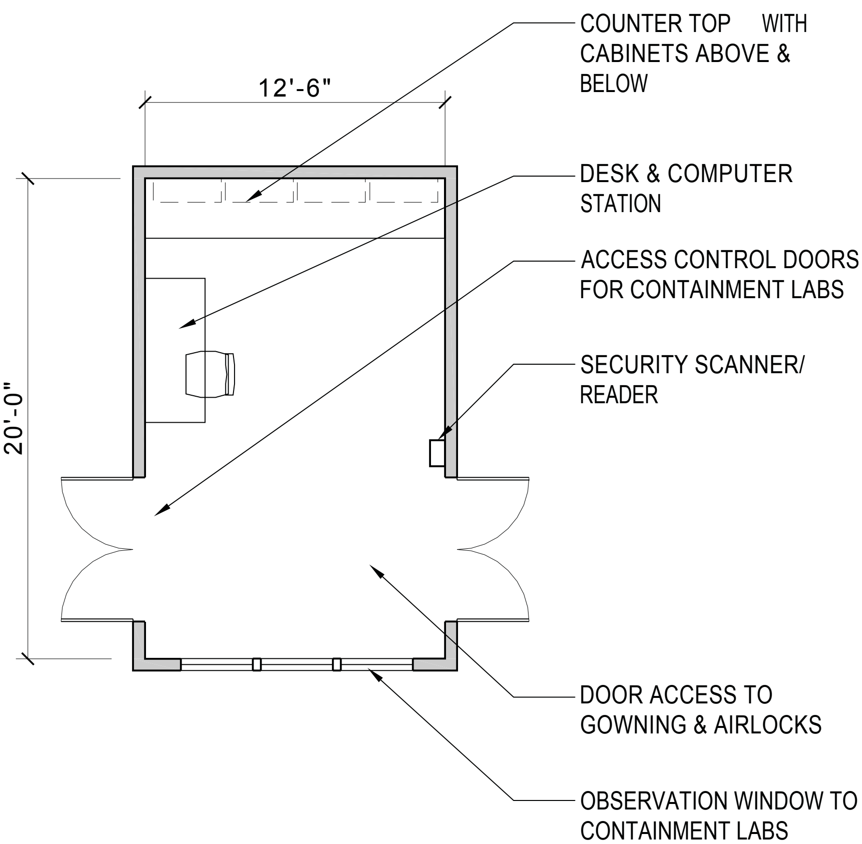
Special Requirements

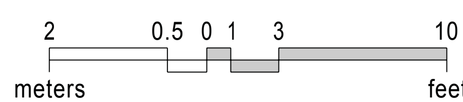
Light Controls	
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Keypad Access
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

2.05.01 - Common Ante Room - 250 nasf





2.05.02 Gowning

Department	Biocontainment	Researcher		# of Occupants	
Function				Area	80 NASF
Adjacencies					

Architectural

Floor: Rubber
Base: Rubber
Walls: Gypsum Wall Board
Wall Finish: Paint- Low VOC
Ceiling: Accoustic Ceiling Tile
Ceiling Height:
Door Size: 3'-6" (single leaf)

Casework

Wall Cabinets: None
Base Cabinets: None
Bench Top: None
Bench Height: NA
Desktop: None
Shelving: None
Drawer Units: None

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: Sitting Bench
Tables: No
Files: No
White Boards: No
Tack Boards: No
Other Furn.:

Plumbing

Sinks: None
Pure Water:
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste: None
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum
Other Gas

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: Office Standard
Fresh Air Changes: Office Standard
Pressure: Negative
Temperature: Office Standard
Relative Humidity: Office Standard
Local Exhaust: None
Air Filtration: Office Standard
CO2 Sensor: No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 50fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets 0
Data Outlets 0
Network
Clocks No
Paging Systems No
Monitors/Alarms

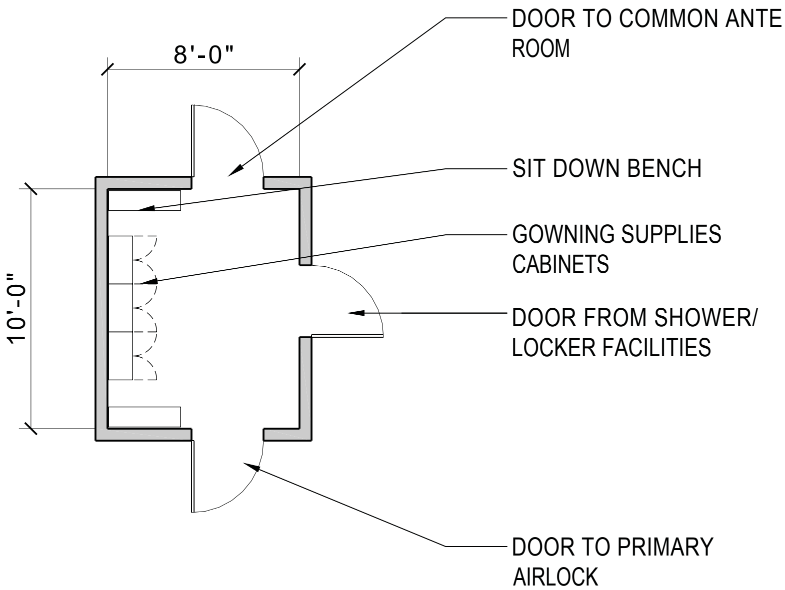
Special Requirements

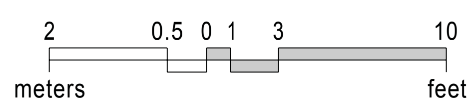
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				
Sticky floor mat		1	4'	5'								

2.05.02 - Gowning - 80 nasf





2.05.03 Locker/Shower Out

Department	Biocontainment	Researcher		# of Occupants	
Function				Area	150 NASF
Adjacencies					

Architectural

Floor:	Rubber
Base:	Integral
Walls:	Ceramic Tile
Wall Finish:	
Ceiling:	Susp. Vinyl Coated Tile
Ceiling Height:	
Door Size:	3'-0"

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	Lockers, bench seating

Plumbing

Sinks:	Stainless Steel
Pure Water:	
Hot / Cold Water:	Yes
Floor Drain:	Yes
Hose Bib:	Yes
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Negative
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v GFI
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

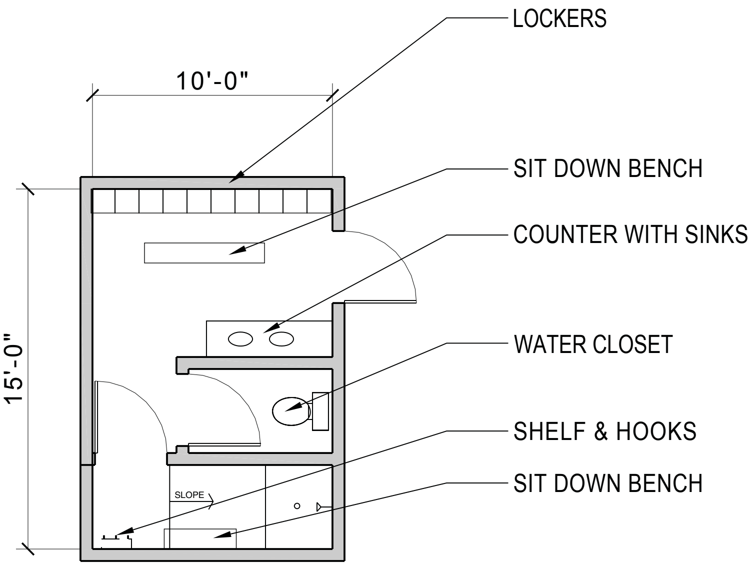
Special Requirements

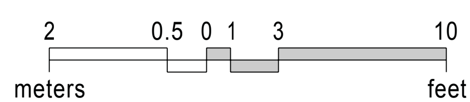
Light Controls	
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

2.05.03 - Lockers/Shower Out - 150 nasf





2.05.04 Personnel Airlock

Department	Biocontainment	Researcher	# of Occupants		
Function			Area	40	NASF
Adjacencies					

Architectural

Floor:	Rubber
Base:	Rubber
Walls:	Aluminum honeycomb
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Air grille
Ceiling Height:	
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	NA
Desktop:	None
Shelving:	None
Drawer Units:	None

Furnishings

Window Treat:	NA
Proj. Screen:	None
Desks:	None
Chairs:	None
Tables:	None
Files:	None
White Boards:	None
Tack Boards:	None
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	No
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Special condition
Fresh Air Changes	Special condition
Pressure	Negative
Temperature	Special condition
Relative Humidity	Special condition
Local Exhaust	None
Air Filtration	HEPA- Filtered Supply
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	30fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	Intercom
# Data Outlets	0
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

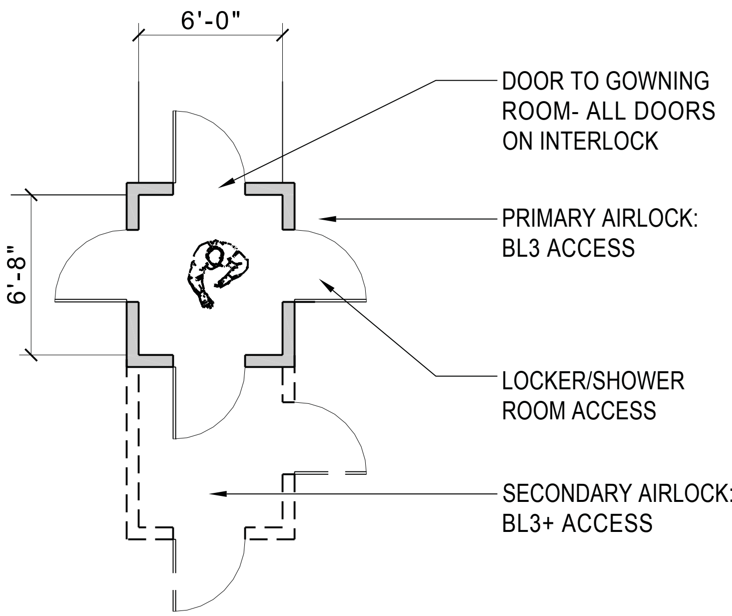
Special Requirements

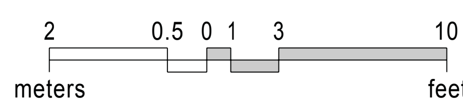
Light Controls	
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	
Shielding	
Other Spec Req	Interlock on doors

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

2.05.04 - Personnel Airlock - 40 nasf





2.05.05 Materials Airlock

Department	Biocontainment	Researcher		# of Occupants	
Function				Area	125 NASF
Adjacencies					

Architectural

Floor:	Rubber
Base:	Rubber
Walls:	Aluminum honeycomb
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Air grille
Ceiling Height:	
Door Size:	4'-0" x 8'-0" w/window

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	NA
Desktop:	None
Shelving:	None
Drawer Units:	None

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	None
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Special condition
Fresh Air Changes	Special condition
Pressure	Mixed[1]
Temperature	Special condition
Relative Humidity	Special condition
Local Exhaust	None
Air Filtration	HEPA- Filtered Supply
CO2 Sensor	No
Other HVAC	Air pressure monitor[2]

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	30fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	Intercom
# Data Outlets	0
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

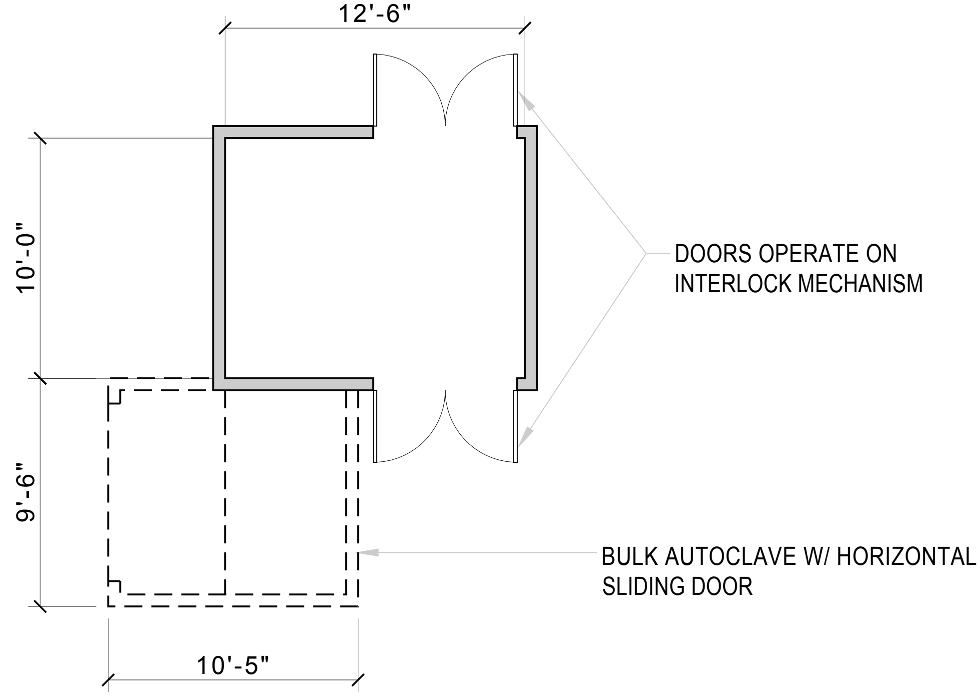
Special Requirements

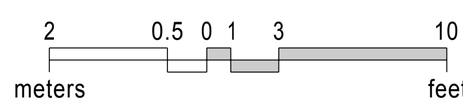
Light Controls	
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Keypad Access
Shielding	
Other Spec Req	Interlock on doors

Notes
1. Negative to clean side, positive to containment side.
2. Photohelic gauge w/alarm on clean side.

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

2.05.05 - Materials Air Lock - 125 nasf





2.05.06 Holding Room

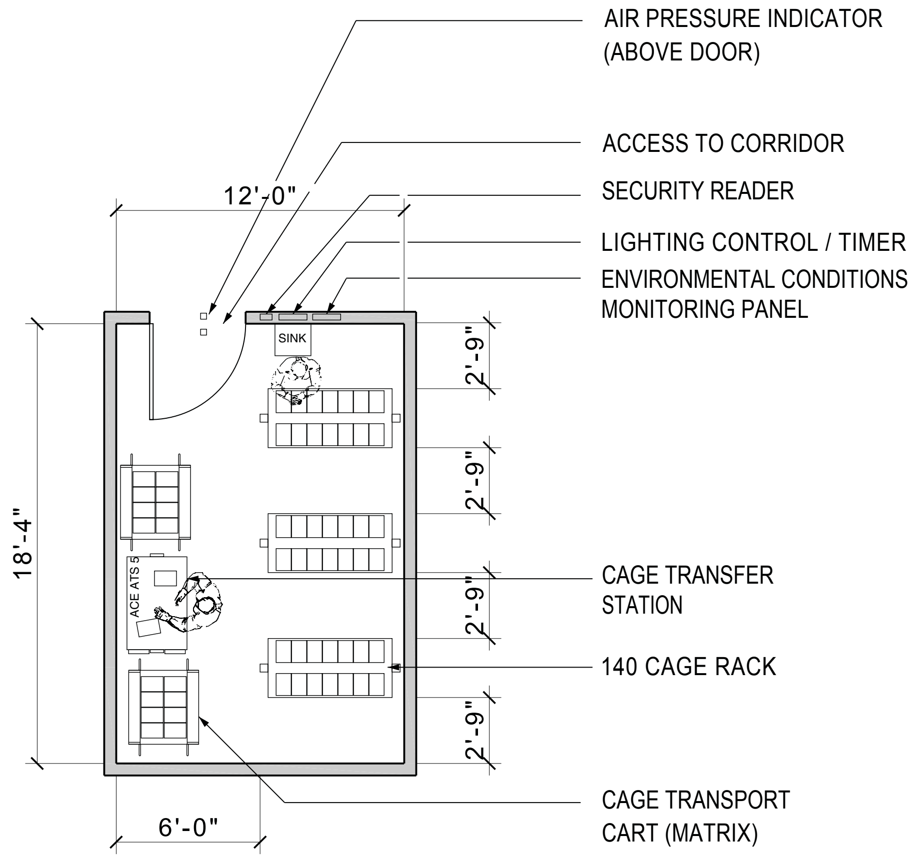
Department	Biocontainment	Researcher		# of Occupants	
Function				Area	220 NASF
Adjacencies					

Architectural		***Plumbing***		***Electrical***	
Floor:	Epoxy	Sinks:	Stainless Steel	Power:	120v
Base:	Integral	Pure Water:	RO	Features:	
Walls:	Fiberglas Panel	Hot / Cold Water:	Yes	Elec. Outlets:	WP Wall Receptacle
Wall Finish:	Paint- Low VOC	Floor Drain:	Yes w/cover	Illumination:	Per species + maint. lvl.
Ceiling:	Gypsum Board / Painted	Hose Bib:	Yes	Fixtures:	Gasketed/WP Fluor.
Ceiling Height:	9'-6"	Waste:	Bio-Hazard	Fixture Mounting:	Recessed
Door Size:	4'-0" x 8'-0" w/window	Eyewash:	No	Occupancy Sensors:	No
		Emerg Shower:	No	Dimming Sensors:	No
		Gases		Switching:	Yes
		Air	No	Task Light:	No
Casework		Lab Gas	No	Em. Power:	Yes- for lighting
Wall Cabinets:	No	CO2	No	UPS:	No
Base Cabinets:	No	Nitrogen	No	***Communications***	
Bench Top:	No	Vacuum		# Phone Outlets	1
Bench Height:	No	Other Gas	No	# Data Outlets	1
Desktop:	NA	***Fire Protection***		Network	
Shelving:	No	FP System	Wet System	Clocks	No
Drawer Units:	No	FP Detection	Rate of Rise	Paging Systems	No
Furnishings		***HVAC***		Monitors/Alarms	Humidity/Temp.
Window Treat:	NA	Total Air Changes	12-15/hr		
Proj. Screen:	No	Fresh Air Changes	12-15/hr	***Special Requirements***	
Desks:	No	Pressure	Mixed[4]	Light Controls	Avoid Natural Light
Chairs:	No	Temperature	NIH std 61-84°F +/-2°	Visual Controls	Visual Privacy Req.
Tables:	No	Relative Humidity	NIH std 30-70%	Acoustic Controls	Noise Sensitivity
Files:	No	Local Exhaust	vent ports for cage racks	Structural Controls	
White Boards:	Yes	Air Filtration	HEPA- Filtered Supply	Security	Keypad Access
Tack Boards:	No	CO2 Sensor	No	Shielding	
Other Furn.:		Other HVAC	Air pressure monitor[5]	Other Spec Req	see notes

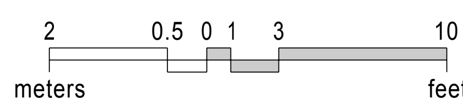
Notes 1. Individual room environmental control & monitoring. 2. Individual room light timer controls & variable light levels required 3. Separate fire alarm system from non vivarium spaces. 4. Negative to clean side, positive to containment side. 5. Photohelic gauge w/alarm at door.

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

2.05.06 - Holding Room - 220 nasf



VENTILATED RODENT RACK LAYOUT
420 CAGES



2.05.07 Holding Room

Department	Biocontainment	Researcher		# of Occupants	
Function				Area	220 NASF
Adjacencies					

Architectural

Floor: Epoxy
Base: Integral
Walls: High Impact Wall Board
Wall Finish: Paint- Low VOC
Ceiling: Gypsum Board / Painted
Ceiling Height: 9'-6"
Door Size: 4'-0" (sngl lf) x 8'-0" H

Casework

Wall Cabinets: No
Base Cabinets: No
Bench Top: No
Bench Height: No
Desktop: NA
Shelving: No
Drawer Units: No

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: RO
Hot / Cold Water: Yes
Floor Drain: No
Hose Bib: No
Waste: Bio-Hazard
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum
Other Gas No

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Lab Standard
Fresh Air Changes Lab Standard
Pressure Negative
Temperature NIH std 61-84°F +/-2°
Relative Humidity NIH std 30-70%
Local Exhaust vent ports for cage racks
Air Filtration HEPA- Filtered Supply
CO2 Sensor No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: WP Wall Receptacle
Illumination: Per species + maint. lvl.
Fixtures: Gasketed/WP Fluor.
Fixture Mounting: Recessed
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: Yes- for lighting
UPS: No

Communications

Phone Outlets 1
Data Outlets 1
Network
Clocks No
Paging Systems No
Monitors/Alarms Humidity/Temp.

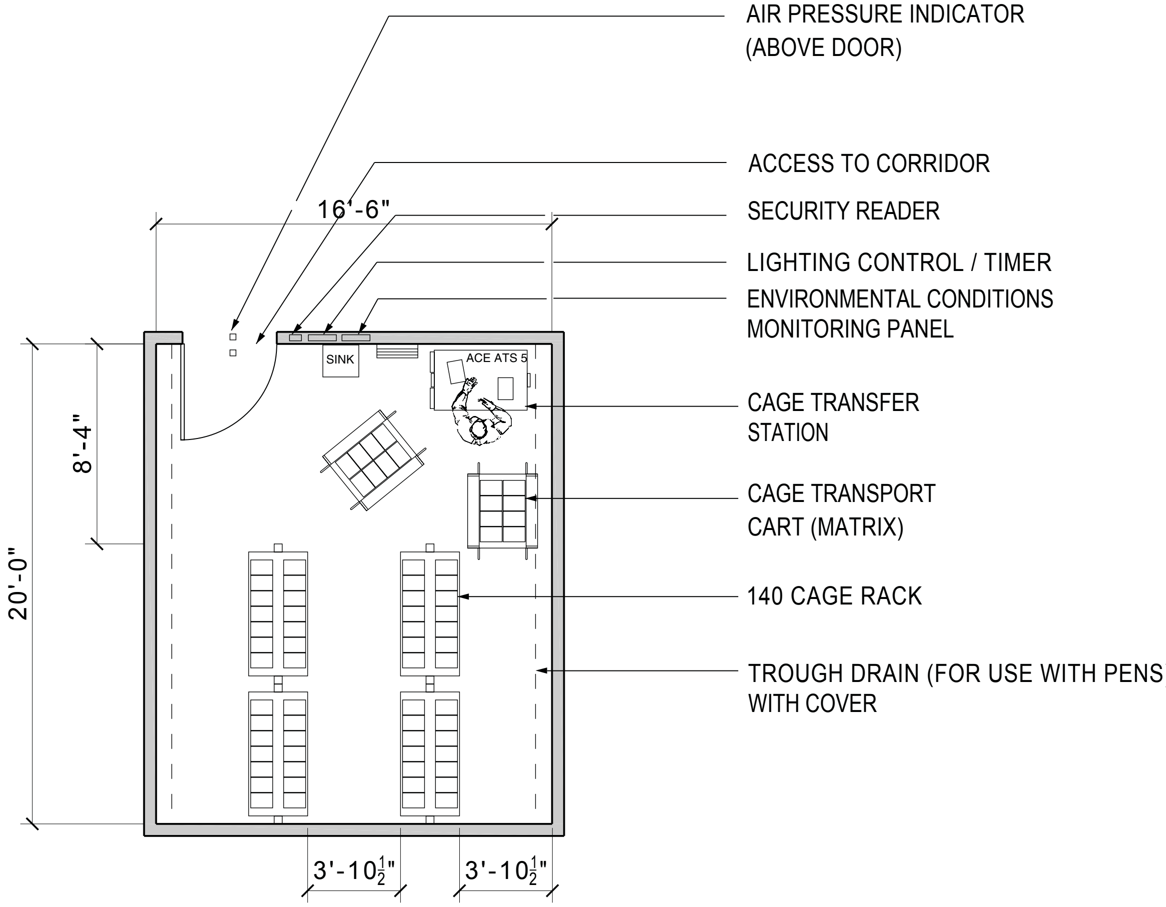
Special Requirements

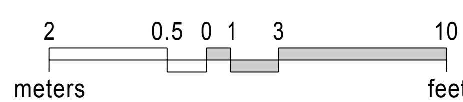
Light Controls Avoid Natural Light
Visual Controls Visual Privacy Req.
Acoustic Controls Noise Sensitivity
Structural Controls
Security Keypad Access
Shielding
Other Spec Req see notes

Notes 1. Individual room environmental control & monitoring. 2. Individual room light timer controls & variable light levels required 3. Separate fire alarm system from non vivarium spaces.

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

2.05.07 - Holding Room - 230 nasf





2.05.08 Procedure Room

Department	Biocontainment	Researcher		# of Occupants	
Function				Area	150 NASF
Adjacencies					

Architectural

Floor: Epoxy
Base: Integral
Walls: High Impact Wall Board
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 9'-6"
Door Size: 4'-0" x 8'-0" w/window

Casework

Wall Cabinets: No
Base Cabinets: Stainless Steel
Bench Top: Stainless Steel
Bench Height: 3'-0"
Desktop: NA
Shelving: No
Drawer Units: No

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: RO
Hot / Cold Water: Yes
Floor Drain: No
Hose Bib: No
Waste: Bio-Hazard
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum:
Other Gas: No

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: 12-15/hr
Fresh Air Changes: 12-15/hr
Pressure: Negative
Temperature: NIH std 55-90°F +/-2°
Relative Humidity: NIH std 30-70%
Local Exhaust: Bio Safety Cabinet
Air Filtration: HEPA- Filtered Supply
CO2 Sensor: No
Other HVAC: No

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 80-100fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets: 1
Data Outlets: 1
Network
Clocks: Yes
Paging Systems: intercom w/phone
Monitors/Alarms

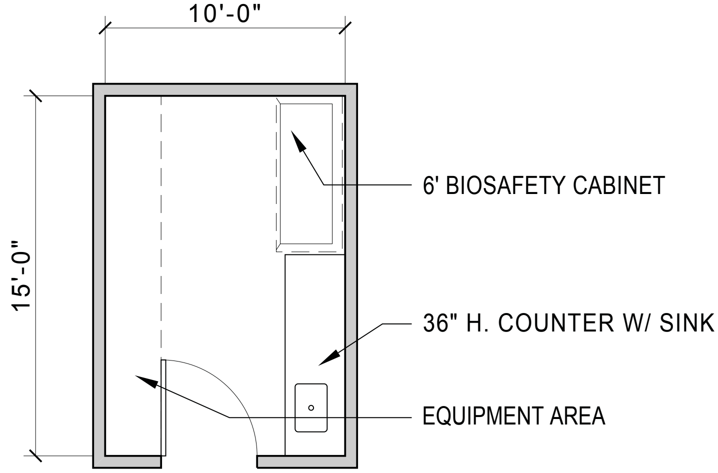
Special Requirements

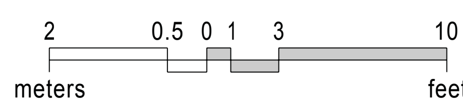
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security: Lockable
Shielding
Other Spec Req

Notes 1. Bio safety cabinet required to be exhausted directly to outdoors

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

2.05.08 - Procedure Room - 150 nasf





2.05.09 Support Lab

Department	Biocontainment	Researcher		# of Occupants	2	
Function				Area	330	NASF
Adjacencies						

Architectural

Floor: Epoxy
Base: Integral
Walls: High Impact Wall Board
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 12'-0"
Door Size: 3'-6" (single leaf)

Casework

Wall Cabinets: Stainless Steel
Base Cabinets: Stainless Steel
Bench Top: Epoxy Resin
Bench Height: 3'-0"
Desktop: None
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: stools
Tables: No
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: RO/DI
Hot / Cold Water: Yes
Floor Drain: No
Hose Bib: No
Waste: Bio-Hazard
Eyewash: Yes
Emerg Shower: Yes

Gases

Air Yes
Lab Gas No
CO2 No
Nitrogen No
Vacuum Yes
Other Gas No

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Lab Standard
Fresh Air Changes Lab Standard
Pressure Negative
Temperature Lab Standard
Relative Humidity Lab Standard
Local Exhaust Elephant Trunk
Air Filtration Lab Standard
CO2 Sensor No
Other HVAC

Electrical

Power: 120v + 208v
Features:
Elec. Outlets: Surf. Mount. Raceway
Illumination: 80-100fc
Fixtures: Fluorescent
Fixture Mounting: Pendant
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: Yes
UPS: Yes

Communications

Phone Outlets 1
Data Outlets 4
Network
Clocks Yes
Paging Systems No
Monitors/Alarms

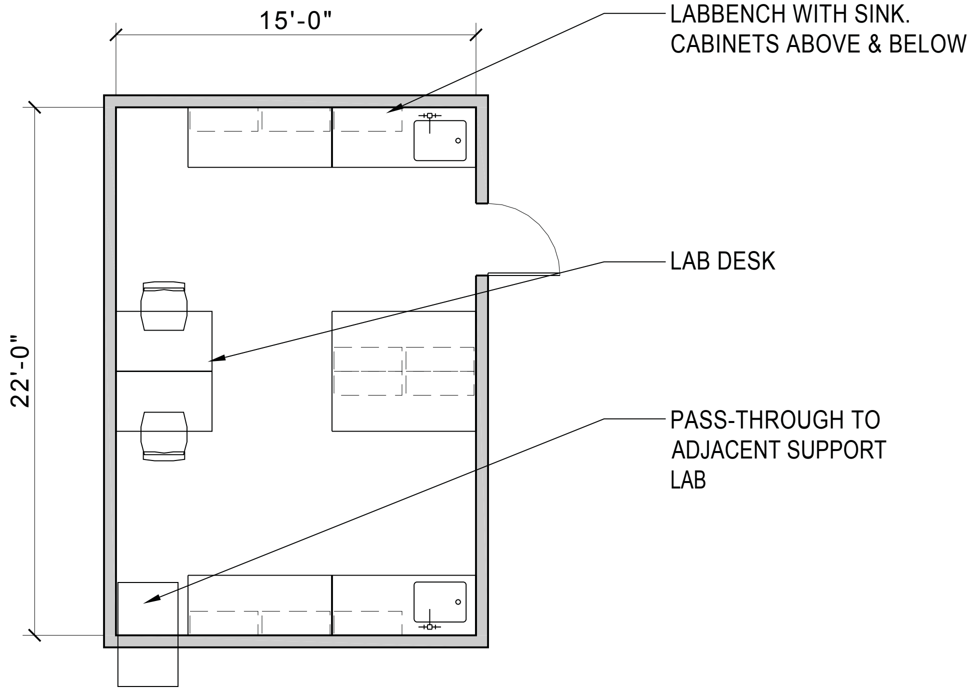
Special Requirements

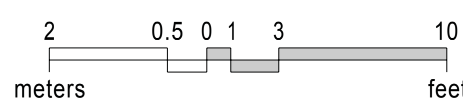
Light Controls
Visual Controls Views Desireable
Acoustic Controls
Structural Controls
Security Keypad Access
Shielding No
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

2.05.09 - Support Lab - 330 nasf





2.05.10 Carcass Disposal/Digester

Department: Biocontainment
Researcher:
# of Occupants:
Function:
Area: 120 NASF
Adjacencies:

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Gypsum Board / Painted
Ceiling Height:	10'-0"
Door Size:	4'-0" (sngl lf) x 8'-0" H

Casework

Wall Cabinets:	Stainless Steel
Base Cabinets:	Stainless Steel
Bench Top:	Epoxy Resin
Bench Height:	3'-0"
Desktop:	None
Shelving:	No
Drawer Units:	Yes

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	Yes
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stainless Steel
Pure Water:	
Hot / Cold Water:	Yes
Floor Drain:	Yes
Hose Bib:	Yes
Waste:	Lab/pH Neutralization
Eyewash:	Yes
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Negative
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	
Other HVAC	

Electrical

Power:	120v + 208v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1 wall phone
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

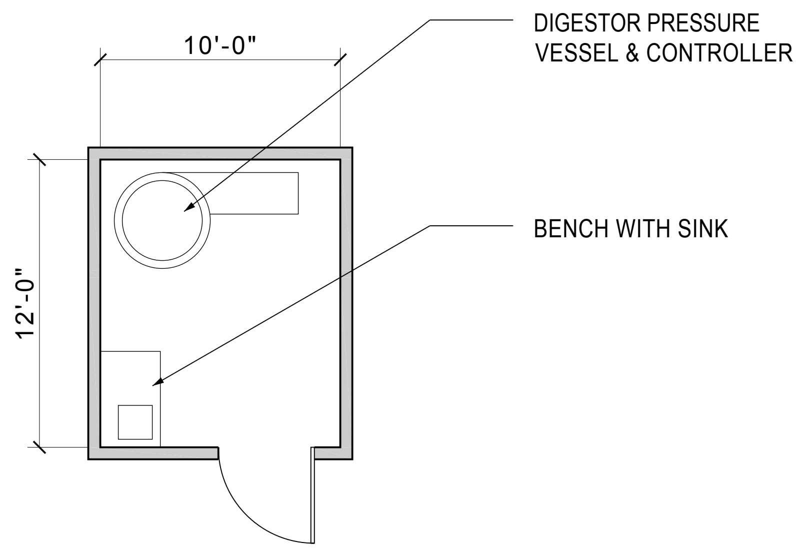
Special Requirements

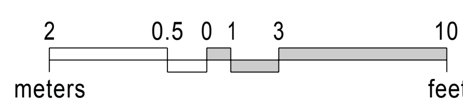
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

2.05.10 - Carcass Disposal Digester - 120 nasf





2.05.11 Supply Storage Room

Department	Biocontainment	Researcher		# of Occupants	
Function				Area	120 NASF
Adjacencies					

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Gypsum Board / Painted
Ceiling Height:	
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	None
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Not Critical
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	30fc
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

- # Phone Outlets
- # Data Outlets
- Network
- Clocks
- Paging Systems
- Monitors/Alarms

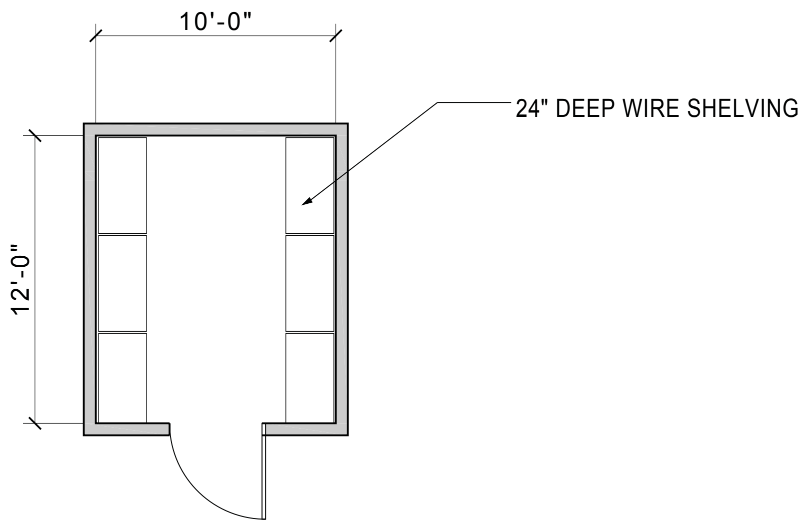
Special Requirements

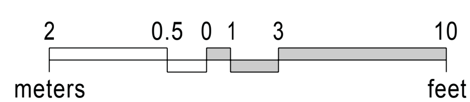
- Light Controls
- Visual Controls
- Acoustic Controls
- Structural Controls
- Security
- Shielding
- Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

2.05.11 - Supply Storage Room - 120 nasf





2.06.01 Supply Room

Department	Biocontainment	Researcher		# of Occupants	
Function				Area	100 NASF
Adjacencies					

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Gypsum Board / Painted
Ceiling Height:	
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	None
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Not Critical
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	30fc
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

Phone Outlets
Data Outlets
Network
Clocks
Paging Systems
Monitors/Alarms

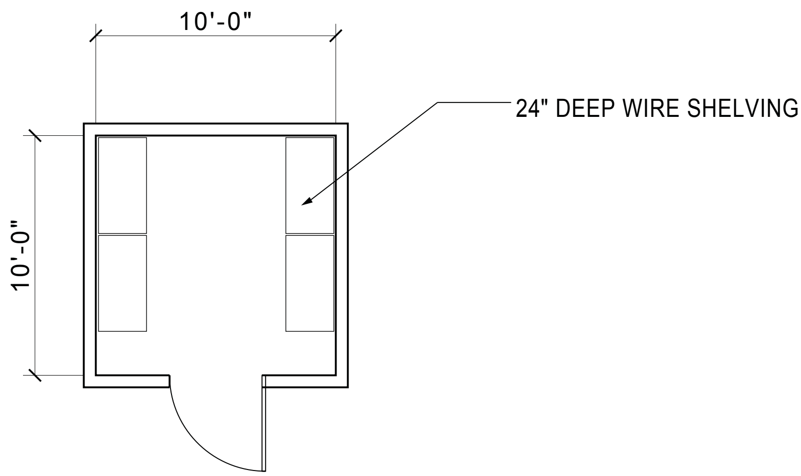
Special Requirements

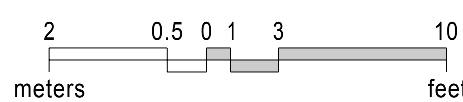
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

2.06.01 - Supply Room - 100 nasf





2.06.02 Janitors Closet

Department	Biocontainment	Researcher		# of Occupants	
Function				Area	25 NASF
Adjacencies					

Architectural

Floor: Epoxy
Base: Integral
Walls: High Impact Wall Board
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height:
Door Size:

Casework

Wall Cabinets: None
Base Cabinets: None
Bench Top: None
Bench Height: None
Desktop: None
Shelving: No
Drawer Units: No

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: No
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Floor sink
Pure Water: None
Hot / Cold Water: No
Floor Drain: No
Hose Bib: Yes
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum No
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Lab Standard
Fresh Air Changes Lab Standard
Pressure Negative
Temperature Lab Standard
Relative Humidity Lab Standard
Local Exhaust
Air Filtration Lab Standard
CO2 Sensor
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 30fc
Fixtures: Gasketed/WP Fluor.
Fixture Mounting: Recessed
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets
Data Outlets
Network
Clocks
Paging Systems
Monitors/Alarms

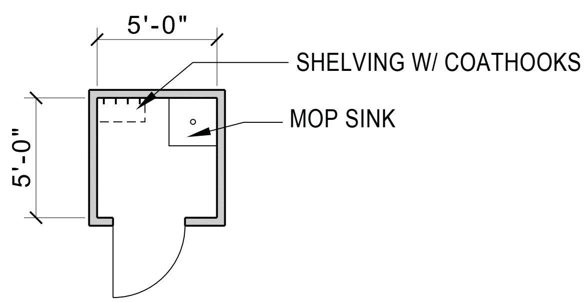
Special Requirements

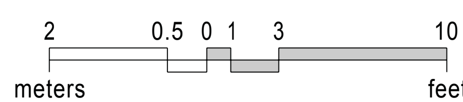
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

2.06.02 - Janitors Closet - 25 nasf





2.06.03 Waste Decon / Holding

Department	Biocontainment	Researcher		# of Occupants	
Function				Area	40 NASF
Adjacencies					

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Gypsum Board / Painted
Ceiling Height:	9'-0"
Door Size:	3'-0"

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stnless Stl- hand wash
Pure Water:	
Hot / Cold Water:	Yes
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	Yes
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Negative
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1 wall phone
# Data Outlets	1
Network	
Clocks	
Paging Systems	
Monitors/Alarms	

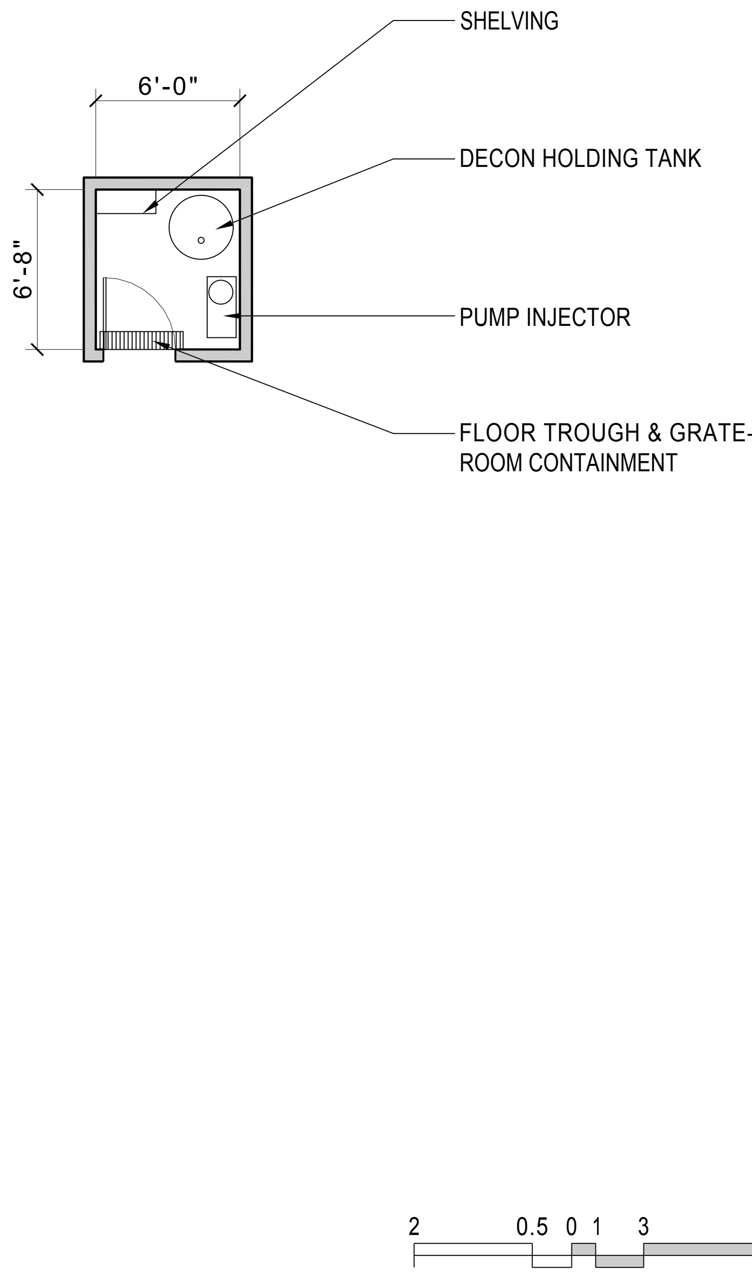
Special Requirements

Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

2.06.03 - Waste Decon / Holding - 40 nasf



3.01.01 Private Office

Department	Vivarium	Researcher	# of Occupants	1	
Function			Area	150	NASF
Adjacencies					

Architectural

Floor:	Carpet
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	8'-0"
Door Size:	3'-0"

Casework

Wall Cabinets:	
Base Cabinets:	
Bench Top:	
Bench Height:	
Desktop:	Wood- Certified
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	Yes
Proj. Screen:	No
Desks:	Yes
Chairs:	Yes
Tables:	Yes
Files:	Yes
White Boards:	Yes
Tack Boards:	Yes
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	NA
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	NA
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	None
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	Office Standard
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	Yes
Dimming Sensors:	Yes
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

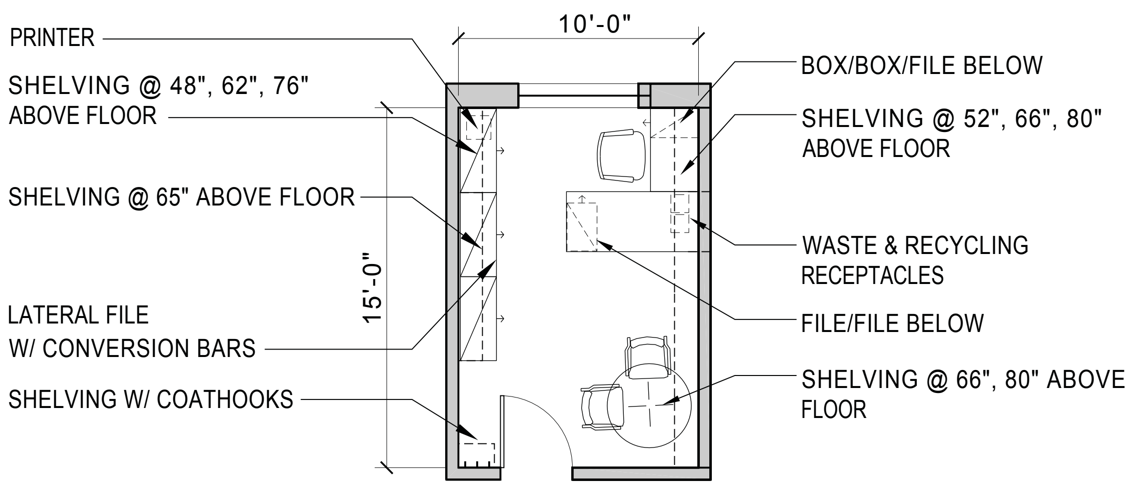
Special Requirements

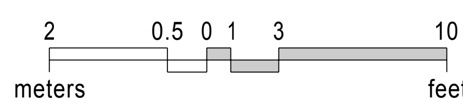
Light Controls	Requires Natural Light
Visual Controls	Visual Privacy Req.
Acoustic Controls	
Structural Controls	
Security	Lockable
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.01.01 - Private Office - 150 nasf





3.01.04 Admin Space

Department	Vivarium	Researcher		# of Occupants	
Function				Area	75 NASF
Adjacencies					

Architectural

Floor: Carpet
Base: Rubber
Walls: NA
Wall Finish: NA
Ceiling: NA
Ceiling Height: NA
Door Size: NA

Casework

Wall Cabinets:
Base Cabinets:
Bench Top:
Bench Height:
Desktop: Plastic Laminate
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: Yes
Chairs: Yes
Tables: No
Files: Yes
White Boards: No
Tack Boards: Yes
Other Furn.:

Plumbing

Sinks: None
Pure Water:
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Office Standard
Fresh Air Changes Office Standard
Pressure Not Critical
Temperature Office Standard
Relative Humidity Office Standard
Local Exhaust
Air Filtration
CO2 Sensor No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Surf. Mount. Raceway
Illumination: 50fc
Fixtures: Fluorescent
Fixture Mounting: Pendant
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets 1
Data Outlets 1
Network
Clocks No
Paging Systems No
Monitors/Alarms

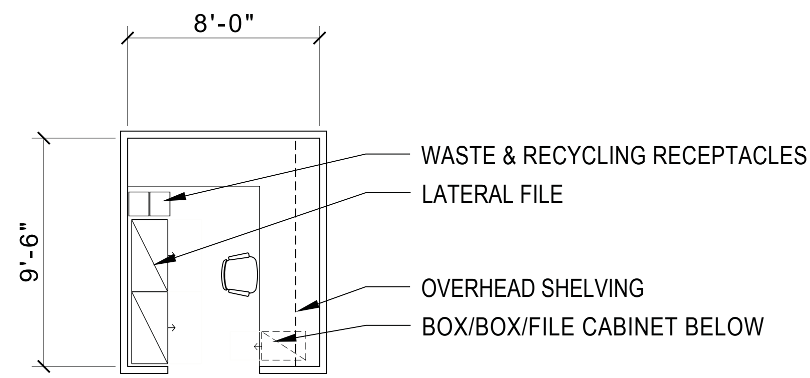
Special Requirements

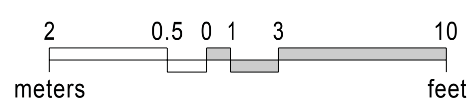
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.01.04 - Admin Space - 75 nasf





3.01.05 Reception

Department	Vivarium	Researcher		# of Occupants	
Function				Area	150 NASF
Adjacencies					

Architectural

Floor:	Carpet
Base:	Rubber
Walls:	NA
Wall Finish:	NA
Ceiling:	NA
Ceiling Height:	NA
Door Size:	NA

Casework

Wall Cabinets:	
Base Cabinets:	
Bench Top:	
Bench Height:	
Desktop:	Plastic Laminate
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	Yes
Chairs:	Yes
Tables:	No
Files:	Yes
White Boards:	No
Tack Boards:	Yes
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Surf. Mount. Raceway
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

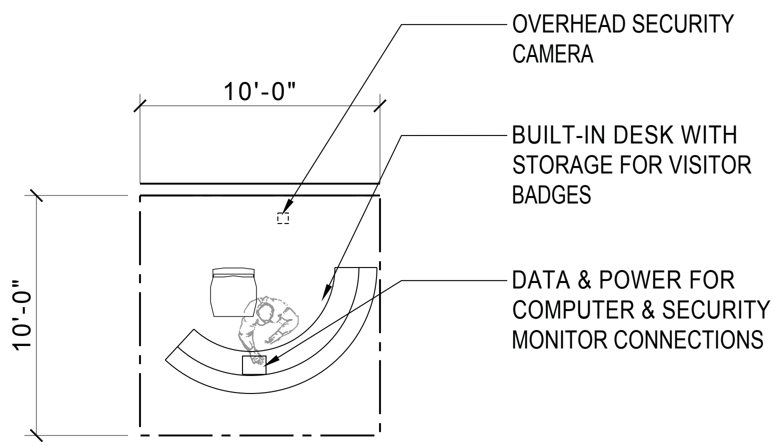
Special Requirements

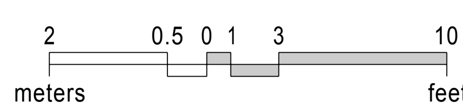
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.01.05 Reception





3.01.06 ~~10 P Meeting Room~~ SPACE DELETED

Department	Vivarium	Researcher		# of Occupants	12	
Function				Area	0	NASF
Adjacencies						

Architectural

Floor:	Carpet- Low VOC
Base:	Carpet
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	3'-0"

Casework

Wall Cabinets:	None
Base Cabinets:	Wood- Certified
Bench Top:	Wood- Certified
Bench Height:	2'-10"
Desktop:	Wood- Certified
Shelving:	Yes
Drawer Units:	No

Furnishings

Window Treat:	Yes
Proj. Screen:	Yes
Desks:	No
Chairs:	Yes
Tables:	Yes
Files:	No
White Boards:	Yes
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	No
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	No

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	80-100fc
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

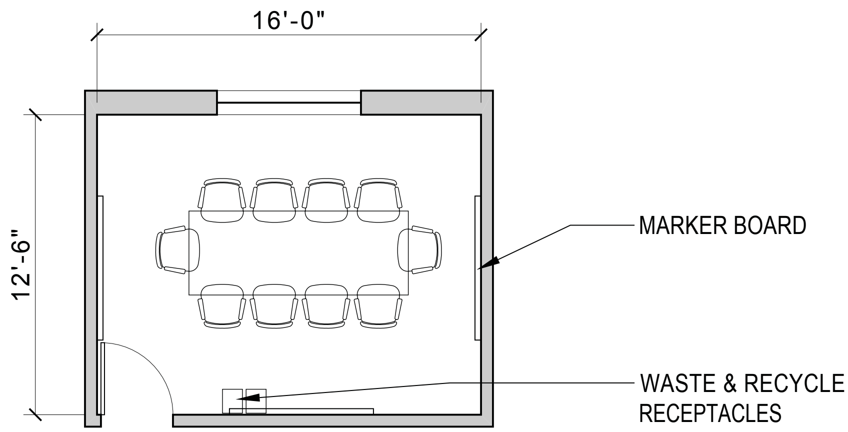
Special Requirements

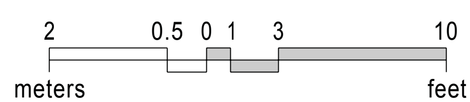
Light Controls	Natural light desireable
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Lockable
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.01.06 - Meeting Room - 200 nasf





3.05.01 Breeding Rooms

Department	Vivarium	Researcher		# of Occupants	
Function				Area	220 NASF
Adjacencies					

Architectural

Floor: Epoxy
Base: Rubber
Walls: High Impact Wall Board
Wall Finish: Paint- Low VOC
Ceiling: Gypsum Board / Painted
Ceiling Height: 9'-6"
Door Size: 4'-0" x 8'-0" w/window

Casework

Wall Cabinets: No
Base Cabinets: No
Bench Top: No
Bench Height: NA
Desktop: No
Shelving: No
Drawer Units: No

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: No
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stnls Stl Custodial Sink
Pure Water: RO
Hot / Cold Water: Yes
Floor Drain: Yes
Hose Bib: Yes
Waste: Lab/pH Neutralization
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum
Other Gas

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: Lab Standard
Fresh Air Changes: Lab Standard
Pressure: Positive
Temperature: Lab Standard
Relative Humidity: Lab Standard
Local Exhaust
Air Filtration: Lab Standard
CO2 Sensor: No
Other HVAC: env. controls & monitors

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 50fc, variable
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: Yes- for lighting
UPS: No

Communications

Phone Outlets: 1
Data Outlets: 1
Network
Clocks: No
Paging Systems: No
Monitors/Alarms: sep fire alrm fr non-viv

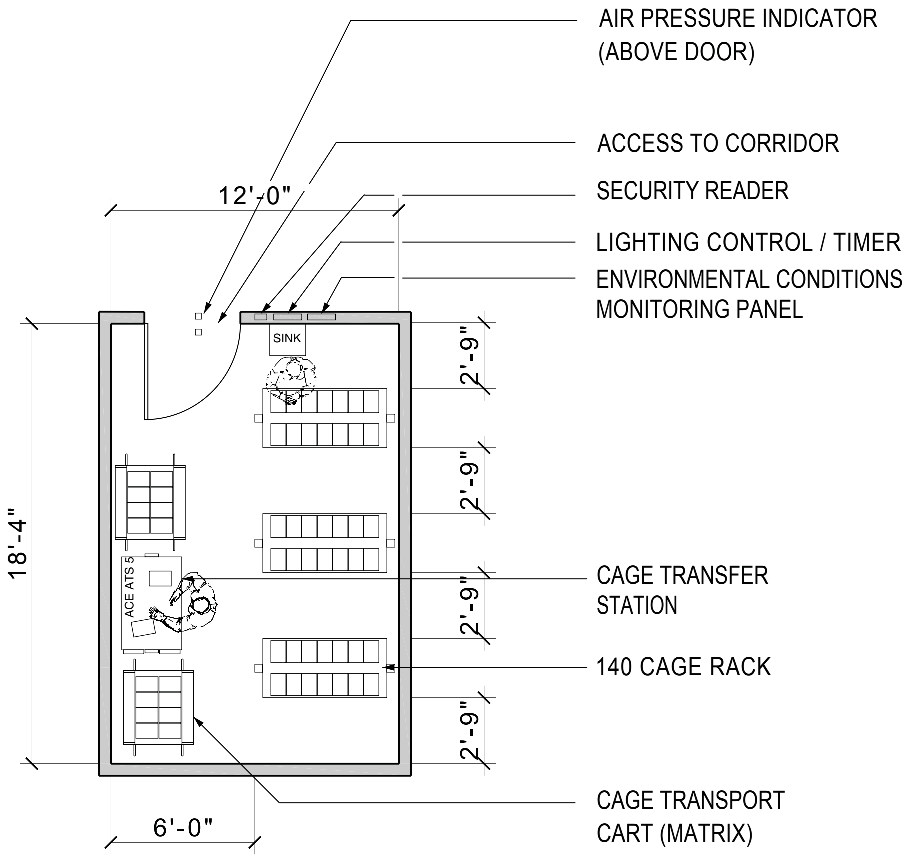
Special Requirements

Light Controls: timer operated lights
Visual Controls
Acoustic Controls
Structural Controls
Security: Keypad Access
Shielding
Other Spec Req

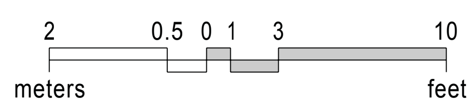
Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.05.01 -Breeding Room - 220 nasf



VENTILATED RODENT RACK LAYOUT
420 CAGES



3.05.02 Small Holding Room

Department	Vivarium	Researcher		# of Occupants	
Function				Area	165 NASF
Adjacencies					

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Gypsum Board / Painted
Ceiling Height:	9'-6"
Door Size:	4'-0" x 8'-0" w/window

Casework

Wall Cabinets:	No
Base Cabinets:	No
Bench Top:	No
Bench Height:	No
Desktop:	NA
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stnls Stl Custodial Sink
Pure Water:	RO
Hot / Cold Water:	Yes
Floor Drain:	Yes w/cover
Hose Bib:	Yes
Waste:	Lab/pH Neutralization
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	No

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Vivarium Standard
Fresh Air Changes	Vivarium Standard
Pressure	Positive
Temperature	NIH std 61-84°F +/-2°
Relative Humidity	NIH std 30-70%
Local Exhaust	vent ports for cage racks
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	WP Wall Receptacle
Illumination:	Per species + maint. lvl.
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	Yes- for lighting
UPS:	No

Communications

# Phone Outlets	0
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	Humidity/Temp.

Special Requirements

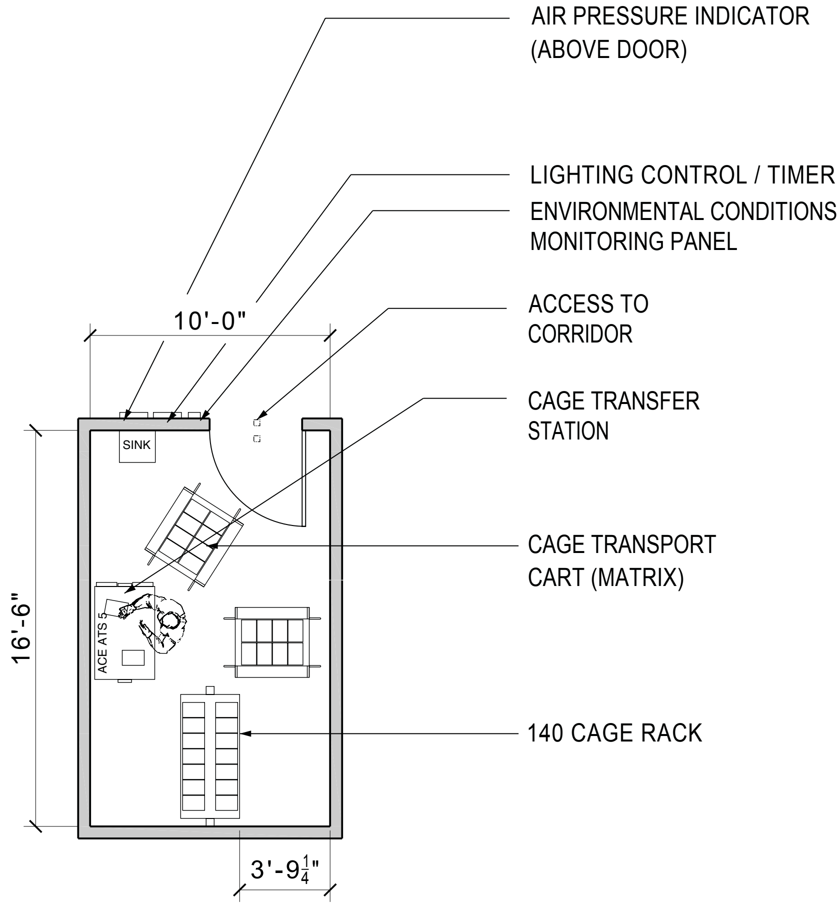
Light Controls	24-hour light control[1,2]
Visual Controls	Visual Privacy Req.
Acoustic Controls	Noise Sensitivity
Structural Controls	
Security	Keypad Access
Shielding	
Other Spec Req	see notes

Notes

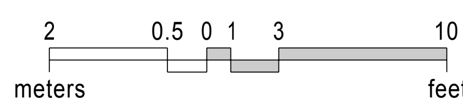
1. Individual room environmental control & monitoring
2. Individual room light timer controls & variable light levels required
3. Separate fire alarm system from non vivarium spaces

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.05.02 - Small Holding Room - 165 nasf



VENTILATED RODENT RACK LAYOUT
140 CAGES



3.05.03 Medium Holding Room

Department	Vivarium	Researcher		# of Occupants	
Function				Area	220 NASF
Adjacencies					

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Gypsum Board / Painted
Ceiling Height:	9'-6"
Door Size:	4'-0" x 8'-0" w/window

Casework

Wall Cabinets:	No
Base Cabinets:	No
Bench Top:	No
Bench Height:	No
Desktop:	NA
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stnls Stl Custodial Sink
Pure Water:	RO
Hot / Cold Water:	Yes
Floor Drain:	Yes- Trench w/cover
Hose Bib:	Yes- w/washdown sta.
Waste:	Lab/pH Neutralization
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	No

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	12-15/hr
Fresh Air Changes	12-15/hr
Pressure	Positive
Temperature	NIH std 61-84°F +/-2°
Relative Humidity	NIH std 30-70%
Local Exhaust	vent ports for cage racks
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	WP Wall Receptacle
Illumination:	Per species + maint. lvl.
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	Yes- for lighting
UPS:	No

Communications

# Phone Outlets	0
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	Humidity/Temp.

Special Requirements

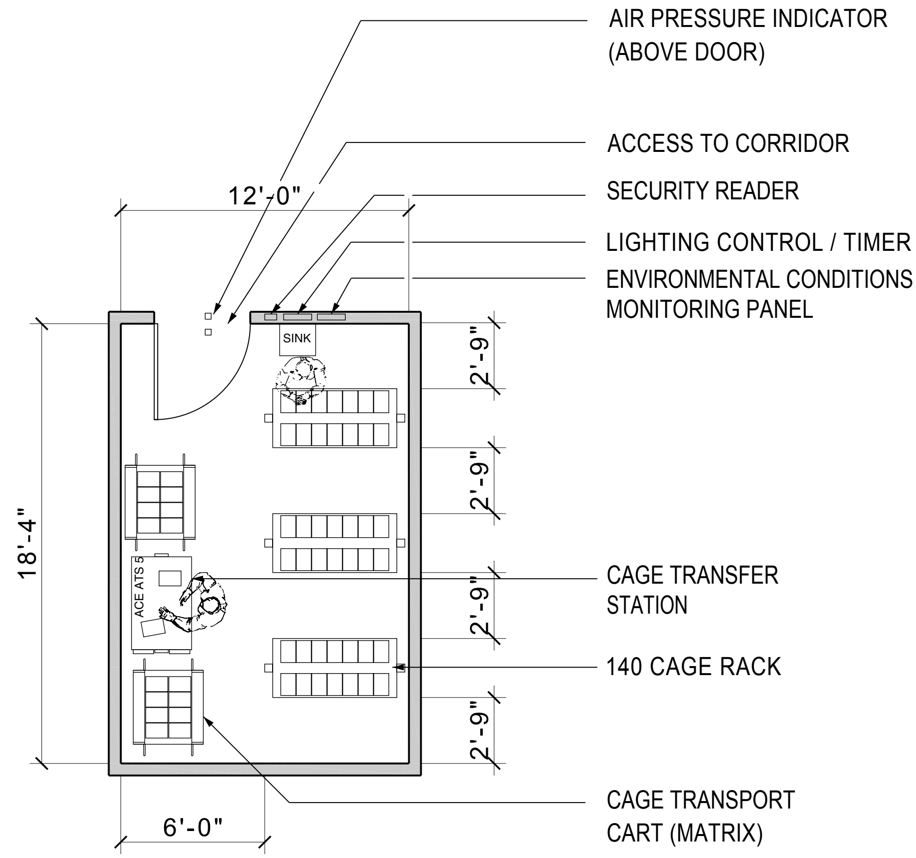
Light Controls	Avoid Natural Light
Visual Controls	Visual Privacy Req.
Acoustic Controls	Noise Sensitivity
Structural Controls	
Security	Keypad Access
Shielding	
Other Spec Req	see notes

Notes

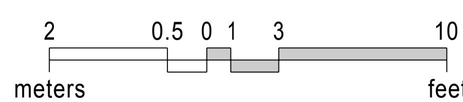
1. Individual room environmental control & monitoring
2. Individual room light timer controls & variable light levels required
3. Separate fire alarm system from non vivarium spaces

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.05.03 - Medium Holding Room - 220 nasf



VENTILATED RODENT RACK LAYOUT
420 CAGES



3.05.04 Large Holding Room

Department	Vivarium	Researcher		# of Occupants	
Function				Area	330 NASF
Adjacencies					

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Gypsum Board / Painted
Ceiling Height:	9'-6"
Door Size:	4'-0" x 8'-0" w/window

Casework

Wall Cabinets:	No
Base Cabinets:	No
Bench Top:	No
Bench Height:	No
Desktop:	NA
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	Yes
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stnls Stl Custodial Sink
Pure Water:	RO
Hot / Cold Water:	Yes
Floor Drain:	Yes- Trench w/cover
Hose Bib:	Yes- w/washdown sta.
Waste:	Lab/pH Neutralization
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	No

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Positive
Temperature	NIH std 61-84°F +/-2°
Relative Humidity	NIH std 30-70%
Local Exhaust	vent ports for cage racks
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	WP Wall Receptacle
Illumination:	Per species + maint. lvl.
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	Yes- for lighting
UPS:	No

Communications

# Phone Outlets	0
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	Humidity/Temp.

Special Requirements

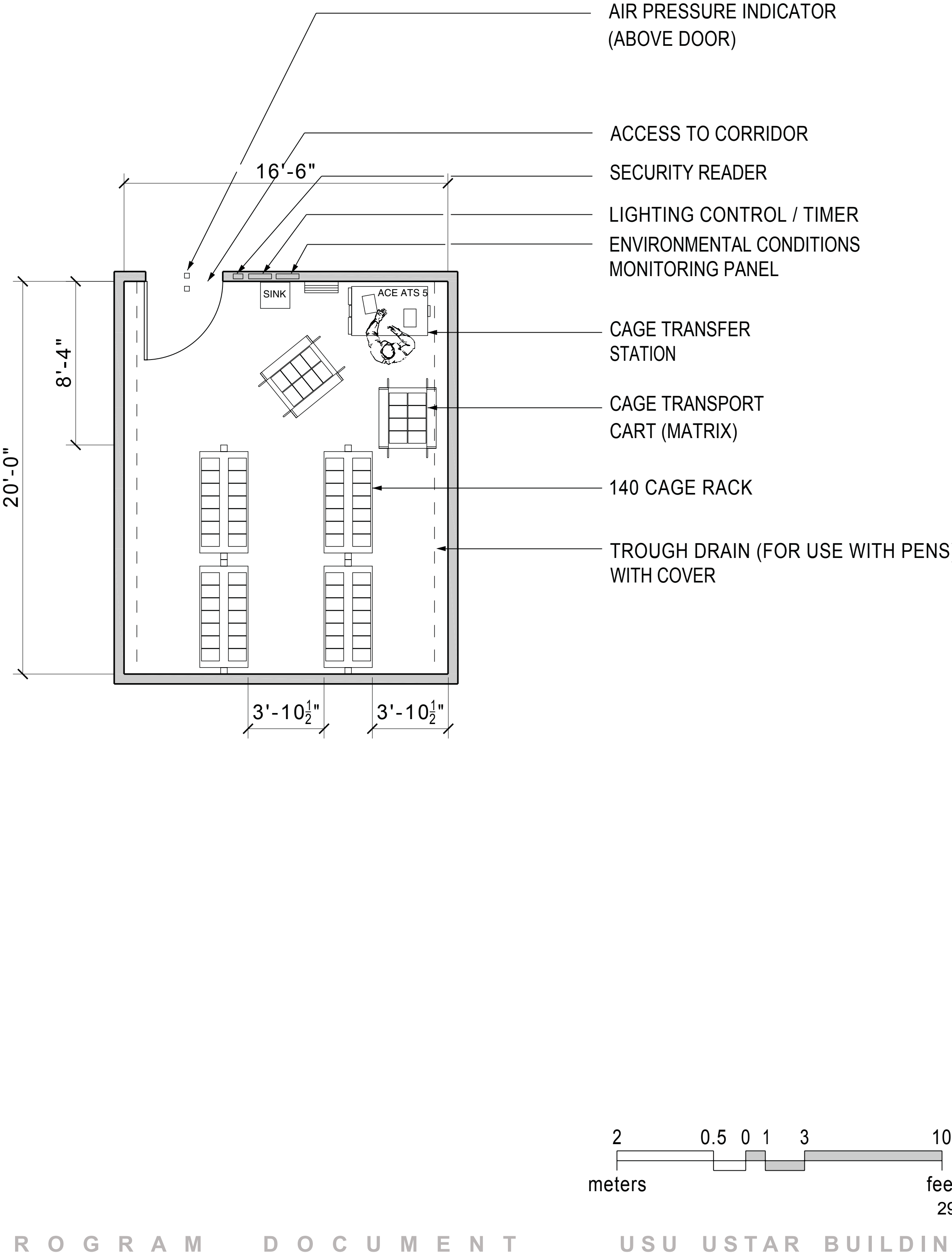
Light Controls	24 light control[1,2]
Visual Controls	Visual Privacy Req.
Acoustic Controls	Noise Sensitivity
Structural Controls	
Security	Keypad Access
Shielding	
Other Spec Req	see notes

Notes

1. Individual room environmental control & monitoring
2. Individual room light timer controls & variable light levels required
3. Separate fire alarm system from non vivarium spaces

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.05.04 - Large Holding Room - 230 nasf



3.06.01 Behavior Testing Room

Department	Vivarium	Researcher		# of Occupants	
Function				Area	165 NASF
Adjacencies					

Architectural

Floor:	Epoxy
Base:	Rubber
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Gypsum Board / Painted
Ceiling Height:	9'-6"
Door Size:	4'-0" x 8'-0" w/window

Casework

Wall Cabinets:	No
Base Cabinets:	No
Bench Top:	No
Bench Height:	NA
Desktop:	No
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stnls Stl Custodial Sink
Pure Water:	RO
Hot / Cold Water:	Yes
Floor Drain:	Yes w/cover
Hose Bib:	Yes
Waste:	Lab/pH Neutralization
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	Yes
Other Gas	Medical Gases?

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	12-15/hr
Fresh Air Changes	12-15/hr
Pressure	Negative
Temperature	NIH std 55-90°F +/-2°
Relative Humidity	NIH std 30-70%
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	env. control & monitor

Electrical

Power:	120v
Features:	
Elec. Outlets:	WP Wall Receptacle[1]
Illumination:	80-100fc, variable
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	

Communications

# Phone Outlets	0
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	sep fire alrm fr non-viv

Special Requirements

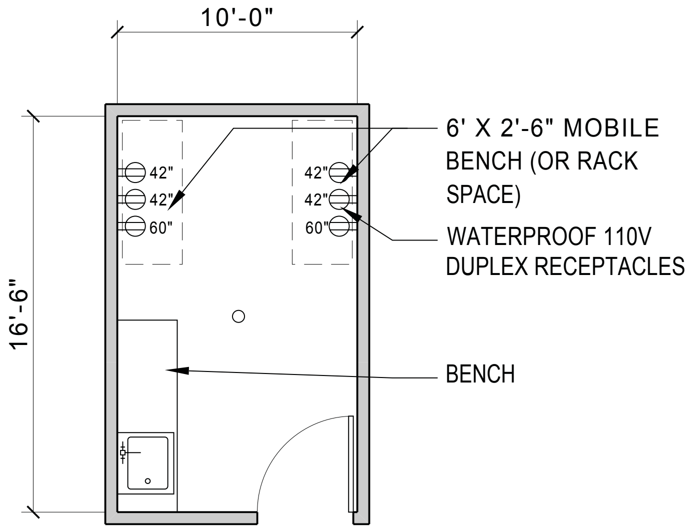
Light Controls	yes- see notes
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Keypad Access
Shielding	
Other Spec Req	

Notes

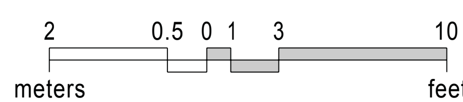
1. All outlets & fixtures sealed and waterproofed.
2. Individual room environmental control & monitoring
3. Individual room light timer controls & variable light levels required

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.01 - Behavior Testing Room - 165 nasf



140 CAGE CAPACITY



3.06.02 Surgery- Large Animal OR

Department	Vivarium	Researcher		# of Occupants	6
Function				Area	250 NASF
Adjacencies					

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Gypsum Board / Painted
Ceiling Height:	9'-6"
Door Size:	4'-0" x 8'-0" w/window

Casework

Wall Cabinets:	Stainless Steel
Base Cabinets:	Stainless Steel
Bench Top:	Stainless Steel
Bench Height:	3'-0"
Desktop:	
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	Yes
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	Lab/pH Neutralization
Eyewash:	No
Emerg Shower:	No

Gases

Air	Yes
Lab Gas	Yes
CO2	Yes
Nitrogen	Yes
Vacuum	Yes
Other Gas	Medical Oxygen, V, A

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	15/hour
Fresh Air Changes	15/hour
Pressure	Positive
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	Anaesthesia scavenging
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v + 208v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	80-100fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	Yes-Operating Lamp
Em. Power:	Yes
UPS:	

Communications

# Phone Outlets	0
# Data Outlets	
Network	
Clocks	
Paging Systems	
Monitors/Alarms	

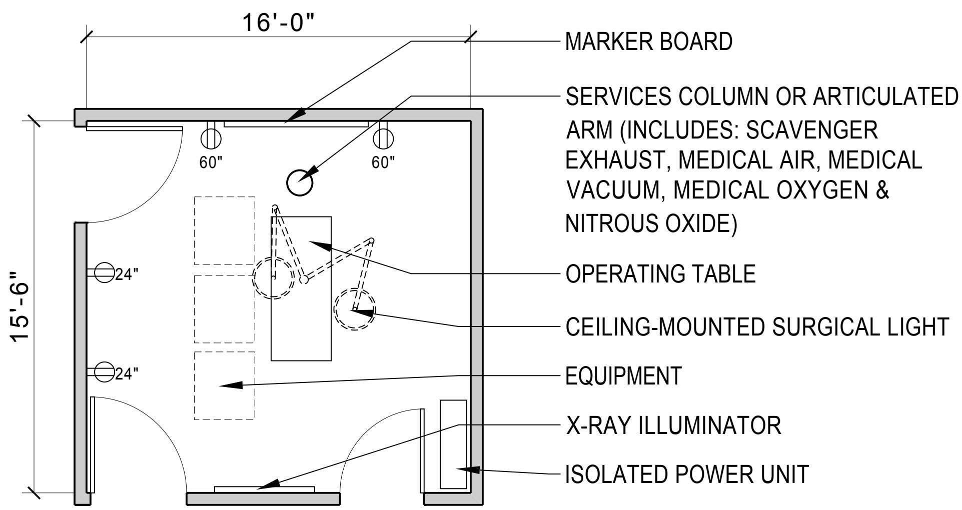
Special Requirements

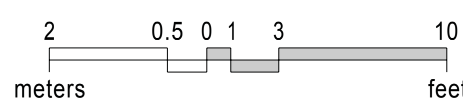
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.02 - Surgery - Large Animal OR - 250 nasf





3.06.03 Surgery- Small Animal OR

Department	Vivarium	Researcher		# of Occupants	
Function				Area	150 NASF
Adjacencies					

Architectural

Floor: Epoxy
Base: Integral
Walls: Gypsum Wall Board
Wall Finish: Specialty Epoxy Paint
Ceiling: Accoustic Ceiling Tile
Ceiling Height: 9'-6"
Door Size: 4'-0" x 8'-0" w/window

Casework

Wall Cabinets: Stainless Steel
Base Cabinets: Stainless Steel
Bench Top: Stainless Steel
Bench Height: 3'-0"
Desktop:
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.:

Plumbing

Sinks: None
Pure Water:
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste: Lab/pH Neutralization
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum: Yes
Other Gas: Medical Oxygen, V, A

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: 15/hour
Fresh Air Changes: 15/hour
Pressure: Positive
Temperature: Lab Standard
Relative Humidity: Lab Standard
Local Exhaust: Anaesthesia scavenging
Air Filtration: Lab Standard
CO2 Sensor: No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 80-100fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets: 0
Data Outlets: 1
Network
Clocks: No
Paging Systems: Intercom w/phone
Monitors/Alarms

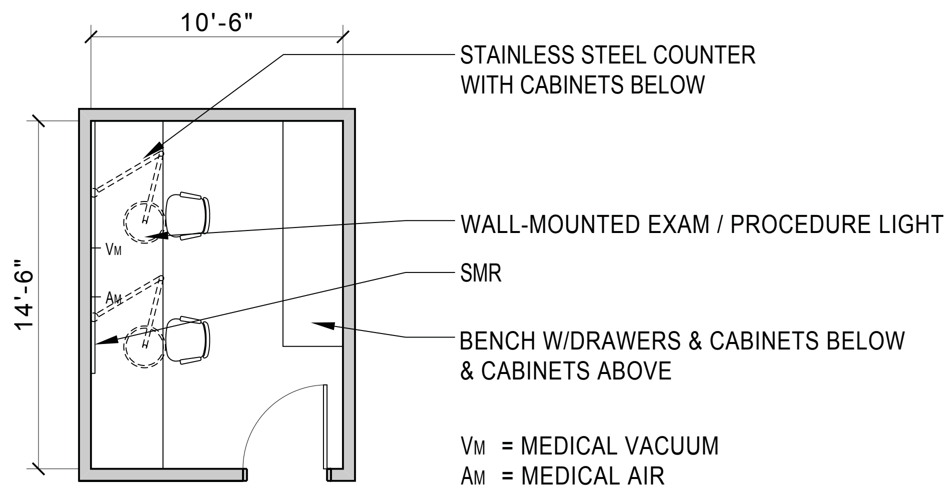
Special Requirements

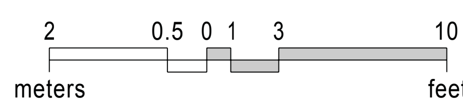
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

3.06.03 - Surgery - Small Animal OR - 150 nasf





3.06.04 Surgery- Pre Op Room

Department	Vivarium	Researcher		# of Occupants	2	
Function				Area	120	NASF
Adjacencies						

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	Gypsum Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Gypsum Board / Painted
Ceiling Height:	9'-6"
Door Size:	4'-0" x 8'-0" w/window

Casework

Wall Cabinets:	None
Base Cabinets:	Stainless Steel
Bench Top:	Stainless Steel
Bench Height:	3'-0"
Desktop:	Stainless Steel
Shelving:	Yes
Drawer Units:	No

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	Exam Table
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stainless Steel
Pure Water:	RO
Hot / Cold Water:	Yes
Floor Drain:	No
Hose Bib:	No
Waste:	Lab/pH Neutralization
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	Yes
Other Gas	Medical Oxygen, V, A

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	4-6/hour
Fresh Air Changes	(see total A.C.)
Pressure	Positive
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	Anaes. gas scavenging
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	80-100fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed, Sealed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	Exam light
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	0
Network	
Clocks	No
Paging Systems	Intercom w/phone
Monitors/Alarms	

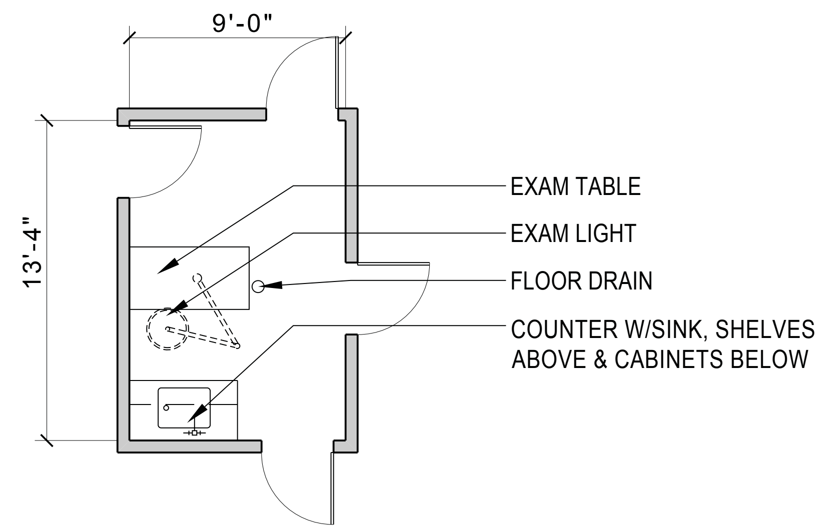
Special Requirements

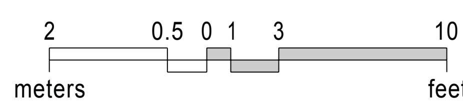
Light Controls	
Visual Controls	Visual Privacy Req.
Acoustic Controls	
Structural Controls	
Security	
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.04 - Surgery - Pre Op Room - 120 nasf





3.06.05 Surgery- Post Op/Recovery Room

Department	Vivarium	Researcher		# of Occupants	2
Function				Area	120 NASF
Adjacencies					

Architectural

Floor: Epoxy
Base: Integral
Walls: High Impact Wall Board
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 9'-6"
Door Size: 4'-0" x 8'-0" w/window

Casework

Wall Cabinets: None
Base Cabinets: Stainless Steel
Bench Top: Stainless Steel
Bench Height: 3'-0"
Desktop: No
Shelving: No
Drawer Units: No

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: RO
Hot / Cold Water: Yes
Floor Drain: Yes
Hose Bib: No
Waste: Lab/pH Neutralization
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum:
Other Gas: Medical Oxygen, V, A

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: 4-6/hour
Fresh Air Changes: (see total A.C.)
Pressure: Positive
Temperature: Lab Standard
Relative Humidity: Lab Standard
Local Exhaust: Anaesthesia evac.
Air Filtration: Lab Standard
CO2 Sensor: No
Other HVAC:

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 80-100fc
Fixtures: Fluorescent
Fixture Mounting: Recessed, Sealed
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets: 1
Data Outlets: 2
Network:
Clocks: No
Paging Systems: Intercom w/phone
Monitors/Alarms:

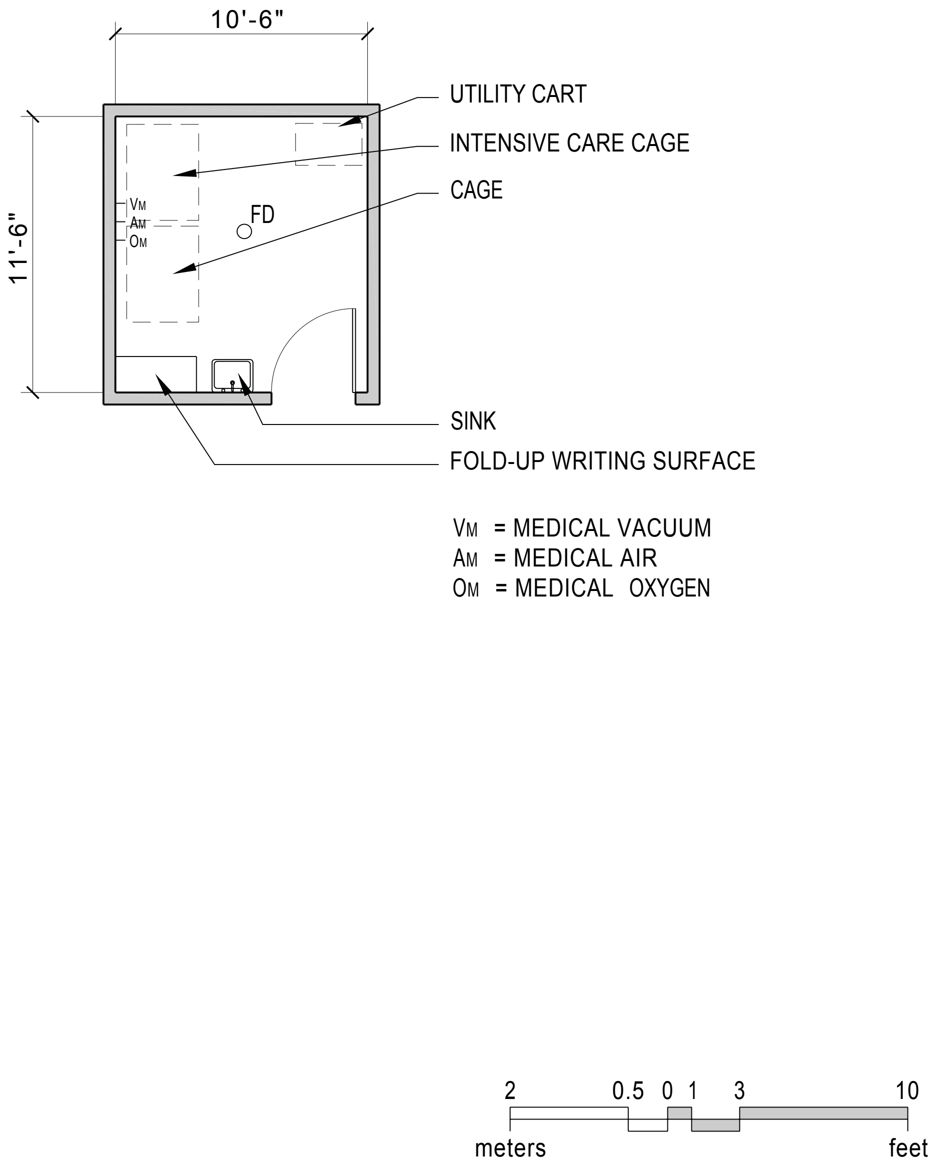
Special Requirements

Light Controls:
Visual Controls: Visual Privacy Req.
Acoustic Controls:
Structural Controls:
Security:
Shielding:
Other Spec Req:

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

3.06.05 - Surgery - Post Op Room - 120 nasf



3.06.06 Surgery- Scrub & Gown Room

Department	Vivarium	Researcher	# of Occupants	2	
Function			Area	95	NASF
Adjacencies					

Architectural

Floor: Epoxy
Base: Integral
Walls: Gypsum Wall Board
Wall Finish: Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 9'-6"
Door Size: 3'-0"

Casework

Wall Cabinets:
Base Cabinets: Stainless Steel
Bench Top: Stainless Steel
Bench Height: 3'-0"
Desktop:
Shelving: Yes
Drawer Units: No

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.: coat hooks

Plumbing

Sinks: Stainless Steel[1]
Pure Water: RO
Hot / Cold Water: Yes
Floor Drain: No
Hose Bib: No
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum:
Other Gas:

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: 4, min
Fresh Air Changes: 4, min
Pressure: Positive
Temperature: Lab Standard
Relative Humidity: Lab Standard
Local Exhaust: None
Air Filtration:
CO2 Sensor: No
Other HVAC:

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 50fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets: 0
Data Outlets: 0
Network:
Clocks: Yes
Paging Systems:
Monitors/Alarms:

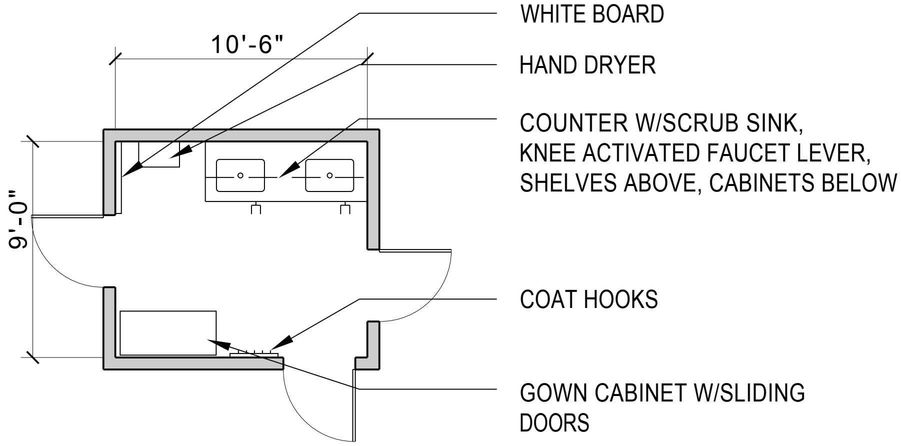
Special Requirements

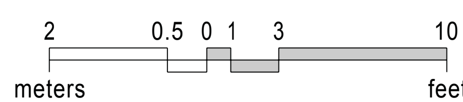
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes 1. Knee or elbow activated water.

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				
Storage Cabinet		1	48	22	84							
Hand Dryer		1					120	20				

3.06.06 - Surgery - Scrub & Gown Room - 95 nasf





3.06.07 Surgery- Prep Lab & Supply

Department	Vivarium	Researcher		# of Occupants		
Function				Area	145	NASF
Adjacencies						

Architectural

Floor: Epoxy
Base: Integral
Walls: High Impact Wall Board
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 9'-6"
Door Size: 4'-0" x 8'-0" w/window

Casework

Wall Cabinets: Stainless Steel
Base Cabinets: Stainless Steel
Bench Top: Stainless Steel
Bench Height: 3'-0"
Desktop:
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: RO
Hot / Cold Water: Yes
Floor Drain: No
Hose Bib: No
Waste: Lab/pH Neutralization
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum
Other Gas

Fire Protection

FP System Dry System
FP Detection Rate of Rise

HVAC

Total Air Changes Lab Standard
Fresh Air Changes Lab Standard
Pressure Positive
Temperature Lab Standard
Relative Humidity Lab Standard
Local Exhaust
Air Filtration Lab Standard
CO2 Sensor No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 80-100fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets 1
Data Outlets 1
Network
Clocks No
Paging Systems No
Monitors/Alarms

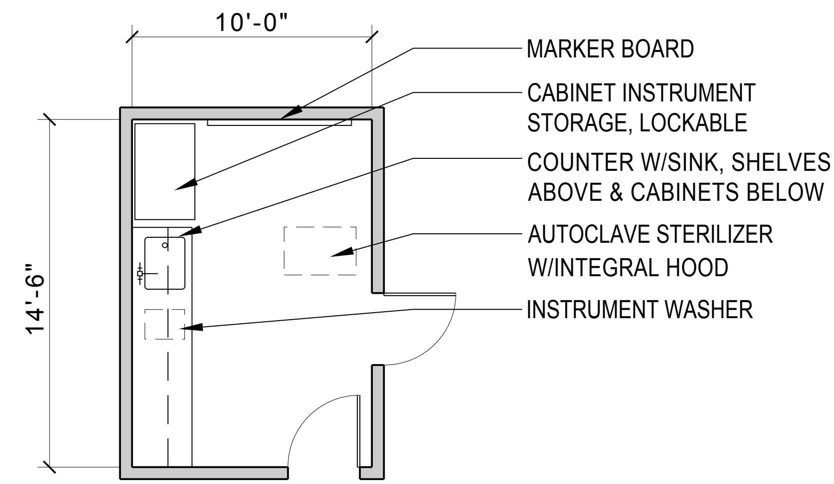
Special Requirements

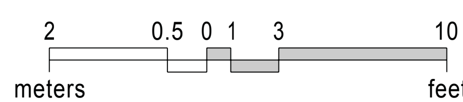
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				
Refrigerator		1					120					

3.06.07 - Surgery - Prep Lab & Supply - 145 nasf





3.06.08 Animal Receiving/Examination

Department	Vivarium	Researcher		# of Occupants	
Function				Area	150 NASF
Adjacencies					

Architectural

Floor: Epoxy
Base: Integral
Walls: High Impact Wall Board
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 9'-6"
Door Size: 4'-0" (sngl lf) x 8'-0" H

Casework

Wall Cabinets: Stainless Steel
Base Cabinets: Stainless Steel
Bench Top: Stainless Steel
Bench Height: 3'-0"
Desktop: Stainless Steel
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: Yes - Exam Table
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: RO
Hot / Cold Water: Yes
Floor Drain: Yes- w/cover
Hose Bib: No
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: Yes
Nitrogen: No
Vacuum
Other Gas

Fire Protection

FP System: Dry System
FP Detection: Rate of Rise

HVAC

Total Air Changes: 12-15/hr
Fresh Air Changes: 12-15/hr
Pressure: Negative
Temperature: NIH std 55-90°F +/- 2°
Relative Humidity: NIH std 30-70%
Local Exhaust
Air Filtration: Lab Standard
CO2 Sensor: No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 80-100fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: Yes-Exam Light
Em. Power: No
UPS: No

Communications

Phone Outlets: 1
Data Outlets: 1
Network
Clocks: No
Paging Systems: No
Monitors/Alarms

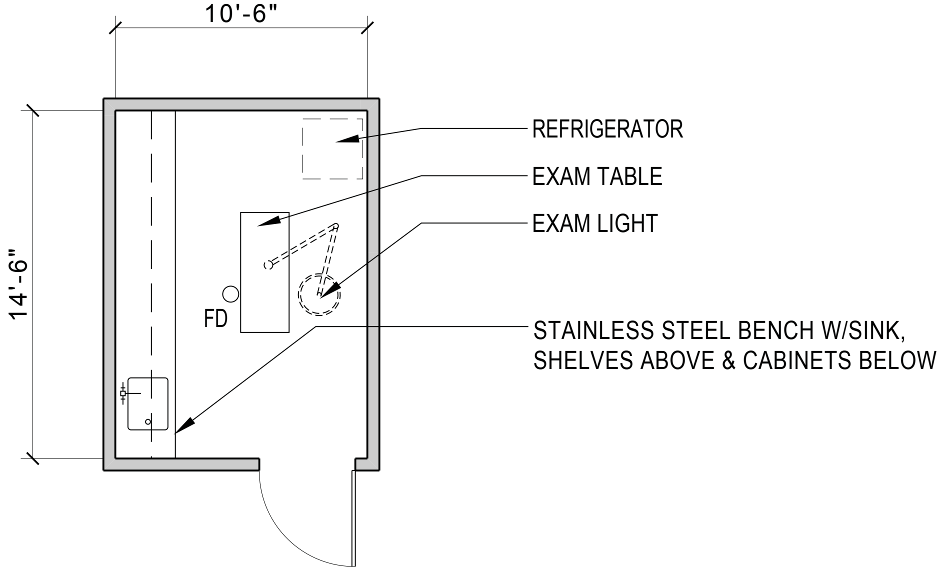
Special Requirements

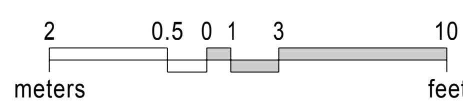
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes
Refrigerator		1					120					

3.06.08 - Animal Receiving / Examination - 150 nasf





3.06.09 Quarantine Room

Department	Vivarium	Researcher		# of Occupants	
Function				Area	230 NASF
Adjacencies					

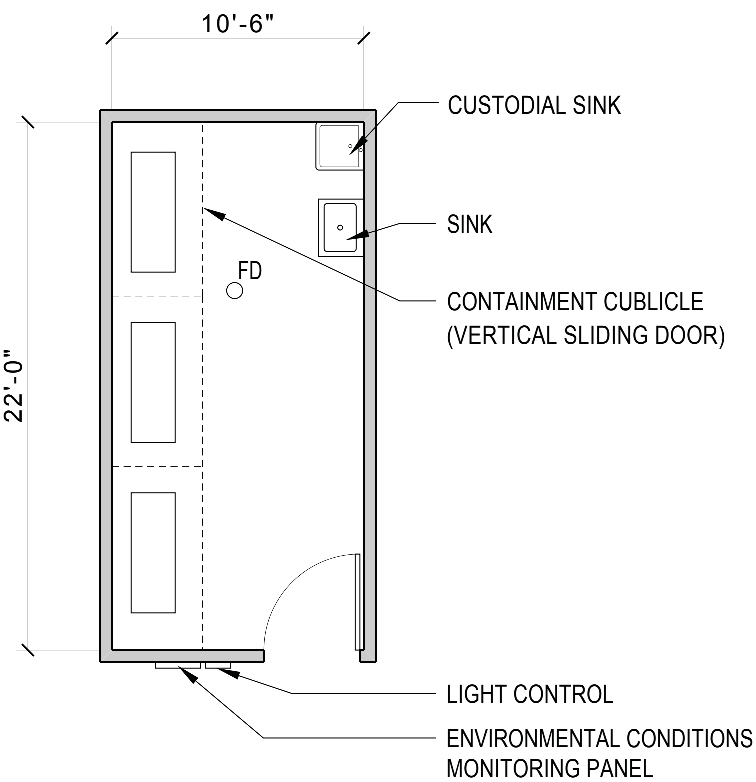
Architectural		***Plumbing***		***Electrical***	
Floor:	Epoxy	Sinks:	Stainless Steel	Power:	120v
Base:	Integral	Pure Water:	RO	Features:	
Walls:	Gypsum Wall Board	Hot / Cold Water:	Yes	Elec. Outlets:	Wall Receptacle
Wall Finish:	Paint- Low VOC	Floor Drain:	Yes	Illumination:	50fc, variable
Ceiling:	Gypsum Board / Painted	Hose Bib:	Yes	Fixtures:	Gasketed/WP Fluor.
Ceiling Height:	9'-6"	Waste:		Fixture Mounting:	Recessed
Door Size:	4'-0" x 8'-0" w/window	Eyewash:	No	Occupancy Sensors:	Yes
		Emerg Shower:	No	Dimming Sensors:	No
		Gases		Switching:	Yes
		Air	No	Task Light:	No
Casework		Lab Gas	No	Em. Power:	No
Wall Cabinets:		CO2	No	UPS:	No
Base Cabinets:		Nitrogen	No	***Communications***	
Bench Top:		Vacuum		# Phone Outlets	1 wall phone jack
Bench Height:		Other Gas		# Data Outlets	0
Desktop:		***Fire Protection***		Network	
Shelving:	No	FP System	Wet System	Clocks	No
Drawer Units:	No	FP Detection	Rate of Rise	Paging Systems	No
Furnishings		***HVAC***		Monitors/Alarms	sep fire alarm fr non-viv
Window Treat:	NA	Total Air Changes	12-15/hr		
Proj. Screen:	No	Fresh Air Changes	12-15/hr	***Special Requirements***	
Desks:	No	Pressure	Negative	Light Controls	yes- see notes
Chairs:	No	Temperature	NIH std 55-90°F +/-2°	Visual Controls	
Tables:	No	Relative Humidity	NIH std 30-70%	Acoustic Controls	
Files:	No	Local Exhaust		Structural Controls	
White Boards:	No	Air Filtration	Lab Standard	Security	Keypad Access
Tack Boards:	No	CO2 Sensor	No	Shielding	
Other Furn.:		Other HVAC	env. control & monitor	Other Spec Req	

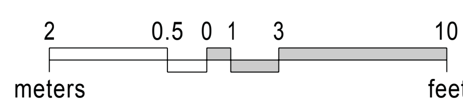
Notes

1. Individual room environmental control & monitoring
2. Individual room light timer controls & variable light levels required
3. Separate fire alarm system from non vivarium spaces

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				
Cage Rack		2										

3.06.09 - Quarantine - 230 nasf





3.06.10 Support Lab

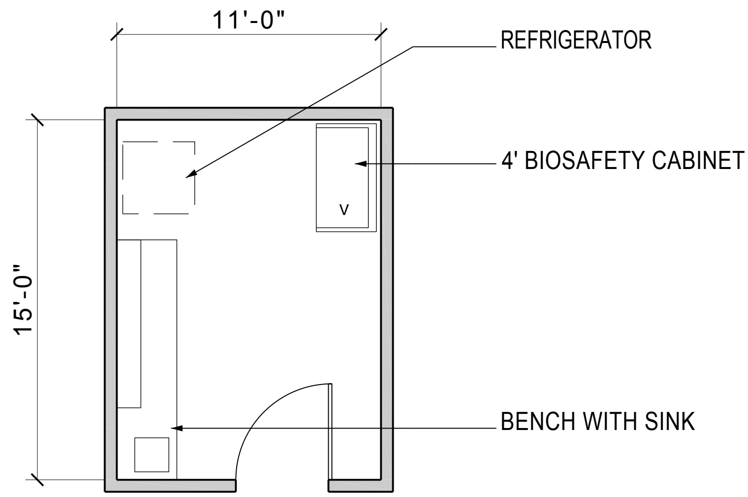
Department	Vivarium	Researcher		# of Occupants	
Function	animal health monitoring			Area	165 NASF
Adjacencies					

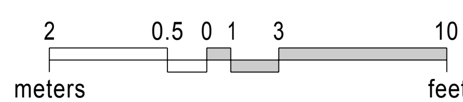
Architectural		Plumbing		Electrical	
Floor:	Epoxy	Sinks:	Stainless Steel	Power:	120v
Base:	Integral	Pure Water:	RO	Features:	
Walls:	High Impact Wall Board	Hot / Cold Water:	Yes	Elec. Outlets:	Wall Receptacle
Wall Finish:	Specialty Epoxy Paint	Floor Drain:	Yes- w/cover	Illumination:	80-100fc
Ceiling:	Gypsum Board / Painted	Hose Bib:	No	Fixtures:	Fluorescent
Ceiling Height:	9'-6"	Waste:		Fixture Mounting:	Recessed
Door Size:	4'-0" x 8'-0" w/window	Eyewash:	No	Occupancy Sensors:	Yes
		Emerg Shower:	No	Dimming Sensors:	No
		Gases		Switching:	Yes
		Air	No	Task Light:	Yes-Exam Light
Casework		Lab Gas	No	Em. Power:	No
Wall Cabinets:	Stainless Steel	CO2	No	UPS:	No
Base Cabinets:	Stainless Steel	Nitrogen	No	**Communications**	
Bench Top:	Stainless Steel	Vacuum		# Phone Outlets	1
Bench Height:	3'-0"	Other Gas		# Data Outlets	1
Desktop:	Stainless Steel	**Fire Protection**		Network	
Shelving:	Yes	FP System	Dry System	Clocks	No
Drawer Units:	Yes	FP Detection	Rate of Rise	Paging Systems	No
Furnishings		**HVAC**		Monitors/Alarms	
Window Treat:	NA	Total Air Changes	Lab Standard		
Proj. Screen:	No	Fresh Air Changes	Lab Standard	**Special Requirements**	
Desks:	No	Pressure	Positive	Light Controls	
Chairs:	No	Temperature	Lab Standard	Visual Controls	
Tables:	Yes - Exam Table	Relative Humidity	Lab Standard	Acoustic Controls	
Files:	No	Local Exhaust		Structural Controls	
White Boards:	Yes	Air Filtration	Lab Standard	Security	
Tack Boards:	No	CO2 Sensor	No	Shielding	
Other Furn.:		Other HVAC		Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				
Refrigerator		1					120					

3.06.10 - Support Lab - 165 nasf





3.06.11 Multi Purpose/Necropsy Room

Department	Vivarium	Researcher		# of Occupants	
Function				Area	175 NASF
Adjacencies					

Architectural

Floor: Epoxy
Base: Integral
Walls: High Impact Wall Board
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 9'-6"
Door Size: 4'-0" x 8'-0" w/window

Casework

Wall Cabinets: None
Base Cabinets: Stainless Steel
Bench Top: Stainless Steel
Bench Height: 3'-0"
Desktop: None
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: No
Proj. Screen: No
Desks: No
Chairs: No
Tables: Yes - necropsy
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: No
Hot / Cold Water: Yes
Floor Drain: Yes w/cover
Hose Bib: Yes
Waste: Lab/pH Neutralization
Eyewash: Yes
Emerg Shower: No

Gases

Air: Yes
Lab Gas: Yes
CO2: Yes
Nitrogen: No
Vacuum:
Other Gas: Vacuum

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: 15 per hour
Fresh Air Changes: (see total A.C.)
Pressure: Negative
Temperature: Lab Standard
Relative Humidity: Lab Standard
Local Exhaust: (see necropsy table)
Air Filtration: Lab Standard
CO2 Sensor: No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination:
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: Yes
Em. Power: No
UPS: No

Communications

Phone Outlets: 1
Data Outlets: 2
Network
Clocks: No
Paging Systems: No
Monitors/Alarms

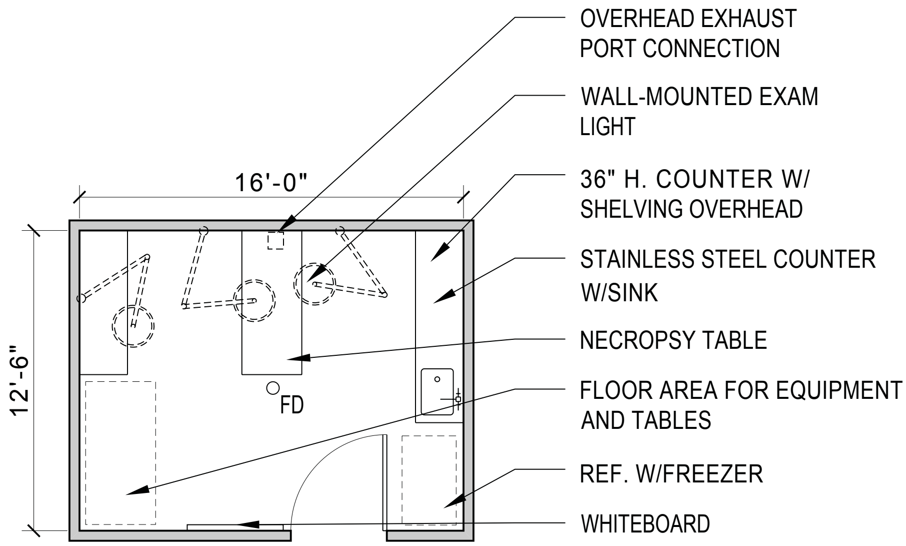
Special Requirements

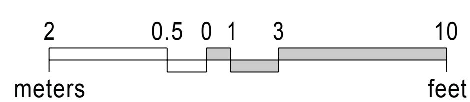
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes
Fume Hood		1	5'				120					
Necropsy Table		1	6'	2'-6"						down draft		
Exam light		1										
Refrigerator w/frzr		1										

3.06.11 - Multipurpose / Necropsy - 200 nasf





3.06.13 Carcass Disposal/Digester

Department	Vivarium	Researcher		# of Occupants		
Function				Area	145	NASF
Adjacencies						

Architectural

Floor: Epoxy
Base: Integral
Walls: Concrete Masonry Units
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 10'-0"
Door Size: 4'-0" (sngl lf) x 8'-0" H

Casework

Wall Cabinets: None
Base Cabinets: None
Bench Top: None
Bench Height: NA
Desktop: Stainless Steel- Flip dn
Shelving: None
Drawer Units: None

Furnishings

Window Treat: NA
Proj. Screen: None
Desks: None
Chairs: None
Tables: None
Files: None
White Boards: Yes
Tack Boards: None
Other Furn.: None

Plumbing

Sinks: Stainless Steel
Pure Water: None
Hot / Cold Water: Yes
Floor Drain: Yes- w/cover
Hose Bib: Yes
Waste: Lab/pH Neutralization
Eyewash: Yes
Emerg Shower: Yes

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum: No
Other Gas

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: Holding Rm. Req.
Fresh Air Changes: Holding Rm. Req.
Pressure: Negative
Temperature: Equip Rm Standard
Relative Humidity: Equip Rm Standard
Local Exhaust: Canopy hood
Air Filtration
CO2 Sensor: No
Other HVAC

Electrical

Power: 208v
Features:
Elec. Outlets:
Illumination: 50fc
Fixtures: Gasketed/WP Fluor.
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS:

Communications

Phone Outlets: 1 wall phone jack
Data Outlets: 1
Network
Clocks: No
Paging Systems: No
Monitors/Alarms

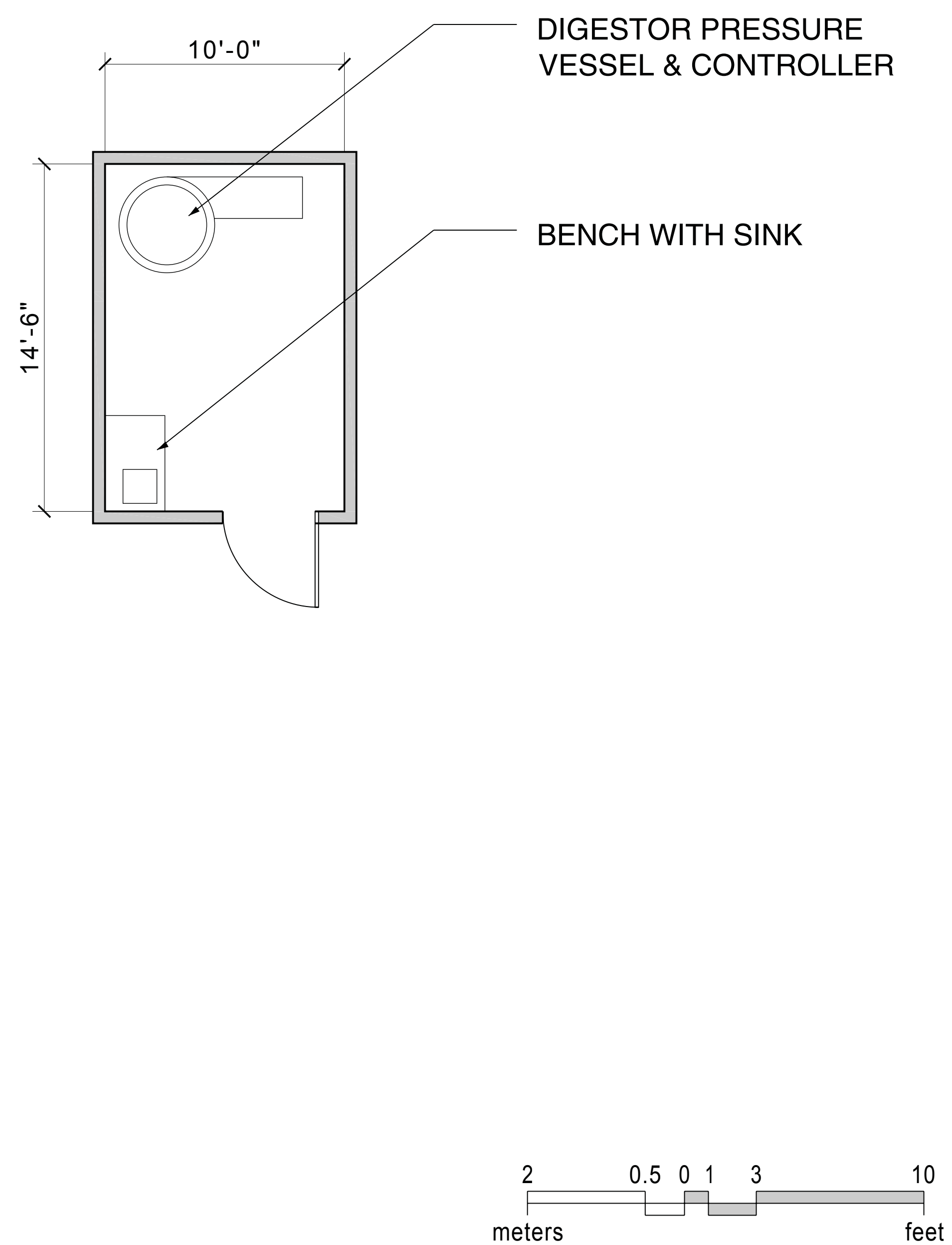
Special Requirements

Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.13 - Carcass Disposal - 145 nasf



3.06.14 Cage Wash: Dirty

Department	Vivarium	Researcher	# of Occupants
Function			Area 1800 NASF
Adjacencies	Cage Wash: Clean		

Architectural

Floor: Sealed Concrete
Base: Integral
Walls: Concrete Masonry Units
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 12'-0"
Door Size: 4'-0" x 8'-0" w/window

Casework

Wall Cabinets: Stainless Steel
Base Cabinets: Stainless Steel
Bench Top: Stainless Steel
Bench Height: 3'-0"
Desktop:
Shelving: Yes
Drawer Units: No

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: No
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: RO
Hot / Cold Water: Yes
Floor Drain: Yes
Hose Bib: Yes
Waste: Lab/pH Neutralization
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes 12-15/hr
Fresh Air Changes 12-15/hr
Pressure Negative
Temperature 55-65°F
Relative Humidity Lab Standard
Local Exhaust
Air Filtration Lab Standard
CO2 Sensor No
Other HVAC

Electrical

Power: 120v + 208v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 50fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets 1
Data Outlets 3
Network
Clocks No
Paging Systems
Monitors/Alarms

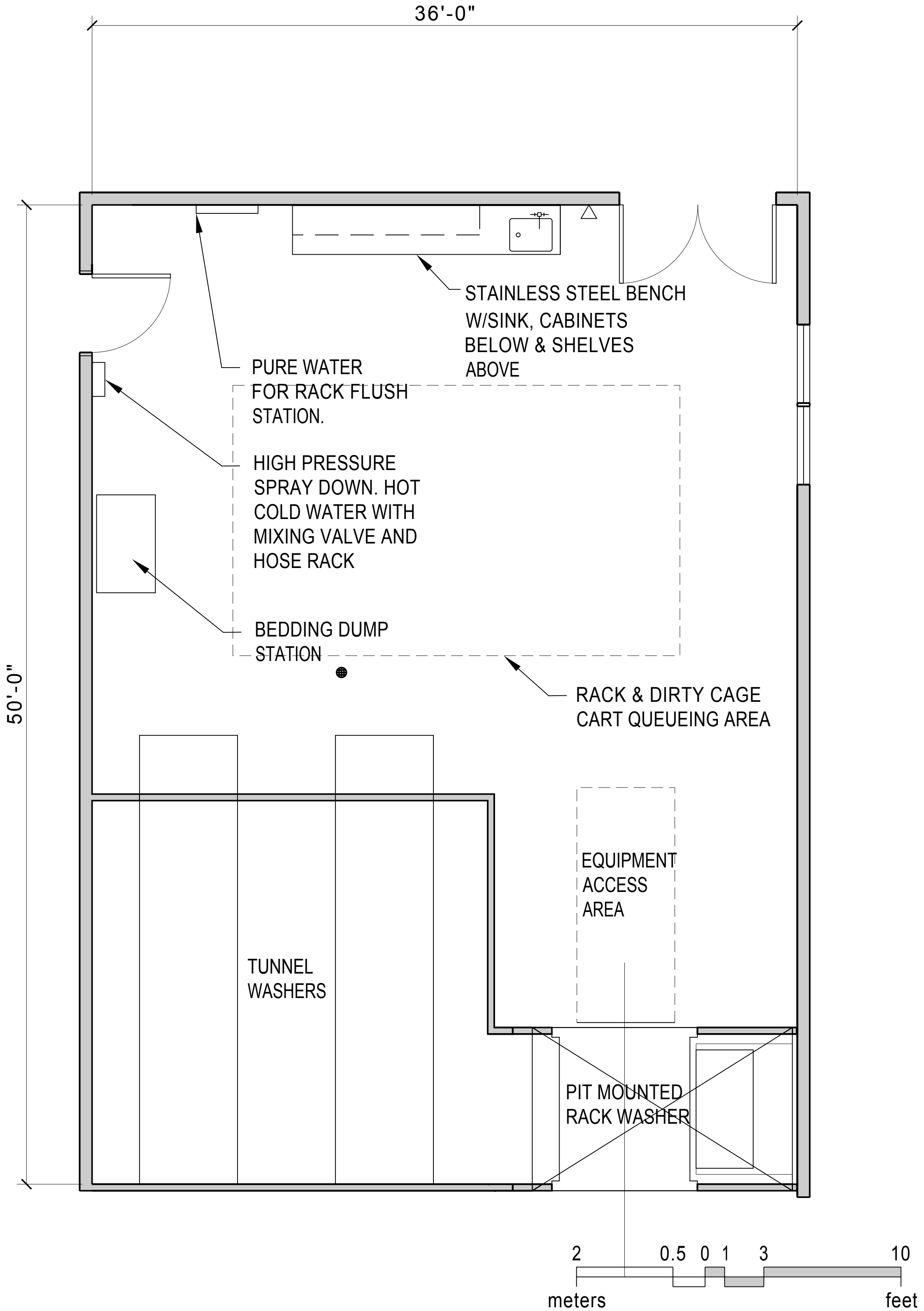
Special Requirements

Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.14 - Cage Wash : Dirty - 1,800 nasf



3.06.15 Cage Wash: Clean

Department	Vivarium	Researcher		# of Occupants	
Function				Area	1800 NASF
Adjacencies	Cage Wash: Dirty				

Architectural

Floor: Sealed Concrete
Base: Integral
Walls: Concrete Masonry Units
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 12'-0"
Door Size: (dbl) 4'-0" x 8'-0" w/win

Casework

Wall Cabinets: No
Base Cabinets: No
Bench Top: No
Bench Height: 3'-0"
Desktop: Stainless Steel
Shelving: Yes
Drawer Units: No

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: No
Tack Boards: Yes
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: RO
Hot / Cold Water: Yes
Floor Drain: Yes
Hose Bib: Yes
Waste: Lab/pH Neutralization
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO_2: No
Nitrogen: No
Vacuum
Other Gas

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: 12-15/hr
Fresh Air Changes: 12-15/hr
Pressure: Positive
Temperature: 55-65°F
Relative Humidity: Lab Standard
Local Exhaust: Elephant Trunk
Air Filtration: Lab Standard
CO_2 Sensor: No
Other HVAC

Electrical

Power: 120v + 208v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 50fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets: 1
Data Outlets: 1
Network
Clocks
Paging Systems: Intercom w/phone
Monitors/Alarms

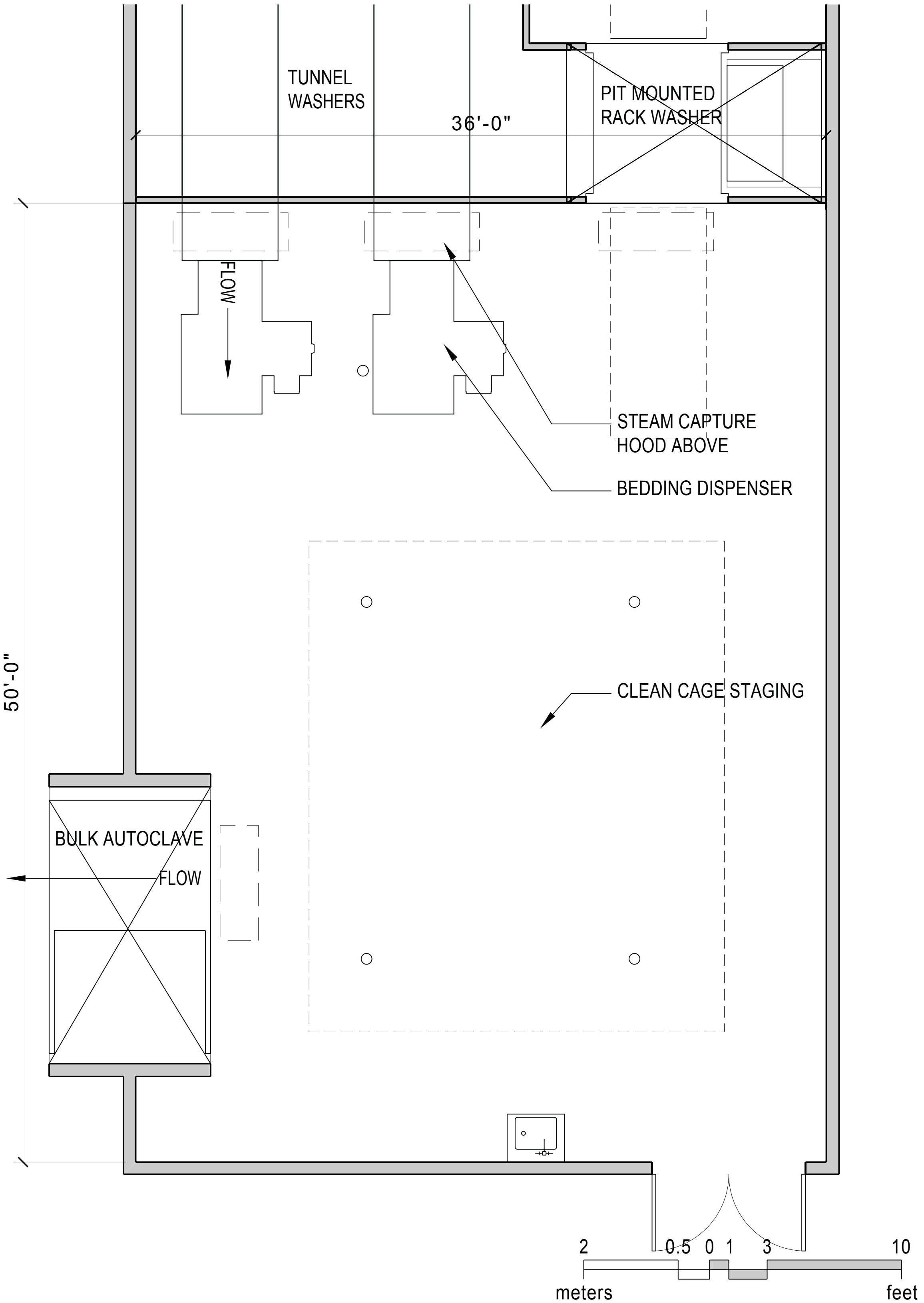
Special Requirements

Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes
Bulk Autoclave		1										
Tunnel Washer		2										
Bedding Dispenser		2										
Rack washer		1										

3.06.15 - Cage Wash : Clean - 1,800 nasf



3.06.16 Cage Wash: Detergent Storage

Department	Vivarium	Researcher		# of Occupants		
Function				Area	100	NASF
Adjacencies						

Architectural

Floor: Epoxy
Base: Integral
Walls: High Impact Wall Board
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 9'-0"
Door Size: 3'-0" double leaf

Casework

Wall Cabinets: None
Base Cabinets: None
Bench Top: None
Bench Height: None
Desktop: None
Shelving: No
Drawer Units: No

Furnishings

Window Treat: No
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: No
Tack Boards: No
Other Furn.:

Plumbing

Sinks: None
Pure Water: None
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum No
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Lab Standard
Fresh Air Changes Lab Standard
Pressure Negative
Temperature Lab Standard
Relative Humidity Lab Standard
Local Exhaust
Air Filtration Lab Standard
CO2 Sensor No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 50fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets 1 wall phone
Data Outlets
Network
Clocks No
Paging Systems No
Monitors/Alarms

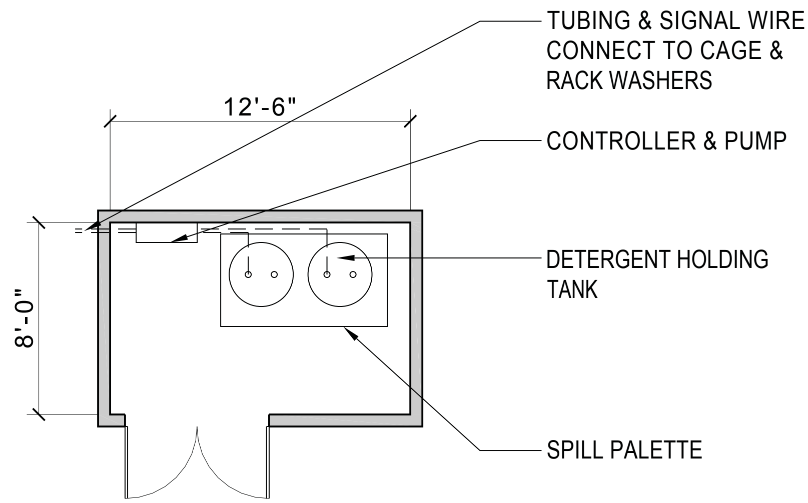
Special Requirements

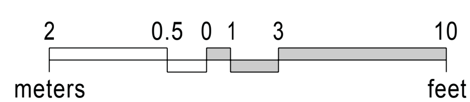
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.16 - Cage Wash: Detergent Storage - 100 nasf





3.06.17 Feed Storage

Department	Vivarium	Researcher		# of Occupants	
Function				Area	400 NASF
Adjacencies	Clean cage storage				

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Gypsum Board / Painted
Ceiling Height:	9'-6"
Door Size:	

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	NA
Desktop:	None
Shelving:	Heavy duty
Drawer Units:	

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	NA
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	NA
Eyewash:	No
Emerg Shower:	

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Not Critical
Temperature	55^{o} - 60^{o} F
Relative Humidity	Lab Standard
Local Exhaust	None
Air Filtration	
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	WP Wall Receptacle
Illumination:	30fc
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1 wall phone jack
# Data Outlets	None
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

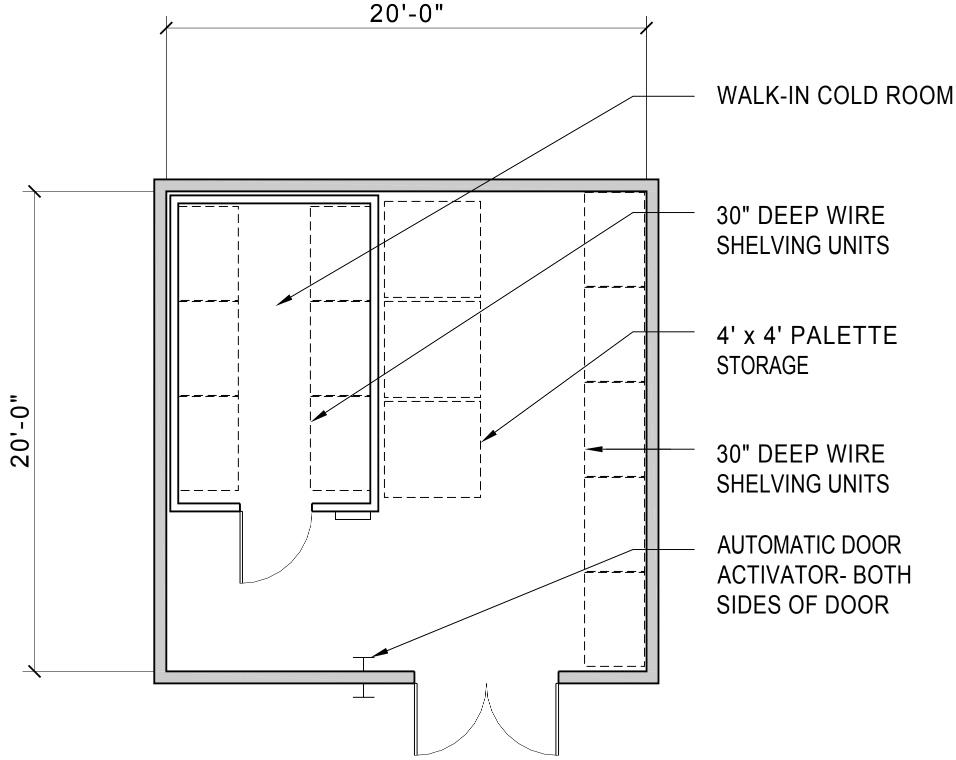
Special Requirements

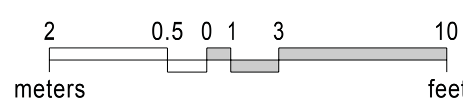
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes 1. includes a 100 SF walk-in cold room

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.17 - Feed Storage - 400 nasf





3.06.18 Bedding Storage

Department	Vivarium	Researcher		# of Occupants	
Function				Area	400 NASF
Adjacencies	Clean cage storage				

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Gypsum Board / Painted
Ceiling Height:	9'-6"
Door Size:	

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	NA
Desktop:	None
Shelving:	Heavy duty
Drawer Units:	

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	NA
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	NA
Eyewash:	No
Emerg Shower:	

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Not Critical
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	None
Air Filtration	
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	WP Wall Receptacle
Illumination:	30fc
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1 wall phone jack
# Data Outlets	None
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

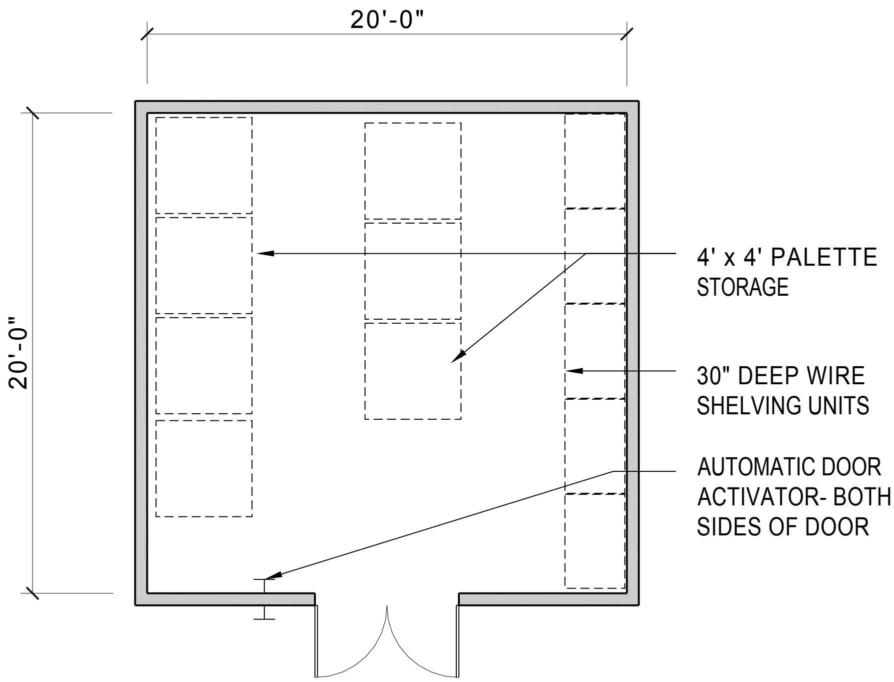
Special Requirements

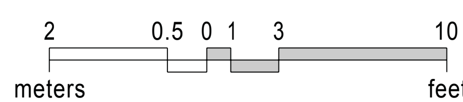
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.18 - Bedding Storage - 400 nasf





3.06.19 Clean Cage Storage

Department	Vivarium	Researcher		# of Occupants	
Function				Area	1500 NASF
Adjacencies	Clean cage wash, feed & bedding storage				

Architectural

Floor: Epoxy
Base: Integral
Walls: High Impact Wall Board
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 9'-6"
Door Size:

Casework

Wall Cabinets: None
Base Cabinets: None
Bench Top: None
Bench Height: NA
Desktop: None
Shelving: No
Drawer Units:

Furnishings

Window Treat: No
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: No
Tack Boards: No
Other Furn.:

Plumbing

Sinks: None
Pure Water: NA
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste: NA
Eyewash: No
Emerg Shower:

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum: No
Other Gas

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: Lab Standard
Fresh Air Changes: Lab Standard
Pressure: Not Critical
Temperature: Lab Standard
Relative Humidity: Lab Standard
Local Exhaust: None
Air Filtration
CO2 Sensor: No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: WP Wall Receptacle
Illumination: 30fc
Fixtures: Gasketed/WP Fluor.
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets: 1 wall phone jack
Data Outlets: None
Network
Clocks: No
Paging Systems: No
Monitors/Alarms

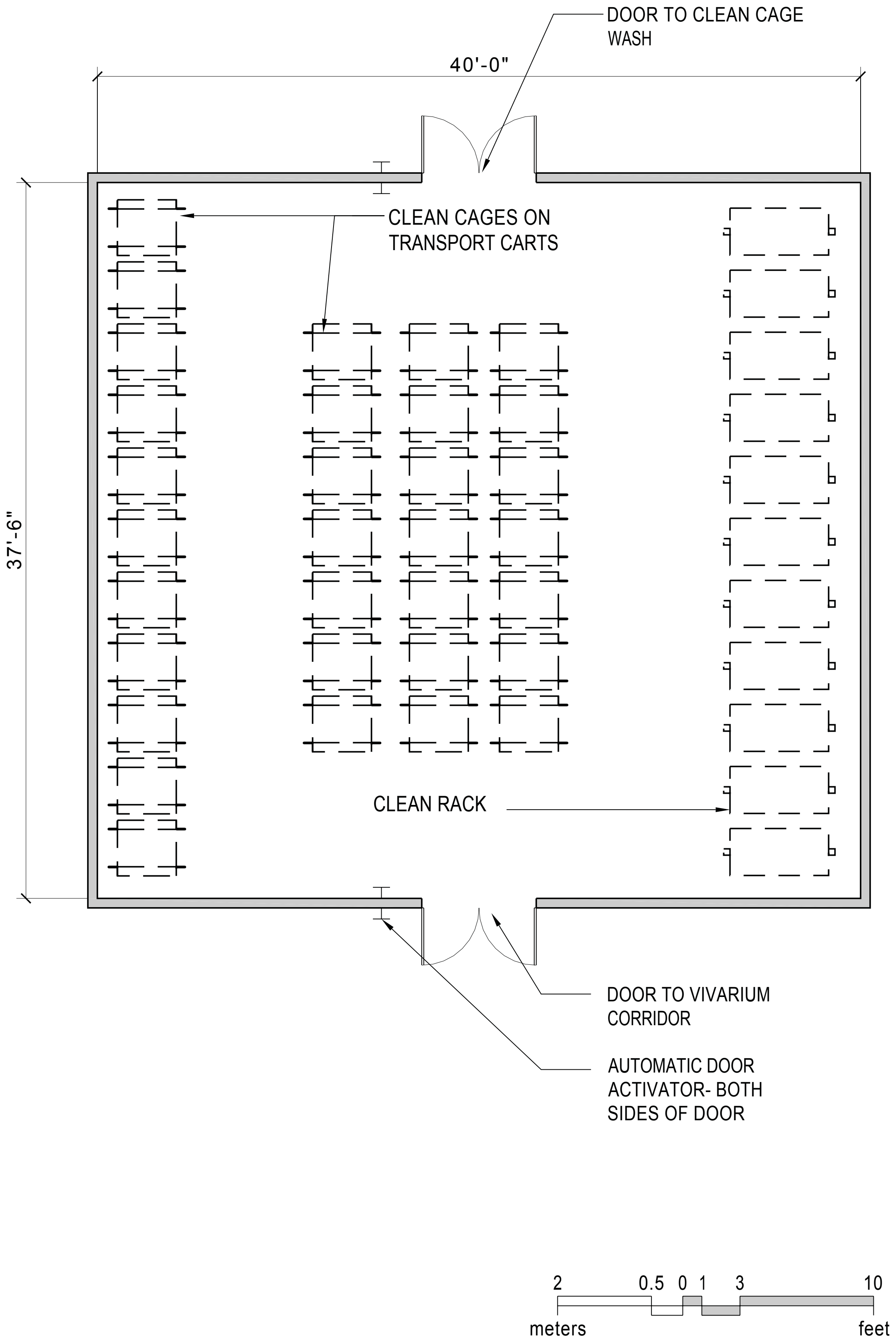
Special Requirements

Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.19 - Clean Cage Storage - 1,500 nasf



3.06.20 Clean Bottle Storage

Department	Vivarium	Researcher		# of Occupants	
Function				Area	200 NASF
Adjacencies	Clean cage storage				

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Gypsum Board / Painted
Ceiling Height:	9'-6"
Door Size:	

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	NA
Desktop:	None
Shelving:	Heavy duty
Drawer Units:	

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	NA
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	NA
Eyewash:	No
Emerg Shower:	

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Not Critical
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	None
Air Filtration	
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	WP Wall Receptacle
Illumination:	30fc
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1 wall phone jack
# Data Outlets	None
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

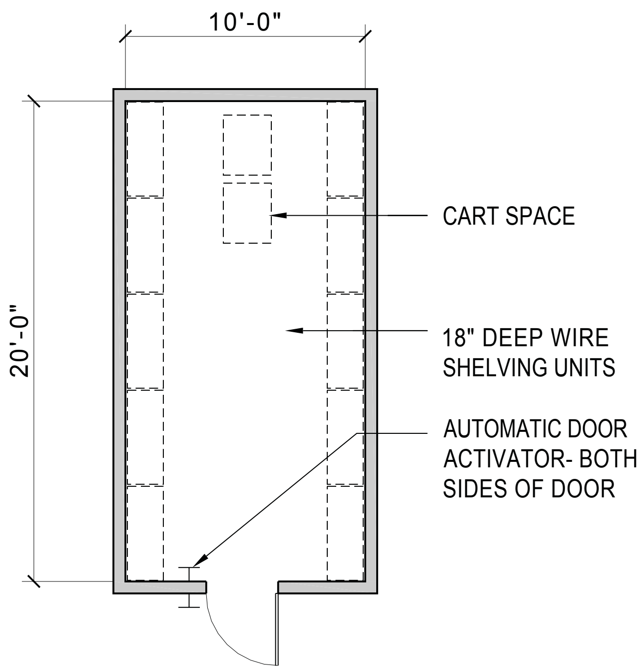
Special Requirements

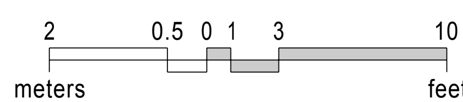
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.20 - Clean Bottle Storage - 200 nasf





3.06.21 Staff Lockers / Restrooms

Department Vivarium

Researcher

# of Occupants

Function

Area 150 NASF

Adjacencies

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	Ceramic Tile
Wall Finish:	None
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	3'-0"

Casework

Wall Cabinets:	Metal lockers
Base Cabinets:	None
Bench Top:	None
Bench Height:	NA
Desktop:	None
Shelving:	Yes
Drawer Units:	None

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	Locker room benches

Plumbing

Sinks:	SS vanity/hand sink
Pure Water:	None
Hot / Cold Water:	Yes
Floor Drain:	Yes
Hose Bib:	Yes
Waste:	Standard
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Negative
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	None
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	30fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1 wall phone jack
# Data Outlets	None
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

Special Requirements

Light Controls

Visual Controls

Acoustic Controls

Structural Controls

Security

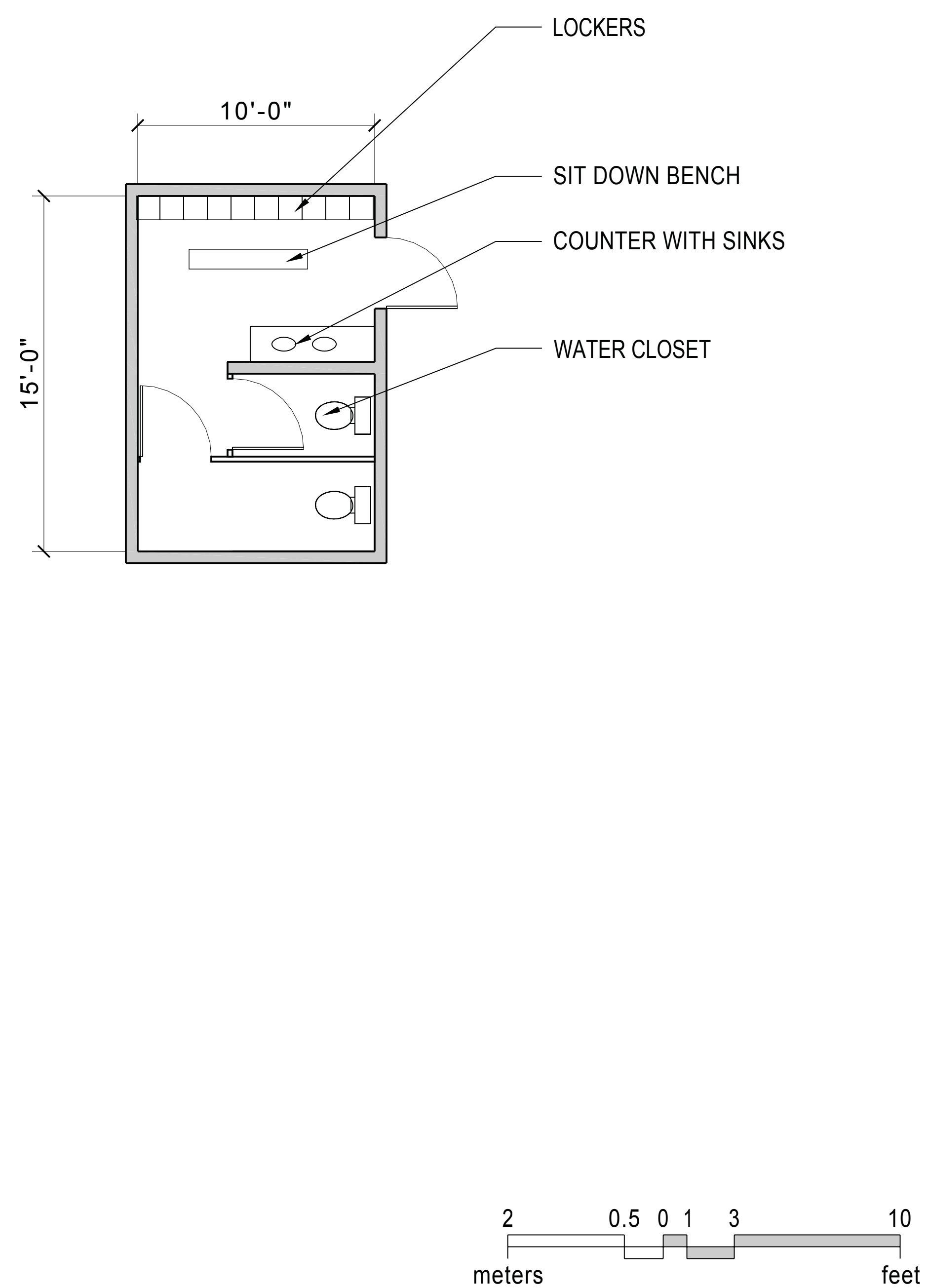
Shielding

Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.21 - Staff Lockers / Restrooms - 150 nasf



3.06.22 Staff Break Room

Department	Vivarium	Researcher		# of Occupants	
Function				Area	200 NASF
Adjacencies					

Architectural

Floor:	Epoxy
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-0"
Door Size:	3'-0"

Casework

Wall Cabinets:	Metal
Base Cabinets:	Metal
Bench Top:	Plastic Laminate
Bench Height:	3'-0"
Desktop:	None
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	Yes- if exterior exposure
Proj. Screen:	No
Desks:	No
Chairs:	Yes
Tables:	Yes
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stainless Steel
Pure Water:	None
Hot / Cold Water:	Yes
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	No
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1 wall phone
# Data Outlets	1 wall jack
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

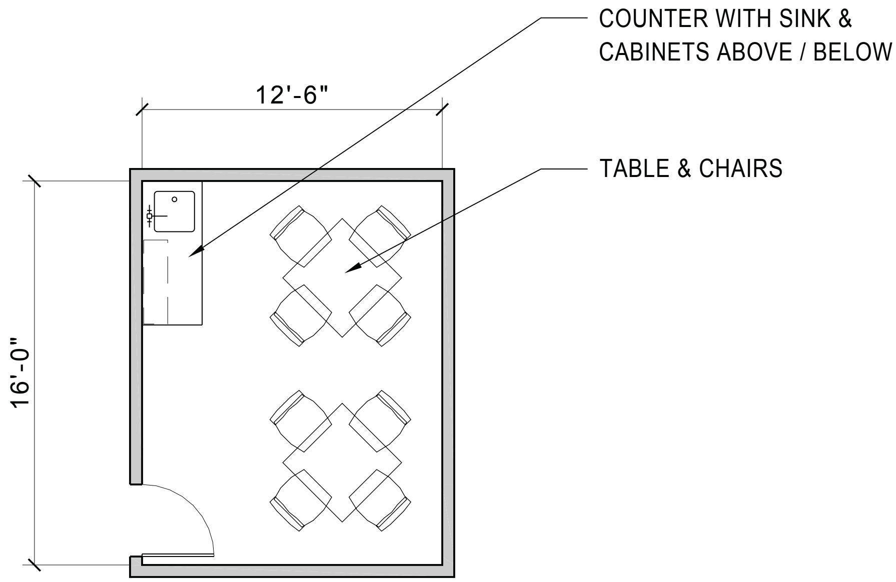
Special Requirements

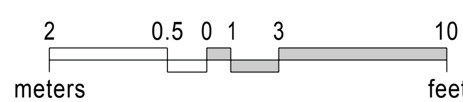
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

3.06.22 - Staff Break Room - 200 nasf





3.06.23 Animal Imaging

Department	Vivarium	Researcher		# of Occupants		
Function				Area	154	NASF
Adjacencies						

Architectural

Floor: Epoxy
Base: Integral
Walls: High Impact Wall Board
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 9'-6"
Door Size: 4'-0" (sngl lf) x 8'-0" H

Casework

Wall Cabinets: Stainless Steel
Base Cabinets: Stainless Steel
Bench Top: Stainless Steel
Bench Height: 3'-0"
Desktop:
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: NA
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: Yes
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: RO
Hot / Cold Water: Yes
Floor Drain: No
Hose Bib: No
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Lab Standard
Fresh Air Changes Lab Standard
Pressure Negative
Temperature Lab Standard
Relative Humidity Lab Standard
Local Exhaust
Air Filtration Lab Standard
CO2 Sensor No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 80-100fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets 1
Data Outlets 2
Network
Clocks Yes
Paging Systems Intercom w/phone
Monitors/Alarms

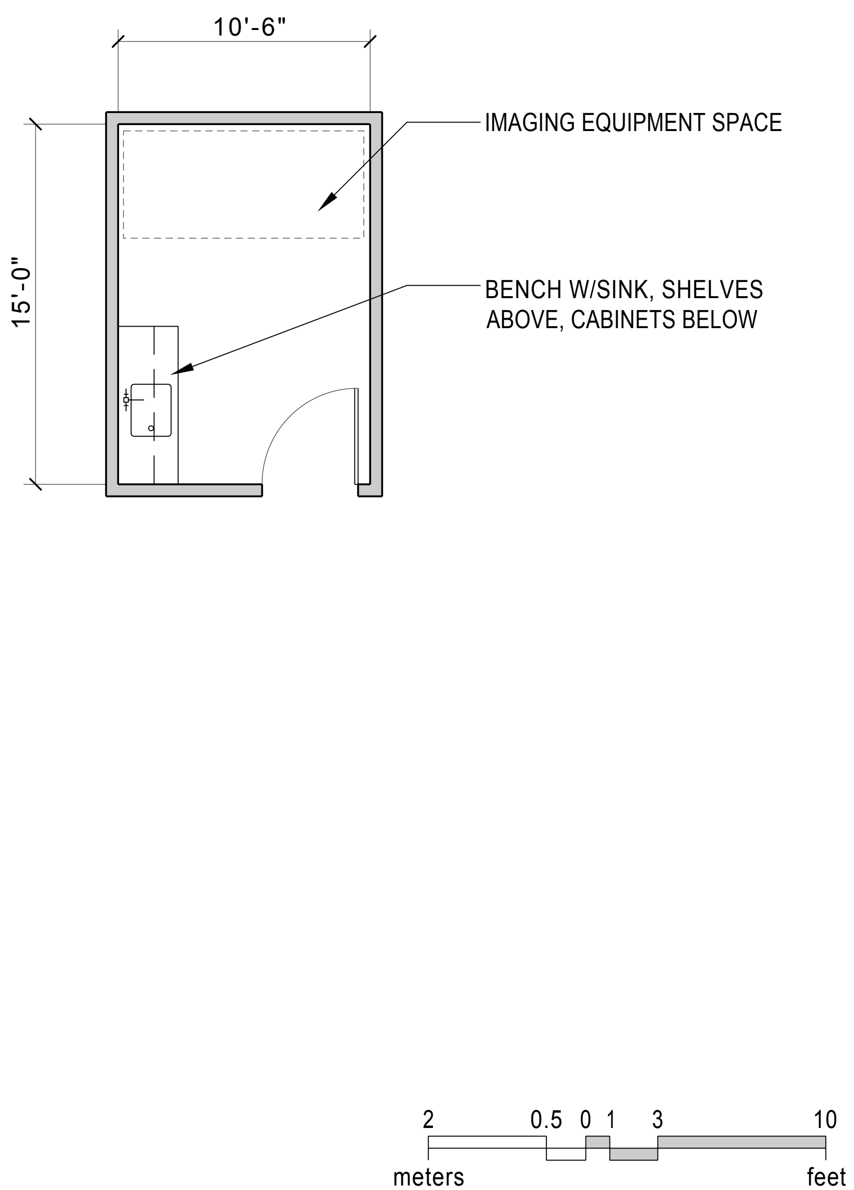
Special Requirements

Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.23 - Animal Imaging - 154 nasf



3.06.24 Supplies Storage

Department	Vivarium	Researcher		# of Occupants	
Function				Area	300 NASF
Adjacencies					

Architectural

Floor: Epoxy
Base: Integral
Walls: High Impact Wall Board
Wall Finish: Specialty Epoxy Paint
Ceiling: Gypsum Board / Painted
Ceiling Height: 9'-6"
Door Size:

Casework

Wall Cabinets: None
Base Cabinets: None
Bench Top: None
Bench Height: NA
Desktop: None
Shelving: Heavy duty
Drawer Units:

Furnishings

Window Treat: No
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: No
Tack Boards: No
Other Furn.:

Plumbing

Sinks: None
Pure Water: NA
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste: NA
Eyewash: No
Emerg Shower:

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum: No
Other Gas:

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: Lab Standard
Fresh Air Changes: Lab Standard
Pressure: Not Critical
Temperature: Lab Standard
Relative Humidity: Lab Standard
Local Exhaust: None
Air Filtration:
CO2 Sensor: No
Other HVAC:

Electrical

Power: 120v
Features:
Elec. Outlets: WP Wall Receptacle
Illumination: 30fc
Fixtures: Gasketed/WP Fluor.
Fixture Mounting: Recessed
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets: 1 wall phone jack
Data Outlets: None
Network
Clocks: No
Paging Systems: No
Monitors/Alarms

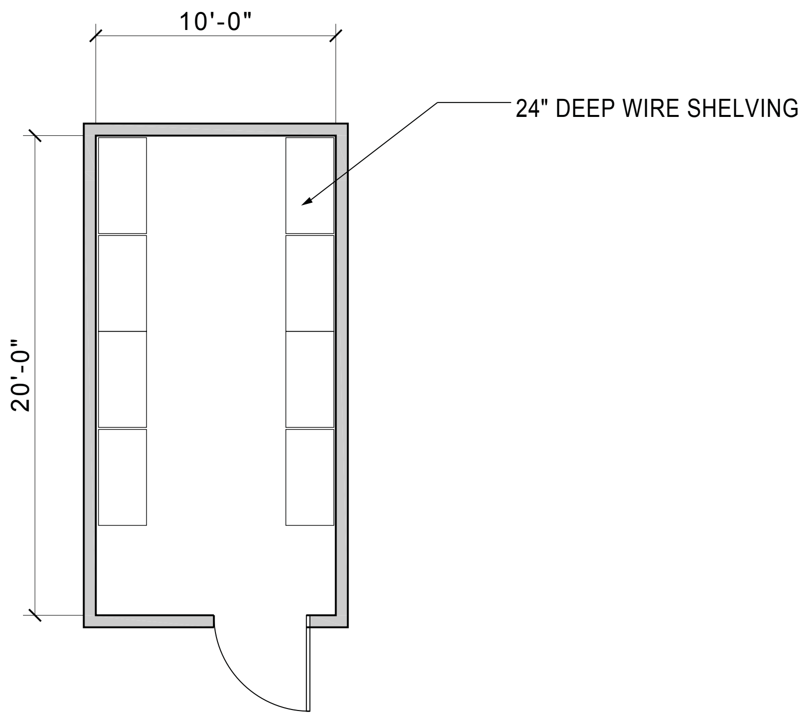
Special Requirements

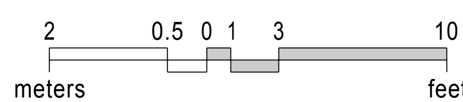
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.24 - Supplies Storage - 200 nasf





3.06.25 Laundry Room

Department	Vivarium	Researcher		# of Occupants	
Function				Area	70 NASF
Adjacencies					

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-0"
Door Size:	3'-0"

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	Yes- as furniture
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	Laundry bins

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	Yes
Floor Drain:	Yes
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Not Critical
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v + 208v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

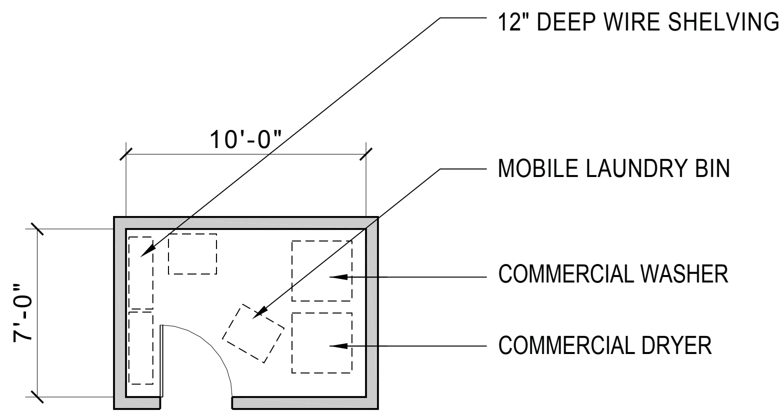
Special Requirements

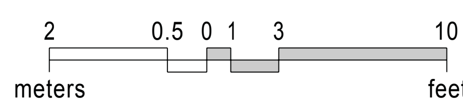
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

3.06.25 - Laundry Room - 70 nasf





3.06.26 Janitors Closet

Department	Vivarium	Researcher		# of Occupants	
Function				Area	25 NASF
Adjacencies					

Architectural

Floor: Epoxy
Base: Rubber
Walls: High Impact Wall Board
Wall Finish: Paint- Low VOC
Ceiling: Accoustic Ceiling Tile
Ceiling Height: 9"-0"
Door Size: 3'-0"

Casework

Wall Cabinets: None
Base Cabinets: None
Bench Top: None
Bench Height: None
Desktop: None
Shelving: No
Drawer Units: No

Furnishings

Window Treat: No
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: No
Tack Boards: No
Other Furn.:

Plumbing

Sinks: Floor receptor/mop sink
Pure Water: None
Hot / Cold Water: Yes
Floor Drain: No
Hose Bib: Yes
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum: No
Other Gas

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: Lab Standard
Fresh Air Changes: Lab Standard
Pressure: Negative
Temperature: Lab Standard
Relative Humidity: Lab Standard
Local Exhaust
Air Filtration: Lab Standard
CO2 Sensor: No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 30fc
Fixtures: Fluorescent
Fixture Mounting: Recessed
Occupancy Sensors: No
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets
Data Outlets
Network
Clocks: No
Paging Systems: No
Monitors/Alarms

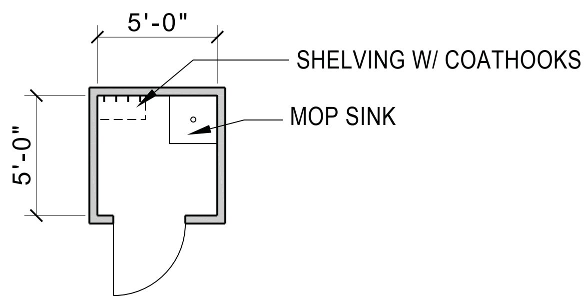
Special Requirements

Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

3.06.26 - Janitors Closet - 25 nasf



3.06.27 Holding Suite Ante Room

Department	Vivarium	Researcher		# of Occupants		
Function	Sub corridor access to suite of holding rooms			Area	120	NASF
Adjacencies						

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Gypsum Board / Painted
Ceiling Height:	10'-0"
Door Size:	4'-0" (sngl lf) x 8'-0" H

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	Yes
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	Stainless Steel (maybe)
Pure Water:	None
Hot / Cold Water:	Yes
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Holding Rm. Req.
Fresh Air Changes	Holding Rm. Req.
Pressure	Adjustable
Temperature	Holding Rm. Req.
Relative Humidity	Holding Rm. Req.
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	75 fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1 wall phone
# Data Outlets	1 wall jack
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	None

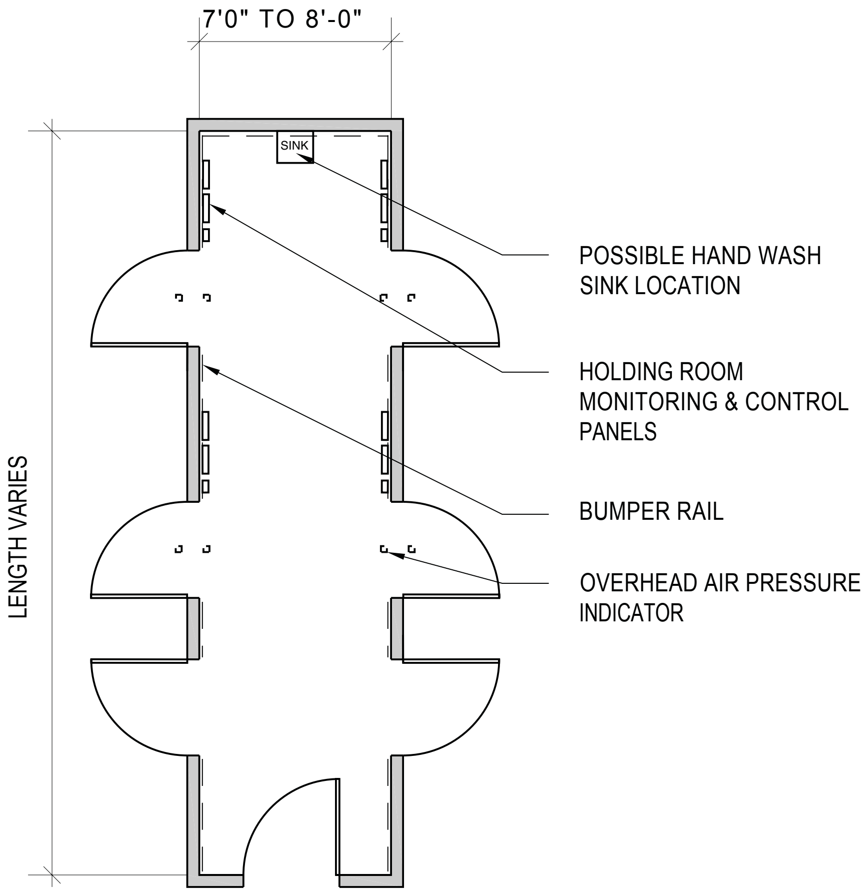
Special Requirements

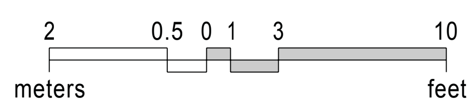
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

3.06.27 - Holding Suite Ante Room - 120 nasf





4.01.01 Reception/Security Desk

Department	Shared Support	Researcher	# of Occupants		
Function			Area	100	NASF
Adjacencies					

Architectural

Floor:	Carpet
Base:	Rubber
Walls:	NA
Wall Finish:	NA
Ceiling:	NA
Ceiling Height:	NA
Door Size:	NA

Casework

Wall Cabinets:	
Base Cabinets:	
Bench Top:	
Bench Height:	
Desktop:	Plastic Laminate
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	NA
Proj. Screen:	No
Desks:	Yes
Chairs:	Yes
Tables:	No
Files:	Yes
White Boards:	No
Tack Boards:	Yes
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Surf. Mount. Raceway
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

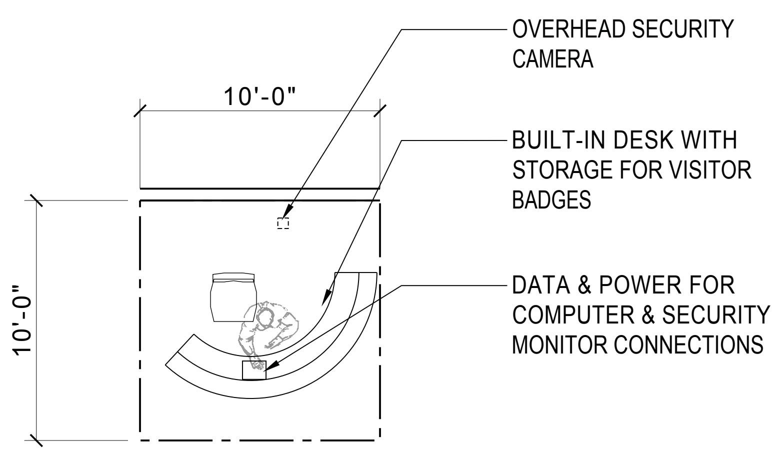
Special Requirements

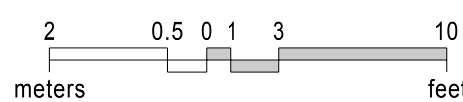
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

4.01.01 - Reception/Security Desk - 100 nasf





4.01.02 Security Office

Department	Shared Support	Researcher	# of Occupants	1	
Function			Area	200	NASF
Adjacencies					

Architectural

Floor: Carpet
Base: Rubber
Walls: Gypsum Wall Board
Wall Finish: Paint
Ceiling: Accoustic Ceiling Tile
Ceiling Height: 8'-0"
Door Size: 3'-0"

Casework

Wall Cabinets:
Base Cabinets:
Bench Top:
Bench Height:
Desktop: Wood- Certified
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: Yes
Proj. Screen: No
Desks: Yes
Chairs: Yes
Tables: Yes
Files: Yes
White Boards: Yes
Tack Boards: Yes
Other Furn.:

Plumbing

Sinks: None
Pure Water: NA
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste: NA
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Office Standard
Fresh Air Changes Office Standard
Pressure Not Critical
Temperature Office Standard
Relative Humidity Office Standard
Local Exhaust None
Air Filtration Office Standard
CO2 Sensor No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: Office Standard
Fixtures: Fluorescent
Fixture Mounting: Pendant
Occupancy Sensors: Yes
Dimming Sensors: Yes
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets 1
Data Outlets 1
Network
Clocks No
Paging Systems No
Monitors/Alarms

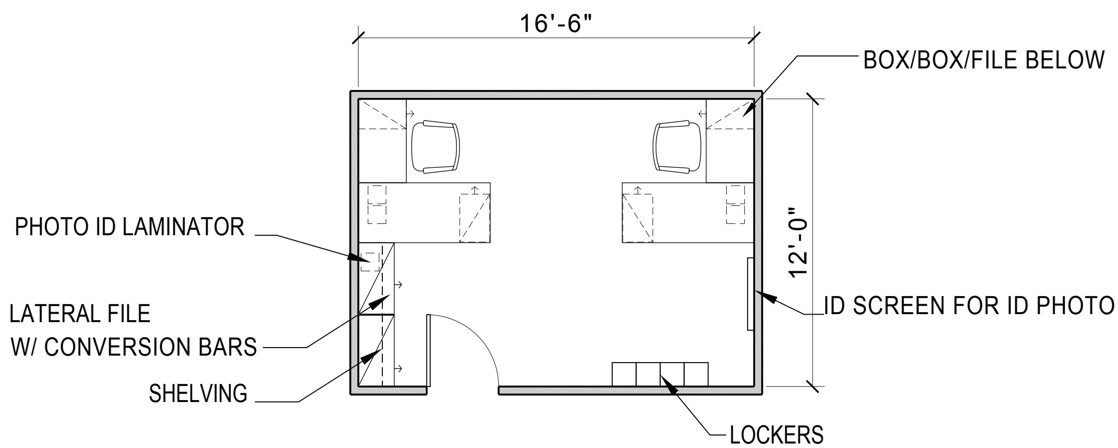
Special Requirements

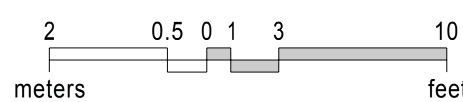
Light Controls Requires Natural Light
Visual Controls Visual Privacy Req.
Acoustic Controls
Structural Controls
Security Lockable
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.01.02 - Security Office - 200 nasf





4.05.01 Lobby / Waiting Area

Department	Shared Support	Researcher		# of Occupants	
Function				Area	1000 NASF
Adjacencies	Non wet lab support dining area				

Architectural

Floor: Stone/tile
Base: Tile
Walls: Gypsum Wall Board
Wall Finish: Paint- Low VOC
Ceiling: Gypsum Board / Painted
Ceiling Height:
Door Size:

Casework

Wall Cabinets: None
Base Cabinets: None
Bench Top: None
Bench Height: None
Desktop: None
Shelving: No
Drawer Units: No

Furnishings

Window Treat: Yes
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: No
Tack Boards: No
Other Furn.:

Plumbing

Sinks: None
Pure Water: None
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum No
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Office Standard
Fresh Air Changes Office Standard
Pressure Not Critical
Temperature Office Standard
Relative Humidity Office Standard
Local Exhaust
Air Filtration Office Standard
CO2 Sensor
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 50fc
Fixtures: Fluorescent & incandesc
Fixture Mounting: Pendant
Occupancy Sensors: No
Dimming Sensors: Yes
Switching: Yes
Task Light:
Em. Power: No
UPS: No

Communications

Phone Outlets
Data Outlets
Network
Clocks
Paging Systems
Monitors/Alarms

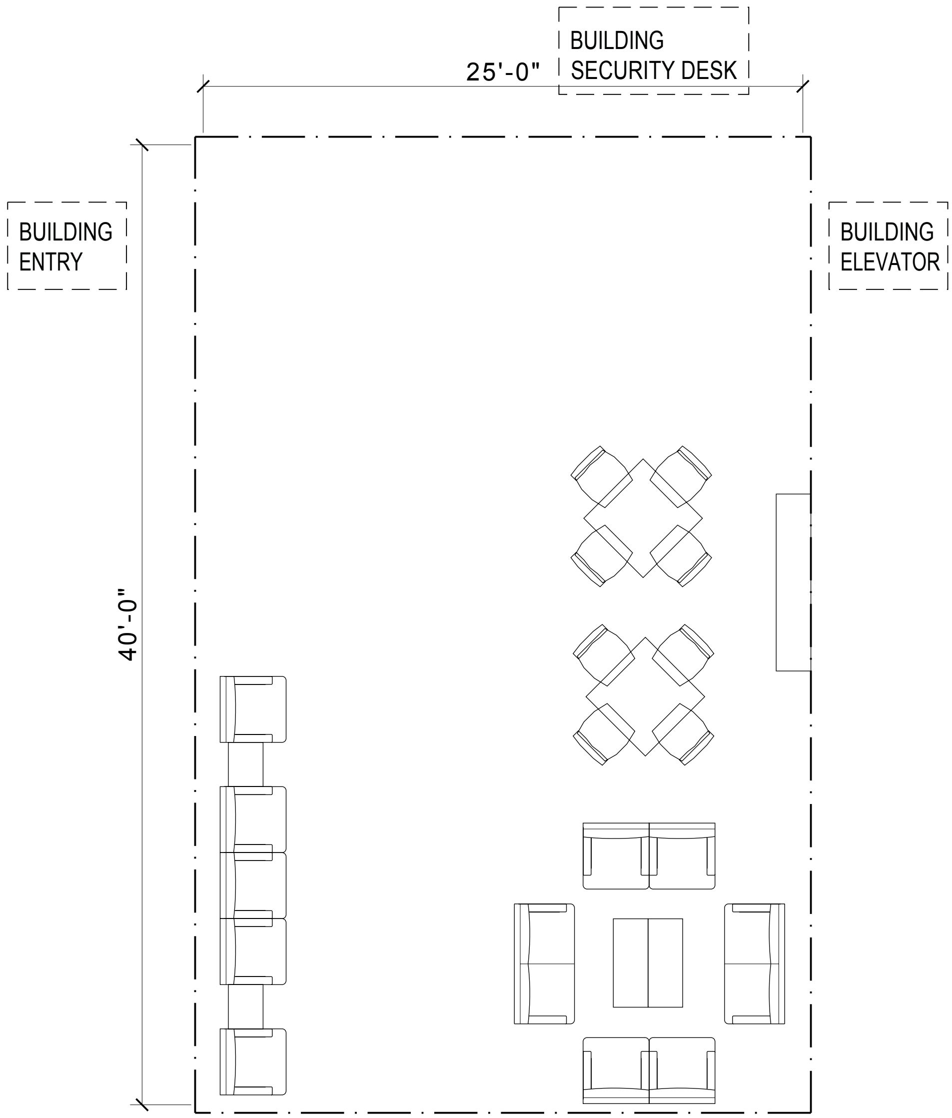
Special Requirements

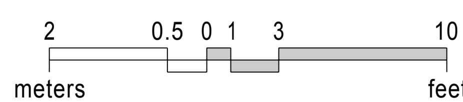
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.01 - Lobby Waiting Area - 1000 nasf





4.01.03 Loading Dock/Receiving Office

Department	Shared Support	Researcher	# of Occupants	1
Function			Area	150 NASF
Adjacencies				

Architectural

Floor: Carpet
Base: Rubber
Walls: Gypsum Wall Board
Wall Finish: Paint
Ceiling: Accoustic Ceiling Tile
Ceiling Height: 8'-0"
Door Size: 3'-0"

Casework

Wall Cabinets:
Base Cabinets:
Bench Top:
Bench Height:
Desktop: Wood- Certified
Shelving: Yes
Drawer Units: Yes

Furnishings

Window Treat: Yes
Proj. Screen: No
Desks: Yes
Chairs: Yes
Tables: Yes
Files: Yes
White Boards: Yes
Tack Boards: Yes
Other Furn.:

Plumbing

Sinks: None
Pure Water: NA
Hot / Cold Water: No
Floor Drain: No
Hose Bib: No
Waste: NA
Eyewash: No
Emerg Shower: No

Gases

Air No
Lab Gas No
CO2 No
Nitrogen No
Vacuum
Other Gas

Fire Protection

FP System Wet System
FP Detection Rate of Rise

HVAC

Total Air Changes Office Standard
Fresh Air Changes Office Standard
Pressure Not Critical
Temperature Office Standard
Relative Humidity Office Standard
Local Exhaust None
Air Filtration Office Standard
CO2 Sensor No
Other HVAC

Electrical

Power: 120v
Features:
Elec. Outlets: Wall Receptacle
Illumination: Office Standard
Fixtures: Fluorescent
Fixture Mounting: Pendant
Occupancy Sensors: Yes
Dimming Sensors: Yes
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets 1
Data Outlets 1
Network
Clocks No
Paging Systems No
Monitors/Alarms

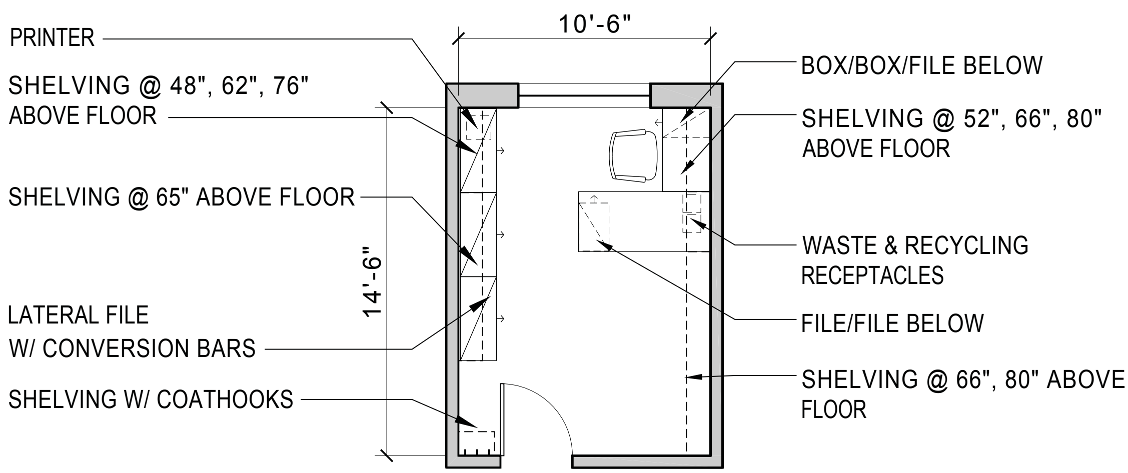
Special Requirements

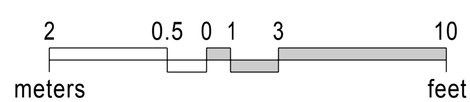
Light Controls Requires Natural Light
Visual Controls Visual Privacy Req.
Acoustic Controls
Structural Controls
Security Lockable
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.01.03 - Loading Dock Receiving Office - 150 nasf





4.05.03 50 P. Large Conference Room

Department	Shared Support	Researcher	# of Occupants	22
Function			Area	1000 NASF
Adjacencies				

Architectural

Floor:	Carpet- Low VOC
Base:	Carpet
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	10'-0"
Door Size:	3'-0"

Casework

Wall Cabinets:	None
Base Cabinets:	Wood- Certified
Bench Top:	Wood- Certified
Bench Height:	2'-10"
Desktop:	Wood- Certified
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	Yes
Proj. Screen:	Yes
Desks:	No
Chairs:	Yes
Tables:	Yes
Files:	No
White Boards:	Yes
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	No
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	80-100fc
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	2
# Data Outlets	4
Network	
Clocks	Yes
Paging Systems	No
Monitors/Alarms	

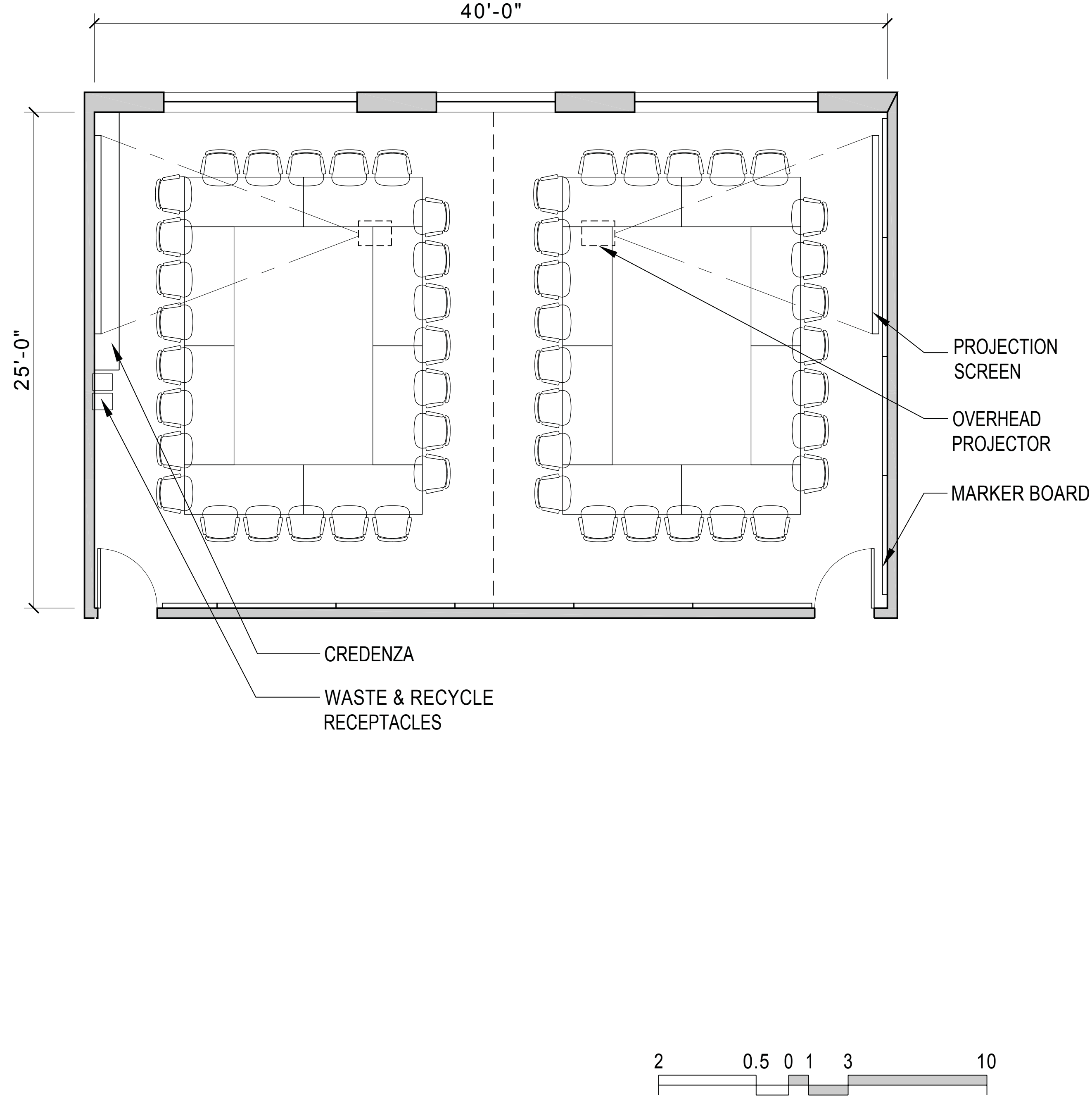
Special Requirements

Light Controls	Natural light desireable
Visual Controls	Views Desireable
Acoustic Controls	Noise Sensitivity
Structural Controls	
Security	Lockable
Shielding	No
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.03 - 50 P. Large Conference Room - 1000 nasf



4.05.04 15 P. Break Out Meeting Room

Department	Shared Support	Researcher	# of Occupants	17	
Function			Area	300	NASF
Adjacencies					

Architectural

Floor:	Carpet- Low VOC
Base:	Carpet
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	10'-0"
Door Size:	3'-0"

Casework

Wall Cabinets:	Wood- Certified
Base Cabinets:	Wood- Certified
Bench Top:	Wood- Certified
Bench Height:	3'-0"
Desktop:	Wood- Certified
Shelving:	Yes
Drawer Units:	No

Furnishings

Window Treat:	Yes
Proj. Screen:	No
Desks:	No
Chairs:	Yes
Tables:	Yes
Files:	No
White Boards:	Yes
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	No
Pure Water:	
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	2
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

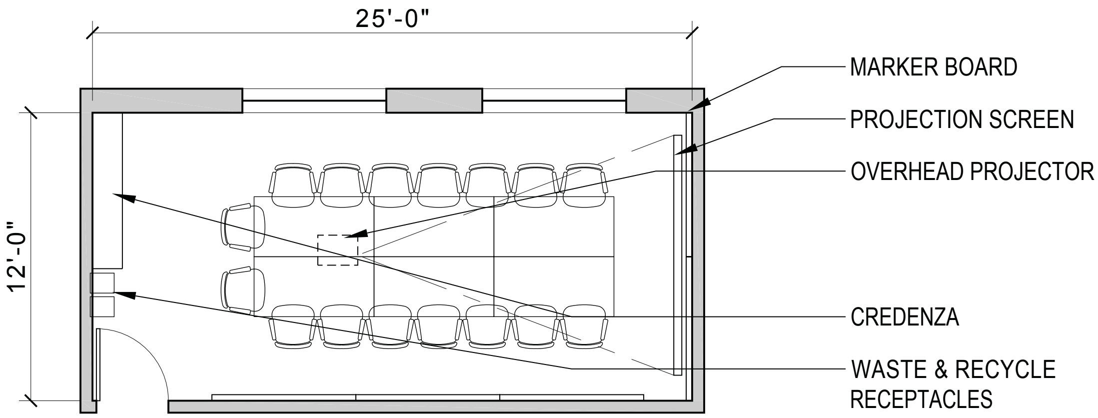
Special Requirements

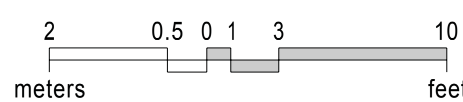
Light Controls	
Visual Controls	Visual Privacy Req.
Acoustic Controls	Noise Sensitivity
Structural Controls	
Security	
Shielding	No
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.04 - 15 P. Meeting/Committee - 300 nasf





4.05.05 10 P. Break Out Meeting Room

Department	Shared Support	Researcher	# of Occupants	12	
Function			Area	200	NASF
Adjacencies					

Architectural

Floor:	Carpet- Low VOC
Base:	Carpet
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	3'-0"

Casework

Wall Cabinets:	None
Base Cabinets:	Wood- Certified
Bench Top:	Wood- Certified
Bench Height:	2'-10"
Desktop:	Wood- Certified
Shelving:	Yes
Drawer Units:	No

Furnishings

Window Treat:	Yes
Proj. Screen:	Yes
Desks:	No
Chairs:	Yes
Tables:	Yes
Files:	No
White Boards:	Yes
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	No
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	No

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	80-100fc
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	1
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

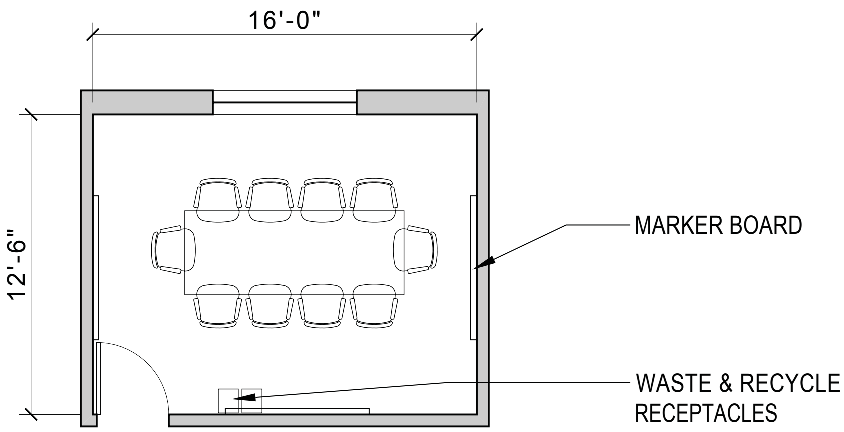
Special Requirements

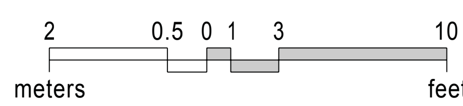
Light Controls	Natural light desireable
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Lockable
Shielding	
Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.05 - 10 P. Large Conference Room - 200 nasf





4.05.06 Break Room / Lounge

Department	Shared Support	Researcher	# of Occupants	22
Function			Area	250 NASF
Adjacencies				

Architectural

Floor:	Carpet- Low VOC
Base:	Carpet
Walls:	High Impact Wall Board
Wall Finish:	Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	3'-0"

Casework

Wall Cabinets:	Wood- Certified
Base Cabinets:	Wood- Certified
Bench Top:	Wood- Certified
Bench Height:	3'-0"
Desktop:	Wood- Certified
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	Yes
Proj. Screen:	No
Desks:	No
Chairs:	Yes
Tables:	Yes
Files:	No
White Boards:	No
Tack Boards:	Yes
Other Furn.:	

Plumbing

Sinks:	No
Pure Water:	
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Pendant
Occupancy Sensors:	Yes
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1
# Data Outlets	2
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	No

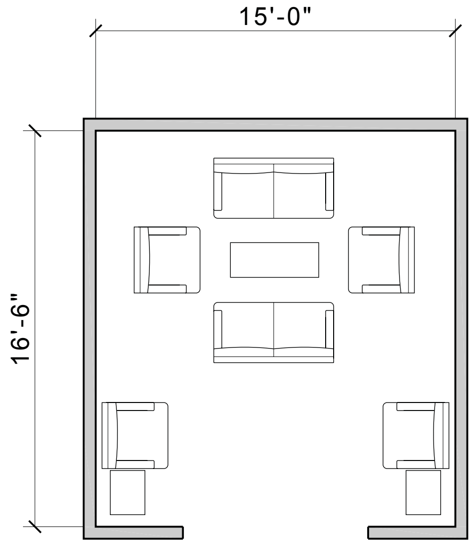
Special Requirements

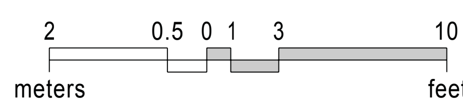
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.06 - Break Room Lounge - 250 nasf





4.05.07 Mail Room

Department	Shared Support	Researcher	# of Occupants		
Function			Area	200	NASF
Adjacencies					

Architectural

Floor:	Linoleum
Base:	Rubber
Walls:	High Impact Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-6"
Door Size:	3'-0"

Casework

Wall Cabinets:	Wood- Certified
Base Cabinets:	Wood- Certified
Bench Top:	Epoxy Resin
Bench Height:	3'-0"
Desktop:	None
Shelving:	Yes
Drawer Units:	Yes

Furnishings

Window Treat:	Yes- if exterior exposure
Proj. Screen:	No
Desks:	No
Chairs:	Yes
Tables:	No
Files:	No
White Boards:	Yes
Tack Boards:	No
Other Furn.:	Sorting table, mail totes

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Office Standard
Fresh Air Changes	Office Standard
Pressure	Not Critical
Temperature	Office Standard
Relative Humidity	Office Standard
Local Exhaust	
Air Filtration	Office Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	1 wall phone
# Data Outlets	1 wall jack
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

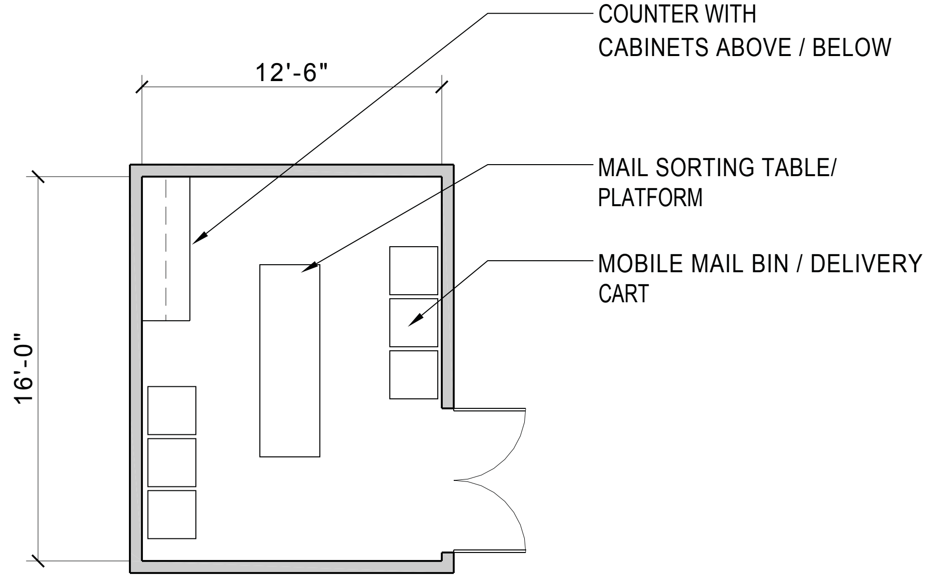
Special Requirements

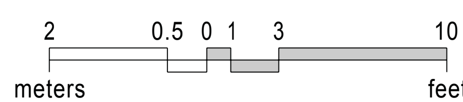
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.07 - Mail Room - 200 nasf





4.05.09 Loading Dock- 2 Bays General

Department	Shared Support	Researcher		# of Occupants	
Function				Area	1360 NASF
Adjacencies					

Architectural

Floor: Sealed Concrete
Base: Rubber
Walls: Concrete Masonry Units
Wall Finish: Paint
Ceiling: Accoustic Ceiling Tile
Ceiling Height: 12'-0"
Door Size: (dbl) 4'-0" x 8'-0" w/win

Casework

Wall Cabinets: No
Base Cabinets: No
Bench Top: No
Bench Height: NA
Desktop: No
Shelving: No
Drawer Units: No

Furnishings

Window Treat: No
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: Yes
Tack Boards: Yes
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: No
Hot / Cold Water: Yes
Floor Drain: Yes w/cover
Hose Bib: Yes
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum:
Other Gas: No

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: 4/hour
Fresh Air Changes: 4/hour
Pressure: Not Critical
Temperature:
Relative Humidity:
Local Exhaust:
Air Filtration:
CO2 Sensor: No
Other HVAC:

Electrical

Power: 120v + 208v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 50fc
Fixtures: Fluorescent
Fixture Mounting: Pendant
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets: 1
Data Outlets: 1
Network:
Clocks: No
Paging Systems: Yes
Monitors/Alarms:

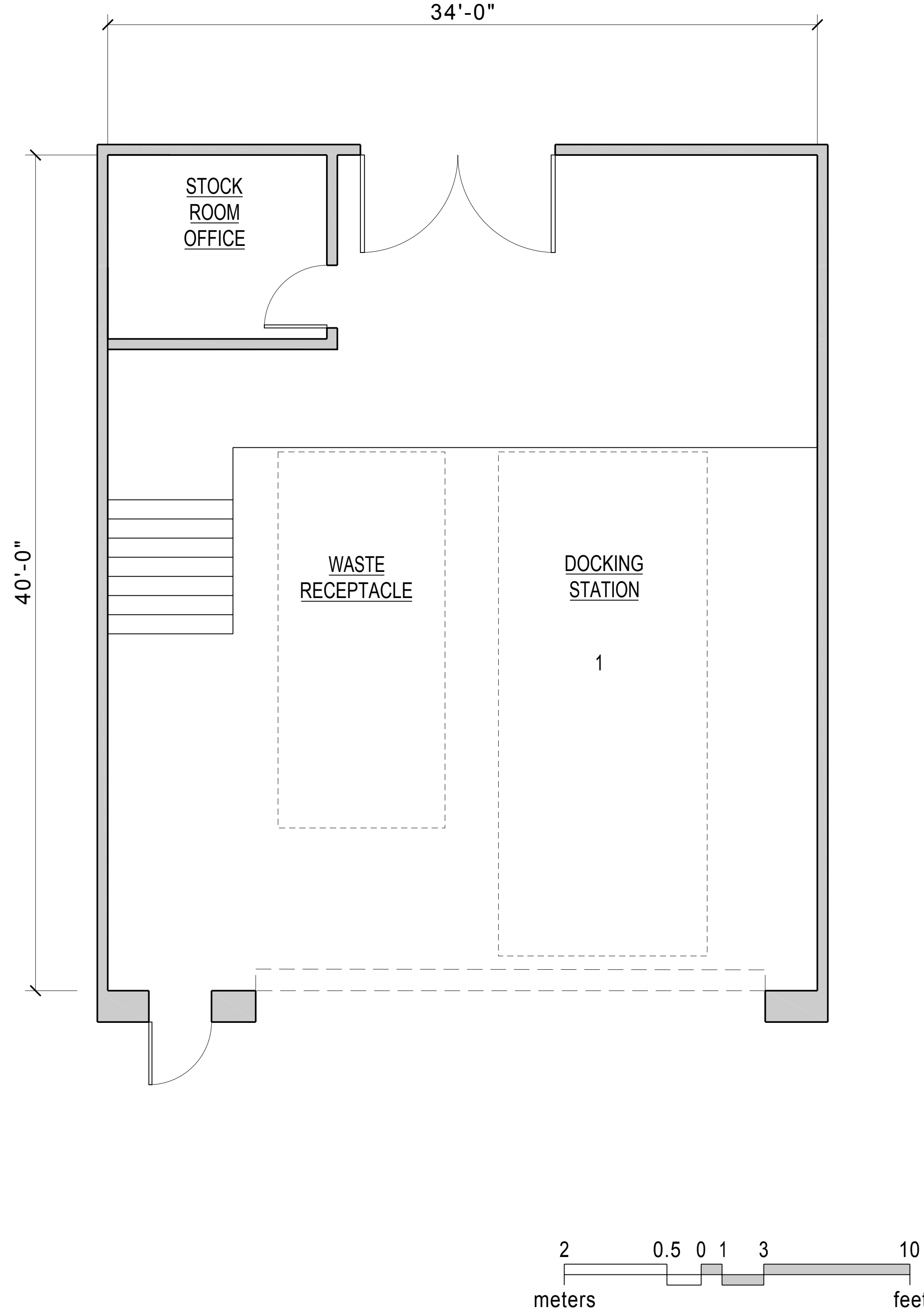
Special Requirements

Light Controls:
Visual Controls:
Acoustic Controls:
Structural Controls:
Security: Keypad-ext, CCTV cam
Shielding:
Other Spec Req:

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.09 - Loading Dock - 1,360 nasf



4.05.10 Loading Dock- 1 Bay Vivarium

Department	Shared Support	Researcher		# of Occupants	
Function				Area	1360 NASF
Adjacencies					

Architectural

Floor: Sealed Concrete
Base: Rubber
Walls: Concrete Masonry Units
Wall Finish: Paint
Ceiling: Accoustic Ceiling Tile
Ceiling Height: 12'-0"
Door Size: (dbl) 4'-0" x 8'-0" w/win

Casework

Wall Cabinets: No
Base Cabinets: No
Bench Top: No
Bench Height: NA
Desktop: No
Shelving: No
Drawer Units: No

Furnishings

Window Treat: No
Proj. Screen: No
Desks: No
Chairs: No
Tables: No
Files: No
White Boards: Yes
Tack Boards: Yes
Other Furn.:

Plumbing

Sinks: Stainless Steel
Pure Water: No
Hot / Cold Water: Yes
Floor Drain: Yes w/cover
Hose Bib: Yes
Waste:
Eyewash: No
Emerg Shower: No

Gases

Air: No
Lab Gas: No
CO2: No
Nitrogen: No
Vacuum:
Other Gas: No

Fire Protection

FP System: Wet System
FP Detection: Rate of Rise

HVAC

Total Air Changes: 4/hour
Fresh Air Changes: 4/hour
Pressure: Not Critical
Temperature:
Relative Humidity:
Local Exhaust:
Air Filtration:
CO2 Sensor: No
Other HVAC:

Electrical

Power: 120v + 208v
Features:
Elec. Outlets: Wall Receptacle
Illumination: 50fc
Fixtures: Fluorescent
Fixture Mounting: Pendant
Occupancy Sensors: Yes
Dimming Sensors: No
Switching: Yes
Task Light: No
Em. Power: No
UPS: No

Communications

Phone Outlets: 1
Data Outlets: 1
Network:
Clocks: No
Paging Systems: Yes
Monitors/Alarms:

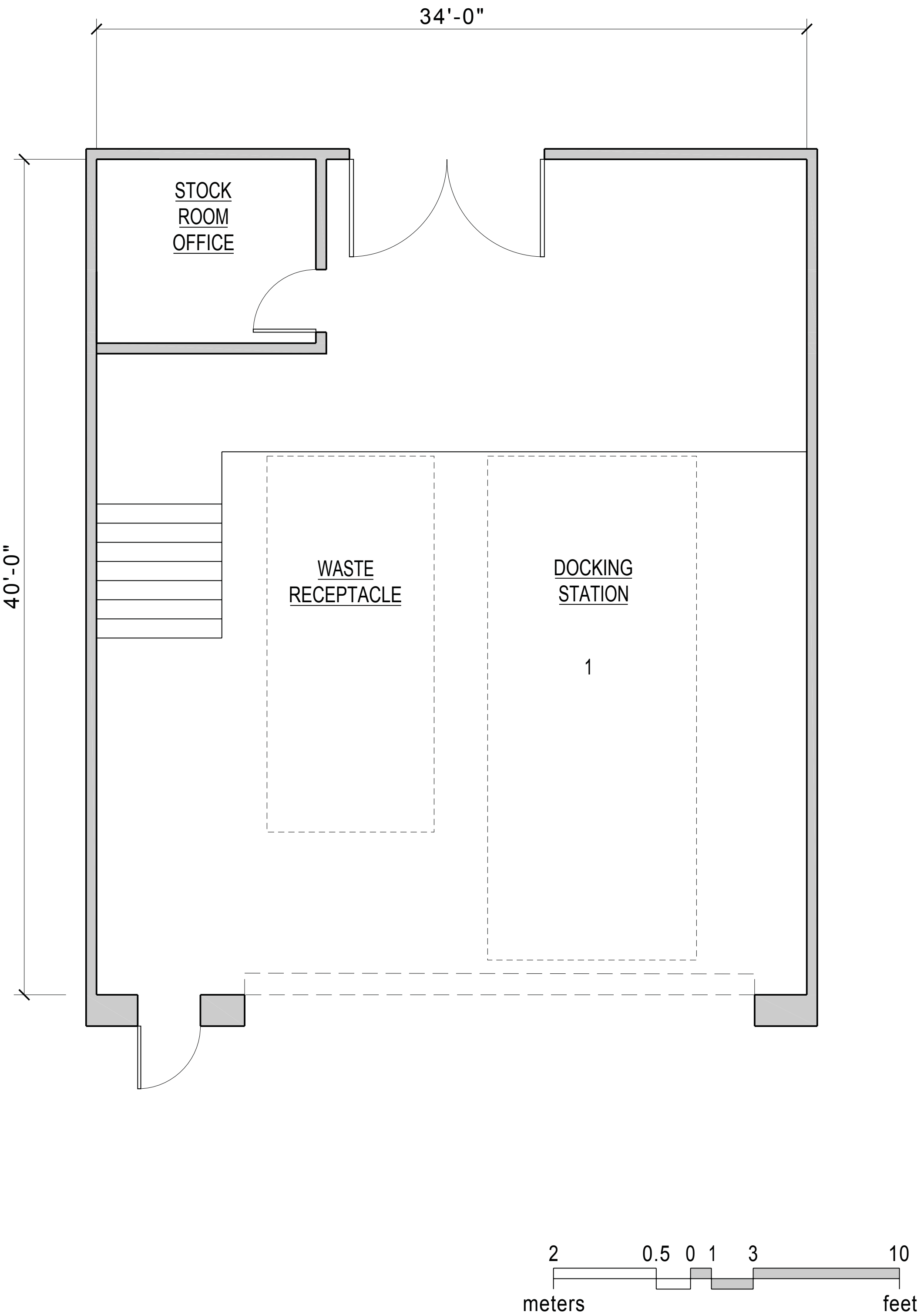
Special Requirements

Light Controls:
Visual Controls:
Acoustic Controls:
Structural Controls:
Security: Keypad-ext, CCTV cam
Shielding:
Other Spec Req:

Notes 1. Door width to be clear - no center post

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.10 - Loading Dock - 1,360 nasf



4.05.11 Chemical Storage

Department	Shared Support	Researcher		# of Occupants	
Function				Area	300 NASF
Adjacencies					

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Gypsum Board / Painted
Ceiling Height:	9'-0"
Door Size:	3'-0" double leaf

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	Flammable storage cabs

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	Yes- outside of room
Emerg Shower:	Yes- outside of room

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Negative
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	cabinet vents
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	Class I, Div 2
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Gasketed/WP Fluor.
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

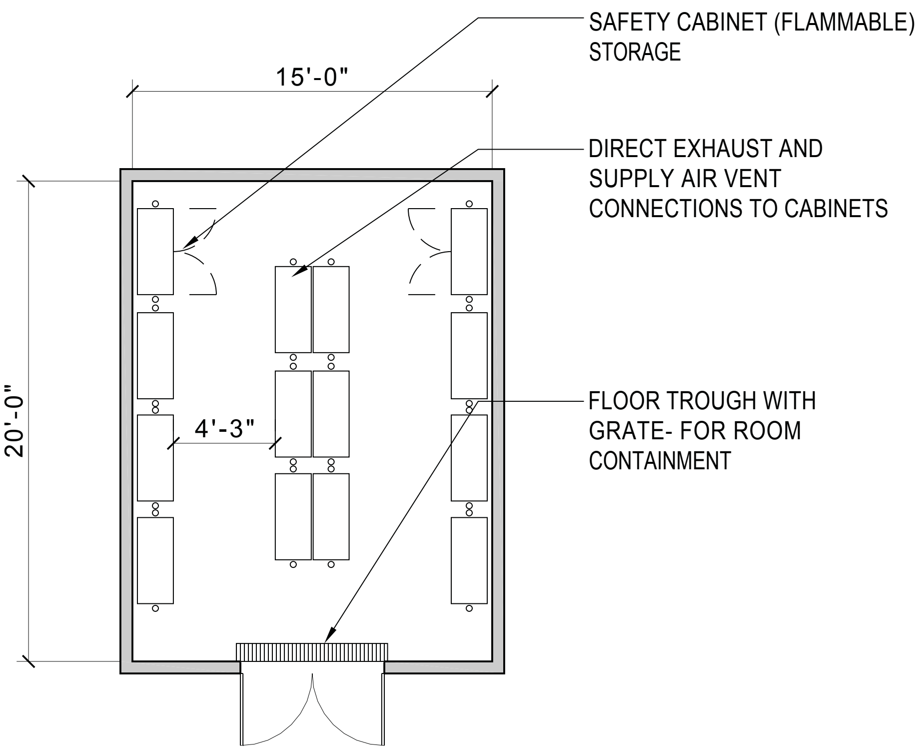
Special Requirements

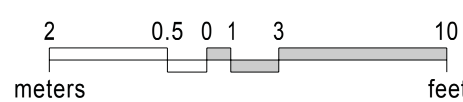
Light Controls	
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	
Shielding	
Other Spec Req	liquid containment req.

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.11 - Chemical Storage - 300 nasf





4.05.12 Waste Storage- Flammable

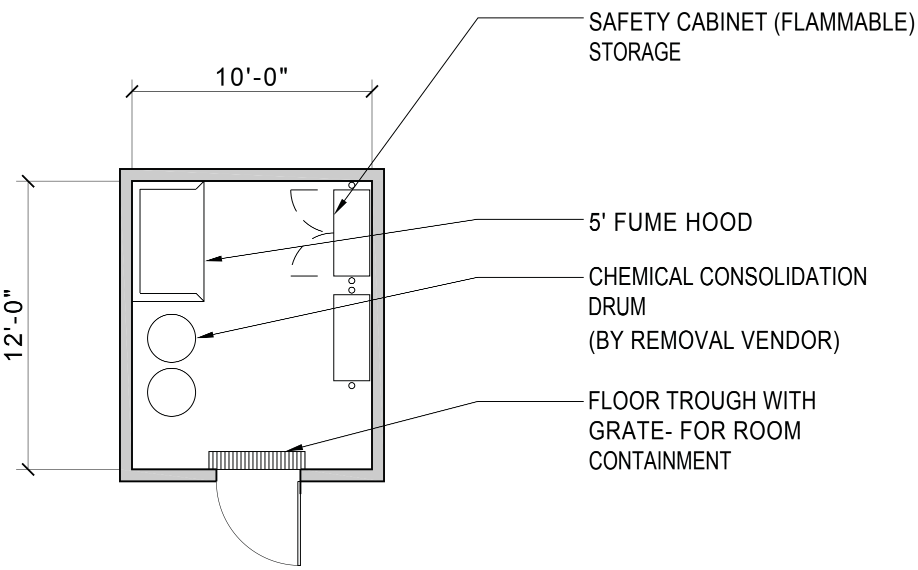
Department	Shared Support	Researcher		# of Occupants	
Function				Area	120 NASF
Adjacencies					

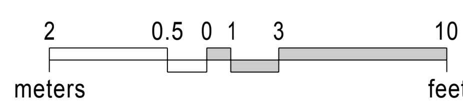
Architectural		Plumbing		Electrical	
Floor:	Epoxy	Sinks:	None	Power:	120v
Base:	Integral	Pure Water:	None	Features:	Class I, Div 2
Walls:	High Impact Wall Board	Hot / Cold Water:	No	Elec. Outlets:	Wall Receptacle
Wall Finish:	Specialty Epoxy Paint	Floor Drain:	No	Illumination:	50fc
Ceiling:	Gypsum Board / Painted	Hose Bib:	No	Fixtures:	Gasketed/WP Fluor.
Ceiling Height:	9'-0"	Waste:		Fixture Mounting:	Recessed
Door Size:	3'-6" (single leaf)	Eyewash:	Yes- outside of room	Occupancy Sensors:	No
		Emerg Shower:	Yes- outside of room	Dimming Sensors:	No
		Gases		Switching:	Yes
		Air	No	Task Light:	No
Casework		Lab Gas	No	Em. Power:	No
Wall Cabinets:	None	CO2	No	UPS:	No
Base Cabinets:	None	Nitrogen	No	***Communications***	
Bench Top:	None	Vacuum	No	# Phone Outlets	
Bench Height:	None	Other Gas		# Data Outlets	
Desktop:	None	***Fire Protection***		Network	
Shelving:	No	FP System	Wet System	Clocks	No
Drawer Units:	No	FP Detection	Rate of Rise	Paging Systems	No
Furnishings		***HVAC***		Monitors/Alarms	
Window Treat:	No	Total Air Changes	Lab Standard		
Proj. Screen:	No	Fresh Air Changes	Lab Standard	***Special Requirements***	
Desks:	No	Pressure	Negative	Light Controls	
Chairs:	No	Temperature	Lab Standard	Visual Controls	
Tables:	No	Relative Humidity	Lab Standard	Acoustic Controls	
Files:	No	Local Exhaust		Structural Controls	
White Boards:	No	Air Filtration	Lab Standard	Security	
Tack Boards:	No	CO2 Sensor	No	Shielding	
Other Furn.:		Other HVAC		Other Spec Req	

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes
Fume hood		1	5'									

4.05.12 - Waste Storage - Flammable- 120 nasf





4.05.13 Waste Storage- Biological

Department	Shared Support	Researcher	# of Occupants		
Function			Area	120	NASF
Adjacencies					

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-0"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	Yes- as furniture
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	wire shelving

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	Yes- outside the room
Emerg Shower:	Yes- outside the room

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Negative
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

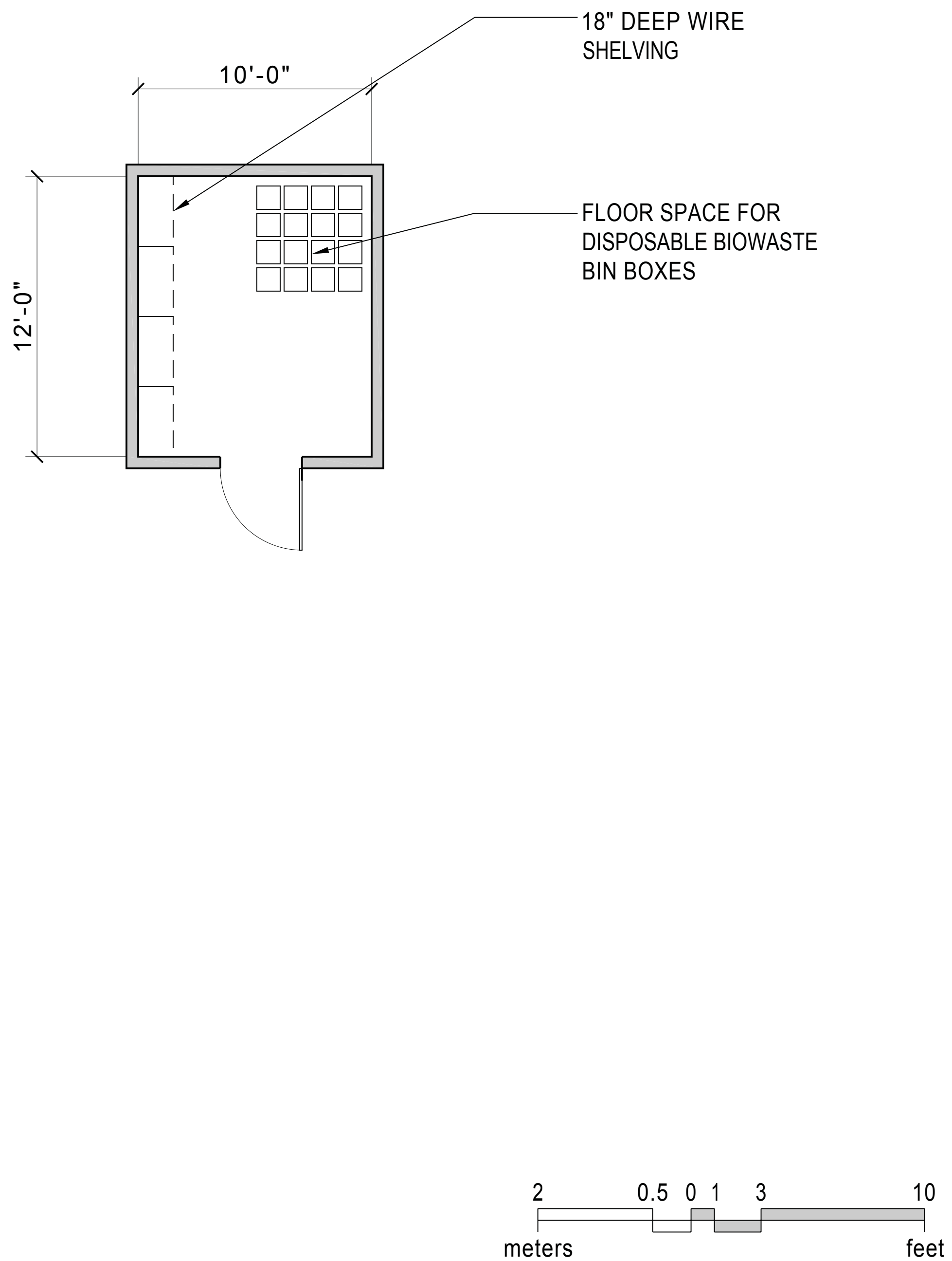
Special Requirements

Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.13 - Waste Storage - Biological- 120 nasf



4.05.14 Waste Storage- Radioactive

Department: Shared Support
Researcher:
# of Occupants:
Function:
Area: 80 NASF
Adjacencies:

Architectural

Floor:	Epoxy
Base:	Integral
Walls:	High Impact Wall Board
Wall Finish:	Specialty Epoxy Paint
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-0"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	Yes- as furniture
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	wire shelving units

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Negative
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	Yes
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

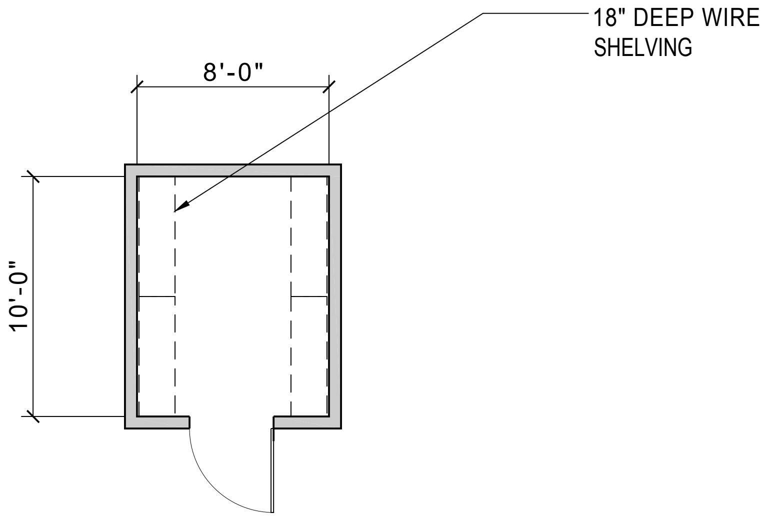
Special Requirements

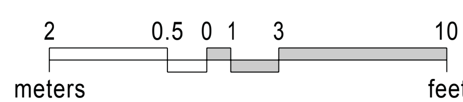
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.14 - Waste Storage - Radioactive- 80 nasf





4.05.15 Cylinder Storage- Full

Department	Shared Support	Researcher		# of Occupants	
Function				Area	120 NASF
Adjacencies					

Architectural

Floor:	Sealed Concrete
Base:	Rubber
Walls:	Concrete Masonry Units
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-0"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Negative
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	30fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	No
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

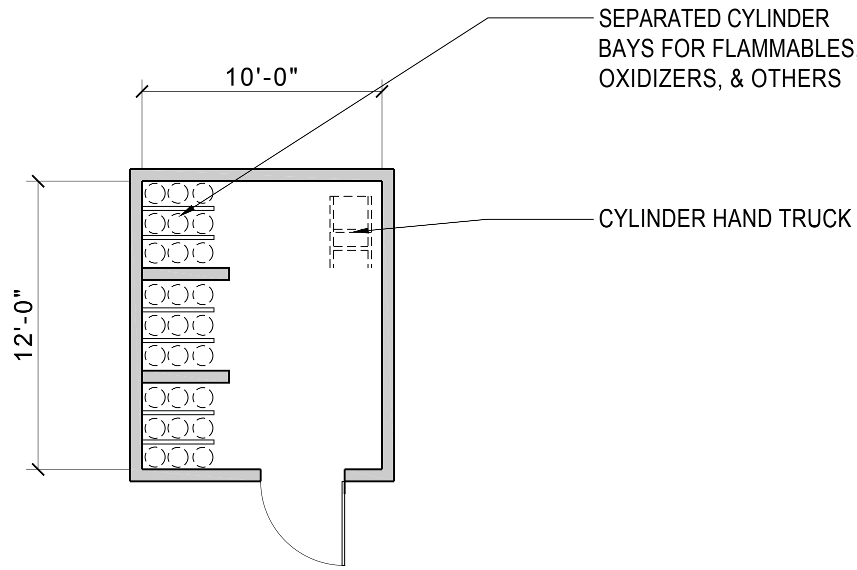
Special Requirements

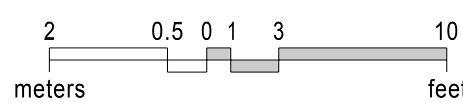
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size L	Size W	Size H	Size Wt	Electrical volts	Electrical amps	Plumbing	Exhaust	Heat Load	Notes

4.05.15 - Cylinder Storage- Full- 120 nasf





4.05.16 Cylinder Storage- Empty

Department	Shared Support	Researcher		# of Occupants	
Function				Area	120 NASF
Adjacencies					

Architectural

Floor:	Sealed Concrete
Base:	Rubber
Walls:	Concrete Masonry Units
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-0"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Wet System
FP Detection	Rate of Rise

HVAC

Total Air Changes	Lab Standard
Fresh Air Changes	Lab Standard
Pressure	Negative
Temperature	Lab Standard
Relative Humidity	Lab Standard
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v
Features:	
Elec. Outlets:	Wall Receptacle
Illumination:	30fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	No
Task Light:	No
Em. Power:	No
UPS:	No

Communications

# Phone Outlets	
# Data Outlets	
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

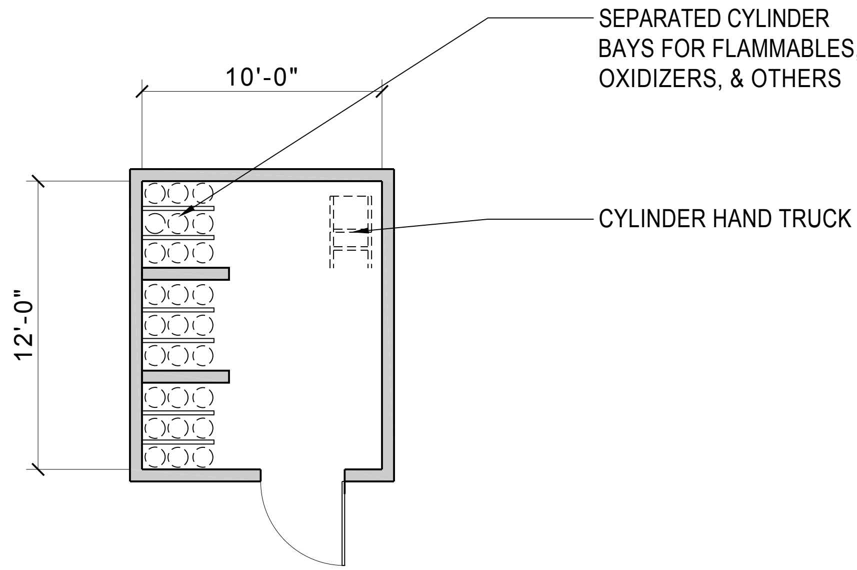
Special Requirements

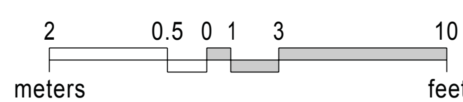
Light Controls
Visual Controls
Acoustic Controls
Structural Controls
Security
Shielding
Other Spec Req

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.16 - Cylinder Storage- Empty- 120 nasf





4.05.17 Locker/Shower

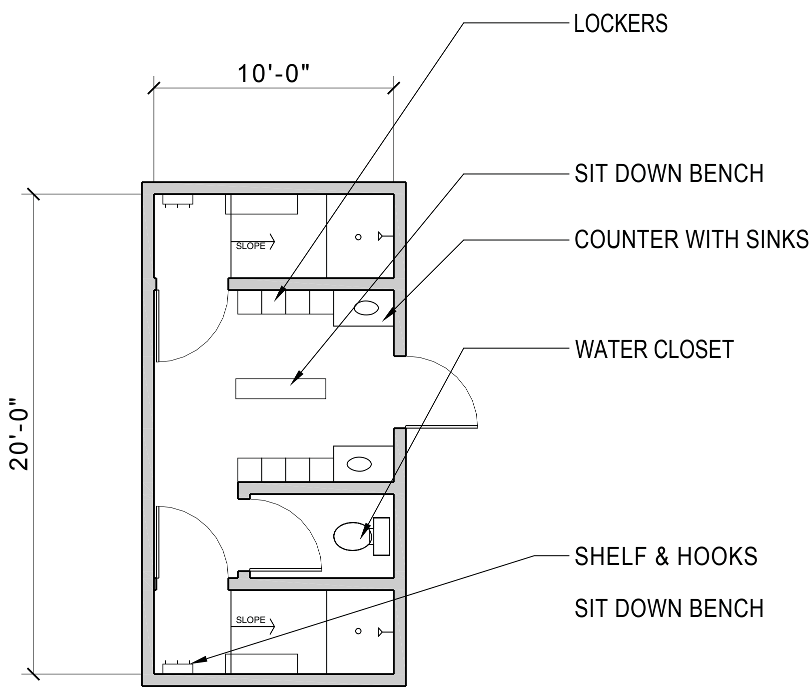
Department	Shared Support	Researcher	# of Occupants		
Function			Area	200	NASF
Adjacencies					

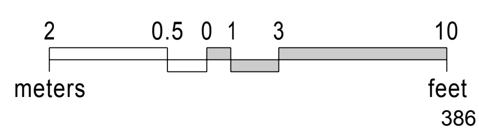
Architectural		***Plumbing***		***Electrical***	
Floor:	Rubber	Sinks:	Stainless Steel	Power:	120v
Base:	Rubber	Pure Water:	None	Features:	
Walls:	Ceramic Tile	Hot / Cold Water:	Yes	Elec. Outlets:	Wall Receptacle
Wall Finish:		Floor Drain:	Yes	Illumination:	50fc
Ceiling:	Susp. Vinyl Coated Tile	Hose Bib:	No	Fixtures:	Fluorescent
Ceiling Height:	9'-0"	Waste:		Fixture Mounting:	Recessed
Door Size:	3'-0"	Eyewash:	No	Occupancy Sensors:	No
		Emerg Shower:	No	Dimming Sensors:	No
		Gases		Switching:	Yes
		Air	No	Task Light:	Yes
Casework		Lab Gas	No	Em. Power:	Yes
Wall Cabinets:	None	CO2	No	UPS:	Yes
Base Cabinets:	None	Nitrogen	No	***Communications***	
Bench Top:	None	Vacuum	No	# Phone Outlets	
Bench Height:	None	Other Gas		# Data Outlets	
Desktop:	None	***Fire Protection***		Network	
Shelving:	No	FP System	Wet System	Clocks	No
Drawer Units:		FP Detection	Rate of Rise	Paging Systems	No
Furnishings		***HVAC***		Monitors/Alarms	
Window Treat:	No	Total Air Changes	Office Standard		
Proj. Screen:	No	Fresh Air Changes	Office Standard	***Special Requirements***	
Desks:	No	Pressure	Negative	Light Controls	
Chairs:	No	Temperature	Office Standard	Visual Controls	
Tables:	No	Relative Humidity	Office Standard	Acoustic Controls	
Files:	No	Local Exhaust		Structural Controls	
White Boards:	No	Air Filtration		Security	
Tack Boards:	No	CO2 Sensor	No	Shielding	
Other Furn.:		Other HVAC		Other Spec Req	

Notes

Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.17 - Locker/Shower - 200 nasf





4.05.18 Computer Server Room

Department	Shared Support	Researcher	# of Occupants		
Function			Area	200	NASF
Adjacencies					

Architectural

Floor:	Rubber- anti static
Base:	Rubber
Walls:	Gypsum Wall Board
Wall Finish:	Paint- Low VOC
Ceiling:	Accoustic Ceiling Tile
Ceiling Height:	9'-0"
Door Size:	3'-6" (single leaf)

Casework

Wall Cabinets:	None
Base Cabinets:	None
Bench Top:	None
Bench Height:	None
Desktop:	None
Shelving:	No
Drawer Units:	No

Furnishings

Window Treat:	No
Proj. Screen:	No
Desks:	No
Chairs:	No
Tables:	No
Files:	No
White Boards:	No
Tack Boards:	No
Other Furn.:	

Plumbing

Sinks:	None
Pure Water:	None
Hot / Cold Water:	No
Floor Drain:	No
Hose Bib:	No
Waste:	
Eyewash:	No
Emerg Shower:	No

Gases

Air	No
Lab Gas	No
CO2	No
Nitrogen	No
Vacuum	No
Other Gas	

Fire Protection

FP System	Dry System
FP Detection	Other

HVAC

Total Air Changes	Equip Rm Standard
Fresh Air Changes	Equip Rm Standard
Pressure	Positive
Temperature	Equip Rm Standard
Relative Humidity	Equip Rm Standard
Local Exhaust	
Air Filtration	Lab Standard
CO2 Sensor	No
Other HVAC	

Electrical

Power:	120v + 208v
Features:	Filtered Supply
Elec. Outlets:	Surf. Mount. Raceway
Illumination:	50fc
Fixtures:	Fluorescent
Fixture Mounting:	Recessed
Occupancy Sensors:	No
Dimming Sensors:	No
Switching:	No
Task Light:	No
Em. Power:	Yes
UPS:	Yes

Communications

# Phone Outlets	1 wall phone
# Data Outlets	as required
Network	
Clocks	No
Paging Systems	No
Monitors/Alarms	

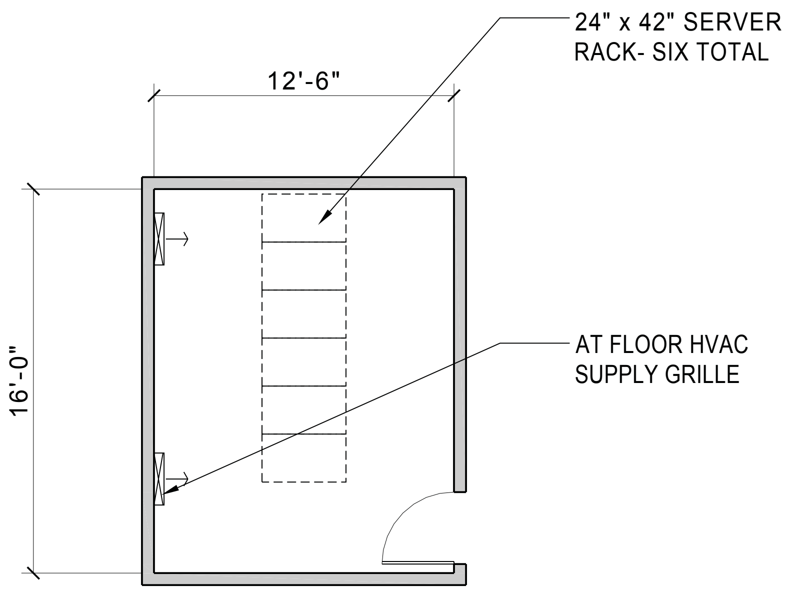
Special Requirements

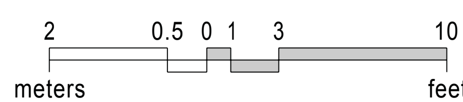
Light Controls	
Visual Controls	
Acoustic Controls	
Structural Controls	
Security	Closed Circuit TV
Shielding	Yes
Other Spec Req	

Notes

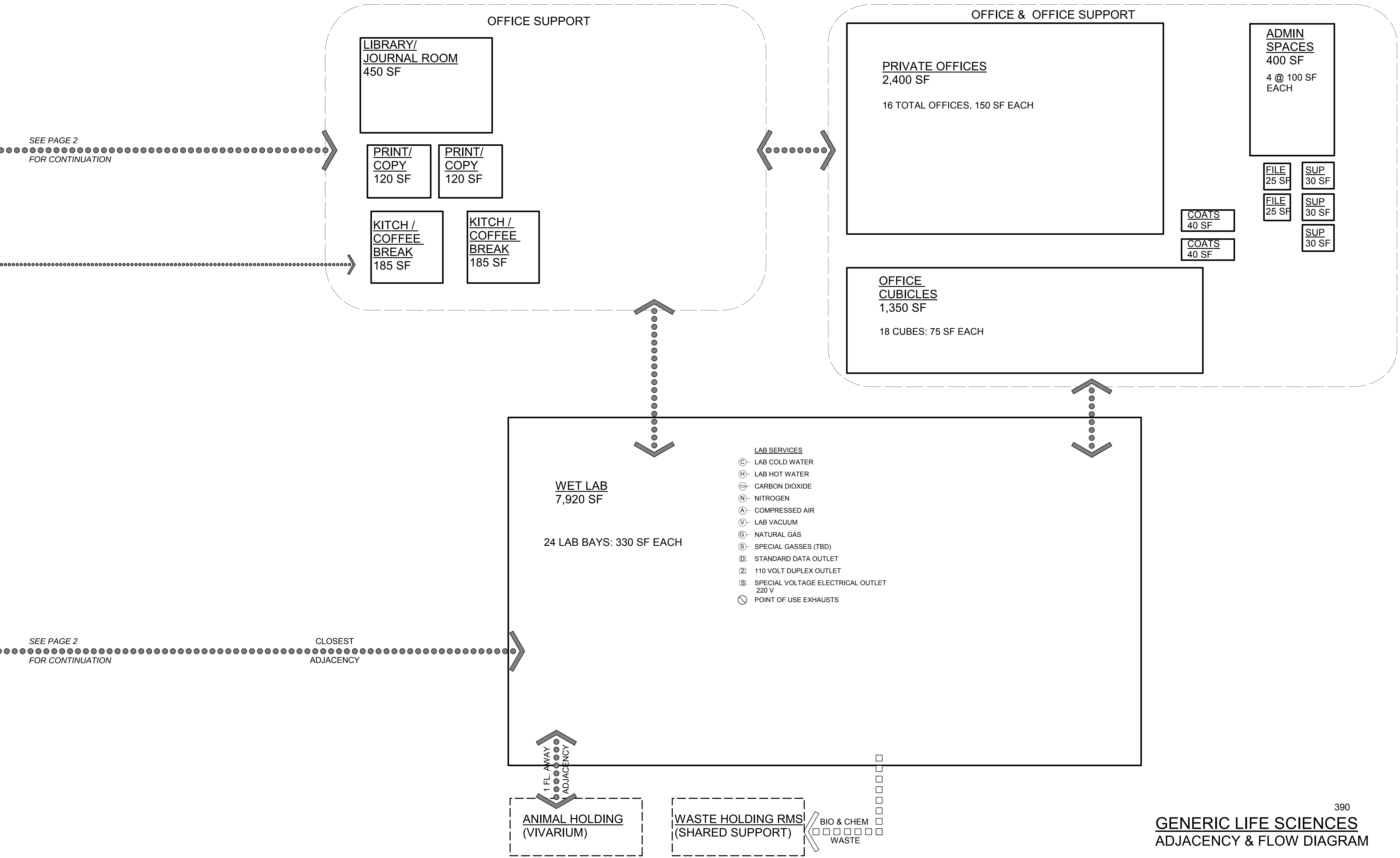
Item	Status	Qty	Size				Electrical		Plumbing	Exhaust	Heat Load	Notes
			L	W	H	Wt	volts	amps				

4.05.18 - Computer Server Room - 200 nasf

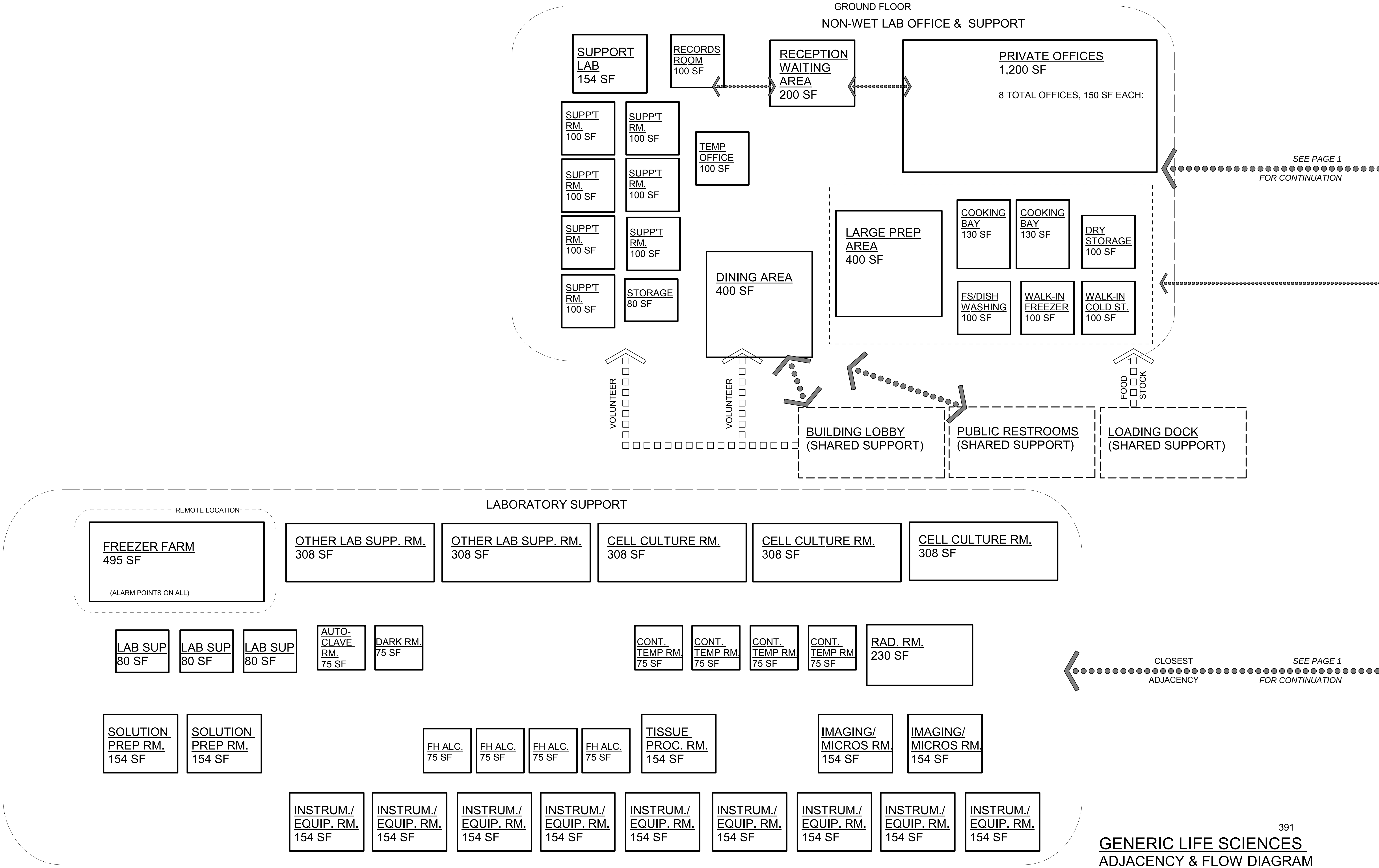




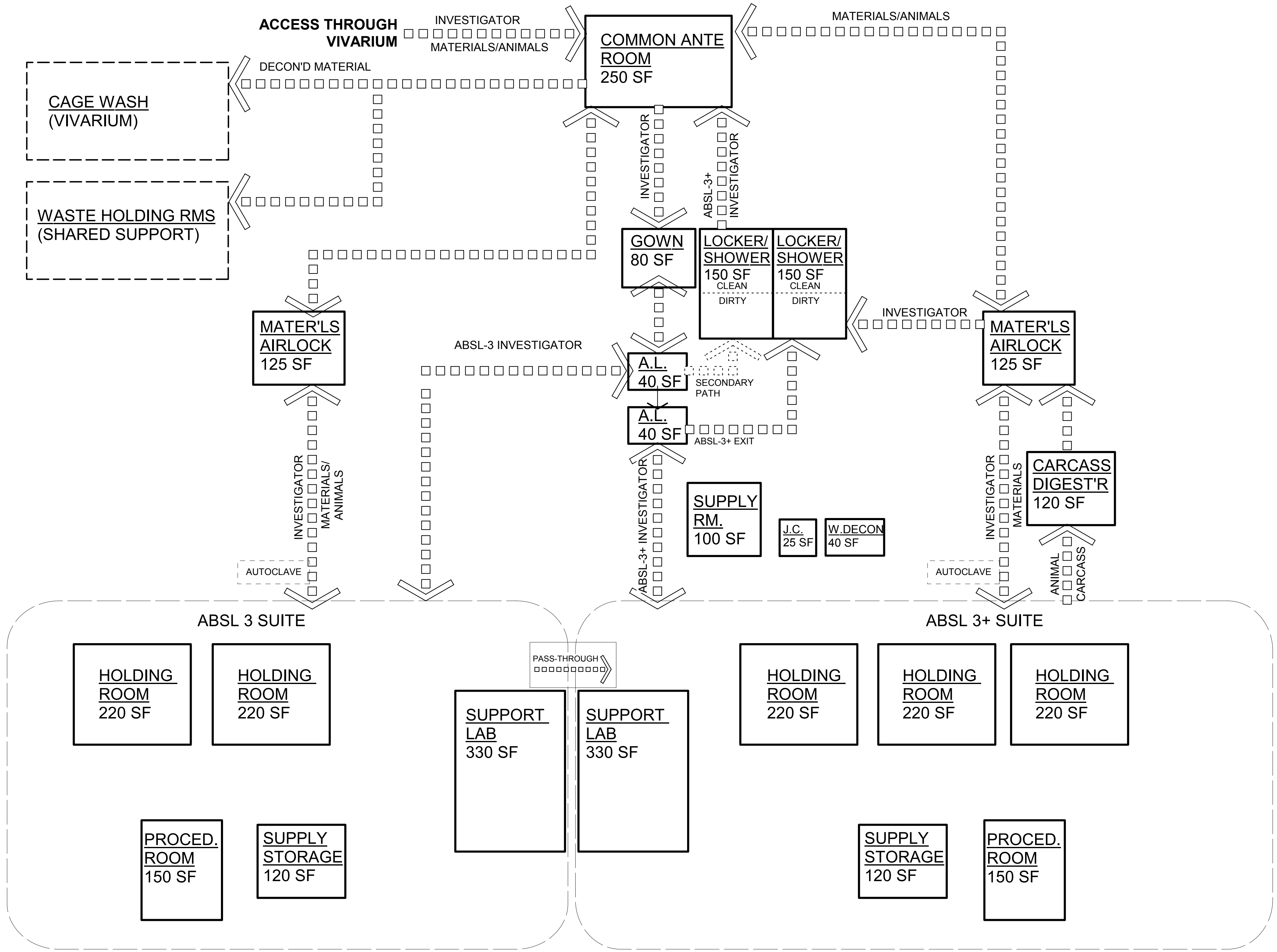
4.4 adjacency & relationship diagrams



GENERIC LIFE SCIENCES
ADJACENCY & FLOW DIAGRAM



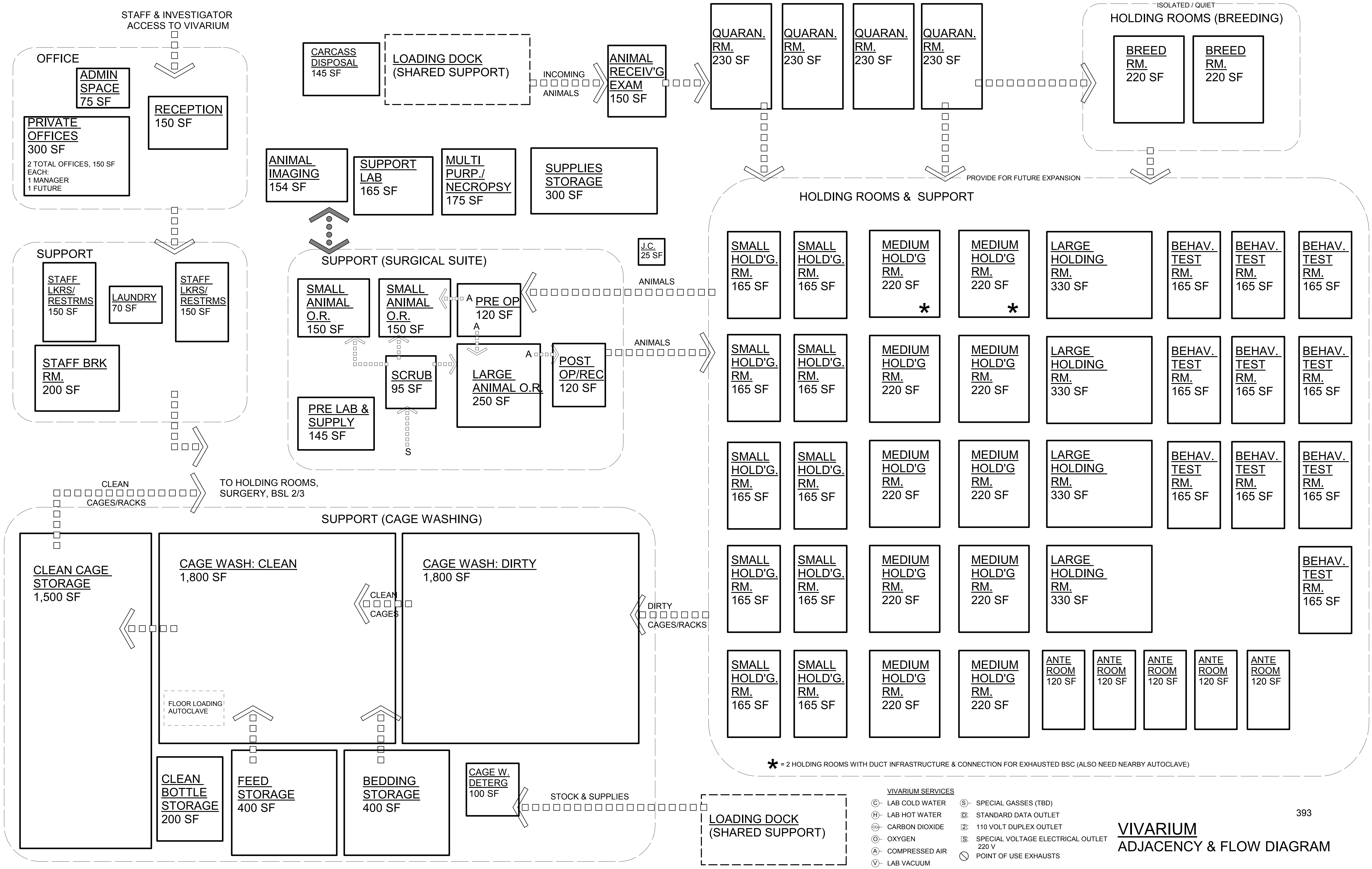
GENERIC LIFE SCIENCES
ADJACENCY & FLOW DIAGRAM



ABSL / VIVARIUM SERVICES

- (C) LAB COLD WATER
- (H) LAB HOT WATER
- (CO_2) CARBON DIOXIDE
- (O) OXYGEN
- (A) COMPRESSED AIR
- (V) LAB VACUUM
- (S) SPECIAL GASSES (TBD)
- (D) STANDARD DATA OUTLET
- (2) 110 VOLT DUPLEX OUTLET
- (S) SPECIAL VOLTAGE ELECTRICAL OUTLET 220 V
- POINT OF USE EXHAUSTS

BIOCONTAINMENT RESEARCH
ADJACENCY & FLOW DIAGRAM



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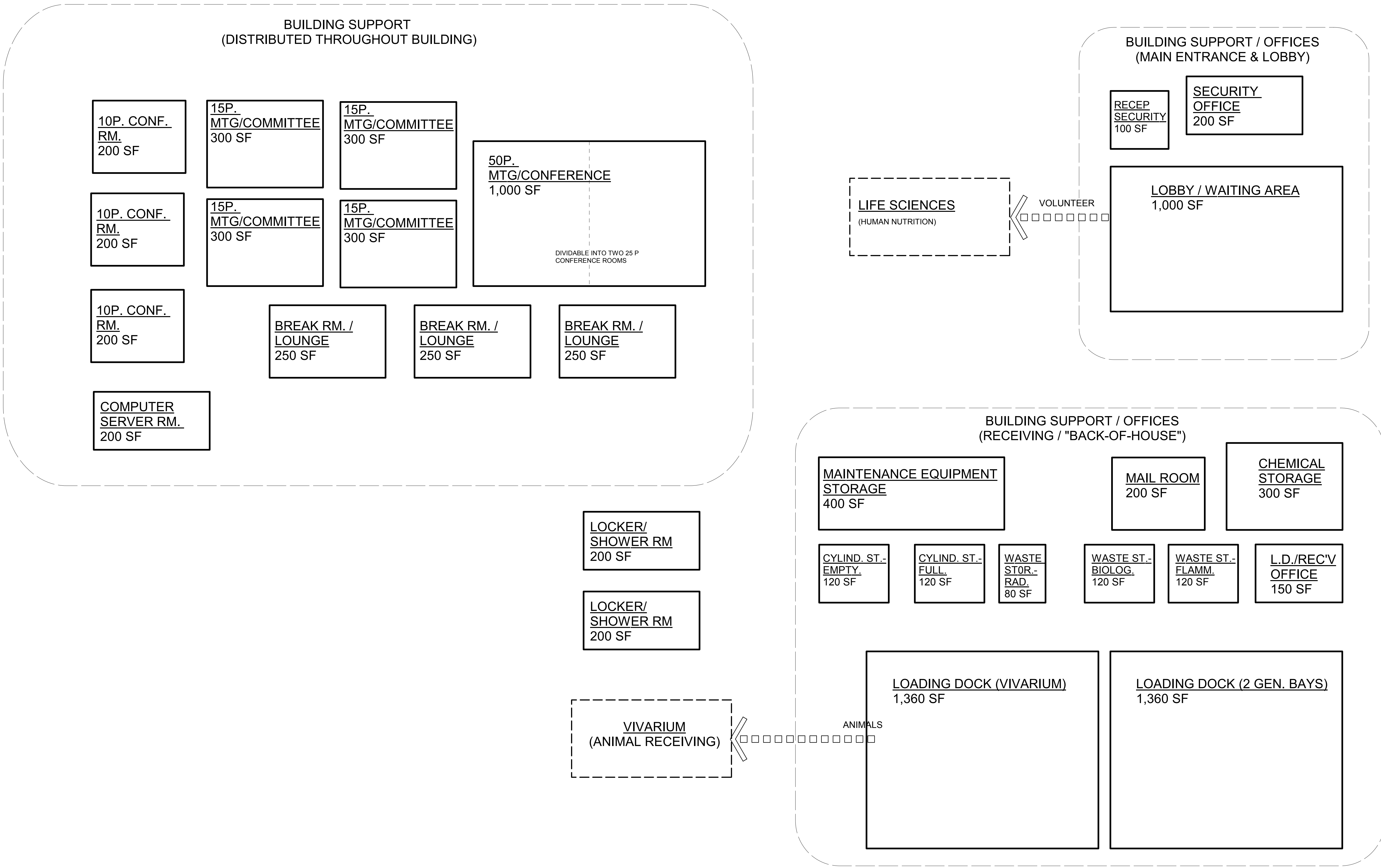
VIVARIUM
ADJACENCY & FLOW DIAGRAM



SHARED SUPPORT
ADJACENCY & FLOW DIAGRAM

05

building cost summary

5.1 building cost summary

5.1 Building Cost Summary

The construction cost estimate on the following pages has been prepared to reflect the anticipated cost of the proposed USTAR Building at Utah State University. This construction cost estimate on the following pages is based on the Programmatic Information included in this document, including LEED Gold design requirements, commissioning, certification, and measurement and pricing of quantities wherever information has been provided. Unit rates have been obtained from historical records, along with discussions with contractors. The unit rates provided include labor, material and equipment that reflect current bid costs in the Logan, Utah area. All subcontractor unit rates include the individual subcontractor's overhead and profit, unless stated otherwise.

Exclusions

The following items are excluded:

-Land acquisition costs
-Financing charges and expenses
-Site related environmental abatement measures
-Project phasing costs
-Limited/restricted working hours

Items Affecting the Construction Cost Estimate

The following items may change the estimated costs, and are not limited to:

-Unforeseen or hidden site utility conditions and capacities
-Modifications to the scope of work represented by this construction cost estimate

Assumptions

The following assumptions have been made:

-Construction takes place during normal working hours
-The CM/GC and subcontractors will have sufficient / temporary site staging and site storage within or adjacent to the vicinity of the construction.

Escalation

This construction cost estimate reflects current costs. Escalation has been included to represent an anticipated bid date of Spring 2009.

Contingencies

This construction cost estimate reflects a design contingency of 10%, to allow for items not included in the program documentation undefined at this stage of project development.

This construction cost estimate has been based on a competitive open bid situation with a maximum of 3 bidders for all items of subcontracted work. Please note that Parametrix has no control over the costs of labor, materials, equipment, contractor's methods, or the current competitive bidding market. This represents Parametrix's best judgement as a professional construction consultant. Parametrix does not guarantee the proposals, bids or the overall construction cost will not vary from the estimated construction costs provided within this program document.

5.2 construction cost estimate

CONSTRUCTION COST ESTIMATE

MASTER SUMMARY

SECTION	AREA	UNIT	COST/SF	COST
CURRENT CONSTRUCTION COST:				
SITE				$3,008,088
BUILDING	100,648	GSF	453.58	$45,652,353
TOTAL (Construction)				$48,660,441

NOTES: Costs are for Construction only.
Costs are Based on a Competitive Bid Basis.
Costs are Based on a Construction Start of Spring 2009.

CONSTRUCTION COST ESTIMATE

SITE SUMMARY

SECTION		AREA	UNIT	COST/SF	COST
SITE					$2,088,950
SUB TOTAL					$2,088,950
GENERAL CONDITIONS	8.0%				$167,116
BONDING	1.0%				$20,890
OVERHEAD & PROFIT	7.0%				$146,227
SUB TOTAL					$2,423,182
DESIGN CONTINGENCY	10.0%				$208,895
INFLATION TO BID DATE (Spring 2009)	18.0%				$376,011
TOTAL (Construction)					$3,008,088

NOTES: Costs are for Construction only.
Costs are Based on a Competitive Bid Basis.
Costs are Based on a Construction Start of Spring 2009.

CONSTRUCTION COST ESTIMATE

S I T E   D E T A I L

SECTION	QUANTITY	UNIT	UNIT COST	COST
SITE				
ON-SITE				
Clear & Grade	130,000	SF	1.00	$130,000
Landscaping & Irrigation	35,800	SF	8.00	$286,400
Asphalt Paving	53,200	SF	4.00	$212,800
Concrete Paving	13,500	SF	10.00	$135,000
Site Specialties	1	LS	200,000	$200,000
Natural Gas Line	450	LF	25.00	$11,250
Sanitary Sewer Line	450	LF	70.00	$31,500
Storm Sewer Line	3,750	LF	60.00	$225,000
Storm Water Detention	1	LS	350,000	$350,000
Fire Line	450	LF	100.00	$45,000
Culinary Water Line	1,800	LF	85.00	$153,000

CONSTRUCTION COST ESTIMATE

SITE DETAIL

SECTION		QUANTITY	UNIT	UNIT COST	COST
SITE - Continued					
ON-SITE - Continued					
Power Ductbank		300	LF	225.00	$67,500
Telecom Ductbank		850	LF	90.00	$76,500
High Voltage Switch		1	EA	65,000	$65,000
Site Lighting		1	LS	100,000	$100,000
					$2,088,950
SUB TOTAL					$2,088,950
GENERAL CONDITIONS	8.0%				$167,116
BONDING	1.0%				$20,890
OVERHEAD & PROFIT	7.0%				$146,227
SUB TOTAL					$2,423,182
DESIGN CONTINGENCY	10.0%				$208,895
INFLATION TO BID DATE (Spring 2009)	18.0%				$376,011
TOTAL (Construction)					$3,008,088

NOTES: Costs are for Construction only.
Costs are Based on a Competitive Bid Basis.
Costs are Based on a Construction Start of Spring 2009.

CONSTRUCTION COST ESTIMATE

B U I L D I N G   S U M M A R Y

SECTION		AREA	UNIT	COST/SF	COST
ARCHITECTURAL		100,648	GSF	114.51	$11,524,782
STRUCTURAL		100,648	GSF	59.80	$6,019,093
MECHANICAL		100,648	GSF	102.90	$10,356,280
ELECTRICAL		100,648	GSF	37.78	$3,802,868
SUB TOTAL		100,648	GSF	314.99	$31,703,023
GENERAL CONDITIONS	8.0%				$2,536,242
BONDING	1.0%				$317,030
OVERHEAD & PROFIT	7.0%				$2,219,212
SUB TOTAL		100,648	GSF	365.39	$36,775,507
DESIGN CONTINGENCY	10.0%				$3,170,302
INFLATION TO BID DATE (Spring 2009)	18.0%				$5,706,544
TOTAL (Construction)		100,648	GSF	453.58	$45,652,353

NOTES: Costs are for Construction only.
Costs are Based on a Competitive Bid Basis.
Costs are Based on a Construction Start of Spring 2009.

CONSTRUCTION COST ESTIMATE

BUILDING DETAIL

SECTION	QUANTITY	UNIT	UNIT COST	COST
ARCHITECTURAL				
ROOF				
Membrane Roofing System, Rigid Insul & Flashings	25,162	SF	11.00	$276,782
Skylight System	1,200	SF	100.00	$120,000
			3.94	$396,782
EXTERIOR WALLS				
Foundation Dampproofing w/ Rigid Insulation	3,440	SF	4.00	$13,760
Brick/Precast Veneer, Metal Studs, Batt Insul, Gyp Bd	43,860	SF	36.00	$1,578,960
Metal Panels, Metal Studs, Batt Insulation & Gypsum Board (Penthouse)	14,620	SF	30.00	$438,600
			20.18	$2,031,320
INTERIOR WALLS				
Metal Studs, Sound Insulation & Gypsum Board	95,040	SF	10.00	$950,400
			9.44	$950,400
DOORS AND WINDOWS				
Aluminum Windows / Curtainwall w/ Glass	23,390	SF	70.00	$1,637,300
Sun Shading Devices	2,580	SF	90.00	$232,200
Man Doors w/ Hardware	336	LEAF	1,500	$504,000
			23.58	$2,373,500

CONSTRUCTION COST ESTIMATE

BUILDING DETAIL

SECTION	QUANTITY	UNIT	UNIT COST	COST
ARCHITECTURAL - Continued				
FINISHES				
Floor Finishes	100,648	SF	7.00	$704,536
Wall Finishes	223,710	SF	2.00	$447,420
Ceiling Finishes	100,648	SF	5.50	$553,564
			16.95	$1,705,520
SPECIALTIES				
Cabinets	1,320	LF	315.00	$415,800
Bath Accessories	12	EA	4,200	$50,400
Misc Specialties	100,648	SF	2.50	$251,620
			7.13	$717,820
EQUIPMENT				
Lab Equipment	100,648	SF	28.00	$2,818,144
Misc Equipment	100,648	SF	2.00	$201,296
			30.00	$3,019,440
CONVEYING SYSTEM				
Elevators	10	STOP	33,000	$330,000
			3.28	$330,000

CONSTRUCTION COST ESTIMATE

BUILDING DETAIL

SECTION	QUANTITY	UNIT	UNIT COST	COST
STRUCTURAL				
FOUNDATION				
Excavation and Backfill, Foundation	4,025	CY	23.00	$92,575
Concrete Piles / Piers with Caps, Reinf	25,162	SF	30.00	$754,860
Concrete Grade Beams / Foundation Walls, Reinf	415	CY	500.00	$207,500
			10.48	$1,054,935
FLOORS				
Concrete Slab on Grade w/ Reinf	25,162	SF	6.00	$150,972
Concrete Pan Joist System w/ Reinf	75,486	SF	42.00	$3,170,412
Steel Pan Stairs w/ Railings	14	FLT	22,000	$308,000
			36.06	$3,629,384
COLUMNS				
Concrete Columns	100,648	SF	5.00	$503,240
			5.00	$503,240
ROOF				
Steel Structure, Decking & Fireproofing	25,162	SF	27.00	$679,374
			6.75	$679,374
INTERIOR WALLS				
CMU Interior Walls	9,510	SF	16.00	$152,160
			1.51	$152,160

CONSTRUCTION COST ESTIMATE

BUILDING DETAIL

SECTION	QUANTITY	UNIT	UNIT COST	COST
MECHANICAL				
FIRE PROTECTION				
Fire Sprinkler System	100,648	SF	3.50	$352,268
			3.50	$352,268
PLUMBING				
Plumbing Fixtures w/ Piping	224	EA	3,700	$828,800
Plumbing Equipment & Specialties	100,648	SF	2.50	$251,620
Lab Piping System	100,648	SF	6.00	$603,888
			16.73	$1,684,308
HVAC				
HVAC Ductwork & Insulation	120,780	LB	8.00	$966,240
HVAC Grilles, Registers & Diffusers	1,260	EA	140.00	$176,400
HVAC VAV Boxes	185	EA	1,800	$333,000
HVAC Equipment	100,648	SF	30.00	$3,019,440
HVAC Piping & Specialties	100,648	SF	11.00	$1,107,128
HVAC Control System	100,648	SF	6.50	$654,212
Lab Systems	100,648	SF	17.00	$1,711,016
Test, Balance & Commissioning	100,648	SF	3.50	$352,268
			82.66	$8,319,704

CONSTRUCTION COST ESTIMATE

B U I L D I N G   D E T A I L

SECTION		QUANTITY	UNIT	UNIT COST	COST
ELECTRICAL					
ELECTRICAL					
Light Fixtures		1,680	EA	265.00	$445,200
Devices (Outlets & Switches)		2,520	EA	85.00	$214,200
Gear (Panels & Transformers)		100,648	SF	4.50	$452,916
Emergency Generator		1	EA	200,000	$200,000
UPS System		1	EA	75,000	$75,000
Feeder & Branch Circuitry		100,648	SF	8.50	$855,508
Fire Alarm System		100,648	SF	2.00	$201,296
Phone / Data System		100,648	SF	3.50	$352,268
Security System		100,648	SF	4.00	$402,592
Special Systems		100,648	SF	5.00	$503,240
Electrical Specialties		100,648	SF	1.00	$100,648
				37.78	$3,802,868
SUB TOTAL		100,648	GSF	314.99	$31,703,023
GENERAL CONDITIONS	8.0%				$2,536,242
BONDING	1.0%				$317,030
OVERHEAD & PROFIT	7.0%				$2,219,212
SUB TOTAL		100,648	GSF	365.39	$36,775,507
DESIGN CONTINGENCY	10.0%				$3,170,302
INFLATION TO BID DATE (Spring 2009)	18.0%				$5,706,544
TOTAL (Construction)		100,648	GSF	453.58	$45,652,353

NOTES: Costs are for Construction only.
Costs are Based on a Competitive Bid Basis.
Costs are Based on a Construction Start of Spring 2009.

5.3 cost comparables

5.3 cost comparablels

As part of the Programming effort, the Programming Team researched similar university wet-laboratory projects that have completed construction in the past three years. Cost Comparability information for two of these projects, Arizona State University's Biodesign Institute, and Washington State University's Biotechnology and Life Sciences Building, is included below:

1 Biodesign Institute, Phase A & B
ARIZONA STATE UNIVERSITY

Year Construction Started/Completed:	Phase A - 2002/2004 Phase B - 2004/2006
Size of Buildings:	Phase A - 176,018 GSF Phase B - 174,374 GSF
Total Construction Cost Building & Site (per SF):	Phase A - $53,429,134 ($303/SF) Phase B - $55,645,872 ($316/SF)
Cost per Square-Foot, escalated to 2009*:	Phase A - $510/SF (at 68%*) Phase B - $496/SF (at 57%*)

2 Biotechnology/Life Sciences Building
WASHINGTON STATE UNIVERSITY

Year Construction Started/Completed:	2007/2009
Size of Buildings:	130,000 GSF
Total Construction Cost Building & Site (per SF):	$56,185,000 ($432/SF)
Cost per Square-Foot, escalated to 2009*:	$555/SF (at 24%*)

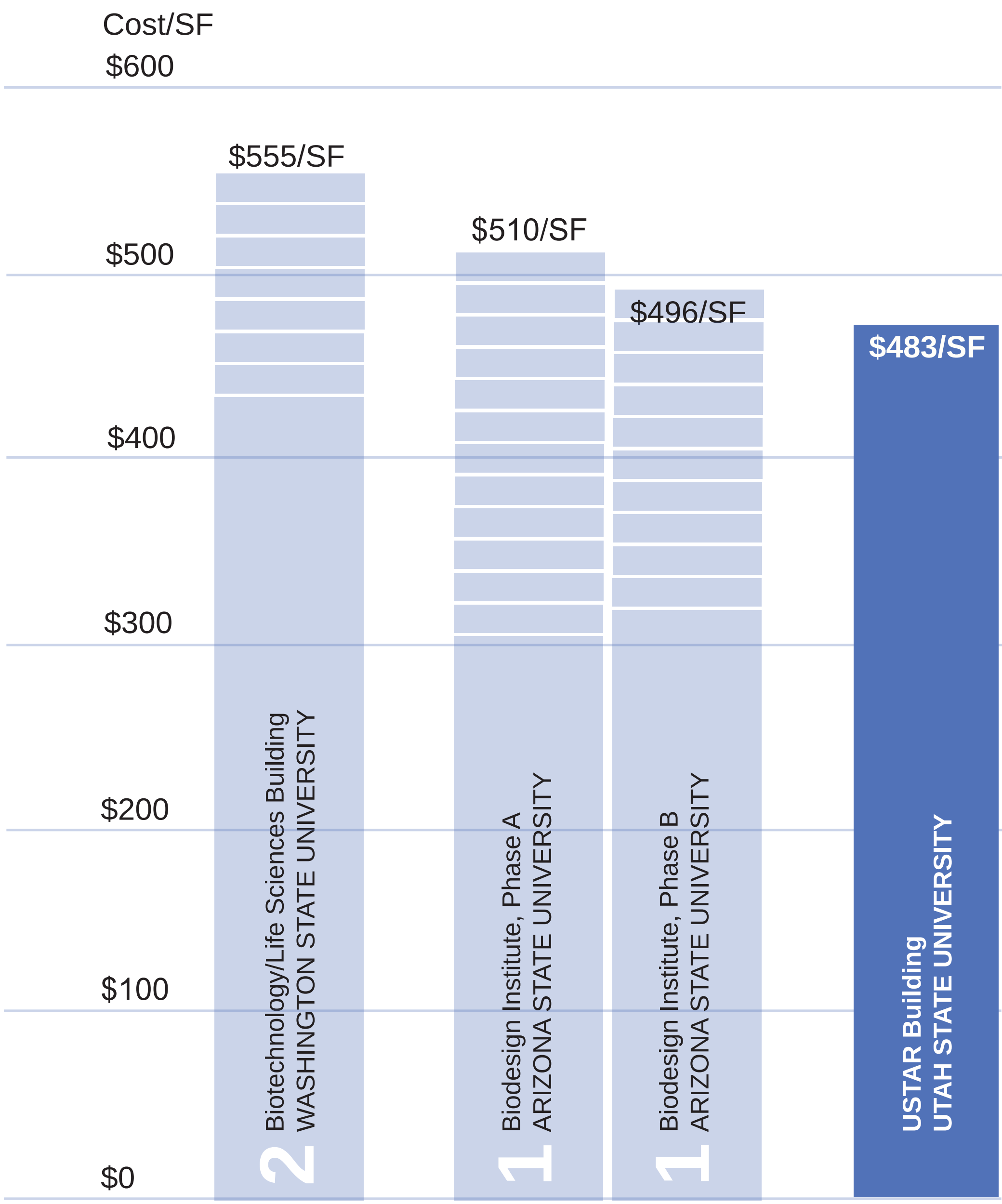
*inflation based on the following:
2003 - 5%, 2004 - 6%, 2005 - 9%, and 12% for each year 2006 through 2009.

5.4 cost comparison graph

5.4 cost comparison graph

The Cost Comparison Graph reflects the following:

Building & Site Construction
Comparables are inflated to 2009 dollars



06

appendices

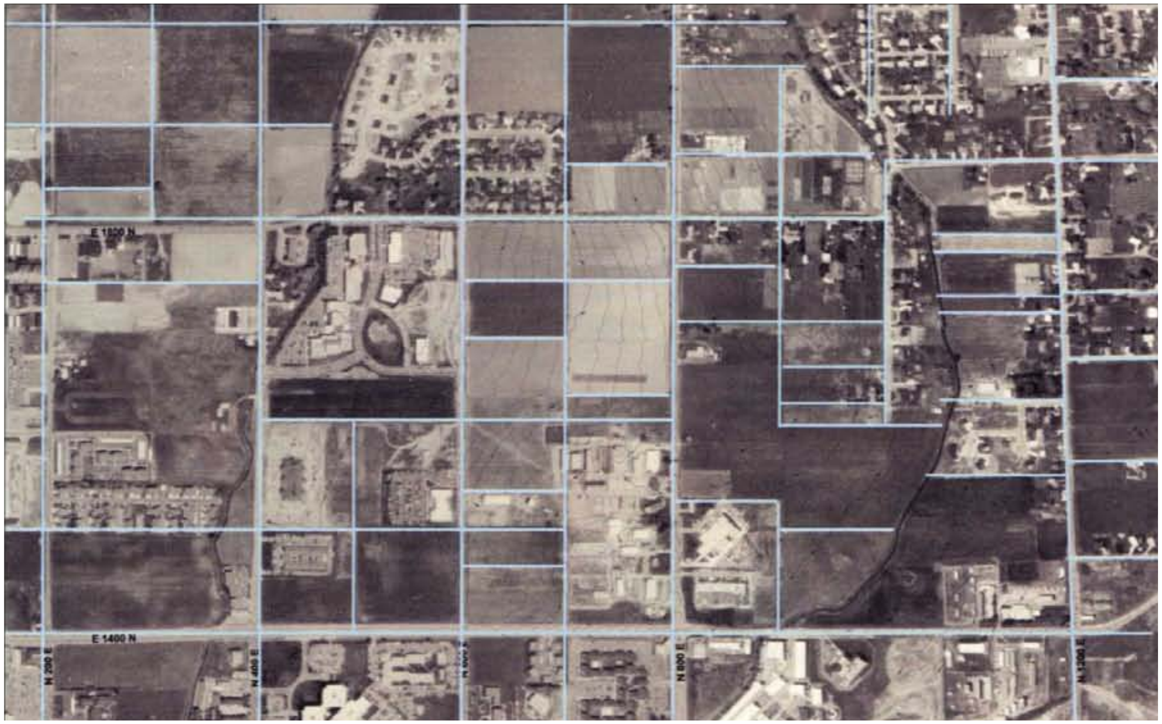
6.0 appendices

6.1 appendix A

USTAR PROJECT VISIONING REPORT

JULY 12, 2007

UTAH STATE UNIVERSITY



ajc architects / P A Y E T T E

JULY 12, 2007

USTAR PROJECT VISIONING REPORT
UTAH STATE UNIVERSITY

ajc architects / P A Y E T T E

USTAR is an economic initiative for the state of Utah with the goal of increasing her share of the high technology industry. The strategy is to optimize the conditions for innovative research in Sciences and Engineering at Utah's research Universities, in order to invent technologies and transfer them to commercial enterprises. The premise is that University R&D expenditures have a direct relation to firm births, and hence local economic growth.

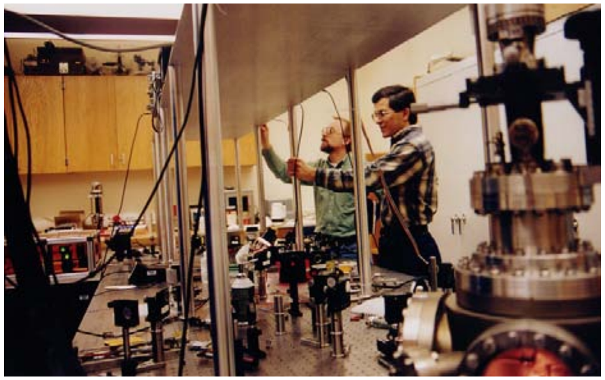
USTAR has allocated funds for research programs at Utah State University as well as the construction of a research facility, the USTAR Building. This visioning report examines the three contexts in which the USTAR building programs will need to succeed – USU, the state of Utah, the nation and beyond.

Visioning Goal

The goal of the visioning process is to develop criteria and recommendations for sciences and engineering research at USU, with focus on USTAR funded programs. The following are the main focus areas:

- Ensure optimal use of the USTAR opportunity as a foundation for sustainable long term growth, especially once USTAR support is no longer available.
- Identify challenges and opportunities in the governance of technology transfer oriented research at Utah State University.
- Promote conditions for mutually supportive relationships between USTAR and the University, between the Main Campus and the Innovation Campus and between academic research and commercial applications.

The criteria and recommendations will be based on data from Utah State University existing conditions and future outlook, forecasting on state and national funding and benchmarking of peer and target institutions.
After the visioning process the design team will proceed with the programming and site planning phase of the USTAR building. During this phase, the criteria developed during visioning will guide the USTAR building, in order to meet the objectives for the long term development of Utah State University.



USU Laboratories, 1930, 1950 & 2000

USU Archives

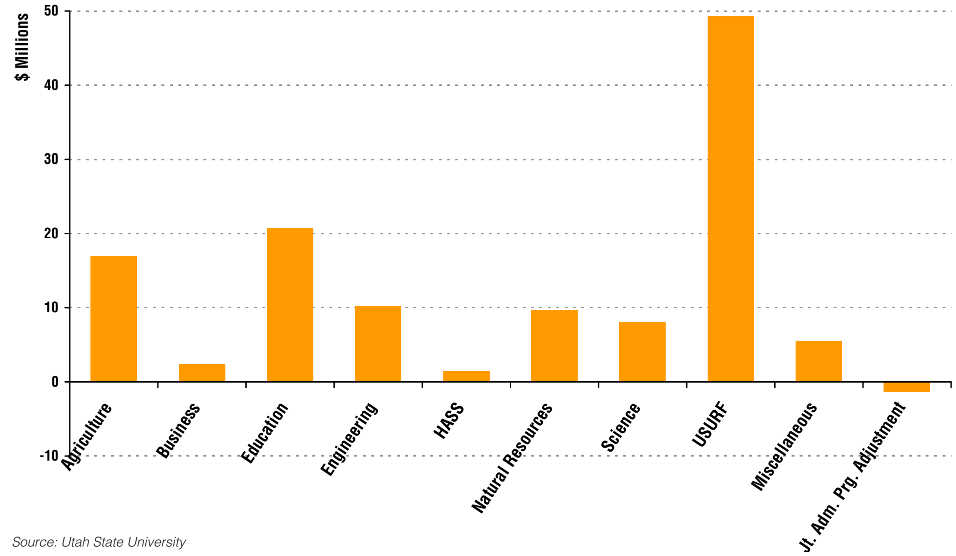
USTAR PROJECT OBJECTIVES

The following objectives for the USTAR Project were identified by the Visioning Committee during the first two meetings. The visioning process seeks to develop the framework for realizing these objectives.

- The USTAR Project shall promote interdisciplinary research and support collaboration between research and industry.
- The research of the USTAR Project shall lead to commercial applications & economic development opportunities.
- The USTAR Project will support the development of technology transfer oriented research at USU, by providing the following:
  - State-of-the-art facilities and equipment
  - Protocol & high level security for equipment and ideas
  - Technology and commercialization outreach
  - Meeting/strategic planning rooms
- Research at the USTAR Project will accent the strengths of Utah State University and the Governor's Office of Economic Development economic clusters.
- The USTAR Project will provide a link between the Main Campus and the Innovation Campus.
- The USTAR Project will seek efficiencies and avoid redundancies with existing core facilities.
- The architecture of the USTAR Project will express the state-of-the-art research it houses.
- The USTAR Project will embody environmentally friendly design by embracing the USTAR Governing Board's mandate to aim for LEED Gold certification.

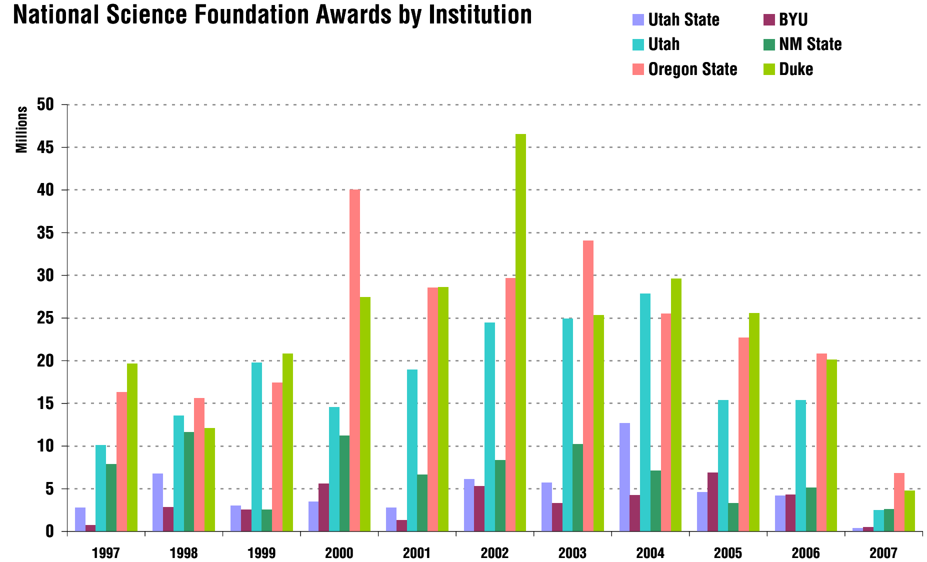
Externally Funded Awards by College, FY 2005-2006

Utah State University



Source: Utah State University

National Science Foundation Awards by Institution



Source: National Science Foundation

UTAH STATE UNIVERSITY:
CONTEXT & OUTLOOK

"Research has been a distinguishing characteristic of the university since the Utah Agricultural Experiment Station began its work with the institution's opening in 1890. From land, water and space to life enhancement, research permeates all of the university's seven colleges and 42 academic departments. The university also supports a diverse number of specialized centers and laboratories in the sciences, education, business, arts, humanities, agriculture, natural resources and engineering."

from "A Brief History of Utah State University"

The premise for the USTAR project is to build and expand on the areas of strength in the sciences and engineering at USU. The following is an inventory of the existing strengths which are expected to provide significant opportunities for further development.

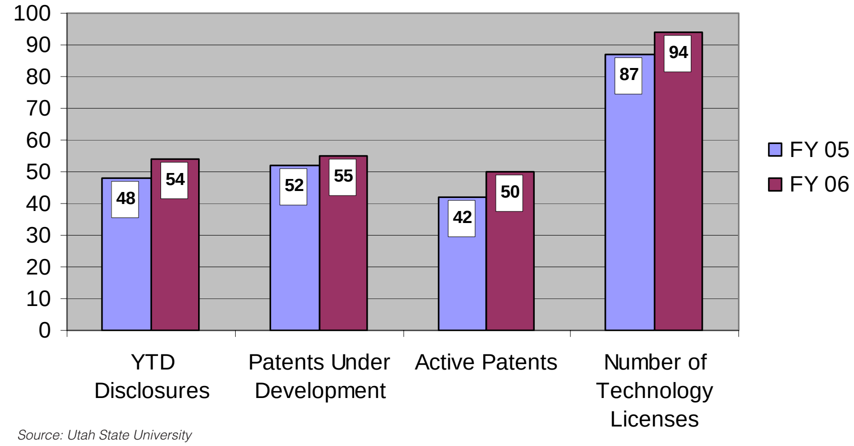
Major Research Centers and Institutes
There are several key entities that are involved in high level research - most are involved in interdisciplinary work:

- Space Dynamics Laboratory
- Institute for Antiviral Research
- Center for Persons with Disabilities
- Utah Water Research Laboratory
- Ecology Center
- Center for Self-Organizing and Intelligent Systems
- Center for High Speed Information Processing
- Utah Agricultural Experiment Station
- Western Dairy Center
- Center for Epidemiological Studies

USTAR Teams

- Biofuels Initiative
- Center for Advanced Nutrition
- Directed Energy Sensor Technology
- Intelligent Systems Engineering

USU Commercialization Indicators



Source: Utah State University

Innovation Campus Master Plan

Credit: Sasaki Associates

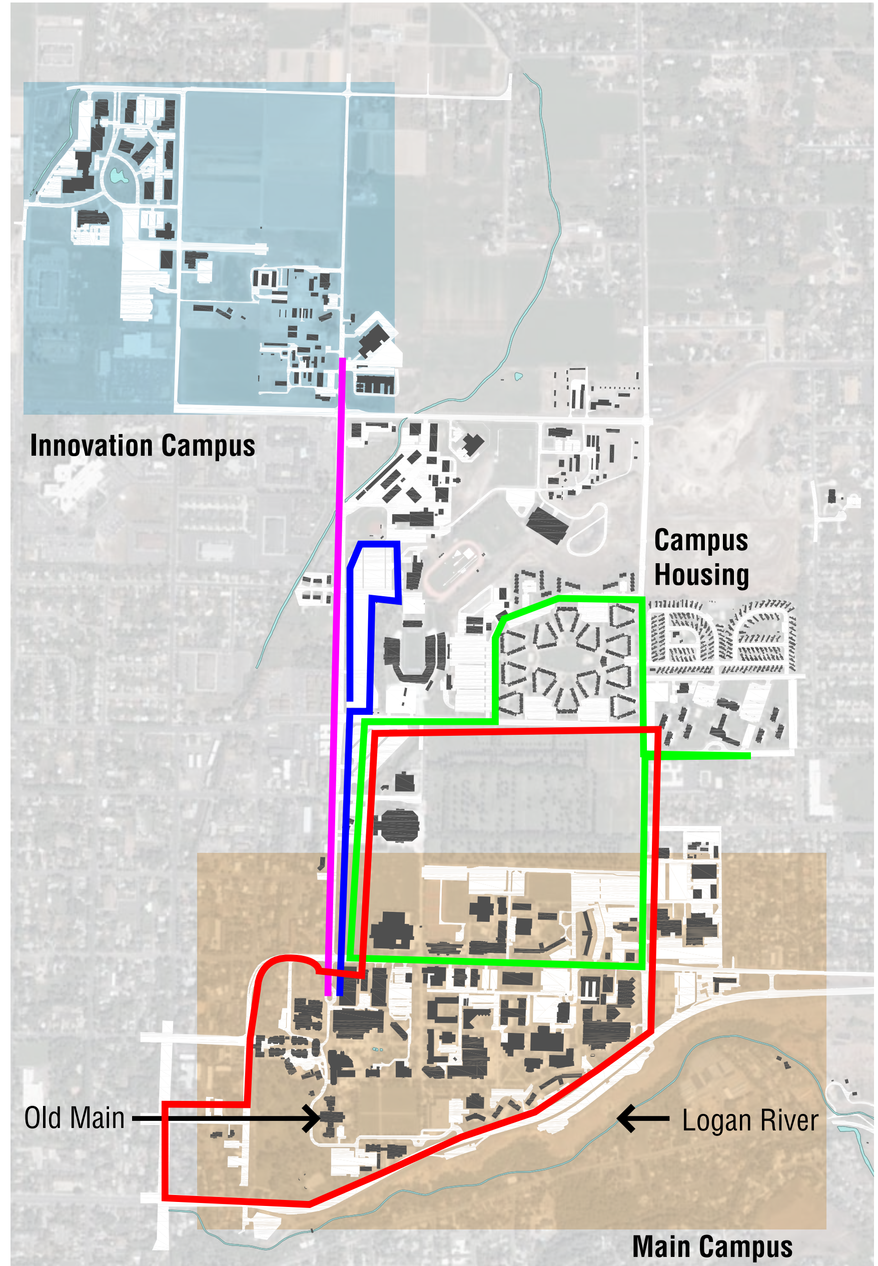
Center for Integrated BioSystems
The CIB is a core service facility at USU, organized in three areas: genomics, proteomics and bioinformatics. Several key research areas at the CIB have been targeted for enhancement through strategic investment. It is the intent that no duplication of core services is created between the CIB and the USTAR building.

Other Important Research Facilities
- Utah Veterinary Diagnostic Laboratory
- Poisonous Plant Research Laboratory
- Center for High Performance Computing

Areas of USU Strength
- Veterinary Sciences
- Nutrition
- Biotechnology
- Hydrology
- Information Technology
- Software Development
- Space Aeronautics

Areas identified by USTAR
- Microbe Biotechnology
- Advanced Nutrition
- Intelligent Systems
- Infectious Diseases
- Energy + Water

Initiatives and Proposals from USU
- Microbe Biotechnology
  - Bioremediation + Waste Management
  - Bio-fuels
  - Environmental Clean-Up
  - Agricultural Waste
  - Chemical Feed Stocks
- Advanced Nutrition/Obesity (Dr. David York)
  - Dietary Fat Intake Regulation
  - Peptides Effect on Protein Trafficking
  - Gene Linkages Response to Diet Intervention
  - Animal Behavioral Studies



Campus Map With Shuttle Routes

- Infectious Diseases
- Intelligent Systems (Dr. Krishna Shenai)
  - Semiconductor chips/Wireless Sensors
  - Directed Sensors/3D Imaging (Bldg. 620)

Priorities and Concerns for Research at USU

The following are excerpts from the Office of the Vice President for Research Annual Report, date July , 2005 to June 30, 2006. They address the strategic priorities and areas of concern for research at USU:

- Priorities - the main focus is on interdisciplinary research and revenue from commercialization:
  - Strengthen and develop major interdisciplinary research clusters and initiatives.
  - Increase indirect cost recovery.
  - Create credible reports of research related activities.
  - Develop Technology Commercialization Office into a strong service unit for inventors and a revenue generating enterprise for USU.
  - Shift Innovation Campus culture toward a community environment, emphasizing partnerships.

- Concerns - they fall into the categories of recruitment, funding, space and security:
  - Human Capital is a critical problem.
  - Other states offer better financial incentives for attracting and retaining faculty.
  - Space is required for growing research programs in the sciences and engineering. Some existing spaces are in need of renovation.
  - Utah needs to develop better financial plans to build and fund facilities, including computing, imaging + bioinformatics capacity.
  - More funding is needed to support graduate students.
  - A financial safety net is needed for students to finish their programs when grants and soft monies expire.
  - Security plans to be evaluated and upgraded.

Old Main Building, 1892

USU Archives

Innovations Campus Master Plan

Credit: Sasaki Associates

Funding

Funding is a primary objective and an area of concern for the VPR office, because the success of research at USU is dependent on it. It is crucial to hiring and retaining the best faculty in order to maintain a competitive edge. The following issues are of strategic value to funding plans, and they need to be continuously evaluated and improved:

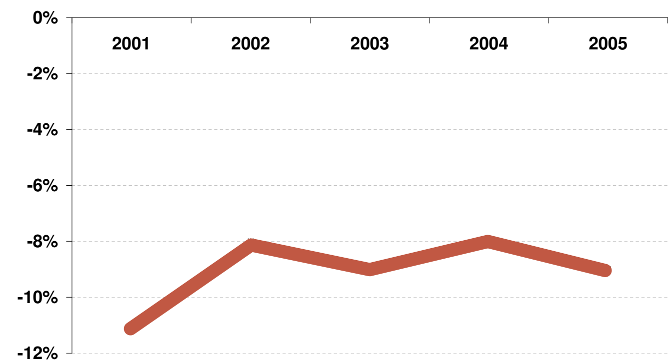
- Funding levels per School, Department or Research Group - this includes federal, state and industry funding.
- The ratio of direct to indirect recovery costs should be assessed across all programs - see charts on this issue in this report. Increasing indirect cost recovery is a major objective of the VPR office.
- Recruitment and Retention targets and criteria should be set.
  - › A report on recruitment strategies by other leading research institutions has been compiled by the VPR office and should be reviewed by USU administrators.
  - › Compensation levels have been lower at USU (-9% to -11%) than peer institutions since 2001, see graph.
- Connections to industry are vital and need to be cultivated and increased. The following metrics will be key indicators of success:
  - › Patents filed and approved
  - › Licenses
  - › Revenue from licenses
  - › Start-up firms
  - › Equity agreements for technology transfer
- Future outlook for growth

Existing Facilities

The inventory of research related facilities on campus should be evaluated for the following criteria:

- › Projected building lifespan
- › Lifespan of the building systems (infrastructure, utilities, envelope)

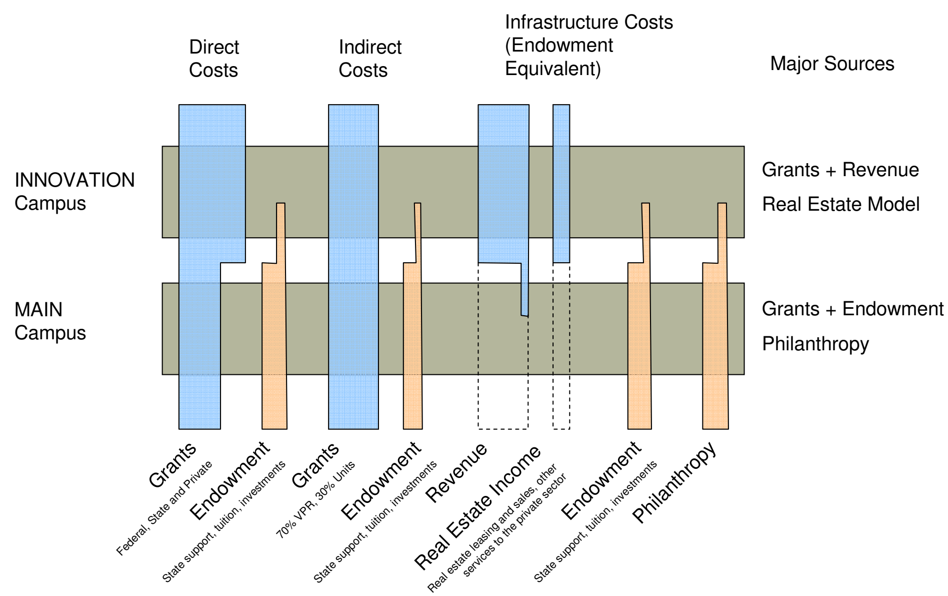
Total Faculty Compensation Compared to Peer Institutions



Salary plus benefits, average for all ranks within USU Peers Group

Source: Utah State University

Financial Model for Research and Development

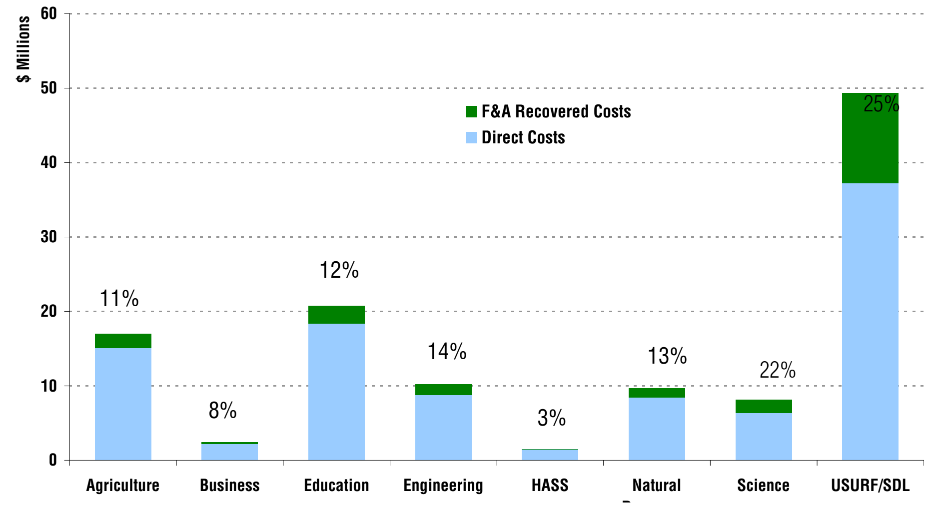


- › How the building meets the current program needs
  - › Capacity for future expansion
  - › Link potential to existing and future facilities
- Core facilities are a major investment for the University. Such facilities typically include animal research centers, imaging suites, special instrumentation etc. Their use should be optimized to offer maximum benefits to research programs. Whether proprietary in use or shared, the planning of core facilities should increase efficiencies and prevent duplication.
- Campus Planning is the adhesive that brings all activities together through transportation networks, pedestrian pathways, open spaces with assembly areas and other public amenities that promote a collegial culture.
- Mission of Main Campus + Innovation Campus
  The Main Campus and the Innovation Campus share common goals:
  - › Promote interdisciplinary learning and seek excellence in sciences and engineering research
  - › Provide a campus infrastructure with amenities that will be incentives for faculty and student recruitment
  - › Avoid redundancy and maximize efficiencies
  - › Enhance potential for relationships with industry

  The Innovation Campus places particular emphasis on the following:
  - › Provide cost efficient space for start-up companies
  - › Less emphasis on didactic learning

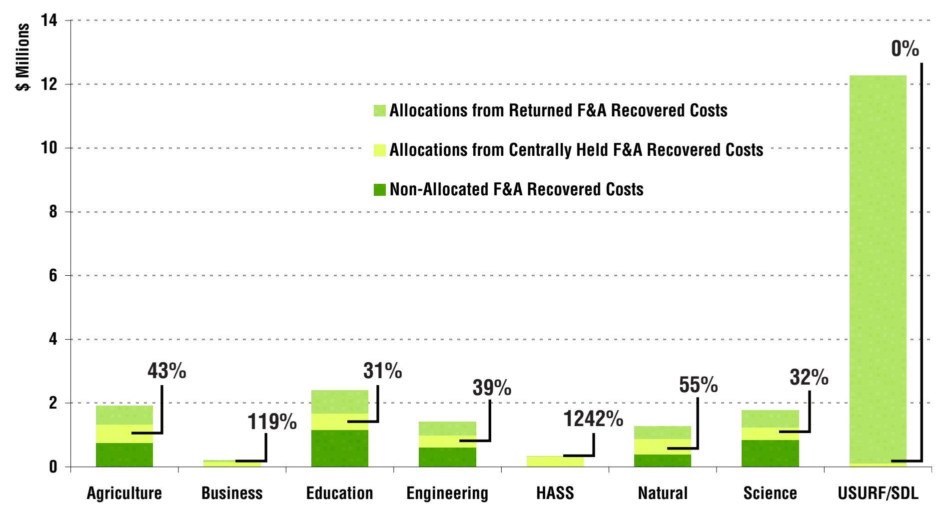
  Any conflicts between the two campuses should be identified and reconciled. In addition, an equitable financial model for their users should be developed, taking into account the evolving relationship between USTAR & USU.

F&A Costs as a Percentage of Total Award
Utah State University
2006 Federal Research Awards



Source: Utah State University

Allocations From F&A Recovered Costs
Utah State University
2006 Federal Research Awards



Source: Utah State University

Governance

Operational structure

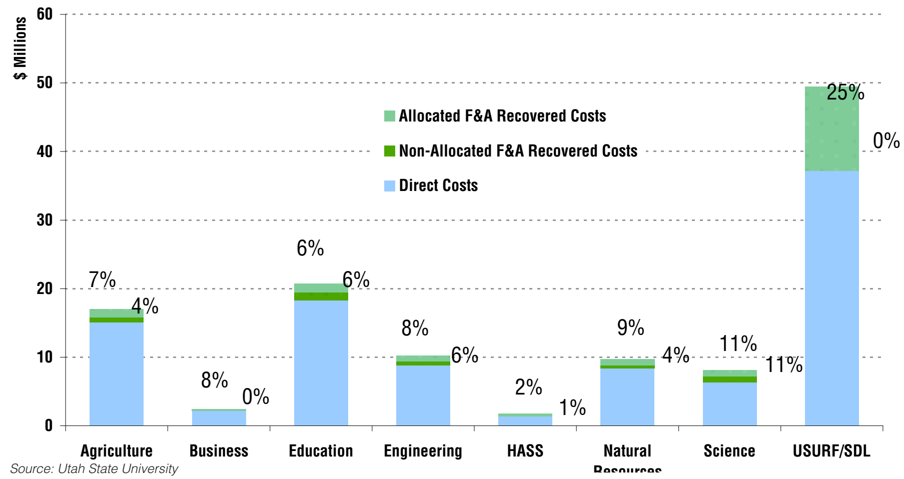
Sciences and Engineering at USU need to function within the context of USU. The following have been identified as key units whose operational interrelationship is critical for setting optimal growth conditions at USU and beyond. USTAR in particular is a new unit with a yet undefined protocol at USU. This needs to be better defined, so that USU can maximize its partnership potential with USTAR.

- Research Council
- Technology Commercialization Office
- USU Research Foundation
- Innovation Campus
- Business Accelerator
- USTAR (currently shown as USTAR coordination with VP for Economic Development)

Financial structure

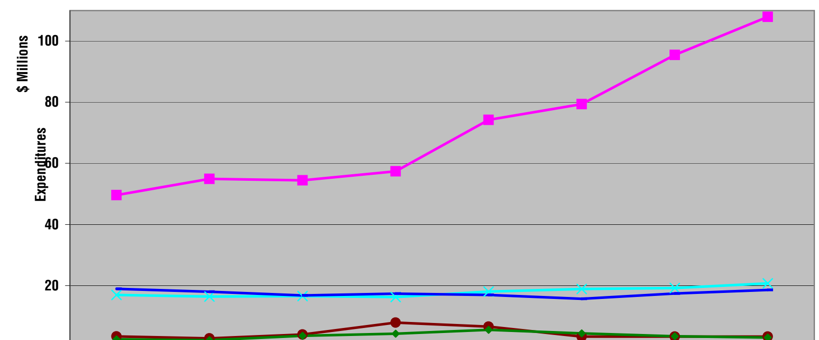
- Facilities and administration (F&A) costs are the shared indirect or overhead costs of research, partially recovered from sponsors at a given rate (indirect recovery funds). 30% are returned to the cost center and 70% are held by the VPR office.
    - › USURF and SDL is one notable exception to this rule, in that almost 100% of the recovered indirect costs are allocated to USURF with only a minimal contribution to the VPR office. This arrangement is due to the specific nature of USURF, but will need to be accounted in the development of the overall financial model.
- Increasing the ratio of sponsored versus endowment research is a goal.
- Operations and Maintenance costs (including deferred maintenance) and their funding sources. O&M costs are typically in the range of 7% - 10% per square foot annually for research buildings. Because of the high level research requirements at the USTAR building, it is expected that the O&M costs will be at the high end of the range.

Total Allocations as a Percentage of Total Award
Utah State University
2006 Federal Research Awards



Source: Utah State University

USU R&D Expenditures by Source of Funds
FY1997 - 2004



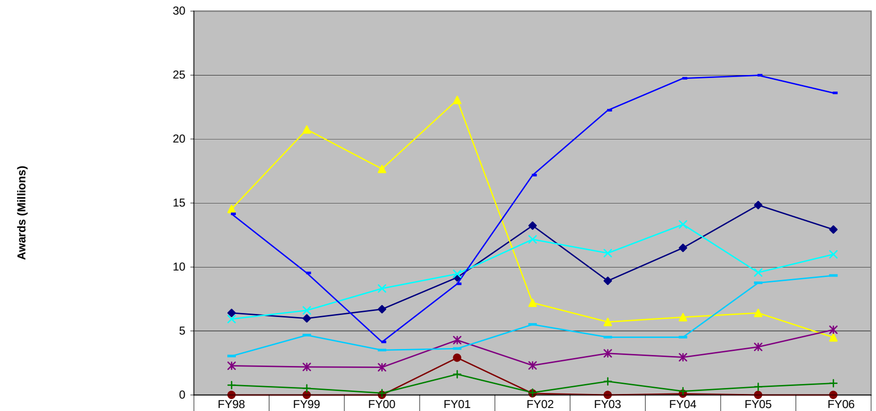
Year (Rank)	1997 (90)	1998 (92)	1999 (95)	2000 (96)	2001 (88)	2002 (97)	2003 (96)	2004 (94)
Federal Gov't	49,594,000	54,903,000	54,433,000	57,378,000	74,251,000	79,393,000	95,494,000	107,945,000
Fed Gov't % of Total	54%	58%	57%	56%	61%	65%	69%	70%
State & Local Gov't	16,965,000	16,424,000	16,547,000	16,241,000	18,024,000	18,901,000	19,204,000	20,736,000
State/Local % of Total	19%	17%	17%	16%	15%	16%	14%	13%
Industry	3,356,000	2,744,000	3,998,000	7,885,000	6,595,000	3,298,000	3,340,000	3,338,000
Industry % of Total	4%	3%	4%	8%	5%	3%	2%	2%
Institutional Funds	18,958,000	18,005,000	16,784,000	17,370,000	16,956,000	15,655,000	17,403,000	18,591,000
Institutional % of Total	21%	19%	18%	17%	14%	13%	13%	12%
Other	2,419,000	2,152,000	3,602,000	4,287,000	5,533,000	4,374,000	3,421,000	3,006,000
Other % of Total	3%	2%	4%	4%	5%	4%	2%	2%
Total	91,292,000	94,228,000	95,364,000	103,161,000	121,359,000	121,621,000	138,862,000	153,616,000

Source: National Science Foundation

- Infrastructure costs which are not included in either of the above categories, such as incremental increases in services, as well as non F&A costs such as recruitment, faculty development, core facilities. These costs may have to be covered by the endowment revenue (hence endowment equivalent costs) or state subsidies. Revenue from other sources, such as commercialization royalties or equity, real estate income and others can decrease endowment spending.
- A new financial model for both Main and Innovation Campus needs to be developed with regard to indirect cost recovery management, O&M and other costs. An inequity has been identified by the Visioning Committee in this area, which may act as a disincentive for moving to the Innovation Campus.
- USU Research Focus Committee:
  The committee is currently working on analyzing best practices for internal research investments.
  Background on Research Focus Committee:
  Wise investment of recovered F&A funds to build quality research programs and maintain a competitive research edge must be an integral part of the research future of Utah State University. Thus, F&A funds invested in faculty, departments, and colleges should be made with the expectation of a solid return on investment. With support from the Research Council, the VPR formed a Research Focus Group charged with the responsibility to identify opportunities and best practices for growing research of all kinds, but especially sponsored research. This will enable USU to capture recovered overhead dollars to improve research infrastructure and enhance the university's capacity for research excellence.

USU Research Awards by Selected Federal Sponsoring Agency

1998-2006

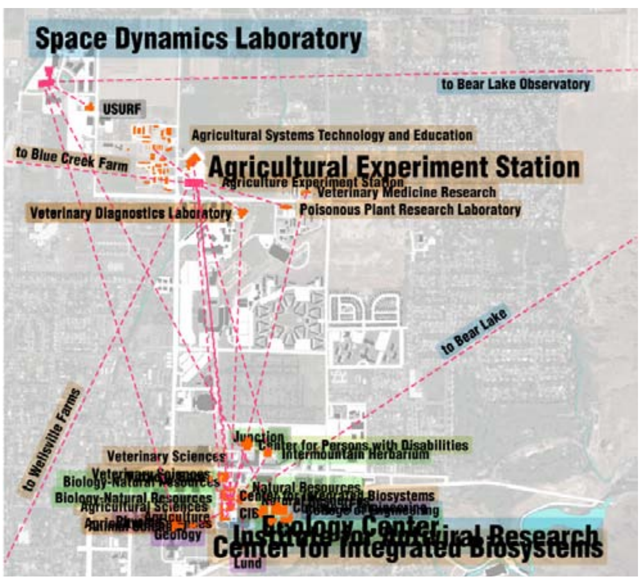


	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06
Department of Agriculture	6,412,452	5,983,764	6,707,558	9,186,883	13,230,864	8,921,597	11,501,852	14,844,728	12,933,403
Department of Education	14,540,602	20,754,246	17,670,996	23,051,008	7,203,705	5,712,791	6,083,005	6,415,175	4,495,930
Department of Health and Human Services	5,928,222	6,616,663	8,323,618	9,464,566	12,160,887	11,086,906	13,327,011	9,568,985	10,997,713
Department of the Interior	2,288,929	2,193,711	2,163,742	4,293,360	2,313,308	3,248,809	2,949,134	3,754,104	5,096,481
Department of State	0	0	0	2,901,385	118,000	0	98,267	0	0
Environmental Protection Agency	767,318	512,079	150,000	1,620,279	182,465	1,060,190	294,821	643,766	911,386
National Aeronautics & Space Administration	14,150,731	9,525,668	4,136,181	8,677,958	17,182,036	22,249,464	24,749,979	24,977,824	23,596,496
National Science Foundation	3,037,952	4,666,874	3,505,830	3,625,487	5,505,032	4,513,242	4,510,344	8,761,253	9,331,392

Fiscal Year

Source: National Science Foundation

Inter-Collegiate Connections



UTAH STATE UNIVERSITY:
CRITERIA & RECOMMENDATIONS

Criteria for user groups

The criteria for USTAR and non USTAR user groups are not meant to differentiate between the two groups The opportunity for the USTAR infusion is to provide an impetus for interdisciplinary work among different groups, rather than draw divisions. The following criteria apply to both user groups; criteria with specific user group focus are noted as such.

USTAR user group criteria

- Interdisciplinary groups and programs
- Researchers with a "return on investment" approach
- Liaisons to industry
- Inventions, disclosures, patents, licenses, revenue (royalties, equity etc)
- Spin-off companies
- Generate quality jobs in Utah
- Space for start-up companies
- Education through research only (graduate students)
- Focus on graduate teaching (focus for non USTAR)
- Outreach program

Faculty recruitment criteria and expectations

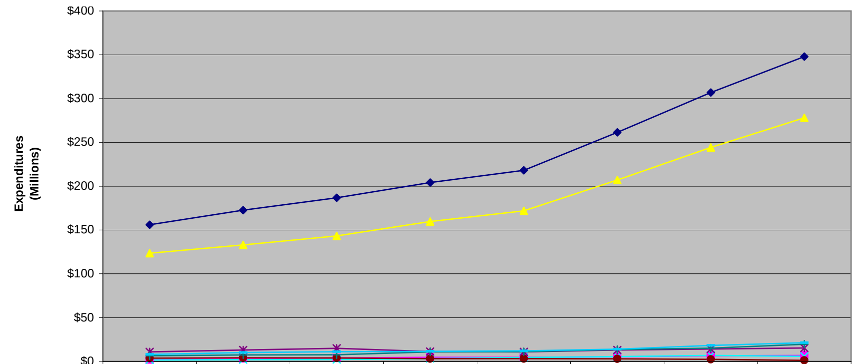
The criteria and expectations for USTAR faculty are largely the same as non USTAR faculty.

USTAR faculty criteria

- Teaching (negotiated with USTAR)
- Research
- External funding – recovery costs
- Outreach Program
- Collaboration
- Tenure Track
- Academic Credentials/Affiliations

Duke University Federally Financed R&D Expenditures by Selected Science and Engineering Fields

1997-2004

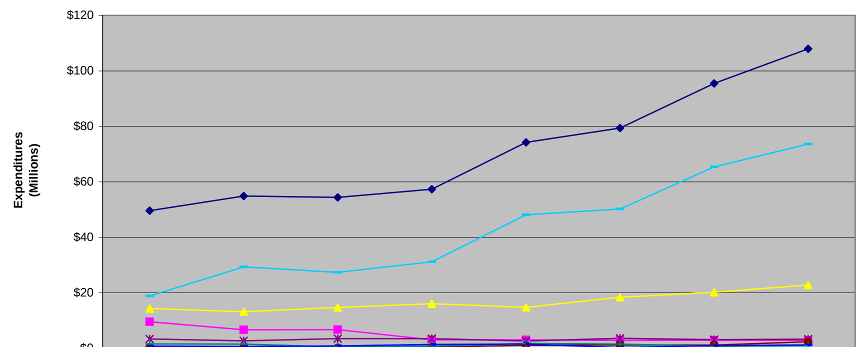


	FY97 (24)	FY98 (21)	FY99 (23)	FY00 (22)	FY01 (23)	FY02 (21)	FY03 (17)	FY04 (17)
Federal R&D expenditures	155,894,000	172,532,000	186,757,000	204,180,000	218,109,000	261,356,000	306,864,000	347,896,000
Environmental sciences	2,003,000	3,235,000	3,921,000	4,638,000	4,719,000	5,263,000	6,291,000	6,757,000
Life sciences	123,383,000	132,886,000	143,274,000	159,656,000	171,792,000	207,083,000	244,212,000	278,054,000
Math and computer sciences	1,630,000	1,920,000	2,225,000	3,344,000	4,495,000	5,509,000	6,722,000	5,882,000
Physical sciences	10,770,000	12,906,000	14,936,000	11,171,000	10,799,000	13,054,000	14,090,000	15,267,000
Psychology	3,732,000	4,031,000	3,836,000	3,089,000	3,184,000	2,943,000	2,394,000	1,209,000
Social sciences	6,371,000	7,399,000	7,563,000	10,924,000	11,045,000	13,611,000	15,005,000	19,525,000
Engineering	8,005,000	10,155,000	11,002,000	11,358,000	12,075,000	13,893,000	18,150,000	21,202,000

Source: National Science Foundation **Year(Rank)**

USU Federally Financed R&D Expenditures by Selected Science and Engineering Fields

1997-2004



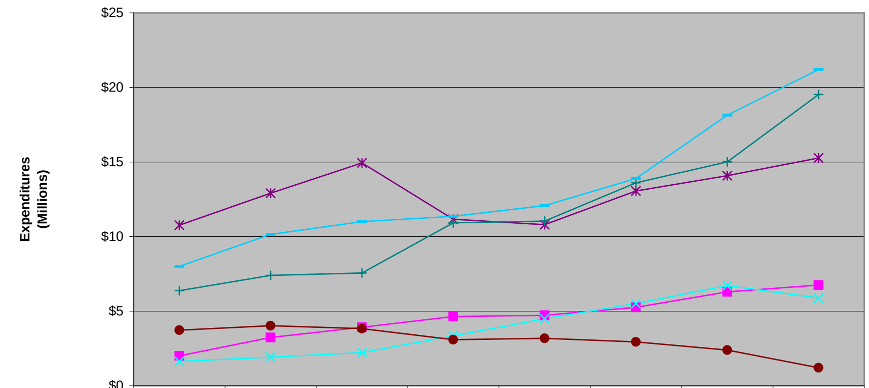
	FY97 (89)	FY98 (85)	FY99 (92)	FY00 (93)	FY01 (83)	FY02 (84)	FY03 (83)	FY04 (79)
Federal R&D expenditures	49,594,000	54,903,000	54,433,000	57,378,000	74,251,000	79,393,000	95,494,000	107,945,000
Environmental sciences	9,570,000	6,682,000	6,739,000	3,053,000	3,048,000	2,895,000	2,944,000	2,891,000
Life sciences	14,353,000	13,189,000	14,747,000	16,066,000	14,796,000	18,448,000	20,215,000	22,815,000
Math and computer sciences	606,000	537,000	508,000	869,000	1,155,000	1,101,000	998,000	769,000
Physical sciences	3,406,000	2,726,000	3,526,000	3,529,000	2,658,000	3,641,000	3,117,000	3,298,000
Psychology	364,000	219,000	193,000	451,000	1,131,000	1,223,000	1,151,000	2,379,000
Social sciences	1,623,000	1,523,000	501,000	811,000	1,804,000	1,542,000	743,000	963,000
Sciences, nec	829,000	690,000	859,000	1,419,000	1,505,000	279,000	952000	1219000
Engineering	18,843,000	29,337,000	27,360,000	31,180,000	48,154,000	50,264,000	65,374,000	73,611,000

Source: National Science Foundation **Year(Rank)**

Recommendations

- Identify and promote opportunities for interdisciplinary research and development
- Increase indirect recovery funds
- Campus wide committee to administer grants (evaluate, prioritize and coordinate) and to develop standardized criteria for initiative proposals, allocating resources, scientific import, maturity of idea, benefits to USU and its mission.
- Develop and maintain database of research related activities and data to maximize efficiency and avoid redundancies.
- Refine and validate financial models and projections to inform and implement strategic planning decisions.
    - › Develop sustainable financial model that accounts for the needs at both campuses and generates enough revenue to be sustainable without USTAR funds (should they expire in the future).
    - › The model should address any inequity, perceived at real, between the cost structures at the two campuses.
    - › The model should address development of amenities and infrastructure at the Innovation Campus, not least as a recruitment incentive.
- The development of a vibrant cultural, entertainment and community infrastructure at USU, and in particular at the Innovation Campus will be vital for attracting outstanding people, and fostering a creative environment.
- Increase diversity on all levels (women, minorities)
- Catch up or exceed faculty compensation levels of peer institutions.

Duke University Federally Financed R&D Expenditures for Selected Science and Engineering Fields
1997-2004

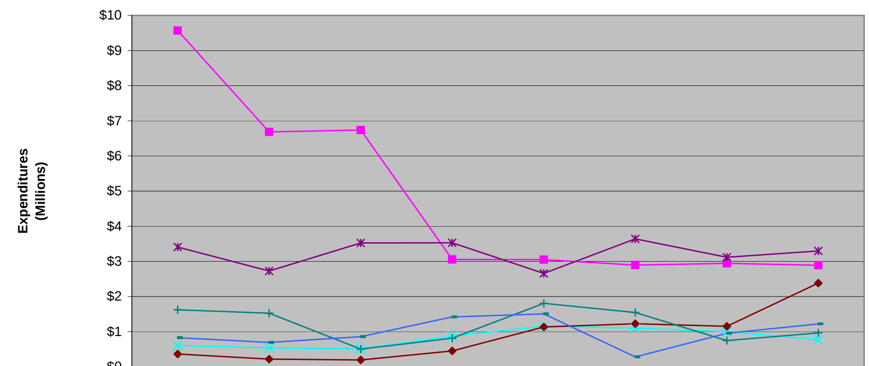


	FY97 (24)	FY98 (21)	FY99 (23)	FY00 (22)	FY01 (23)	FY02 (21)	FY03 (17)	FY04 (17)
Environmental sciences	2,003,000	3,235,000	3,921,000	4,638,000	4,719,000	5,263,000	6,291,000	6,757,000
Math and computer sciences	1,630,000	1,920,000	2,225,000	3,344,000	4,495,000	5,509,000	6,722,000	5,882,000
Physical sciences	10,770,000	12,906,000	14,936,000	11,171,000	10,799,000	13,054,000	14,090,000	15,267,000
Psychology	3,732,000	4,031,000	3,836,000	3,089,000	3,184,000	2,943,000	2,394,000	1,209,000
Social sciences	6,371,000	7,399,000	7,563,000	10,924,000	11,045,000	13,611,000	15,005,000	19,525,000
Engineering	8,005,000	10,155,000	11,002,000	11,358,000	12,075,000	13,893,000	18,150,000	21,202,000

Year (Rank)

Source: National Science Foundation

USU Federally Financed R&D Expenditures for Selected Science and Engineering Fields
1997-2004



	FY97 (89)	FY98 (85)	FY99 (92)	FY00 (93)	FY01 (83)	FY02 (84)	FY03 (83)	FY04 (79)
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Engineering	18,843,000	29,337,000	27,360,000	31,180,000	48,154,000	50,264,000	65,374,000	73,611,000

Year (Rank)

Source: National Science Foundation

Network of Connections

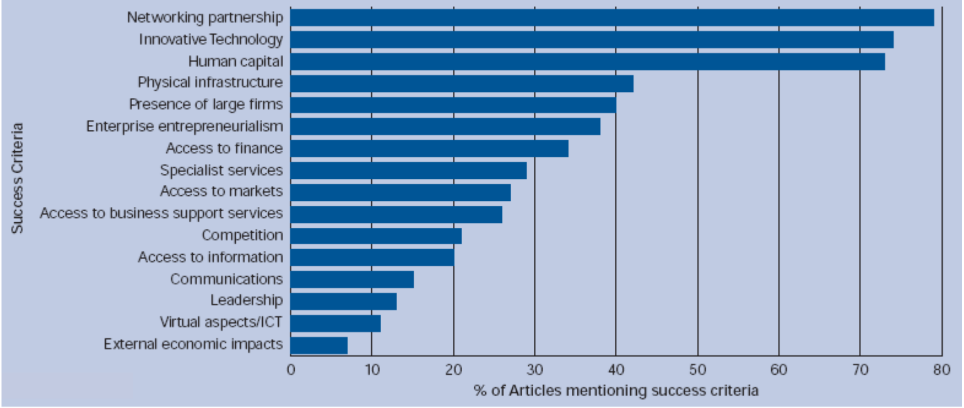
Innovative R&D happens when talented people from diverse disciplines interact frequently and informally. A dense network of connections across the state will form a community from academic R&D, industry, financial and legal services and government. This is not unlike a biological community whose survival and growth potential is related to the diversity and abundance of species, the interaction among them and its ability to adapt to external stimuli. R&D communities can trigger connections through joint programs, professional and social organizations and cultural and community activities. Because face to face interactions are vital, the communities tend to grow in clusters and depend on efficient transportation and communication networks.

Academic Connections

- Other research institutions (University of Utah, Brigham Young University):
    - Identify areas of potential collaboration and mutually supporting research programs, avoid overlaps with the University of Utah
    - Avoid competing for faculty, students or funding
- USTAR Discovery Conferences:
  The objective of the conferences is to create an awareness and identify opportunities for research collaboration among Utah's research Universities.

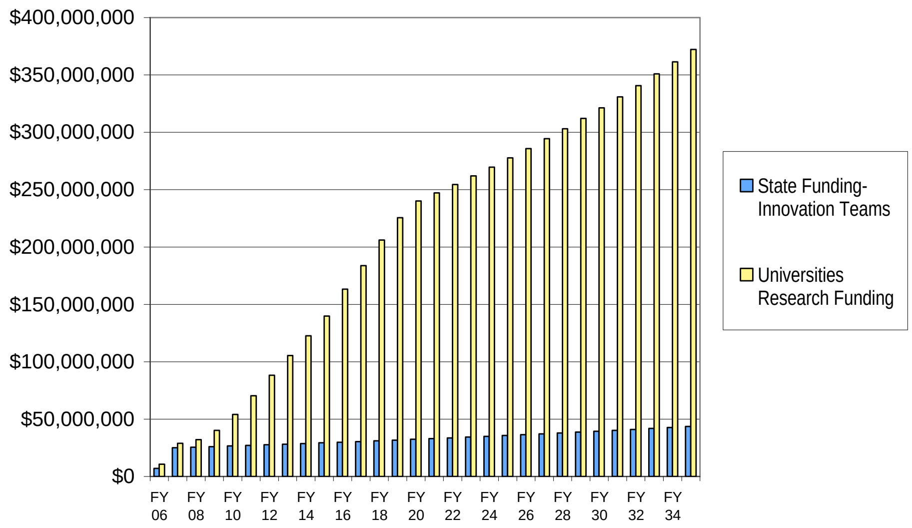
  Discovery Conference Background:
  USTAR has partnered with the University of Utah, Utah State University and Brigham Young University to host a series of conferences, The Discovery Conferences, which will showcase each University's research and expertise in specifically identified technology development areas. The focus of the initial Discovery Conference will be Energy: conventional,

Success Criteria For High Technology Networks



Source: Ecotec

USTAR Annual Direct Contributions to Economic Development



Source: USTAR

unconventional and renewable. The objectives of the Energy Discovery Conference are:
  - To bring together researchers from Utah's institutions of higher education to create awareness and identify opportunities for research collaboration in the fields of conventional, unconventional and renewable energy.
  - To increase opportunities for sponsored research by showcasing expertise and research capabilities to energy-related industries.
- Collaborate on Technology Outreach centers
- Joint faculty development programs

Industry Connections
- Identify areas of Growth in state
  - The governor (GOED) has identified economic growth clusters.
- Identify joint programs/collaboration areas with industry.
- National Business Incubator Association (NBIA) provides information, education, advocacy and networking resources. TCO is a member of NBIA.
- Association of University Research Parks (AURP) – mission is to promote the development and operations of research parks that foster innovation, commercialization and economic competitiveness in a global economy through collaboration among universities, industry and government.

Human Capital
- Identify conditions that need to be addressed by economic development:
  - Average salaries in Utah as a percentage of US average shrinking from 96% in the 80s to 82% now.
  - Number of high technology jobs is decreasing
  - Bankruptcies are on the rise
  - Education expenditures per pupil are low
- R&D communities require a highly skilled workforce for all components of a healthy ecosystem for high technology:
  - R&D at Universities and teaching Hospitals
  - Venture capital
  - Cluster of innovative companies
  - Financial services

Funding
- State government funding (e.g. USTAR)
- Industry funding
- Income from patents and licenses
- Equity in private spin-off companies as part of the licensing agreement

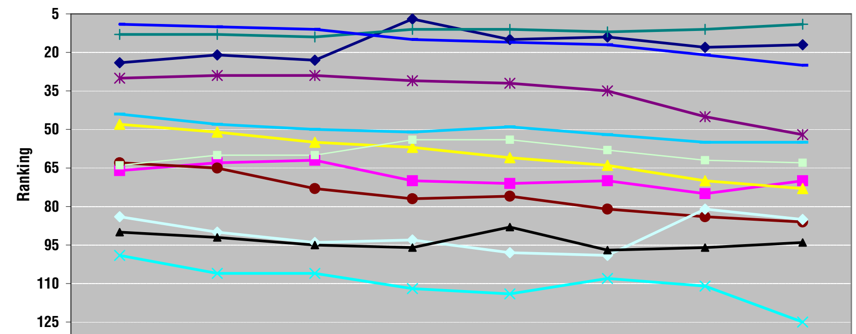
- USU to develop/Increase collaboration with other research institutions in the state (University of Utah, Brigham Young University) and identify areas where research programs at different universities can benefit from each other's strengths.
- Utah to develop and maintain an active database for all research related activities in the state
- Utah to improve K-12 and undergraduate education in sciences and engineering, in order to address shortcomings in this area. The goal is to maintain a highly trained workforce in the state as an incentive for high technology firms to stay or relocate to Utah, with multiple economic and social benefits. The state should expand the "New Century Early High School" program, of which the high school at the Innovation Campus is the sixth member.
- Evaluate and support involvement of USU with professional associations and community in general, across the State. Cultivate social and professional support networks that will keep alumni in the state.
- Support growth of start up technology companies by facilitating pre-seed funding, angel investing, small business award and loan programs (SBIR/STTR)
- Keep a diversified portfolio of research programs for better returns during both growth and slow periods.
- Develop efficient transportation and communication networks.

Bear Lake
Credit: "C.A."

Benchmarking

- Benchmarking is used to evaluate the current position in the national context and define goals for improving it. Benchmarking uses criteria and metrics to define success and the pathway towards it. USU has identified the following institutions as peer institutions and Duke University as a valuable success example.
- Peer institutions
  - UC Davis
  - Colorado State
  - Iowa State
  - New Mexico State
  - North Carolina State
  - Oregon State
  - Penn State
  - Texas A&M
  - Virginia Tech
  - Washington State
- Effective strategies to grow R&D:
  The USU Research Focus Group analyzed strategies employed by other institutions that showed impressive upward movement in National Science Foundation R&D expenditure rankings. Several recurring themes were discovered:
  - Move toward interdisciplinary or multidisciplinary research initiatives
  - Strategic use of human resource management in selecting hires and hiring areas
  - Providing faculty support throughout the proposal process and other areas
  - Facility development to accommodate new initiatives
  - Strengthening of industry ties

Change in R&D Expenditure Ranking for USU Peer Institutions
from FY 1997-2004



	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04
U. CA, Davis	24	21	23	7	15	14	18	17
CO State U.	66	63	62	70	71	70	75	70
IA State U.	48	51	55	57	61	64	70	73
NM State U. all campuses	99	106	106	112	114	108	111	125
NC State U.	30	29	29	31	32	35	45	52
OR State U.	63	65	73	77	76	81	84	86
PA State U. all campuses	13	13	14	11	11	12	11	9
TX A&M U. all campuses	9	10	11	15	16	17	21	25
VA Polytechnic	44	48	50	51	49	52	55	55
WA State U.	84	90	94	93	98	99	81	85
U. UT (Not Peer)	64	60	60	54	54	58	62	63
UT State U.	90	92	95	96	88	97	96	94

Source: National Science Foundation

Human Capital:

- US Graduate enrollments in science and Engineering on an upward trend since 2000, despite recent concerns
- American Competitiveness Initiative launched in 2006 with a 1.3 billion budget. ACI focuses on developing human capital through K-12 education, teacher development, skilled worker training, immigration reform and innovative research programs funding.

Utah metrics in the national context:

- Utah is one of 12 states with fewer S&E doctorate holders in academia in 2003 than both in 1997 and 2001

Recruitment and retention

The competition for the top talent between US and foreign institutions is becoming more intense. The following are steps related to both recruitment and retention:

- Bracket metrics for recruiting and retention (salaries, sf data, industry opportunities, amenities, lifestyle)
- Develop strong incentives:
  - › Top knowledge workers choose regions with well developed cultural amenities, according to Richard Florida's analysis in "The Rise of the Creative Class". This may play an equally important role as the quality of the research facilities.
  - › Compensation levels need to be competitive with peer institutions, see recommendations in USU section.
- Develop retention criteria and policies

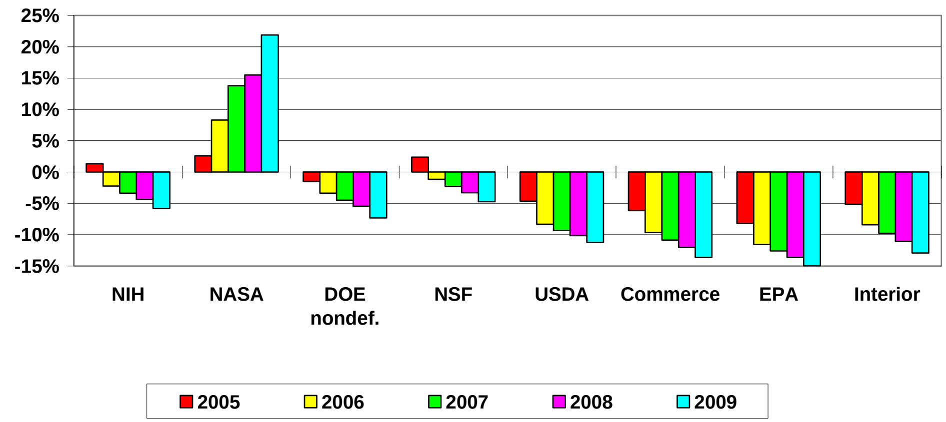
Growth + Funding:

- Identify areas of national growth in research and development
- Funding indicators (historical and current data)

Federal Funding

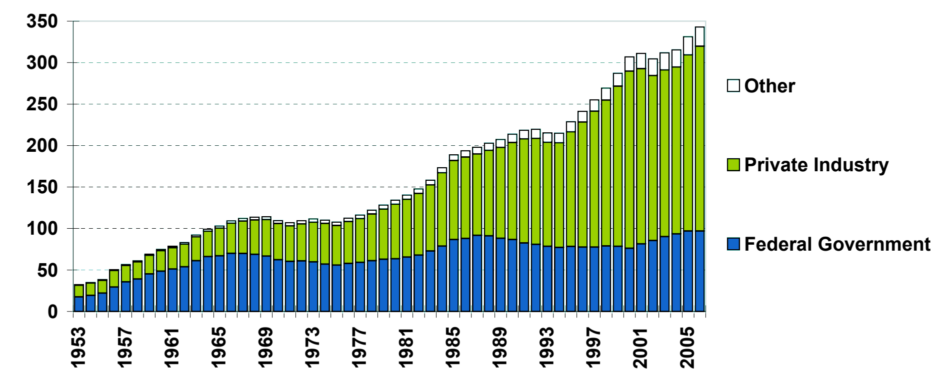
- Proposed FY 2008 Federal Budget:
- Administration priorities: defense development, space exploration and basic physical sciences

Projected Nondefense R&D in the President's Budget, FY 2004-2009
% change from FY 2004 funding level in constant dollars



Source: AAAS Analysis of the Outyear Projections for R&D in the FY 2005 Budget

U.S. R&D Funding by Source, 1953-2006
expenditures in billions of constant 2006 dollars



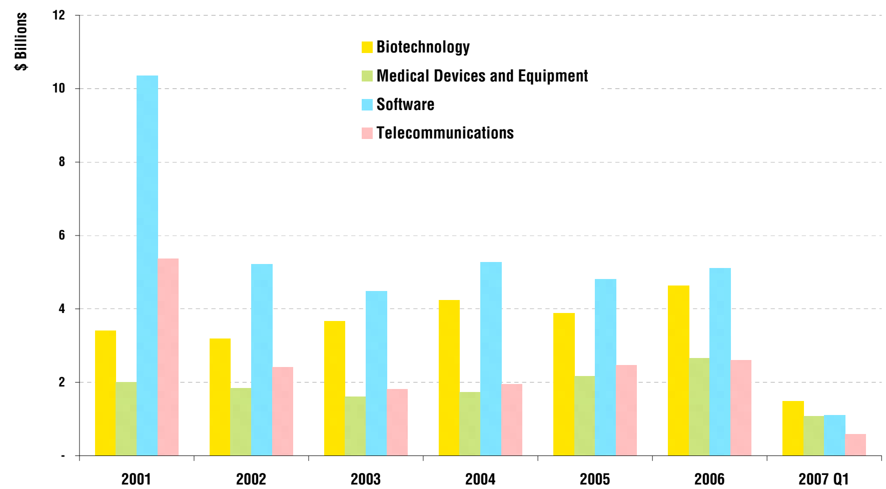
Source: AAAS Analysis of the Outyear Projections for R&D in the FY 2005 Budget research.

- Large increase for DOD weapons development and NASA human spacecraft
- Flat or declining funding for most other research programs, even in the physical sciences
- Increases for three physical sciences in the American Competitiveness Initiative (ACI)
- NSF funding on slight upward trend between 05-08
- DOE R&D funding declining since 2004, increase expected for Office of Science in FY 08. Large increases expected in R&D for hydrogen, biomass and solar energy technology, and elimination of gas and oil technologies research proposed.
- DOC R&D funding declining since 2002, NIST funding to increase in 2008
- Declining funding for climate change science programs
- NIH budget has been declining since 2004, expected to decline further in FY 2008
- NIH funded basic and applied research at universities accounts for over 60% of total funding. The decline in NIH funding will be a challenge for universities.
- USDA R&D funding declining since 2005
- Federal investment in non-defense basic and applied research in decline for the fourth year in a row, as a counter deficit measure.
- Congress Appropriations process allocated 21 billion more than proposed, which may allow declining programs to move slightly past inflation instead.
- Declining Federal R&D as % of GDP, FY 1976-2008
- US has 35% of total world R&D (world total 874 billion)
- US has fallen behind Japan and Korea in % of R&D of GDP

Industry Funding

- Private industry funding of R&D at Colleges and Universities has increased more than tenfold during 1953 - 2006, while federal funding has only increased 3 to 4-fold.
- 2/3 of all US R&D is funded by industry, but industry

Venture Capital Investments by Industry
Nationwide



Source: PriceWaterHouse Coopers / Moneytree Report 2007 focuses on development, while the Federal government funds most of the research.

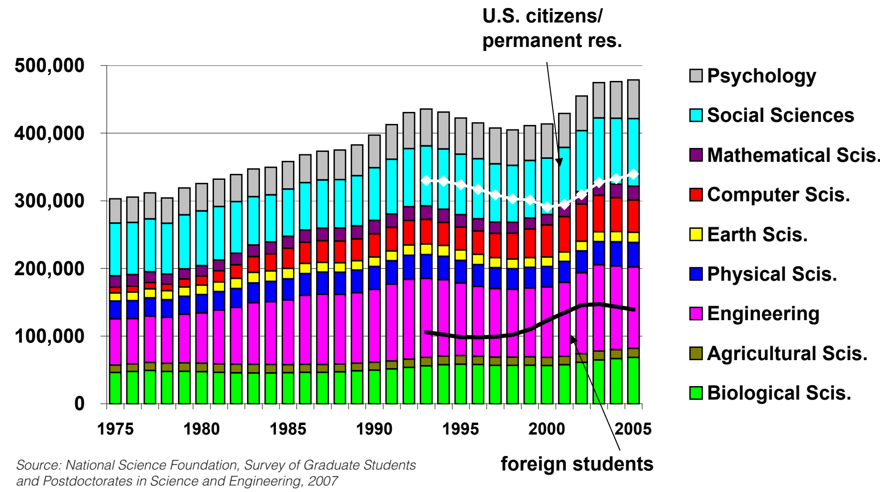
- Total annual income for all US Universities in 2006 from patenting and licensing activities is 700 million.
- The software industry has received the most venture capital among all industries since 2003. Biotechnology has consistently been in second place, except for the first quarter in 2007 when it edged the software industry.
- Biotechnology is a risky economic development model. The drug development sequence of basic research, incubator, R&D, clinical trials and FDA approval has long cycles and is costly to sustain at all levels. A typical drug takes 8 - 10 years to bring to market, and costs 1.2 billion. The total investment is always at risk, as only a very small percentage of drugs in development make it to market.
- Pay-off has not been good for early stage biotechnology companies and investors. For example, the public biotechnology companies in New England collectively lost $1.3 billion in 2006. There is a concern that venture capital may shift to more profitable industries as software development and applications.
- Biotechnology accounts for less than 1% of all workforce in most states, but has one of the highest growth rates compared to other life sciences sectors.

UTAH METRICS IN THE NATIONAL CONTEXT

Federal funding

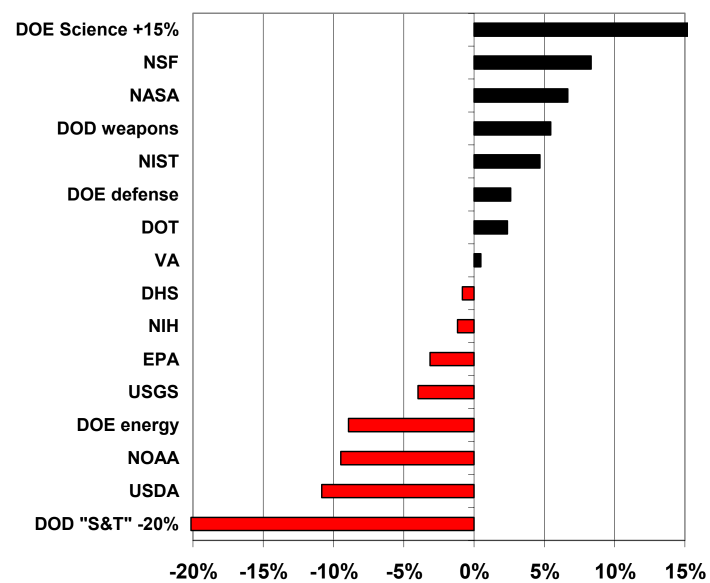
- Utah has moved up in rank from 30 to 27 in federal R&D funds by state between 1970 – 2004 (highest rank 23 in 1988 and 1989)
- Utah has increased her share of federal R&D from 0.40% to 0.64% between 1970 – 2004 (peak 0.92% in 1981)
- Utah has increased federal obligations for R&D from

Trends in U.S. Graduate S&E Enrollment by Field
1975-2005



Source: National Science Foundation, Survey of Graduate Students and Postdoctorates in Science and Engineering, 2007

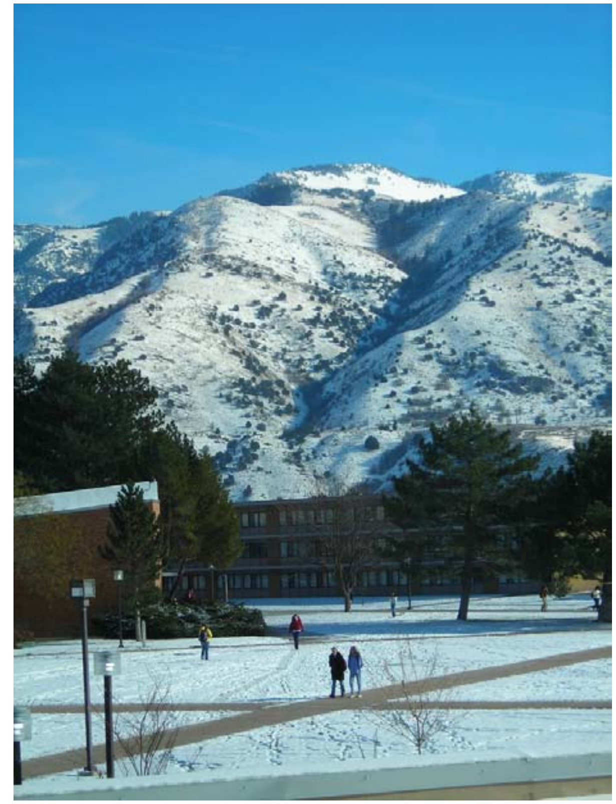
Trends in U.S. Graduate S&E Enrollment by Field
1975-2005



Source: National Science Foundation, Survey of Graduate Students and Postdoctorates in Science and Engineering, 2007

62 million to 683 million between 1970 – 2004
- Utah State University received the same amount of NSF funding in 2006 as Brigham Young University (over 6 million). University of Utah received four times this amount (24 million)

Industry funding
- Venture Capital disbursements for Science and Technology in the US increased 1300% between 1995 and 2000 and 250% between 1995 and 2004
- Venture Capital in Utah increased 6000% between 1995 and 2000 and 1700% between 1995 and 2004
- Utah ranked in the top 12 states in 1998 for percentage of high technology firms among all business establishments, and in the top 10 states for the same metric in 2002.
- Utah ranked number 1 in the nation in 2002 for percentage of net high technology business formations among all business establishments.
- However, Utah's share of the high technology market has been declining.



USU Main Campus

Credit: S.R. Harris

NATION AND BEYOND:
CRITERIA AND RECOMMENDATIONS

- USU needs to develop the conditions and incentives for recruiting the best talent from the US and beyond. A committee should be charged with this task and a study should be commissioned to develop a strategy and address the areas of need.
- Utah/USTAR needs a strategy for reclaiming its position as a high technology state and target sectors for potential leadership.
- Utah/USU need to increase their share of federal R&D funds.
- In view of federal reductions for R&D funds, Utah needs to evaluate sustained state funding for University R&D programs.
- Utah/USTAR/USU to evaluate trends in federal funding and strategize accordingly
- Utah needs to attract venture capital firms and cultivate financial and legal service industries.
- Utah needs to address educational needs at the K12 and collegiate level, especially in Math and Sciences - build on Early College High School Initiative.
- Utah needs to improve/maintain training and continuing education programs for skilled labor force.

6.2 appendix B

DEST

	NASF		Quantity	Subtotal NASF	Notes
Laboratory Offices					
Private Office	150		14	2,100	9 FTEs (4 PI's currently)
Shared Office	150		18	2,700	18 FTEs
Office Cube	75		27	2,025	27 FTEs
Admin Space	75		2	150	2 FTEs
Lab Desk					all FTE's in above numbers
SUBTOTAL				**6,975**	56 FTEs at full growth
Office Support					
Printer/Copy Area	120		1	120	
Supply Closet	60		1	60	
File Storage	25		1	25	
25 P. Meeting/Conference	500		1	500	20SF /person
5 P. Meeting/Conference	100		2	200	
Kitchenette/Coffe/Break Area	200		1	200	
Coat Closet	40		1	40	
SUBTOTAL				**1,145**	
Laboratory					
Mobile Sensor Lab				0	parked in vehicle bay or outside
Computer Optics Lab	660		1	660	(2) 12LF benches per 11' x 30' bay
Laser Radar Studio	660		1	660	
Atmospheric Optics Lab	660		1	660	
Terrestrial Optics Lab	660		1	660	
EMI/RFI Shielded Lab	660		1	660	
SUBTOTAL				**3,300**	
Laboratory Support					
Shop	308		1	308	
Vehicle Bay (Mobile Sensor Lab)	1,600		1	1,600	4 vehicle bays @ 10' x 40' each
Clean Room	308		1	308	Classification TBD
Laser Safety Lab	308		1	308	
Computer Server Room	200		1	200	Consider making this a Shared Support space with segregation
SUBTOTAL				**2,724**	
Other Support					
Hazardous Waste Holding			0	0	See "Shared Support"
Building Lobby & Waiting				0	See "Shared Support"
SUBTOTAL				**0**	
TOTAL				**14,144**	

Microbe Biotechnology

	NASF		Quantity	Subtotal NASF	Notes
Laboratory Offices					
Private Office	150		10	1,500	6 FTEs
Shared Office	150		2	300	4 FTEs
Office Cube	75		6	450	6 FTEs
Admin Space	75		2	150	2 FTEs
Lab Desk					2 FTEs per wet lab bay = 24
SUBTOTAL				**2,400**	42 FTEs at full growth
Office Support					
Printer/Copy Area	120		1	120	
Supply Closet	60		1	60	
File Storage	25		1	25	
25 P. Meeting/Conference	500		1	500	20SF /person
5 P. Meeting/Conference	100		2	200	
Kitchenette/Coffe/Break Area	200		1	200	
Coat Closet	40		1	40	
SUBTOTAL				**1,145**	
Laboratory					
Bioreactor Lab Bay	330		6	1,980	one 100L bioreactor per 11' x 30' bay
Wet Lab Bay	330		10	3,300	(2) 12LF benches per 11' x30' bay: 4 tech sta.
SUBTOTAL				**5,280**	
Laboratory Support					
Staging Area (prep/pre-processing)	616		1	616	equiv to 2 lab bays. Low humidity enviro
Receiving- secure holding area	350		1	350	
Cold Storage Room	132		1	132	(8) 55 gal drum @ 9 SF+ 5' wide aisle
Shop (bioreactor fabrication)	616		1	616	
Data Analysis	150		1	150	6 people @ 25 SF / person
Analytical Instrument Room	330		1	330	10 set-ups @ 6 LF per system
Constant Temp Chamber Room	160		1	160	6 chambers @ 12.5 SF + 5' wide aisle
Test Engine Lab	308		1	308	equivalent to 1 lab bay
Imaging Room (AFM, etc.)	165		1	165	allow for two scope set-ups
Freezer Farm	330		1	330	space for (20) -20 freezers
Walk-in/work-in Cold Room (4º)	154		1	154	bench, sink + lab services
SUBTOTAL				**3,311**	
Other Support					
Hazardous Waste Holding				0	See "Shared Support"
Glass Washing & Sterile Prep				0	See "Shared Support"
Building Lobby & Waiting				0	See "Shared Support"
SUBTOTAL				**0**	

6.3 appendix C

Utah State University USTAR Building - Program Options

ajc/Payette 07-12-07

Option 1 - Current mixed

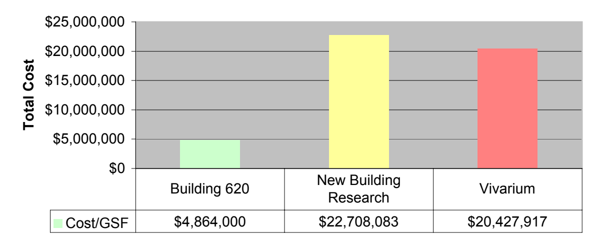
Microbe Biotechnology	11,670
DEST	9,129
Advanced Nutrition	19,318
Infectious Disease	3,880
Vivarium	18,405
Shared Support	8,400
Total	***70,802***

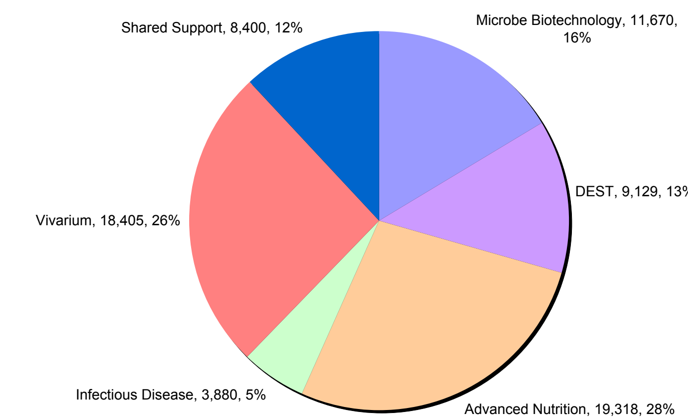
	GSF	NASF		USTAR BUILDING: Building 620				USTAR BUILDING: New Building							NSF	GSF
			3rd floor					800	2,666	1,629	4,730				9,826	16,376
	14,500	8,700	2nd floor	7,500			1,200	1,000	8,826						9,826	16,376
	15,900	9,540	1st floor		6,940		2,600	2,000	7,826						9,826	16,376
			lower level					800				3,880	18,405		23,085	38,475
total	30,400	18,240		7,500	6,940		3,800	4,600	19,318	1,629	4,730	3,880	18,405	*total*	52,562	87,604
				DEST	Microbe	other	shared		Adv Nutr	DEST	Microbe	Infect Dis	Vivarium			
			balance	3,361	0		0		0			0	0			
			Program NASF	12,490	11,670		8,400		19,318			3,880	18,405			
			Cost/GSF	160	160		160	450	450	450	450	550	550			
			Cost	2,000,000	1,850,667		1,013,333	3,450,000	14,488,500	1,222,083	3,547,500	3,556,667	16,871,250			
			Total cost	48,000,000												
			Total budget	48,000,000												
			delta	0												

Construction cost and Square footage formula

	USTAR BUILDING: Building 620	USTAR BUILDING: New Building		total
		Research	Vivarium	
NSF	18,240	30,277	22,285	70,802
GSF	30,400	50,462	37,142	118,004
cost/GSF	160	450	550	387 avg.
cost	$4,864,000	$22,708,083	$20,427,917	**$48,000,000**
total budget				**48,000,000**
	Building 620	New Building	Vivarium	

Program/Cost distribution





Option 1a - Current w/ Life Sciences expansion

Microbe Biotechnology	6,940
DEST	7,500
Advanced Nutrition	19,318
Life Sciences expansion	*6,359*
Infectious Disease	3,880
Vivarium	18,405
Shared Support	8,400
Total	***70,802***

	GSF	NASF		USTAR BUILDING: Building 620				USTAR BUILDING: New Building							NSF	GSF
			3rd floor					800	2,666	*6,359*					9,826	16,376
	14,500	8,700	2nd floor	7,500	*		1,200	1,000	8,826						9,826	16,376
	15,900	9,540	1st floor		6,940		2,600	2,000	7,826						9,826	16,376
			lower level					800			3,880	18,405	**		23,085	38,475
total	30,400	18,240		7,500	6,940		3,800	4,600	19,318	*6,359*	3,880	18,405		*total*	52,562	87,604
				DEST	Microbe	other	shared		Adv Nutr	LS exp.	Infect Dis	Vivarium	Viv. Exp.			
				4,990	4,730											
			Program NASF	12,490	11,670		8,400		19,318	0	3,880	18,405				
			Cost/GSF	160	160		160	450	450	450	550	550				
			Cost	2,000,000	1,850,667		1,013,333	3,450,000	14,488,500	4,769,583	3,556,667	16,871,250				
			Total cost	48,000,000												
			Total budget	48,000,000												
			delta	0												

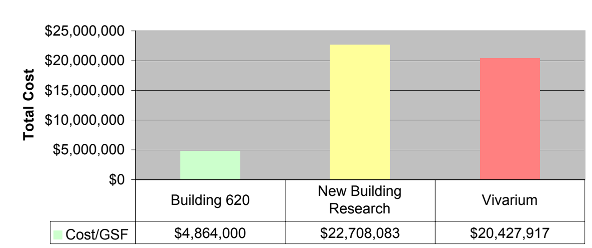
* *Once (and if) DEST moves out, Microbe moves to the 2nd floor with* ***1950*** *nasf expansion space*

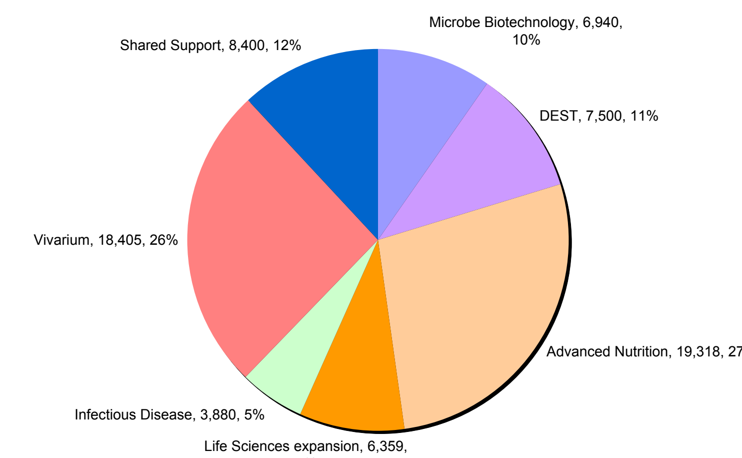
** *The additional* ***6,359*** *nasf Life Sciences may require additional Vivarium space. It may either displace Infect. Dis. or expand the Vivarium, or both.*

Construction cost and Square footage formula

	USTAR BUILDING: Building 620	USTAR BUILDING: New Building		total
		Research	Vivarium	
NSF	18,240	30,277	22,285	70,802
GSF	30,400	50,462	37,142	118,004
cost/GSF	160	450	550	387 avg.
cost	4,864,000	22,708,083	20,427,917	**48,000,000**
total budget				**48,000,000**

Program/Cost distribution





Utah State University USTAR Building - Program Options

ajc/Payette 07-12-07

Option 2 - Life Sciences

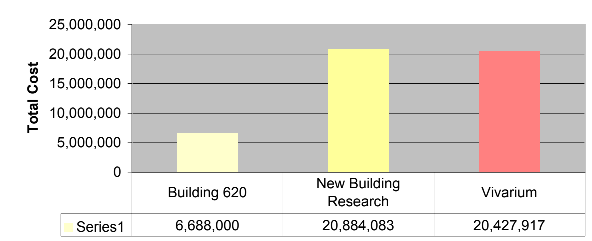
Advanced Nutrition	19,318
Life Sciences expansion	***18,367***
Vivarium	18,405
Vivarium expansion	***3,880***
Shared Support	8,400
Total	***68,370***

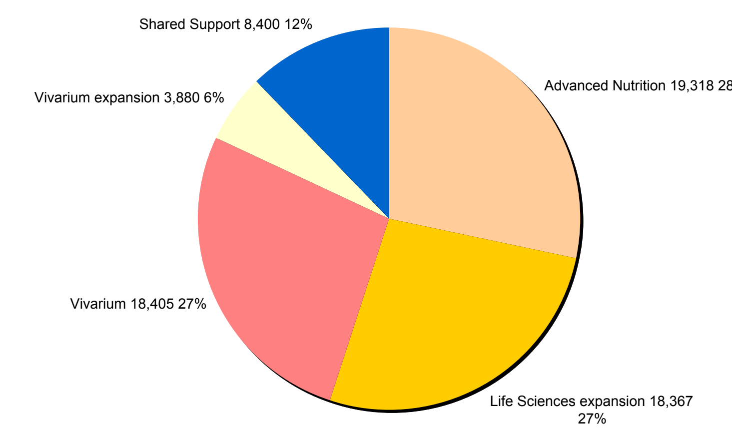
				USTAR BUILDING											
				Building 620				New Building							
	GSF	NASF												NSF	GSF
			3rd floor					800	4,288	***3,927***				9,015	15,025
	14,500	8,700	2nd floor	0		***7,500***	1,200	1,000	8,015					9,015	15,025
	15,900	9,540	1st floor		0	***6,940***	2,600	2,000	7,015					9,015	15,025
			lower level					800			0	18,405	***3,880***	23,085	38,475
total	30,400	18,240		0	0	***14,440***	3,800	4,600	19,318	***3,927***	0	18,405	***3,880***	*total* 50,130	83,551
				DEST	Microbe	LS exp.	shared		Adv Nutr	LS exp.	Infect. Dis	Vivarium	Viv. Exp.		
				12,490	11,670						3,880				
			Program NASF	12,490	11,670	0	8,400		19,318	0	3,880	18,405	0		
			Cost/GSF	220	220	220	220	450	450	450	550	550	550		
			Cost	0	0	5,294,667	1,393,333	3,450,000	14,488,500	2,945,583	0	16,871,250	3,556,667		
			Total cost	48,000,000											
			Total budget	48,000,000											
			delta	0											

Construction cost and Square footage formula

	USTAR BUILDING				
	Building 620	New Building		total	
		Research	Vivarium		
NSF	18,240	27,845	22,285	68,370	2,432 NSF deficit
GSF	30,400	46,409	37,142	113,951	
cost/GSF	220	450	550	407	avg.
cost	6,688,000	20,884,083	20,427,917	**48,000,000**	
total budget				**48,000,000**	

Program/Cost distribution





Option 3 - Physical Sciences

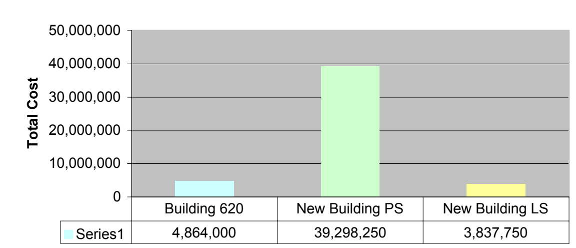
Microbe Biotechnology	11,670
DEST	12,490
Physical Sciences expansion	***54,524***
Shared Support	8,400
Total	***87,084***

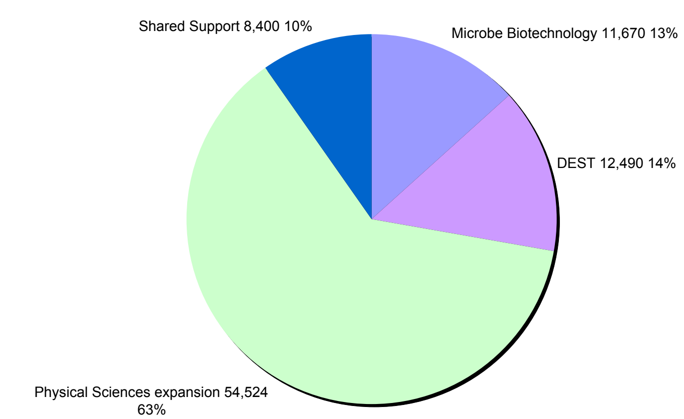
				USTAR BUILDING											
				Building 620				New Building							
	GSF	NASF												NSF	GSF
			3rd floor					800	0	***18,815***				19,615	32,691
	14,500	8,700	2nd floor	5,550		***1,950***	1,200	1,000	0	***18,615***				19,615	32,691
	15,900	9,540	1st floor	6,940			2,600	2,000	0	***5,945***		6,553	5,117	19,615	32,691
			lower level					800		***9,200***	0			10,000	16,667
total	30,400	18,240		12,490	0	***1,950***	3,800	4,600	0	***52,574***	0	6,553	5,117	*total* 68,844	114,740
				DEST	Microbe	PS exp.	shared		Adv Nutr	PS exp.	Vivarium	Microbe PS	Microbe LS		
									19,318		18,405				
			Program NASF	12,490		0	8,400		19,318	0	18,405		11,670		
			Cost/GSF	160	160	160	160	370	370	370	550	370	450		
			Cost	3,330,667	0	520,000	1,013,333	2,836,667	0	32,420,567	0	4,041,017	3,837,750		
			Total cost	48,000,000											
			Total budget	48,000,000											
			delta	0											

Construction cost and Square footage formula

	USTAR BUILDING				
	Building 620	New Building		total	
		Research	Microbe LS		
NSF	18,240	63,727	5,117	87,084	16,281 NSF surplus
GSF	30,400	106,211	8,528	145,140	
cost/GSF	160	370	450	327	avg.
cost	4,864,000	39,298,250	3,837,750	**48,000,000**	
total budget				**48,000,000**	

Program/Cost distribution





Utah State University USTAR Building - Program Options

ajc/Payette 07-12-07

Option 4 - Hybrid a

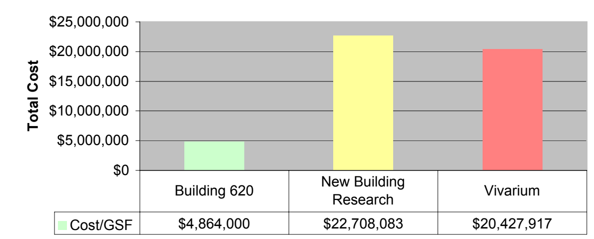
Microbe Biotechnology	11,670
Physical Sciences expansion	***2,770***
Advanced Nutrition	19,318
Life Sciences expansion	***6,359***
Vivarium	18,405
Vivarium expansion	***3,880***
Shared Support	8,400
Total	***70,802***

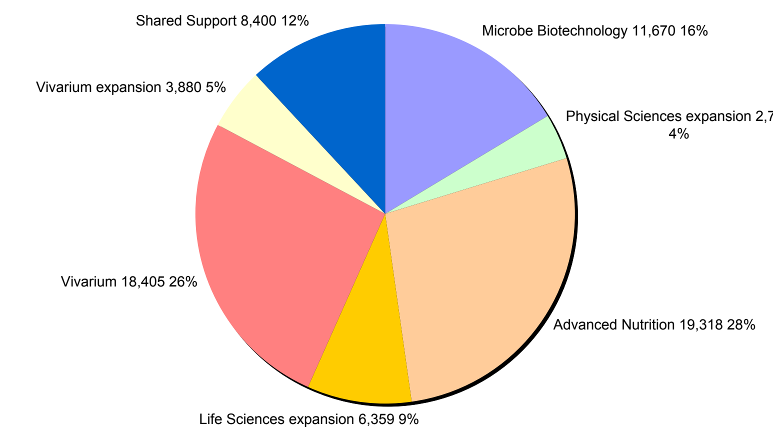
				USTAR BUILDING												
				Building 620				New Building								
	GSF	NASF													NSF	GSF
			3rd floor					800	2,666	***6,359***					9,826	16,376
	14,500	8,700	2nd floor	0	4,730	***2,770***	1,200	1,000	8,826						9,826	16,376
	15,900	9,540	1st floor		6,940		2,600	2,000	7,826						9,826	16,376
			lower level					800			0	18,405	***3,880***		23,085	38,475
total	30,400	18,240		0	11,670	***2,770***	3,800	4,600	19,318	***6,359***	0	18,405	***3,880***	*total*	52,562	87,604
				DEST	Microbe	PS exp.	shared		Adv Nutr	LS exp.	Infect. Dis	Vivarium	Viv. Exp.			
				12,490							3,880					
			Program NASF	12,490	11,670		8,400		19,318	0	3,880	18,405	0			
			Cost/GSF	160	160	160	160	450	450	450	550	550	550			
			Cost	0	3,112,000	738,667	1,013,333	3,450,000	14,488,500	4,769,583	0	16,871,250	3,556,667			
			Total cost	48,000,000												
			Total budget	48,000,000												
			delta	0												

Construction cost and Square footage formula

	USTAR BUILDING			
	Building 620	New Building		total
		Research	Vivarium	
NSF	18,240	30,277	22,285	70,802
GSF	30,400	50,462	37,142	118,004
cost/GSF	160	450	550	387 avg.
cost	4,864,000	22,708,083	20,427,917	**48,000,000**
total budget				**48,000,000**

Program/Cost distribution





Option 5 - Hybrid b

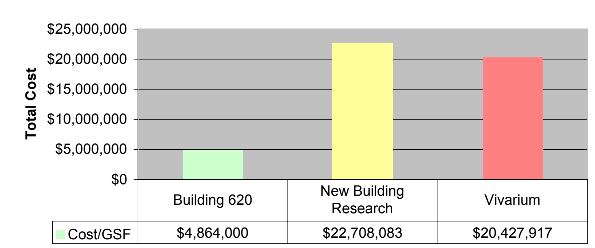
DEST	12,490
Physical Sciences expansion	***1,950***
Advanced Nutrition	19,318
Life Sciences expansion	***6,359***
Vivarium	18,405
Vivarium expansion	***3,880***
Shared Support	8,400
Total	***70,802***

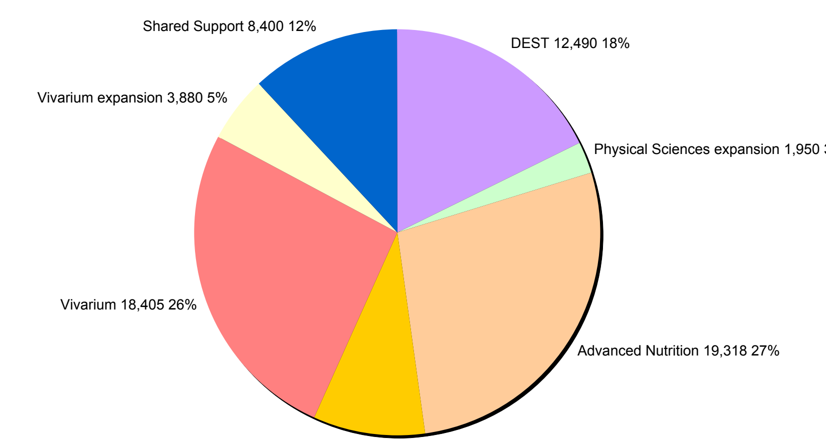
				USTAR BUILDING												
				Building 620				New Building								
	GSF	NASF													NSF	GSF
			3rd floor					800	2,666	***6,359***					9,826	16,376
	14,500	8,700	2nd floor	5,550	0	***1,950***	1,200	1,000	8,826						9,826	16,376
	15,900	9,540	1st floor	6,940	0		2,600	2,000	7,826						9,826	16,376
			lower level					800			0	18,405	***3,880***		23,085	38,475
total	30,400	18,240		12,490	0	***1,950***	3,800	4,600	19,318	***6,359***	0	18,405	***3,880***	*total*	52,562	87,604
				DEST	Microbe	PS exp.	shared		Adv Nutr	LS exp.	Infect. Dis	Vivarium	Viv. Exp.			
				0	11,670						3,880					
			Program NASF	12,490	11,670		8,400		19,318	0	3,880	18,405	0			
			Cost/GSF	160	160	160	160	450	450	450	550	550	550			
			Cost	3,330,667	0	520,000	1,013,333	3,450,000	14,488,500	4,769,583	0	16,871,250	3,556,667			
			Total cost	48,000,000												
			Total budget	48,000,000												
			delta	0												

Construction cost and Square footage formula

	USTAR BUILDING			
	Building 620	New Building		total
		Research	Vivarium	
NSF	18,240	30,277	22,285	70,802
GSF	30,400	50,462	37,142	118,004
cost/GSF	160	450	550	387 avg.
cost	4,864,000	22,708,083	20,427,917	**48,000,000**
total budget				**48,000,000**

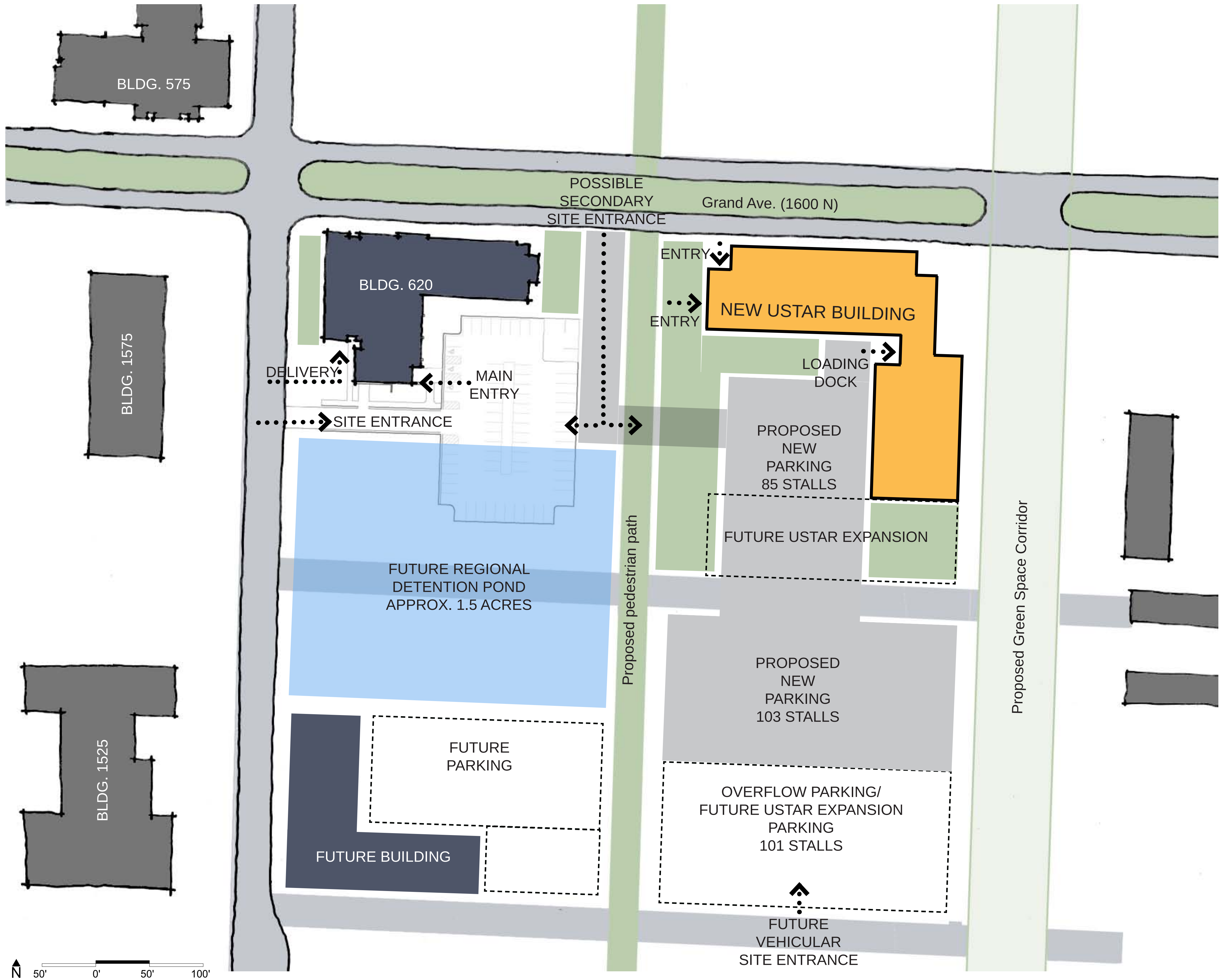
Program/Cost distribution



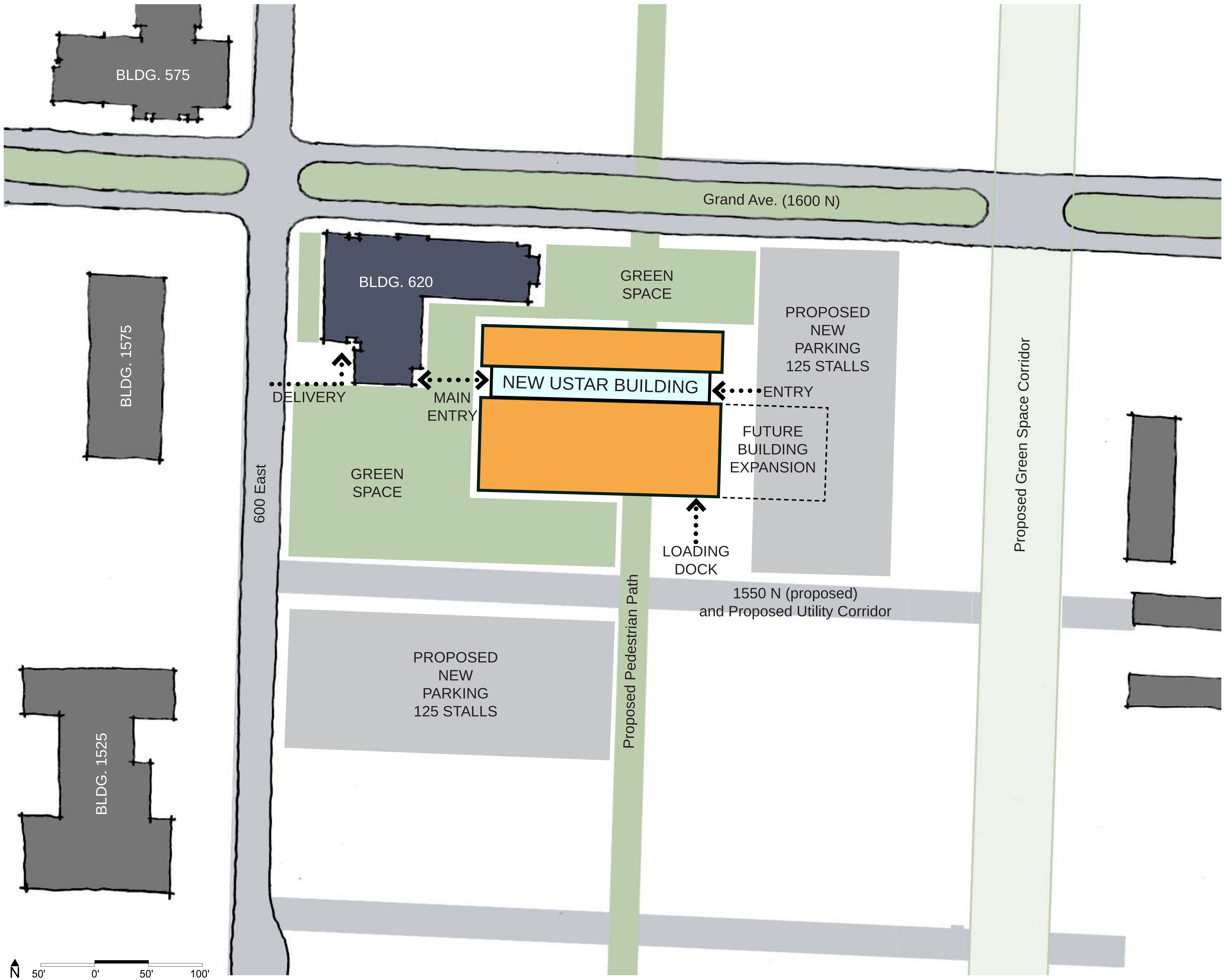


6.4 appendix D

alternate slected site option



site option one



Advantages:

- Main entrance, creates a joined entry courtyard with Building 620 entrance.

- Loading dock/ service area is in the middle of the block and away from Grand Anenue.

Disadvantages:

- The USTAR Building distrupts the prposed pedestrian path defined by Master Plan.

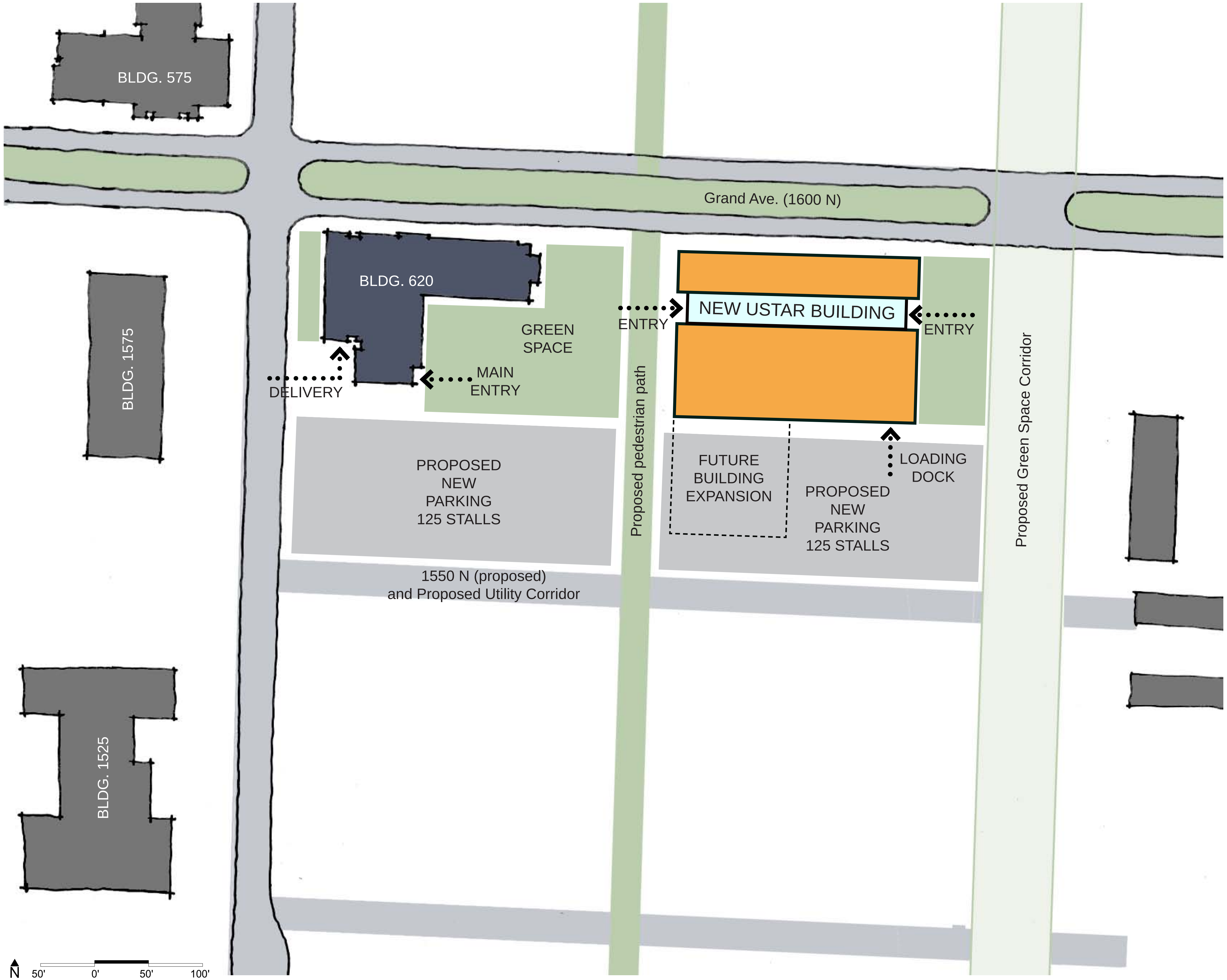
- Main facade of the USTAR Building does not have a strong presence on GrandAvenue or 600 East Street.

- The USTAR Building creates shadow on the south facade of Building 620.

- The USTAR Building location eliminates the proposed green space in the middle of the block defined by Master Plan.

- Building placement is in conflict with the master Plan concept of 300'x300 blocks.

- Requires existing parking for Building 620 to be relocated (added expense)



site option two

Advantages:

- Main facade of the USTAR BUILDING has a strong presence on Grand Avenue.

- Building placement on the block is within the Master Plan guidelines.

- The east and west side of the USTAR Building is bordered by two major pedestrian corridors defined by the Master Plan.

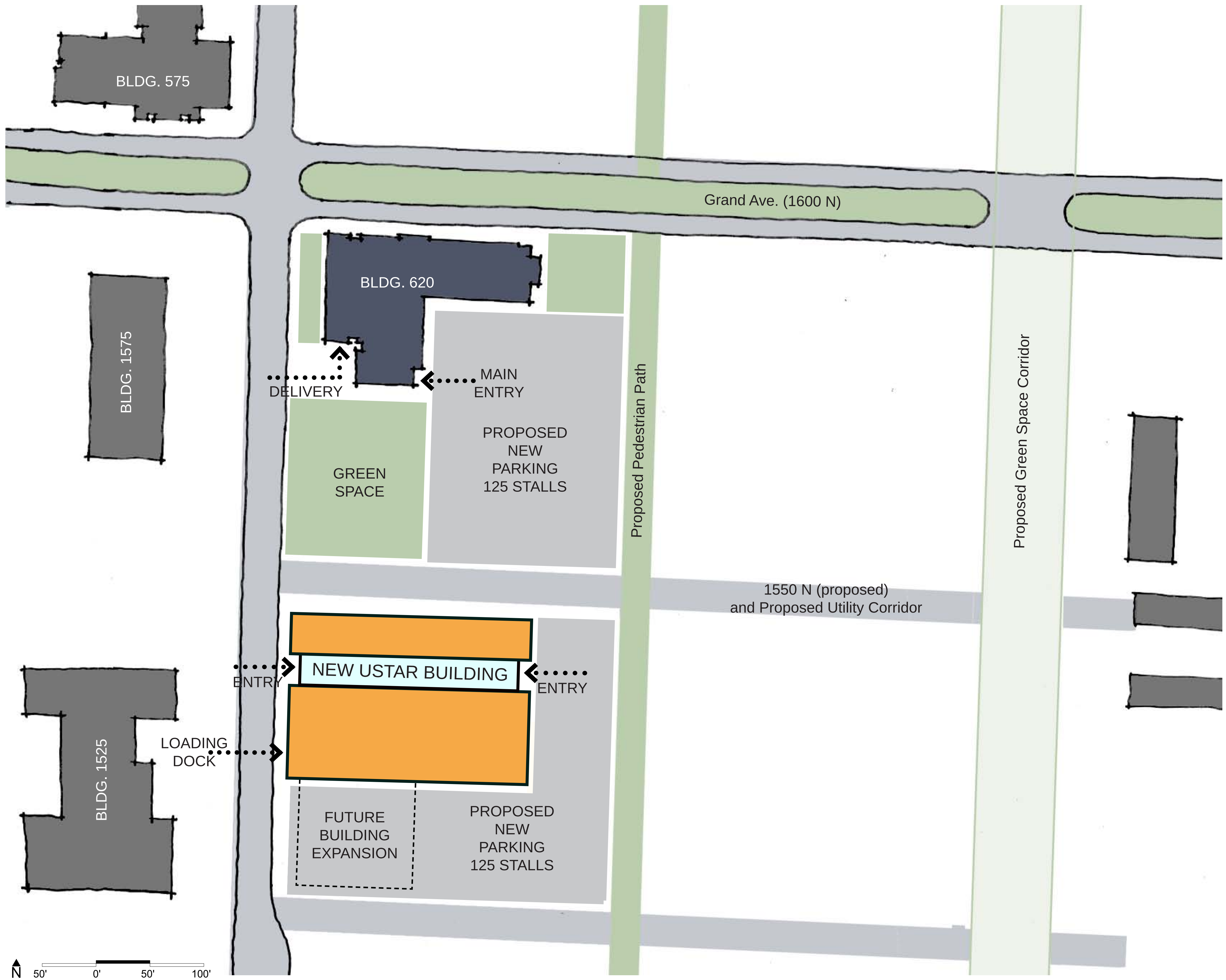
- The USTAR Building allows for a pedestrian friendly green space between it's entrance and Building 620 entrance.

- Loading dock/ service area is in the middle of the block and away from Grand Avenue.

- Multiple points of entry to the building from the parking lot.

Site Option Two was the selected preferred option and was further developed (see section 2.8)

site option three



Advantages:

- The Building has a strong presence on the 600 East Street.

- Loading dock/ service area is on the 600 East Street, which is a secondry road.

Disadvantages:

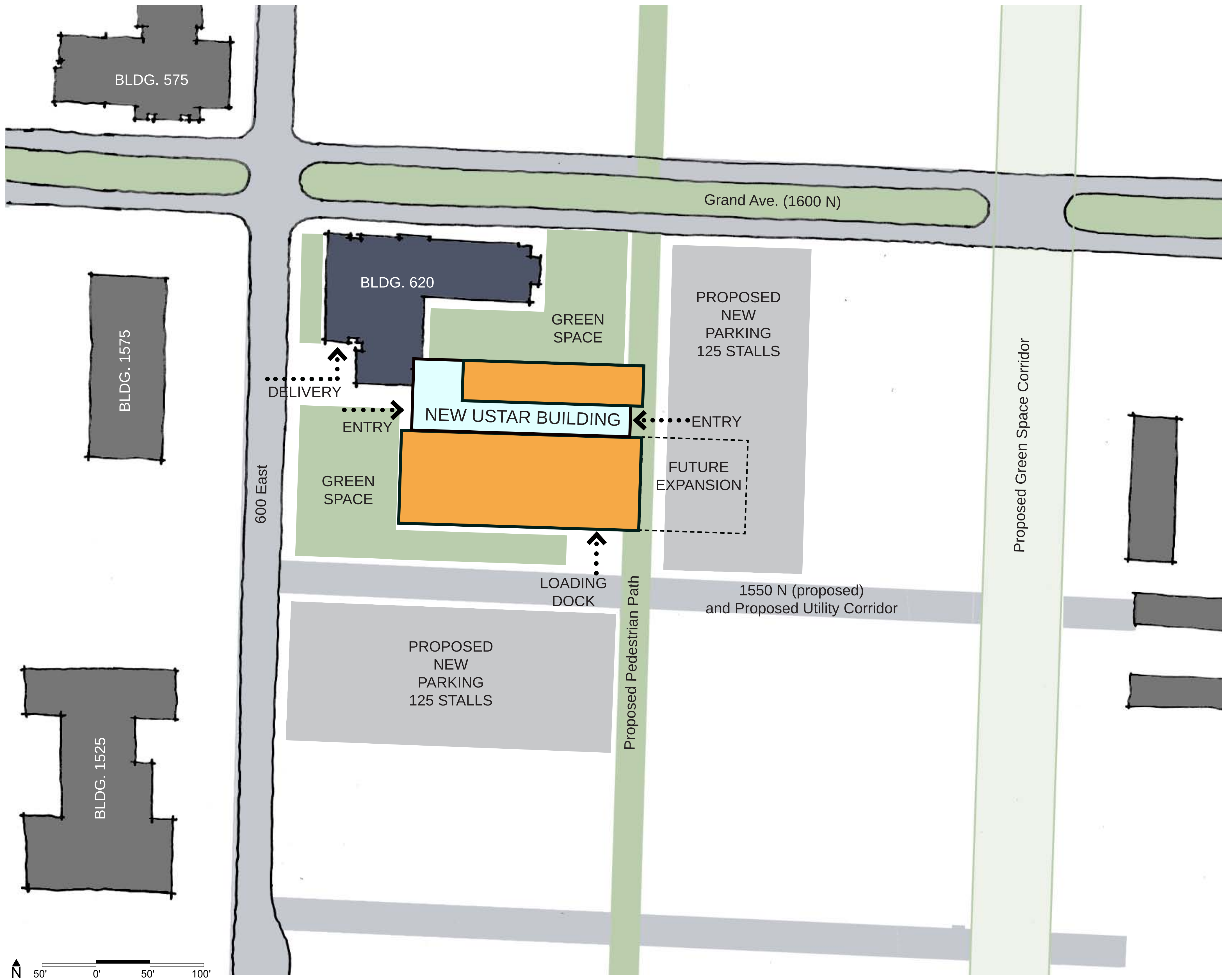
- New USTAR Building does not have a presence on Grand Avenue.

- New USTAR Building does not relate to Building 620.

- USTAR Building placement on the block is in conflict with the Master Plan.

- Locating USTAR Building does not allow for a green space on the block.

site option four



Advantages:

- The new USTAR Building has a direct physical connection to Building 620.

- Loading dock/ service area of the USTAR Building is in the middle of the block and away from Grand Avenue.

Disadvantages:

- The USTAR Building does not have a strong presence on Grand Avenue or 600 East Street

- USTAR Building placement on the block is in conflict with the Master Plan.

- Creates shadow on the south facade of Building 620.

- The main entrance to the USTAR Building does not have a direct pedestrian access to the parking.

- Requires existing parking for Building 620 to be relocated (added expense)

6.5 appendix E

stacking scheme 1

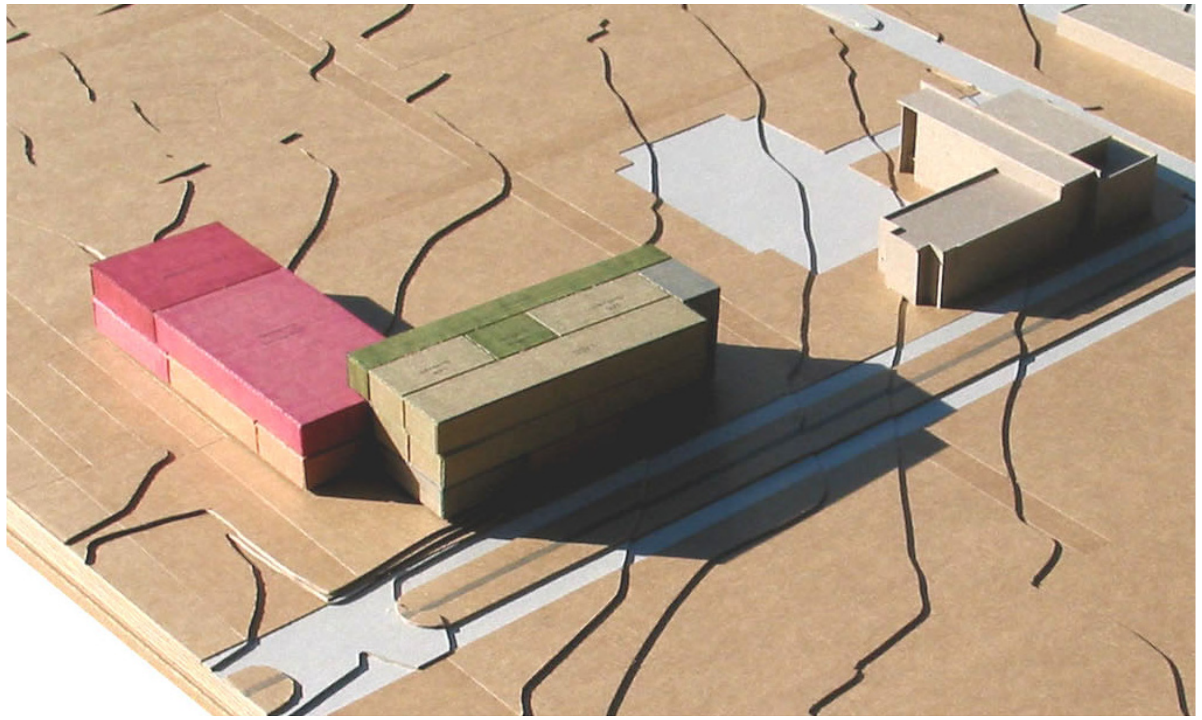
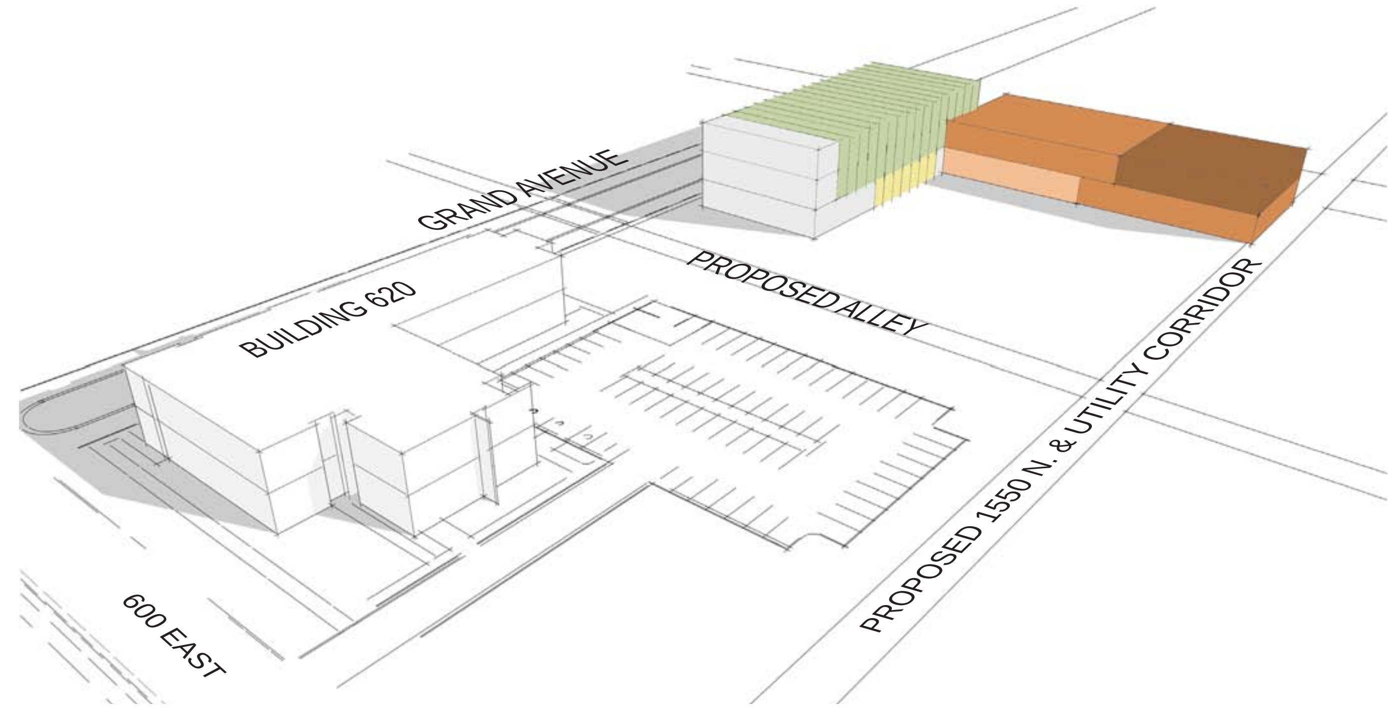


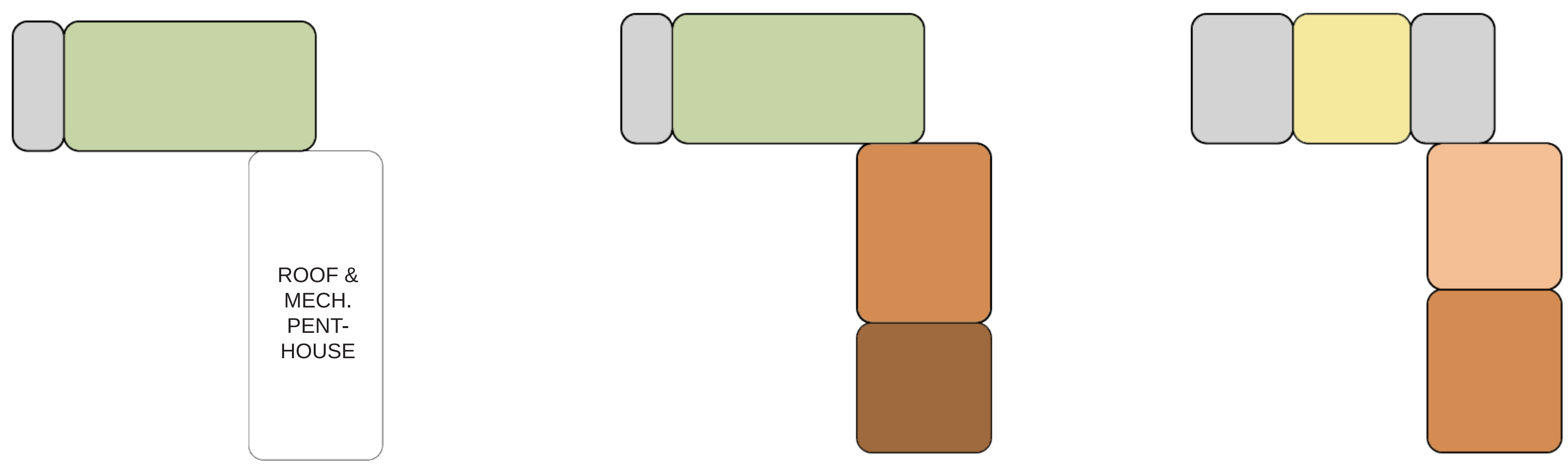
PHOTO OF STUDY MODEL
VIEW TO THE SOUTHWEST



COMPUTER MODEL
VIEW TO THE NORTHEAST

LEGEND

- WET LABS, LAB SUPPORT OFFICES, & OFFICE SUPPORT
- NON-WET LABS, NWL OFFICES & NWL OFFICE SUPPORT
- VIVARIUM
- VIVARIUM - CAGE WASH & SUPPORT
- BIOCONTAINMENT RESEARCH (ABSL3 & ABSL3+ SUITES)
- CIRCULATION & BUILDING SUPPORT



LEVEL 3 LEVEL 2 LEVEL 1

stacking scheme 2

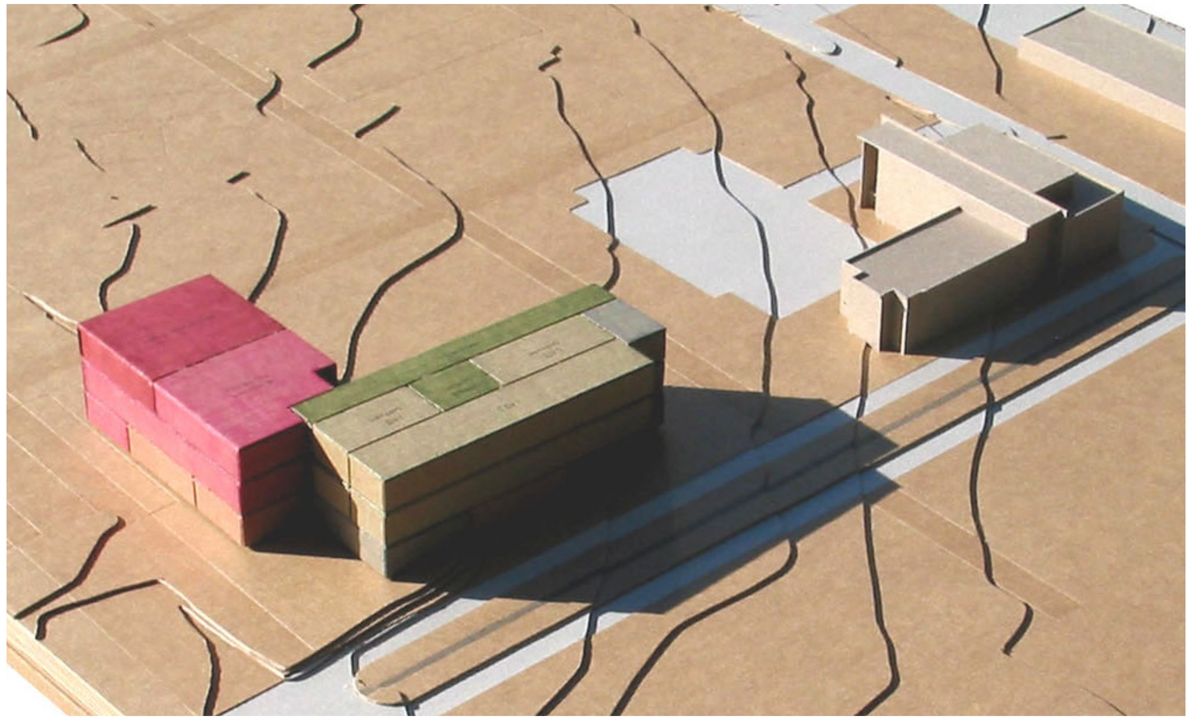
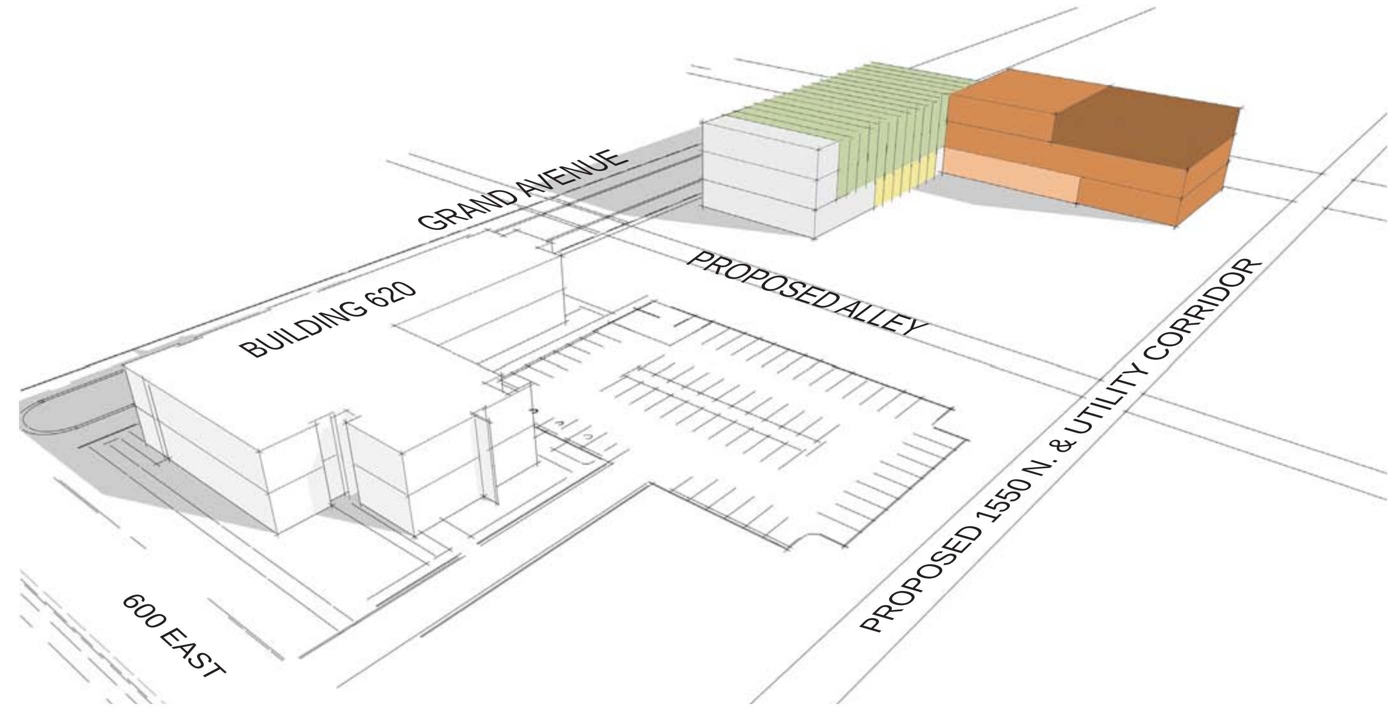


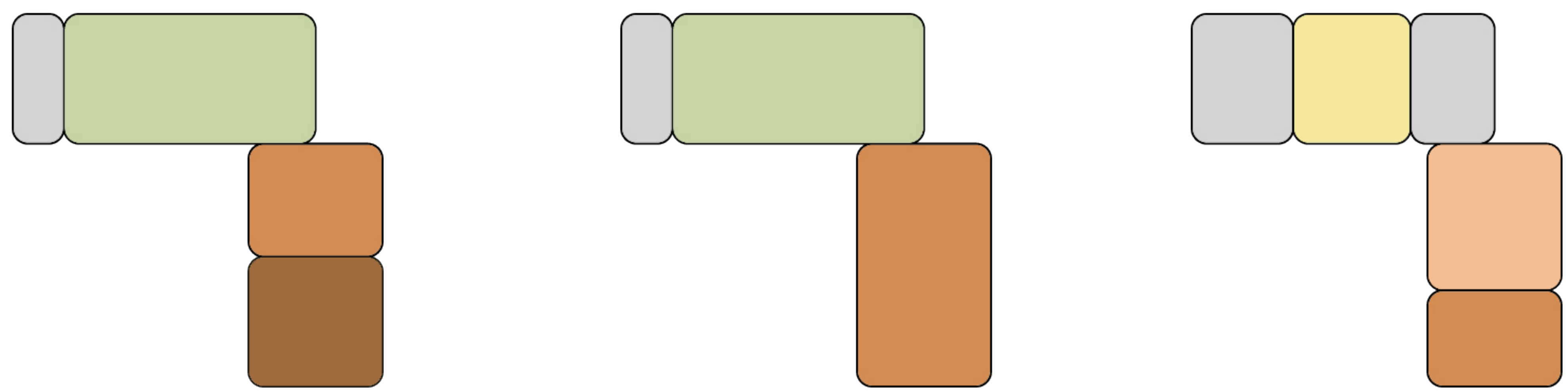
PHOTO OF STUDY MODEL
VIEW TO THE SOUTHWEST



COMPUTER MODEL
VIEW TO THE NORTHEAST

LEGEND

- WET LABS, LAB SUPPORT OFFICES, & OFFICE SUPPORT
- NON-WET LABS, NWL OFFICES & NWL OFFICE SUPPORT
- VIVARIUM
- VIVARIUM - CAGE WASH & SUPPORT
- BIOCONTAINMENT RESEARCH (ABSL3 & ABSL3+ SUITES)
- CIRCULATION & BUILDING SUPPORT



LEVEL 3 LEVEL 2 LEVEL 1

stacking scheme 3

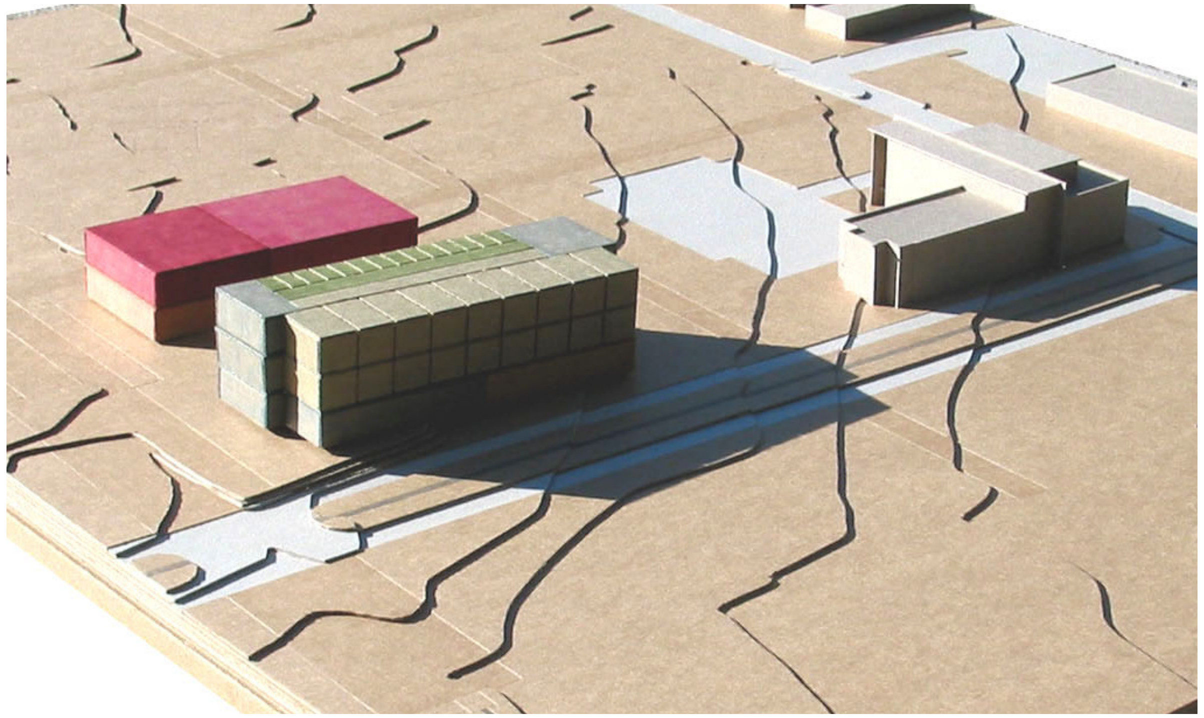
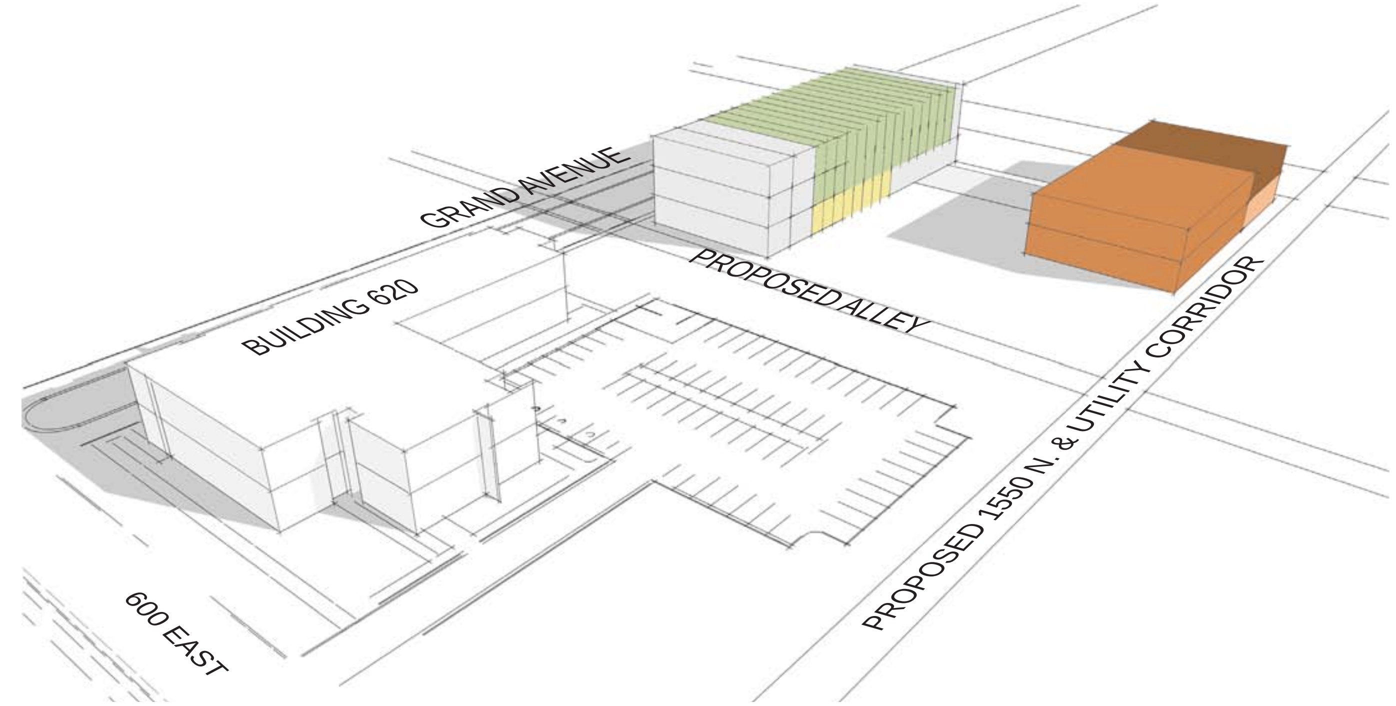


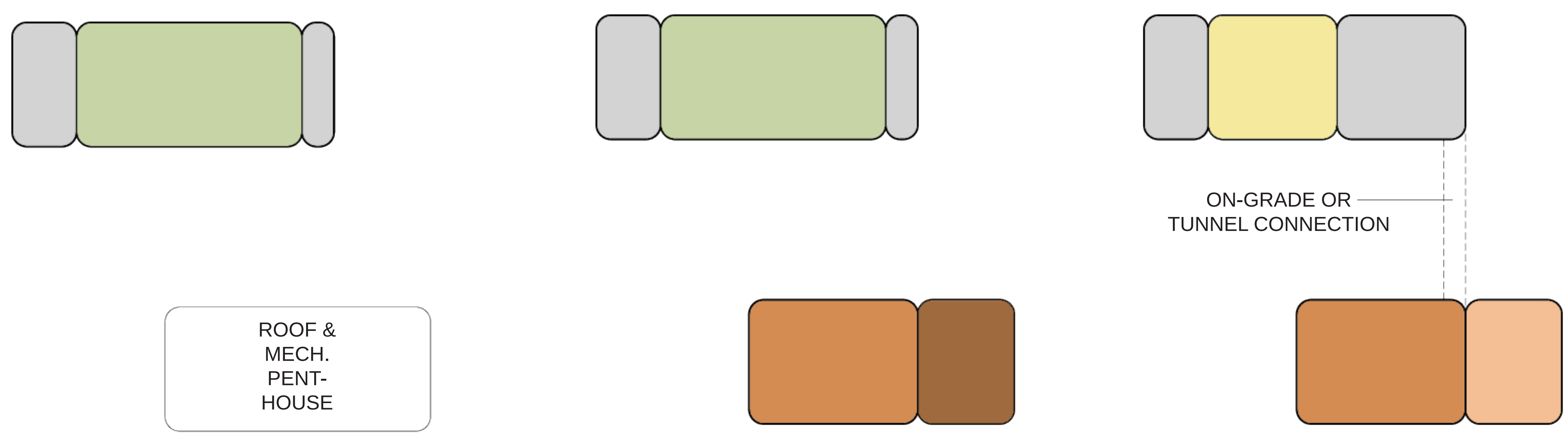
PHOTO OF STUDY MODEL
VIEW TO THE SOUTHWEST



COMPUTER MODEL
VIEW TO THE NORTHEAST

LEGEND

- WET LABS, LAB SUPPORT OFFICES, & OFFICE SUPPORT
- NON-WET LABS, NWL OFFICES & NWL OFFICE SUPPORT
- VIVARIUM
- VIVARIUM - CAGE WASH & SUPPORT
- BIOCONTAINMENT RESEARCH (ABSL3 & ABSL3+ SUITES)
- CIRCULATION & BUILDING SUPPORT

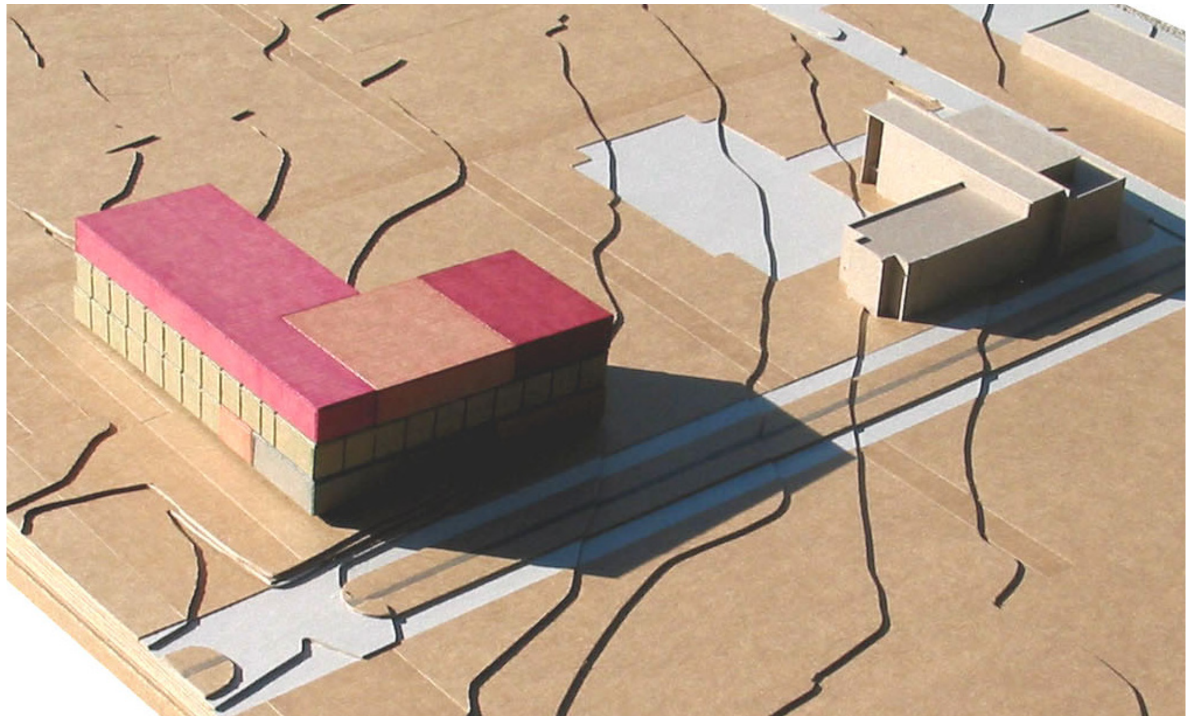


LEVEL 3

LEVEL 2

LEVEL 1

stacking scheme 4



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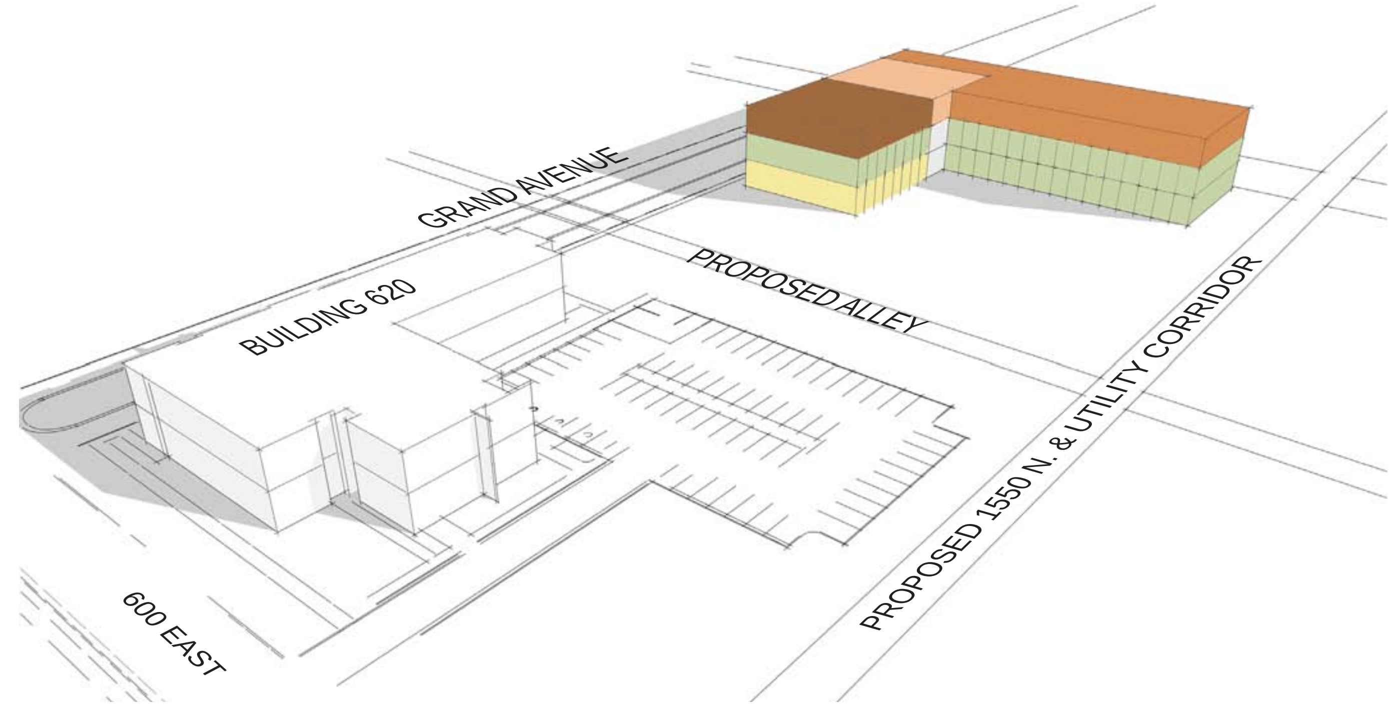
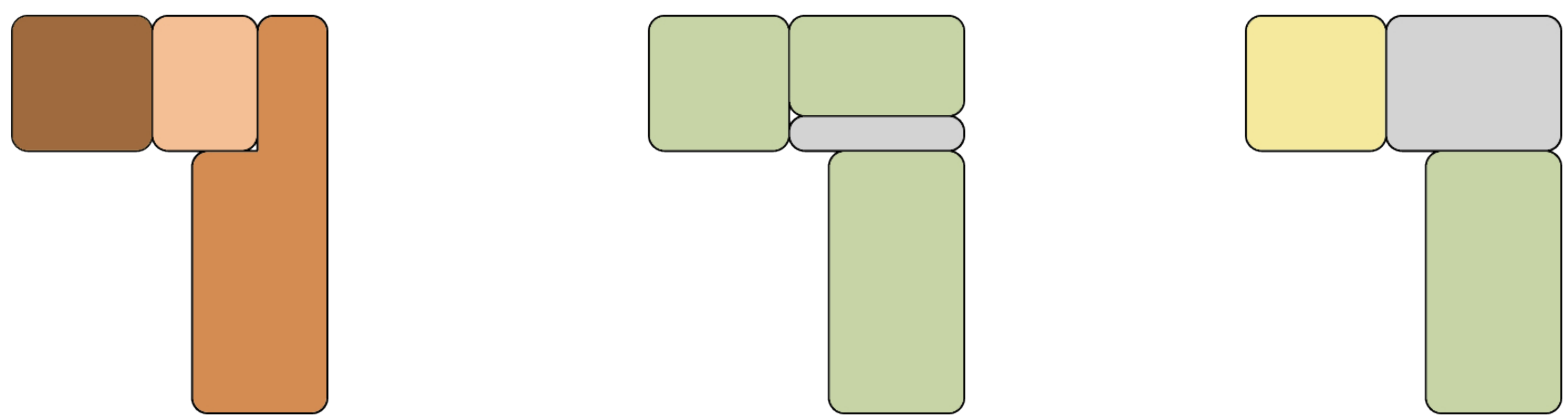
VIEW TO THE SOUTHWEST



COMPUTER MODEL
VIEW TO THE NORTHEAST

LEGEND

- WET LABS, LAB SUPPORT OFFICES, & OFFICE SUPPORT
- NON-WET LABS, NWL OFFICES & NWL OFFICE SUPPORT
- VIVARIUM
- VIVARIUM - CAGE WASH & SUPPORT
- BIOCONTAINMENT RESEARCH (ABSL3 & ABSL3+ SUITES)
- CIRCULATION & BUILDING SUPPORT



LEVEL 3 LEVEL 2 LEVEL 1

stacking scheme 5

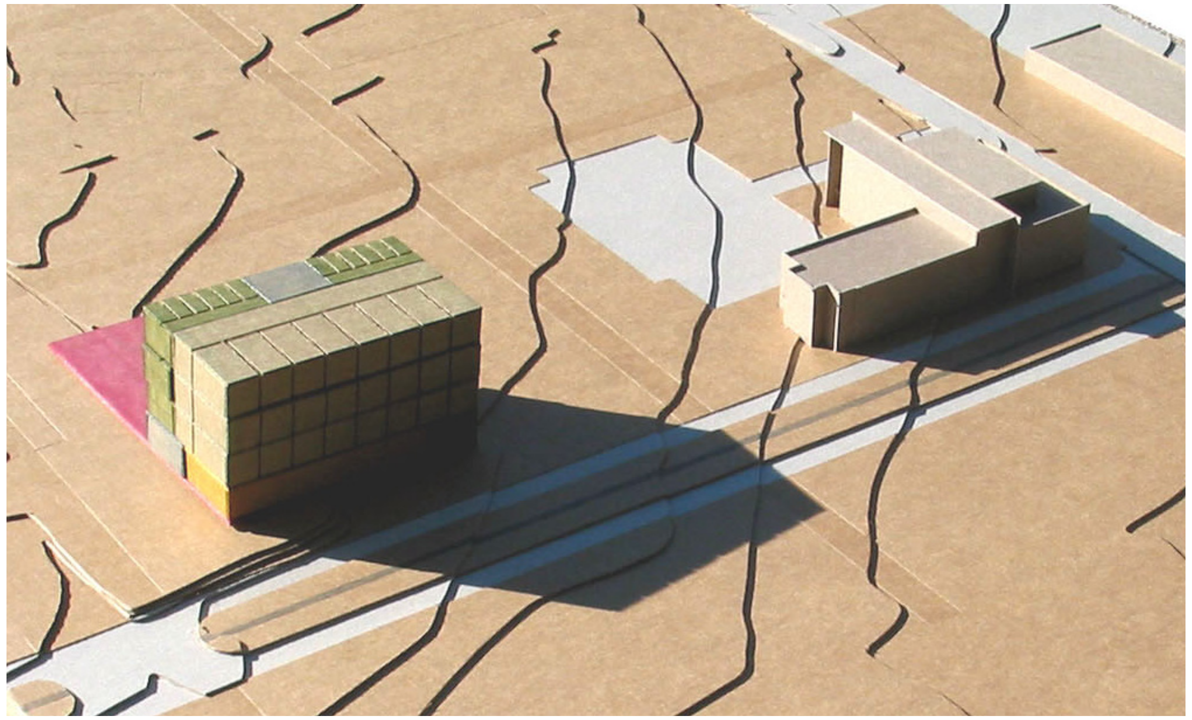
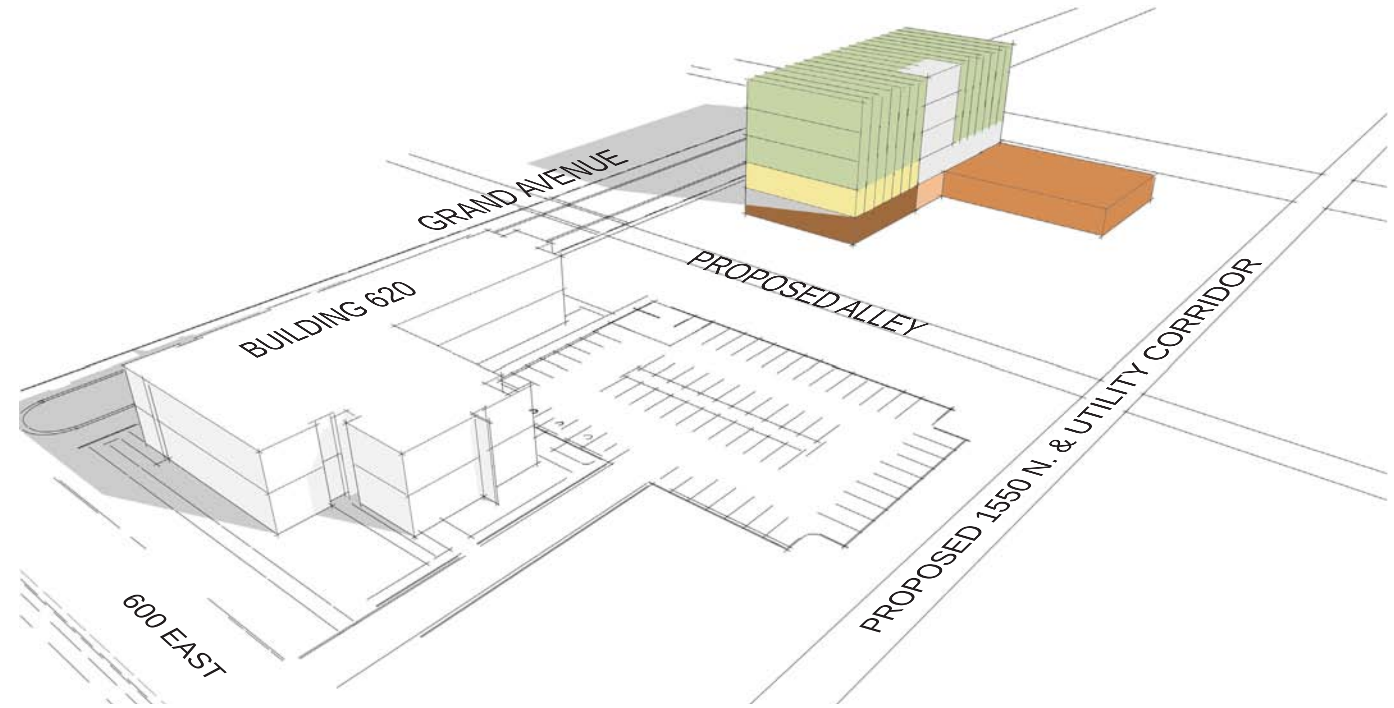


PHOTO OF STUDY MODEL
VIEW TO THE SOUTHWEST



COMPUTER MODEL
VIEW TO THE NORTHEAST

LEGEND

- WET LABS, LAB SUPPORT OFFICES, & OFFICE SUPPORT
- NON-WET LABS, NWL OFFICES & NWL OFFICE SUPPORT
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- VIVARIUM - CAGE WASH & SUPPORT
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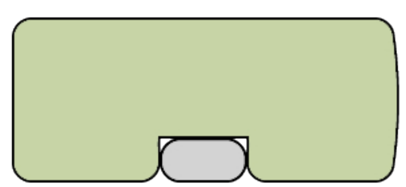
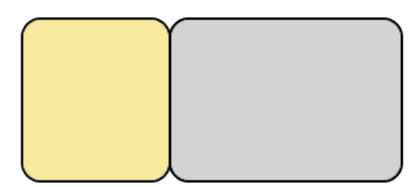
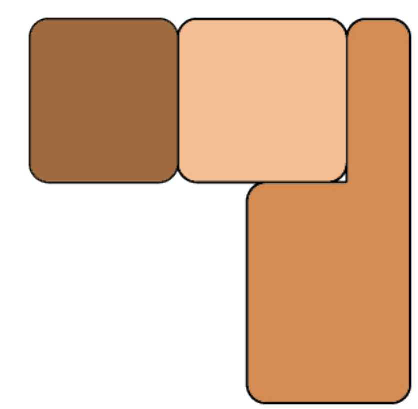


LEVEL 2 - LEVEL 4



LEVEL 1



BASEMENT LEVEL

6.6 appendix F

In order to fully engage the current programming process for USTAR's proposed cutting-edge, collaboration-oriented interdisciplinary science and research building on USU's Innovation Campus, a broad comprehension of existing institutions' successes and failures is invaluable. The Programming Team (comprised of USU/USTAR representatives and the Design Team of ajc architects and Payette) embarked on site visit to experience and analyze a nationally-recognized model institution. This site visit served as a common point of reference for the Programming Team.

SITE VISIT 01: BioDesign Institute, Arizona State University May 21, 2007

The BioDesign Institute was visited by the representatives of the Programming Team: Ned Wienshenker, Henry Nowak, Jeff Broadbent, and Dr. York - represented USU/USTAR, and Jill A. Jones, AIA, Mehrdad Samie, AIA, Joshua W. Greene, all of ajc architects – represented the Design Team. An extensive tour of the facility was provided by a representative of Gould Evans Affiliates and BioDesign Institute administrative staff. The information gleaned during the site visit is summarized in two main categories: Architectural Component, Administrative Component.

BioDesign Institute: Architectural Component

The BioDesign Institute will provide four buildings totaling 800,000 Gross Square-Feet (GSF) of office, research laboratory, core facilities, and support space when complete. Building A and Building B, completed in 2004 and 2005 respectively, provide 350,000 GSF. Total project cost for Building A was $71,000,000. Total project cost for Building B was $78,500,000. When finished, all four buildings will be connected by air-conditioned bridges or tunnels.

During the initial planning phases of the multi-mullion dollar investment in research facilities, ASU President Michael Crow mandated that the BioDesign Institute would be a state-of-the-art interdisciplinary research laboratory complex. The building itself was to be used as a tool to attract and inspire collaborative research. With this mandate, the facility was designed to encourage innovation and collaboration, maximize physical transparency to enhance visual connections among researchers. The design provides: ample informal space for impromptu discussions, innovative security – both physical and intellectual, vital core facilities (such as the vivarium), and unparalleled flexibility in laboratory/lab support spaces and related infrastructure – to accommodate changing and evolving research needs. The building was designed to be as environmentally friendly and energy efficient as possible, and is expected to be LEED gold certified.

The BioDesign institute is sited on 13 acres at the edge of ASU's Tempe campus, providing a connection to both campus and the community. Unique use of red masonry brick "skins" the major volumes of the 3-story concrete frame (plus basement), and relates the architecture to the campus context. Elaborate sun shades and large expanses of glass and metal balance the facility's material palette, and help to communicate the building's innovative research programs within (see Figures 1 and 2).


FIGURE 1


FIGURE 2

FIGURE 3

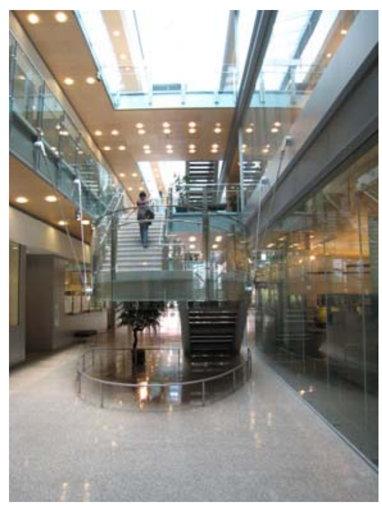


FIGURE 4

The facility is surrounded by an urban interpretation of the desert landscape, a transitional buffer between the campus streets and the facility's outdoor plazas and circulation spaces. The landscaping includes a bio-swale to help control roof drainage. Open-air structures on adjacent blocks provide parking and convenient access to the main entries. The main/visitor entrance connects to a lobby/gallery-like space lined with a wall of digital video display screens (see Figure 3). A reception/security desk is at the front of the lobby, and directly adjacent to the highly-secured entrance to the atrium and labs beyond. A moderately sized auditorium and very small deli component (operated by a concessionaire) is accessed directly from the lobby.

Additional secure entrances are located around the building, providing multiple points to access the building. Retina scanners and electronic card readers are located next to entrances, providing, and controlling, 24 hour access.

Offices and labs are organized on opposite sides of a canyon-like glass and metal panel atrium, which is oriented along the long axis of the building. The atrium brings daylight into the center of the building, to all floors, including the basement. The atrium contains the horizontal and public vertical circulation spaces – highlighting the sculptural stairways (see Figure 4), and provides access to secure elevators and stairs. The atrium was designed to provide informal gathering areas for both small and moderate sized groups. Ceiling mounted digital screens are scattered throughout the atrium, and provide cable news shows as well as event and emergency information to researchers. Whiteboards are placed wherever possible to encourage informal and impromptu discussion.

Infrastructure Details:

A vertical mechanical shaft at the back of the open lab spaces runs the length of the building, providing ample space for flexible and adaptable utility infrastructure. The majority of the mechanical air-handling equipment is located in a penthouse. The penthouse, designed with flexibility in mind, is roughly 50% of the entire building footprint. With the majority of air handling units on the roof of the structure, vibration is minimized. A sizeable portion of the penthouse is devoted to the atrium's smoke evacuation system, installed to meet life-safety requirements.

The 18" thick concrete floor structure helps to minimize vibration. Floor to floor heights are generally 15'-4", with the exception of the main level's 20'-0" floor to floor height. A mezzanine level is located above the basement, providing utility space for the Vivarium.

Laboratory Details:

The labs are continuous open spaces with multiple secure access points. The research programs share open lab space, a programmatic element intended to encourage collaboration. Graduate students have work stations right in the lab space.

One of the main features of the labs is the moveable benches, all on wheels, which maximize flexibility by providing relatively quick and easy reconfiguration. Electrical panels are located in the labs. De-ionized water is provided at each lab (it was noted that, in retrospect, a centralized system would have been preferred).

Lab support spaces and lab equipment rooms have lower ceilings to control sound, and are on either side of the vertical mechanical shafts and the back of the labs. While the support and equipment spaces can be accessed directly from the labs, they can also be accessed from a "gray" corridor on the opposite side.

The lab floors have simple and affordable 12"x12" vinyl composite tiles, instead of sheet vinyl. The gray corridors were lined with cementitious fiber-board to provide protection from moveable equipment.

Each level has small H2 occupancy areas for hazardous chemical storage.

Office Details:

While the offices are on the opposite side of the atrium, large expanses of glass provide visual connections in the informal gather areas, and beyond into the labs. Each research program has its own office suite, complete with 11' wide private offices, open work stations, small meeting rooms, and individual libraries. It was noted that the original design did not include an adequate number of medium and large conference rooms.

The private offices on the exterior wall of the building have an elaborate computer-controlled sun-shade system with override capabilities. The work stations have low walls, again enhancing opportunities for visual connections and encouraging informal discussions. Finishes in the office space include a perforated wood panel, which adds sound absorption to the spaces.

Vivarium Details:

The vivarium employs a "barrier at the cage" philosophy. Carefully thought-through planning accommodates complex circulation patterns within the vivarium, in order to minimize contamination, and maximize security. It is designed to house virtually any size animal. Multiple rooms are large enough for large animals, or several racks of ventilated cages for small animals, but not so large as to cause wide-spread contamination. Many rooms are designed to maximize flexibility, and could relatively easily be converted for a different function if necessary, from surgery rooms, to storage rooms. Each room has a concrete floor and floor drain. Most doors have some glass to see through, and a cover to block view if desired. Visual elements communicate positive and negative pressure for sensitive rooms.

The vivarium corridors are constructed of CMU and coated with epoxy paint. The Corridor floors are epoxy with cove bases.

A large cage-washing facility will serve this and future phases. The vivarium is only have a larger plan that will be completed in future phases. Additionally, multiple autoclaves are located through-out the space.

The vivarium has a dedicated elevator to/from the labs for security. The vivarium also has its own dedicated door and dock within the main dock space.

Other Spaces:

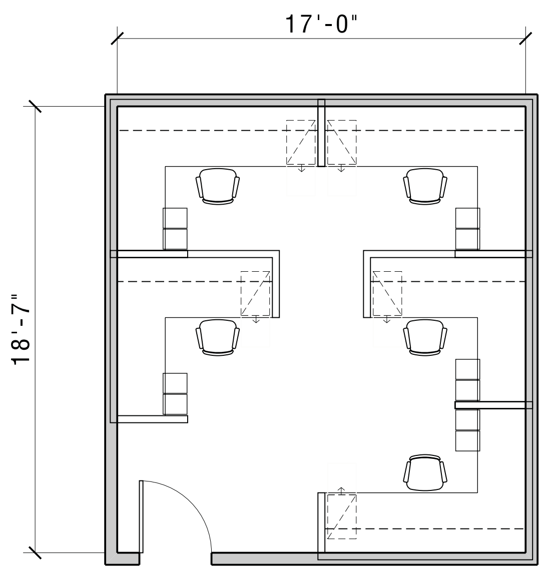
The basement level includes a large sitting area with tables and chairs for lunch and after-hours functions, with an adjacent kitchen for catering and setup. Lockers are also located near this common open space.

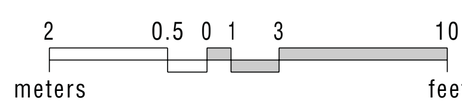
On each level, break rooms, complete with vending machines and digital screens, are tucked into the corners of the building, at the end of a long corridor. Nearby, back stairways provide additional means of access to the building. A central, secure bicycle parking area is near these back entrances.

A moderately-sized dock, at the basement level, located between Building A and Building B, will serve all four buildings.

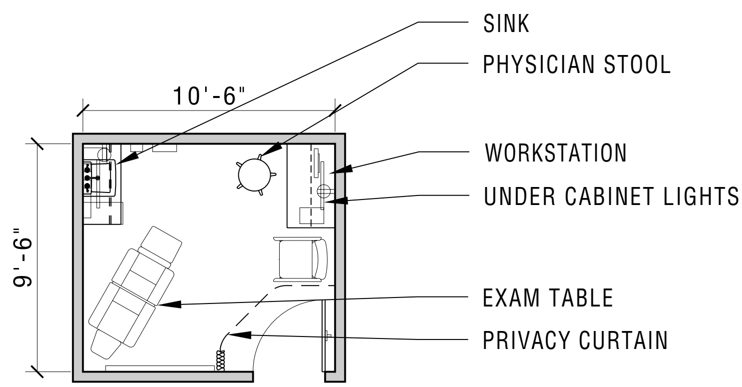
6.7 appendix G

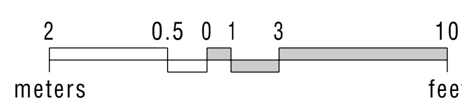
Bioinformatics Room - 308 nasf



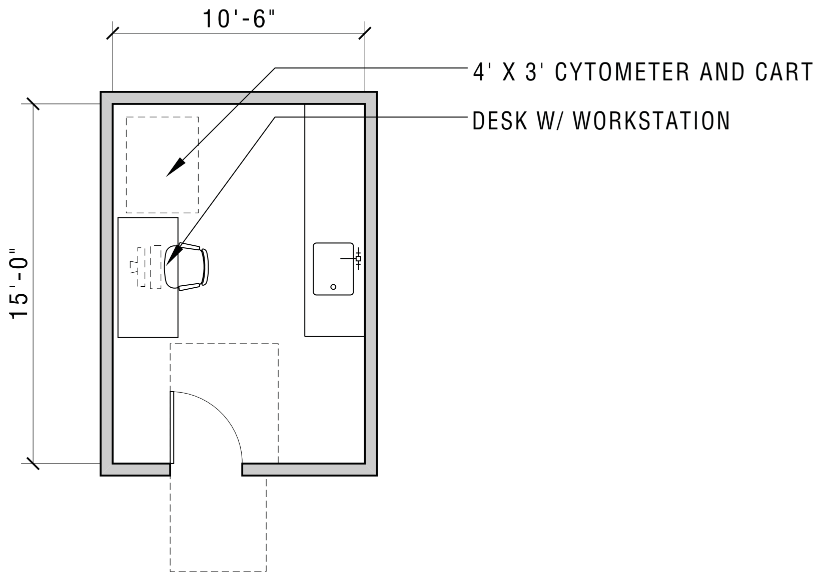


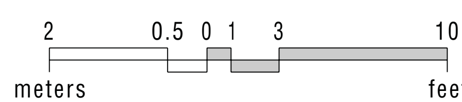
Exam Room - 100 nasf



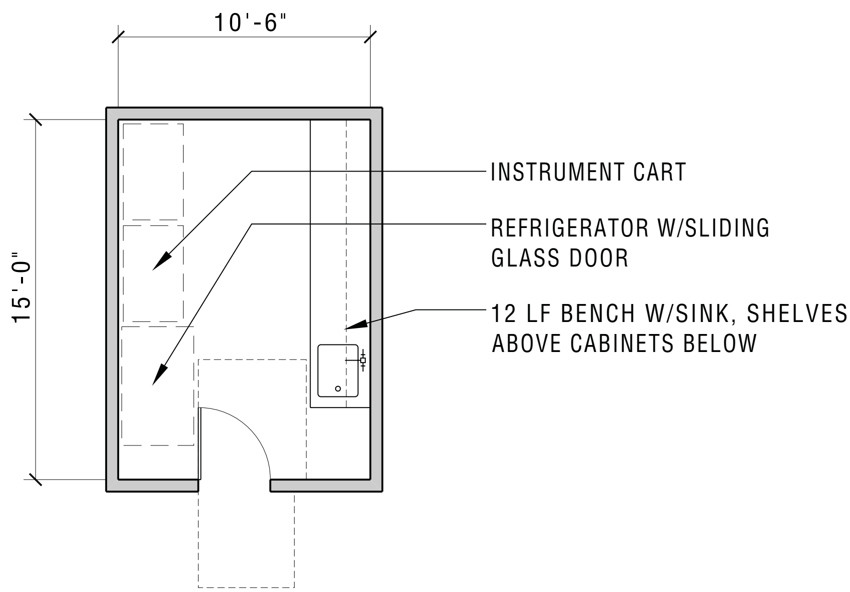


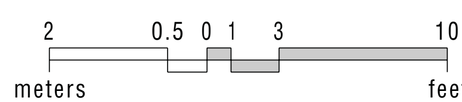
Flow Cytometer Room - 154 nasf



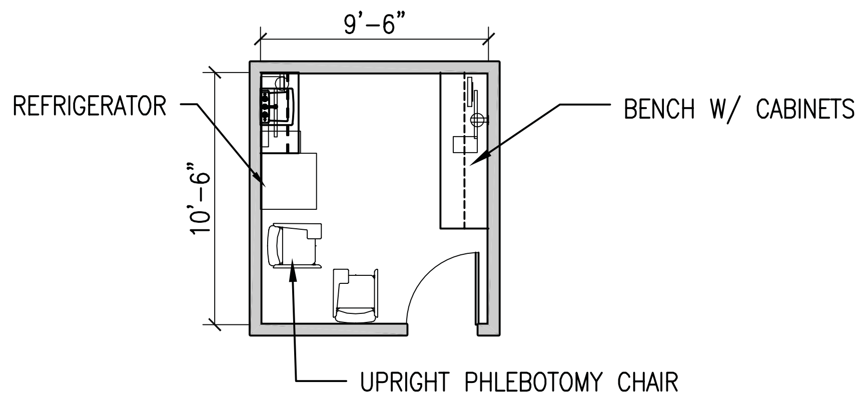


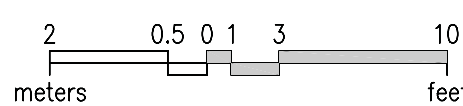
Microbiology Room - 154 nasf



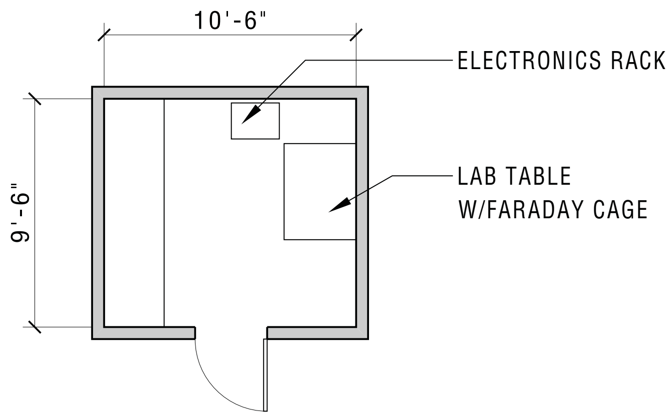


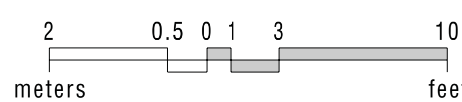
Phlebotomy Room - 100 nasf



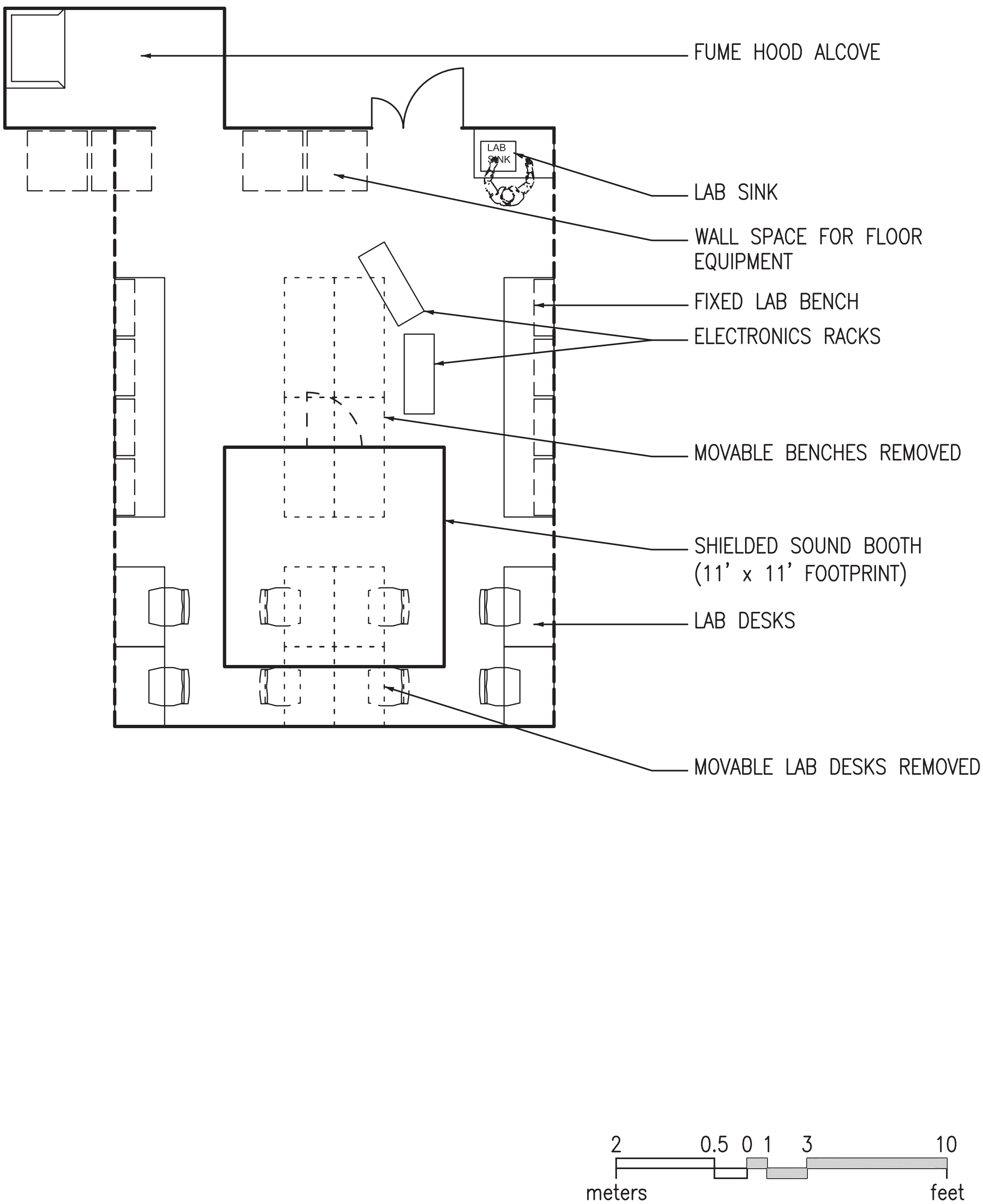


Electrophysiology Room - 100 nasf

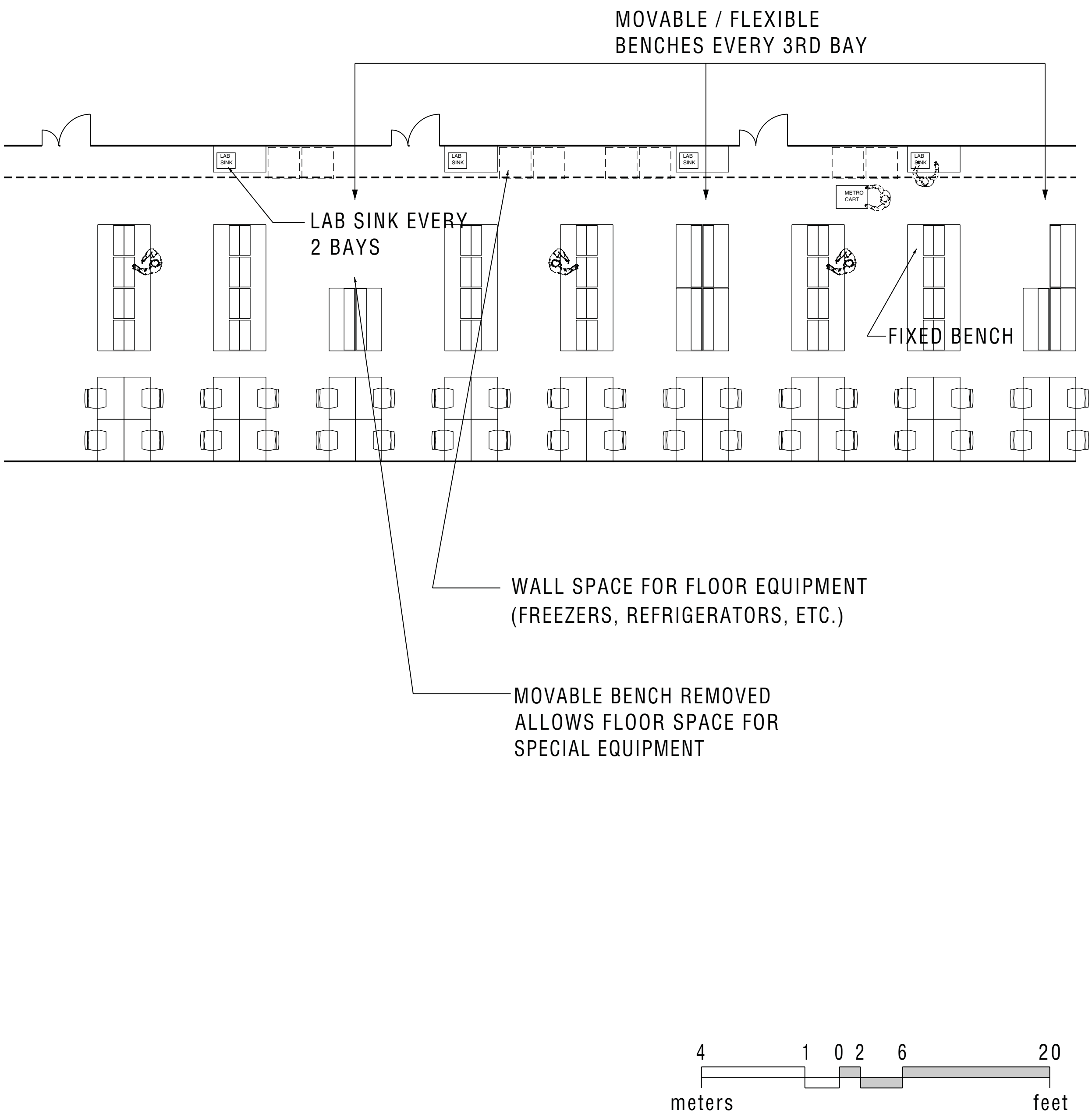




Sound Booth


FUME HOOD ALCOVE
LAB SINK
LAB SINK
WALL SPACE FOR FLOOR EQUIPMENT
FIXED LAB BENCH
ELECTRONICS RACKS
MOVABLE BENCHES REMOVED
SHIELDED SOUND BOOTH (11' x 11' FOOTPRINT)
LAB DESKS
MOVABLE LAB DESKS REMOVED
2
0.5
0
1
3
10
meters
feet

Lab Module for Limited Flexibility



6.8 appendix H

amec

GEOTECHNICAL ENGINEERING REPORT
USU USTAR RESEARCH INSTITUTE
1600 NORTH 600 EAST
LOGAN, UTAH

Submitted To:

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December 3, 2007
Project No. 7-817-005223

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Re: **Geotechnical Study Report**
USU USTAR Research Institute
1600 North 600 East
Logan, Utah
AMEC Job No. 7-817-005223

1. INTRODUCTION

1.1 Objectives and Scope

This report presents the results of our geotechnical study for the proposed University of Utah USTAR Research Institute building. The location of the planned project is approximately 1600 North 600 East Street in Logan, Utah. The approximate location of the site is shown on Figure 1, Vicinity Map. The objectives of this investigation were to explore and evaluate subsurface materials and conditions and develop recommendations for the design and construction of the new building. The studies were conducted in accordance with the scope of work outlined in AMEC's proposal PL07-086 dated October 17, 2007. AMEC's scope of work included a site reconnaissance, field explorations, laboratory testing, engineering analyses, and report preparation.

2. PROJECT DESCRIPTION

We understand the proposed construction will consist of a three story above grade steel and concrete building. The building will be "L" shaped and will have a footprint of approximately 33,000 sf. We anticipate maximum column loads to be on the order of 750 to 1000 kips. Areas surrounding the building will be landscaped and parking areas will be included. We anticipate that traffic in the parking areas will consist of a light volume of automobiles and light trucks, and occasional medium-weight trucks.

3. SITE DESCRIPTION

3.1 Site Conditions

The majority of the project site is situated on land that has been primarily used for agriculture. There are several existing structures such as stables and hay covers on the east of the site, which will be removed for the project, and an above grade storm water detention basin is located in the northwest corner of the site. The site is located within the Utah State University Research Park and is bordered on the north by 1600 North, on the south by buildings and pastures, on the east by an adjacent Utah State research building, and on the east by stables and hay covers. The site is relatively flat with a slope down to the west. The approximate elevation of the site is 4580 feet above sea level.

3.2 Geology

The project site is located in Cache Valley Utah near the eastern edge of the Basin and Range physiographic province, which extends from the Sierra Nevada Mountains to the Wasatch Mountains. The Basin and Range province is characterized by north-trending mountain ranges and intervening sediment-filled valleys. The mountain ranges are bounded by high-angle normal faults formed in response to regional extension of the earth's crust. A geologic map prepared by Dover, 1995[1] indicates that the site is underlain by alluvial and lacustrine deposits placed during the Provo Stage of Lake Bonneville. Soils consists of silt, clay, sand, and gravel to depths of approximately 50 to 75 feet.

4. FIELD EXPLORATIONS & LABORATORY TESTING

4.1 Field Explorations

Subsurface materials and conditions at the project site were investigated on October 25, 2007 with 8 borings designated B-1 through B-8. The approximate locations of the borings are shown on Figure 2, Site Plan. All field operations were observed by a technician provided by our firm, who maintained a detailed log of the materials and conditions encountered in each bore hole and directed the sampling operation. Additional information on the field exploration is presented in Appendix A, Field Explorations.

4.2 Laboratory Testing

Laboratory testing consisted of natural moisture content, gradations, fines washes, Atterberg limits, consolidation, and corrosion testing. Details concerning the tests and the laboratory results can be found in Appendix B, Laboratory Testing.

5. SUBSURFACE CONDITIONS

5.1 Fill and Disturbed Soil Conditions

Subsurface investigations encountered agriculturally disturbed surface soils over the majority of the site extending down approximately 1 foot below grade. In addition to these disturbed soils, 3 feet of fill was present on the far east part of the site. The top of fill is 3 feet above adjacent agricultural land and appears to have been placed during the construction of adjacent buildings. This fill contains debris such as concrete blocks. At the northeast corner, there is a 6-foot high berm, which encloses a storm water detention area.

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1 Dover, J.H.; 1995; Geologic Map of the Logan 30' x 60' Quadrangle, Cache and Rich Counties, and Lincoln and Uinta Counties, Wyoming; U.S. Geological Survey Miscellaneous Publication MAP I-2210, Scale 1:100,000

5.2 Geotechnical Profile

Logs of the borings B-1 through B-8 are presented on Figures 3A through 3H, Log of Borings. The terms used to describe the soils disclosed by the borings are defined on Figure 4, Soil Classification Chart & Legend.

The native soil profile is comprised of surficial lean clay underlain by layered silts and clays with occasional layers of silty gravel. Silty gravel layers of 3 to 4 feet were typically encountered at depths ranging from 5 to 12 feet. Shallow borings within parking areas sometimes encountered a 1- to 2-foot layer of gravel at 2 to 3 feet below grade. Liquid limits on tested samples typically ranged from 23 to 35, and plasticity indices ranged from 3 to 14. One sample from boring B-3 at a depth of 14 feet was non-plastic. Dry densities ranged from 106.6 to 109.5 pcf with moisture contents ranging from 20.3 to 22.8 percent.

5.3 Groundwater

At the time of the investigation, groundwater was encountered at depths ranging from 6.0 to 8.5 feet below grade in borings B-2 and B-8. Subsequent measurements more than a week later indicate groundwater at depths ranging from 8.0 to 9.5 feet in borings B-1 and B-8. Fluctuations in groundwater and perched groundwater do occur due to variations in precipitation, runoff, water levels in nearby ditches, drainages and other factors. Longer-term groundwater fluctuations should be anticipated with the highest seasonal levels generally occurring during the late spring and summer months.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

The site is generally favorable to supporting the proposed building on shallow foundations; however, it is anticipated that heavy loads will require the use of alternative foundation systems such as a mat foundation, rammed aggregate piers, or driven piles.

If shallow spread footings are used, then they should be established upon structural fill extending down to suitable undisturbed native soils. Flatwork (inside and outside) may be established upon properly prepared native soils, and/or upon structural fill extending down to suitable undisturbed native soils.

Undocumented fills are often poorly compacted and contain deleterious material within their matrix. It is our experience that undocumented fills have an increased risk of total and differential settlements, which can lead to poor performance of foundations and pavements. Existing undocumented fill in the east of the site should be completely removed from beneath the building footprint and pavement areas. If existing site fill meets structural fill requirements, it may be reused on site as structural fill. Excavated native soils may be placed in landscaped areas, but should not be used as structural fill.

Agriculturally disturbed soil must be improved through scarification and re-compaction or removed entirely from below structures and parking areas.

Silty soils are prone to moisture sensitivity and are easily disturbed and softened by construction equipment.

Considering the depth of shallow footings with respect to the water table, the water table could be an issue during the construction of the project. Soils at the bottom of footing excavations may be soft and wet and easily disturbed. Although we do not anticipate shallow footings or mat foundations to be below the water table, it is feasible that some thick mat foundations could be. Dewatering and soil stabilization may be necessary, if these conditions occur.

Liquefaction settlement is a concern with the site. Measures can be taken to improve structural connections, improve site soils, or use deep foundations as dictated by the risk the client is willing to accept. Mat foundations can cope with additional uniform settlements, but may have some problems if significant differential settlement occurs. Rammed aggregate piers can reduce the overall liquefaction settlement, while driven piers can bypass liquefiable layers to bear on deep stable soils. All alternative foundation systems offer improvements over the basic shallow spread footing foundation with respect to liquefaction settlement, but the selection of a foundation system is related to acceptable cost and the risk that the client is willing to accept.

If grades are to be raised more than approximately 3 feet above existing grade, our office should be contacted for further engineering analyses. Thick areal fill can often induce significant settlement over time as underlying layers of soft saturated clays and silts consolidate under the weight of the fill. Further analysis will be needed to determine settlement and its affects on any structure if fills exceed 3 feet.

Subgrade pavement characteristics indicate fair support characteristics. Pavement sections include 4 inches of base course over 8 inches of granular borrow materials as subbase improvement. Asphalt thickness options range from 3 to 4 inches of asphaltic concrete, depending on expected traffic loads.

An alternative to shallow foundations is to establish the foundation upon a rammed aggregate pier. Rammed aggregate piers are a proprietary foundation system developed by the Geopier Foundation Company (Geopier[R]). They are constructed by drilling a 24 or 30 inch diameter hole, removing a volume of soil, and then building a bottom bulb of clean, open-graded stone using beveled, high-energy tamper. The Geopier shaft is constructed on top of the bottom bulb using well-graded highway base couse stone placed in lifts (12-inches compacted thickness). Geopier shaft lengths typically range between 8 and 25-feet as measured from the footing subgrade. The result of construction is a reinforced zone of soil directly under footings that allows for the construction of shallow spread footings proportioned for a relatively high bearing pressure.

Geopier-reinforced soils improve the subgrade below conventional spread footings, reduce the compressibility of underlying soil, allow for a higher bearing pressure to be used for design, and can often reduce liquefaction settlement potential. If serious consideration is given to a rammed aggregate pier foundation, then our office should be contacted for additional information after which Geopiers will need to be contacted to offer preliminary design recommendations.

Considering soft site soils and relatively shallow exploratory depths, there is insufficient data to provide driven pile foundation design. Since, no stiff bearing layer was encountered during the investigation, preliminary assessment of the site indicates that the piles would likely need to be greater than 50 feet in length. If driven piles are a serious consideration, then additional exploration to a depth of approximately 100 to 150 feet would be required.

6.2 Earthwork

6.2.1 Site Preparation

Preparation of the site should consist of stripping all fill, debris, vegetation, frozen soils, loose soils, and disturbed soils from the area. Any foundation elements from prior structures should be removed entirely and replaced with structural fill.

For prior agricultural areas, stripping should extend down at least 6 inches below buildings and parking areas. After stripping is complete, the site soils should be scarified down at least 8 inches, moisture conditioned, and re-compacted to the same compaction standard as structural fill. As an alternative to scarification and re-compaction, stripping should extend down to 14 inches below existing grade, after which grades can be raised back up with structural fill. Upon completion of site preparation, the exposed subgrade should be observed by a qualified representative of the geotechnical engineer to assess the result of the stripping and scarification processes.

For areas with several feet of fill, the fill should be entirely removed along with the upper 12 inches of underlying soils. Berm soils associated with the detention area will also need to be removed down to native undisturbed soils.

If pavement areas are not paved closely after preparation of the subgrade, they should be proof-rolled with a heavy pneumatic-tire roller or equivalent rubber-tire construction equipment to verify the subgrade has not been weakened by ponding and infiltration of precipitation. Any soft areas identified by the proof rolling should be removed down to firm native soil or a maximum of two feet below grade and replaced with structural fill.

The site soils are predominately fine-grained. If the fine-grained soil is exposed to significant precipitation, snow melt or other sources of water, it may become slippery and soft, and disturbed by construction traffic. Disturbed and softened soils are unsuitable for support of foundations and pavement and should be removed and replaced with granular structural fill in building and pavement areas. On site soil that may need to be used for backfill or grading fill may become too wet to achieve proper compaction without drying.

The contractor should be aware of these potential difficulties. The risk of problems can be reduced by performing earthwork activities during warmer months. Other precautions may be desirable such as placing gravel working pads, temporary grading to channel run off away from roads, stockpiles and excavations, and covering the stockpile soils.

6.2.2 Excavations

Temporary construction excavations in soils not exceeding 4 feet in depth may be constructed with near-vertical side slopes. Temporary excavation slopes up to 7 feet in height and above the water table may be constructed no steeper than one horizontal to one vertical (1H:1V). If excessive sloughing occurs, the excavation slope should be flattened. Excavations encountering the groundwater table or perched groundwater will require much flatter slopes, shoring and bracing, and/or dewatering. Excavation safety and dewatering is the responsibility of the contractor. All excavations should be constructed in conformance with Federal, State and local regulations. All excavations must be inspected periodically by qualified personnel. If any signs of instability are noted, immediate remedial action must be initiated.

6.2.3 Fill Requirements

Fill material should be free from debris, vegetation, roots, other unsuitable material, frozen material, and excess moisture. Structural fill should also conform to the gradation and plasticity requirements shown in the following table, Fill Material Requirements.

FILL MATERIAL REQUIREMENTS

Fill Name	Type	Application	Max Size in.	Max Percent Passing			Max Liquid Limit	Max Plasticity Index
				No. 4	No. 10	No. 200		
Structural	S1	Below structural elements	4	-	60	30	35	15
Upper Slab	UF	Immediately below slabs, upper 4 inches	2		25	5	-	-
Free Draining	FD	Drainage layers of drainage backfill	4		5	2	-	-

Existing site fill may be reused as structural site grading fill if it meets the requirements of structural fill.

6.2.4 Fill Placement and Compaction Requirements

Structural fill and floor slab fill should be compacted to at least 95 percent of the maximum dry density at a moisture content within about 3 percent of optimum as determined by ASTM D-1557 (modified Proctor). Structural fill should extend out from the edge of footings a distance equal to half the depth of the fills. For example, if the structural fill depth is 4 feet, the fill should extend out at least 2 feet past the outside edge of the footing.

Fill should be placed and compacted in lifts. The lift thickness should be appropriate for the type of equipment being used so that the entire lift thickness is compacted to the required level. With heavy compaction equipment, we recommend that loose lift thickness be limited to a maximum of 12 inches unless specific arrangements are made with the testing entity to verify compaction in thicker lifts. Fill compaction should be tested frequently. The contractor should have sufficient testing early to verify that compaction methods are adequate to meet compaction requirements and regular additional testing to demonstrate consistent compaction.

Where free draining fill is used to collect or drain water, a filter fabric capable of preventing the migration of fines into the free draining fill should be placed between the fill and native soil on all sides.

Fill in landscaped areas should be compacted to a minimum of 85 percent of the maximum dry density as determined by ASTM D-1557.

If pumping of the subgrade occurs when compacting fill, compaction should immediately stop and the geotechnical engineer consulted for appropriate action.

Excess compaction of backfill behind walls can cause significant stresses against walls and should be avoided. The use of moderate to heavy equipment, especially compactors, near walls can also cause significant stresses against walls and should be avoided. Such equipment should not operate within a distance equal to the height of the wall to minimize the potential for excessive lateral pressure. Compaction close to the walls should be accomplished using hand-operated vibratory plate compactors or small trench compactors.

6.2.5 Fill Placement Considerations

In general, we recommend that the contractor be left to determine the most cost effective and practical means to place and compact fill. However, the following information may be helpful.

When performing compaction testing, the measured degree of compaction is only meaningful if gradation of the soil tested in the field corresponds to the gradation of the samples tested in the lab from which the maximum dry density and optimum moisture was determined. The fill material should be sampled and tested in the laboratory at a frequency appropriate for the variability of the fill. For highly variable soils this can be extremely difficult to ensure and there is a significant risk that field testing may not be representative. Additional measures such as limiting lift thickness may be advised.

The maximum particle size should generally be limited to ½ of the compacted lift thickness. Oversize pieces at the lift surface can carry the weight of the compaction equipment resulting in a poorly compacted zone around the oversized particle. Over a relatively firm subgrade, large pieces extending above the surface of the fill can result in a concentrated foundation load and/or thin section of footing.

All compaction equipment has a limited depth of influence. For hand operated equipment such as vibratory plate or "jumping jack" compactors, we recommend that the compacted lift thickness be limited to 4 inches. For small "trench" rollers, moderate sized roller compactors and larger roller compactors we recommend that compacted lift thickness be limited to 6, 8 and 12 inches unless it can be demonstrated that the recommended compaction can be achieved throughout the lift with thicker lifts.

6.2.6 Utility Trenches

It should be noted that utility trench excavations have the potential to degrade the engineering properties of the adjacent fill materials. Utility trench walls that are allowed to move laterally can lead to reduced bearing capacity and increased settlement of adjacent structural elements and overlying slabs. Backfill for utility trenches is as important as the original preparation or structural fill placed to support either a foundation or slab. Therefore, it is imperative that the backfill for utility trenches be placed to meet the project specifications for the structural fill of this project.

Most utility companies and municipalities are now requiring that AASHTO Type A-1 or A-1-a soil (granular soil with less than less than 25 or 15 percent fines, respectively) be used as backfill over utilities. These organizations are also requiring that in public roadways the backfill over major utilities be compacted over the full depth of fill to at least 96 percent of the maximum dry density as determined by the AASHTO T-180 (ASTM D-1557) method of compaction. We recommend that as the major utilities continue onto the site that these compaction specifications are followed.

6.2.7 Finished Grading

Finish grading should be established to convey water away from foundation walls and backfill and to prevent ponding. Down spouts should discharge away from foundation backfill. Irrigation above or near any wall backfill should be minimized. We recommend that landscaped surfaces adjacent to buildings be sloped down away from the buildings at a minimum slope of 6 inches down in the first 10 feet (5 percent) away from buildings. Concrete flatwork or pavement adjacent to buildings should slope down away from the buildings at a slope of 1 percent or more.

6.3 Foundations

6.3.1 Design Criteria

Foundation support for the proposed project can be provided by conventional wall and column-type spread footings provided resulting capacities are sufficient for building loads. If loads exceed provided soil capacities other foundation may be necessary. The following table presents general options for footing design:

DESIGN CRITERIA

Footing Location	Foundation Type	Bearing Soils	Foundation Depth (feet)	Allowable Bearing Capacity (psf)	Max Width (feet)	
					Square Column	Wall
At Grade Level	Spread Foundations	Min. 2' Structural Fill [2]	1.0 [1]	2,500	12	5
		Min 4' Structural Fill [2]	2.5 [1]	3,000	12	5

Notes:

1. Bottom of footing elevation below finished floor. For exterior footings, footings should be at the depth listed in this table, or 2.5' below exterior grade, whichever is deeper.
2. Footings should be founded upon properly compacted structural fill, which has been placed on undisturbed native soil.

In addition to the above table, a footing bearing graph is provided in Figure 5 for square footings underlain by 4 feet of granular structural fill. Selected footings should have widths and bearing pressures below <u>both</u> the allowable bearing pressure line and the 1-inch settlement line. This graph allows for flexibility and optimization of the design. Footing depths are assumed to be at least 2.5 feet below grade for this graph.

Strip (wall) footings should have a minimum footing width of 1½ feet, and square footings should have a minimum footing width of 2 feet in order to maintain bearing capacity. The allowable bearing pressure applies to the total of real loads, i.e., dead load plus frequently and/or permanently applied live loads. The allowable bearing pressure can be increased by one-third for the total of all loads: dead, live, and wind or seismic.

Soft, loose, or otherwise unsuitable soils, if encountered at footing depth, should be removed down to firm subgrade material and replaced with granular structural fill or a lean concrete flowable fill.

6.3.2 Settlements

Settlement of foundations designed and installed in accordance with the above recommendations should not exceed 1 inch.

6.3.3 Installation

Under no circumstances should the footings be installed upon loose or disturbed soil, sod, rubbish, construction debris, topsoil, frozen soil, non-engineered fill, highly expansive clays, other deleterious materials, or within ponded water. If there are unsuitable conditions encountered, the soils must be completely removed and replaced with compacted granular structural fill. If granular soils become loose or disturbed, they must be properly re-compacted before the footings are poured. The width of replacement fill below footings should be equal to the width of the footing plus ½ foot for each foot of fill thickness on either side of the footing. For example, if the width of the footing is 2 feet and the thickness of the structural fill beneath the footing is 2 feet, the width of the structural fill at the base of the footing excavation would be a total of 4 feet.

6.3.4 Lateral Resistance

Lateral loads imposed upon foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footings and the supporting soils. In determining frictional resistance, ultimate coefficient of friction values of 0.35 and 0.45 may be utilized for footings established on silt or on granular structural fill, respectively.

Passive resistance provided by properly placed and compacted granular structural fill above the water table may be considered equivalent to a fluid with a density of 300 pounds per cubic foot (pcf). Below the water table, this granular soil should be considered equivalent to a fluid with a density of 150 pcf.

A combination of passive earth resistance and friction may be utilized provided that the friction component of the total is divided by 1.5.

6.4 Mat Foundations

6.4.1 Mat Design

The site is generally favorable to supporting the proposed building on mat foundations. A k_1 modulus of subgrade reaction of 100 pci can be used for design. This value represents an estimate of the modulus of subgrade reaction for a 1 x 1 plate at the site. The value should be adjusted for the larger areas associated with mats using the following expression for cohesive and cohessionless soil:

Modulus of Subgrade Reaction, $k_s = (\frac{k_1}{B})$ for Cohesive Soil

$k_s = k_1 (\frac{B+1}{2B})^2$ for Cohessionless Soil

Where:
k_s = Coefficient of Vertical Subgrade Reaction for Loaded Area
k_1 = Coefficient of Vertical Subgrade Reaction for 1x1 square foot area
B = Width of Area Loaded, in feet

6.4.2 Mat Settlements

Settlements of mat foundations should be approximately less than 1.5 inches, using a maximum net allowable bearing pressure of 650 psf for the mat. Settlement will occur throughout the construction process as soils are gradually loaded. Typically more than 50 percent of the settlement occurs during the construction phase of the project. Differential settlements should be approximately ½ inch, or less, between the corner of the mat and the center of the mat.

6.4.3 Mat Recommendations

Mats should be established on native soils or structural fill extending to suitable native soils. It is recommended that mat foundations are underlain by a minimum thickness of 6-inches of “free-draining” granular material, such as 1-inch to ¾-inch crushed rock. Base course should be installed in a single lift and compacted until well keyed.

Under no circumstance should mats be established upon loose or disturbed soils, sod, rubbish, construction debris, non-engineered fill, other deleterious materials, expansive soils, frozen soils, or within ponded water.

6.5 Lateral Earth Pressures

Design lateral earth pressures for embedded walls depend on the type of construction, i.e., the ability of the wall to yield. The two possible conditions regarding the ability of the wall to yield include the at-rest and the active earth pressure cases. The at-rest earth pressure case applies to walls that are relatively rigid and laterally supported at top and bottom and therefore is unable to yield. The active earth pressure case applies to walls that are capable of yielding slightly away from the backfill by either sliding or rotating about the base. A conventional cantilevered retaining wall is an example of a wall that develops the active earth pressure case by yielding.

Yielding and non-yielding walls can be designed using a lateral earth pressure based on an equivalent fluid having a unit weight of 35 and 55 pcf, respectively. The ground surface should be sloped down at a minimum of 5 percent away from the wall.

6.5.1 Seismic Lateral Earth Pressures

Lateral earth pressure resulting from seismic loading can be calculated based on an equivalent fluid weight of 15 and 30 pounds per cubic foot for active and at-rest cases, respectively. This is assuming an even grade or negative slope at the top of the backfilled wall. For seismic loading the pressure should be inverted increasing from 0 at the base of the wall to a maximum at the top of the wall.

6.6 Floor Support

Floor slabs may be established upon suitable native soils and/or upon structural fill extending to suitable native soils. Slabs may be established upon properly prepared existing near-surface soil, suitable undisturbed natural soils, and/or upon structural fills extending down to suitable natural soils or properly prepared existing near-surface soils. It is recommended that floor slabs are underlain by a minimum thickness of 4-inches of "free-draining" granular material, such as 1-inch to ¾-inch crushed rock. Base course should be installed in a single lift and compacted until well keyed. Settlements of lightly loaded floor slabs are anticipated to be minor.

Under no circumstance should floor slabs be established upon loose or disturbed soils, sod, rubbish, construction debris, non-engineered fill, other deleterious materials, expansive soils, frozen soils, or within ponded water.

6.7 Seismic Hazards

6.7.1 General

Northern Utah is an area of high seismic activity associated with the East Cache fault zone, which defines the eastern boundary of the Basin and Range province. The East Cache fault zone is considered capable of generating earthquakes as large as magnitude 7.3[2].

Utah municipalities have adopted the International Building Code (IBC) 2006. The IBC 2006 code determines the seismic hazard for a site based upon regional acceleration mapping prepared by the United States Geologic Survey (USGS) and the soil site class. The structure must be designed in accordance with the procedures presented in the IBC 2006 edition. The risk from geologic hazards other than those discussed below is low.

6.7.2 IBC Site Class

For dynamic structural analysis, Site Class "E," as defined in Table 1615.1.1, Site Class Definitions of the 2006 IBC, can be utilized.

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[2] Arabasz, W.J., Pechmann, J.C., and Brown, E.D., 1992, Observational seismology and the evaluation of earthquake hazards and risk in the Wasatch Front area, Utah, in Gori, P.L., and Hays, W.W., eds., Assessment of regional earthquake hazards and risk along the Wasatch Front, Utah: U.S. Geological Survey Professional Paper 1500-D, 36 p.

6.7.3 Earthquake Ground Motions

The IBC 2006 code provides values of ground and structural acceleration for structural design. These design accelerations are based on data collected and interpreted by the US Geological Survey (USGS, 1997) for the maximum considered earthquake (MCE), a level of ground acceleration associated with a 2 percent probability of being exceeded in 50 years (which we abbreviate as 2%PE50yrs). The IBC allows the use of 2/3 of these values. This represents a standard design and risk level, adjusted for local seismicity. Structures could be designed for higher accelerations if the additional costs are out weighed by reduced risk.

Using 41.7667 degrees north latitude and 111.8167 degrees west longitude as the project coordinates; the following table summarizes spectral accelerations for the maximum considered earthquake.

DESIGN EARTHQUAKE ACCELERATIONS

Spectral Acceleration Value	MCE* Ground Motion Values for Site Class B % g
0.2-Sec Spectral Acceleration (S_S)	89.9
1.0–Sec Spectral Acceleration (S_1)	31.7

*MCE – Maximum considered earthquake

For Site Class E and the above-referenced short and long term spectral acceleration values, the amplification factors $F_a = 1.021$ and $F_v = 2.734$ values can be used for design.

6.7.4 Surface Fault Rupture

Known active faults are not mapped in the immediate vicinity of the site. The risk of surface fault rupture affecting the site is very low.

6.7.5 Liquefaction & Lateral Spread

Liquefaction is a condition where earthquake ground motion causes a build up of water pressure in the spaces between saturated soil particles causing the soil to behave like a fluid. Liquefaction will generally occur only in relatively loose granular or low-plasticity fine-grained soil subjected to earthquake ground motion with sufficient intensity and sufficient duration. Damaging settlement may result from liquefaction. Damaging lateral movement known as lateral spread may occur if liquefaction occurs beneath a slope or near a free-face, such as the bank of a river.

The site is located in an area that has been mapped as having a "moderate to high liquefaction potential" on planning maps. This means that high groundwater is present below the site. Our investigation confirmed a high water table of approximately seven feet below ground surface at the site. Additionally, field and laboratory analyses confirm that highly susceptible liquefiable soils like low consistency saturated silts are present below the site.

We estimate that settlement due to liquefaction could be as high as three to four inches during a major seismic event. Current methods do not allow precise estimates of settlement due to liquefaction. If liquefaction were to occur, the settlement could be greater or less than estimated.

There are several potential options for addressing potential settlement due to liquefaction including:

- Accept the risk without any additional measures.
- Design the structure to minimize the potential for collapse. This might include designing grade beams to tie foundation together, extra reinforcing in foundations, strengthening key connections, or other measures.
- Mitigate the liquefaction by grouting or densification of the liquefiable layers. This would partly be accomplished through a rammed aggregate foundation system.
- Support the structure on deep foundations extending through the liquefiable layers such driven piles.

Deep foundations and mitigation are generally very expensive and usually not considered except for critical structures.

Although disturbed layering was not encountered during our soil investigation, the results of a lateral spread analysis indicate a potential for lateral spread at the site. Although slopes are mild, they are still within the limits of observed lateral spread; grain-size and soil density is also consistent with potentially liquefiable materials. Available analysis methods are weighted toward sites where lateral spread has occurred; therefore, the lateral spread displacement model may be skewed to predict lateral spread when in fact no lateral spread may occur. Lateral spreading is also dependent on the presence of continuous liquefiable layers below the site. With these considerations, our model indicates total lateral displacements could be approximately a foot, if lateral spread were to occur.

Complete mitigation of lateral spread potential can be difficult to realize. Lateral spread can be a regional problem with movement occurring over large land areas. Prevention often requires mitigation at a regional scale because spreading can overwhelm localized mitigation efforts. Typical mitigation of lateral spread consists of subsurface barriers, which include slurry walls, sheet-pile walls, and columnar walls consisting of packed gravel or a soil cement mix. Barrier walls can also consists of liquefaction ground improvement procedures. Deep foundation such as driven piles or drilled pile can also provide some lateral resistance to soil movement, but such resistance can be overwhelmed if the area and displacement of the lateral spread slide is too great.

The risk of lateral spread occurring during the life of the structure is low, but not negligible. In order for lateral spread to occur there has to be a sizeable earthquake near the site, which may or may not induce liquefaction in site soils. If liquefaction does occur, it does not necessarily mean lateral spread will occur. Soil conditions and empirical models suggest it may occur, but it is not a certainty with a large scale earthquake. Therefore the risk of lateral spread is generally considered low. Similar to liquefaction settlement, mitigation measures for lateral spread are generally very expensive and usually not considered except for critical structures.

6.8 Soil Corrosivity and Sulfate Attack on Concrete

Soil corrosivity and sulfate attack was performed on site soils and was found to be negligibly corrosive. It is our judgment that site soils can use cement type I or II for concrete placed in contact with the on-site soil.

6.9 Pavements

Existing site surface soils exhibit good support characteristics for pavements. From available laboratory data, we estimate the subgrade to have a CBR value of 4. This value was used to calculate pavement sections consistent with Utah Department of Transportation design procedures and recommendations.

Good drainage is vital to the long-term performance of a roadway surface. Parking areas should allow for complete drainage of surface water without the formation of puddles.

Prior to placement of any structural fill or the pavement design section, the exposed subgrade should be prepared as discussed in Section 6.2.1, Site Preparation. If subgrade soils become loose, saturated, or disturbed they should be recompacted to the requirements for structural fill or be removed and replaced with structural fill. A suitable pavement section resulting in adequate pavement performance is highly dependent on actual traffic loading [18 kip equivalent single axle loads (ESALs) especially for heavy truck traffic]. The designer/owner should choose the appropriate sections to meet the anticipated traffic volume and life expectancy. The section capacity is reported as daily ESALs, Equivalent 18 kip Single Axle Loads. Typical Light Trucks impart 0.25 to 0.50 ESALs per truck; medium sized trucks and school buses impart 1.0 to 1.5 ESALs per truck; heavy trucks impart 2.0 to 2.5 trucks per day. It takes approximately 1,200 passenger cars to impart 1 ESAL.

If the design team considers that any assumptions are not accurate, AMEC should be informed in order that we may review the pavement designs as necessary. Similarly, AMEC should be contacted if alternate designs are needed. The pavement materials and placement should be in accordance with the Utah Department of Transportation or American Public Works Association specifications.

Pavement Design Parameters

Design Life	20 years
Initial Serviceability	4.5
Terminal Serviceability	2.5
Reliablilty	90%
Std Deviation - Flexible	0.45
Asphaltic-Concrete Structural Coefficient	0.4
Untreated Road Base	0.10
Granular Subbase	0.08
Design CBR	4

Flexible Pavement Sections

Alternate	Area of Placement	Daily 18-kip ESALs	Flexible		
			AC	UTBC	GB
Alternate 1	Auto Parking/Drives	4	3.0"	4.0"	8.0"
Alternate 2		8	3.5"	4.0"	8.0"
Alternate 3		16	4.0"	4.0"	8.0"

Notes:
1. Full depth asphalt or increased asphalt thickness can be increased by adding 1.0-inch asphalt for each 4 inches of base course or granular borrow replaced.
2. Based on our experience, limited data, and analysis, we anticipate Alternate 1 as the best cost effective option for the project. However, we recommend that the designer/owner perform their own assessment to determine whether this suggested pavement section really does meet project traffic needs, or whether one of the other alternates would have a capacity better suited to the expected traffic.

Rigid Pavement Sections

Pavement Use	Daily 18-kip ESALs	Layer Thickness (inches)	
		Portland Cement Concrete	Untreated Base Course
Auto Drives	12	5	4
Truck Drives	32	6	4

Sidewalks not subject to vehicle traffic can consist of 4 inches of concrete over 4 inches of granular base. Trash dumpster pads should consist of at least 6 inches of concrete over 4 inches of granular base. Areas in front of dumpsters can be subject to repeated heavy loading from dump trucks, which can cause early failure in asphalt. Great consideration should be given to using a concrete apron in front of the dumpster to help prevent pavement failure.

7. LIMITATIONS

This report has been prepared to aid the architect and engineer in the design of this project. The scope is limited to the specific project and location described herein, and our description of the project represents our understanding of the significant aspects of the project relevant to the design and construction of the earthwork, foundations, and floor slabs. In the event that any changes in the design and location of the building as outlined in this report are planned, we should be given the opportunity to review the changes and to modify or reaffirm the conclusions and recommendations of this report in writing.

The conclusions and recommendations submitted in this report are based on the data obtained from the borings made at the locations indicated on Figure 2, Site Plan, and from other sources of information discussed in this report. In the performance of subsurface investigations, specific information is obtained at specific locations at specific times. However, it is acknowledged that variations in soil conditions may exist between explorations. This report does not reflect any variations that may occur between these explorations. The nature and extent of variation may not become evident until construction. If, during construction, subsurface conditions are different from those encountered in the explorations, we should be advised at once so that we can observe and review these conditions and reconsider our recommendations where necessary.

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted engineering principles and practices at this time along the Wasatch Front.

We appreciate the opportunity to provide this service for you. If you have any questions or require additional information, please do not hesitate to contact us.

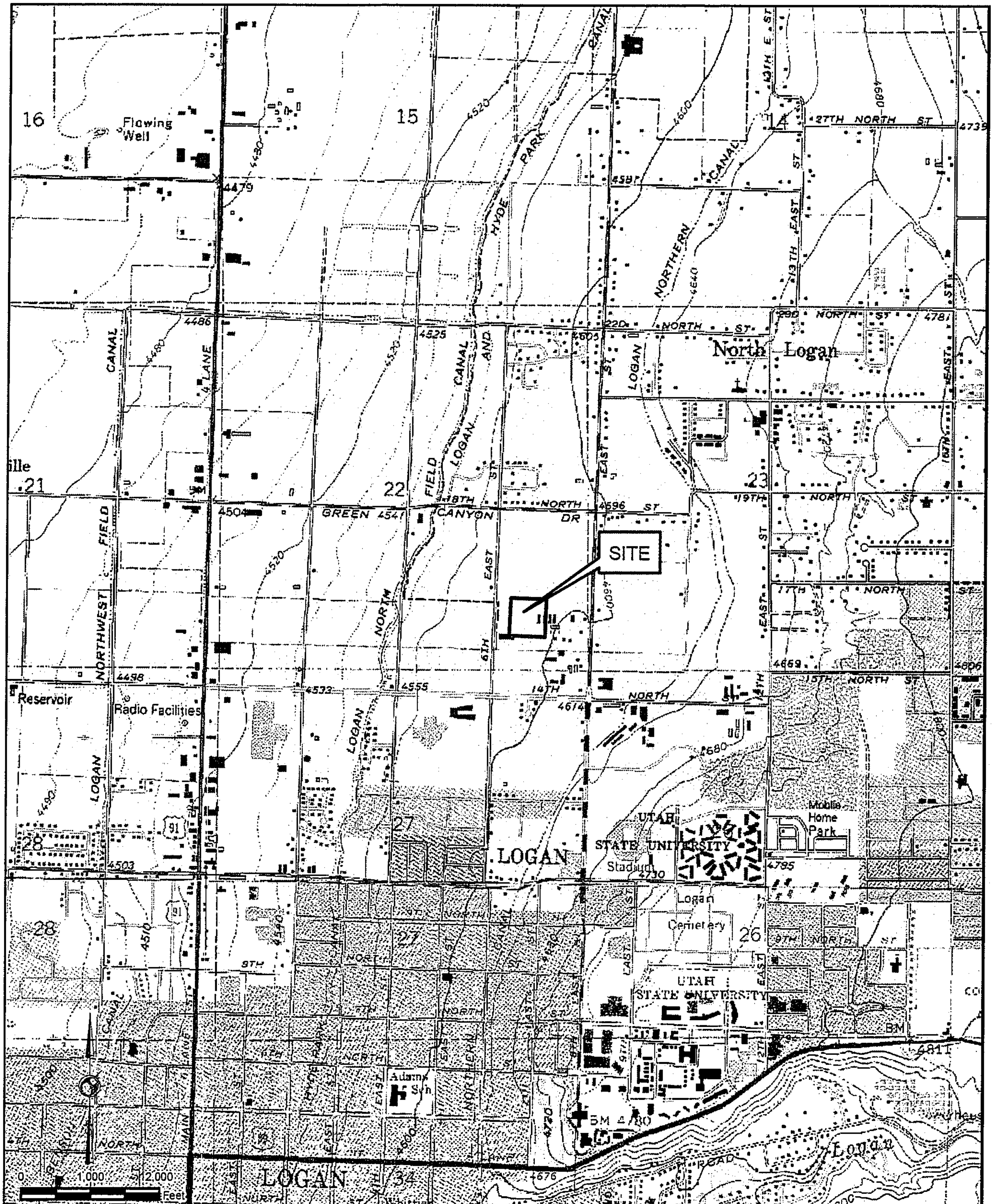
Respectfully submitted,
AMEC Earth & Environmental, Inc.

Reviewed by:

Daniel W. DeDen, P.E.
Professional Engineer

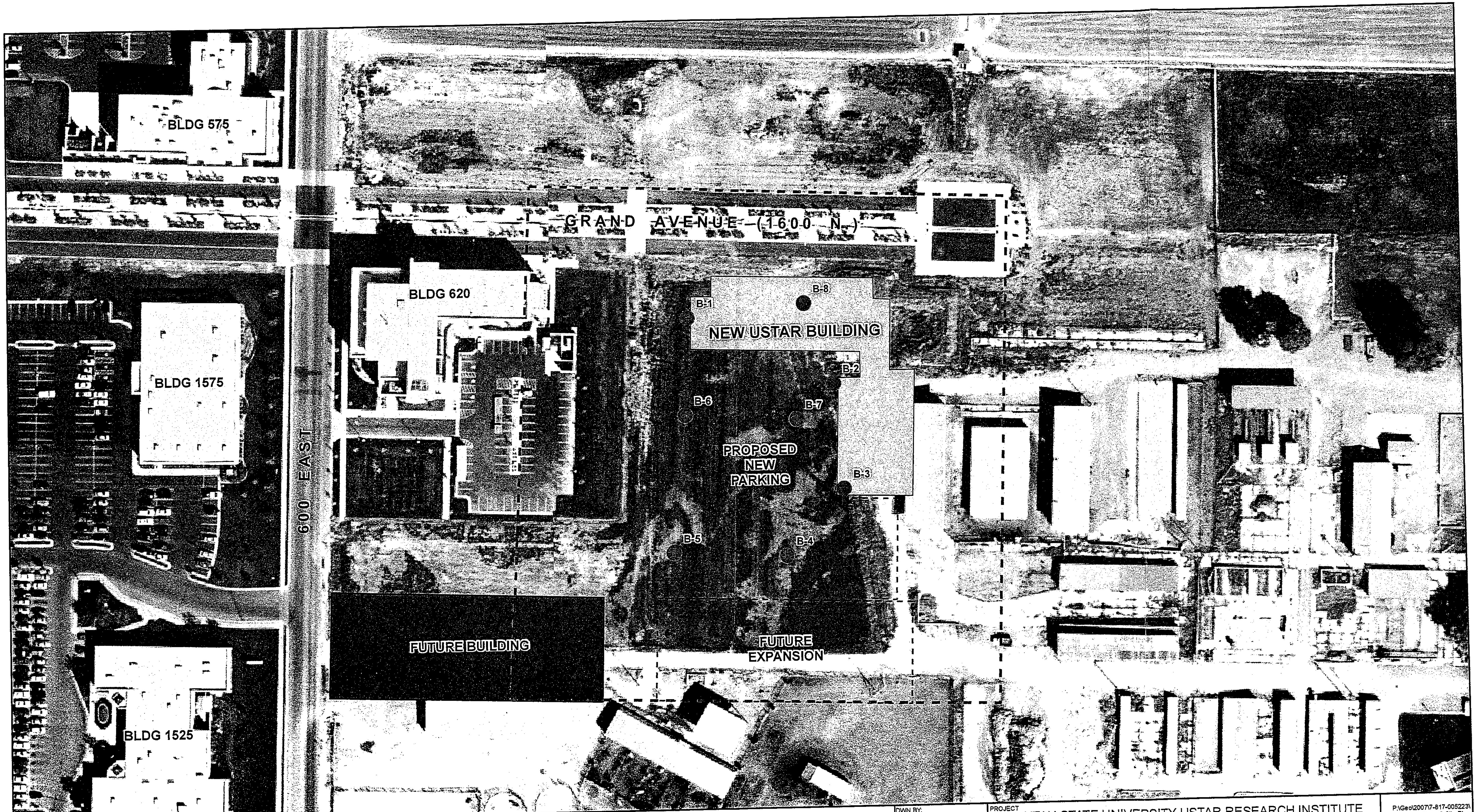
David K. Fadling, P.E.
Senior Engineer

Addressee (4)



AMEC Earth & Environmental 9865 South 500 West Sandy, Utah 84070 Tel: (801) 999-2002 Fax: (801) 999-2098	amec	Smithfield Quadrangle USGS 7.5 Minute Series (Topographic)	CLIENT AJC Architects 703 East 1700 South Salt Lake City, Utah 84105

PROJECT UTAH STATE UNIVERSITY USTAR RESEARCH INSTITUTE 1600 North 600 East Logan, Utah	DWN BY: MKW	DATUM: NAD 83	DATE: 11/07/07
	CHK'D BY: BMP	P:\Geo\2007\7-817-005223\GIS\Figure1 Vicinity Map	PROJECT NO: 7-817-005223
TITLE VICINITY MAP	PROJECTION: UTM 12 North	SCALE: 1 inch equals 2,000 feet	FIGURE NO: 1



NOTE: THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMEC EARTH & ENVIRONMENTAL REPORT NO. 7-817-005223.

REFERENCE: AERIAL PHOTOGRAPHY IS HIGH RESOLUTION ORTHO-PHOTOGRAPHY (HRO), DATED 2006. 1-FOOT RESOLUTION.

Legend

- ● Approximate Bore Location In Proposed Building Footprint
- ● Approximate Bore Location At Proposed Parking Area

CLIENT

AJC Architects
703 East 1700 South
Salt Lake City, Utah 84105

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9865 South 500 West
Sandy, Utah 84070
Tel: (801) 999-2002
Fax: (801) 999-2098

amec

DWN BY:	MKW
CHK'D BY:	BMP
DATUM:	N/A
PROJECTION:	N/A
SCALE:	NOT TO SCALE

PROJECT
UTAH STATE UNIVERSITY USTAR RESEARCH INSTITUTE
1600 North 600 East
Logan, Utah

TITLE
SITE PLAN

P:\Geo\2007\7-817-005223\GIS\Figure2 Site Plan

DATE:	11/08/07
PROJECT NO:	7-817-005223
FIGURE NO:	2

LOG OF BORING NO. B-1

Project Name: USU USTAR	Date Drilled: 10/25/07
Location: 1600 North 600 East, Logan, UT	Rig Type: SIMCO 2800
	Drilled By: A Cache
Project No: 7-817-005223 — Sheet 1 of 1	Logged By: R. Buxton

amec

Surface El.:

Depth, feet	MATERIAL DESCRIPTION	Samples	Penetration Blows / Foot	Recovery, in	Unit Dry Weight, pcf	Water Content, %	% Passing No. 200 Sieve	Liquid Limit	Plasticity Index	REMARKS
0–5.0	**Lean CLAY [CL]** very stiff, dark brown, dry to moist, low to medium plastic, pinholes, major roots to 2", plow disturbance to 12"									
		D-1	71	16						
5.0–21.5	**Layered SILTS and CLAYS with fine sand [CL-ML]** stiff to very stiff, light brown to grey, damp to wet, low to medium plasticity, occasional silty sand layers 1" to 12".	D-2	52	18	107	21	86	28	7	
	Some Gravels at 8.5' - 12'									
		D-3	16	16			47			
		D-4	20	16	108	22				
		D-5	24	0						
21.5	Bottom of Boring at 21.5' 1 1/4" Slotted PVC pipe Installed to 19'									

Remarks:

Water Level Observations	
▽	
▼ 9.5 ft	11/6/07

The discussion in the report is necessary for a proper understanding of the nature of subsurface materials.

Figure 3A

LOG OF BORING NO. B-2

Project Name: USU USTAR
Location: 1600 North 600 East
Logan, UT
Project No: 7-817-005223
Sheet 1 of 1

Date Drilled: 10/25/07
Rig Type: SIMCO 2800
Drilled By: A Cache
Logged By: R. Buxton

amec

Surface El.:

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Samples	Penetration Blows / Foot	Recovery, in	Unit Dry Weight, pcf	Water Content, %	% Passing No. 200 Sieve	Liquid Limit	Plasticity Index	REMARKS
	0–3.5	**Lean CLAY [CL]** very stiff, dark brown, dry to moist, low to medium plastic, pinholes, major roots to 2", plow disturbance to 12"	D-1	36	13						
	3.5–7.0	**Layered SILTS and CLAYS with fine sand [CL-ML]** stiff to very stiff, light brown to grey, damp to wet , low to medium plasticity, occasional silty sand layers 1" to 12"	D-2	27	13						
	7.0–10.0	**Silty GRAVEL with Sand [GM]** medium dense to dense, wet, subangular to angular clasts	D-3	16	16	110	20	61	23	3	
	10.0–15.0	**Layered SILTS and CLAYS with fine sand [CL-ML]** stiff to very stiff, light brown to grey, damp to wet, low to medium plasticity, occasional silty sand layers 1" to 12" some gravel at 11.5' to 12.5'	D-4	16	13						
	15.0	Bottom of Boring at 15'									

Depth scale: 5, 10, 15, 20, 25

Remarks:

Water Level Observations	
▽ 6.0 ft	10/25/07
▼	

The discussion in the report is necessary for a proper understanding of the nature of subsurface materials.

Figure 3B

AMEC.SLC.BORING.1.BASE 7-817-005223 USU USTAR RESEARCH INSTITUTE.GPJ LAGNNN10.GDT 11/29/07

LOG OF BORING NO. B-3

Project Name: USU USTAR
Location: 1600 North 600 East
Logan, UT
Project No: 7-817-005223
Sheet 1 of 1

Date Drilled: 10/25/07
Rig Type: SIMCO 2800
Drilled By: A Cache
Logged By: R. Buxton

amec

Surface El.:

Elevation, feet	Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Penetration Blows / Foot	Recovery, in	Unit Dry Weight, pcf	Water Content, %	% Passing No. 200 Sieve	Liquid Limit	Plasticity Index	REMARKS
	0–1.0		**Lean CLAY [CL]** very stiff, dark brown, dry to moist, low to medium plastic, pinholes, major roots to 2", plow disturbance to 12" (1.0)									
	1.0–2.0		**Silty GRAVEL with Sand [GM]** medium dense to dense, dry, angular to subangular clasts (2.0)									
	2.0–20.5		**Layered SILTS and CLAYS with fine sand [CL-ML]** stiff to very stiff, light brown to grey, damp to wet, low to medium plasticity, occasional silty sand layers 1" to 12"	D-1	22	16	103	23	60			
					15	0						
	10			D-2	15	15						
	15			D-3	12	12	107	23	77	NP	NP	
	20		(20.5)	D-4	12	12	106	23		28	8	

Bottom of Boring at 20.5'
1 1/4" Slotted PVC pipe Installed to 19'

Remarks:

Water Level Observations	
∇	
▼ 7.7 ft	11/6/07

The discussion in the report is necessary for a proper understanding of the nature of subsurface materials.

Figure 3C

LOG OF BORING NO. B-4

Project Name: USU USTAR
Location: 1600 North 600 East
Logan, UT
Project No: 7-817-005223
Sheet 1 of 1

Date Drilled: 10/25/07
Rig Type: SIMCO 2800
Drilled By: A Cache
Logged By: R. Buxton

amec

Elevation, feet	Depth, feet	Graphic Log	Surface El.: MATERIAL DESCRIPTION		Samples	Penetration Blows / Foot	Recovery, in	Unit Dry Weight, pcf	Water Content, %	% Passing No. 200 Sieve	Liquid Limit	Plasticity Index	REMARKS
			Lean CLAY [CL] very stiff, dark brown, dry to moist, low to medium plastic, pinholes, major roots to 2", plow disturbance to 12"	0.8									
			Silty GRAVEL with Sand [GM] medium dense to dense, dry, angular to subangular clasts	3.0	D-1	22	16						
			Layered SILTS and CLAYS with fine sand and gravel [CL-ML] stiff to very stiff, light brown to grey, dry, low to medium plasticity	3.5									
	5		Bottom of Boring at 3.5'										
	10												
	15												
	20												
	25												

Remarks:

Water Level Observations	
∇	
▼	

The discussion in the report is necessary for a proper understanding of the nature of subsurface materials.

Figure 3D

LOG OF BORING NO. B-5

Project Name: USU USTAR
Location: 1600 North 600 East
Logan, UT
Project No: 7-817-005223 Sheet 1 of 1

Date Drilled: 10/25/07
Rig Type: SIMCO 2800
Drilled By: A Cache
Logged By: R. Buxton

amec

Surface El.:

Elevation, feet	Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Penetration Blows / Foot	Recovery, in	Unit Dry Weight, pcf	Water Content, %	% Passing No. 200 Sieve	Liquid Limit	Plasticity Index	REMARKS
			Lean CLAY [CL] very stiff, dark brown, dry to moist, low to medium plastic, pinholes, major roots to 2", plow disturbance to 12" 0.8									
			Silty GRAVEL with Sand [GM] medium dense to dense, brown, dry, angular to subangular clasts 1.3									
			Layered SILTS and CLAYS with fine sand [CL-ML] stiff to very stiff, light brown to grey, damp, low to medium plasticity, occasional silty sand layers	D-1	18	18						
	5		5.0									
			Bottom of Boring at 5'									
	10											
	15											
	20											
	25											

Remarks:

Water Level Observations	
∇	
∇	

The discussion in the report is necessary for a proper understanding of the nature of subsurface materials.

Figure 3E

LOG OF BORING NO. B-6

Project Name: USU USTAR	Date Drilled: 10/25/07
Location: 1600 North 600 East, Logan, UT	Rig Type: SIMCO 2800
	Drilled By: A Cache
Project No: 7-817-005223 Sheet 1 of 1	Logged By: R. Buxton

amec

Surface El.:

Elevation, feet	Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Penetration Blows / Foot	Recovery, in	Unit Dry Weight, pcf	Water Content, %	% Passing No. 200 Sieve	Liquid Limit	Plasticity Index	REMARKS
			Lean CLAY [CL] very stiff, dark brown, dry to moist, low to medium plastic, pinholes, major roots to 2" plow disturbance to 12" 1.0									
			SILT [ML] very stiff, brown, dry to moist 3.0	D-1	16	16						
	5		**Layered SILTS and CLAYS with fine sand [CL-ML]** stiff to very stiff, light brown to grey, dry, low to medium plasticity, occasional silty sand layers 5.0	GS-2								
			Bottom of Boring at 5'									
	10											
	15											
	20											
	25											

Remarks:

Water Level Observations	
▽	
▼	

The discussion in the report is necessary for a proper understanding of the nature of subsurface materials.

Figure 3F

LOG OF BORING NO. B-7

Project Name: USU USTAR
Location: 1600 North 600 East
Logan, UT
Project No: 7-817-005223
Sheet 1 of 1

Date Drilled: 10/25/07
Rig Type: SIMCO 2800
Drilled By: A Cache
Logged By: R. Buxton

amec

Surface El.:

Elevation, feet	Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Penetration Blows / Foot	Recovery, in	Unit Dry Weight, pcf	Water Content, %	% Passing No. 200 Sieve	Liquid Limit	Plasticity Index	REMARKS
			Lean CLAY [CL] very stiff, dark brown, dry to moist, low to medium plastic, pinholes, major roots to 2", plow disturbance to 12" 1.5									
			Layered SILTS and CLAYS with fine sand [CL-ML] stiff to very stiff, light brown to grey, damp, low to medium plasticity, occasional silty sand layers	D-1	9	11			92			
	5		5.0									
			Bottom of Boring at 5'									
	10											
	15											
	20											
	25											

Remarks:

Water Level Observations	
∇	
▼	

The discussion in the report is necessary for a proper understanding of the nature of subsurface materials.

Figure 3G

AMEC.SLC.BORING.1.BASE 7-817-005223 USU USTAR RESEARCH INSTITUTE.GPJ LAGNNN10.GDT 11/29/07

LOG OF BORING NO. B-8

Project Name: USU USTAR
Location: 1600 North 600 East, Logan, UT
Project No: 7-817-005223
Sheet 1 of 2

Date Drilled: 10/25/07
Rig Type: SIMCO 2800
Drilled By: A Cache
Logged By: R. Buxton

amec

Surface El.:

Elevation, feet	Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Penetration Blows / Foot	Recovery, in	Unit Dry Weight, pcf	Water Content, %	% Passing No. 200 Sieve	Liquid Limit	Plasticity Index	REMARKS
			CLAY with Silt [CL] very stiff, dark brown, dry to moist, low to medium plastic, pinholes, major roots to 2", plow disturbance to 12"									
			4.0									
	5		**Silty GRAVEL with Sand [GM]** medium dense to dense, dry, subangular to angular clasts	S-1	39	2						
			8.0									
	10		**SILT to SILT with Clay [CL-ML]** layered silts and clays with fine sand; stiff to very stiff, light brown to grey, wet, low to medium plasticity, occasional silty sand and clay layers 1" to 12"	S-2	8	18						
	15		some gravel at 13.5'	S-3	6	15						
	20			S-4	10	16						
	25			S-5	8	18						

Remarks:

Water Level Observations		
▽	8.5 ft	10/25/07
▼	8.0 ft	11/6/07

The discussion in the report is necessary for a proper understanding of the nature of subsurface materials.

Figure 3H

AMEC.SLC.BORING.1.BASE 7-817-005223 USU USTAR RESEARCH INSTITUTE.GPJ LAGNNN10.GDT 11/29/07

LOG OF BORING NO. B-8

Project Name: USU USTAR
Location: 1600 North 600 East
Logan, UT
Project No: 7-817-005223
Sheet 2 of 2

Date Drilled: 10/25/07
Rig Type: SIMCO 2800
Drilled By: A Cache
Logged By: R. Buxton

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Surface El.:

Elevation, feet	Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Penetration Blows / Foot	Recovery, in	Unit Dry Weight, pcf	Water Content, %	% Passing No. 200 Sieve	Liquid Limit	Plasticity Index	REMARKS
	30			S-6	9	14						
	35			S-7	17	14						
			37.0									
			Lean CLAY [CL] medium stiff, grey to dark grey, wet, low to medium placticity									
	40			S-8	4/6"	24				35	14	
	45		45.5	S-9	5	18						
			Bottom of Boring at 45.5' 1 1/4" Slotted PVC pipe Installed to 19'									
	50											

Remarks:

Water Level Observations	
▽ 8.5 ft	10/25/07
▼ 8.0 ft	11/6/07

The discussion in the report is necessary for a proper understanding of the nature of subsurface materials.

Figure 3H

SOIL CLASSIFICATION CHART & LEGEND

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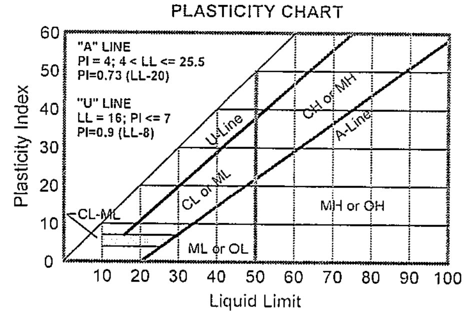
MAJOR DIVISIONS				GRAPHIC SYMBOL	GROUP SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS Less than 50% passes No. 200 sieve	GRAVELS (50% or less of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passing No. 200 sieve)			GW	Well graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures
					GP	Poorly graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures
		GRAVELS WITH FINES (More than 12% Passing No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart		GM	Silty gravels, gravel-sand-silt mixtures
			Limits plot above "A" line & hatched zone on plasticity chart		GC	Clayey gravels, gravel-sand-silt mixtures
	SANDS (50% or more of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passing No. 200 sieve)			SW	Well graded sands, gravelly sands
					SP	Poorly graded sands, gravelly sands
		SANDS WITH FINES (More than 12% Passing No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart		SM	Silty sands, sand-silt mixtures
			Limits plot above "A" line & hatched zone on plasticity chart		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes No. 200 sieve	SILTS Limits Plot Below A Line	SILTS OF LOW PLASTICITY (Liquid Limit less than 50)			ML	Inorganic silts, clayey silts of low to medium plasticity
		SILTS OF HIGH PLASTICITY (Liquid Limit 50 or more)			MH	Inorganic silts, micaceous or diatomacaeous silty soils, elastic silts
	CLAYS Limits Plot Above A Line	CLAYS OF LOW PLASTICITY (Liquid Limit less than 50)			CL	Inorganic clays of low to medium plasticity, gravelly, sandy, and silty clays
		CLAYS OF HIGH PLASTICITY (Liquid Limit 50 or more)			CH	Inorganic clays of high plasticity, fat clays, sandy clays of high plasticity
	ORGANICS SILTS AND CLAYS	ORGANIC SILTS AND CLAYS OF LOW PLASTICITY (Liquid Limit less than 50)			OL	Organic silts and clays of low to medium plasticity, sandy organic silts and clays
		ORGANIC SILTS OF HIGH PLASTICITY (Liquid Limit 50 or more)			OH	Organic silts and clays of high to medium plasticity, sandy organic silts and clays
ORGANIC SOILS		PRIMARILY ORGANIC MATTER (dark in color and organic odor)			PT	Peat

NOTE: Coarse-grained soils with between 5% and 12% passing the No. 200 sieve and fine-grained soils with limits plotting in the gray zone on the plasticity chart have dual classifications.

- D - Dames and Moore Sampler
- S - Split Spoon Sampler (SPT)
- T - Pushed Thin Walled Tube
- GS - Grab Sample
- BS - Bulk Sample
- DT - Driven Thin Wall
- C - Rock Core Sample
- CS - Continuous Soil Sample
- R - California Ring Sampler
- Water Level at Time of Drilling
- Stabilized Water Level
- CBR California Bearing Ratio
- PP Pocket Penetrometer, tsf
- ST Swell Test
- TOR Torvane Shear, psf
- UC Unconfined Compression, psf
- NR No Recovery

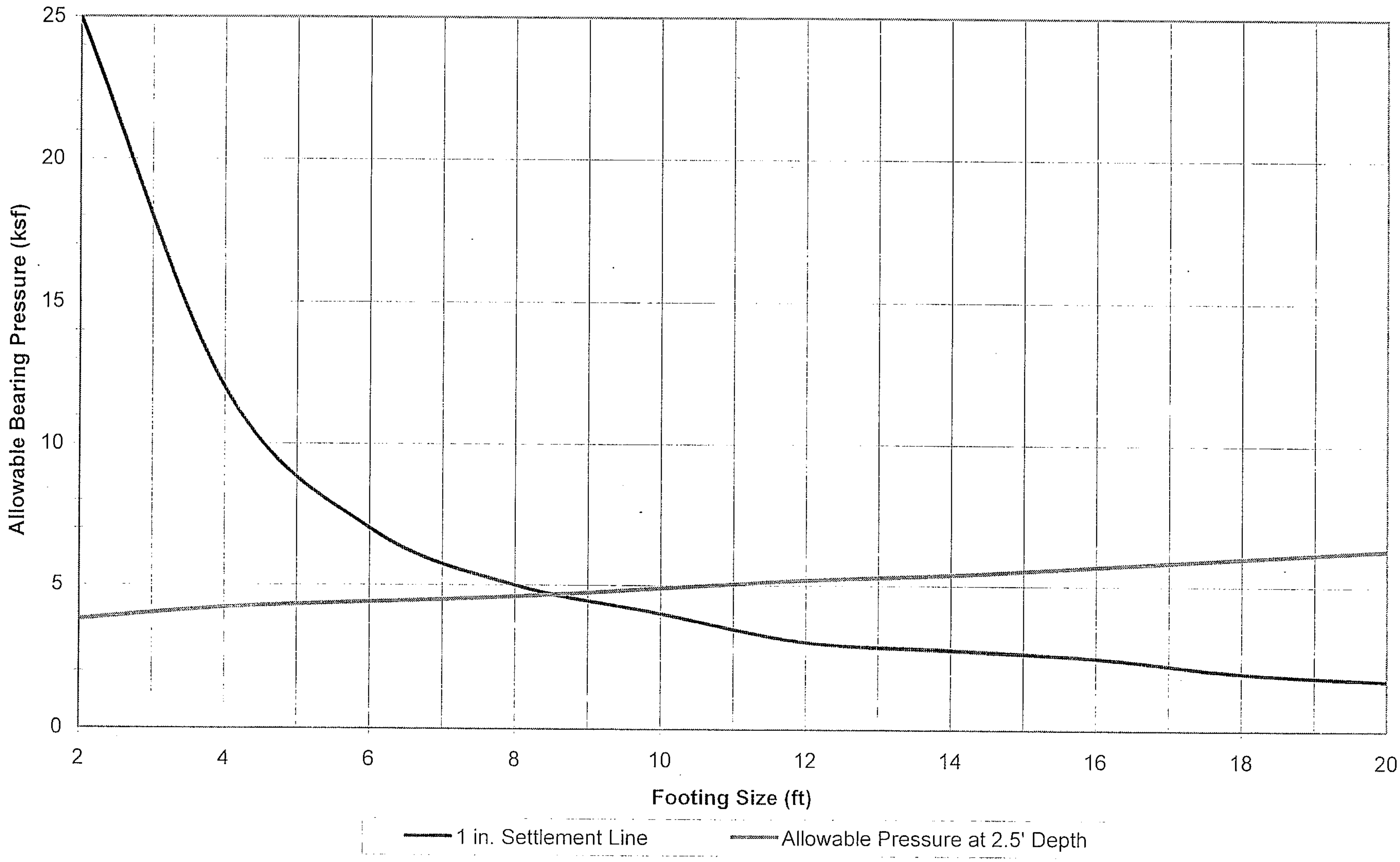
PLASTICITY CHART



Material	Particle Size	
	mm	Sieve sizes
Boulders	304.8 to 914.4	12 in to 36 in
Cobble	76.2 to 304.8	3 in to 12 in
Gravel Fine Coarse	 4.76 to 19.1 19.1 to 76.2	 3/4 in to 3 in #4 to 3/4 in
Sand Fine Medium Coarse	 2.00 to 4.76 0.42 to 2.00 0.074 to 0.42	 #10 to #4 #40 to #10 #200 to #40
Silt & Clay	<0.074	<#200

Figure 4

Footing Bearing Pressure Chart



* For square footing underlain with 4 feet of granular fill

Figure 5

APPENDIX A

FIELD EXPLORATIONS

APPENDIX A

FIELD EXPLORATIONS - BORINGS

General

Subsurface materials and conditions at the project site were investigated on October 25, 2007 with 8 borings designated B-1 through B-8. The approximate locations of the borings are shown on Figure 2, Site Plan. All field operations were observed by a senior technician provided by our firm, who maintained a detailed log of the materials and conditions encountered in each boring and directed the sampling operations.

Borings

The borings were drilled with a truck-mounted SIMCO 2800 drill rig provided and operated by A Cache of Mendon, Utah. The borings were advanced to depths ranging from 5 to 45.5 feet below grade using hollow-stem auger drilling and sampling techniques. Disturbed samples were obtained from the borings at three to five-foot intervals of depth. Disturbed samples were obtained using a three inch O.D. Dames & Moore sampler and a two inch standard split spoon sampler. At the time of sampling, the Standard Penetration Test was conducted. This test consists of driving the split-barrel sampler into the soil a distance of 18 inches using a 140-lb hammer falling from a height of 30 inches. The number of blows required to drive the sampler the last 12 inches is recorded as the penetration resistance for the Dames & Moore Split barrel sampler and the standard split spoon sampler. The penetration resistance provides a measure of the relative density of granular soils, such as sand, and the relative consistency, or stiffness, of cohesive soils, such as silt. It should be recognized that penetration resistance values tend to overestimate the relative density of coarse granular soils, such as those containing significant amounts of gravel and cobble-sized particles. The soil samples obtained in the split-spoon sampler were carefully examined in the field, and representative portions were saved in containers for further examination and physical testing in our laboratory.

Logs of the borings are shown on Figures 3A through 3H, Log of Borings. Each log presents a descriptive summary of the various types of material encountered and notes the depth where the materials and/or characteristics of the materials change. To the right of the descriptive summary, the numbers and types of samples taken during the drilling operation are indicated. The terms used to describe the soils are defined on Figure 4, Soil Classification Chart & Legend.

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APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

General

All samples obtained from the field were transported to our laboratory for examination and testing. The physical characteristics were noted, and the field classifications were modified where necessary. The laboratory testing program was conducted to provide data for our engineering analyses. The laboratory program included determinations of natural moisture content, washed sieve analyses, gradation, Atterberg Limits, consolidation, and chemical tests. The following sections describe the testing program in more detail.

Natural Moisture Content

Natural moisture content determinations were made in general conformance with ASTM D 2216. The results are presented on Figures 3A through 3K, Log of Borings.

Unit Weight

The dry unit weight, or density, of undisturbed soil samples was determined in the laboratory in general conformance with ASTM D 2937.

Percent Passing the No. 200 Sieve (Washed Sieve Analysis)

The silt and clay content (percent passing the No. 200 sieve) were evaluated for selected soil samples in general conformance with ASTM D 1140. Oven-dried samples were weighed and placed on the No. 200 sieve. The silt and clay were washed through the sieve, and the sample remaining on the sieve was oven-dried and weighed. The change in sample weight is used to calculate the percent of material passing the No. 200 sieve.

Gradation Tests

Gradation tests were preformed on selected samples in general accordance with ASTM C 136 to aid in classifying soils. The oven-dried samples were weighed and vibrated through a series of different size sieves. The individual sieves were then weighed in order to calculate the percentage of gravel, sand and fine grained material.

Atterberg Limits

Atterberg Limit tests were performed in general accordance with ASTM D 4318 on representative samples of the native soils encountered at the site to verify field classifications.

One-Dimensional Consolidation Tests

Consolidation tests were performed in general accordance with ASTM D 2435 to obtain data on the compressibility characteristics of samples of relatively undisturbed soil.

Chemical Tests

Chemical tests were conducted on selected samples collected from the site. Water Soluble Sulfate tests were performed by TEI Testing Services, Inc. of Salt Lake City, Utah.

6.9 appendix J

Stantec Consulting Inc.
3995 South 700 East Suite 300
Salt Lake City UT 84107
Tel: (801) 261-0090
Fax: (801) 266-1671

November 12, 2007
File: 186302019

AJC Architects
Attention: Ms. Jill Jones
703 East 1700 South
Salt Lake City, UT 84105

Reference: USU USTAR Building Fire Flow Test

Dear Ms. Jones:

The USU USTAR Building is located at the southeast corner of the Grand Street and 600 East intersection in Logan, Utah. Stantec has coordinated the completion of a fire hydrant flow test for the project. North Logan City completed the field work on November 7, 2007 and provided the raw results via fax. Stantec has processed the results using standard methodology for fire hydrant flow tests.

METHODOLOGY AND RESULTS

Two fire hydrants are required for the completion of a fire hydrant flow test. One fire hydrant is used to measure flow, and one is required to record system pressure before and during the flow event. North Logan City selected two hydrants along 600 East to complete the field test. The flow hydrant (hydrant # 1) is located south of the Grand Street intersection. The second hydrant (hydrant #2) is located north of the Grand Street intersection. Pitot pressure was measured at hydrant #1 in a 2.5" nozzle. Static and residual pressures were measured at hydrant #2. The results of the field test are as follows:

- Hydrant #1 – Pitot Pressure: 50 psi
- Hydrant #2 – Static Pressure: 92 psi
  Hydrant #2 – Residual Pressure: 64 psi

Stantec has analyzed the pressure data reported by North Logan City to approximate the flow at hydrant #1 during the test as well as the projected flow available at hydrant #1 when the residual pressure at hydrant #2 is 20 psi. North Logan City reported that a 2.5" nozzle was used for the field test. The nozzle is assumed to have a discharge coefficient of 0.90. The resulting flow during the test is 1,187 gpm at hydrant #1 based on the nozzle size and pitot pressure. Based on the test flow and the pressure drop during the test, there will be **1,977 gpm** available at hydrant #1 with a 20 psi residual pressure at hydrant #2. Correspondence between Stantec and North Logan City is attached to this letter.

It should be understood that this test was preformed at a specific date and time and provides a snapshot of the available fire flow conditions. System pressures will vary throughout each day and will change seasonally. This test was performed for background information; however, North Logan City will require the fire protection system designer to perform a separate fire flow test to confirm available fire flow.

Reference: USU USTAR Building Fire Flow Test

If you have questions related to this test, please contact me or Ken Engstrom.

Sincerely,

STANTEC CONSULTING INC.

Peter Duberow, P.E.
Project Manager
Tel: (801) 261-0090
Fax: (801) 266-1671
peter.duberow@stantec.com

Attachment: Fax, North Logan City (1 Pg)
Fax, Stantec (3 Pgs)

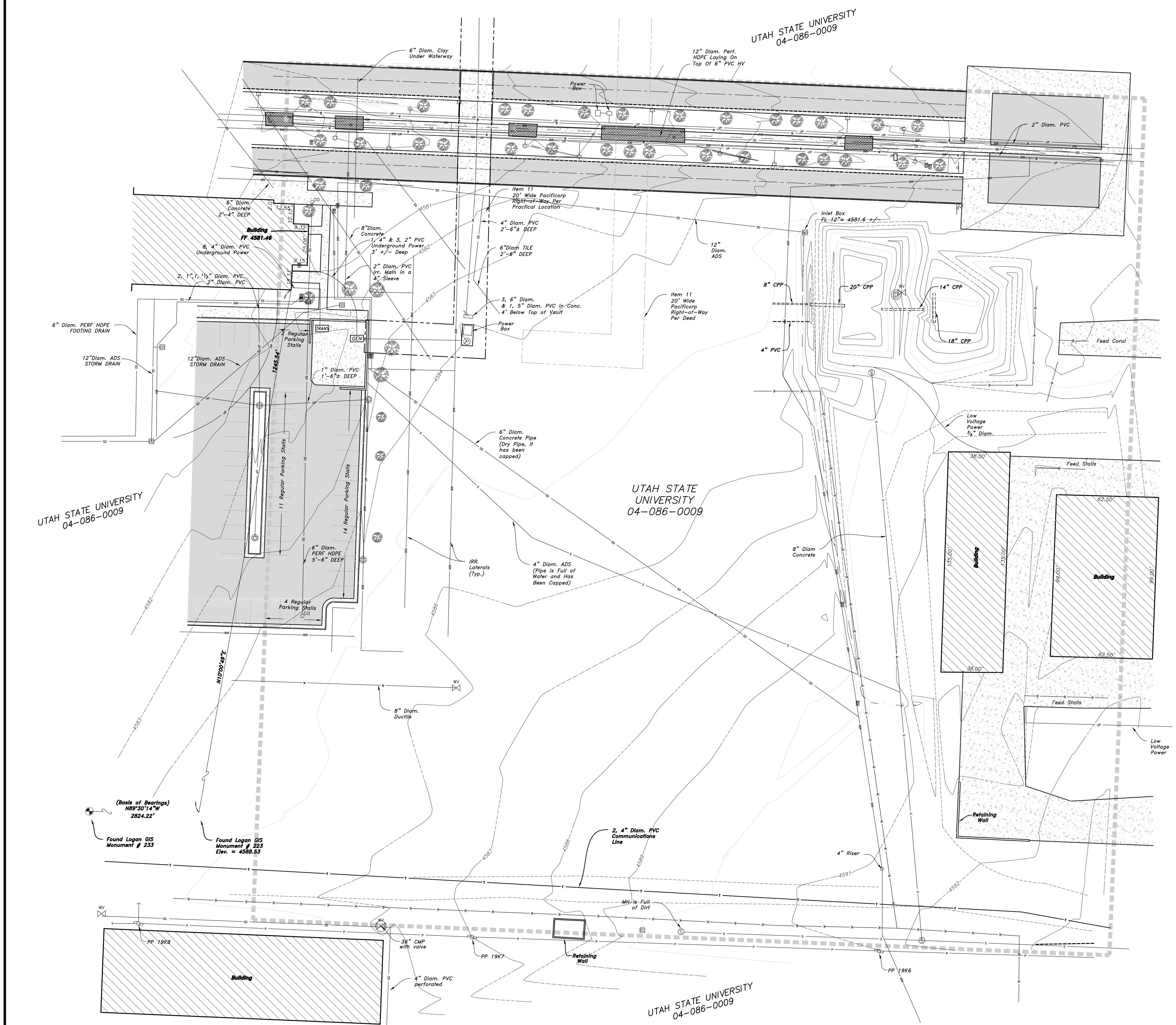
c.

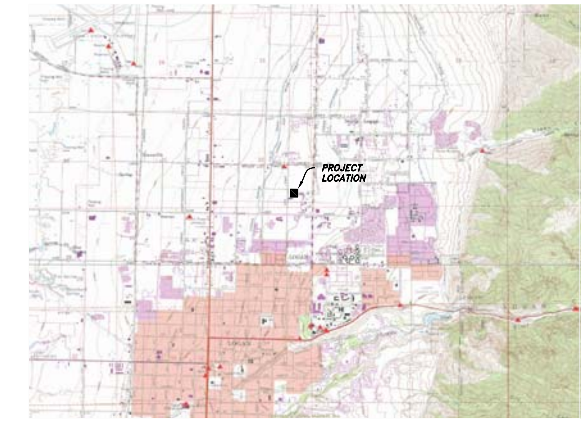
pmd c:\documents and settings\pduberow\my documents\let.doc

6.10 appendix K

ALTA/ACSM survey

The ALTA Survey indicates a 20' wide Pacificorp right-of-way (item #11), for the location of power lines/utilities. The actual location of power that has been brought to the site for Building 620 is shown just west of this deeded right-of-way. It is anticipated the new USTAR Building will be in conflict with the deeded right-of –way (which as indicated on the ALTA Survey is not being utilized), and will utilize the imposed right-of-way as established by Building 620. Therefore, as the project moves into design, the site design will require a new legal description to re-locate the deeded right-of-way to the existing utility location. Hickman Title will need to prepare a legal document for both the University and Pacificorp to agree and sign, for this to occur.





VICINITY MAP (NO SCALE)

NOTES:

1- THIS AREA IS F.E.M.A. DESIGNATED AS FLOOD ZONE C, DEFINED AS: AREAS OUTSIDE THE 1-PERCENT ANNUAL CHANCE FLOODPLAIN, AREAS OF 1% ANNUAL CHANCE SHEET FLOW FLOODING WHERE AVERAGE DEPTHS ARE LESS THAN 1 FOOT, AREAS OF 1% ANNUAL CHANCE STREAM FLOODING WHERE THE CONTRIBUTING DRAINAGE AREA IS LESS THAN 1 SQUARE MILE, OR AREAS PROTECTED FROM THE 1% ANNUAL CHANCE FLOOD BY LEVEES. NO BASE FLOOD ELEVATIONS OR DEPTHS ARE SHOWN WITHIN THIS ZONE. INSURANCE PURCHASE IS NOT REQUIRED IN THESE ZONES.

2- THE VERTICAL DATUM OF THIS MAP IS NAVD 88. IT WAS CALCULATED USING LOGAN GIS MONUMENTATION FOUND NEAR THE PROJECT.

3- THE MAJORITY OF THE UNDERGROUND UTILITIES SHOWN ON THIS MAP WERE REFRENCED FROM USU UTILITY MAPS RECEIVED FROM LARRY DUNKLEY- ENGINEERING TECHNICIAN AND ULTILITIES MAPPER OF USU.

4- THE CURRENT SETBACKS AND HEIGHT RESTRICTIONS ARE NOT KNOWN. THE LOCATION OF THIS PROJECT FALLS WITHIN THE INNOVATION CAMPUS PROJECT AREA HOUSING PLAN WHICH IS AN ECONOMIC DEVELOPMENT AREA.

LEGEND:

FLOW LINE
CONCRETE
EDGE OF PAVEMENT
DITCH
EXISTING FENCE
EXISTING WATER LINE
BUILDING LINE
EXISTING SANITARY SEWER
EASEMENT LINE
EXISTING STORM DRAIN
PAINT STRIPING
EXISTING 1' CONTOUR
EXISTING 5' CONTOUR
PROJECT AREA LINE
EXISTING IRRIGATION LINE
UNDERGROUND POWER
BURIED PIPE
CROWN OF ROAD
UNDERGROUND COMMUNICATION
POWER LINE

CLEANOUT
SEWER MANHOLE
STORM DRAIN MANHOLE
LIGHT POLE
TREE
WATER VALVE
FIRE HYDRANT
LIGHT POLE WITH BASE
IRRIGATION CONTROL BOX
INLET BOX
STREET SIGN
POWER POLE
CURB AND GUTTER
SURVEY MONUMENT
SHADE CONCRETE
SHADE ASPHALT
SHADE BUILDING
SHADE DECORATIVE BLOCKS

SCHEDULE B - Section 2 Exceptions

11. Easement Agreement executed February 9, 2005 by Utah State University, a non-profit corporation and a public agency of the State of Utah to Pacificorp, a corporation of the State of Utah. Recorded March 11, 2005, as Filing No. 885258, in Book 1343, at Page 963, in the office of the Recorder of Cache County, Utah. Said easement is for the purpose of installing, constructing, maintain, repairing and replacing thereon, public utility infrastructure and facilities. (Plotted and Labeled as Item 11)

SURVEY CERTIFICATION

To Jill A. Jones of AJC Architects:

This is to certify that this map or plat and the survey on which it is based were made in accordance with the "Minimum Standard Detail Requirements for ALTA/ACSM Land Title Surveys," jointly established and adopted by ALTA and NSPS in 2005, and includes items 2, 3, 4, 5, 7a, 8, 9, 10, 11 (a)(b), 14, 15 and 16 of Table A thereof. Pursuant to Accuracy Standards as adopted by ALTA and NSPS and in effect on the date of this certification, undersigned further certifies that in my professional opinion, as a land surveyor registered in the State of Utah, License No. 167819, the relative Positional Accuracy of this survey does not exceed that which is specified therein.

Surveyor: ______________________

Registration No. 167819

Date: ______________

PROFESSIONAL LAND SURVEYOR
STATE OF UTAH

Revision | No. | Date | By

HANSEN & ASSOCIATES, INC.
Consulting Engineers and Land Surveyors
538 North Main, Brigham City, Utah 84302
67 East 100 North, Logan, Utah 84321
Brigham City (435) 723-3491 (435) 723-7663
Ogden (801) 399-4905
Logan (435) 752-9197 (435) 752-8272

Drawn By: JES Date: NOV 2007
Designed By:
Checked By:
Approved By:
Scale: A" = 30'
Drawing File: 07-3-244.dwg
JOB NUMBER: 07-3-244

ALTA\ACSM SURVEY FOR

JILL A. JONES

LOGAN, CACHE COUNTY, UTAH
A PART OF THE NORHTEAST QUARTER OF SECTION 14,
TOWNSHIP 9 NORTH, RANGE 2 WEST, S.L.B.& M.

SHEET 1 OF 1 SHEETS