PROJECT PROGRAM FOR

THE CROCKER SCIENCE CENTER @ THE GEORGE THOMAS BUILDING

THE UNIVERSITY OF UTAH

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CROCKER SCIENCE CENTER REVIEW SIGNATURES

UNIVERSITY OF UTAH REVIEW SIGNATURES

We have reviewed the Crocker Science Center Program for the University of Utah and warrant that it adequately represents our request for a facility to fulfill our mission and programmatic needs. All appropriate parties representing the University have reviewed it for approval.

Patti Ross, Chief Strategy Officer — Date 8/19/13

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Eric Browning, Campus Planning — Date 7.29.13

Jennifer Still, Campus Planning — Date 7.29.13

DIVISION OF FACILITIES CONSTRUCTION & MANAGEMENT, STATE OF UTAH

I have reviewed the Crocker Science Center Program, jointly prepared with the University for approval.

Rick James, Project Manager, DFCM — Date 9-9-13

ACKNOWLEDGEMENTS

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PROGRAMMING REFERENCES

University of Utah Campus Master Plan, 2008

West Campus Precinct Plan, 2012

University of Utah Long Range Development Plan, 1997

DFCM Programming Standards

LEED for New Construction and Major Renovations

George Thomas Building College of Science Pre-programming Study, 2010

2012 International Building Code (IBC)

2012 International Fire Code (IFC)

2012 International Plumbing Code (IPC)

2012 International Mechanical Code (IMC)

2011 National Electrical Code (NEC)

2009 International Energy Conservation Code (IECC)

2009 ANSI/A117.1

2012 International Plumbing Code (IPC)

2012 International Fuel Gas Code (IFGC)

LEED 2009 for New Construction

01.

EXECUTIVE SUMMARY

Project Justification
Project Vision, Goals, Needs and Concepts
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PROJECT JUSTIFICATION

As the first co-ed, stand-alone library at the University of Utah, the George Thomas Building (GTB) is an important historic landmark for the campus and the community of Northern Utah. It was dedicated in 1935 and rapidly became a hub of both academic and social activity. With the completion of the Marriott Library in 1968, the building took on another cultural life as the home of the Utah Museum of Natural History until 2011. It is the intention of the University to repurpose the building as the Crocker Science Center (CSC), an exciting teaching and research facility that will provide a gateway experience to both science major and non-major students and establish a collaborative environment for cutting edge knowledge creation. This restored and expanded center will house a consortium of several centers including the Center for Cell and Genome Science, the Center for Quantitative Biology and the Center for Science and Mathematics Education along with state-of-the-art, highly flexible classroom and teaching laboratory space. The building will also become a highly visible and stimulating showcase for the promotion of literacy in the sciences for undergraduates, graduates, school children and other segments of the community at-large.

PROJECT VISION, GOALS, NEEDS AND CONCEPTS

The programming process documented the overall vision of the Crocker Science Center and the restoration goals and requirements of the historic George Thomas Building. Working with the various stakeholders including the Steering Committee, Executive Committee, the University and DFCM, common threads emerged defining the vision and mission of the CSC.

Vision
Provide innovative, interdisciplinary opportunities in science and mathematics through the integration of teaching, learning and research.

Mission
Produce the next generations of interdisciplinary scholars and scientists capable of tackling the complex scientific problems and issues of the future.

In addition, a number of guiding principles and goals were established that were used as a checks and balance system during the programming process.

- The CSC should be known as a place of learning and education on campus and within the larger community and state. As such, college/university/community wide interaction and integration are critical to the success of the CSC.
- In an effort to foster science educated citizens, every student should have an opportunity to visit the CSC on a regular basis through general education courses, college of science coursework, undergraduate advising and tutoring, public interaction and gathering spaces and collaborative/experiential environments.
- The CSC should foster communication, leadership and teaching opportunities as it strives to address the key issues of demographics, diversity and retention in the STEM (Science/Technology/Engineering/Mathematics) disciplines.
- The building should be greater than the sum of its parts by fostering a collaborative, interdisciplinary environment of research and education.
- The building should be an experiential environment that showcases science education and research. This experiential environment should be the backbone of the building and create opportunities for student/teacher, scientist/public, education/research interaction.
- The CSC needs to maintain flexibility for changes in pedagogies, research techniques and future scientific developments.
- The renovation of the existing GTB should seek to maintain and preserve the inherent historical character of the building and its significant components.

Key Program Components

- **General Science Education Space**. The primary goal of the CSC is education and the inclusion of flexible classroom space and teaching labs within the CSC is crucial to the success of the building. These key educational spaces will help centralize students, both major and non-major, in a creative environment where science is on display.

- **Center for Cell and Genome Science (CCGS)**. The CCGS will allow for the centralization of principal investigators currently scattered across campus into a state-of-the-art, collaborative research center. It presence in the building will also allow

students and other users to witness a variety of laboratory work and processes associated with genomic research.

- **Center for Quantitative Biology (CQB)**. The CQB seeks to enhance the undergraduate experience through cross-disciplinary teaching, research, collaboration and outreach programs.

- **Center for Science and Math Education (CSME)**. The goal of the CSME is to build programs, provide resources, and foster partnerships between academia and the community at large that promote understanding and enthusiasm for science and mathematics.

- **Advising Hive**. In an effort to centralize advising within the College of Science, the hive will co-locate advisors from the Math, Physics/Astronomy, Biology and Chemistry Departments. It will also house a visible area for promoting undergraduate science research opportunities.

- **College of Science Dean's Suite**. The CSC should house the dean's suite in an effort to centralize academic administration and community development. Integrating the administration with the CSC will improve work-place performance, communication among administration, students, faculty, researchers, and the general public on a daily basis. The suite will provide office and support spaces easily accessed to the CSC common areas.

- **Café/ Tutoring Center/Gathering Space/Experiential Environments/Informal Learning Areas**. The CSC should accommodate informal student gathering and learning areas to promote positive interaction between researchers, educators, students, and the community.

SITE INFORMATION

The GTB's prominent location at the gateway of Presidents Circle offers many opportunities and challenges in terms of site considerations. As part of the Presidents Circle Historic District, the GTB is a significant and recognizable piece of historic architecture and a major feature of the campus landscape viewable from both the Circle and University Street. The GTB sits in one of the more compact and intimate areas of the campus and is in close proximity to the Stewart Building to the south and Emery and Life Sciences Buildings to the east. Directly southwest of the GTB is Cottam's Gulch/Grove, a historic landscaped area associated with Walter Cottam, a renowned University botany professor, early ecologist, and founder of Red Butte Garden. This area contains mature specimen trees that are part of the University's arboretum. Cottam's Gulch/Grove is also part of a larger green space preservation zone that stretches from the Quinney Law School to Gardner Hall, which creates a landscaped buffer to University Street. These landscape features and materials should be maintained to the greatest extent possible with special provisions to protect and/or replace important landscape features during the construction of the GTB expansion.

The main vehicular circulation to the site is from Presidents Circle to the north of the building. A connecting drive on the east side of the building serves not only the GTB but also the Allred Emery Building, William Stewart Building, Life Sciences Building and the South Biology Building. Given the University's desire to limit access points along Presidents Circle, the service drive should be maintained and integrated into the gateway element of Science Yard.

A bus stop located on University Street on the west side of the GTB serves as a strong public link and a major contributor to pedestrian traffic patterns in this part of the campus. The commercial/residential areas on the west side of campus also add to this pedestrian traffic flow. Currently a high-traffic sidewalk runs from the corner of University Street and Presidents Circle to the southwest corner of GTB. This connection should be maintained and enhanced as an alternate and handicap accessible point of entrance to both the CSC and to the Science Yard.

In terms of topography and landscape features, there are a number of contributing factors that will shape the eventual building's expanded footprint. The primary factor is the location of Cottam's Gulch on the southwest corner of the GTB. The steep slope into the gulch will limit expansion to the west. Currently seen as an under-utilized area, the GTB and the adjoining landscape area should seek opportunities to revitalize and integrate the gulch area as campus amenity.

ENVIRONMENT AND CLIMATE

The site is located at latitude of 40°45'50" and a longitude of 111°51'04". The climate features very warm summers (highs near 100 °F June through August and cold winters (lows below 20 °F November through March), with large diurnal temperature swings throughout the year. Humidity levels are low, so dehumidification is rarely needed and evaporative cooling strategies are effective. Average year-round humidity is 55% and is highest from March through May and lowest from June through mid-September. Precipitation in the foothills is about 20 inches per year. Major sources of precipitation are winter snow storms, late winter and spring rains, and summer monsoons. May is the wettest month, averaging 2.09 inches (53.1 mm) of precipitation.

SITE DEMOLITION

Construction of the new addition will require that a portion of the existing building and a section of landscaping will need to be demolished, including tree and sidewalk removal, to accommodate the proposed improvements.

SITE GRADING

Existing site contours are shown in the Appendix. The existing George Thomas building is on a lot that

is sloped from east to west, with the east side of the building at an approximate elevation of 4653 and the west side of the building at 4644. The overall site has an elevation change from the east side of the site (1400 East) at an approximate elevation of 4656 to a low point along the west side of the site (University Street) at 4623. The overall average slope across the site from east to west is approximately 6.5%, and from north to south is approximately flat (0%). Since the expansion of the building will extend directly south, the proposed building expansion will avoid excess grading that would result with any east/west improvements. Southwest of the building is Cottam Gulch which has historical significance. It is the intention of the design to avoid impact on the Gulch and therefore the grading will not extend into the Gulch. The site should be designed to balance cuts and fills and minimize import and export of materials.

Roadways exist on three sides of the site, the north, west, and east. Site grading will need to tie into these roadways. In general, all surfaces should have a minimum of 2.0% slope. Parking lots should not exceed 6% grade and landscape surfaces should not exceed a 3:1 slope. ADA paths of travel and parking areas shall comply with the latest edition of the Americans with Disabilities Act standards and as reviewed by the University. ADA access to the CSC was evaluated as part of this program, and proposals for addressing pedestrian access to the historic entrance from University Street and Presidents Circle as well as a proposed new entrance on the east side of the GTB are outlined in Chapter O3.

EROSION CONTROL

An erosion control plan should be developed to minimize erosion during and after construction. Best Management Practices (BMPs) such as filter socks around drain inlets, stabilized site entrances and silt fences should be used to control sedimentation into the storm water runoff. Special care should be taken to protect the Cottam Gulch area.

ABOUT THE GEORGE THOMAS BUILDING

The GTB is one of eight historic buildings on President's Circle, located at the heart of the University of Utah. Designed by the firm of Ashton & Evans, it was constructed as the University's main library between 1933 and 1935. The library soon outgrew the space and in 1968 the building was converted to the Utah Museum of Natural History, which likewise expanded and moved to a new location in 2011.

The GTB is listed on the National Register of Historic Places as a contributing building to the University of Utah Circle National Register District. The building's primary facades face north, east and west, and are marked by simply detailed cast stone masonry with punched window openings, fitted with narrow sash steel awning windows. The National Register nomination form calls out as significant many of the building's exterior and interior features, including its Neoclassical massing and cornices at the parapet, Second Renaissance Revival rusticated main entry, art deco metal work, interior stone finishes in the lobby and stair and the woodwork and decorative cornice moldings in many rooms.

The building's exterior has a high level of integrity and is in good condition given the age of the building; remarkably few alterations have been made. On the exterior, these include the modification of an original doorway and the creation of two more doors from window openings, the addition of a ramp next to the north entry, and the addition of a stair tower on the south side. On the interior, some floors have been covered with carpet, many book cases have been removed or covered over, and acoustic tiles have been applied to some of the plaster ceilings. Reading rooms have been altered to accommodate museum exhibits (and, more currently, dance studios), but modifications mainly comprise false walls and are reversible.

The programming effort for CSC has been guided by the vision that the most historically significant exterior and interior spaces and features of the GTB will be retained, allowing secondary and non-contributing spaces and features to be modified or removed to accommodate the building's new use. This approach is consistent with national standards as defined by the Secretary of the Interior's Standards for Rehabilitation. Proposed major changes to the GTB include the removal of the book stacks wing and its replacement with an addition housing modern laboratories, which may impact two adjacent historic resources: Cottam's Gulch and the Stewart Building.

Potential impacts to the historic resources were discussed at several meetings, resulting in recommendations for programming and rehabilitation actions for the GTB, Cottam's Gulch, and the Stewart Building that will be consistent with the Secretary's Standards. As well, during the development of the CSC program document, a Memorandum of Agreement (MOA) was drafted between the University and the Utah SHPO regarding the demolition of another university building, Carlson Hall, also designed by Ashton & Evans. As part of off-site mitigation for the loss of Carlson Hall, the University agreed to prepare a historic preservation plan for the GTB prior to rehabilitation. The plan is summarized in Section 4.0 and a complete version is contained in an appendix to this report.

Rehabilitation goals for the exterior are to preserve and rehabilitate the cast stone facade and copper roof and to improve the anchorage of the cast stone veneer. The character of the steel sash windows will be maintained while improving thermal performance. (This report and cost estimate assumes the windows will be replaced with new steel insulated units that match the existing window profiles.) Leaded windows in the main reading room will be preserved in place or integrated into the new windows. The ramp on the north side will be removed and relocated if possible, or replaced with a more compatible design. The stair tower will be removed along with the book stack wing.

The building's interior also has a high level of integrity and is in good condition. The most significant

historic spaces are the ground-floor vestibule, lobby, main staircase and the second floor main reading room, and delivery hall. Other contributing secondary spaces are the ground-floor reserve reading rooms, with their wood veneer finishes and elaborate cornices, the second-floor periodical reading room, and the third-floor graduate reading room, which retains its streamlined art deco paneling, bookcases and plaster ceiling moldings. Major rehabilitation goals for the interior are to maintain or restore the spatial volume and character of the significant primary spaces; preserve the graduate reading room as a representative example of a secondary contributing space; preserve and repair the main staircase and railings; and preserve and rehabilitate the decorative stone finishes in the vestibule, lobby, and delivery hall. Wood and plaster finishes in secondary spaces will be preserved and rehabilitated in place or relocated to appropriate newly designed spaces within the building when possible.

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SPACE PROGRAM SUMMARY

The major allocations of space in the CSC are evenly split between science education and research. In addition, there are allocations for a technology incubator, administrative offices for the College of Science, and common spaces.

- The education spaces include flexible classrooms and teaching labs, space for undergraduate research, an advising hive, a science tutorial center, The Center for Science and Math Education, and the Center for Quantitative Biology.
- The research space will provide laboratories for the Center for Cell and Genome Science, an interdisciplinary center focused on understanding the genetic and molecular bases of cellular function.
- The technology incubator includes wet lab and office space intended to bring local science based industries into the CSC for inspiration and collaboration.
- Programmed common spaces like seminar rooms, exhibit areas, and a café will encourage the mixing of science education and research.
- A detailed space tabulation list is provided for each program group, which identifies spaces to be completed in the base building and in the completed shell space.

PREPROGRAMMING SCHEME ANALYSES

As part of the pre-programming options study (completed May 14, 2010) two primary massing schemes were developed: the Cube and the Loft. Both concepts were based on preserving and adaptively reusing the majority of the existing George Thomas Building with the exception of the unusable original library stacks spaces centrally located along the south wall of the building. The space vacated by the demolition of the stacks allows for a new infill piece to plug into the south side of the building. This infill piece is a critical component of the seismic upgrades to the existing building. In both the Cube and Loft scheme and subsequent programming schemes, the variance in strategy centers on the size and footprint of this new infill addition and its integration with the existing building and the surrounding site.

In the initial feasibility and pre-programming studies the more compact 4-story Cube Scheme was considered as the most viable option given its floor plate efficiency and minimal impact to the adjacent buildings and green space. However, in an update to the 2010 pre-program report (Revised: November 26, 2012), the 3-story Loft scheme was reconsidered and adopted as the preferred approach for future evaluation. It was the feeling of the College of Science Steering Committee that there needs to be a critical mass of principal investigators (PIs) on each level in order to make the new building addition a successful research facility. By switching from a 4-story Cube to a 3-story Loft scheme, the larger floor plates allow for better interaction and collaboration between PI labs. The cost models for both schemes were also updated, showing that there was a small increase in the construction cost of the Loft scheme compared to the Cube, based on the larger perimeter wall area of the Loft scheme. This increased cost was considered negligible relative to the level of detail undertaken at this point in the pre-programming process.

PROGRAMMING SCHEME ANALYSIS

In light of new and/or additional information gleaned from the programming phase of this project, the programming team re-evaluated the two primary schemes investigated in the pre-programming design process (the Cube and the Loft) and developed two additional schemes for comparison: the Wing and the West Addition.

WEST ADDITION.

The West addition expands the GTB to the west of the existing building in a new stand alone structure. This scheme, however, was quickly eliminated because of significant impacts to the historic architecture and green space preservation zone along University Street. In meetings with the University it became apparent that the impact to the western landscape zone far exceeded any positive aspects of the expansion. In addition, any development to the west would greatly change the historic character and feeling of the buildings along President's Circle and the GTB. This scheme would also likely create a separation between research and education, undermining the hoped-for synergy identified as a key objective of the project. See Figure 1.1.1.

WING SCHEME

The Wing has the least number of floors and looked at the opportunity to mitigate the visual impact of any addition to the GTB by reducing the number of floors built above grade. The scheme also took into account the potential impacts on Cottam's Gulch

by adjusting the infill expansion around the existing topography. Similar to the Loft scheme, the infill building runs east-west but also has a north-south extension that would allow for future expansion of the CSC. The result of this north-south extension was a greater historic impact and encroachment to the historic Stewart Building. In addition, although the building consolidated PI's to three floors versus four floors (Loft) and five floors (Cube), it did not sufficiently enhance connectivity of laboratory research space compared to the Loft scheme. In the end it was the consensus of the executive/steering committee that similar to the West Addition, the Wing Scheme presented too many challenges to be considered a viable option. See Figure 1.1.2.

CUBE SCHEME

With the smallest floor plate, the Cube Scheme provided the least amount of impact to green space, including Cottam's Gulch and the adjacent Stewart Building. The scheme looked at consolidating PIs in a 5-story infill addition rather than 2 (Wing) or 3 (Loft) stories. As a result of the increased height, the new Cube structure would have the greatest visual presence above the George Thomas Building and be more visible from President's Circle and 1300 East. In addition, the research area in the new building would need to be fragmented on multiple levels (as compared to the Loft) and disrupt the requested critical mass of PIs per floor. Like the Loft and Wing schemes, the Cube comes within 25 feet of the north face of the Stewart Building, requiring special attention to the design of the resulting *allée* as a useful, attractive, and safe outdoor space. See Figure 1.1.3.

LOFT SCHEME

The Loft Scheme represents a balance of compact floor plates, acceptable building

Note: These visual impact studies (at right) for each of the schemes are solely intended to represent estimated building mass and the proposed impact to surrounding buildings and views and not the final design form.

FIGURE 1.1.1 WEST SCHEME

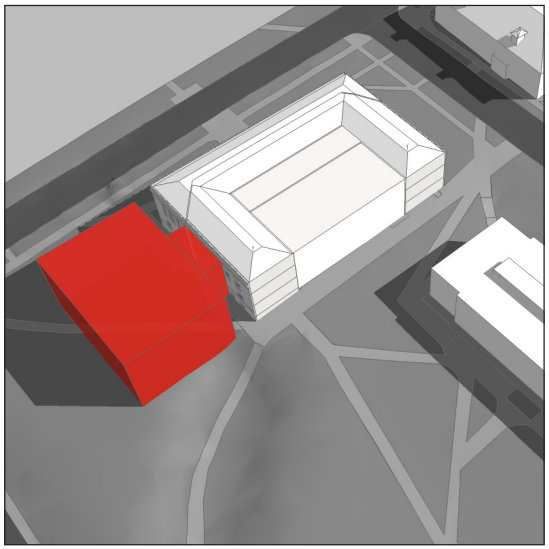


FIGURE 1.1.3 CUBE SCHEME

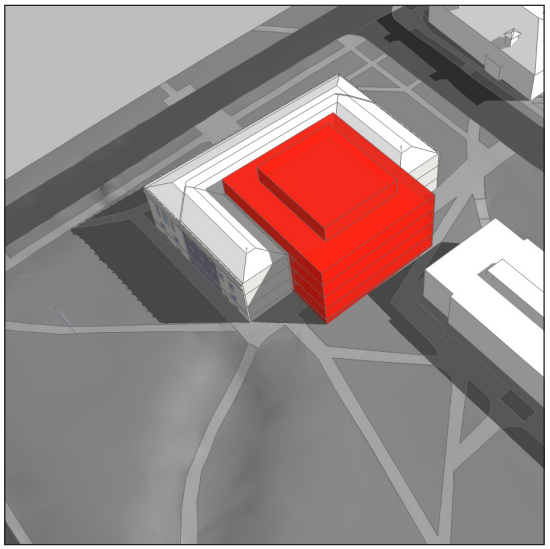


FIGURE 1.1.2 WING SCHEME

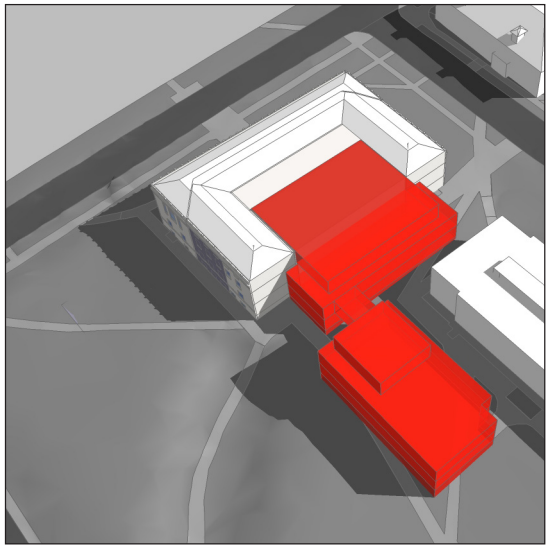
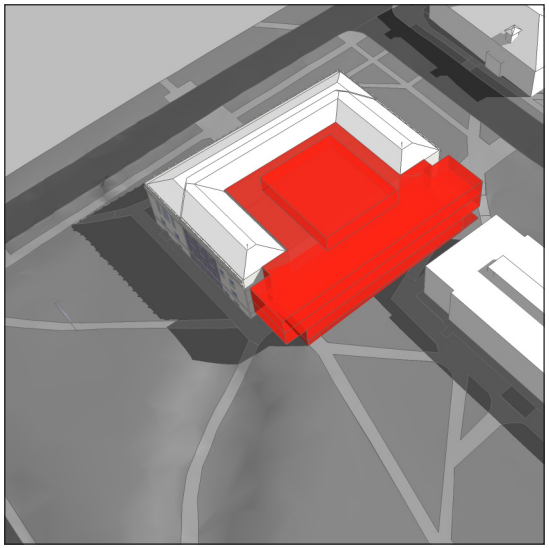


FIGURE 1.1.4 LOFT SCHEME



height, and density of researchers. Although the new infill structure on the south side of the existing GTB will be more visible from east and west views to the building, impacts can be successfully mitigated through appropriate and sensitive design approaches. The 4-story structure would come to the eastern/western edges of the existing building and within 25 feet of the Stewart Building. Careful design consideration will need to given to reduce the impacts to Cottam's Gulch and the *allée* between buildings. In both cases, the stakeholders believed that the building could help make these underutilized areas attractive, useful, and potentially powerful spaces in the urban design framework of the University of Utah. See Figure 1.1.4. Note: While there was broad support for the Loft scheme as the preferred alternative, this scheme is not meant to represent a final design solution but a means for evaluating other relevant program issues, including: existing building test fit, historic preservation strategies, utility and building systems approaches, site development concepts, sustainability strategies and cost projections.

EXPERIENTIAL ENVIRONMENTS

The University of Utah has developed a strategy for enhancing the user experience of its academic and research facilities identified in Appendix C of the DFCM Programming Standards (University of Utah Supplement), but also known as Experiential Environmental Design. The purpose of this strategy is to integrate the mission of the University, department or division into the architecture as well as creating an "overlay" of displays, wayfinding, donor recognition, and academic/research showcasing (excluding campus-designated exterior identification signs). To achieve a holistic and integrated approach to the implementation of this strategy, it will be important to identify a line item for it in the project budget (1.5% of the construction budget has historically been used) and to recognize it as a component of the design process beginning with any pre-Schematic Design Phase activities. The College of Science and the Center of Cell and Genome Research have identified key goals, experiences and messages that it wants the Crocker Science Center to imbue (see Project Vision, Goals, Needs and Concepts, Executive Summary, Page 01.3), specifically that:

- The building should be an experiential environment that showcases science education and research. This experiential environment should be the backbone of the building and create opportunities for student/teacher, scientist/public, education/research interaction both inside and out.
- In an effort to foster science educated citizens, every student should have an opportunity to visit the CSC on a regular basis through general education courses, college of science coursework, public interaction and gathering spaces and collaborative/experiential environments.
- The building should be greater than the sum of its parts by fostering a collaborative, interdisciplinary environment of research and education.

COST MODEL SUMMARY

A significant effort was made during the programming process to evaluate and track the project budget with all of the stakeholders. The initial project budget was identified at $50,000,000 and it was later increased to $55,000,000. The total project budget will accommodate a Base Building build out of approximately 123,000 s.f., which includes the renovation of the George Thomas Building and a 52,000 s.f. addition to the building. It was also determined that 30,000 s.f. of the Base Building space would be designated as unfinished Shelled Space. This represents approximately 25% of the total programmed space. Further breakdown of the project budget is provided in Chapter 10.

02.

PROGRAMMING PROCEDURE

PROGRAMMING PROCESS

The programming process for the Crocker Science Center at the George Thomas Building was organized around a number of all-day workshops. The workshops were used to gather all of the stakeholders and team members in a forum where ideas could be shared and tested in a collaborative environment. These focused workshops also allowed the program team to extract information to develop specific project needs, common goals and visions, test alternatives and confirm direction. As with any programming process the end goal was always centered on building consensus.

As with other programming processes, this effort began by identifying critical issues, both general and project specific, that needed to be addressed in the various workshops. These included:

- Defining of expectations
- Creating a collaborative experience for all stakeholders
- Integrating campus planning and place making
- Establishing sustainable design goals
- Defining the budget
- Outlining renovation and constructability strategies
- Establishing current and future needs and strategies for expansion and adaptation
- Validating user space and functional requirements
- Distinguishing between user "wants and needs"
- Looking for opportunities for sharing resources and minimizing redundancy
- Benchmarking to inform appropriate space allocation
- Defining adjacency requirements
- Defining environmental conditions for each space, including temperature, humidity, air change rate, lighting, shielding, vibration
- Defining furniture, fixtures and equipment needs
- Defining specialized laboratory equipment and research tools and related services
- Inventorying chemical and hazardous materials

To best facilitate the process, the workshops were generally organized around (3) distinct phases:

- Extracting Information
- Testing Alternatives/Confirming Direction
- Confirming Program/Finalizing Direction

The program team began the workshop process by reviewing the prior planning work. This included the University's master plan and precinct plan, specific site information, standards, anticipated science and education groups to be accommodated, key schedule dates, the pre-programming study and other pertinent information. The team also met with building user groups to better understand their activities, general lab size and requirements. From these responses, the team developed a preliminary staff and space tabulation.

Each of the workshops was used to discuss and increasingly refine information about specific space and support requirements. These sessions were also used to tour and evaluate existing teaching and laboratory spaces at the University and to develop a common language and expectation. Additionally, the sessions explored precedent analyses and case studies related to contemporary learning space (science classrooms, teaching laboratories and informal education spaces) and new pedagogies researched by consultant Robert Beichner, PhD (SCALE-UP). Information was organized in each workshop in tabular and graphic formats and brought to the subsequent meeting for verification and more detailed discussion. Following each workshops the decisions made and directions given were recorded and action items noted

along with responsibilities. The time between project workshops was used by the project team to develop planning design and programming summaries to be reviewed at the next meeting.

In addition to the larger group workshops EDA spent time in specific breakout session with the various stakeholder groups to clearly identify space needs as they related to the overall project vision. The information gathered from the user group meetings was organized and expressed in a graphic program in order to visualize the entire building program and relationships in one view. This helped the University's users and leadership in evaluating the requested spaces for redundancy and possible beneficial sharing opportunities. A distinct effort was made to distinguish between user wants and needs in order to manage project costs.

After completion of the workshop process EDA generated and vetted the gathered information through a series of communications and meetings involving the DFCM and University representatives, individual researchers and science and education personnel, support groups, regulatory agencies, and the design team. In particular, the design team spent time with the Executive Committee to ensure the program document included the appropriate space list, room criteria, test fit plans, and cost analysis/budget management.

Meeting minutes for all workshops, breakout sessions and stakeholder meetings have been included in the appendix of this document.

Workshop Agendas

Kick-off Summit
- Introduction + Roles
- Clarification of Process
- Pre-program Review (2010/2012 Document Update and Consultant Review
- Project Visioning Session

Workshop 1
- Project Vision & Budget
- Education Benchmarking
- Research Benchmarking
- Department SCALE-UP Discussion
- Site Considerations
- Historical Analysis
- Sustainability Charrette
- Space List Verification
- Breakout: Tutoring
- Breakout: CSME
- Breakout: CQB
- Breakout: Advising Hive
- Breakout: Dean's Suite
- Breakout: Research
- Breakout: Education

Workshop 2
- Café Breakout Session
- PI Lab Tours
- Microscopy/Vivarium Meeting
- Site Considerations
- Program Update
- Program Vision, Branding and Experiential Space
- Research Breakout Session
- Education Breakout Session
- Wrap up discussion

Workshop 3
- Steering Committee Program/Budget Review
- Program Review and Plan Options
- Consultant Information
- Historic Preservation Breakout Session
- Code/Health & Safety Breakout Session
- Wrap up discussion

03.

SITE CONSIDERATIONS

About the University
The Planning Framework
The Site
Environmental Analysis
Site Access
Site Utilities and Infrastructure
Site Design
Site Materials

BUILDINGS AND LANDSCAPE reflect a hidden curriculum that powerfully influences the learning process. The curriculum embedded in any building instructs as fully and as powerfully as any course taught in it.

David Orr, PhD, Environmental Educator

ABOUT THE UNIVERSITY

Founded in 1850, The University of Utah is located on 1,534 acres, which incorporates the main campus (including academic, research, athletics and recreation functions); the Health Sciences Center; the Heritage Preserve; and Research Park. The campus is bounded on the south by Foothill Drive, 500 South, and Sunnyside Avenue; on the west by University Street; on the north by 100 South and North Campus Drive; and on the east by the foothills of the Wasatch Mountains. The campus is bordered by two historic residential areas: Federal Heights to the north and west and Yalecrest to the south. Other significant developments within proximity of the campus include: Fort Douglas, the Salt Lake University Institute of Religion; the VA Hospital complex; Hogle Zoo, This is the Place State Park; and the Salt Lake City Sports Complex along Guardsman Way. The University currently serves over 31,000 students.

THE PLANNING FRAMEWORK

The George Thomas Building resides in the historic core of the campus, anchoring the southwest corner of Presidents Circle. This area of the campus (constructed primarily in the late 19th century) was developed on an east-west axis, reflective of the Salt Lake City street gridiron. Several of the University's most prominent and public buildings are situated on the Circle, including the John Park Building, Kingsbury Hall, Gardner Hall, and the Cowles, Widstoe, and Talmadge Buildings. The George Thomas Building, the University's first dedicated library facility, was constructed in 1935 and was the last structure added to the Circle.

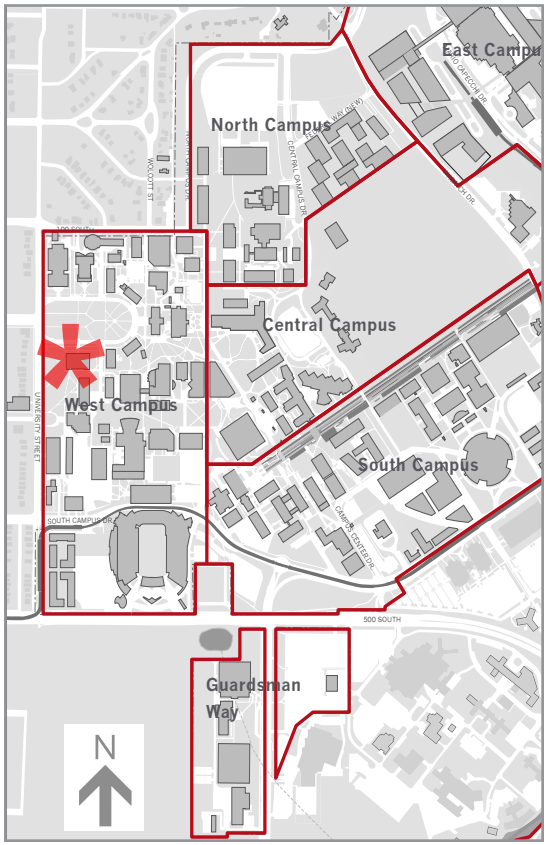
The campus is divided into several precincts, with this project located near the center of the 96-acre West Campus precinct, which is bounded by University Street, 100 South, South Campus Drive and the Union Building. This area has been characterized by the Master Plan as the University's "front door" and provides a "more optimal setting with stronger and intimate relationships between buildings and open space". The West Campus Precinct Plan was updated in 2012 to reflect the addition of the new Quinney Law Building, which will be constructed on the northeast corner of University Street and 300 South. The Precinct Plan also proposes revisions to pedestrian and bike paths, vehicular routes, and parking from 300 South to Pioneer Memorial Theatre.

The George Thomas Building also partially abuts the "Science Yard", a pedestrian corridor stretching from the Marriott Library to Pioneer Memorial Theatre and defined by several buildings supporting the College of Science. The Science Yard is one of fourteen transformative projects identified by the Master Plan as viable solutions to enhancing student life and strengthening the campus' sense of place, among other goals. The Master Plan indicates a site for the proposed Center for Cell and Genome Science in the Science Yard, south of the Skaggs Biology Building. With the relocation of the Cell Center as an integral part of the new Crocker Science Center, consideration should be given to extending the Science Yard northward to include the George Thomas Building as a "gateway" from Presidents Circle.

THE SITE

The GTB's location offers many opportunities and challenges in terms of expansion considerations. The site is constrained on the north by Presidents Circle, on the east by the historic Emery Building and existing vehicular and pedestrian ways, on the south by the historic Stewart Building and on the west by Cottam's Gulch and the University's historic arboretum, which is part of an expansive green space stretching between the existing law school and Gardner Hall. The area for expansion is also con-

FIGURE 3.1.1 CAMPUS PRECINCT MAP



strained by historic preservation requirements, which limit or prohibit visual impacts of new construction on the major (north, east and west) elevations of the historic George Thomas Building (see Appendix: GTP Preservation Plan). The affect of the proposed physical relationship between the expanded GTB and the Stewart Building relative to exterior wall construction and allowable openings on the south wall of the proposed expansion is addressed in Chapter O7. Other considerations relative to the development of the space between the Stewart Building and the renovated GTB is discussed in Site Design Consideration Section of this Chapter.

ENVIRONMENTAL ANALYSIS

The Crocker Science Center (CSC) site is a product both of its geophysical, climatic and biological location, on the one hand, and of its perception by community and building occupants, on the other. Both are important to the uses and functions of the Center's future. The product of this equation is a unique opportunity for the University to leverage the project into a state of dynamic visibility.

GEOGRAPHY AND CLIMATE

Site geography is established and certain, unlike that of many Campus sites. There is no confusion about building orientation relative to Campus, community or the immediate street. A large proportion of the project is to adaptively rehabilitate the historic structure. The balance is to be made up of a significant addition.

The climate is moderate, punctuated with highly variable extremes. Average precipitation is 18" to 20", most falling in February through May. The area is typified by temperature inversions, in which cooler air stagnates at lower elevations, trapping not only pollution in valleys in winter and summer, but also air in winter is sufficiently cold to cause 'Lake Effect' moisture from the Great Salt Lake to intensify local snow episodes in the Salt Lake Valley. The inland extension of West Coast Mediterranean climate, dominated by equatorial high pressure systems, the Salt Lake region receives little moisture during the warm-to-hot, dry summer months. This period commences in approximately June and extending to the Thanksgiving-Christmas season. Winter shifts to domination by arctic and northern Pacific weather systems, which bring increasing moisture in the form of rain and snow. Temperatures are generally moderate, seldom exceeding 100ºF in summer, and not dipping below 0º or 10ºF in winter. Inversions can hold winter temperatures in the sub-freezing range at valley elevations, such as the CSC site, for weeks at a time, while diurnal variations above the inversion ceiling (6000' to 7500' elevation, varying) follow typical daily swings of 20º to 40ºF. Summer inversions, conversely, trap not so much heated air as ozone-polluted air --- smog --- in the valley for extended periods. Mechanical systems need to filter fine particulate matter from winter ambient air, and to defeat ozone from outside in summer. Envelope transfer of outside temperatures must retain internal temperatures and strategic solar gain, supplemented by passive ventilation benefits, for overall energy efficiency and for advancing the *Presidents' Climate Change Commitment* and the University of Utah's 2010 Climate Action Plan goals.

Climate change projections for the region are extenuating, forecasting greater episodic variability of precipitation, with much higher temperatures in both winter and summer. Snow pack is likely to disappear by 2050, or soon thereafter, as the precipitation storage mechanism on which the hydrological system can depend.

PHYSIOGRAPHY, VEGETATION AND GEOLOGICAL SETTING

The CSC site is focused on the front entrance to the historic building, located at latitude 40º 45' 51.52" N / longitude 111º 51' 03.99 W (lat. 40.764311 N / long. 111.851108 W). The front door elevation is approximately 4654' AMSL. The surface slopes across the site from east to west, descending from approximately 4660' at 1400 East to about 4627' at the east curb of University Street (approximately 475 feet E-W). Against the building's foundation, the site slopes a little more than 10' from east to west. Cottam's Gulch, which slopes gently west-southwest from the George Thomas Building's southwest corner, creates a distinctive landform along University Street.

Large, mature trees of several deciduous species are clustered closely around the east and southwest sides of the existing building, especially in Cottam's Gulch, echoing the urban forest on the Presidents Circle parkland across the street to the north. The University's desire is that many if not all of these trees are to be preserved. It follows that they must be integrated into solar energy projections for the site. In general, vegetation cools the site and mitigates against weather extremes, justifying the University's policy toward trees.

Geologically, the CSC site sits on deep alluvial materials, an extension of the alluvial fan reaching below from the Wasatch Mountains well into the valley. The alluvial fan that makes up the site is near the

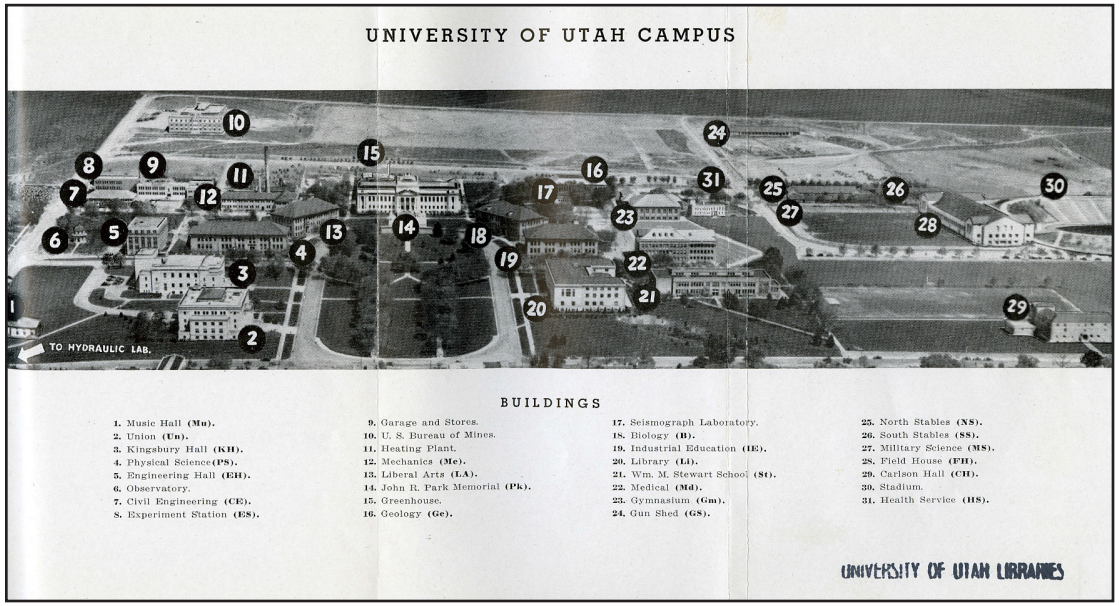


FIGURE 3.1.2
View of the University of Utah Campus in 1946, showing the George Thomas Library on the south side of Presidents Circle (Number 20).

FIGURE 3.1.3
View of the proposed Science Yard from the 2008 Master Plan. The Plan indicates a location for the Center for Cell and Genome Studies (Number 2), which has since been located in the George Thomas Building (upper left of diagram).

western 'lip' of one of the Salt Lake City seismological segments of the Wasatch Fault zone. Approximately 4 blocks southwest of the site (~3,000' distant from CSC) is a City park called 'Faultline Gardens,' 300' below 1100 East on the north side of 400 South at latitude 40º 45' 39.78" N / longitude 111º 51" 39.77" (40.76105 N / 111.861047 W). Surface elevations drop 95' from the center line of 11th East to the center line of 10th East, 795' to the west. The park consists of a landscaped escarpment midway down this 400 South slope, where a past ground slip occurred, illustrating the risk of building along this zone. The 'east bench' traversed by the east-west streets in this zone are extremely steep because of the slip-faulting that has occurred over the past millennia. The CSC site's proximity to the fault indicates vulnerability only if the engineering of foundations and structures fails to account for lateral acceleration in keeping with earthquake probabilities, progressive design guidelines, and prevailing building codes.

SOLAR ORIENTATION AND DAYLIGHT POTENTIAL

Solar energy balances are rigidly dictated by the E-W orientation of the existing George Thomas Building, offering favorable envelope solar control efficiencies. Facility expansion to the south in the "Loft" scheme offers the potential to open the south-facing and partial east- and west-oriented addition spaces to selective daylight harvesting. Trees will shade portions of the structure, the new addition's south face can manipulate insolation to benefit the research and office areas.

SITE ACCESS

VEHICULAR CIRCULATION

The primary vehicular routes to the CSC are University Street and Presidents Circle. University Street has 30 minute parallel parking and Presidents Circle has metered, angled parking long the inner side of the loop. University Street also has a University and UTA transit stop where it meets Presidents Circle directly south of the George Thomas Building. There is currently a vehicular drop-off area directly in front of the George Thomas Building that was installed for a temporary building use by Tanner Dance and should be removed with the progression of the CSC.

There is a secondary vehicular route running north-south, on the east side of the George Thomas Building that has angled parking on both sides. This road loops around the Life Sciences Building and is primarily used for service vehicles and pick-up/drop-off for the daycare inside of the Emery Building.

PEDESTRIAN ACCESS AND ACCESSIBILITY

Currently the accessible routes to the CSC are limited to the main entry on Presidents Circle and the entry on the east side of the building, which connects to the North-South Pedestrian Boulevard. The west side of the building is separated from University Street, which has a UTA and University transit stop, by several feet of elevation change and currently has no accessible routes heading north or east into Campus (Refer to Figures 3.1.5A and B). As the development of the CSC progresses it is imperative that the accessibility between the west side of the building and University Street is addressed.

Beyond the west entries to the building and along the south side of the CSC are the South Corridor / South Plaza which is also currently inaccessible from the east and west. A set of stairs divides this area from the Pedestrian Boulevard, both physically and visually disconnecting it from the vitality of the Pedestrian Boulevard and the North-South Science Yard. Replacing the stairs with a ramp would greatly improve the accessibility of the South Corridor / South Plaza. The ramp would also improve the accessibility for maintenance.

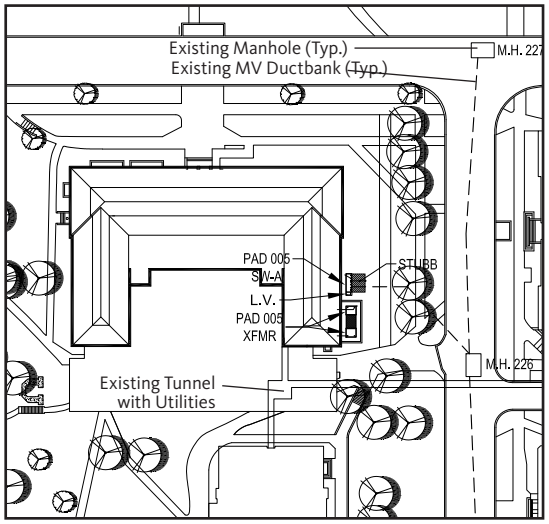
With the creation of an accessible route from University Street through the South Corridor / South Plaza and into the North-South Science Yard / Pedestrian Boulevard a new East-West accessible link will be established through Campus. The renovation of the George Thomas Building is the perfect opportunity to improve what is currently a weak point in the overall accessible circulation on campus.

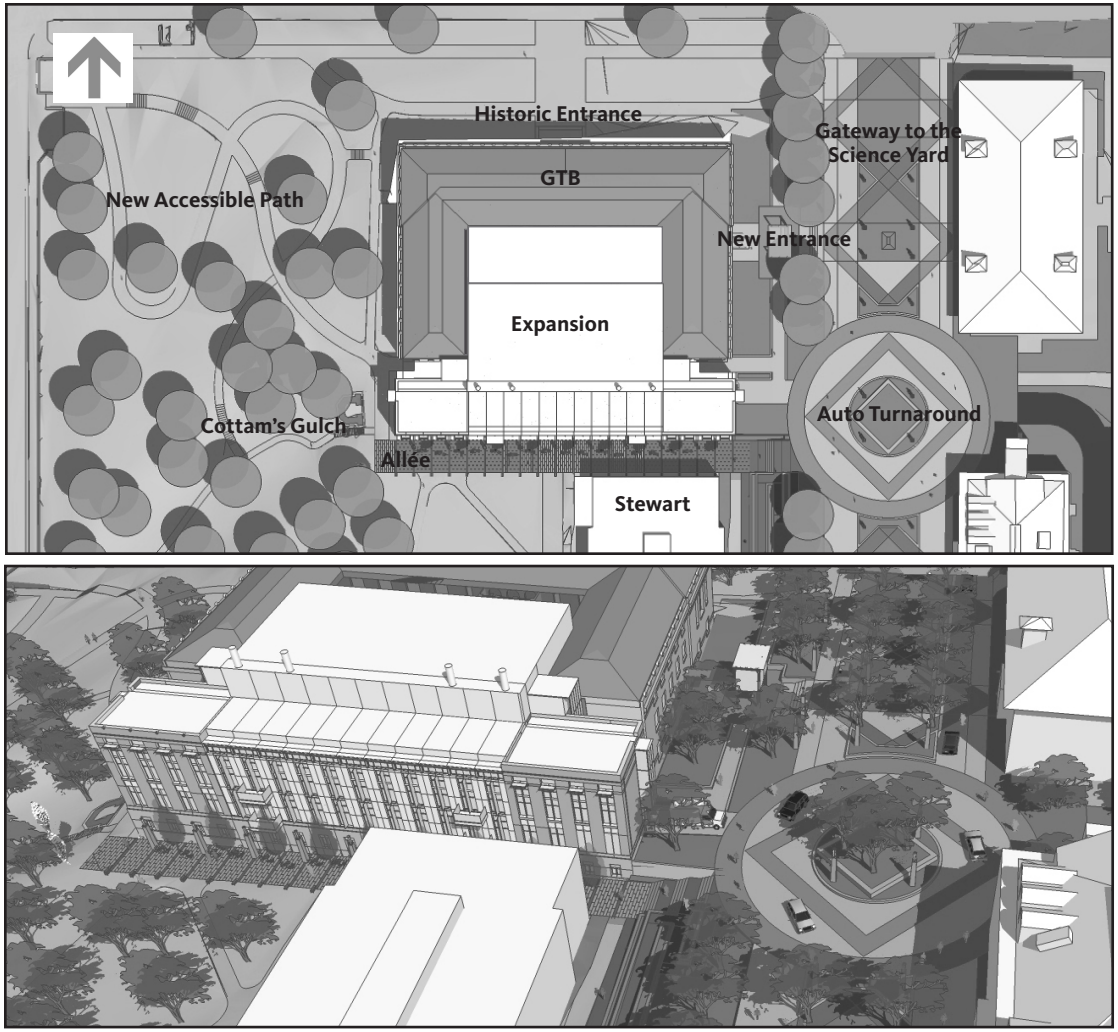
SITE UTILITIES AND INFRASTRUCTURE

EXISTING UTILITIES

Existing utilities in the area of the site are shown in Exhibit 2. There are many existing utilities through the site and in adjoining roadways. Utilities in Presidents Circle, 1400 East, and throughout the site are owned, operated and maintained by The University of Utah. The utilities in University Street are owned, operated and maintained by Salt Lake City Public Utilities. During design, Salt Lake City Public Utilities department will need review and approve any modifications or connections to their utility lines.

FIGURE 3.1.4 EXISTING POWER UTILITY LOCATIONS





FIGURES 3.1.5A AND B

Plan and bird's eye of potential pedestrian boulevard (with partial vehicle access and turn-around). This scheme proposes an entrance into the GTB main lobby from the east connecting to a passenger and school bus drop-off point with drive lanes coordinated with design of the pedestrian areas. The proposed expansion to the south (as demonstrated by the Loft scheme) creates a 25 foot allée between the GTB and the Stewart Building, which can designed as an intimate urban street (with integrated site lighting, furniture and art and with transparency into the laboratory spaces of the new addition) that brings you to the head of Cottam's Gulch. A proposed sidewalk west of the GTB creates a handicap accessible route from the University Street to the GTB historic entrance and to the south allée and Science Yard.

UTILITY RELOCATION

There is an existing underground tunnel that contains steam and hot water pipes in addition to an assortment of communication lines. The tunnel services the George Thomas building and the William Stuart from a tunnel running east-west between the Home Economics and Life Sciences buildings. This tunnel and the utilities contained within will need to be adjusted to maintain service to both buildings.

STORM WATER

The University of Utah requires that any increase in storm water runoff from existing sites must be detained or retained and released at a controlled rate that does not exceed the discharge rate from the pre-developed site. Both the University and Salt Lake City have the same requirement; to detain a 100-year storm volume with a maximum release rate of 0.2 cfs per acre of site. The University also has a requirement to retain the 10-year 2-hour storm on site with no discharge. Storm water detention will be handled by creating a detention/retention pond to the west of the George Thomas building. This detention/retention pond is shown in the Appendix.

In addition, the University has a goal of becoming "water neutral" in the next 10 years, where "water neutral" means that the University is not dependent on culinary sources for irrigation water. Non-culinary water is available from storm water, snowmelt, reverse osmosis effluent, etc. should be stored and used for irrigation. Every effort should be made and may possibly be required to reduce or eliminate storm water discharge from the site through retention and recharge of the aquifer or reuse for other non-culinary purposes.

The new University design standards published in September 2012 encourage designers to capture roof runoff for beneficial use such as outdoor landscaping irrigation or indoor gray water uses such as toilet flushing. Also, no roof drains may be directly tied into the underground storm drainage pipes. Roof drains must drain into pervious areas or be captured for reuse.

SANITARY SEWER

A 4" sanitary sewer lateral exists on the south west corner of the building. This lateral connects to a 4" clay line that continues south. The expansion of the George Thomas building will completely eliminate the lateral and a portion of the clay line. The building should still discharge from the southwest and into the system as originally constructed. In order to tie into the existing clay sewer line, a manhole will be required where the new lateral is to connect to the main.

Sanitary sewer laterals outside the building should be a minimum 4" diameter and a slope of 2.0%. Mainlines should be a minimum 8" diameter and 0.5% slope. If this building contains food service facilities, a grease interceptor will be required outside the building.

DOMESTIC WATER/FIRE SUPPLY

The existing George Thomas building has an existing 6" fire lateral connected to the south east corner. This lateral originates in 1400 East which contains a recently installed 12" main. A fire hydrant exists on the on the east side of the building, on the west side of 1400 East. A fire flow test has been performed on this hydrant and preliminary assessment indicates that the system pressure is below required per the IFC. The pressure in the system is limited by an existing 6" line that originates at the supplying tank and feeds the 12" main which the hydrant is connected to. This line may be upsized by the University in the future, at which time the system should be reassessed.

Additional existing fire hydrants are located further south down 1400 East. These hydrants may not be sufficient to meet the minimum coverage requirements and a new hydrant may be required along President's Circle, in front of the building.

NATURAL GAS

Record drawings indicate that an existing Natural Gas lateral on the east side of the building has been abandoned. No gas service to the existing building is currently known. The nearest gas line runs along the eastern side of the Life Sciences building. It is not anticipated that natural gas will be required in the CSC at this time.

ELECTRICAL UTILITIES

An existing circuit from the Stadium Substation will be used to supply the power for the CSC. Recent improvement of the medium voltage infrastructure under the 2012 Utility Upgrade Project upgraded the majority of the medium voltage power for this area and no additional work will be required in terms of new duct bank or new medium voltage switches. Under the Utility Upgrade Project, a 600 amp medium voltage padmount switch, a 12470-208Y/120 volt transformer, and a 2000 amp main building disconnect will be installed at the southeast corner of the existing GTB. This equipment should be in place by the end of 2013. The 600 amp switch has two interrupter switches that are designated for use for this project. One switch shall feed a 12470-208Y/120V transformer and the other switch shall feed a 12470-480Y/277V transformer. A tie at this new switch to the medical substation provides redundancy for this system.

TELECOMMUNICATION UTILITIES

There is an existing tunnel running east to west that provides communication conveyance to the existing GTB and the Stewart Building. The current utilities for the Stewart Building include (1) Century Link 200 pair copper cable, (1) University 18 strand single mode air-blown fiber optic cable, and (1) University 6 strand multi-mode air-blown fiber optic cable. The current utilities for the George Thomas Building include (1) Century Link 100 pair copper cable and (1) University 18 strand single mode air-blown fiber optic cable. All existing fiber optic cables for each building extend back to the Park Building to the northeast. The Century link copper cables extend back to a Century Link Hub. It would appear that based on how a new addition may be added to the GTB and/or mechanical utility changes, the existing tunnel will be impacted significantly requiring the existing telecommunication cables currently feeding the Stewart building to be most likely replaced with new. The new CSC will be provided with new telecommunication utilities to meet the requirements of this new facility and any old utilities will be removed completely back to the source. Dependent upon how significantly the tunnel is impacted, new concrete encased telecommunication ductbanks with (2) 4" PVC conduits shall be extended from the modified tunnel to the Stewart Building and to the CSC. The ductbank for the Stewart building should enter on the north end or the very northeast corner of the building. There are existing tunnels under the Stewart building which should help facilitate the installation of the new telecommunication ductbank. The ductbank for the CSC shall enter the building either on the south end of the building or on east side of the building near the electrical utilities. The Stewart building will require (1) University 18 strand single mode air-blown fiber optic cable and (1) University 6 strand multi-mode air-blown fiber optic cable and (1) Century Link 200 pair copper cable. The CSC will require (1) University 18 strand single mode air-blown fiber optic cable and (1) Century Link 100 pair copper cable. The new fiber optic cables for each building will need to extend from each building back to the Park Building. The Century Link copper cables will need to extend from each building back to the existing tunnel and spliced into the existing cables using new or existing splice cases.

SITE DESIGN APPROACH

The CSC is located at the terminus of the North-South Science Yard / Pedestrian Boulevard and the edge of Presidents Circle, situating it at the junction of two primary pedestrian corridors (Refer to Figure 3.1.5). The influx of pedestrians along the corridor creates the need for a gathering space which can accommodate large traffic volumes and facilitate interaction for passive activities. The design of the Pedestrian

Boulevard should be flexible in nature, thus creating a variety of spaces to support the day-to-day activities as well as special events – gatherings, forums, presentations, conferences, graduation ceremonies and gala events, etc. The site should also be flexible to provide areas for a comfortable, private exchange between a small group as well as a more formal, organized gathering, such as a study group, team meeting or gala event with several participants.

RELATIONSHIP BETWEEN THE BUILDING AND THE LANDSCAPE

The CSC's goal to create connections with other buildings in the College of Science will benefit from strengthening the indoor/outdoor relationship between the internal uses and the site/landscape. Consider both the experience of the user inside the building perceiving the environment beyond, as well as the user outside the building looking in. Because of the grade changes adjacent to the building, special consideration will need to be given to the building and site design relationship to link the indoor experience with the outdoor experience. Linking the building with the landscape is not limited to interfacing with the immediate surrounding site. Opportunities to link the building and site with views, especially the view to the west should be considered.

NORTH-SOUTH SCIENCE YARD / PEDESTRIAN BOULEVARD

The CSC will be the central hub for the College of Science, acting as a student center for the department and a place to showcase innovative research efforts, thus attracting new students and giving the department greater transparency to students, visitors and donors. The rest of the College is located to the southeast, disconnected from the CSC. This disconnect creates a significant need for a strong pedestrian connection from the CSC to the East-West Science Yard. As both Science Yard's develop over time vehicular traffic should be restricted to Presidents Circle and University Street. Necessary service and fire access, drop-off space for the Emery, Biology and Life Sciences Building as well as high pedestrian and bicycle traffic should lend itself toward a design that includes plazas and wide promenades while maintaining formal stretches of tree-lined green space. The theme of science and research should be reflected in the site design through sculpture, interactive elements, abstract hardscape patterns, etc.

One of the main entrances to the CSC will be on the east side of the building (Refer to Figure 3.1.6 Note C), opening out onto what is currently a two-way drive aisle with angled parking along the west and east sides. In order to update this entrance from what would appear to be a side egress to a main building entry it will be necessary to create a pedestrian friendly gathering space / front porch at the new entry with amenities such as bike racks, benches, trash receptacles, etc.

SERVICE, EMERGENCY AND DROP-OFF TO THE EMERY, LIFE SCIENCES, AND BIOLOGY BUILDINGS

Ideally, access to the neighboring science buildings should be maintained during the development of the CSC. In the future, as the North-South Science Yard / Pedestrian Boulevard is developed, vehicular traffic and parking should ultimately be removed from the east side of the CSC and pedestrian circulation should be enhanced. As vehicles are removed from the boulevard, service, fire access and a drop-off will still be available. However, parking and through traffic should be restricted to Presidents Circle and University Street.

Service access to the CSC will be located at the southeast corner of the building. Dumpsters will be shared with the Emery Building and located behind the Emery Building. Site walls and/or vegetation should be used to screen dumpsters, utilities and service areas.

The vehicular temporary drop-off area on the southern edge of Presidents Circle needs to be removed and restored to a straight curb line. The drop-off was installed as part of a temporary relocation for Tanner Dance and will no longer be necessary or in harmony with the character of Presidents Circle.

COTTAM'S GULCH

Cottam's Gulch is a historic open space that runs along University Street from Presidents Circle to the Law School on South Campus Drive. The defining features of this area include a natural depression with a stone pathway leading to a "U" logo, which has been a popular landmark for the Campus for many years. This area is also home to several historic trees planted by Walter Cottam, a professor of Botany, who used the area for the research and preservation of an assortment of native and experimental trees. In 1961 the university designated this area as a portion of the State Arboretum. It is the desire of the University to continue to preserve this open space for its historic significance as well as a buffer between the University and the residential area across University Street.

SOUTH CORRIDOR / SOUTH PLAZA

The expansion of the GTB will create a corridor in between the south side of the CSC and the Stewart Building (Refer to Image 3.1.6 Note E). There is also

Above: View of Cottam's Gulch from University Street with George Thomas Building in background.

an elevation change of about nine feet from the eastern edge of the corridor at the Science Yard to the western edge of the corridor at Cottam's Gulch. Due to the lower elevation and narrowness of this space, special attention should be paid to ensure that the area is inviting and safe for pedestrians. Lighting, open sight lines, sculptural elements, plant material, rhythm in the paving pattern and other strategies to create a positive experiential environment will aid in the creation of a safe secondary passageway into campus. In addition, there is potential to create a South Plaza on the south-east corner or the CSC.

CAMPUS GATEWAY

The northern edge of the North-South Science Yard / Pedestrian Boulevard terminates at Presidents Circle, giving high visibility and access to the Science Yard. A strong pedestrian route running north-south and beginning at the School of Law intersects the Science Yard at this juncture and continues across Presidents Circle between the Widstoe Building and Kingsbury Hall. The intersection of the Science Yard and north-south Promenade naturally makes this area a key location for a gateway into campus. Architectural elements relating to the adjacent historical buildings could work to clearly define this gateway in conjunction with formal green spaces that direct views toward key landmarks on campus.

PUBLIC TRANSIT CONSIDERATIONS

The existing Utah Transit Authority light rail and transit systems, in addition to the campus and UTA bus service lines, make it possible for the CSC users to take advantage of alternative transportation modes and public transit. This is consistent with the agenda of the University to encourage the use of transportation other than private cars. Convenient pedestrian walkways should be provided from all transit stops to the CSC to further encourage the use of alternative transportation modes. Providing sufficient bicycle storage and locker/shower facilities will also contribute to the alternate transportation program success.

BICYCLE CIRCULATION

The University of Utah has made a concerted effort over the past few years to facilitate bicycle routes across Campus. In several situations this has led to dedicated cycling routes that are shared pedestrian walkways and are delineated with striping or the cycling routes are completely segregated from pedestrian routes in order to reduce conflicts. Where space is limited around the CSC we recommend that the cycling routes share pathways with pedestrians, but do receive a dedicated route with striping. A primary bicycle route could be established in conjunction with the north-south corridor that would provide cyclists a clear, safe route from the Light Rail stop by the stadium up to the CSC and on to other areas of campus.

SITE MATERIALS APPROACH

LEED

Site designers should consider sustainable materials and implementation in an effort to achieve the program's site design goals relative to LEED (see Chapter O9. Sustainability Goals).

HISTORIC SITE ELEMENTS

The corner of University Street and Presidents Circle is defined by a historic, locally quarried stone wall that is approximately 18" in height and continues along the entire length of University Street. To preserve the integrity and continuity of this historic feature, the wall should be preserved and protected throughout future development. Slight improvements may need to be made in order to accommodate an existing bus shelter on University Street as well as an accessible route from the bus shelter to the CSC that will cross through the open space immediately north of Cottam's Gulch.

The existing entry to the GTB features original granite steps that should be preserved during the renovation of the building. In recent years an accessible ramp has been added to the entry that partially covers the original steps. The redesign of the entry should strive to preserve the granite steps while improving accessibility into the building.

SITE MATERIALS SELECTION

The materials used in the site design should tie this project into the existing campus, and particularly the historical elements along Presidents Circle. The materials should complement the building materials and complement the facility as the gateway to the North-South Science Yard / Pedestrian Boulevard. Consideration should be given to the selection of the materials and construction detailing, to contribute to the overall sustainability of the project and to minimize extensive long-term maintenance. Sustainable materials may include:

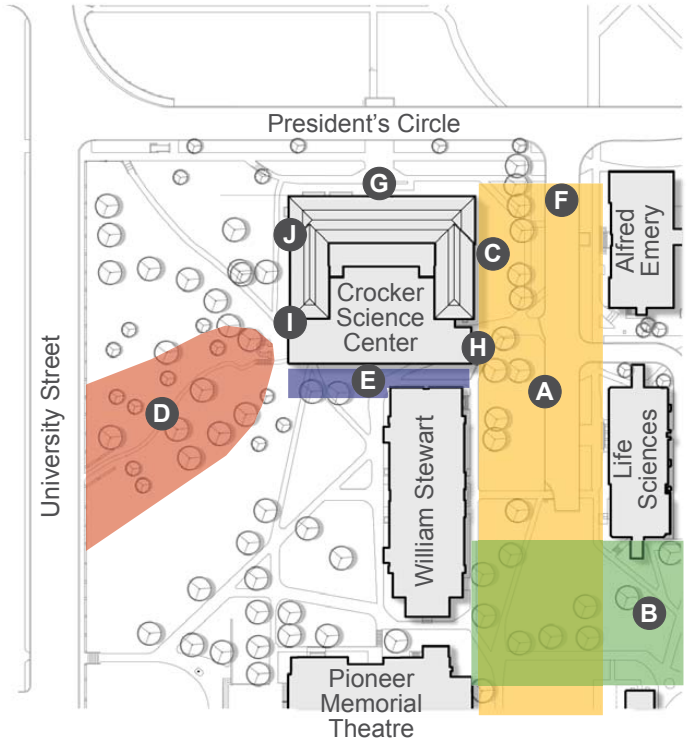
1. Alternate forms of energy: solar, geothermal, etc.
2. Re-use of existing parking lot pavement as base course under pavement or fill material
3. Porous pavement materials
4. Albedo of materials – lighter and textured materials diffuse reflected heat and reduce heat gain
5. High fly-ash concrete
6. Bicycle facilities
7. Utilize local materials, where feasible
8. Select materials with life cycle in mind

SITE FURNISHINGS

Site furnishings should follow the University's design standards to add to an overall sense of campus unity. The University's design standards are available via the Facilities Management division of campus, and address benches, tables, waste receptacles, tree grates, urns, tree grates, and site furnishing anchors.

Tree grates shall be specified for trees located in paved areas. The grates shall be removable for University maintenance and the inner rings shall be removed as the tree grows.

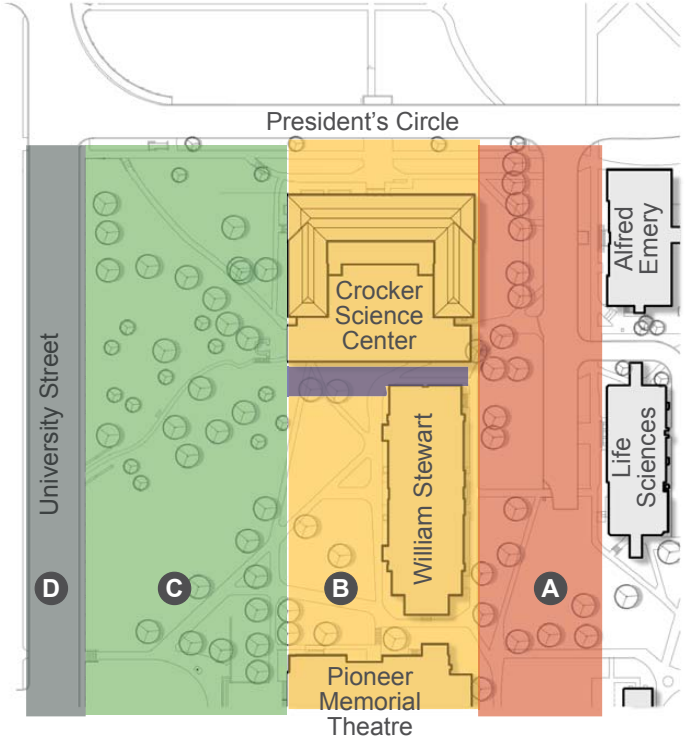
FIGURE 3.1.6 LANDSCAPE DESIGN CONCEPTS



Notes

A	North-South Science Yard / Pedestrian Boulevard
B	East-West Science Yard
C	New East Entry
D	Cottom's Gulch
E	South Corridor / South Plaza
F	Science Yard Gateway
G	Existing Main Entry
H	Service Dock and New Entry
I	New West Mid-Level Entry
J	Existing West Basement Entry

FIGURE 3.1.7 AREA TOPOGRAPHY



Topography

		Variation in grades (elevation above sea level)
A	North-South Science Yard / Pedestrian Boulevard	4656-4654
B	Crocker Science Center / South Corridor	4654-4642
C	Open Space / Cottom's Gulch	4642-4621
D	University Street	4621

PLANT MATERIALS SELECTION

Located on the Bonneville Shoreline bench, the Science Center will benefit from using native plant materials to connect the facility to its vernacular landscape. Native and locally-adapted plant material can add identity to the facility and perhaps provide inspiration for users.

Plant material should be selected for its functional use as well as educational and aesthetic purposes. Functional uses may include framing views, providing shade to reduce heat gain, creating a pedestrian scale against the building facade, creating a ceiling of tree canopies to define a particular space and directing users to entrances and key site features. Aesthetic uses may be to provide color and texture for year-round interest, provide aromatic scents in pedestrian areas, and provide interesting patterns or rhythm to contribute to the synergy of a space or represent the native plant material in an urban setting.

Plant material may be selected based the site's historical planting design, thus grounding it in history and definitely relating it to the historic State Arboretum and classic design of Presidents Circle. Historical photos and site plans should be referenced to gather accurate information.

The site for the Crocker Science Center may benefit from consideration of a broad range of possibilities for integration of site botany, ecology and habitat elements into the building design. Ecological interactions among community elements from micro- to macro-scales may occur, from soils effects, to bird, herpetological and mammal activities, as well as human community interrelationships. Place-based education may occur here to explore the spectrum of possibilities. These may range from aspects of the building, itself (bird-warning features in window glazing) to plantings to attract prey for seasonal predator activity (insects, particularly, or perhaps berries on trees and bushes) in configurations that affect design choices. Seasonal, neo-tropical songbirds may be attracted to 'micro-habitat' plantings incorporated into surrounding landscapes, or integrated into possible design of a vegetated roofscape on top of the building. A topic-specific track of the project eco-charrette can address these questions, or separate work sessions may be formulated to work with the many topics related to project design.

IRRIGATION

The overall goal of the landscape and irrigation system is to work in conjunction with each other to reduce the amount of water necessary to maintain the facilities. The University of Utah is currently working toward a "water-neutral" system, which means it does not require more water for operation than it receives, on average, annually.

In order for the University to be able to achieve this system, the CSC needs to approach its planning and design with sustainability in mind, working toward a LEED standard of 50% water reduction.

The irrigation water for the CSC will be provided by the University's well. According to current LEED standards, this well water is not considered "secondary" water, but is still a sustainable source within the bounds of a "water-neutral" system. As such, all irrigation water should be directed to a system that, in the end, recharges the local aquifer. This may include on-site retention and the incorporation of bio-swales.

Irrigation equipment should be selected according to the campus standards, available from the Facilities Maintenance.

UTILITIES

Utility and service equipment (e.g. mechanical vents, transformers, generators, and dumpsters) should be located on the site so as to be screened from the main flow of vehicular traffic and pedestrian zones. This may include the incorporation of screen walls to conceal the equipment.

04.

PRESERVATION CONSIDERATIONS

FIGURE 4.1.1.
Elevation drawing of the GTB by Ashton and Evans, c. 1933.

INTRODUCTION

The George Thomas Building (GTB) is one of eight historic buildings on President's Circle, located at the heart of the University of Utah. Designed by the firm of Ashton & Evans, it was constructed as the University's main library between 1933 and 1935. The library soon outgrew the space and in 1968 the building was converted to the Utah Museum of Natural History, which likewise expanded and moved to a new location in 2011. Through an adaptive reuse and rehabilitation project, the GTB will soon become the home of the Crocker Science Center (CSC).

In 1978, the historic significance of President's Circle was recognized when it was listed on the National Register of Historic Places (NRHP) as the University of Utah Circle Historic District. The GTB, built with Public Works Administration (PWA) monies in the 1930s and the last erected on the circle, is significant because it brings the story of the district and the history of the University through the Great Depression. It can also be considered significant for its association with University president George Thomas, who was actively involved in its planning, design, and construction, and who served a pivotal role in expanding and modernizing the University of Utah to create a regionally important institution. Finally, the building is significant because it embodies the distinctive characteristics of PWA architecture while also seeking to harmonize with the earlier Renaissance Revival and Neoclassical buildings on Presidents Circle, resulting in a unique yet harmonious progression of styles.

PROGRAM APPROACH

The programming effort for CSC has been guided by the vision that the most historically significant exterior and interior spaces and features of the GTB will be retained, allowing secondary and non-contributing spaces and features to be modified or removed to ac-

commodate the building's new use. This approach is consistent with national standards as defined by the Secretary of the Interior's Standards for Rehabilitation. Major changes to the GTB include the removal of the book stacks wing and its replacement with an addition housing modern laboratories, which may impact two adjacent historic resources: Cottam's Gulch and the Stewart Building.

The development of the project program involved numerous meetings, presentations, and work sessions between the University's steering committee, executive committee, faculty and administrative staff, Campus Planning staff, and other representatives; the Utah Department of Facilities and Construction Management (DFCM); the Utah State Historic Preservation Office (SHPO); the Utah Heritage Foundation (UHF); and EDA Architects and its consultants. Potential impacts to historic properties were discussed at several meetings, resulting in recommendations for programming and rehabilitation actions for the GTB, Cottam's Gulch, and the Stewart Building that will be consistent with national historic preservation standards.

In the late spring of 2013, during the development of the draft program document for the CSC, a Memorandum of Agreement (MOA) was drafted between the University and the Utah SHPO regarding the demolition of another university building, Carlson Hall. The building, located southwest of the GTB and constructed in 1938, was the first women's dormitory on campus and was also designed by Ashton & Evans. As part of off-site mitigation for the loss of Carlson Hall, the University agreed to prepare a historic preservation plan for the GTB prior to rehabilitation.

Through the preparation of this plan, the University commits to retain and preserve the inherent historical character of the exterior and primary interior features of the Thomas Library. This plan will also identify how the University will preserve the physical history embodied in the secondary and contributing areas of the building. The University commits to preserve the following key elements of the building:

1. Ground floor entry corridor and the double-sided stairway such that they are one contiguous area with a view from the entry doors to the stairway.
2. Materials included within the entry corridor and stairway including, but not limited to wood paneling, marble, and stainless steel railings.
3. The plaque citing the original construction of the George Thomas Library.
4. The circulation corridors [sic] on the second floor including its original materials and engraved statements along the frieze.
5. The Reading Room's volume of space. How to best preserve this will be determined as part of the adaptive reuse design in continued discussion with the Utah SHPO and consulting parties (University of Utah and Utah State Historic Preservation Office, Memorandum of Agreement," draft 2013).

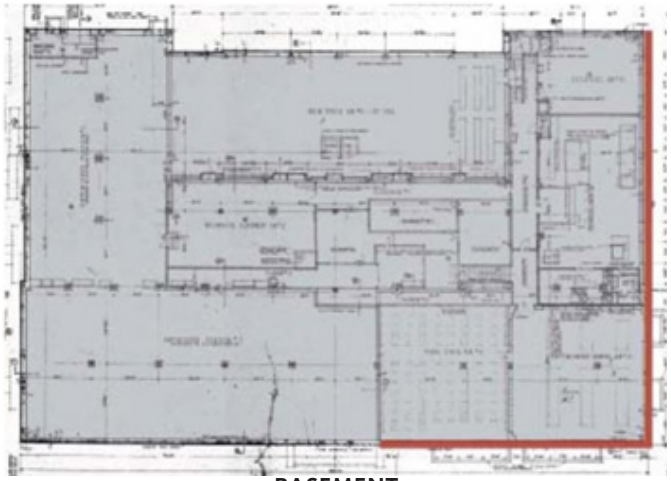
In partial fulfillment of the MOA, a historic preservation plan (HPP) was developed for the GTB. The complete version is included in an appendix to this report. The plan provides the following:

- a summary of the historic context and significance of the GTB, Cottam's Gulch, and the Stewart Building;
- a summary of the national standards that guide historic preservation and help to determine significance and integrity, followed by an identification of significance levels and zones for the three historic properties;
- an inventory of primary and secondary contributing spaces, elements, and features for each of the three historic properties, including a description, a summary of condition, optimum and acceptable levels of treatment, and the expected level of effort to achieve an acceptable level of treatment;
- the proposed rehabilitation actions and associated preservation goals for each historic property or space;
- historic (when available) and current photographs for each significant property and/or space; and
- conclusions and recommendations for documentation and monitoring during and after construction in order to support compliance with the preservation plan and evaluate to what degree preservation goals are achieved.

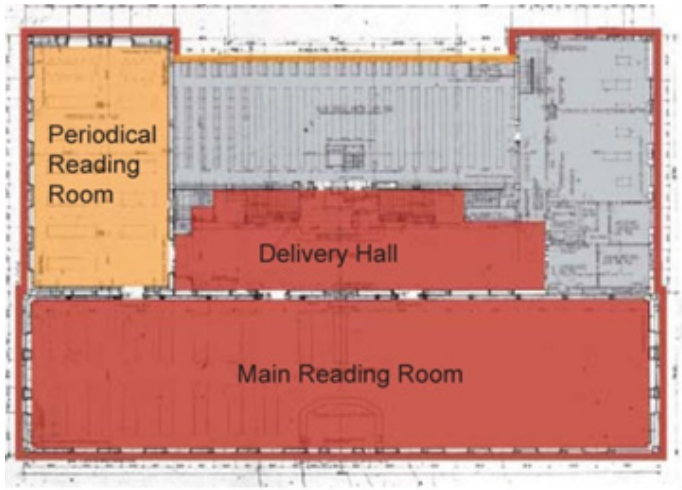
Based on the results of historic research and visual inspections, the spaces and features of all three historic resources can be prioritized by their significance in forming or contributing to the most important aspects of integrity. The four levels of significance are primary, secondary/contributing, non-contributing, and non-historic. At the GTB, zones of primary significance comprise the exterior envelope of the U-shaped part of the building, the lobby and main staircase, the delivery hall, and the main reading room. Areas of secondary/contributing importance comprise the south exterior wall of the stacks wing, the two reserve book reading rooms on the first floor, the periodical reading room on the second floor, and the graduate reading room on the third floor. All other areas are considered non-contributing or non-historic zones (Figure 4.1.2). Rehabilitation efforts can be directed toward retaining primary zones and, to the extent possible, secondary/contributing ones. Major changes can be programmed for non-contributing and non-historic zones or for secondary/contributing ones when other options are not viable.

For Cottam's Gulch, the zone of primary significance comprises the entire length of the gulch and the immediately adjacent lawns with their planted and (sometimes) labeled trees, about a 30-foot buffer. The zone of secondary significance comprises the remaining open areas to the north and south, again with their planted and labeled trees. The only aspects of the Stewart Building relevant to this project are the exterior building envelope and its associated setting. These are considered of primary significance on the building's east and west sides and of secondary/contributing significance on its north and south sides.

TABLE 4.1.2. HISTORIC SIGNIFICANCE DIAGRAMS FOR GTB

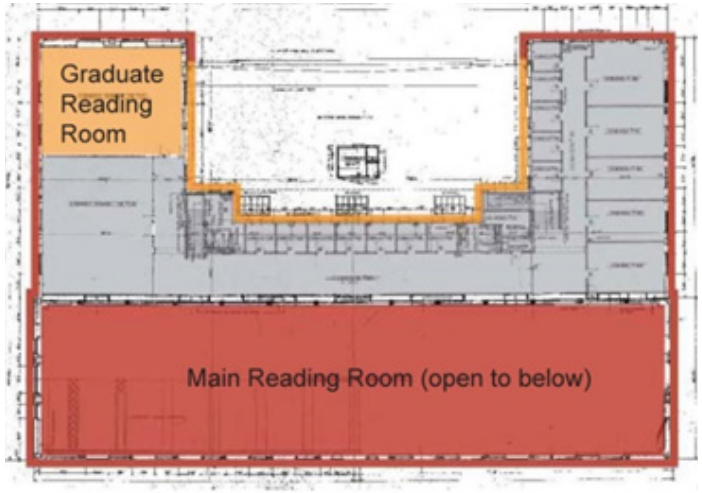


BASEMENT



SECOND FLOOR

FIRST FLOOR



THIRD FLOOR

HISTORIC SIGNIFICANCE DIAGRAMS

- Primary
- Secondary and Contributing
- Non Contributing

FIGURES 4.1.3 AND 4.1.4.
Views of the George Thomas Library showing the north and east elevation shortly after construction in 1936 (top, courtesy Utah State Historical Society) and in 2013 (bottom).

GTB EXTERIOR

The GTB is a Neoclassical building with Second Renaissance Revival details, clad in cast concrete veneer with cast concrete features like window sills and surrounds, and articulated with incised and carved concrete details like belt courses, cornices, and parapets (Figures 4.1.3 and 4.1.4). The original metal-framed windows remain, as do the original main entryway and doors on the north side. Significant alterations are few but include the replacement of many secondary doors and the addition of a stair tower on the south side of the building.

In general, the exterior of the GTB is in good to excellent condition. Visible deterioration conditions are limited to very minor mortar loss, staining and soiling of the foundation and walls due to uneven water runoff and ivy growth (since removed), corrosion of metal transom bars, and disintegration of the granite pavers at the north entrance. Incompatible alterations include window-mounted air-conditioning units, the design and details of original and new secondary entrances on the west and south sides, and, to a lesser extent, the design of the ramp providing handicapped accessibility at the north entrance. Of greatest concern, however, are the original methods of attachment for the cast concrete veneer, cornice, and parapet, which likely do not meet current seismic safety codes. Limited destructive testing is required to evaluate the nature and strength of these attachments. Rehabilitation actions and preservation goals that will be consistent with the Secretary's Standards for Rehabilitation are summarized in Table 4.1.1.

TABLE 4.1.1. SUMMARY OF PROPOSED REHABILITATION ACTIONS AND ASSOCIATED PRESERVATION GOALS FOR THE EXTERIOR OF THE GTB.

Proposed Rehabilitation Actions	Preservation Goals
Maintain the historic character and integrity of the building exterior through the preservation and restoration of as many zones, elements and features of primary and secondary significance as possible.	For existing zones, elements, and features, comply with the recommendations for optimum treatment levels when possible and acceptable treatment levels when necessary as presented in the HPP.
Install supplementary attachments for concrete veneer, cornices and parapets for seismic stability.	Install all new veneer attachments on the interior side of the building on the east, north, and west sides; exterior attachments can be made on the south side when historic interior finishes will be impacted. Install new cornice and parapet attachments from the back or top side. No new attachments should be visible on the exterior faces of the east, north, and west sides.
Replace roof covering.	Remove existing roofing materials and replace with like or new materials similar in design and appearance to the original.
Upgrade or replace windows to meet sustainability goals.	Retain existing windows if possible. If not, replace with insulated/thermal pane glass between existing metal frames, otherwise design new windows to match original in design, profile, and materials.
Upgrade existing window transoms to meet sustainability goals.	Repair and restore existing window transoms. Install ventilated storm windows on the interior side as necessary.
Redesign handicapped accessible ramp on north side or relocate to secondary entrance.	Remove the ramp and create ADA-compliant entrances on the east and west sides of the building if possible. If not, redesign north ramp to be compatible in design and materials with the historic building.
Create new entrance in east wall using an existing window opening.	Enlarge opening only enough to accommodate doorway. Contain entry doors and vestibule within building envelope. Limit exterior additions to canopy or awning over opening, compatible in design and materials with historic elements features.
Demolish the stacks wing and replace with a three-story, T-shaped addition on the south side that will extend across the south sides of east and west arms of main building.	Create breaks on east and west sides to differentiate historic walls from addition walls. Limit addition to three stories and do not exceed height of historic building. Use new walls to improve seismic stability and minimize damage to historic walls.
Impinge on head of Cottam's Gulch and remove some historic trees to accommodate new addition.	Do not alter present contours of gulch. Remove only those trees within or immediately adjacent to footprint of new addition. Protect roots and canopies of other trees during construction, as well as banks of gulch. Design entrance and other features at southwest corner of addition to provide link between building and gulch.
Minimize physical and visual impacts to the Stewart Building by limiting size of addition.	Protect Stewart Building during construction activities. Retain passage between buildings and adjust landscaping and walkways as needed to preserve and strengthen link from GTB to main entrances on east and west sides of Stewart. Preserve current unobstructed views of east and west sides of Stewart as viewed from east and west.

FIGURES 4.1.5 AND 4.1.6.
Top: View of the staircase in the lobby of the George Thomas Library c. 1935, facing southwest (courtesy Utah State Historical Society). Bottom: View of the main staircase in 2013, facing southeast.

VESTIBULE, LOBBY, AND MAIN STAIRCASE (ROOM 23/ROOM 100)

The vestibule, lobby, and staircase are in good condition due to ongoing maintenance and the use of simple yet durable materials (Figures 4.1.5 and 4.1.6). The removal of ceiling tiles, the repair or replacement of the original floor with one of similar design, and the installation of more compatible light fixtures will go a long way toward restoring the historic appearance and feeling of the spaces. The vestibule floor requires minor repair or resurfacing while the limestone veneer used for the wainscoting, and for the newels in particular, is chipped and exhibits mortar loss. Alterations like the low ramp leading into the former Treasure Room, walls for temporary office space in the east arm of the lobby, and the blocked upper flights of the east staircase are all reversible.

As the GTB is converted for use to the CSC, a number of proposed programming measures and rehabilitation actions will impact the historic character of the vestibule, lobby, and main staircase, which are considered of primary significance as architectural spaces. Rehabilitation actions and preservation goals that will be consistent with the Secretary's Standards for Rehabilitation are summarized in Table 4.1.2.

TABLE 4.1.2. SUMMARY OF PROPOSED REHABILITATION ACTIONS AND ASSOCIATED PRESERVATION GOALS FOR THE VESTIBULE, LOBBY, AND MAIN STAIRCASE OF THE GTB.

Proposed Rehabilitation Actions	Preservation Goals
Maintain the historic character and integrity of the vestibule, lobby, and main staircase through the preservation and restoration of as many spaces, elements and features of primary and secondary significance as possible.	For existing spaces, elements, and features, comply with the recommendations for optimum treatment levels when possible and acceptable treatment levels when necessary as presented in the HPP.
Remove doorway to former Treasure Room on west side of lobby to create solid wall just inside vestibule doors.	Remove ramp leading to door as well. Ensure new finishes match existing historic finishes, including polished limestone wainscot with plaster wall above.
Remove south wall of staircase at first floor level and add short flight descending into new addition/atrium to provide visual and physical link between old and new parts of building.	Design new south side of staircase to match or complement historic north side, maintaining width and railing design.
Install secondary stair railings to meet current code.	Retain original railings and install code-compliant railings adjacent to them. Design secondary railings to be unobtrusive and/or compatible with historic railings.
Create conference room and two study rooms beneath east and west arms of main staircase at first floor level.	Place doors to these spaces as far east and west (away from the stairs) as practicable in order to have the least impact on the appearance of the lobby and staircase.
Extend east arm of lobby to link with new entrance on east side of building.	This requires removing the north end of the southeast reserve reading room (Room 20/108). Ensure that finishes in the new portion of the hall are compatible (but not necessarily identical) to those in the historic lobby. The new vestibule and its exterior and interior doors should also be compatible in materials and appearance.
Retain basement staircase.	Remove both half wall and Plexiglas from around historic railing. Retain original railing and install code-compliant railing adjacent to it as required. Design any secondary railing to be unobtrusive and/or compatible with historic railing.
Remove non-original partition wall in west arm of lobby.	Repair any damage to original finishes after partition wall is removed.
Remove staircases above the second floor level and relocate these in the new addition to allow for modified use of original but non-contributing spaces.	Retain original staircase configuration to the landings at the second floor level, including skylights, and restore original materials or replace with compatible materials.

FIGURES 4.1.7 AND 4.1.8.
Top: View of the delivery hall on the second floor of the George Thomas Library c. 1935, facing west (courtesy University of Utah Special Collections. Bottom: View of the delivery hall in 2013, facing east.

DELIVERY HALL (ROOM 57/ROOMS 209-210)

The rectangular delivery hall is on the second floor of the GTB and lies at the head of the double staircase leading up from the lobby on the first floor (Figures 4.1.7 and 4.1.8). Originally, books were requested at a desk set across a recess in the south wall; doors behind the desk led into the stacks wing, where books were retrieved and then delivered to patrons at the desk. Glass-fronted display cases were built into the walls on either side of the delivery desk. Two sets of doors on the north side of the hall led into the grand, vaulted main reading room. A doorway at the east end of the hall led into the periodical reading room and one at the west end provided access to offices. A corridor leading to a large cataloging and accessions room opened from the west end of the south wall. The space had no windows.

The delivery hall is in good condition due to ongoing maintenance and the use of simple yet durable materials. Alterations are few and reversible. The removal of partition walls and ceiling tiles, the restoration of original light fixtures and openings in the south wall, and the repair or replacement of the original floor with one of similar design will help to re-establish the historic appearance and feel of the space. Rehabilitation actions and preservation goals that will be consistent with the Secretary's Standards for Rehabilitation are summarized in Table 4.1.3.

TABLE 4.1.3. SUMMARY OF PROPOSED REHABILITATION ACTIONS AND ASSOCIATED PRESERVATION GOALS FOR THE DELIVERY HALL OF THE GTB.

Proposed Rehabilitation Actions	Preservation Goals
Maintain the historic character and integrity of the delivery hall through the preservation and restoration of as many spaces, elements and features of primary and secondary significance as possible.	For existing spaces, elements and features, comply with the recommendations for optimum treatment levels when possible and acceptable treatment levels when necessary as presented in the HPP.
Restore original feel and volume of the delivery hall.	Remove non-historic partition walls, remove acoustic tile and carpeting, and restore or reproduce the original patterned floor design.
Create a third opening in the north wall to provide access to a proposed classroom at the west end of the main reading room.	Design opening and doors to be compatible in design and materials with historic openings and doors to the east.
Restore some openings in the south wall.	Remove drywall from openings leading to stair landings and repair extant original materials as necessary.
Visually connect delivery hall to new wing by opening south wall of recessed area and creating balcony overlooking atrium.	Minimize damage to limestone walls and retain as much original material as possible. Design new walls, floor, and balcony railings to be compatible with historic materials.
Repurpose the space as a café with a counter along the north wall and an array of tables and chairs.	Design counter to be compatible in design and materials with original space. Ensure any modifications necessary for café infrastructure are reversible.
Reconfigure east and west ends of south wall to accommodate new circulation patterns.	Retain original openings to east and west stair landings. Minimize damage to limestone walls and retain as much original material as possible. Design new finishes to be compatible with historic materials.

FIGURES 4.1.9 AND 4.1.10.
Top: View of the Main Reading Room in the George Thomas Library c. 1935, prior to the installation of furniture, facing west (courtesy University of Utah Special Collections). Bottom: View of east end of reading room in 2013, facing northeast.

MAIN READING ROOM (ROOM 56/ROOM 201)

The rectangular main reading room is the most significant public area in the GTB and extends across the north side of the building on the second floor. Originally, a librarian's desk was located at the center of the north wall and the remainder of the space was filled with reading tables and chairs; by about the 1950s, the librarian's desk had been moved to the south side of the room. The walls were lined with built-in bookcases and the space was lit by large windows set in the east, north, and west walls, as well as light panels recessed into the vaulted ceiling. Two doorways in the south wall led into the delivery hall and a third, at the east end of the south wall, led into the periodical room.

Major alterations to the main reading room comprise the removal of all furniture, including the librarian's desk; the removal or alteration of many of the book cases; the installation of carpet and wood floors over the original floor; the installation of temporary partition walls in the last few years to divide the space into three dance studios; the replacement of original light fixtures in the ceiling panels and the installation of emergency lighting on some walls; and the addition of hanging acoustic panels.

Despite modifications to accommodate a large exhibit hall for UMNH and, more recently, the installation of temporary floors and walls to accommodate use by the dance department, the main reading room is in good condition. Water leaks have caused minor damage to some of the window lintels and the remaining bookcases have been damaged through use or modification, but as with other spaces in the library, ongoing maintenance and the use of simple yet durable materials have proven their worth. Major alterations are few and most are easily reversible, and the removal of partitions and the repair or replacement of the original floor with one of similar design will help to re-establish the historic appearance and feel of the space. For this room in particular, the

TABLE 4.1.4. SUMMARY OF PROPOSED REHABILITATION ACTIONS AND ASSOCIATED PRESERVATION GOALS FOR THE MAIN READING ROOM OF THE GTB.

Proposed Rehabilitation Actions	Preservation Goals
Maintain the historic character and integrity of the main reading room through the preservation and restoration of as many spaces, elements and features of primary and secondary significance as possible.	For existing spaces, elements, and features, comply with the recommendations for optimum treatment levels when possible and acceptable treatment levels when necessary as presented in the HPP. In particular, remove non-historic partition walls and acoustic wall and ceiling panels. Remove newer flooring and restore or reproduce the original patterned floor design. Retain wood paneling on lower part of walls or, at a minimum, retain division of walls into two fields.
Restore and retain original feel and volume of the main reading room while carefully modifying the space to accommodate compatible uses and meet programming needs. Divide space into three parts: classrooms with tiered seating at either end, separated from central tutoring center by glass partition walls that allow uninterrupted view along length of space. Design partition walls to be partially retractable so that three spaces can be joined into one for special events.	Ensure walls are as transparent as practicable to allow for view along length of room from different vantage points. Design structural systems, walls, and furnishings to have as little impact on historic building materials as possible, and to be reversible where possible.
Create a third opening in the south wall to provide access to the delivery hall from the tiered classroom at the west end of the reading room.	Design opening and doors to be compatible in design and materials with historic openings and doors to the east.
Secure exterior cast concrete veneer by creating new attachments from interior walls over entrances on north and west sides, constructing false walls over existing walls to conceal work.	Design any projecting false walls to be similar in finish and appearance with historic walls. Keep false walls to minimum possible dimensions. Do not cover or otherwise impacting design details like pilasters and capitals around window openings.

potential impacts have been discussed at length in general meetings and in smaller discussions with representatives from the University, the Utah SHPO, UHF, and the programming team, resulting in recommendations for programming and rehabilitation that will be consistent with the Secretary's Standards for Rehabilitation (Table 4.1.4).

FIGURES 4.1.11 AND 4.1.12.
Top: View of the Reserve Book Reading Room on the northeast corner of the first floor c. 1935, facing southeast (courtesy University of Utah Special Collections). Bottom: View in 2013, facing southeast.

RESERVE BOOK READING ROOM (NORTHEAST) (ROOM 21/ROOM 109)

The reserve book reading room in the northeast corner of the first floor is considered a secondary contributing space in the GTB (Figures 4.1.11 and 4.1.12). Originally, it was connected by double doors to the reserve book delivery desk in the east arm of the lobby and to a second reserve book reading room to the south. The room was lit by large windows and conical light fixtures suspended from the ceiling. Furnishings were limited to tables and chairs.

The reserve book reading room has been extensively altered to accommodate exhibits during UMNH's tenure but this mainly comprises false walls, surface-mounted directional lighting and fire suppression sprinkler pipes on the ceiling, behind which the original floor, walls, ceiling (beneath the acoustic tiles), windows, and doors remain. All original furnishings have been removed, as have the original light fixtures. Although dusty and neglected, the reserve book reading room is in good condition. Leaks around the windows have damaged small sections of the plaster cornice and have caused the Flexwood veneer to delaminate. The major alterations are easily reversible, and the removal of false walls and ceiling accretions would immediately re-establish the historic appearance and feel of the space. However, the space is scheduled for extensive modification to meet the programming needs for the CSC. Rehabilitation actions and preservation goals that will be consistent with the Secretary's Standards for Rehabilitation are summarized in Table 4.1.5.

TABLE 4.1.5. SUMMARY OF PROPOSED REHABILITATION ACTIONS AND ASSOCIATED PRESERVATION GOALS FOR THE RESERVE BOOK READING ROOM (NORTHEAST) OF THE GTB.

Proposed Rehabilitation Actions	Preservation Goals
Focus restoration efforts on primary contributing spaces (exterior, vestibule, lobby, staircase, delivery hall, main reading room) and extensively modify the northeast reserve reading room to accommodate new use.	Photographically document room after later modifications are removed and original volume and finishes are visible. Permanently archive photographs.
Divide space into two teaching labs accommodating 24 students each.	Retain existing window openings and do not partially or fully cover or obscure with new walls or ceilings. Consider restoring existing ceiling with stepped border and retaining one or more existing walls (with Flexwood finish and cornice) in each room.
Use existing doorways into lobby for access to each room but replace doors.	Retain door if possible. If not, document doors and openings prior to modification/ replacement. Design new doors to be compatible in design and materials with historic lobby. Consider reusing original doors elsewhere in building.

FIGURE 4.1.13.
A view of the southeast reading room of the GTB in 2013, facing southeast.

RESERVE BOOK READING ROOM (SOUTHEAST) (ROOM 20/ROOM 108)

The reserve book reading room in the southeast corner of the first floor is considered a secondary contributing space in the GTB (4.1.13). Originally, it was connected by double doors on the west wall to the reserve book delivery desk in the east arm of the lobby, and to the second reserve book reading room to the north. The room was lit by large windows in the east and south walls. No historic photographs were located but the room was likely furnished with tables and chairs in a manner similar to the northeast reserve book reading room.

The southeast reserve book reading room has been altered in significant ways: partition walls and a drop ceiling were added; the west window on the south wall was converted to a doorway; intrusive fire suppression and electrical systems were mounted on walls and ceilings; the Flexwood finish was removed from the east half of the north wall; and all original light fixtures and furnishings were removed. The room is also in poor condition. Leaks around the windows have damaged sizeable sections of the plaster cornice and have caused the Flexwood veneer to delaminate. The major alterations are reversible and the removal of partition walls and ceiling accretions, as well as repairs to original materials, would immediately re-establish the historic appearance and feel of the space. However, the space is scheduled for extensive modification to meet the programming needs for the CSC. Rehabilitation actions and preservation goals are summarized in Table 4.1.6. Of note, the graduate reading room will be restored (albeit with some modifications), thus preserving an example of this type of space in the building.

TABLE 4.1.6. SUMMARY OF PROPOSED REHABILITATION ACTIONS AND ASSOCIATED PRESERVATION GOALS FOR THE RESERVE BOOK READING ROOM (SOUTHEAST) OF THE GTB.

Proposed Rehabilitation Actions	Preservation Goals
Focus restoration efforts on primary contributing spaces (exterior, vestibule, lobby, staircase, delivery hall, main reading room) and extensively modify the southeast reserve book reading room to accommodate new use.	Photographically document room after later modifications are removed and original volume and finishes are visible. Permanently archive photographs.
Convert northernmost window opening in the east wall to a doorway and use north end of room to create a vestibule and hall for the new entrance.	Ensure design and finishes are compatible with historic lobby.
Subdivide remaining space into an advising hive, with offices for advisors along the east wall and advising rooms to the west. Use the southwest corner of the room to create new toilet facilities that will be accessed from the west side.	Retain all existing window openings and do not partially or fully cover or obscure with new walls or ceilings. Consider restoring existing ceiling with stepped border and retaining existing walls (with Flexwood finish and cornice) along the east and south walls.
Abut new addition against west end of south exterior wall of reading room. Remove non-historic doorway (converted from historic window opening) and replace with solid wall. Begin addition west of remaining window to create recess and separation between historic building and addition.	Retain historic window opening and window at east end of south wall.

FIGURE 4.1.14.
A view of the periodical reading room of the GTB in 2013, facing northeast.

PERIODICAL ROOM (ROOM 55/ROOM 204)

The periodical reading room in the southeast wing of the second floor is considered a secondary contributing space in the GTB (Figure 4.1.14). Originally, it was connected by double doors with sidelights on the west wall to the delivery hall and by double doors to the main reading room to the north. The periodical room was lit by large windows in the east and south walls. No historic photographs were located but the room was likely furnished with tables and chairs in a manner similar to the other reading rooms, and also had built-in wood bookcases and shelves lining most or all walls.

The periodical room has been extensively altered with false walls, partition walls, and display cases, as well as blocked windows and covered bookcases in order to create an exhibit hall for UMNH, but most original features and finishes remain. The room requires maintenance and minor repairs but the visible portions are otherwise in good condition. The major alterations are reversible and the removal of partition walls and exhibit cases, as well as repairs to original materials, would re-establish the historic appearance and feel of the space. However, the space is scheduled for extensive modification to meet the programming needs of the CSC. Rehabilitation actions and preservation goals summarized in Table 4.1.7.

TABLE 4.1.7. SUMMARY OF PROPOSED REHABILITATION ACTIONS AND ASSOCIATED PRESERVATION GOALS FOR THE PERIODICAL ROOM OF THE GTB.

Proposed Rehabilitation Actions	Preservation Goals
Focus restoration efforts on primary contributing spaces (exterior, vestibule, lobby, staircase, delivery hall, main reading room) and extensively modify the periodical room to accommodate new use.	Photographically document room after later modifications are removed and original volume and finishes are visible. Permanently archive photographs.
Subdivide space into classroom, study, and departmental office space that will be accessed primarily from a new corridor in the west wall opening from the addition. Use the southwest corner of the room to create new toilet facilities that will be accessed from the west side.	Retain all existing window openings and do not partially or fully cover or obscure with new walls or ceilings. Consider retaining existing walls (with Flexwood finish and cornice) along portions of the north, east and south walls.
Abut new addition against west end of south exterior wall of periodical room. Begin addition west of remaining window to create recess and separation between historic building and addition.	Retain historic window opening and window at east end of south wall, and window at west end of south wall if possible.

FIGURES 4.1.15 AND 4.1.16.
Top: View of the Graduate Reading Room on the third floor c. 1950s, facing northeast (courtesy University of Utah Special Collections). Bottom: View of the graduate reading room in 2013, facing northeast.

GRADUATE READING ROOM (ROOM 75/ROOM 319)

Originally, two graduate reading rooms were located in the southeast wing on the third floor of the GTB. The south room, presently used as an office, is the more elaborate space; it is considered a secondary contributing space (Figures 4.1.15 and 4.1.16). The walls were lined with built-in bookcases and the space was lit by windows set in the east, south, and west walls (the last overlooking the roof of the stacks wing). A doorway at the west end of the north wall gave access to the corridor while a second doorway near the center of the north wall, not shown in plans but apparently original, led into the graduate reading room to the north. Furnishings, some of which remain in the room, included reading tables, chairs, and a small librarian's desk.

Alterations to the graduate reading room are limited to the installation of carpet on the floor, acoustic tile on the ceiling, new light fixtures, and new corridor doors. The room exhibits typical wear but is in good condition. Alterations are few and easily reversible, and the restoration of the floor and ceiling will re-establish the historic appearance and feel of the space. Because all of the other reading rooms of secondary importance will be extensively altered, the preservation of the graduate reading room takes on added importance as a representative example of this type of space in the former library. Rehabilitation actions and preservation goals are summarized in Table 4.1.8.

TABLE 4.1.8. SUMMARY OF PROPOSED REHABILITATION ACTIONS AND ASSOCIATED PRESERVATION GOALS FOR THE GRADUATE READING ROOM OF THE GTB.

Proposed Rehabilitation Actions	Preservation Goals
Maintain the historic character and integrity of the graduate reading room through the preservation and restoration of as many spaces, elements and features of primary and secondary significance as possible.	For existing spaces, elements, and features, comply with the recommendations for optimum treatment levels when possible and acceptable treatment levels when necessary as presented in the HPP. In particular, retain all original features and remove non-historic carpet, ceiling tile, and lighting.
Eliminate corridor to north and use window opening at south end of west wall to make primary entrance opening into new addition.	Design doorway to fit within existing window opening and fit with new door compatible in design and materials with historic doors.
Eliminate window at north end of west wall.	Retain window and opening if possible. Otherwise retain form of window opening on interior side to mark former location.
Eliminate doorway at center of north wall.	Retain door and opening if possible. Otherwise retain form of doorway on interior side to mark former location; leave door in place or reuse elsewhere in room if possible.
Secure exterior cast concrete veneer as needed by creating new attachments from exterior over entrance on south side to avoid damage to interior finishes.	Avoid all damage to original bookcases and other interior finishes.
Abut new addition against west end of south exterior wall of graduate reading room. Begin addition west of east window to create recess and separation between historic building and addition.	Retain historic window opening and window at east end of south wall. Incorporate window at west end of south wall in new addition if possible, otherwise retain form of window opening on interior side to mark former location.

FIGURES 4.1.17 AND 4.1.18.
Top: Aerial view of University of Utah Circle with Cottam's Gulch extending diagonally toward the bottom right of the photograph. The date is c. 1920-1932, after the construction of the Stewart Building and prior to construction of the George Thomas Library (courtesy University of Utah). Bottom: View of Cottam's Gulch in 2013, facing northeast.

COTTAM'S GULCH

Cottam's Gulch is a grass-covered gully extending southwestward from the GTB (Figures 4.1.17 and 4.1.18). Built features include a stone walkway and staircase as well as a newer concrete, U-shaped planter. Trees in the gully and on the surrounding lawns were planted by Cottam and others beginning in the 1930s and most have reached maturity. Some trees are identified with metal or plastic nameplates on their trunks; circular concrete pads at the base of some trees are evidence of an earlier identification system.

In general, Cottam's gulch is in good to excellent condition, although the nameplates on some of the trees may have been lost and others are aging. As the GTB is modified for use as the CSC, several proposed programming measures and rehabilitation actions may affect the historic character of Cottam's Gulch, which is considered of primary significance as a historic property. The proposed addition will encroach on the steep head of the gulch and construction activities may destabilize the banks. The addition will result in the loss of several labeled trees adjacent to the building and on the surrounding lawns, and the roots and branches of others may be impacted by associated construction activities. As well, the proposed addition poses a danger of removing the gully as usable thoroughfare by blocking its northeast end. Actions and preservation goals that will be consistent with the Secretary's Standards for Rehabilitation are summarized in Table 4.1.9.

TABLE 4.1.9. SUMMARY OF PROPOSED REHABILITATION ACTIONS AND ASSOCIATED PRESERVATION GOALS FOR COTTAM'S GULCH.

Proposed Rehabilitation Actions	Preservation Goals
Recognize and preserve the historic character and significance of Cottam's Gulch throughout the planning and construction process.	Preserve the stone walk and stairway in the gulch. Re-establish the link with Cottam and the University's history through the use of interpretive signage and reactivate the gulch as a place of learning by re-labeling trees.
Preserve the existing topography of the gulch by ensuring footprint of addition does not extend into gulch and protecting head of gulch during construction activities.	Design and install protective shoring and/or fill during construction, monitor condition of gulch during construction, remove protective measures after construction, and restore vegetation as necessary.
Remove only those trees directly impacted by new construction activities; protect other trees during construction activities.	Consult with the state forester, Red Butte Garden, and/or other responsible and knowledge-able party to create a master plan for the trees prior to construction. Clearly identify trees to be removed and trees that will remain. Monitor removal process and replant removed trees as possible. Monitor protective measures and condition of trees during construction process.
Keep access to the gulch viable by creating an entrance in the southwest corner of the addi-tion.	Also create sightlines from the new addition into the gulch and use sidewalks to link the gulch and the GTB.

FIGURES 4.1.19 AND 4.1.20.
Left: View of the west facade of the Stewart Building in 2013, facing southeast. Right: View of the north end of the building adjacent to the GTB in 2013, facing southeast.

STEWART BUILDING

The Stewart Building is a flat-roofed Neoclassical building with early Art Moderne details, built of pale yellow brick with concrete lintels and trim (Figures 4.1.19 and 4.1.20). The primary facades face east and west while the north side of the building, adjacent to the GTB, was originally a gymnasium and/or auditorium and is of secondary importance; all of its windows are presently painted over. In general, the exterior of the Stewart Building is in good condition. Primary sightlines to and from the building from the east and west have been retained through the years, particularly the view across Cottam's Gulch and the lawns west of the building. The proposed addition to the GTB will extend south toward the Stewart Building and has the potential to impact aspects of its historic integrity. Actions and preservation goals are summarized in Table 4.1.10.

TABLE 4.1.10. SUMMARY OF PROPOSED REHABILITATION ACTIONS AND ASSOCIATED PRESERVATION GOALS FOR THE STEWART BUILDING.

Proposed Rehabilitation Actions	Preservation Goals
Recognize and preserve the historic character and significance of the Stewart Building throughout the planning and construction process.	Protect physical fabric of Stewart Building during construction.
Design addition to extend across south side of GTB. Do not extend addition further south or obscure views of the Stewart Building from east and west.	Maintain historic sightlines to and from primary east and west facades of Stewart building through compatible design of addition to GTB.
Keep access to the both buildings viable by maintaining a landscaped walkway between the buildings and using sidewalks to link the buildings.	Create an attractive and usable space between the buildings. If possible, include windows on south side of addition to improve quality of space and provide visual link to the Stewart Building. Remove paint from Stewart Building windows or use reflective glass to improve feel of space and connect with CSC.

CONCLUSIONS AND RECOMMENDATIONS

The GTB is well-built and in good condition, and its rehabilitation and adaptive reuse as the CSC will return it to a prominent place on President's Circle. The restoration of significant zones, including much of the building exterior as well as the vestibule, lobby, main staircase, delivery hall, main reading room, and graduate reading room, will ensure the preservation of the building's historic character. Most secondary contributing zones will be significantly altered or lost in order to meet the CSC program needs, but the graduate reading room will be preserved as an example of that type of space. Careful design and protective measures during construction will minimize impacts to Cottam's Gulch and the Stewart Building.

The following recommendations are made to help mitigate the loss of secondary contributing spaces, support compliance with the HPP and allow for ongoing discussions as issues arise during the design and construction phases, and evaluate to what degree preservation goals were achieved at project completion.

- After additions and alterations are removed, particularly UMNH and Tanner Dance accretions in the reading rooms, photographically document the original spaces and construction materials.
- Photographically document the stacks wing, including significant interior features, prior to demolition.
- Archive the preservation plan and its associated photographs, as well as any new photographs taken for the above tasks.
- During the design and construction phases, continue regular discussions between the design team, contractors, University representatives, Utah SHPO, and UHF regarding preservation issues. If possible, appoint a knowledgeable University representative or a historic preservation consultant to oversee preservation aspects of the project.
- At project completion, prepare an addendum to this report containing the following: a summary of the design and construction phases with an emphasis on preservation issues that arose, including the topics and results of any collaborative preservation meetings; a systematic, tabular evaluation of whether, and to what degree, the preservation goals presented in the HPP were met; a similar evaluation of whether optimum and/or acceptable treatment levels were achieved for specific elements and features within primary and secondary contributing zones, as presented in the HPP; and final photographs, after construction and prior to occupation, of the exterior and interior of the historic building and new addition.

05.

BUILDING ORGANIZATION

Efficiency Analysis
Program Components
Adjacency Diagrams/Test Fits

EFFICIENCY ANALYSIS

Based on an analysis of existing science education and research facilities, and on several test fits of the developing program in the existing George Thomas Building and proposed addition, a 65% net to gross efficiency factor has been calculated for total building square feet.

This high efficiency factor assumes the design of a very efficient research space component with large open interdisciplinary labs, integrated PI offices, equipment corridors that provide access to the lab support spaces, and building circulation paths that have dual purpose.

PROGRAM COMPONENTS

FLEXIBLE CLASS ROOMS

Classrooms with seats for 25 to more than 100 will be distributed throughout the CSC. The classrooms will have flexible furniture systems to accommodate a variety of pedagogies and teaching styles, from traditional lecture to SCALE UP. Two large lecture rooms will be designed to accommodate both traditional lectures and group-style/interactive pedagogies (see Scale-Up discussion below).

About Scale-Up. Because the Crocker Science Center is intended to support a new interdisciplinary curriculum and experience-based pedagogy, the program investigated a new science pedagogy developed at North Carolina State University by program team member and physicist Robert Beichner. Called SCALE-UP (Student-Centered Activities for Large Enrollment with Upside-down Pedagogies), it was designed to facilitate "active, collaborative learning in a studio-like setting" and employs both a formalized spatial organization and special teaching skills. This problem-based approach creates an adaptable learning environment, lending itself to a number of disciplines, particularly applied to the sciences and math. The SCALE-Up premise is that students, working in small teams and organized around tables, are given something interesting to investigate. Teams participate in activities that are both tangible (hands-on measurements or observations) and ponderable (interesting, complex problems), assisted by the instructor, who roams freely around the classroom. There is no separate lab class and most of the "lectures" are actually class-wide discussions.

The College of Science has indicated its desire to create classroom spaces for the Crocker Science Center that would accommodate both SCALE-UP configurations as well as conventional (or lecture-focused) classroom configurations. In sizing the classrooms and in the development of their requirements (see Room Data Sheets), specific provisions have been incorporated to allow the space to be configured for multiple pedagogical approaches. Additionally, four of the six teaching laboratories are programmed to support combined lecture/discussion/laboratory activities in each laboratory.

TEACHING LABS

Flexible interdisciplinary teaching laboratories are one of the core program components of the CSC. Introductory science courses will be taught in departmental teaching labs elsewhere on the University of Utah campus. These laboratories are for teaching integrated math, biology, chemistry, and physics courses. They should be located adjacent to and in full view of the public areas in the CSC. These labs will have long benches for student work, unobstructed sight lines for safety within the lab, fixed laboratory casework with lockable drawers for students to store their course kit and materials, common sinks, counters and cabinets at the perimeter, one fume hood, and a safety station including eyewash, safety shower, fire extinguisher, spill kit, and a phone. Separate prep rooms will have sinks and glass washers, and augment the storage area for instructional materials.

Some of the teaching labs will be larger and include a central area of moveable tables and chairs for lecture and group work to allow the instructor greater teaching flexibility.

UNDERGRADUATE RESEARCH LAB

A highly visible lab will provide space for longer-term undergraduate research projects. The 1200 sf lab will have flexible plug and play benches (like the Center for Cell and Genome Science labs) that can be moved and re-configured to accommodate changing individual or group needs. Fixed casework with sinks, common equipment counters, and storage cabinets, a fume hood and a safety station will be on the perimeter of the room.

ADVISING HIVE

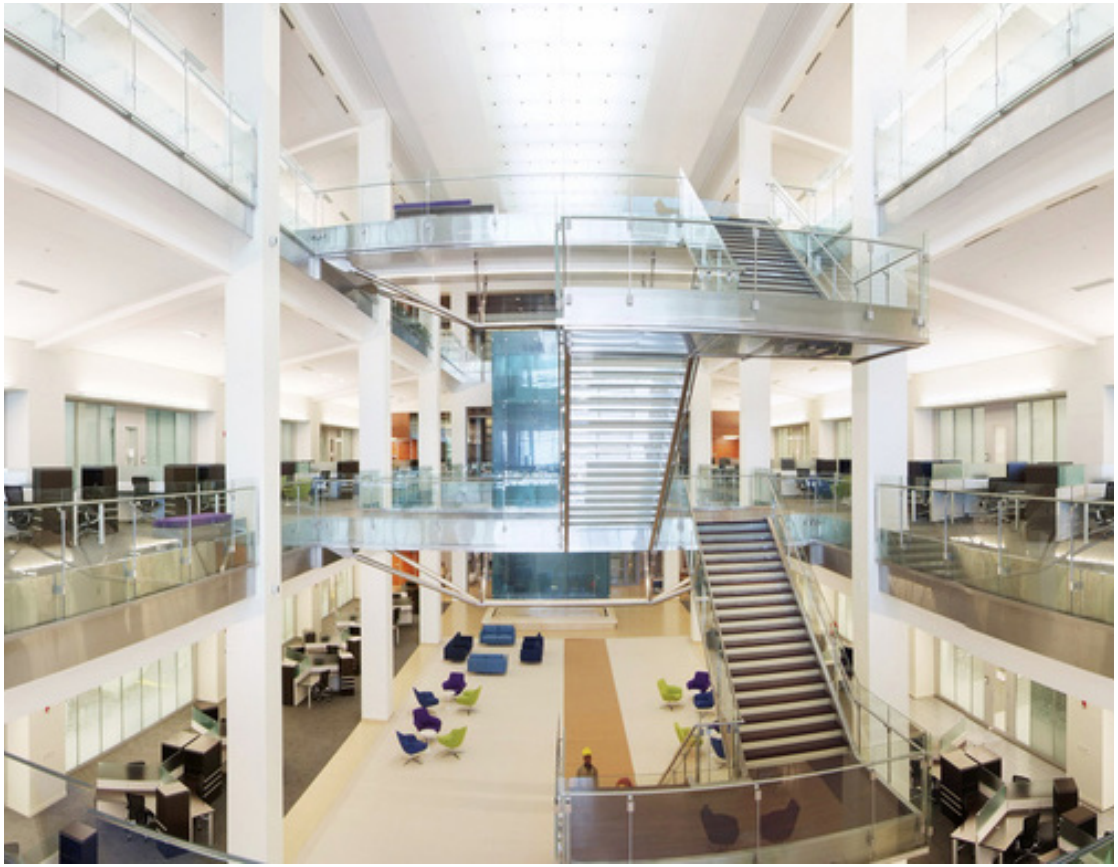
A suite of rooms where students and families can meet with advisors to discuss opportunities, programs, careers and plans of study will be a visible resource in the CSC.

TUTORIAL CENTER

A large gathering area with tables and chairs where students receive individualized instruction from qualified tutors and instructors. This center will feature integrated tutoring for all disciplines in the college. This Center is based on the Math Tutoring Center housed in T. Benny Rushing Mathematics Center of the Cowles Building.

CENTER FOR MATH AND SCIENCE EDUCATION

The Center for Math and Science Education (CSME) maintains programs to prepare K-12 science and math teachers, enhance diversity, improve undergraduate education, and place science in society. The Center also provides connective functions across COS disciplines and programs such as undergraduate research experiences, training for faculty to carry out public outreach to the public, and promoting community-engaged learning. Space will include program support and administration space, a media room to create educational, outreach, and social media materials, and the STEM Resource Center, which will provide cohort space for diverse student and teacher preparation groups.



CENTER FOR QUANTITATIVE BIOLOGY

The Center for Quantitative Biology (CQB) enhances the undergraduate experience through novel cross-disciplinary teaching, increased research and collaboration, and focused outreach programs. The quantitative incubator for undergraduate research serves as the focal location for undergraduate research and collaboration, for interaction with the CCGS and the CSME, and for public outreach on quantitative biology research. Through its interface with a classroom that focuses on interdisciplinary courses and the offices of the Director and visitors, undergraduate students will connect classroom learning with research and collaboration. The quantitative incubator will have an open layout, designed to facilitate work by one larger group or up to four small groups.

RESEARCH LABS

The Center for Cell and Genome Science (CCGS) will be a multidisciplinary center focused on understanding the genetic and molecular bases of cellular function. It will provide research space for twelve faculty labs from the disciplines of biology, chemistry, optical physics, engineering, and computer science. Nine existing faculty labs have been identified for the CCGS and the remaining three appointments are anticipated to be future hires.

The center will contain modern flexible wet labs, chemistry labs, support labs including tissue culture, cold rooms, microscope rooms and other special procedure rooms, a signature laser intensive microscopic imaging core, and a small vivarium for fish and frogs. The center should be flexible open architecture, functional, attractive, and support interdisciplinary communication and cross-pollination of ideas. An open feeling with places to mingle and talk is envisioned. Social connections are important to the scientific discovery process.

In order to maximize function, efficiency, adaptability and flexibility of arrangement, a 10’ 6” laboratory planning module should be utilized to organize all the spaces in the CCGS. A flexible laboratory casework system with 4’ and 6’ long plug and play moveable benches is anticipated. The moveable benches should have power, data, and piped gas outlets located at or just above the work surface for general lab use, and power outlets below the work surface for under counter equipment like refrigerators and shakers. Flexible utility connectors from each moveable bench should plug, with quick connect/disconnect elements, into utility panels located on the module at the ceiling. The bench tops should be adjustable from 30” sit down height to 36” stand up height, and there should be adjustable shelves above. Moveable storage units (drawers and cabinets) on lockable casters below the bench tops will allow knee spaces to be relocated as needed.

The general research labs will be multiple 10’6” x 27’6” modules in large open interdisciplinary lab arrangements. Each module will have 20’ long flexible benches (4’, 6’, 6’, 4’), a 5’ wide ghost corridor, and a sink set against a “wet wall” where the vents and drain lines are concealed. This module can accommodate common bench top equipment or 4’ write up stations with adjacent 6’ long dedicated benches for up to four researchers. It is anticipated that the write

up stations will be at the window end of each bench. Shared fume hoods, common equipment benches, floor standing equipment, and some lab support spaces will be located in alcoves and rooms inboard of the ghost corridor. Safety stations including eyewash, safety shower, fire extinguisher, spill kits, and phones are located at intervals along the ghost corridor. Storage cabinets for glassware are located in the lab entry alcoves.

Enclosed faculty (principal investigator) offices are integrated into the open lab. Each standard 120 sf PI office includes a desk and chair, storage, white board, robe hook, two guest chairs, and a window.

A large open chemistry lab will be separated from the general research labs. This lab will utilize the same flexible lab bench system as the other labs. For each 6' fume hood in the chemistry lab there will be a dedicated 6' bench, and there will be other space for floor standing equipment and benches for common equipment.

Noisy equipment like ice makers and -80 degree freezers are located in equipment corridors that lead to laboratory support rooms. The laboratory support spaces are rooms that need walls for the purpose of noise, light, temperature, EMF, security, and/or contamination control. The modular lab support rooms should accommodate tissue culture, glass wash, media prep, BSL-3, microscopy, cold rooms, plant growth rooms and equipment like environmental chambers and electrophysiology rigs.

An imaging core will provide space for high end imaging equipment (existing and yet to be developed) that will look inside cells. Confocal microscopes, electron microscopes, and more will be accommodated in instrument rooms of various sizes. Vibration, temperature variation, and air movement must be carefully controlled in these rooms. The imaging core should be located on slab on grade in the basement. As one of the unique components of the CCGS and the CSC it should be visible and secure.

A small cold-blooded animal facility will support the CCGS investigations. Two flexible rooms that may accommodate stand alone aquatic habitat for zebra fish or xenopus frogs are anticipated.

COLLEGE OF SCIENCE ADMINISTRATIVE OFFICES

The administrative offices for the College of Science (Dean's suite) is comprised of the Dean's office, offices for two Associate Deans, and work areas for the College's administrative and development staff. These spaces should be organized to allow interaction and collaboration among the staff and include spaces for group meetings and/or work in both public and private areas. The suite may also include support spaces for other groups within the buildings (CSME, CQB, etc.), who may share a common work/copy areas, pantry and meeting rooms. The suite should be connected to the main circulation spaces and atrium, but does not need prime visibility in the overall organization of the building.

TECHNOLOGY INCUBATOR

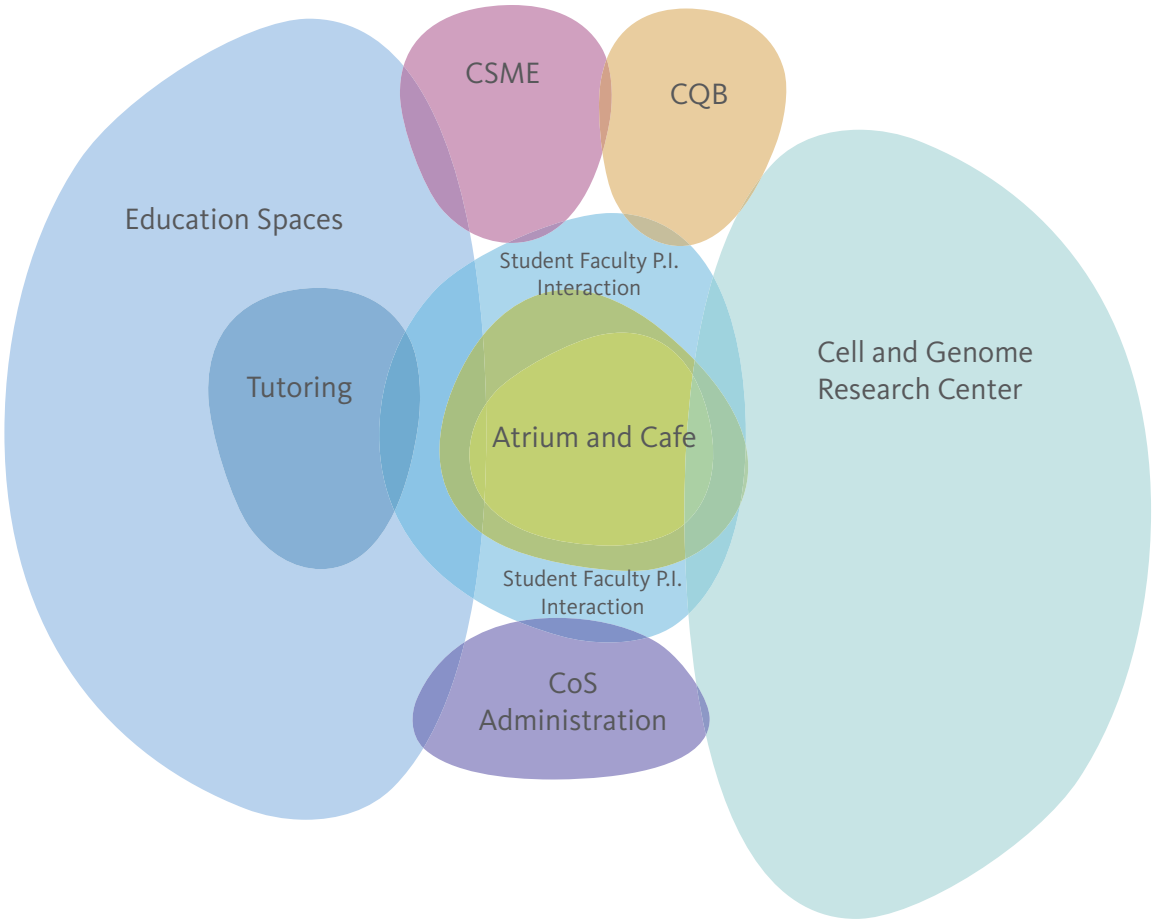
A wet lab and two offices make up this incubator where representatives from local science based industries will have a presence in the CSC. The incubator should be visible from the public spaces. The intent is to further inspire students about the integration of science education and research with real world application beyond the classroom, and to help facilitate synergistic collaborations between research and industry.

COMMON USE SPACES

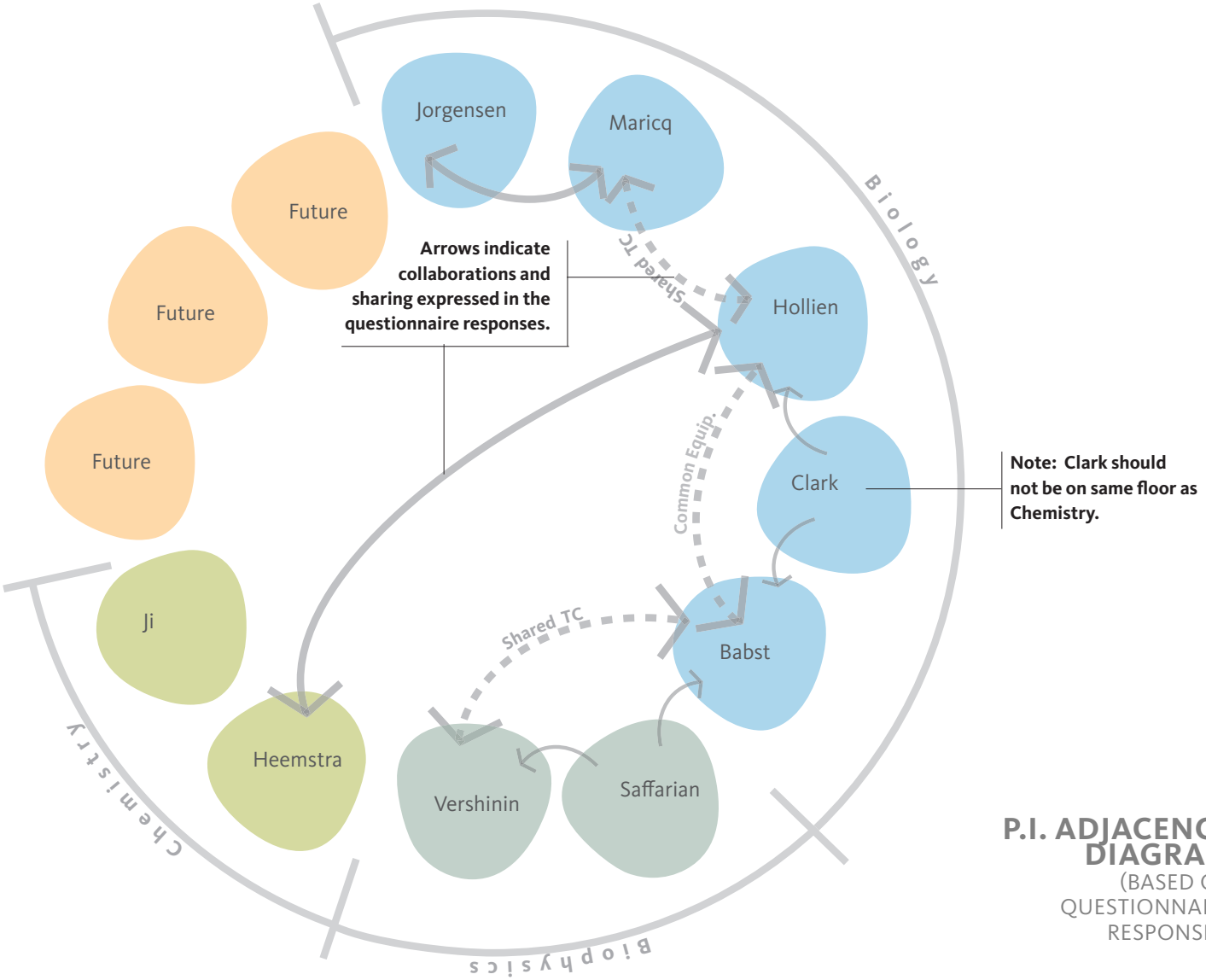
The students, faculty, researchers, and staff in the CSC will share many spaces to bring them together, encourage communication, provide inspiration, and build community. A lobby and atrium will provide experiential space and opportunities for exhibits and the creative display of real-time activity in science education, research and industry. Active spaces for interaction will be balanced with quiet places for study. There will be pantries and a Café. Large and small seminar rooms will be scattered on every floor. IT support space, a copy center, showers for joggers and bicycle riders, and a lactation room will be included.

RECEIVING AREA

A small receiving area will serve the CSC. It will include a secure room for staging incoming items, a separate secure room for the holding of chemicals and potentially hazardous items, and a place to store the waste collection bins.

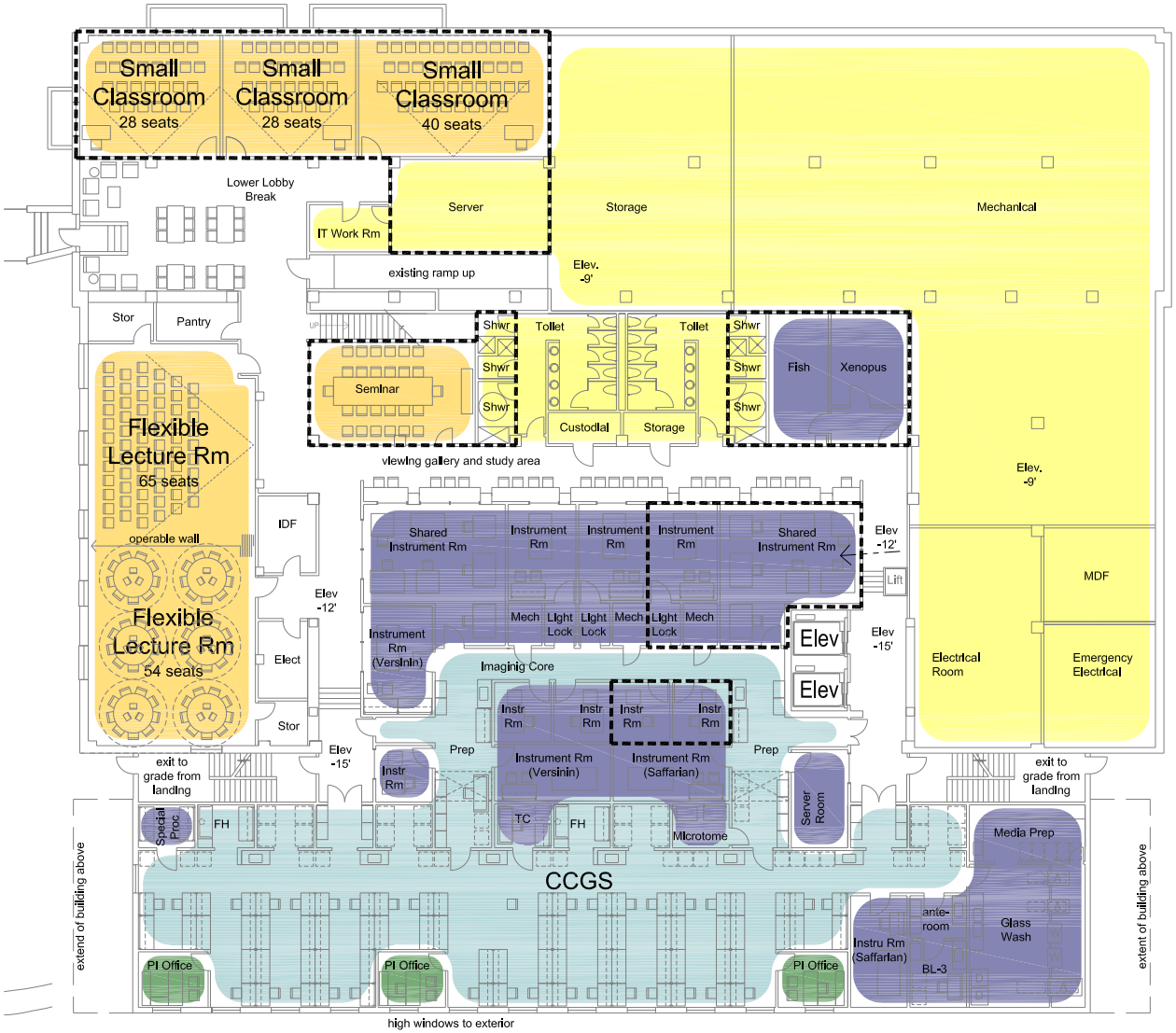


OVERALL PROGRAM ADJACENCIES



P.I. ADJACENCY DIAGRAM

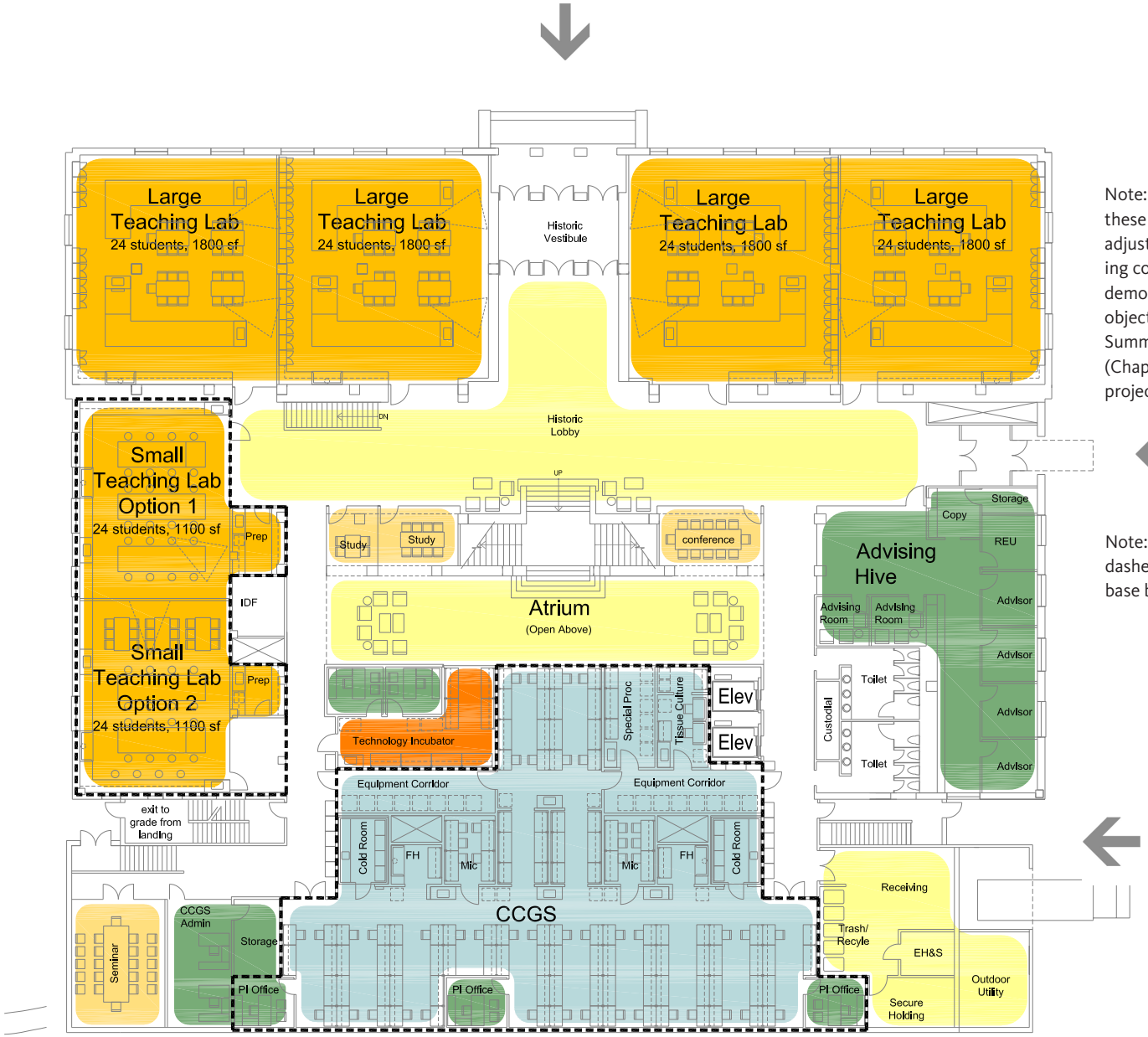
(BASED ON QUESTIONNAIRE RESPONSES)



Note: The spaces identified in these test fit plans may have been adjusted to accommodate existing conditions of the GTB and to demonstrate certain adjacency objectives. The Space Program Summary and Room Criteria Sheets (Chapter O6.) represent the actual project requirements.

Note: All spaces within with dashed outlines are not part of the base building and will be shelled.

BASEMENT LEVEL TEST FIT AND ADJACENCY DIAGRAM



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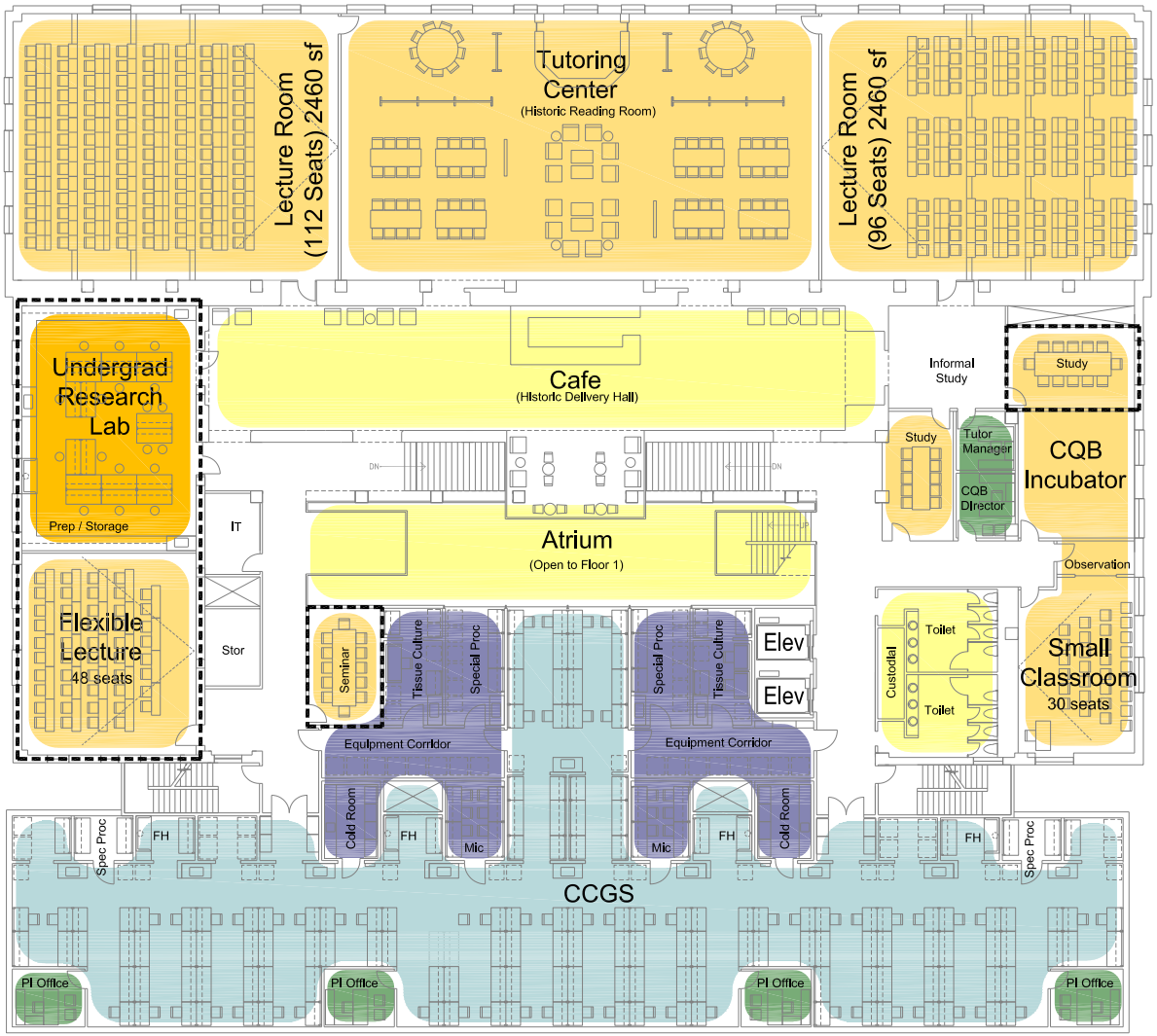
Note: All spaces within with dashed outlines are not part of the base building and will be shelled.

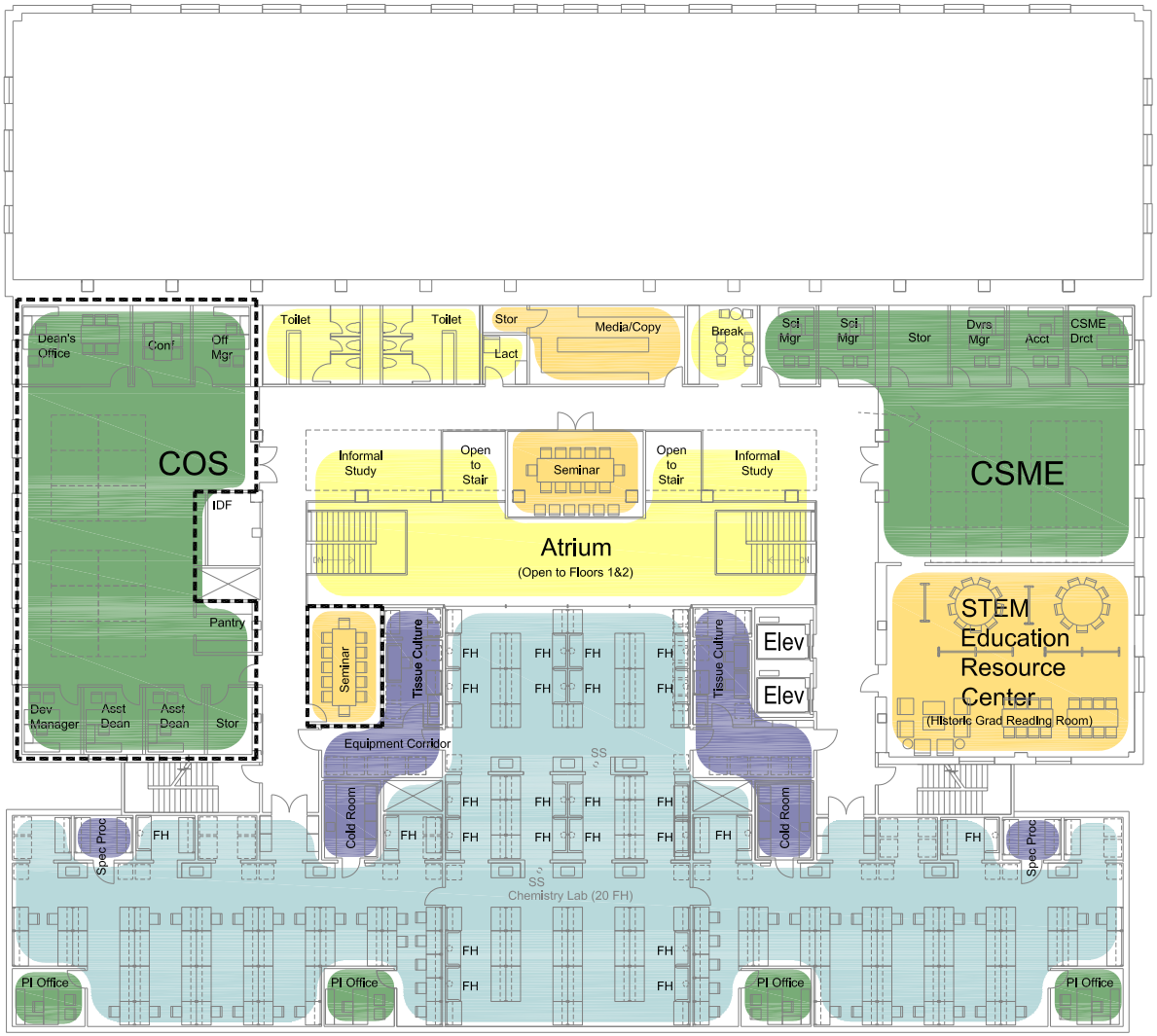
LEVEL 1
TEST FIT AND ADJACENCY DIAGRAM



Note: The spaces identified in these test fit plans may have been adjusted to accommodate existing conditions of the GTB and to demonstrate certain adjacency objectives. The Space Program Summary and Room Criteria Sheets (Chapter O6.) represent the actual project requirements.

Note: All spaces within with dashed outlines are not part of the base building and will shelled.

LEVEL 2
TEST FIT AND ADJACENCY DIAGRAM



Note: The spaces identified in these test fit plans may have been adjusted to accommodate existing conditions of the GTB and to demonstrate certain adjacency objectives. The Space Program Summary and Room Criteria Sheets (Chapter O6.) represent the actual project requirements.

Note: All spaces within with dashed outlines are not part of the base building and will be shelled.

LEVEL 3
TEST FIT AND ADJACENCY DIAGRAM

06.

SPACE PROGRAM SUMMARY AND ROOM DATA

Space Program Summary

Room Criteria Sheets

TABLE 6.1.1 SPACE PROGRAM SUMMARY

		NEEDS				BASE BUILDING				SHELLED SPACE			
	Spaces			asf	staff			asf	staff			asf	staff
1.0.0	**EDUCATION SPACES**												
1.1.0	**Interdisciplinary Education Spaces**												
1.1.1	Lecture Room (90-120 students)	2 @	2,950 =	5,900		2 @	2,950 =	5,900					
1.1.2	Flexible Lecture Room (60 students)	3 @	1,000 =	3,000		2 @	1,000 =	2,000		1 @	1,000 =	1,000	
1.1.3	Small Classroom (25-30 students)	4 @	600 =	2,400		1 @	600 =	600		3 @	600 =	1,800	
1.1.3a	Observation Room	1 @	150 =	150		1 @	150 =	150					
1.1.4	Large Teaching Lab (25 students)	4 @	1,860 =	7,440		4 @	1,860 =	7,440					
1.1.5	Small Teaching Lab (25 students)	2 @	1,400 =	2,800						2 @	1,400 =	2,800	
1.1.6	Undergrad Research Lab (15 students)	1 @	1,200 =	1,200						1 @	1,200 =	1,200	
	Subtotal, Interdisciplinary Education Spaces			**22,890**				**16,090**				**6,800**	
1.2.0	**Advising Hive**												
1.2.1	Reception area	1 @	140 =	140	1	1 @	140 =	140	1				
1.2.2	Advising Rooms	2 @	100 =	200		2 @	100 =	200					
1.2.3	Offices	5 @	100 =	500	5	5 @	100 =	500	5				
1.2.4	Copy/Storage	1 @	100 =	100	1	1 @	100 =	100	1				
1.2.5	internal suite circulation (at .25)			235				235					
	Subtotal, Advising Hive			**1,175**				**1,175**				**0**	
1.3.0	**Tutorial Center**												
1.3.1	General Table Area (162 seats)	1 @	2,800 =	2,800		1 @	2,800 =	2,800					
1.3.2	Breakout Rooms (12-15 seats)	6 @	240 =	1,440		6 @	240 =	1,440					
1.3.3	Manager Office	1 @	100 =	100	1	1 @	100 =	100	1				
	Subtotal, Tutorial Center			**4,340**				**4,340**				**0**	
1.4.0	**Center for Science and Math Education (CSME)**												
1.4.1	Director's Office	1 @	120 =	120	1	1 @	120 =	120	1				
1.4.2	Office	4 @	100 =	400	4	4 @	100 =	400	4				
1.4.3	Open Office	12 @	60 =	720		12 @	60 =	720					
1.4.4	Internal suite circulation (at .25)			310	0			310	0				
1.4.5	Storage	1 @	100 =	100	1	1 @	100 =	100	1				
1.4.6	Media Training/Production	1 @	200 =	200	1	1 @	200 =	200	1				
1.4.7	STEM Resource Center (50 students)	1 @	1,350 =	1,350	1	1 @	1,350 =	1,350	1				
	Subtotal, CSME			**3,200**				**3,200**				**0**	
1.5.0	**Center for Quantitative Biology (CQB)**												
1.5.1	Director's Office	1 @	120 =	120	1	1 @	120 =	120	1				
1.5.2	Incubator for Undergraduate Research	1 @	400 =	400		1 @	400 =	400					
	Subtotal, CQB			**520**				**520**				**0**	
	Sub total Education			**32,125**				**25,325**				**6,800**	

		NEEDS				BASE BUILDING				SHELLED SPACE			
	Spaces			asf	staff			asf	staff			asf	staff
2.0.0	**CENTER FOR CELL AND GENOME SCIENCE**												
2.1.0	**Offices**												
2.1.1	PI Offices	14 @	120 =	1,680	12	11 @	120 =	1,320	9	3 @	120 =	360	3
2.1.2	Manager	2 @	100 =	200	2	2 @	100 =	200	2				
2.1.3	Copy/Storage	1 @	100 =	100	1	1 @	100 =	100	1				
	Subtotal, Research Offices			**1,980**				**1,620**				**360**	
2.2.0	**Research Labs**												
2.2.1	General Research Laboratory	1 @	18,600 =	18,600	125	1 @	14,100 =	14,100	95	1 @	4,500 =	4,500	30
2.2.2	Chemistry Laboratory	1 @	2,950 =	2,950		1 @	2,950 =	2,950					
2.2.3	Microscope Room	4 @	205 =	820		2 @	205 =	410		2 @	205 =	410	
	Subtotal, Research Labs			**22,370**				**17,460**				**4,910**	
2.3.0	**Lab Support**												
2.3.1	Cold Rooms	6 @	135 =	810		4 @	135 =	540		2 @	135 =	270	
2.3.2	Tissue Culture (large)	5 @	198 =	990		4 @	198 =	792		1 @	198 =	198	
2.3.3	Tissue Culture (small)	1 @	78 =	78						1 @	78 =	78	
2.3.4	Shared Microscope Room	4 @	135 =	540		4 @	135 =	540					
2.3.5	Equipment Corridors	4 @	264 =	1,056		4 @	264 =	1,056					
2.3.6	Radio isotope lab	1 @	78 =	78		1 @	78 =	78					
2.3.7	BSL-3 Lab	1 @	198 =	198		1 @	198 =	198					
2.3.8	Environmental Chamber Room	1 @	198 =	198		1 @	198 =	198					
2.3.9	Plant Growth Room	1 @	198 =	198		1 @	198 =	198					
2.3.10	Electrophysiology Rooms	4 @	78 =	312		4 @	78 =	312					
2.3.11	Glass Wash/Media Prep	1 @	725 =	725		1 @	725 =	725					
	Subtotal, Lab Support			**5,183**				**4,637**				**546**	
2.4.0	**Imaging Core**												
2.4.1	Prep Lab	2 @	298 =	596		2 @	298 =	596					
2.4.2	Instrument Room (small)	5 @	105 =	525		3 @	105 =	315		2 @	105 =	210	
2.4.3	Instrument Room (large)	3 @	300 =	900		2 @	300 =	600		1 @	300 =	300	
2.4.4	Instrument Room (shared/multi-rig)	2 @	520 =	1,040		1 @	520 =	520		1 @	520 =	520	
2.4.5	Microtome Room	1 @	78 =	78		1 @	78 =	78					
2.4.6	Server Room	1 @	174 =	174		1 @	174 0	174					
2.4.7	internal suite circulation (@.25)			828				571				258	
	Subtotal, Imaging Core			**4,141**				**2,854**				**1,288**	
2.5.0	**Vivarium Core**												
2.5.1	Vestibule	1 @	85 =	85						1 @	85 =	85	
2.5.2	Zebra Fish Room	1 @	242 =	242						1 @	242 =	242	
2.5.3	Xenepus Room	1 @	216 =	216						1 @	216 =	216	
	Subtotal, Vivarium Core			**543**				**0**				**543**	
	Subtotal, Cell and Genome Science			**34,217**				**26,571**				**7,647**	

		NEEDS			BASE BUILDING			SHELLED SPACE		
	Spaces		asf	staff		asf	staff		asf	staff
3.0.0	**College of Science Administrative Offices (CoS)**									
3.0.1	Reception/Waiting	1 @ 200 =	200					1 @ 200 =	200	
3.0.2	Dean's Office	1 @ 130 =	130	1				1 @ 130 =	130	1
3.0.3	Office	4 @ 100 =	400	4				4 @ 100 =	400	4
3.0.4	Open cubicles	12 @ 60 =	720	12				12 @ 60 =	720	12
3.0.5	Conference Room (6-8 seats)	1 @ 200 =	200					1 @ 200 =	200	
3.0.6	Pantry/Break	1 @ 100 =	100					1 @ 100 =	100	
3.0.7	Copy Machine Alcove	1 @ 100 =	100					1 @ 100 =	100	
3.0.8	File/Supply Storage	1 @ 300 =	300					1 @ 300 =	300	
3.0.9	internal suite circulation (@.25)		538						538	
	Subtotal, CoS suite		**2,688**			**0**			**2,688**	
4.0.0	**Technology Incubator**									
4.0.1	Wet Lab Space	1 @ 400 =	400		1 @ 400 =	400				
4.0.2	Office/Conference Space	2 @ 120 =	240	4	2 @ 120 =	240	4			
	Subtotal, Technology Incubator		**640**			**640**			**0**	
5.0.0	**Common Use Spaces**									
5.0.1	Lobby/Exhibit Space	1 @ 1,500 =	1,500		1 @ 1,500 =	1,500				
5.0.2	Atrium	1 @ 1,000 =	1,000		1 @ 1,000 =	1,000				
5.0.3	Seminar Room (12 seats)	6 @ 250 =	1,500		3 @ 250 =	750		3 @ 250 =	750	
5.0.4	Seminar Room (30 seats)	2 @ 500 =	1,000		1 @ 500 =	500		1 @ 500 =	500	
5.0.5	Café (30 seats)	1 @ 500 =	500		1 @ 500 =	500				
5.0.6	Pantry/Break Area	2 @ 200 =	400		2 @ 200 =	400				
5.0.7	Lactation Room	1 @ 80 =	80		1 @ 80 =	80				
5.0.8	Copy/Work Room	1 @ 200 =	200		1 @ 200 =	200				
5.0.9	Server Room	1 @ 500 =	500					1 @ 500 =	500	
5.0.10	IT Work Room	1 @ 120 =	120		1 @ 120 =	120				
5.0.11	Showers for biker/joggers	2 @ 200 =	400					2 @ 200 =	400	
	Subtotal, Common Use Spaces		**7,200**			**5,050**			**2,150**	
5.1.0	**Dock**									
5.1.1	Receiving Dock (large equip delivery)	1 @ 200 =	200	1	1 @ 200 =	200	1			
5.1.2	Trash Cart/Holding Room	1 @ 100 =	100		1 @ 100 =	100				
5.1.3	EH&S Biomedical Waste Room	1 @ 100 =	100		1 @ 100 =	100				
5.1.4	Transfer Holding	1 @ 200 =	200		1 @ 200 =	200				
	Subtotal, Dock		**600**			**600**			**0**	

SUMMARY

	NEEDS		BASE BUILDING		SHELLED SPACE	
Spaces	**asf**	**staff**	**asf**	**staff**	**asf**	**staff**
Education Spaces	32,125		25,325		6,800	
Center for Cell and Genome Science	34,217		26,571		7,647	
College of Science Administrative Offices	2,688		0		2,688	
Technology Incubator	640		640		0	
Common Use Spaces	7,200		5,050		2,150	
Dock	600		600		0	
Total, Assignable Square Footage	77,470		58,186		19,284	
Target for the total asf (@.65% efficiency)	80,113		60,084		20,028	
Total, People		179		129		50
Assumed NASF/GSF Efficiency	0.65		0.65		0.65	
Gross Square Footage	123,250		92,438		30,813	

ROOM CRITERIA SHEETS

The following Room Criteria information provides a plan diagram and an accompanying data sheet for each program space. They identify sizes, layouts, critical dimensions, desired adjacencies, furniture, equipment, environmental criteria, utilities, and special construction requirements for each room.

SYMBOL LEGEND FOR FLOOR LAYOUTS

CO2	Carbon Dioxide
V	Vacuum
A	Compressed Air
SP	Spacial Gas (Nitrogen or Argon)
H&CW	Hot and Cold Water
CW	Cold Water
CS	Cup Sink
RO	Reversed Osmosis Water
DI	Deionized Water
GW	Glassware
PWS	Process Water Supply
PWR	Process Water Return
EW	Eye Wash
SS	Safety Shower
	Snorkel Exhaust
	110v, 20a Duplex
	110v, 20a Fourplex
	208v, 30a Single Phase
SIG	Sensitive Instrument Ground
W1	Plug Mold with 110v Duplex Outlets at 18” o.c.
W2	Plug Mold with 110v Fourplex at 6” o.c. and 208v outlet at 6’ o.c.
	Data, Phone
	Phone

1.1.1
Lecture Room

Floor Area: 2,950 sf
Adjacencies: Common Spaces, Cafe, Tutoring Center

ARCHITECTURAL	
Occupancy Type	A-3
Load Factor	per 1004.7
Occupancy Load	100
Exits	2
Live Load	-
Wall Finish	Gyp Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustic Plaster
Ceiling Height	Match Existing
Casework Finish	Match existing
Countertops	Solid Surface
Open Shelving/Bookcase	-
Shielding	-
Door Width	6'-0"
Door Height	8'-0"
Door Type	Double
Door Vision Panel	Yes
Door Seals	Yes
Door Threshold Sidelight	-
Daylighting	-
Biological Safety Level	Yes
Level of security	-
Access (Lock, Card, Other)	-
	Lock

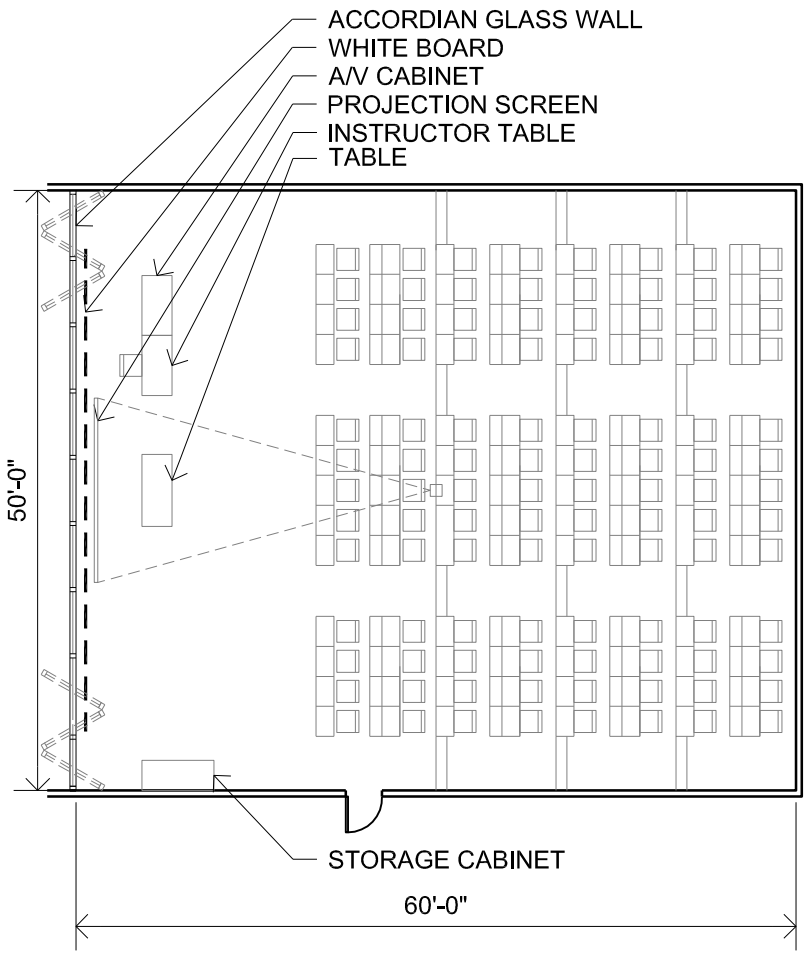
EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table/Chairs	Yes/Casters
Files	-
Casegoods	Yes
Marker Board	Yes
Projection System/AV	Yes
MECHANICAL	
Temperature (F)	72 Heating / 75 Cooling
Relative Humidity	-
Ventilation	9.75/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	No
UPS	No
Sensitive Instrument Ground	No
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	-
Wi-Fi	Yes per U of U
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	Variable
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	Yes
STRUCTURAL	
Floor Loading (psi)	40
Vibration Criteria (mips)	8000

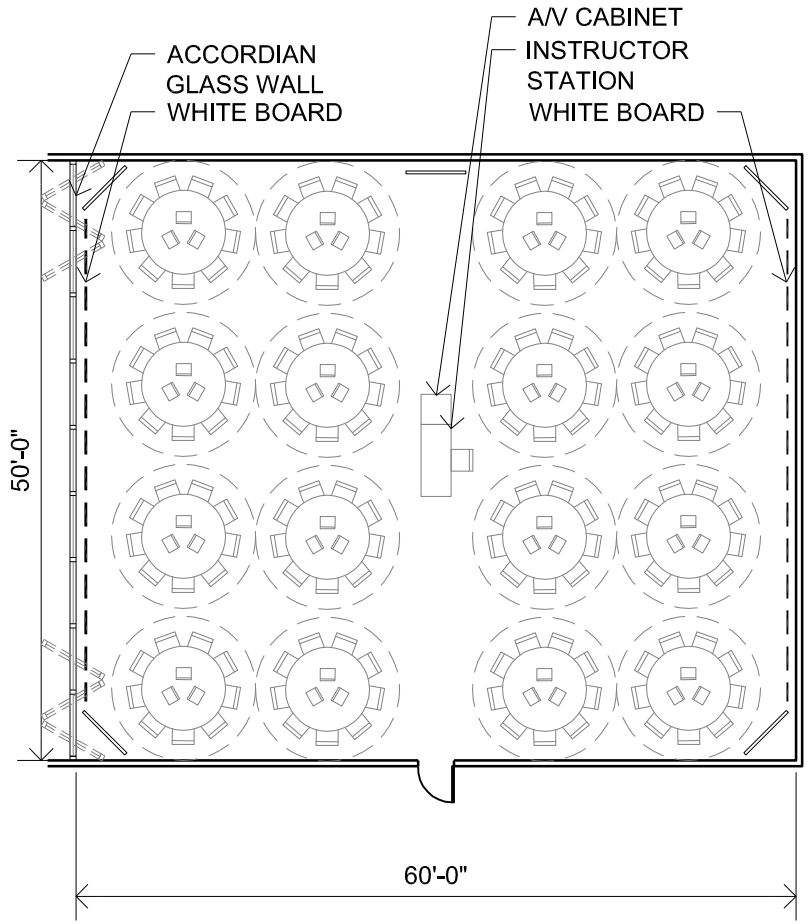
Notes:

Space scheduled to be in historic reading room - refer to preservation plan for restoration requirements.
Final

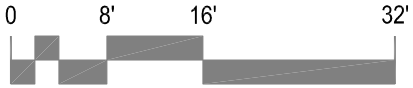
Final Classroom configuration, tiered or flat floor, to be confirmed in design phase based on input and approval from U of U ADA Access Committee; tiered seating configuration preferred.



OPTION 1



OPTION 2



1.1.2
Flexible Lecture Room

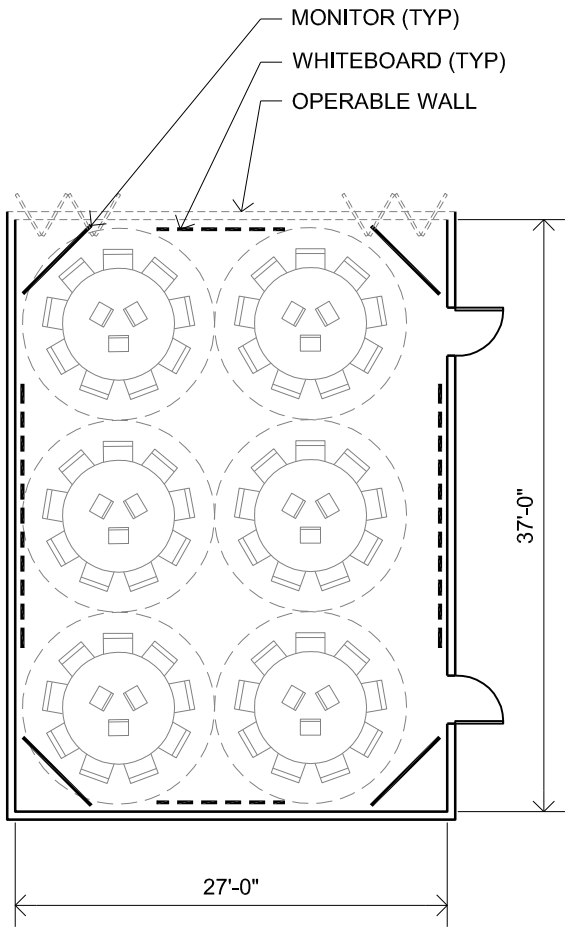
Floor Area: 1,000 sf
Adjacencies: Common Spaces

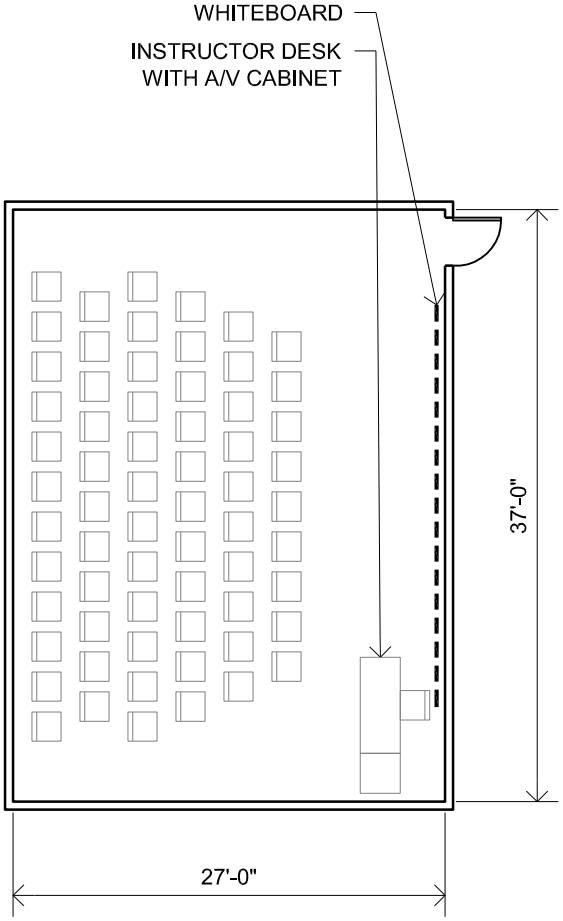
ARCHITECTURAL	
Occupancy Type	A-3
Load Factor	20
Occupancy Load	50
Exits	2
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	10'-0"
Casework Finish	Wood
Countertops	-
Open Shelving/Bookcase	-
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	Yes
Door Threshold Sidelight	-
Daylighting	Yes
Biological Safety Level	Yes
Level of security	-
Access (Lock, Card, Other)	-
	Lock

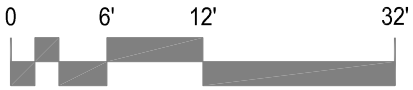
EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	Yes
Table	Yes
Files	-
Casegoods	-
Marker Board	Yes
Projection System/AV	Yes
MECHANICAL	
Temperature (F)	72 Heating / 75 Cooling
Relative Humidity	-
Ventilation	9.75/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	Yes
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	Variable
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	Yes
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


MONITOR (TYP)
WHITEBOARD (TYP)
OPERABLE WALL
37'-0"
27'-0"


WHITEBOARD
INSTRUCTOR DESK
WITH A/V CABINET
37'-0"
27'-0"


0
6'
12'
32'

1.1.3
Small Classroom - Observation

Floor Area: 600 SF +/-
Adjacencies: CQB, Common Spaces

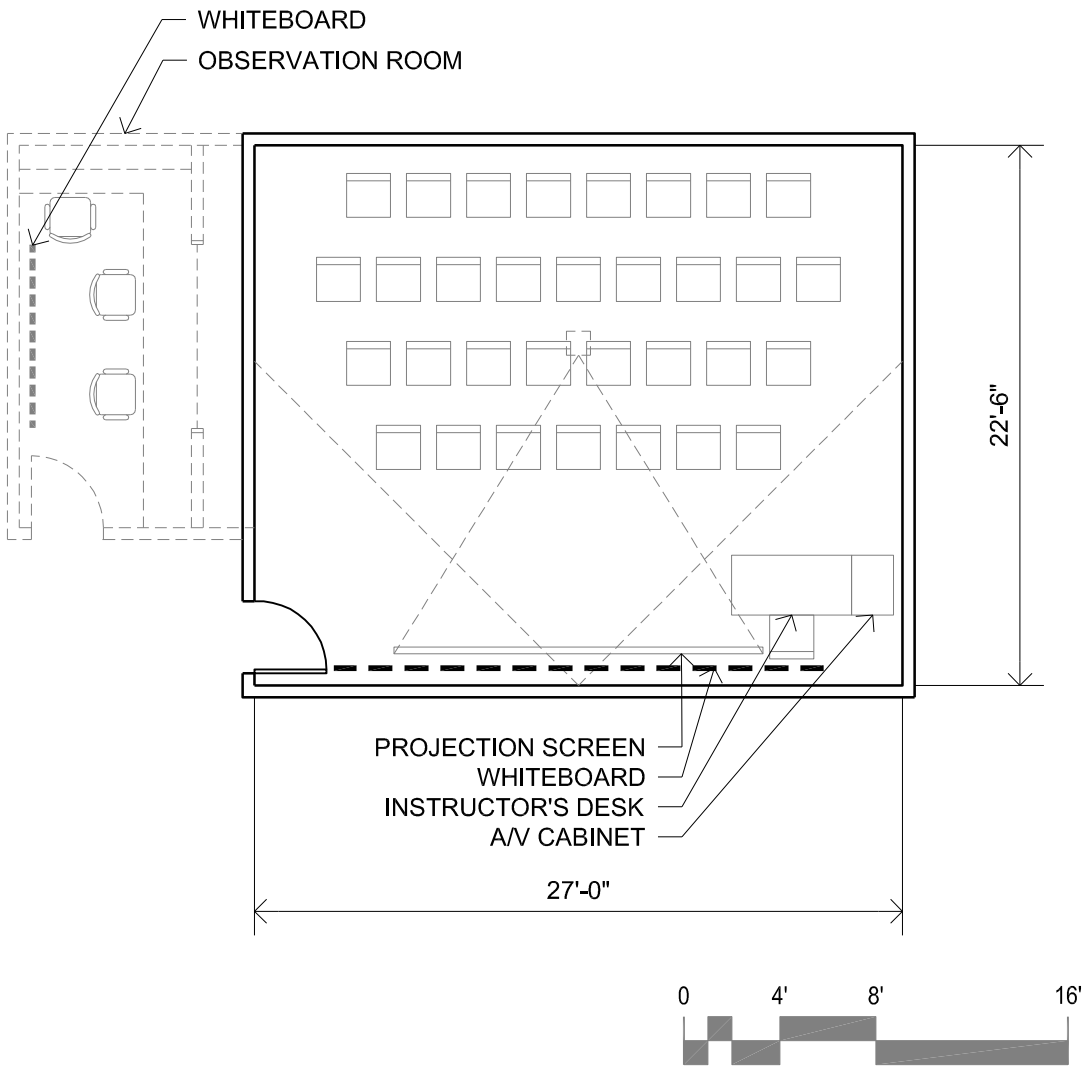
ARCHITECTURAL	
Occupancy Type	B
Load Factor	20/OIL
Occupancy Load	30
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Wood
Countertops	Plastic Lam.
Open Shelving/Bookcase	Yes
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold Sidelight	-
Daylighting	-
Biological Safety Level	Yes
Level of security	-
Access (Lock, Card, Other)	-
	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	Yes
Table	-
Files	Yes
Casegoods	Yes
Marker Board	Yes
Projection System/AV	Yes
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	13/pers, 0.156/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	Yes
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	Variable
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:

(1) classroom should be adjacent to CQB suite and include a separate observation space with one-way glass.


WHITEBOARD
OBSERVATION ROOM
22'-6"
PROJECTION SCREEN
WHITEBOARD
INSTRUCTOR'S DESK
A/V CABINET
27'-0"
0
4'
8'
16'

1.1.4
Teaching Lab (Large)

Floor Area: 1,860 SF
Adjacencies: Public Space, Teaching Lab (Small)

ARCHITECTURAL	
Occupancy Type	B
Load Factor	50
Occupancy Load	38
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral coved
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	10'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Enclosed Wall Cabinets
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	(1) @ 6'
BSC	Yes
Desk	-
Table /Chairs	Yes
Files	-
Casegoods	Fixed metal
Marker Board	Yes
Projection System/AV	Yes
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6 ACH Occ, 0 ACH Unocc
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	Yes
Chilled Water	-
Floor Drain	Yes, w/ deep seal
Sink(s)	Yes (3), see notes
Steam	No
Cooling Water	No
Condensate	No
Safety Shower	Yes
Eyewash	Yes
Gasses	-
Compressed Air	@ hood
Vacuum	@ hood

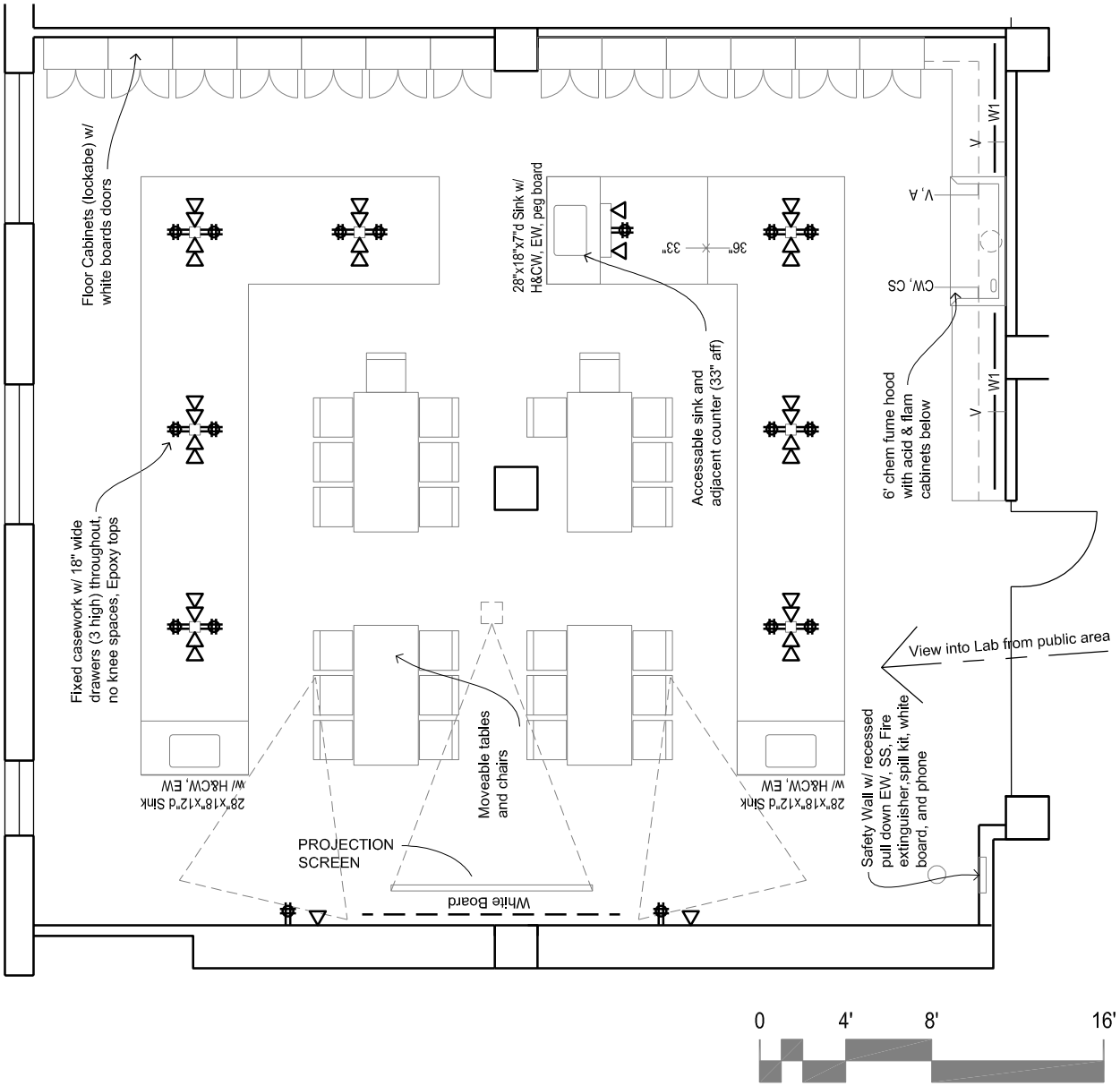
ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	No
UPS	No
Sensitive Instrument Ground	No
COMMUNICATION	
Phone (qty and security)	@ safety station
Data (qty and security)	30
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	80
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

Notes:

Hours of operation: M-F (8-6)

Provide lockable storage cabinets with marker board doors

Sinks: (2) 18x28x12d and (1) 18x28x7d ADA Accessible


Floor Cabinets (lockabe) w/ white boards doors
Fixed casework w/ 18" wide drawers (3 high) throughout, no knee spaces, Epoxy tops
28"x18"x7"d Sink w/ H&CW, EW, peg board
36"
33"
Accessable sink and adjacent counter (33" aff)
6' chem fume hood with acid & flam cabinets below
V, A
CW, CS
V
W1
V
W1
View into Lab from public area
Safety Wall w/ recessed pull down EW, SS, Fire extinguisher, spill kit, white board, and phone
28"x18"x12"d Sink w/ H&CW, EW
28"x18"x12"d Sink w/ H&CW, EW
Moveable tables and chairs
PROJECTION SCREEN
White Board

0 4' 8' 16'

1.1.5
Teaching Lab (Small)

Floor Area: 1,285 SF
Adjacencies: Public Space, Prep Space

ARCHITECTURAL	
Occupancy Type	B
Load Factor	50
Occupancy Load	26
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral coved
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	10'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Enclosed Wall Cabinets
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	(1) @ 6'
BSC	-
Desk	-
Table	-
Files	-
Casegoods	Fixed metal
Marker Board	Yes
Projection System/AV	Yes
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6 ACH Occ, 0 ACH Unocc
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	Yes
Chilled Water	-
Floor Drain	Yes, w/ Deep Seal
Sink(s)	Yes (3)
Steam	No
Cooling Water	No
Condensate	No
Safety Shower	Yes
Eyewash	Yes
Gasses	-
Compressed Air	@ hood
Vacuum	@ hood

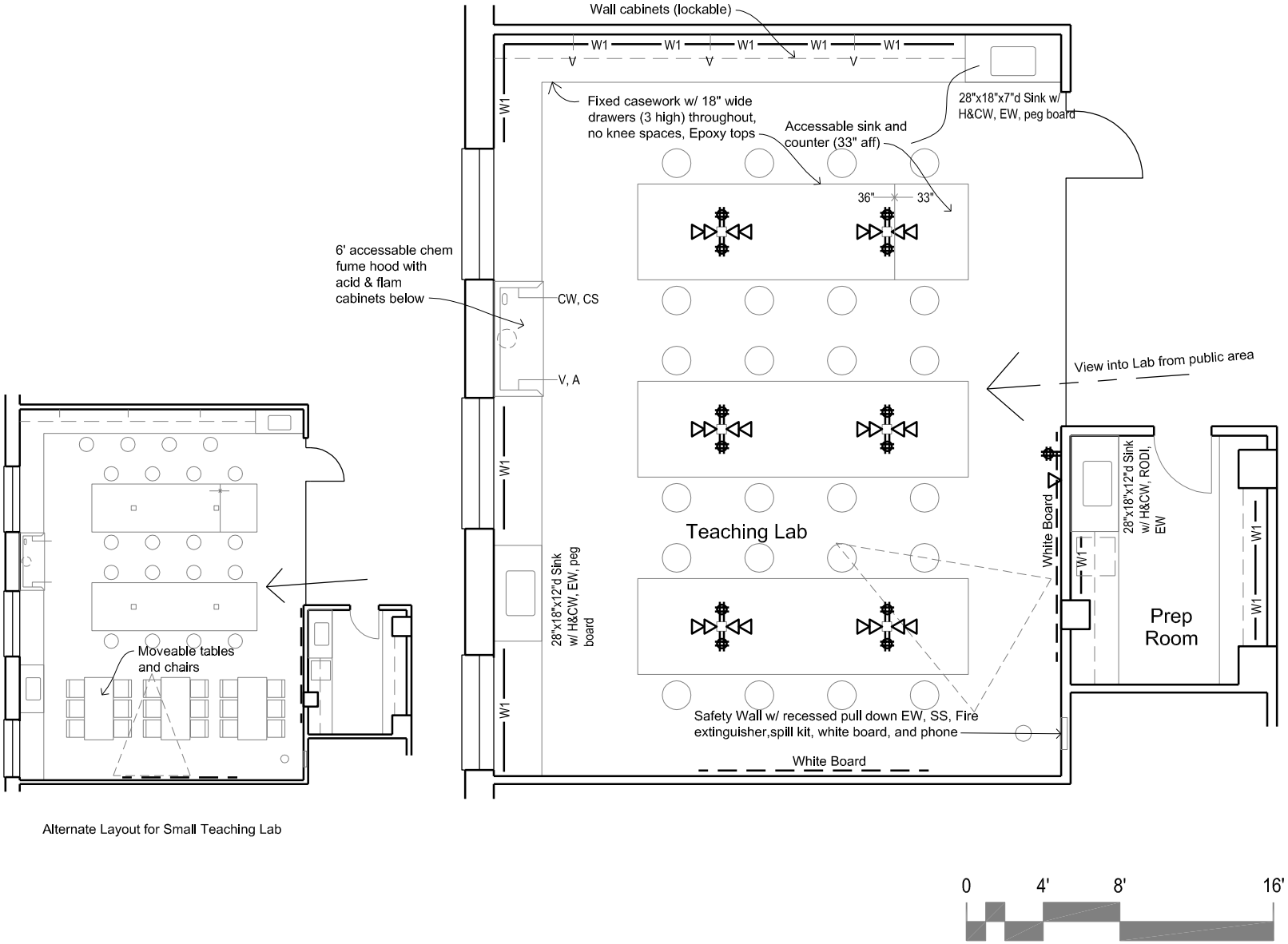
ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	No
UPS	No
Sensitive Instrument Ground	No
COMMUNICATION	
Phone (qty and security)	@ safety station
Data (qty and security)	24
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	80
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

Notes:

Hours of operation: M-F (8-6)

Prep room to have under counter dishwasher

Sinks: (1) 18x28x12d and (1) 18x28x7d ADA Accessible



Alternate Layout for Small Teaching Lab

1.1.6
Undergraduate Research Lab

Floor Area: 1,230
Adjacencies: Public Spaces

ARCHITECTURAL	
Occupancy Type	B
Load Factor	50
Occupancy Load	24
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral coved
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Metal
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

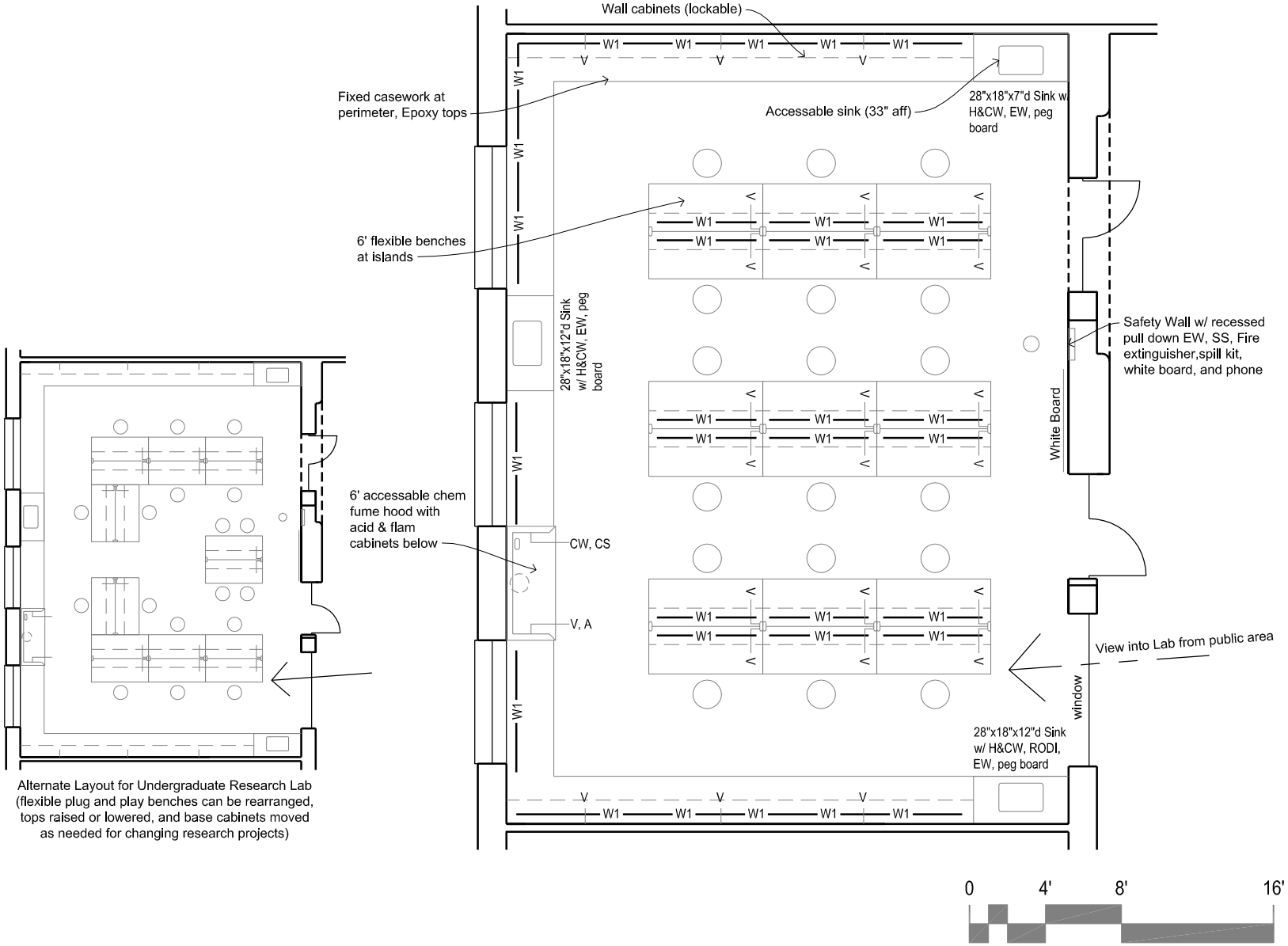
EQUIPMENT/FURNISHINGS	
Fume Hood	(1) @ 6'
BSC	-
Desk	-
Table	-
Files	-
Casegoods	Fixed perim., flex bench
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6 ACH Occ, 4 ACH Unocc
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	RO/DI
Chilled Water	No
Floor Drain	Yes, w/ Deep Seal
Sink(s)	Yes (3)
Steam	No
Cooling Water	No
Condensate	No
Safety Shower	Yes
Eyewash	Yes
Gasses	-
Compressed Air	Yes
Vacuum	Yes

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	No
UPS	No
Sensitive Instrument Ground	No
COMMUNICATION	
Phone (qty and security)	@ safety station
Data (qty and security)	20
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	80
Fixture Type	LED
Safe Light	-
Special Lighting	Under Shelf
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

Notes:

Hours of operation: M-F (8-6)

Sinks: (2) 18x28x12d and (1) 18x28x7d ADA Accessible



Alternate Layout for Undergraduate Research Lab (flexible plug and play benches can be rearranged, tops raised or lowered, and base cabinets moved as needed for changing research projects)

1.2.1
Advising - Reception

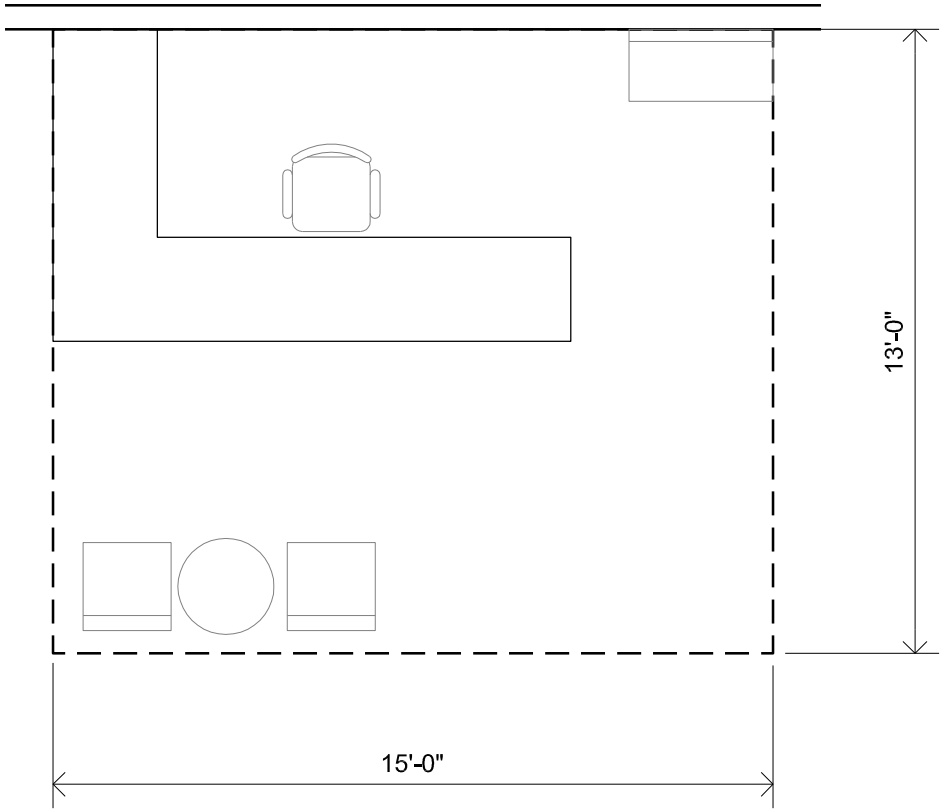
Floor Area: 140 SF
Adjacencies: Advising Hive, Lobby, Advisors

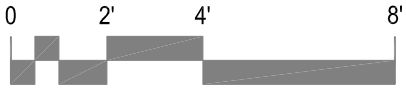
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	2
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Laminate
Countertops	Solid surface
Open Shelving	-
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Desirable
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	Yes
Table	-
Files	Yes
Casegoods	Yes
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	No
UPS	No
Sensitive Instrument Ground	No
COMMUNICATION	
Phone (qty and security)	2
Data (qty and security)	2
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30
Fixture Type	Florescent
Safe Light	-
Special Lighting	-
Dimmable	No
Darkenable	No
Zoned Lighting	No
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


13'-0"
15'-0"


0
2'
4'
8'

1.2.2
Advising - Advising Room

Floor Area: 100 SF
Adjacencies: Reception, Offices, Seminar

ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	1
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	-
Door Width	3'-0"
Door Height	7'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight/Glass wall	Yes
Daylighting	Desirable
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

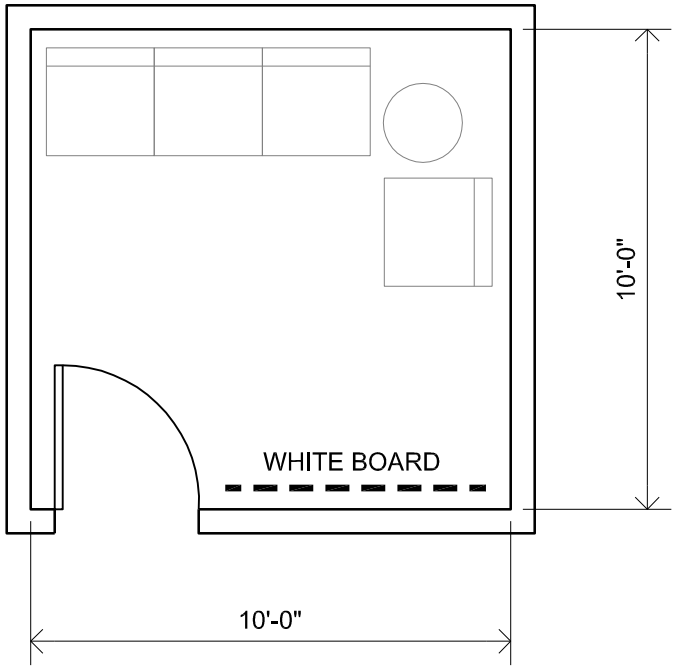
EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table /Chairs	4 people
Files	-
Casegoods	-
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

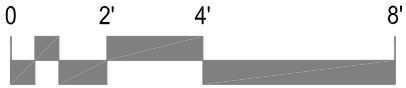
ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	No
UPS	No
Sensitive Instrument Ground	No
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient, 50 Task
Fixture Type	Flourescent
Safe Light	-
Special Lighting	-
Dimmable	No
Darkenable	No
Zoned Lighting	No
STRUCTURAL	
Floor Loading (psi)	80
Vibration Criteria (mips)	8000

Notes:

Provide soft seating or table/chair for (4) people.

Room location should provide privacy for users.


WHITE BOARD
10'-0"
10'-0"


0
2'
4'
8'

1.2.3
Advising - Office

Floor Area: 100 SF
Adjacencies: Reception, Advising Room, Copy/Storage

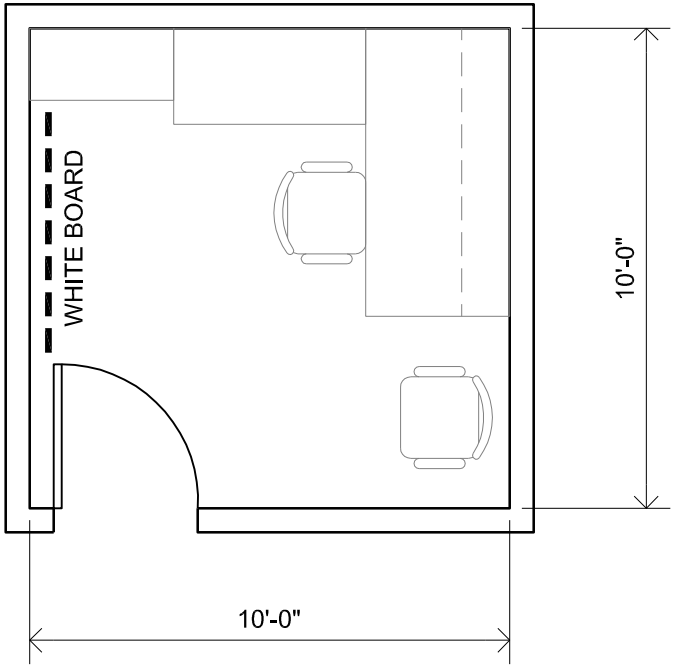
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	1
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam
Countertops	-
Open Shelving	Yes
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

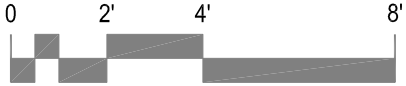
EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk/Chairs	Yes
Table	-
Files	Yes
Casegoods	Yes
Marker Board	Yes
Projection System	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	No
UPS	No
Sensitive Instrument Ground	No
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Cable TV	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Flourescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:

Office should provide some visual transparency for advisor safety.


WHITE BOARD
10'-0"
10'-0"


0
2'
4'
8'

1.2.4
Advising - Copy/Storage

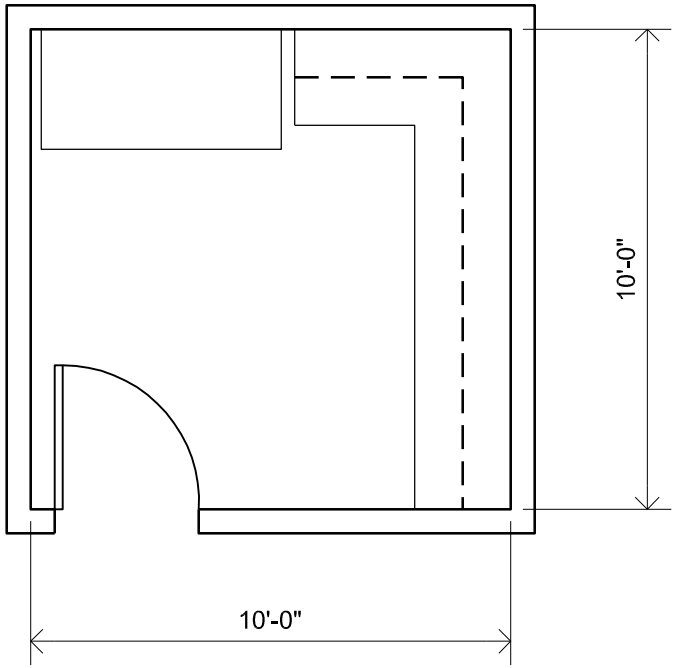
Floor Area: 100 SF
Adjacencies: Reception, Advising Room, Office

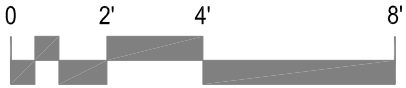
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	Accesory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Laminate
Countertops	Laminate
Open Shelving	Laminate
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	Yes
Casegoods	Yes
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	75
Relative Humidity	-
Ventilation	See Exhaust
Exhaust Air	0.5 cfm/sf
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	1
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	10
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


10'-0"
10'-0"


0
2'
4'
8'

1.3.1
Tutoring - General Table Area

Floor Area: 2,800 SF
Adjacencies: Breakout Room, Manager, Public Spaces

ARCHITECTURAL	
Occupancy Type	A-3
Load Factor	20
Occupancy Load	140
Exits	2
Live Load	-
Wall Finish	Paint
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustic Plaster
Ceiling Height	Existing
Casework Finish	Wood
Countertops	Solid Surface
Open Shelving	Match existing
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Pair
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

EQUIPMENT/FURNISHINGS	
Fume Hood	-
Portable Partitions w/ Casters	Yes
Desk	Yes
Table w/ Casters	Yes
Files	Yes
Casegoods	Yes
Marker Board w/ Casters	Yes
Projection System/AV	Yes
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	13/pers, 0.156/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

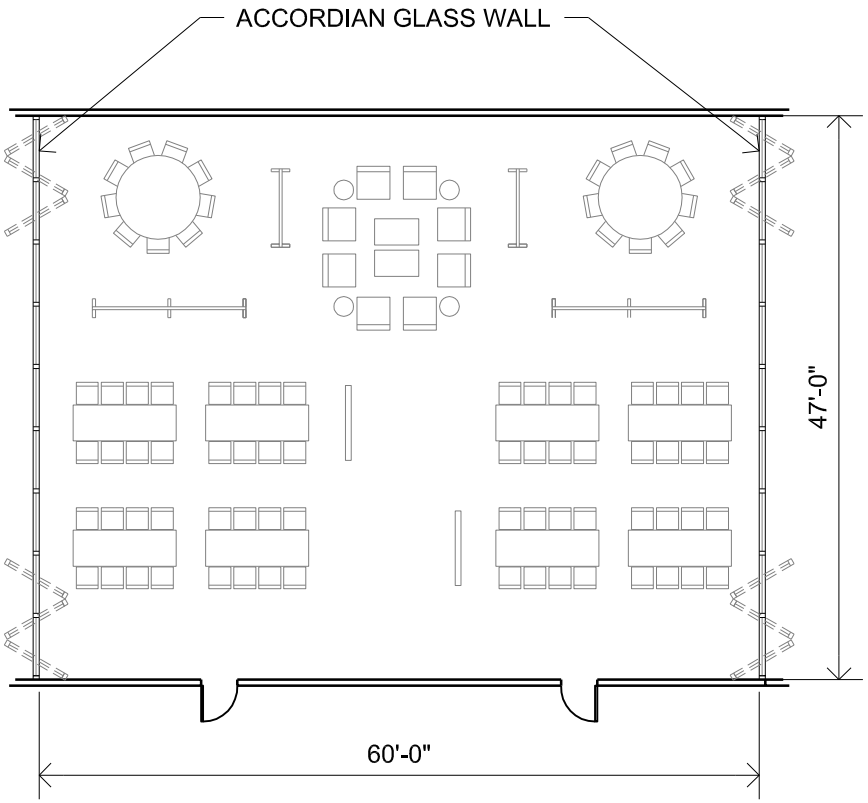
ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	Yes
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30-40
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	No
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

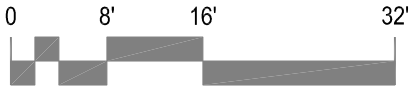
Notes:

Provide mixture of soft seating and table/chairs.

Provide moveable isolation panels for semi-private study areas.

Provide check-in/help desk w/ lockers for 10 employees.


ACCORDIAN GLASS WALL
47'-0"
60'-0"


0
8'
16'
32'

1.3.2
Tutoring - Breakout Room

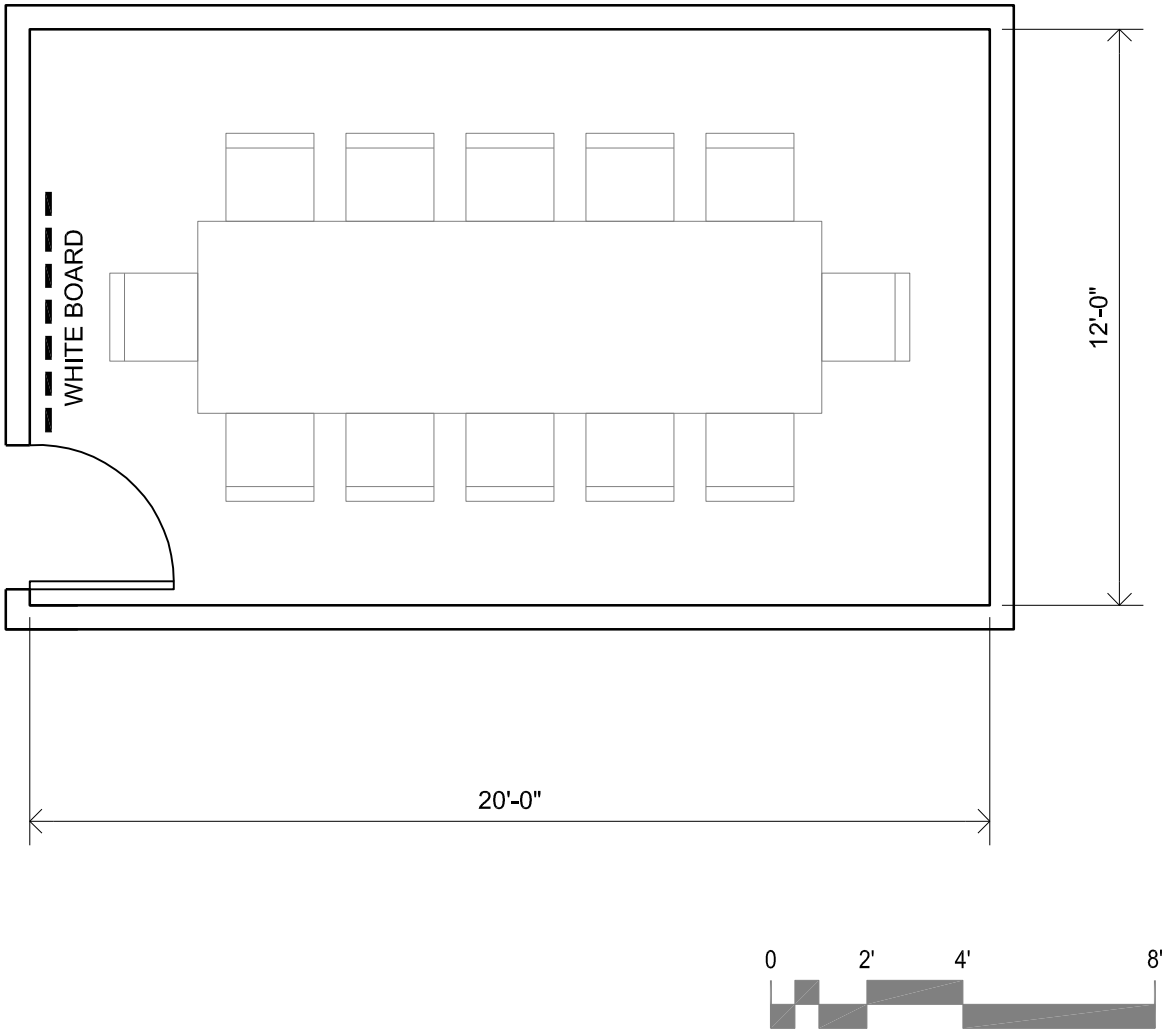
Floor Area: 240 SF
Adjacencies: General Table Area, Public Spaces

ARCHITECTURAL	
Occupancy Type	B
Load Factor	15
Occupancy Load	16
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustic plaster
Ceiling Height	9'-0"
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table / Conference Seating	Yes
Files	-
Casegoods	-
Marker Board	Yes
Projection System/AV	Yes
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	13/pers, 0.156/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	2
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30-40
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


WHITE BOARD
12'-0"
20'-0"
0
2'
4'
8'

1.3.3
Tutoring - Manager's Office

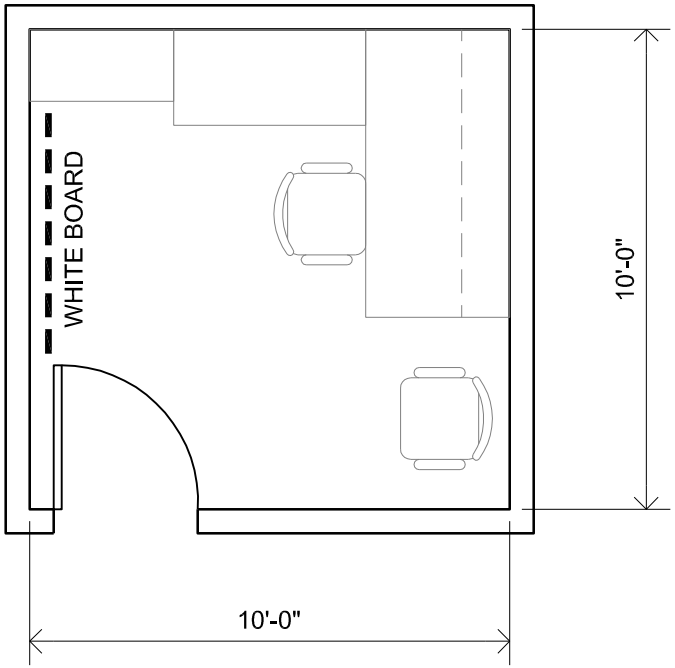
Floor Area: 100 SF
Adjacencies: General Table Area

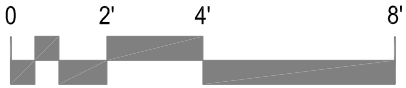
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	1
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	-
Open Shelving	Plastic Lam
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk/Chairs	Yes
Table	-
Files	Yes
Casegoods/Bookcase	Yes
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


WHITE BOARD
10'-0"
10'-0"


0
2'
4'
8'

1.4.1
CSME - Director's Office

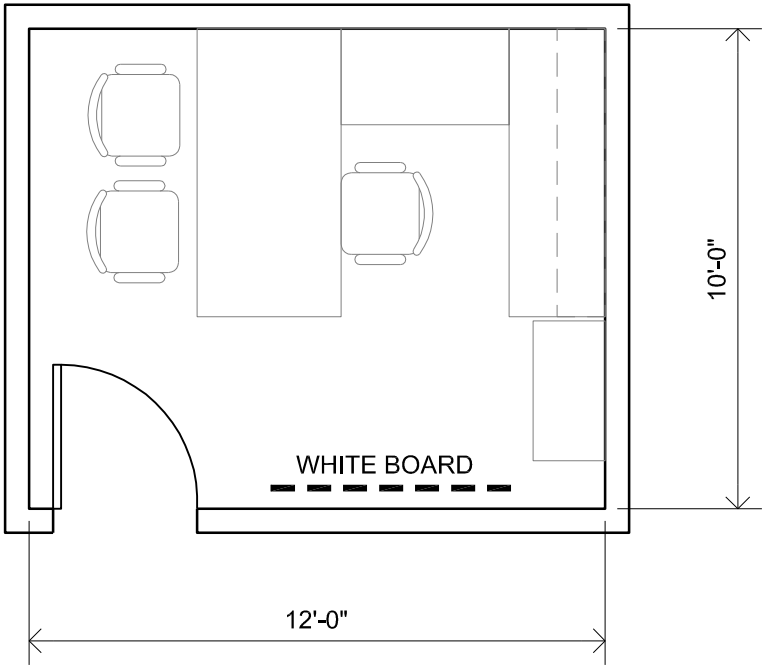
Floor Area: 120 SF
Adjacencies: CSME Office Suite

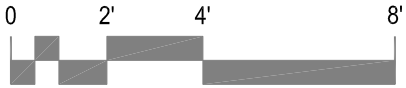
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	2
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	-
Open Shelving/Bookcase	Plastic Lam.
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk/Chairs	Yes
Table	-
Files	Yes
Casegoods/Bookcase	-
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


WHITE BOARD
10'-0"
12'-0"


0
2'
4'
8'

1.4.2

CSME - Office (Enclosed)

Informal Science Manager, Formal Science Manager, Diversity Program Manager, Accountant

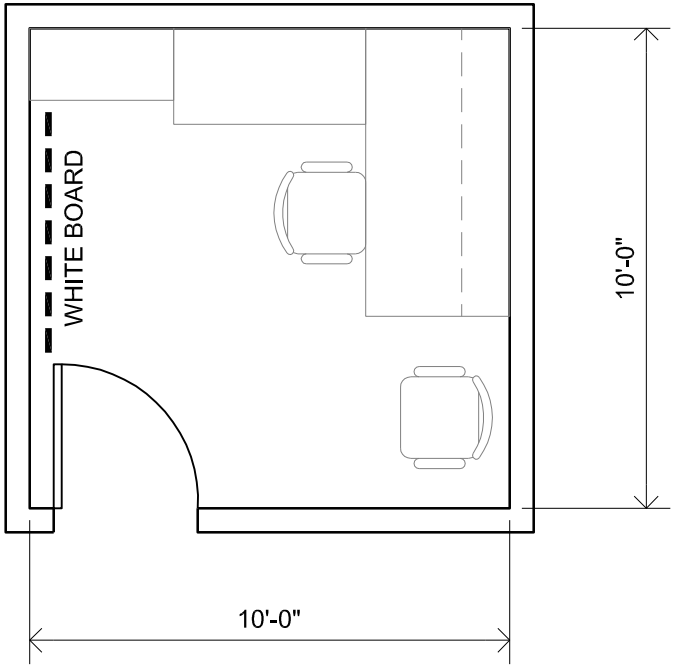
Floor Area: 100 SF
Adjacencies: CSME Office Suite

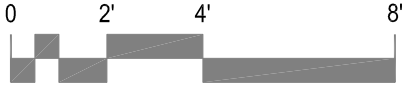
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	1
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	-
Open Shelving/Bookcase	Plastic Lam.
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk/Chairs	Yes
Table	-
Files	Yes
Casegoods/Bookcase	Yes
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


WHITE BOARD
10'-0"
10'-0"


0
2'
4'
8'

1.4.3

CSME - Office (Open)

Director, Accountant, Informal Science (2), Formal Science Grants, Diversity (3), Visiting Faculty, Intern (2)

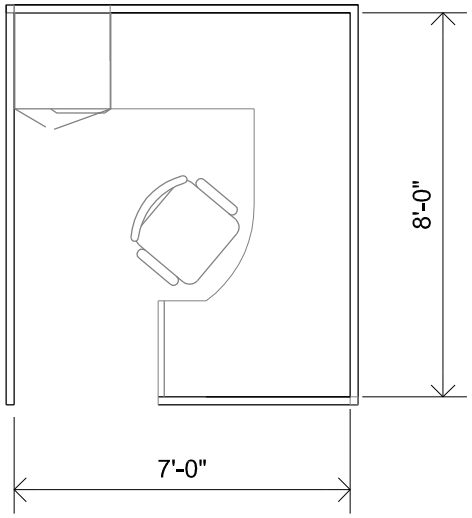
Floor Area: 60 SF/Desking (720 SF Total)
Adjacencies: CSME Office Suite, Work/Copy

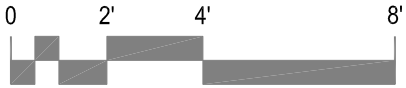
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	8
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	-
Open Shelving	-
Shielding	-
Door Width	-
Door Height	-
Door Type	-
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desking System 6'x8'/Chair	Yes
Table	-
Files	Yes
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1 per station
Data (qty and security)	1 per station
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting/Task	Yes
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


8'-0"
7'-0"


0
2'
4'
8'

1.4.5
CSME - Storage

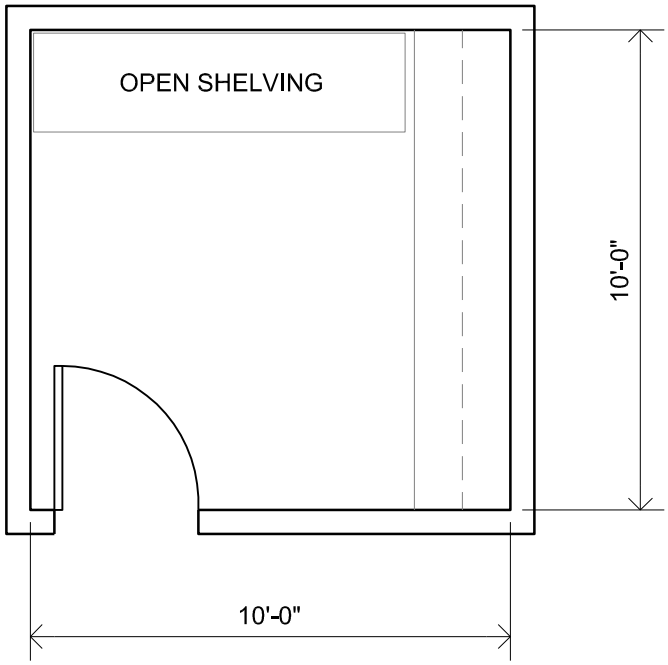
Floor Area: 100 SF
Adjacencies: CSME Office Suite,

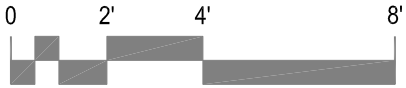
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accesory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	Plastic Lam.
Open Shelving	Plastic Lam.
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	Yes
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.156/cfm
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	-
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	10
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


OPEN SHELVING
10'-0"
10'-0"


0
2'
4'
8'

1.4.6
CSME - Media Train/Production

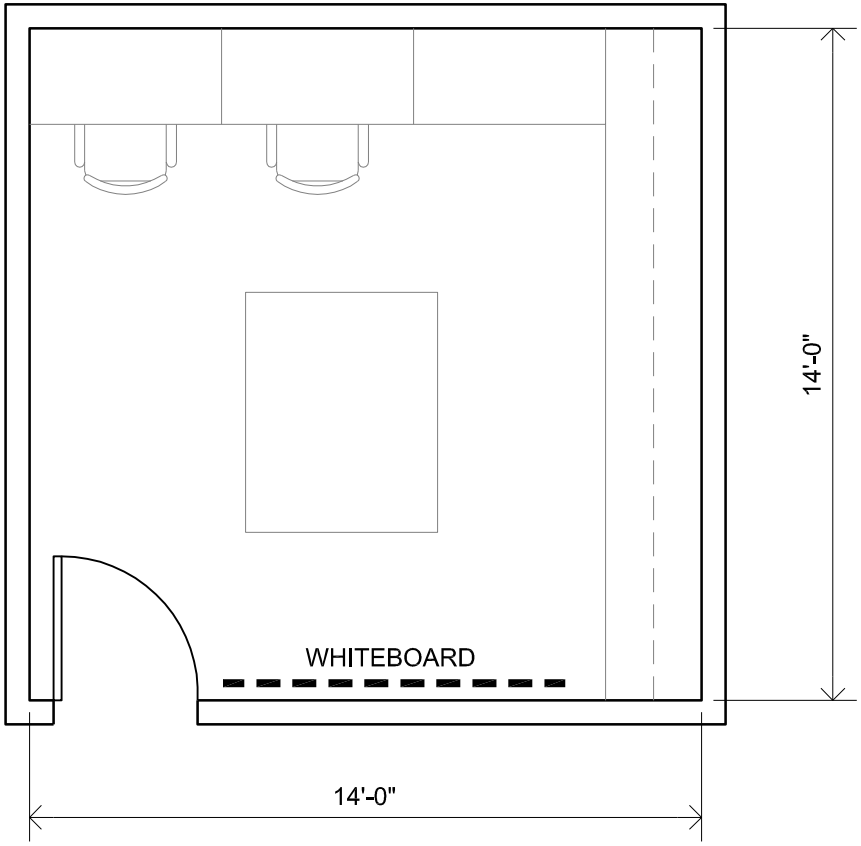
Floor Area: 200 SF
Adjacencies: CSME Office Suite, Work/Copy

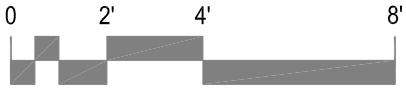
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	2
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	Plastic Lam.
Open Shelving	Plastic Lam.
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk/Seating	Yes
Table	-
Files	Yes
Casegoods	Yes
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1 - Yes
Data (qty and security)	3- Yes
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	50
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


WHITEBOARD
14'-0"
14'-0"


0
2'
4'
8'

1.4.7
CSME - STEM Edu. Rsrc. Center

Floor Area: 1,350 SF
Adjacencies: CSME Office Suite, Public Spaces

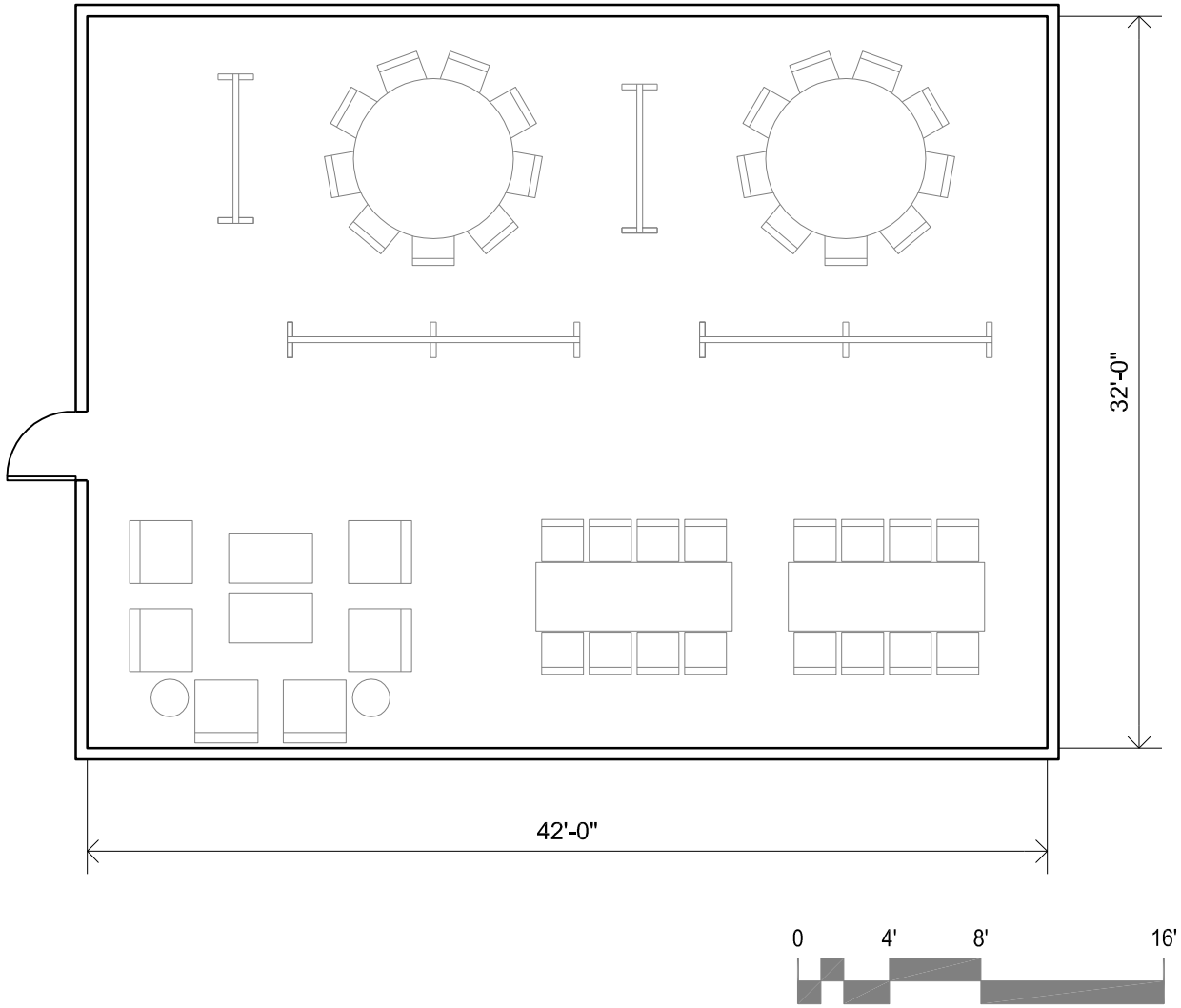
ARCHITECTURAL	
Occupancy Type	B
Load Factor	20
Occupancy Load	68
Exits	2
Live Load	-
Wall Finish	Plaster - Existing
Baseboard	Wood
Floor Finish	Carpet
Ceiling Finish	Plaster
Ceiling Height	Match Existing
Casework Finish	Match Existing
Countertops	-
Open Shelving	Wood (Match Existing)
Shielding	-
Door Width	3'-0"
Door Height	8'-0" - Match Existing
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Tables / Chairs / Casters	Yes
Files	-
Casegoods	Yes
Marker Board	Yes
Projection System/AV	Yes
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	Yes
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	40
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:

Space scheduled to be in historic graduate reading room - refer to preservation plan for restoration requirements.


32'-0"
42'-0"
0
4'
8'
16'

1.5.1
CQB - Director's Office

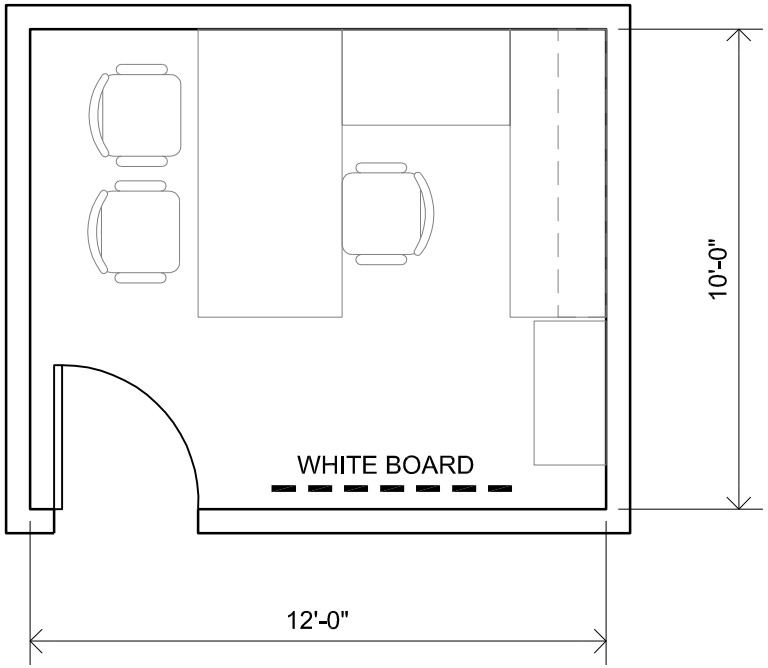
Floor Area: 120 SF
Adjacencies: Undergrad Incubator, CSME, Work/Copy

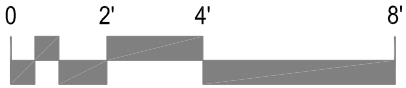
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	2
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	-
Open Shelving/Bookcase	Plastic Lam.
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk/Chairs	Yes
Tables	-
Files	Yes
Casegoods/Bookcase	Yes
Marker Board	Yes
Projection System	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Cable TV	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


WHITE BOARD
10'-0"
12'-0"


0
2'
4'
8'

1.5.2
CQB - Undergrad Incubator

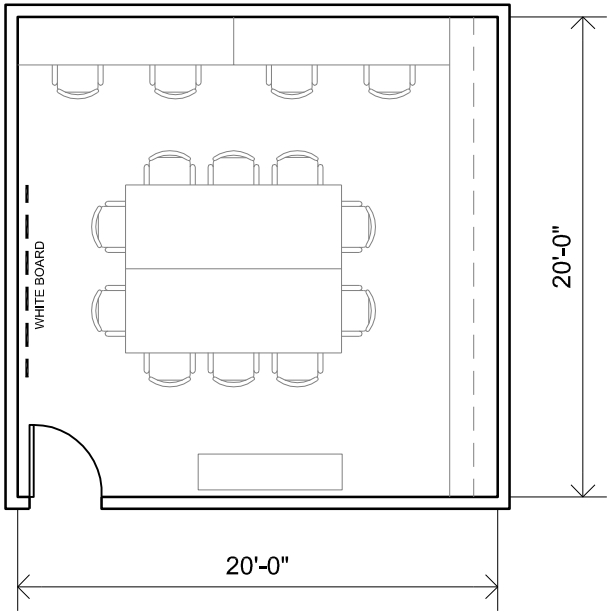
Floor Area: 400
Adjacencies: CQB Director, Public Space, Media

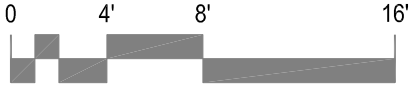
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	4
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	Plastic Lam,
Open Shelving	Plastic Lam.
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	Yes
Tables/Casters	Yes
Files	Yes
Casegoods/Storage	Yes
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	13/pers, 0.156/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	8
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	50
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


WHITE BOARD
20'-0"
20'-0"


0
4'
8'
16'

2.1.1

CCGS - Office

Principal Investigator (12), Senior Scientist (2)

Floor Area: 120 SF
Adjacencies: Research Labs, Seminar Rooms

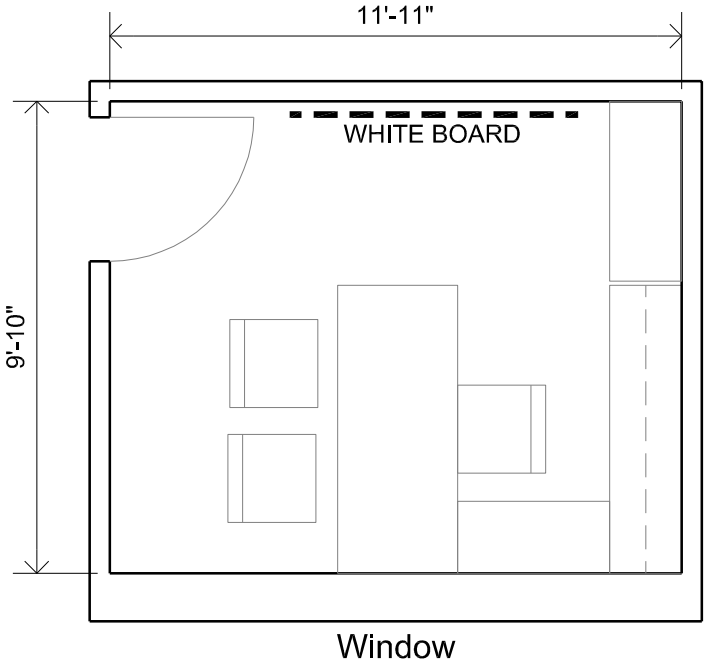
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	2
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	-
Open Shelving/Bookcase	Yes
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

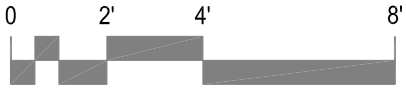
EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk/Seating	Yes
Table	-
Files	Yes
Casegoods/Bookcase	Yes
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	Positive to lab
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:

Hours of Operation: 24/7


11'-11"
WHITE BOARD
9'-10"
Window


0
2'
4'
8'

2.1.2
CCGS - Manager

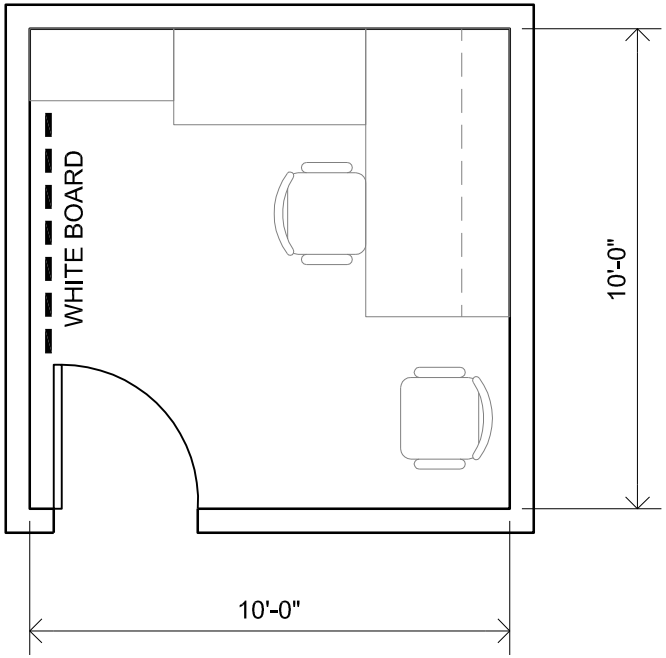
Floor Area: 100 SF
Adjacencies: Research Labs

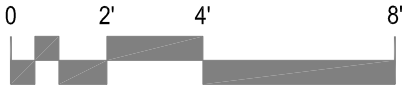
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	1
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	-
Open Shelving	-
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk/Seating	Yes
Table	-
Files	Yes
Casegoods/Bookcase	Yes
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	Positive to Lab
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


WHITE BOARD
10'-0"
10'-0"


0
2'
4'
8'

2.1.3
CCGS - Copy/Storage

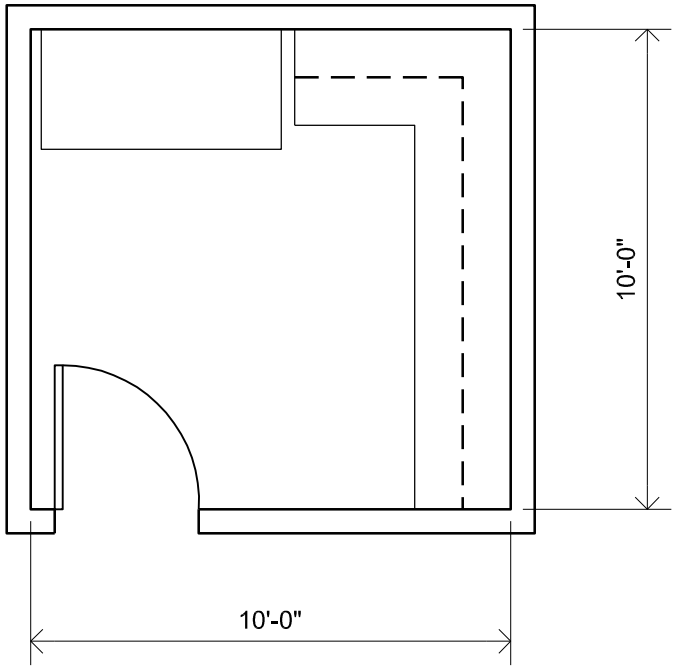
Floor Area: 100 SF
Adjacencies: Research Labs

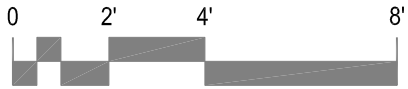
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accesory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Laminate
Countertops	Plastic Laminate
Open Shelving	Yes
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	75
Relative Humidity	-
Ventilation	See Exhaust
Exhaust Air	0.5 cfm/sf
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	1
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	10
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


10'-0"
10'-0"


0
2'
4'
8'

2.2.1
CCGS - General Research Lab

Floor Area: 18,600 SF
Adjacencies: Support Lab, PI Offices

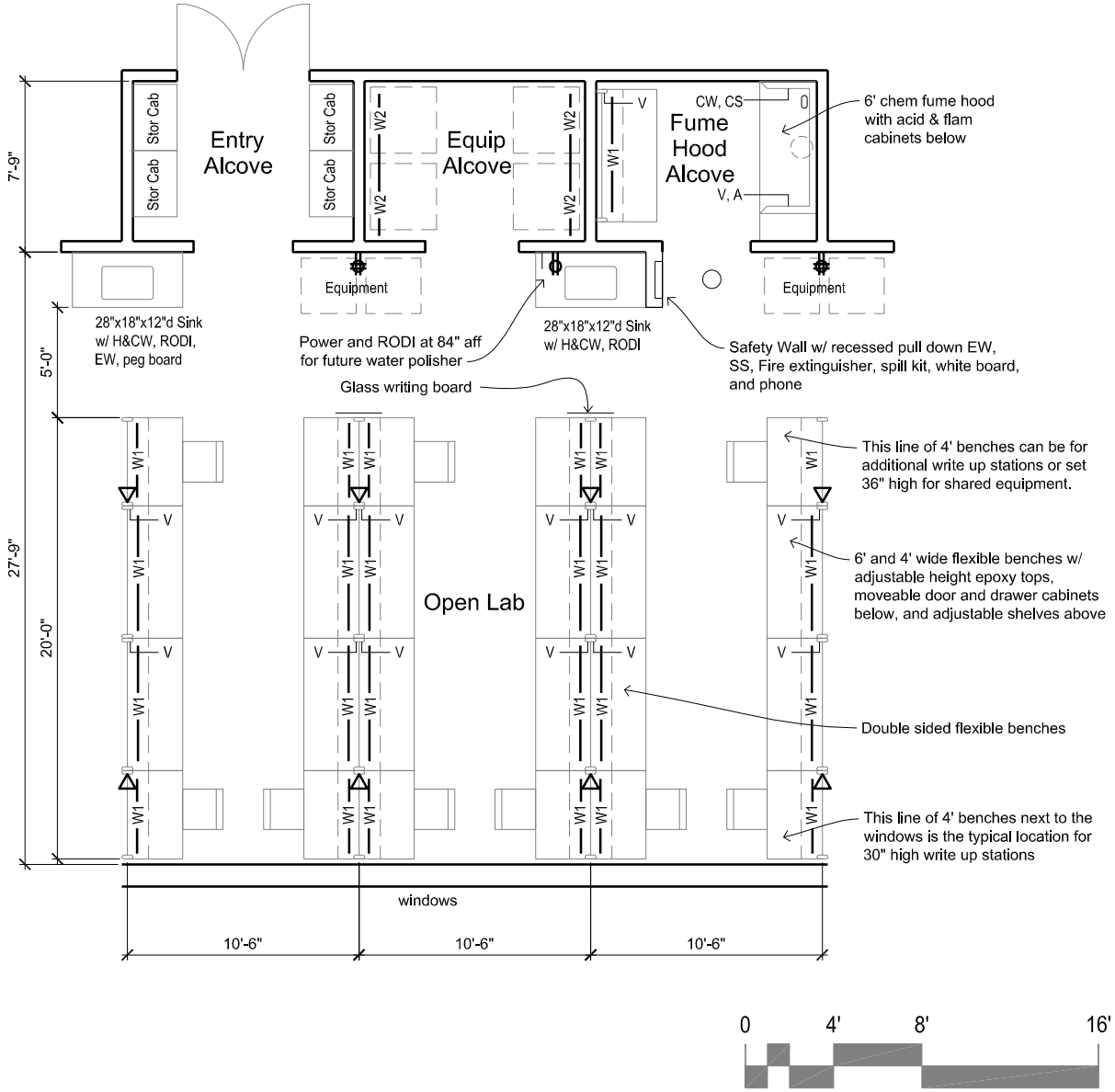
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	186
Exits	2
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral cove
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	10'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Metal
Shielding	-
Door Width	6'-0"
Door Height	7'-0"
Door Type	Double
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	(10) @ 6'
BSC	-
Desk	-
Table	-
Files	-
Casegoods	4' & 6' Flex Benches
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6 ACH Occ, 4 ACH Unocc
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	RO/DI
Chilled Water	-
Floor Drain	Yes, w/ deep seal trap
Sink(s)	(21) @ 28"x18"x12" (SS)
Steam	-
Cooling Water	Yes
Condensate	No
Safety Shower	Yes
Eyewash	Yes
Gasses	-
Compressed Air	@ Fume Hood
Vacuum	@ Benches

ELECTRICAL	
Voltage/Phase	120/208
Estimated Loads	-
Emergency Power	Yes
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	@ safety station
Data (qty and security)	1 per 10' of bench
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	50 Ambient / 80 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	Yes
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

Notes:

Hours of operation: 24/7


Entry Alcove
Equip Alcove
Fume Hood Alcove
Stor Cab
Stor Cab
Stor Cab
Stor Cab
W2
W2
W2
W2
W1
V
CW, CS
V, A
6' chem fume hood with acid & flam cabinets below
Equipment
Equipment
28"x18"x12"d Sink w/ H&CW, RODI, EW, peg board
Power and RODI at 84" aff for future water polisher
28"x18"x12"d Sink w/ H&CW, RODI
Safety Wall w/ recessed pull down EW, SS, Fire extinguisher, spill kit, white board, and phone
Glass writing board
7'-9"
5'-0"
27'-9"
20'-0"
Open Lab
W1
V
This line of 4' benches can be for additional write up stations or set 36" high for shared equipment.
6' and 4' wide flexible benches w/ adjustable height epoxy tops, moveable door and drawer cabinets below, and adjustable shelves above
Double sided flexible benches
This line of 4' benches next to the windows is the typical location for 30" high write up stations
windows
10'-6"
10'-6"
10'-6"
0
4'
8'
16'

2.2.2

CCGS - Chemistry Lab

Ji, Heemstra

Floor Area: 2,946 SF
Adjacencies: Support Lab, PI Offices, General Research Lab

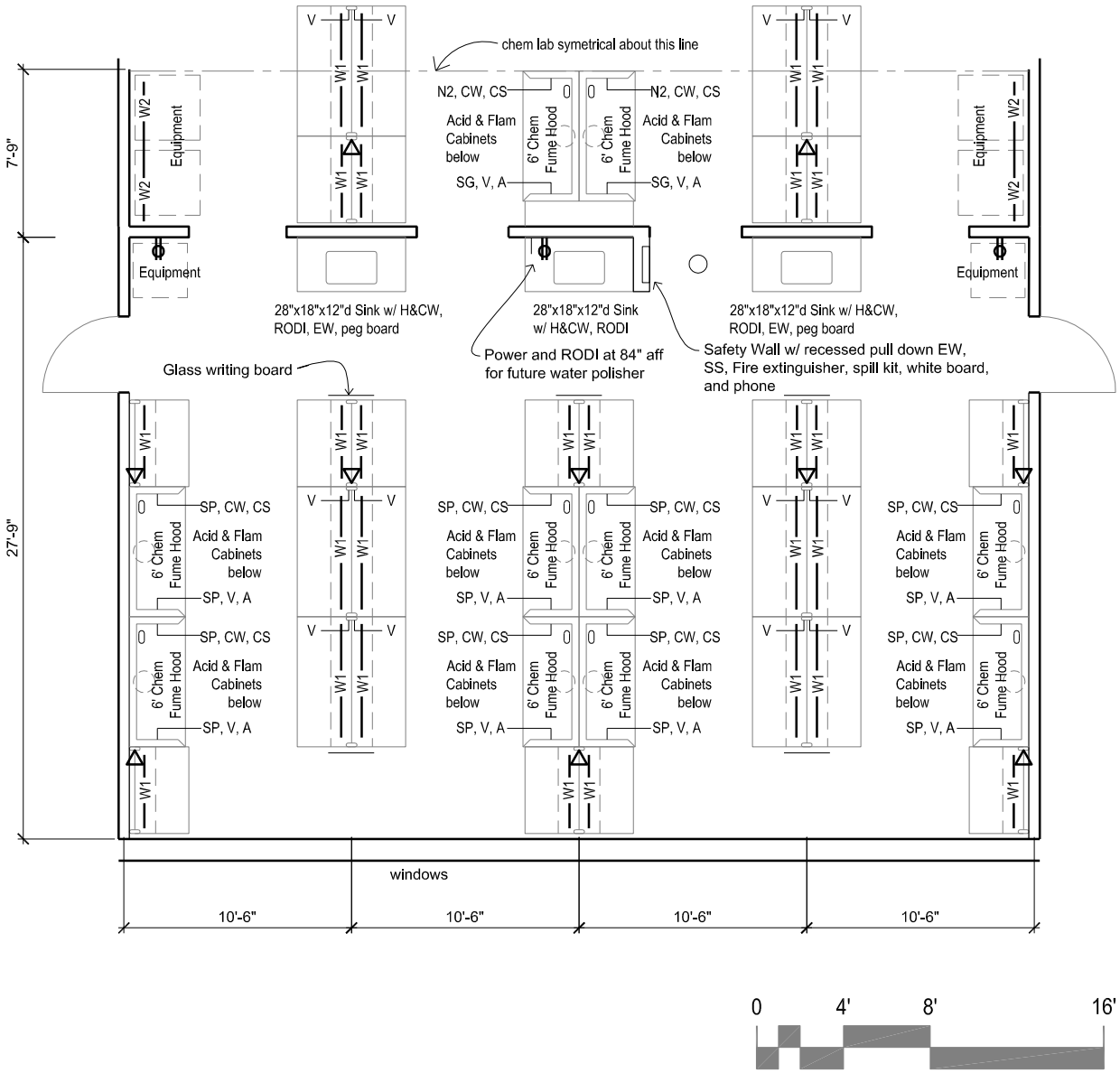
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	30
Exits	2
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral cove
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	10'-0"
Casework Finish	Epoxy
Countertops	Metal
Open Shelving	Yes
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	(20) @ 6'
BSC	-
Desk	-
Table	-
Files	-
Casegoods	4' & 6' Flex Benches
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6 ACH Occ, 4 ACH Unocc
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	RO/DI
Chilled Water	-
Floor Drain	Yes, w/ deep seal trap
Sink(s)	(6) @ 28"x18"x12"
Steam	-
Cooling Water	Yes
Condensate	No
Safety Shower	Yes
Eyewash	Yes
Gasses	N2, Ar
Compressed Air	Yes
Vacuum	Yes

ELECTRICAL	
Voltage/Phase	120/208
Estimated Loads	-
Emergency Power	Yes (Freezers)
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	@ safety station
Data (qty and security)	1 per 10' of bench
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	50 Ambient / 80 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	Yes
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

Notes:

Hours of operation: 24/7


chem lab symetrical about this line
7'-9"
27'-9"
Equipment
W2
W1
V
N2, CW, CS
Acid & Flam Cabinets below
6' Chem Fume Hood
SG, V, A
28"x18"x12"d Sink w/ H&CW, RODI, EW, peg board
28"x18"x12"d Sink w/ H&CW, RODI
Power and RODI at 84" aff for future water polisher
Safety Wall w/ recessed pull down EW, SS, Fire extinguisher, spill kit, white board, and phone
Glass writing board
SP, CW, CS
SP, V, A
windows
10'-6"

0
4'
8'
16'

2.2.3

CCGS - Microscope Room

Saffarian, Vershinin

Floor Area: 205 SF
Adjacencies: General Research Labs

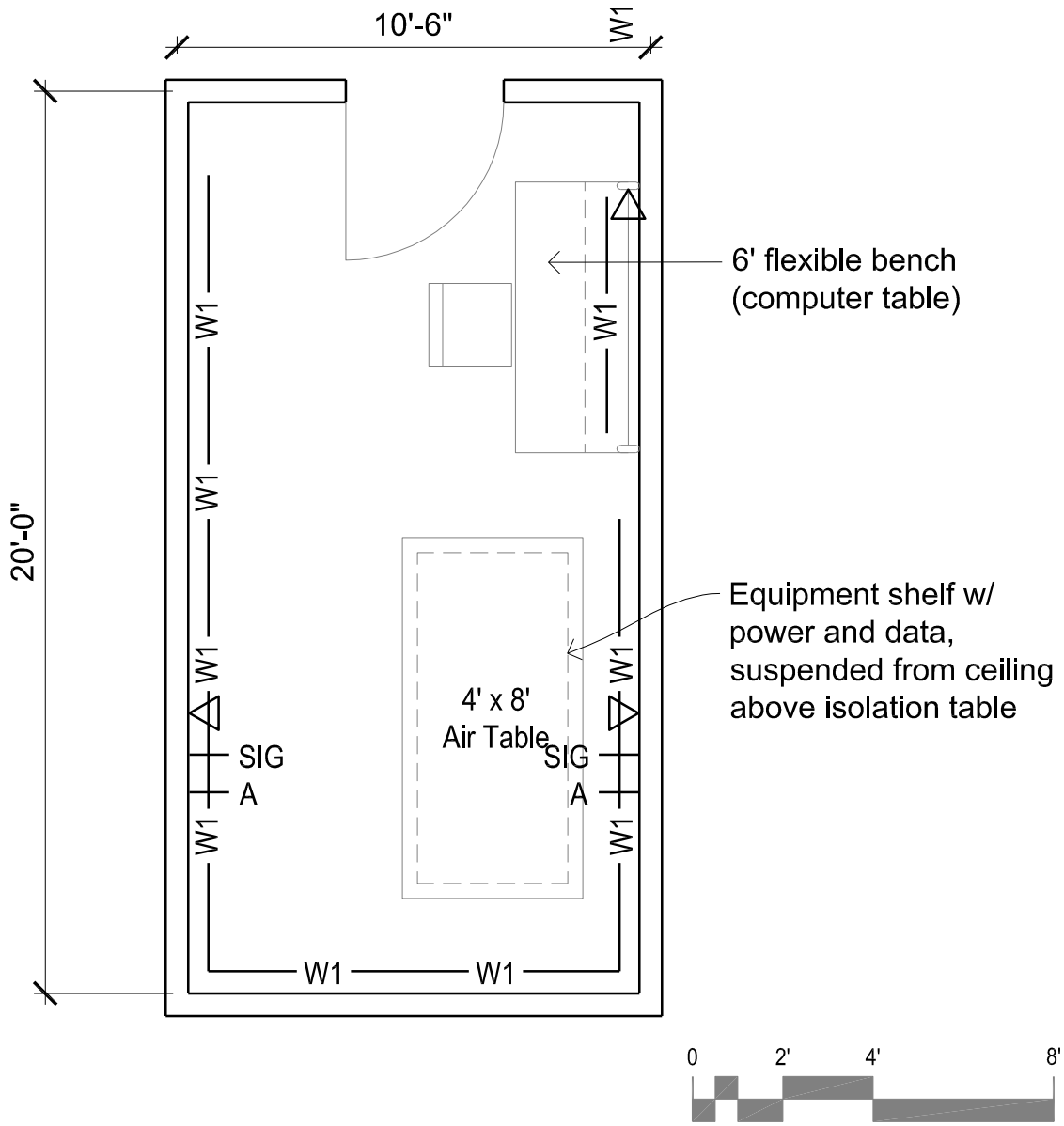
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral cove
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	10'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Metal
Shielding	TBD
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	No
Door Seals	Yes
Door Threshold	-
Sidelight	-
Daylighting	No
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	Air Table
Files	-
Casegoods	Flex Bench
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72°F +/- 1°F
Relative Humidity	50% +/-5%, 2%/hr change
Air Changes	6 ACH
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	HEPA Filtered Supply
Pressurization	Positive To Labs
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	Yes (Air Table)
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	Yes
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	3
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	80
Fixture Type	LED
Safe Light	-
Special Lighting	Electronic Ballasts
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	250

Notes:

-Hours of operation: 24/7
-Low velocity laminar flow supply air in room
-Space is very vibration sensitive.
-Air movement and minor fluctuations in temperature and humidity will adversely effect experiments.
-Equipment shelf suspended from ceiling above air table.
-Separate floor slab from adjacent spaces
-Provide Unistrut ceiling grid


10'-6"
W1
20'-0"
W1
W1
W1
W1
W1
W1
W1
W1
W1
6' flexible bench
(computer table)
Equipment shelf w/
power and data,
suspended from ceiling
above isolation table
4' x 8'
Air Table
SIG
A
SIG
A
0
2'
4'
8'

2.3.1
CCGS - Cold Room

Floor Area: 135 SF
Adjacencies: General Research Labs

ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Prefab Insulated Panel
Baseboard	-
Floor Finish	Sheet Vinyl on Prefab
Ceiling Finish	Insulated Panel
Ceiling Height	8'-6"
Casework Finish	Stainless Steel
Countertops	Stainless Steel
Open Shelving	Stainless Steel
Shielding	-
Door Width	3'-0"
Door Height	7'-0"
Door Type	Single (Insulated)
Door Vision Panel	Yes (Triple Glazed)
Door Seals	Yes
Door Threshold	Yes
Sidelight	-
Daylighting	No
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lockset

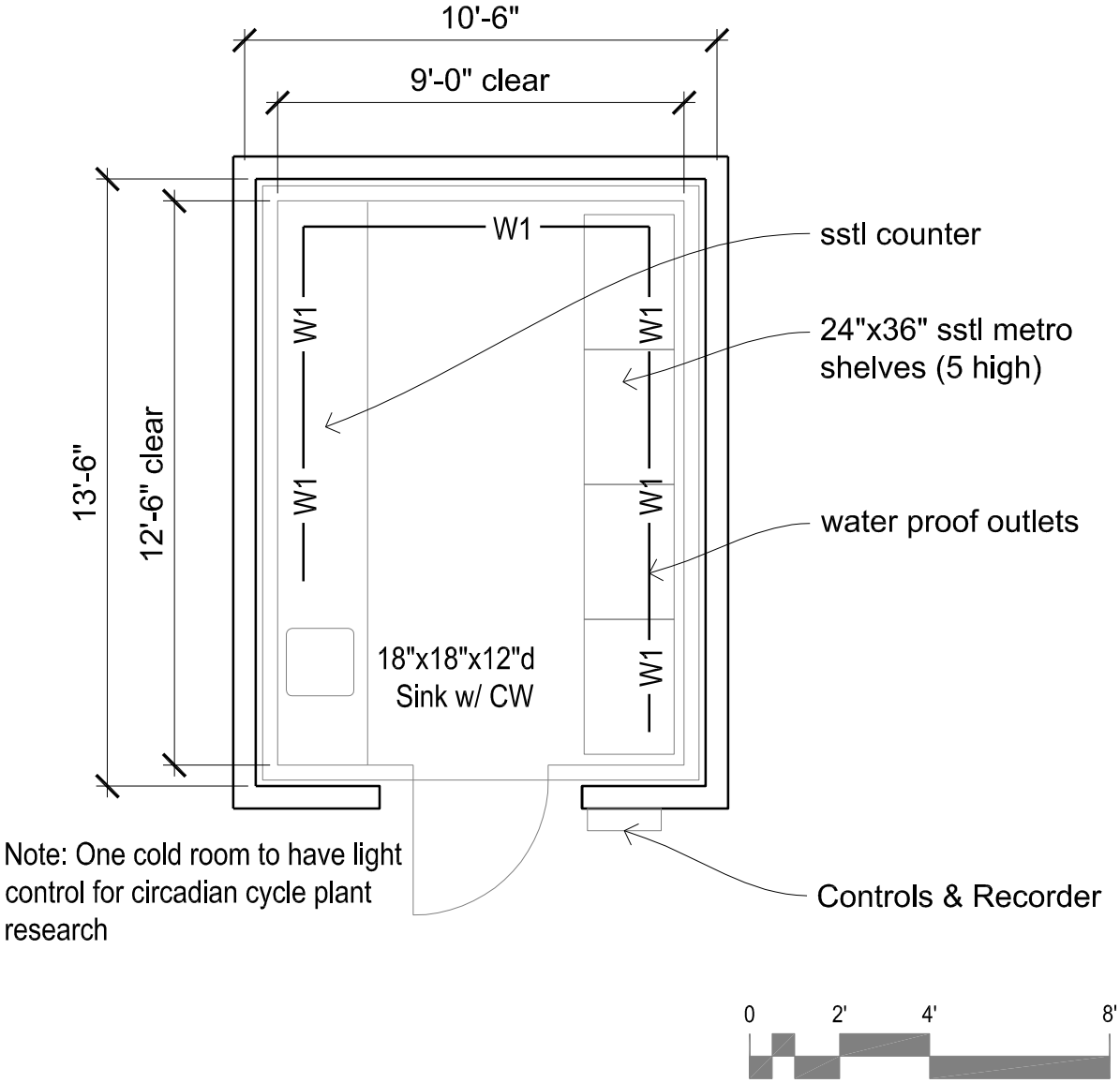
EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	--
Files	-
Casegoods	SS Metro Shelf
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	39°F ± 3°F
Relative Humidity	dpt < 36°F
Ventilation	Work in Cold Room
Exhaust Air	-
Return Air	-
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	Yes
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	Yes, w/ Deep Seal Trap
Sink(s)	(1) 18"X18"x12" (SS)
Steam	-
Cooling Water	-
Condensate	To Drain
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	Yes
UPS	No
Sensitive Instrument Ground	Yes
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	2
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	80
Fixture Type	Sealed
Safe Light	-
Special Lighting	Circadian Control - (1) CR
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

Notes:

Hours of operation: 24/7

Package environmental room and control.


10'-6"
9'-0" clear
13'-6"
12'-6" clear
W1
W1
W1
W1
W1
W1
sstl counter
24"x36" sstl metro shelves (5 high)
water proof outlets
18"x18"x12"d Sink w/ CW
Controls & Recorder
Note: One cold room to have light control for circadian cycle plant research
0
2'
4'
8'

2.3.2
CCGS - Tissue Culture (Large)

Floor Area: 198 SF
Adjacencies: General Research Labs

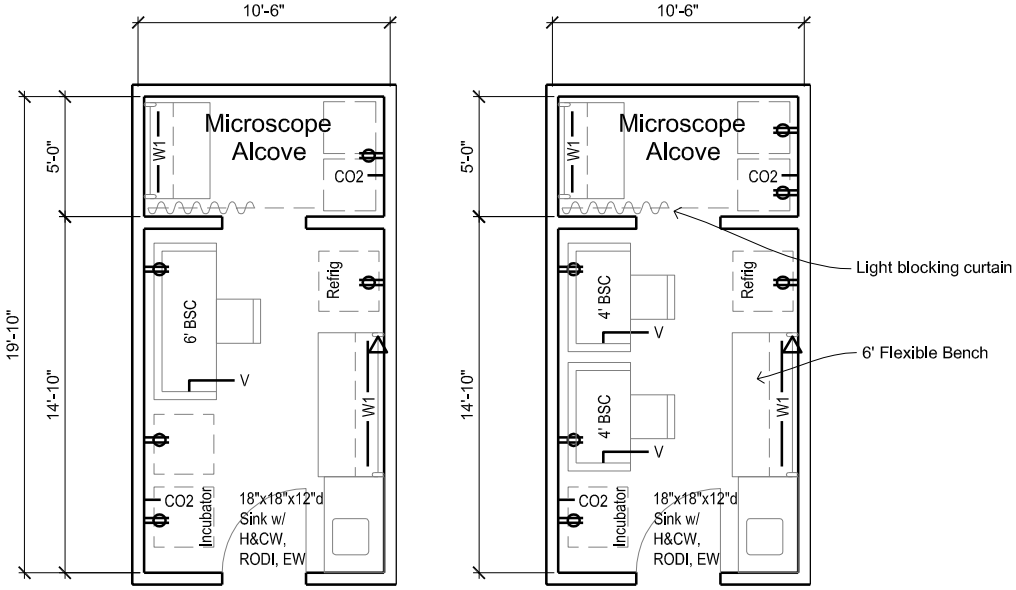
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Intergal Coved
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Metal
Shielding	-
Door Width	3'-6"
Door Height	7'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	No
Biological Safety Level	BSL-2
Level of security	-
Access (Lock, Card, Other)	Lockset

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	(2) 4' Class II, Type A
Desk	-
Table	-
Files	-
Casegoods	Fixed Sink & Flex Bench
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	20-50%
Ventilation	6 ACH Occ, 4 ACH Unocc
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	Standard
Pressurization	Positive
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	RO/DI
Chilled Water	-
Floor Drain	Yes, w/ Deep Seal Trap
Sink(s)	(1) 18"X18"x12" (SS)
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	Yes
Gasses	CO2
Compressed Air	-
Vacuum	Yes

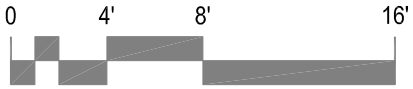
ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	Yes (Incubator/Freezer)
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	80
Fixture Type	Sealed/LED
Safe Light	-
Special Lighting	UV in BSC
Dimmable	@ Microscope Alcove
Darkenable	@ Microscope Alcove
Zoned Lighting	@ Microscope Alcove
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	2000

Notes:

Hours of operation: 24/7



Alternate Layout with one BSC



2.3.3
CCGS - Tissue Culture (Small)

Floor Area: 78 SF
Adjacencies: General Research Labs

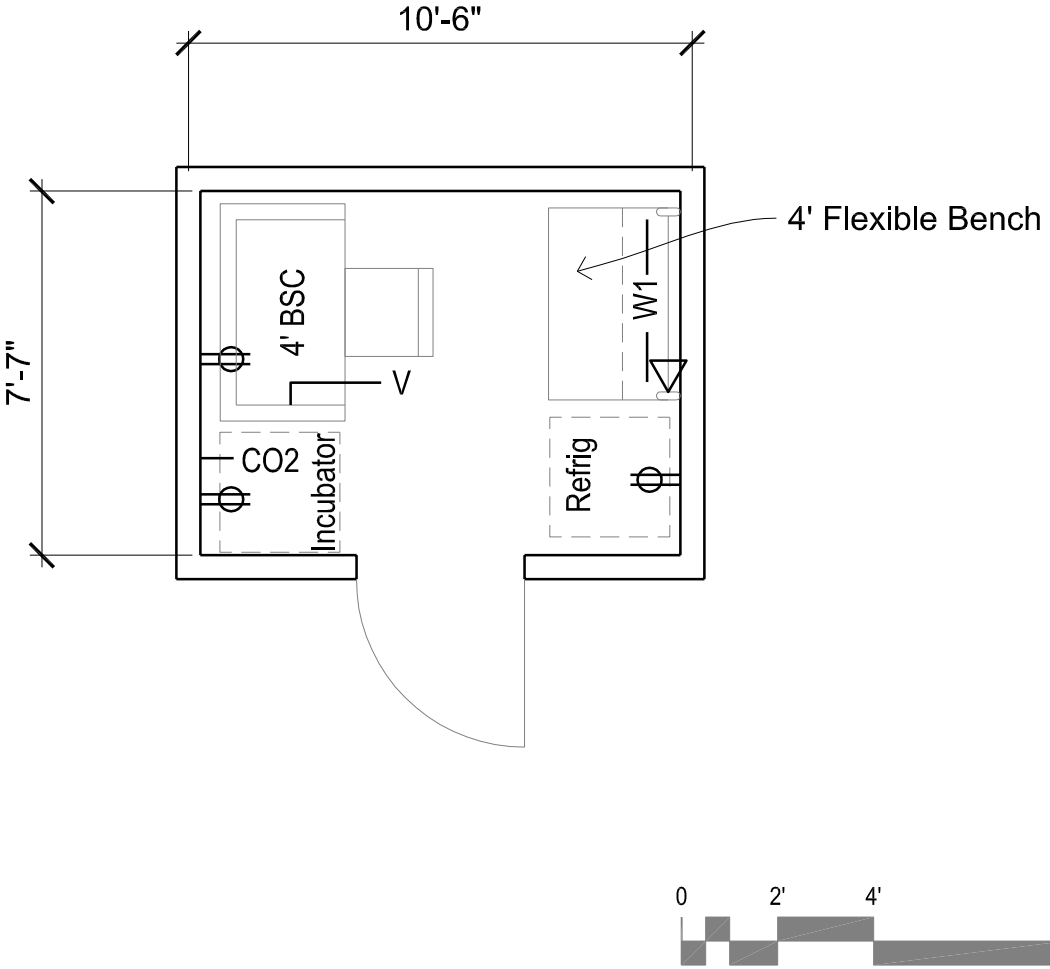
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Intergal Coved
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Metal
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	No
Biological Safety Level	BSL-2
Level of security	
Access (Lock, Card, Other)	Lockset

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	(1) 4' Class II, Type A
Desk	-
Table	-
Files	-
Casegoods	4' Flex Bench
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	20-50%
Ventilation	6 ACH Occ, 4 ACH Unocc
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	Standard
Pressurization	Positive
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	RO/DI
Chilled Water	-
Floor Drain	Yes w/ deep seal trap
Sink(s)	(1) 18"x18"x12" (SS)
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	Yes
Gasses	CO2
Compressed Air	-
Vacuum	Yes

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	Yes (Incubator/Freezer)
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	1
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	80
Fixture Type	Sealed/LED
Safe Light	-
Special Lighting	UV in BSC
Dimmable	Yes
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	2000

Notes:

Hours of operation: 24/7


7'-7"
CO2
Incubator
4' BSC
V
Refrig
W1
10'-6"
4' Flexible Bench
0
2'
4'
8'

2.3.4
CCGS - Microscope Room

Floor Area: 135 SF
Adjacencies: General Research Labs

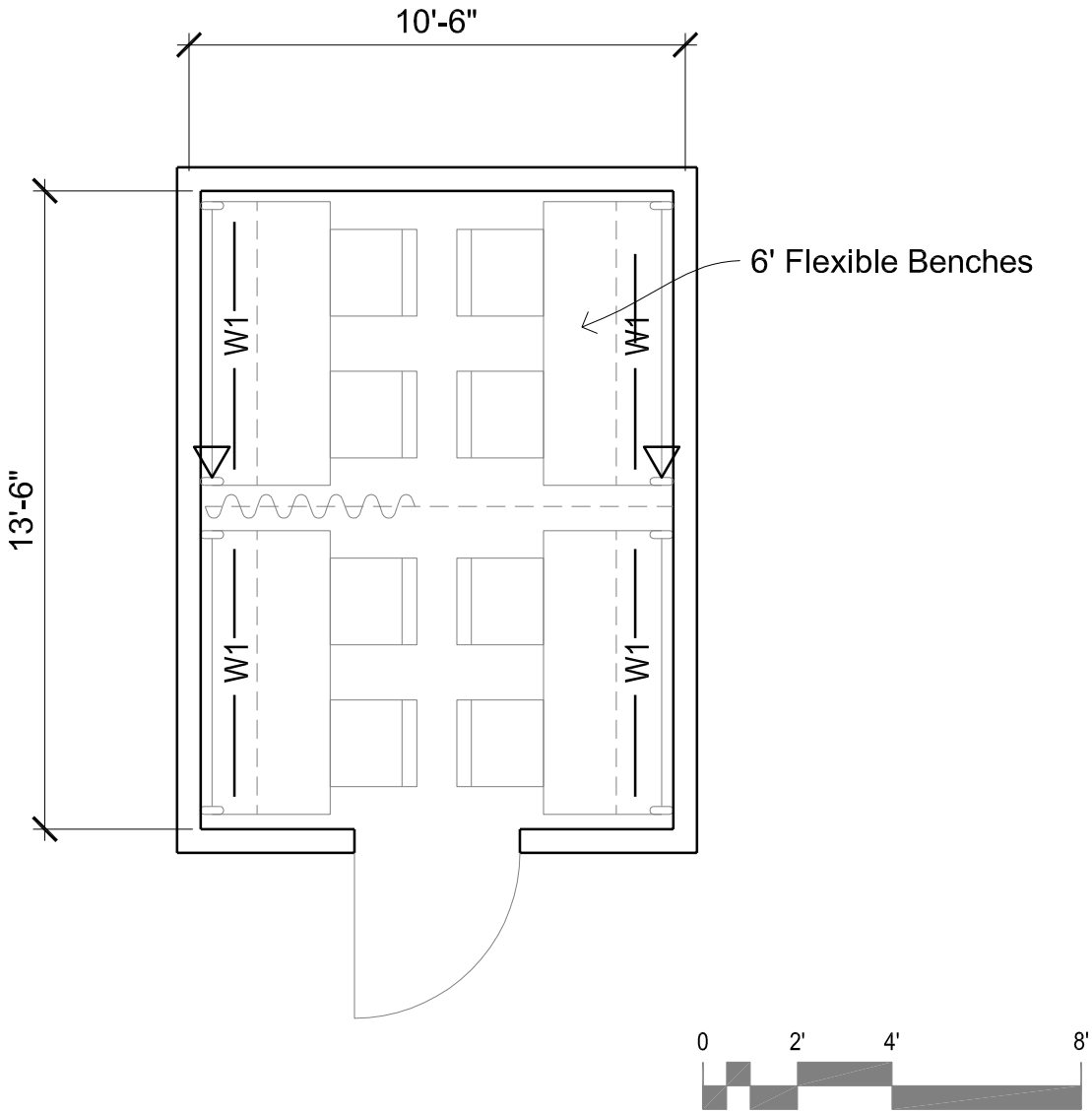
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Intergal Coved
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Metal
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	Light Tight
Door Threshold	Light Tight
Sidelight	-
Daylighting	No
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lockset

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	Flexible Benches
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72°F +/- 1°F
Relative Humidity	50% +/-5%, 2%/hr change
Air Changes	6 ACH
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	HEPA Filtered Supply
Pressurization	Positive To Labs
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	2
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	60
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	2000

Notes:

Hours of operation: 24/7


10'-6"
13'-6"
6' Flexible Benches
W1
W1
W1
W1
0
2'
4'
8'

2.3.5
CCGS - Equipment Corridor

Floor Area: 174 SF
Adjacencies: General Research Labs, Chemistry Labs

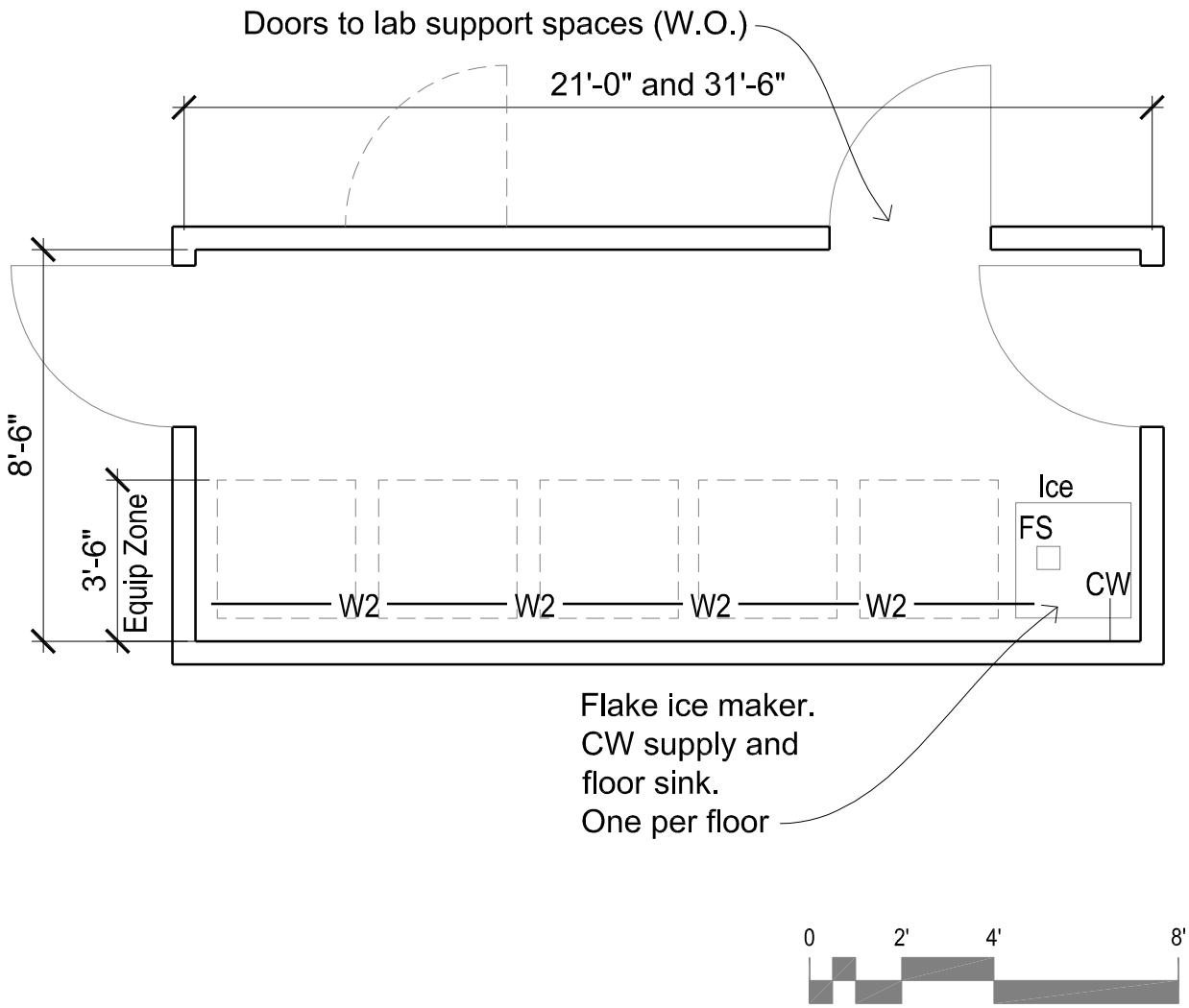
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	
Wall Finish	Gyp. Bd., Painted
Baseboard	Rubber
Floor Finish	VCT
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	Yes
Door Threshold	-
Sidelight	-
Daylighting	No
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6 ACH occ, 2 ACH unocc
Exhaust Air	100% (Heat)
Return Air	No
Makeup Air	-
Filtration	Standard
Pressurization	Negative
PLUMBING	
Cold Water	At Ice Maker
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	Floor Sink at Ice Maker
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120/208
Estimated Loads	-
Emergency Power	Yes (Refrig/Freezer)
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	-
Wi-Fi	Yes
Equipment Alarm	Yes (Refrig/Freezer)
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	70
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

Notes:

Hours of operation: 24/7


Doors to lab support spaces (W.O.)
21'-0" and 31'-6"
8'-6"
3'-6"
Equip Zone
W2
W2
W2
W2
Ice
FS
CW
Flake ice maker.
CW supply and
floor sink.
One per floor
0
2'
4'
8'

2.3.6
CCGS - Radio Isotope Lab

Floor Area: 78 SF
Adjacencies: General Research Lab

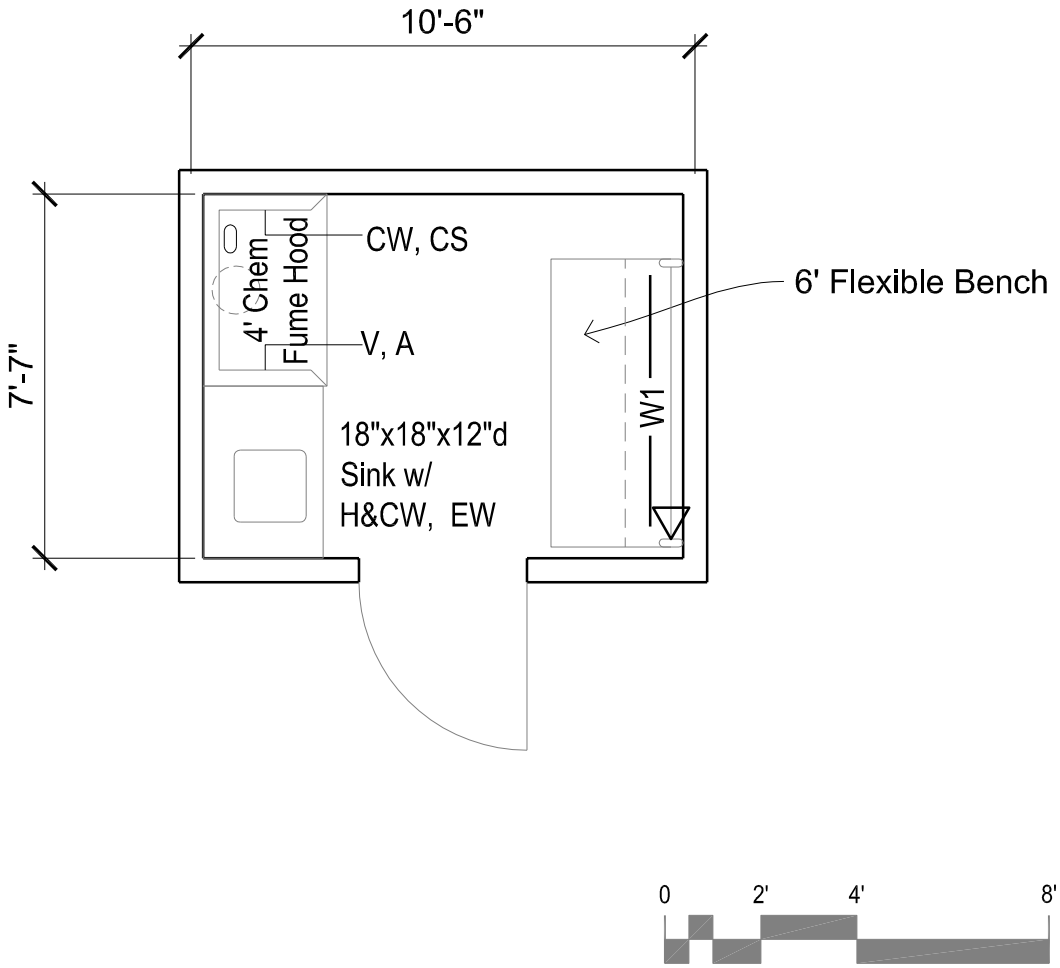
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral Cove
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Metal
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	Yes
Biological Safety Level	-
Level of security	High
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	(1) 4' Chem
BSC	-
Desk	-
Table	-
Files	-
Casegoods	4' Flex Bench
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Air Changes	6 ACH occ, 4 ACH unocc
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	HEPA
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	-
Chilled Water	-
Floor Drain	Yes, w/ deep seal trap
Sink(s)	(1) 18"x18"x12"
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	Yes
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	
Emergency Power	Yes (Refrig/Freezer)
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	Yes (Refrig/Freezer)
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	80
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

Notes:

Hours of operation: 24/7
Review with University Radiological Health Department (RHD)


10'-6"
7'-7"
4' Chem
Fume Hood
CW, CS
V, A
18"x18"x12"d
Sink w/
H&CW, EW
6' Flexible Bench
W1
0
2'
4'
8'

2.3.7

CCGS - BSL 3 Lab

Saffarian

Floor Area: 198 SF
Adjacencies: General Research Lab

ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	H.I. Gyp. Bd., Epoxy Paint
Baseboard	Integral
Floor Finish	Epoxy
Ceiling Finish	Gyp. Bd., Epoxy Paint
Ceiling Height	9'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Metal
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single, Interlocked
Door Vision Panel	Yes
Door Seals	Yes
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	BSL-3
Level of security	High
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	(1) 4' Class II, Type B2
Desk	-
Table	-
Files	-
Casegoods	Metal, Flex Bench
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cold
Relative Humidity	-
Ventilation	6 ACH Continuous
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	Standard
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	Yes
Chilled Water	-
Floor Drain	Yes, w/ deep seal trap
Sink(s)	(1) 18"x18"x12"
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	Yes
Gasses	CO2
Compressed Air	-
Vacuum	Local Pump and Trap

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	HVAC, Inc., BSC, Freezer
UPS	No
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	Yes (Incubator)
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	70
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	UV in BSC
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

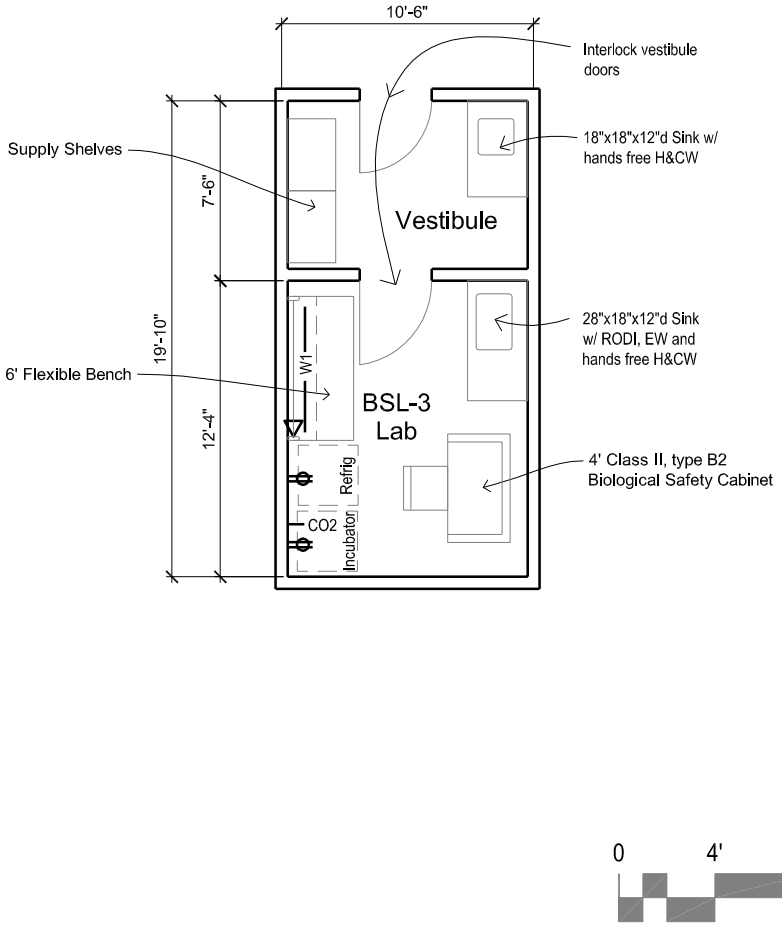
Notes:

Hours of operation: 24/7

Seal all penetrations in BSL-3 Lab

Provide vestibule with interlocked doors.

Space requires security cameras.


10'-6"
Interlock vestibule doors
Supply Shelves
18"x18"x12"d Sink w/ hands free H&CW
7'-6"
Vestibule
19'-10"
28"x18"x12"d Sink w/ RODI, EW and hands free H&CW
6' Flexible Bench
W1
BSL-3 Lab
12'-4"
4' Class II, type B2 Biological Safety Cabinet
Refrig
CO2
Incubator
0
4'
8'
16'

2.3.8

CCGS - Environmental Chamber

Clark

Floor Area: 198 SF
Adjacencies: General Research Lab, Plant Growth Area

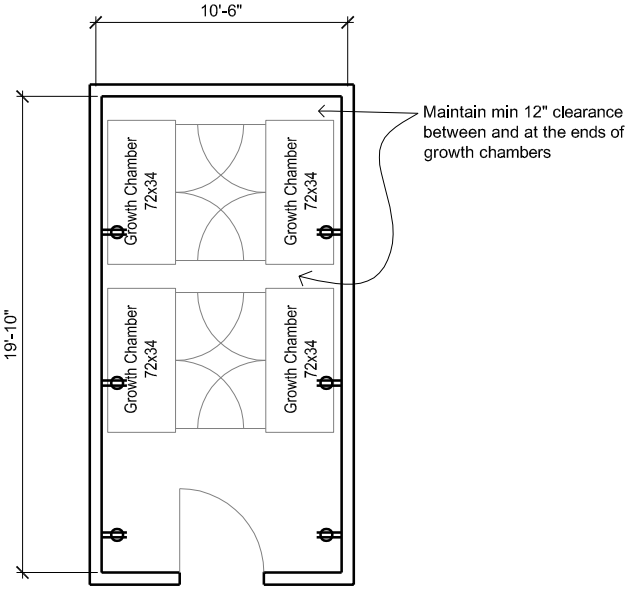
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Rubber
Floor Finish	VCT
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-6"
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	-
Door Width	3'-6"
Door Height	7'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	Not Required
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

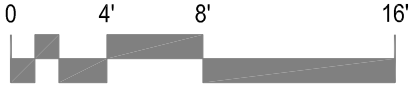
EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6 ACH, Continuous
Exhaust Air	100% (Heat)
Return Air	No
Makeup Air	-
Filtration	Standard
Pressurization	Negative
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	Yes
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	-
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	70
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

Notes:

Hours of operation: 24/7


19'-10"
Growth Chamber
72x34
Growth Chamber
72x34
Growth Chamber
72x34
Growth Chamber
72x34
10'-6"
Maintain min 12" clearance
between and at the ends of
growth chambers


0
4'
8'
16'

2.3.9

CCGS - Plant Growth

Clark

Floor Area: 198 SF
Adjacencies: General Research Lab, Environmental Chamber

ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral Cove
Floor Finish	Epoxy
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	-
Countertops	-
Open Shelving	Yes
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	Metro Shelves
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	20-50%
Ventilation	6 ACH
Exhaust Air	100% (Heat)
Return Air	-
Makeup Air	-
Filtration	Standard
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	7' Scullery (SS)
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	-
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	80
Fixture Type	-
Safe Light	-
Special Lighting	Grow Lights
Dimmable	Yes
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

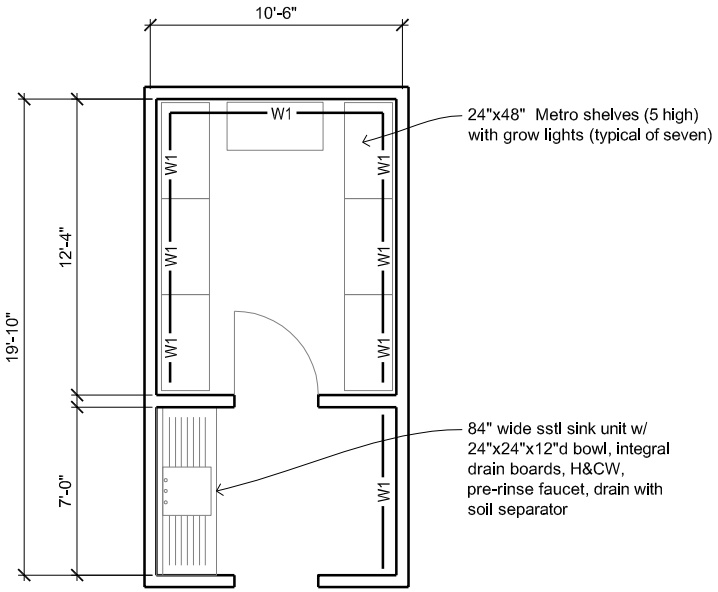
Notes:

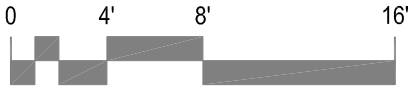
Hours of operation: 24/7

Trap with soil separator.

Pre-rinse faucet (flex hose).

Provide circadian light control system for grow lights


10'-6"
19'-10"
12'-4"
7'-0"
W1
24"x48" Metro shelves (5 high)
with grow lights (typical of seven)
84" wide sstl sink unit w/
24"x24"x12"d bowl, integral
drain boards, H&CW,
pre-rinse faucet, drain with
soil separator


0
4'
8'
16'

2.3.10
CCGS - Electrophysiology

Floor Area: 78 SF
Adjacencies: General Research Lab

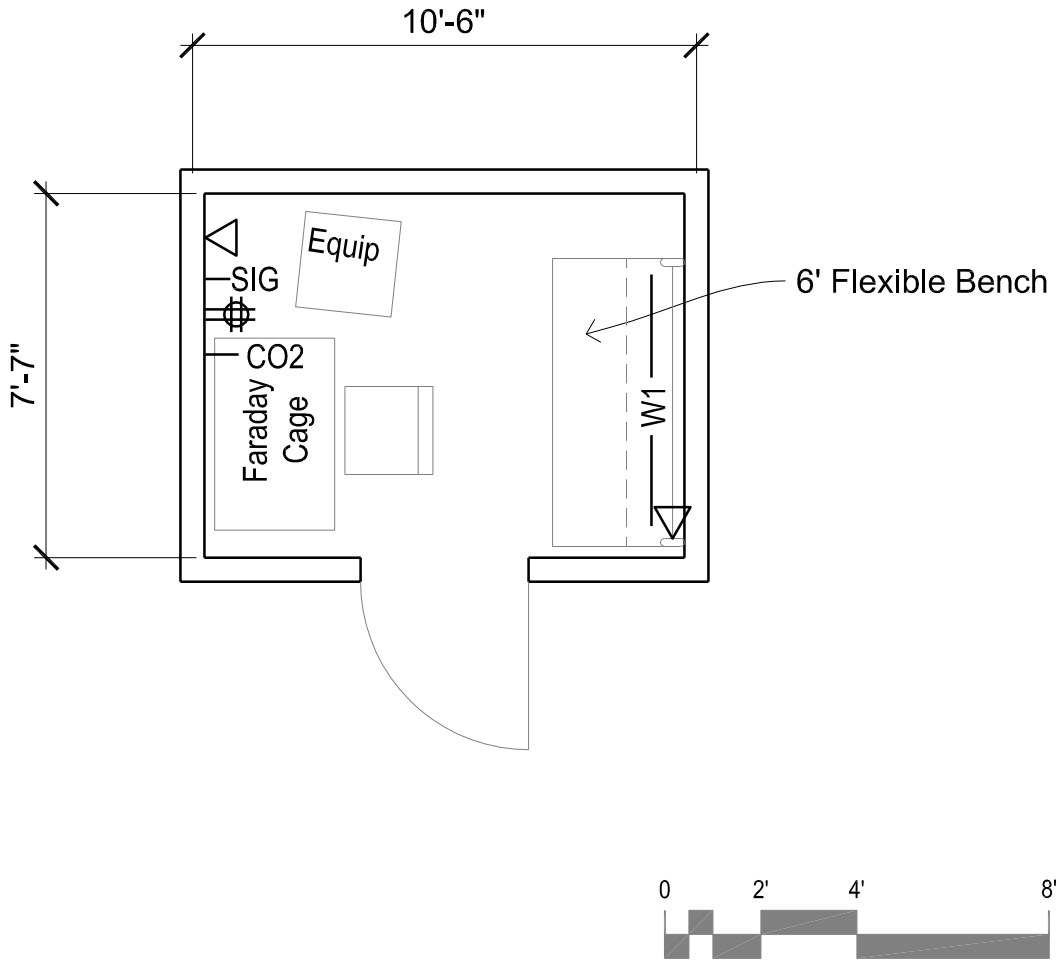
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral Cove
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Metal
Shielding	TBD
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	Yes (Light Control)
Door Threshold	-
Sidelight	-
Daylighting	No
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lockset

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	6' Flex Bench
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72°F ± 2°F
Relative Humidity	-
Ventilation	6 ACH occ, 4 ACH unocc
Exhaust Air	100% (Heat)
Return Air	No
Makeup Air	-
Filtration	Standard
Pressurization	Positive
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	Yes
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	Yes
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	80
Fixture Type	-
Safe Light	-
Special Lighting	Incandescent
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	2000

Notes:

Hours of operation: 24/7


10'-6"
7'-7"
Equip
SIG
CO2
Faraday Cage
W1
6' Flexible Bench
0
2'
4'
8'

2.3.11
CCGS - Glass Wash/Media Prep

Floor Area: 735 SF
Adjacencies: General Research Lab

ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	H.I. Gyp. Bd., Painted
Baseboard	Integral Cove
Floor Finish	Epoxy
Ceiling Finish	Washable Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Stainless Steel
Countertops	Stainless Steel
Open Shelving	Stainless Steel
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	Yes
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lockset

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	(1) 6' Class II, Type A
Desk	Yes
Table	-
Files	-
Casegoods	Fixed Stainless Steel
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	10 ACH occ, 5 ACH unocc
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	RO/DI
Chilled Water	-
Floor Drain	Yes
Sink(s)	(3) @ 28"x18"x12"
Steam	Clean Steam
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	Yes
Gasses	-
Compressed Air	-
Vacuum	@ BSC

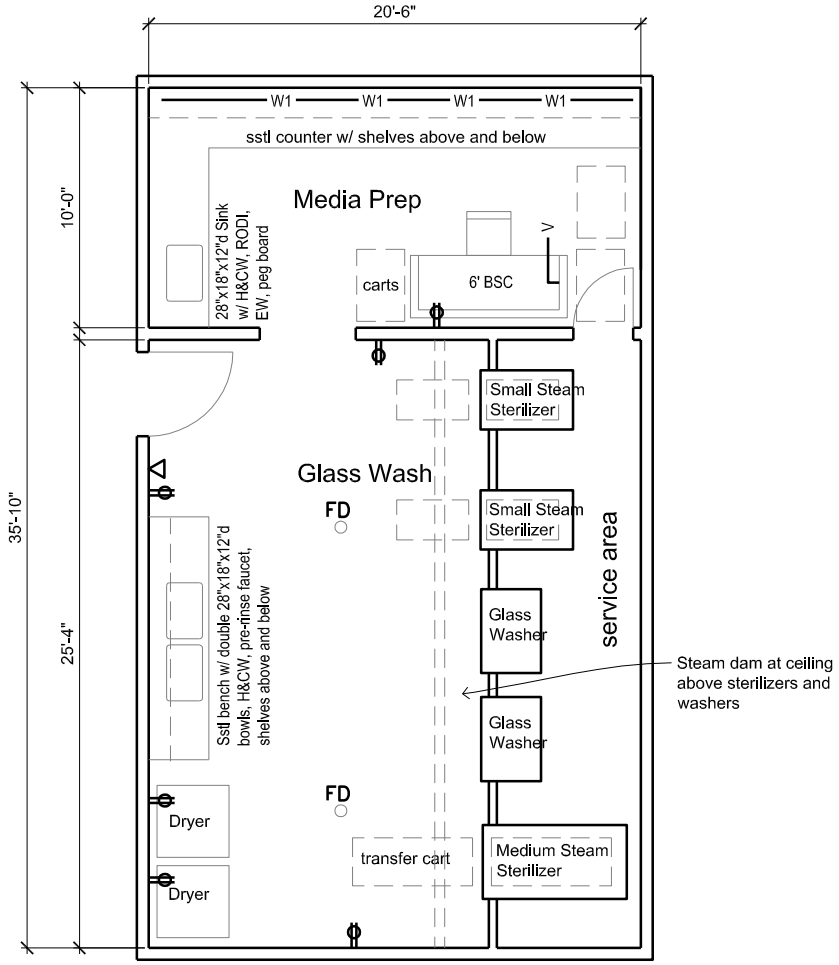
ELECTRICAL	
Voltage/Phase	120/208
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	70
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

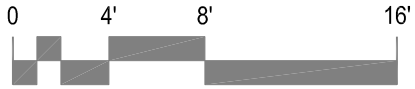
Notes:

Hours of operation: 24/7

Media Prep positive to Glass Wash area

Equipment: (1) medium steam sterilizer, (2) small steam sterilizers, (2) glass washers, (2) dryers


20'-6"
W1
W1
W1
W1
sstl counter w/ shelves above and below
Media Prep
28"x18"x12"d Sink w/ H&CW, RODI, EW, peg board
carts
6' BSC
V
Small Steam Sterilizer
Glass Wash
FD
Small Steam Sterilizer
service area
Glass Washer
Steam dam at ceiling above sterilizers and washers
Glass Washer
Sstl bench w/ double 28"x18"x12"d bowls, H&CW, pre-rinse faucet, shelves above and below
FD
Dryer
Dryer
transfer cart
Medium Steam Sterilizer
10'-0"
35'-10"
25'-4"


0
4'
8'
16'

2.4.1
CCGS - Imaging Core - Prep Lab

Floor Area: 296 SF
Adjacencies: Instrument Rooms

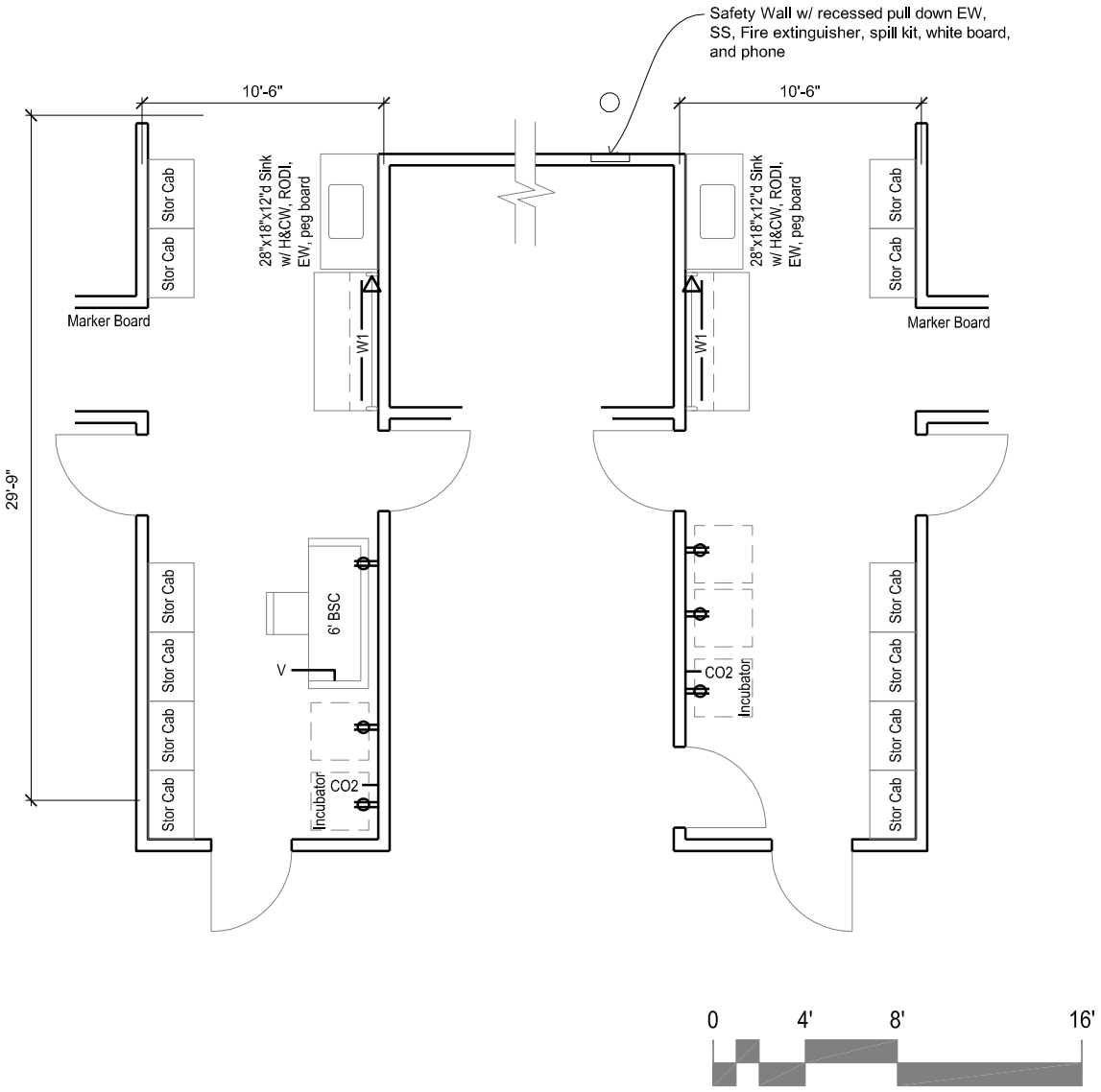
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	3
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral Cove
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	-
Shielding	-
Door Width	5'-0", 3'-6"; See Plans
Door Height	7'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	Desireable
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	(1) 6' Class II, Type A
Desk	-
Table	-
Files	-
Casegoods	6' Flex Benches
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72°F +/- 1°F
Relative Humidity	50% +/-5%, 2%/hr change
Ventilation	6 ACH
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	HEPA Filtered Supply
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	RO/DI
Chilled Water	-
Floor Drain	-
Sink(s)	(2) @ 28"x18"x12"
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	Yes
Eyewash	Yes
Gasses	CO2
Compressed Air	-
Vacuum	@ BSC

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	Yes (Incubator/Freezer)
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	2
Wi-Fi	Yes
Equipment Alarm	(Freezer)
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	70
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

Notes:

Hours of operation: 24/7


Safety Wall w/ recessed pull down EW, SS, Fire extinguisher, spill kit, white board, and phone
10'-6"
10'-6"
29'-9"
Stor Cab
Stor Cab
Marker Board
28"x18"x12"d Sink w/ H&CW, RODI, EW, peg board
W1
28"x18"x12"d Sink w/ H&CW, RODI, EW, peg board
W1
Stor Cab
Stor Cab
Marker Board
Stor Cab
Stor Cab
Stor Cab
Stor Cab
6' BSC
V
Incubator
CO2
CO2
Incubator
Stor Cab
Stor Cab
Stor Cab
Stor Cab
0
4'
8'
16'

2.4.2
CCGS - Instrument (Small)

Floor Area: 105 SF
Adjacencies: Prep Lab

ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	1
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral Cove
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	10'-0"+
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	TBD
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	No
Door Seals	Yes
Door Threshold	-
Sidelight	-
Daylighting	No
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72°F +/- 1°F
Relative Humidity	50% +/-5%, 2%/hr change
Ventilation	6 ACH
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	HEPA Filtered Supply Air
Pressurization	Positive To Labs
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	For Air Table
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	Yes
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	Yes
LIGHTING	
F.C. at Work Surface	-
Fixture Type	LED
Safe Light	-
Special Lighting	Electronic Ballasts
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	250

Notes:

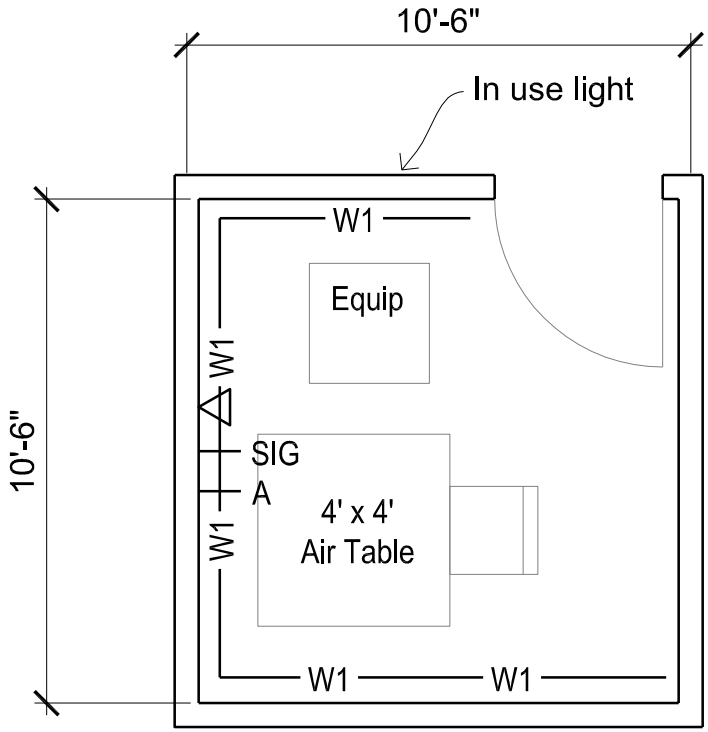
Hours of operation: 24/7

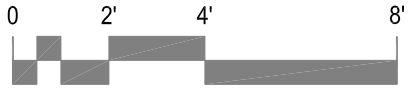
Low velocity laminar flow supply air

Very vibration sensitive

Air movement and minor fluctuations in temperature and humidity will adversely effect experiments.

Locate in basement slab on grade; isolate slab from adjacent spaces.


10'-6"
In use light
W1
Equip
W1
10'-6"
SIG
A
4' x 4'
Air Table
W1
W1
W1


0
2'
4'
8'

2.4.3
CCGS - Instrument (Large)

Floor Area: 300 SF
Adjacencies: Prep Lab

ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	3
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral Cove
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	10'-0"+
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	TBD
Door Width	3'-6"
Door Height	7'-0"
Door Type	Single (Light Interlock)
Door Vision Panel	No
Door Seals	Yes
Door Threshold	-
Sidelight	-
Daylighting	No
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72°F +/- 1°F
Relative Humidity	50% +/-5%, 2%/hr change
Ventilation	6 ACH
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	HEPA Filtered Supply Air
Pressurization	Positive To Labs
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	Yes (Process Sup/Ret)
Floor Drain	In Mech Space
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	Yes (For Air Tables)
Vacuum	-

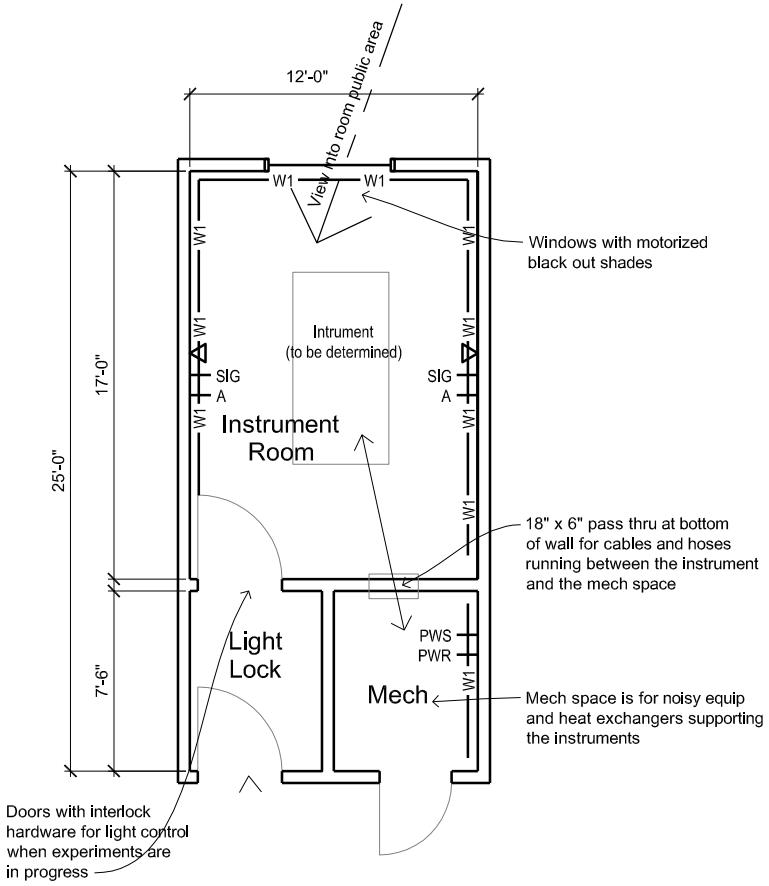
ELECTRICAL	
Voltage/Phase	120/208
Estimated Loads	
Emergency Power	
UPS	
Sensitive Instrument Ground	Yes
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	2
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	Yes
LIGHTING	
F.C. at Work Surface	-
Fixture Type	LED
Safe Light	-
Special Lighting	Electronic Ballasts
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	250

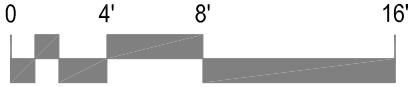
Notes:

Hours of operation: 24/7

Low velocity laminar flow supply air. Space is very vibration sensitive. Air movement and minor fluctuations in temperature and humidity will adversely effect experiments. Locate in basement slab on grade; isolate slab from adjacent spaces.

Provide interlock doors in light lock and motorized black out shades at corridor windows


12'-0"
View into room public area
W1
W1
Windows with motorized black out shades
Intrument (to be determined)
SIG A
SIG A
Instrument Room
25'-0"
17'-0"
7'-6"
18" x 6" pass thru at bottom of wall for cables and hoses running between the instrument and the mech space
Light Lock
PWS
PWR
Mech
Mech space is for noisy equip and heat exchangers supporting the instruments
Doors with interlock hardware for light control when experiments are in progress


0
4'
8'
16'

2.4.4
CCGS - Instrument (Shared)

Floor Area: 532 SF
Adjacencies: Prep Lab

ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	6
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral Cove
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	10'-0"+
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	TBD
Door Width	3'-6"
Door Height	7'-0"
Door Type	Single
Door Vision Panel	No
Door Seals	Yes
Door Threshold	-
Sidelight	-
Daylighting	No
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

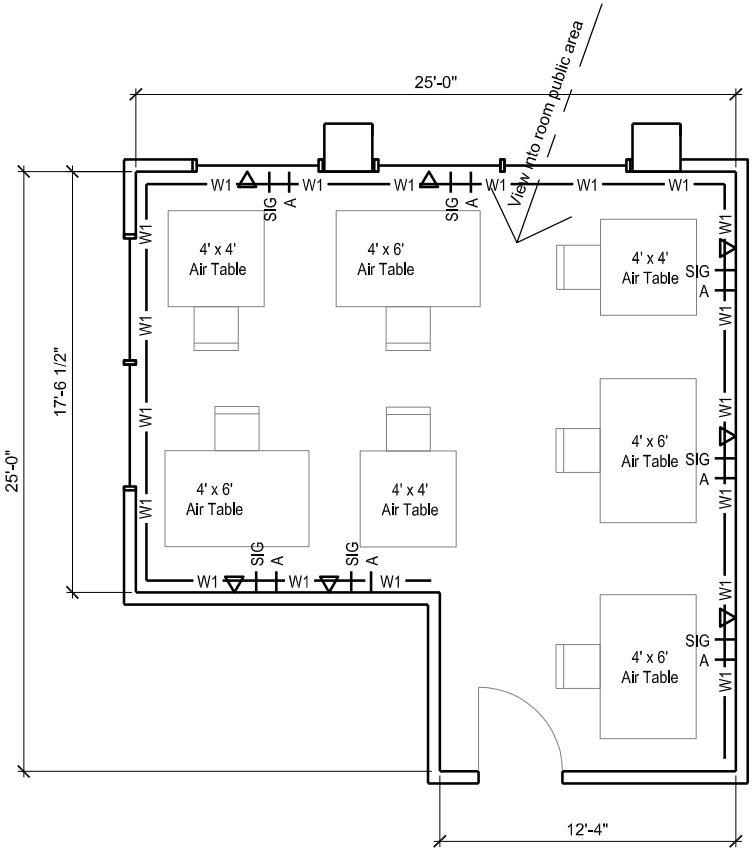
EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72°F +/- 1°F
Relative Humidity	50% +/-5%, 2%/hr change
Ventilation	6 ACH
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	HEPA Filtered Supply Air
Pressurization	Positive To Labs
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	Yes (For Air Table)
Vacuum	-

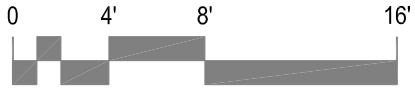
ELECTRICAL	
Voltage/Phase	120/208
Estimated Loads	
Emergency Power	
UPS	
Sensitive Instrument Ground	Yes
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	7
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	Yes
LIGHTING	
F.C. at Work Surface	80
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	Yes
Zoned Lighting	Yes
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	250

Notes:

Hours of operation: 24/7

Low velocity laminar flow supply air. Space is very vibration sensitive. Air movement and minor fluctuations in temperature and humidity will adversely effect experiments. Locate in basement slab on grade; isolate slab from adjacent spaces.


25'-0"
View into room public area
W1
SIG
A
4' x 4'
Air Table
4' x 6'
Air Table
17'-6 1/2"
25'-0"
12'-4"


0
4'
8'
16'

2.4.5
CCGS - Microtome

Floor Area: 78 SF
Adjacencies: Prep Lab

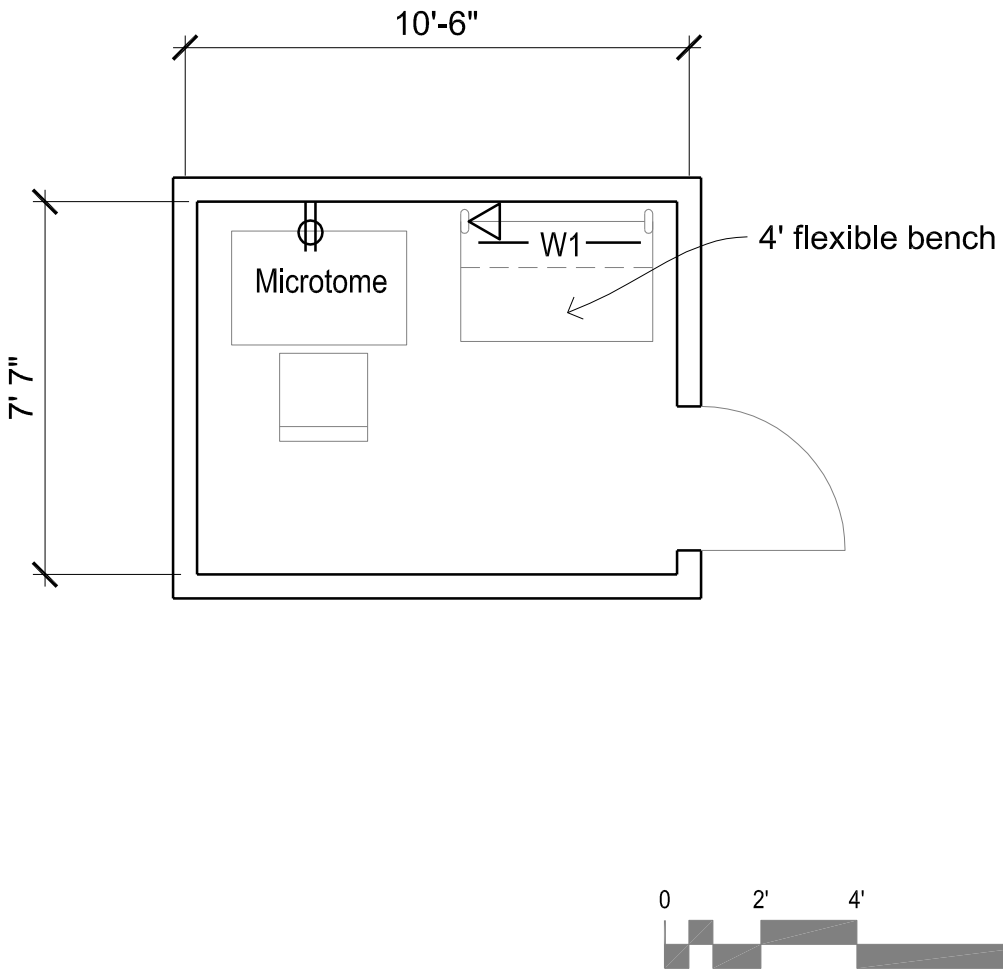
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral Cove
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Metal
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	4' Flex Bench
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6 ACH occ, 4 ACH unocc
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	Standard
Pressurization	Positive
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	Yes
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	1
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	80
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

Notes:

Hours of operation: 24/7


10'-6"
7' 7"
Microtome
W1
4' flexible bench
0
2'
4'
8'

2.4.6
CCGS - Server Room

Floor Area: 174 SF
Adjacencies:

ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp.Bd., Painted/Plywood
Baseboard	4" Rubber
Floor Finish	Sealed Concrete
Ceiling Finish	Open to Structure
Ceiling Height	-
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	-
Door Width	3'-0"
Door Height	7'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

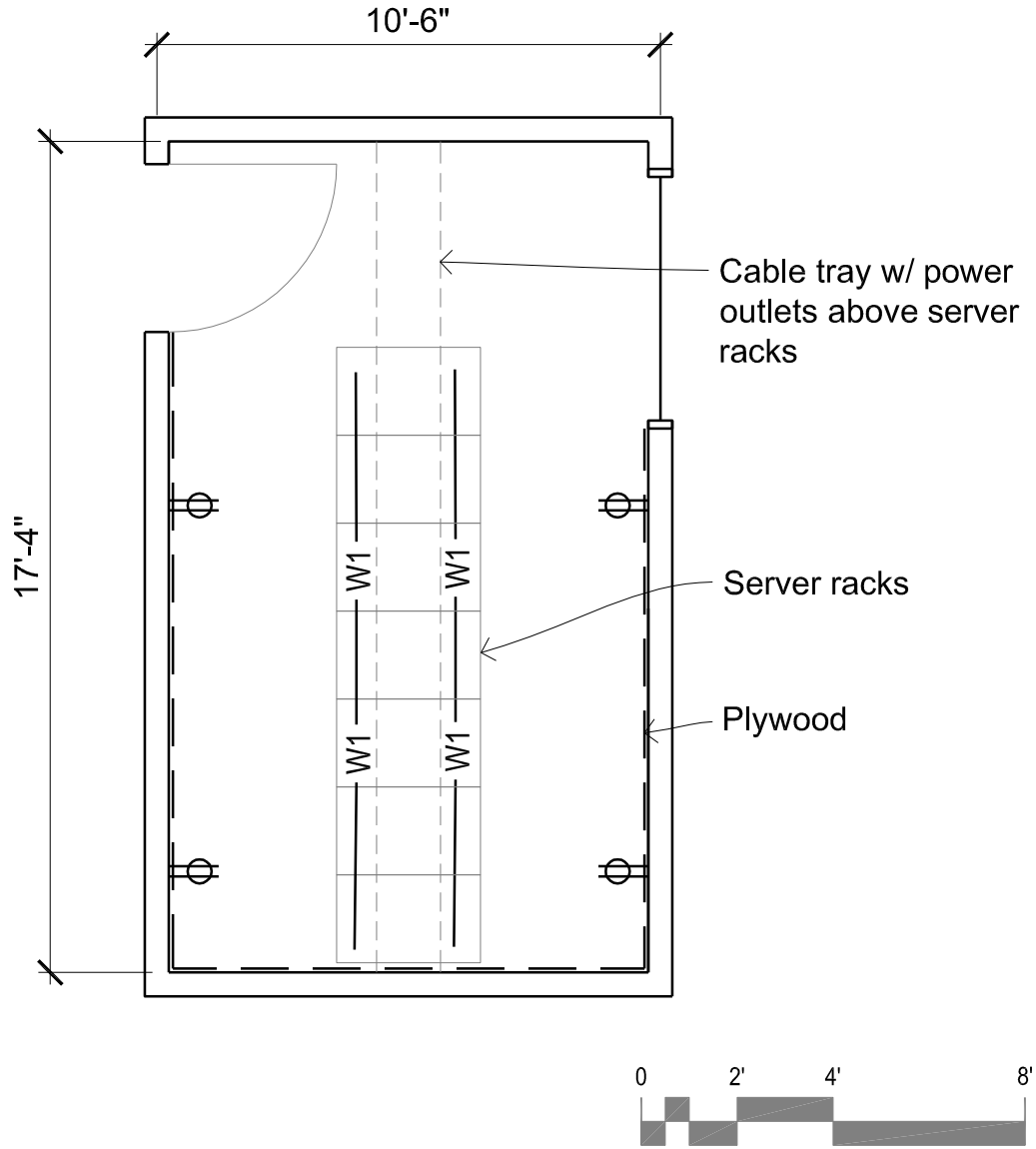
EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	20% Minimum
Ventilation	6.5 cfm/pers, 0.078/sf
Exhaust Air	As Required
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	Yes
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	-
Wi-Fi	-
Equipment Alarm	Yes
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	70
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:

Hours of Operation: 24/7

Overhead cable tray with power outlets


10'-6"
17'-4"
W1
W1
W1
W1
Cable tray w/ power outlets above server racks
Server racks
Plywood
0
2'
4'
8'

2.5.0
CCGS - Vivarium Core

Floor Area: 566 SF
Adjacencies:

ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Epoxy Painted CMU
Baseboard	Integral Cove
Floor Finish	Epoxy
Ceiling Finish	Epoxy Painted Gyp. Bd.
Ceiling Height	9'-0"
Casework Finish	Stainless Steel
Countertops	Stainless Steel
Open Shelving	Stainless Steel
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	Yes
Door Threshold	-
Sidelight	-
Daylighting	No
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	4' Flex Bench
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72°F (For Fish)
Relative Humidity	40-60%
Ventilaiton	-
Exhaust Air	Yes
Return Air	No
Makeup Air	-
Filtration	Standard
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	RO Only
Chilled Water	-
Floor Drain	Yes
Sink(s)	(2) 28"x18"x12"
Steam	If Req'd - Humidification
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	Yes
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	Yes
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	2
Wi-Fi	-
Equipment Alarm	Yes
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	70
Fixture Type	-
Safe Light	-
Special Lighting	Circadian Light Control
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	4000

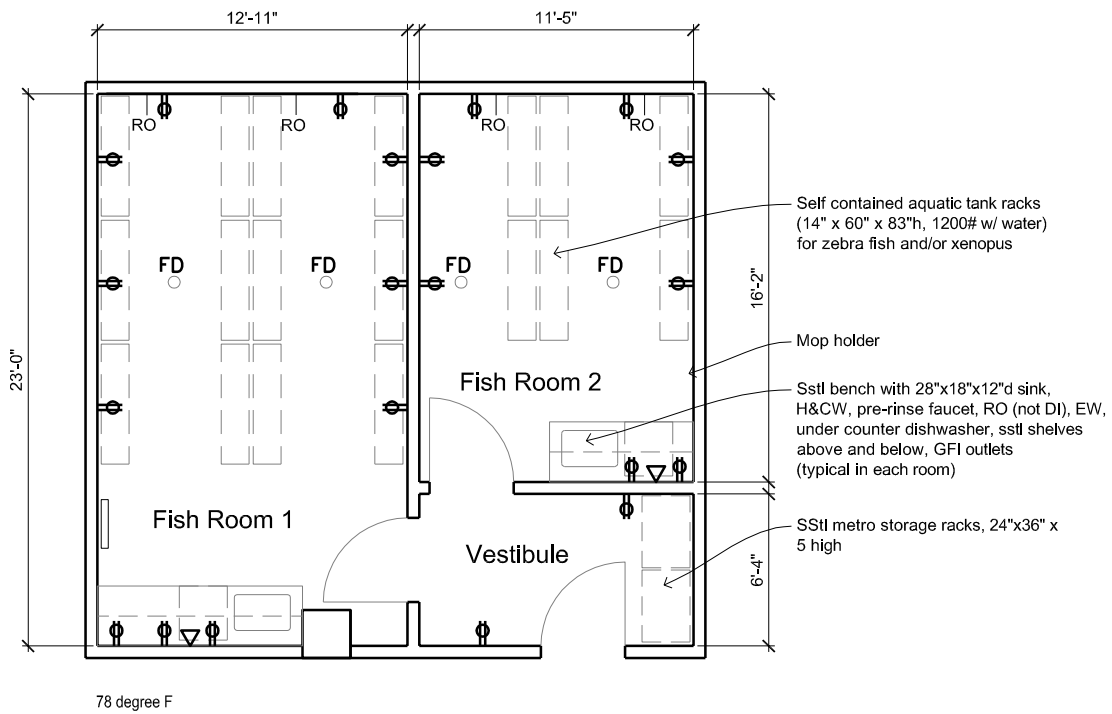
Notes:

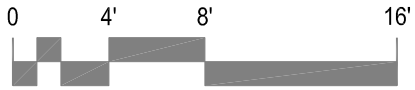
Hours of Operation: 24/7

Vivarium to house fish and frogs

RO water only (not DI or RO/DI)

Equipment: (2) under counter dishwashers, self contained aquatic tank rack system


12'-11"
11'-5"
23'-0"
16'-2"
6'-4"
RO
RO
RO
RO
FD
FD
FD
FD
Fish Room 1
Fish Room 2
Vestibule
Self contained aquatic tank racks
(14" x 60" x 83"h, 1200# w/ water)
for zebra fish and/or xenopus
Mop holder
SstI bench with 28"x18"x12"d sink,
H&CW, pre-rinse faucet, RO (not DI), EW,
under counter dishwasher, sstl shelves
above and below, GFI outlets
(typical in each room)
SStI metro storage racks, 24"x36" x
5 high
78 degree F


0
4'
8'
16'

3.0.1
CoS - Reception

Floor Area: 200 SF
Adjacencies: CoS Suite, Work/Copy, Seminar, Public Spaces

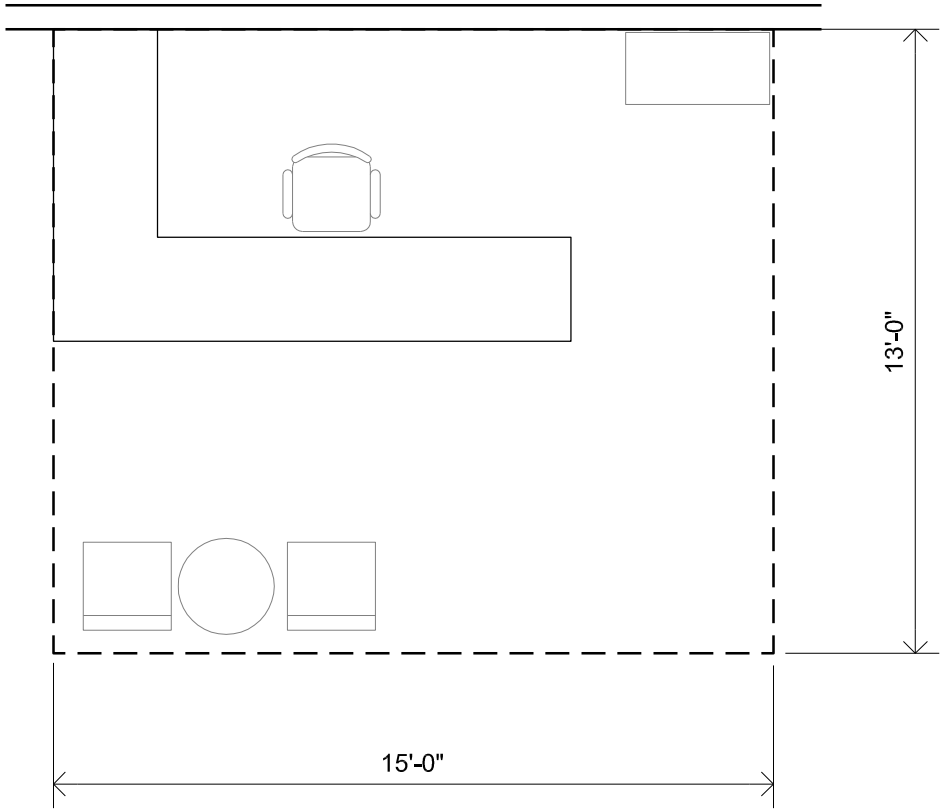
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	2
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Laminate
Countertops	Solid surface
Open Shelving	-
Shielding	-
Door Width	6'-0"
Door Height	8'-0"
Door Type	Double
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Desirable
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

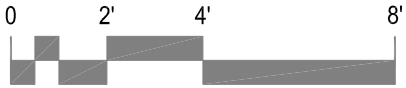
EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk/Seating	Yes
Table	Yes
Files	Yes
Casegoods	Yes
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	2
Data (qty and security)	2
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:

Easily accessible from building common area.


13'-0"
15'-0"


0
2'
4'
8'

3.0.2
CoS - Dean's Office

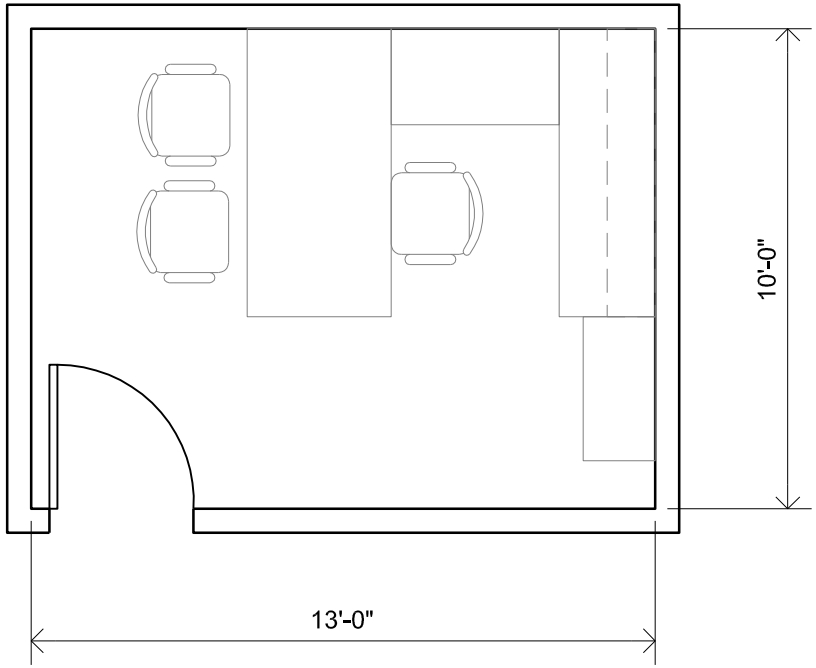
Floor Area: 130 SF
Adjacencies: Reception, Conference

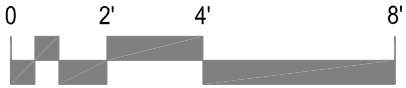
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	2
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Wood
Countertops	Wood
Open Shelving/Boocase	Wood
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold Sidelight	-
Daylighting	Yes
Biological Safety Level	Yes
Level of security	-
Access (Lock, Card, Other)	-
	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk/Seating	Yes
Table	Yes (4 people)
Files	Yes
Casegoods	Yes
Marker Board	Yes
Projection System/AV	Yes
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


10'-0"
13'-0"


0
2'
4'
8'

3.0.3

CoS - Office (Enlcosed)

Associate Dean Student Affairs, Associate Dean of Research Development Manager, Office Manager

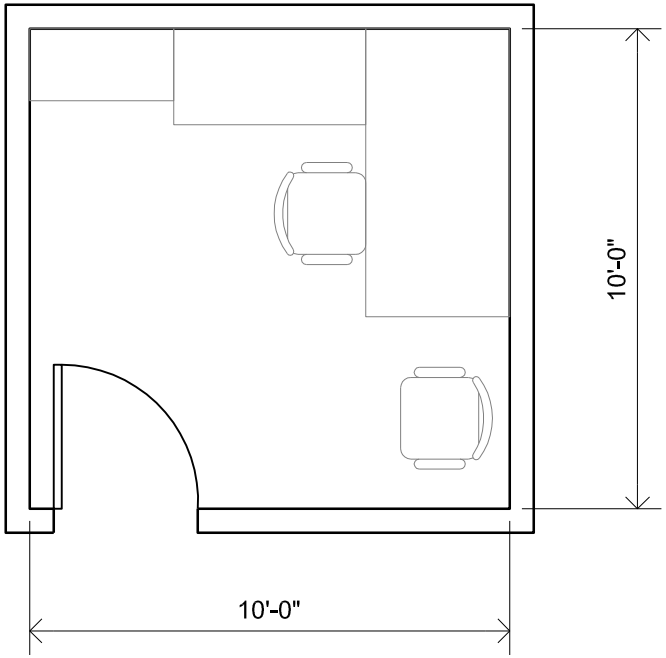
Floor Area: 100 SF
Adjacencies: Reception, Conference, Open Office

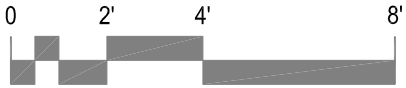
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	1
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	-
Open Shelving/Bookcase	Plastic Lam.
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold Sidelight	-
Daylighting	Yes
Biological Safety Level	Yes
Level of security	-
Access (Lock, Card, Other)	-
	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk/Seating	Yes
Table	-
Files	Yes
Casegoods/Bookcase	Yes
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


10'-0"
10'-0"


0
2'
4'
8'

3.0.4
CoS - Office (Open)

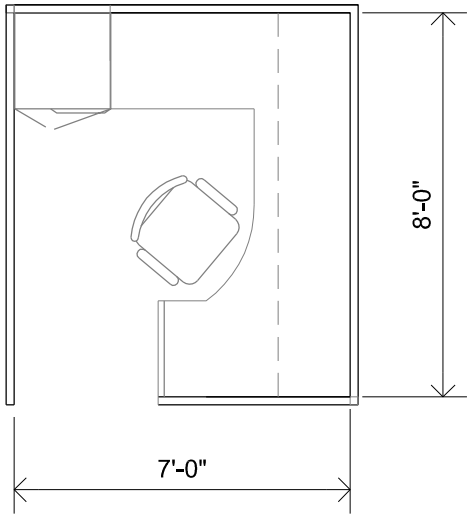
Floor Area: 60 SF/Desk (720 SF Total)
Adjacencies: CSME Office Suite, Work/Copy

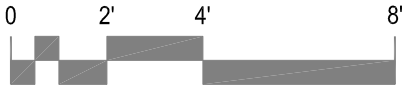
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	8
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	-
Open Shelving	-
Shielding	-
Door Width	-
Door Height	-
Door Type	-
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desking System 6'x8'/Seating	Yes
Table	-
Files	Yes
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1 per station
Data (qty and security)	1 per station
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting/Task	Yes
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


8'-0"
7'-0"


0
2'
4'
8'

3.0.5
CoS - Conference

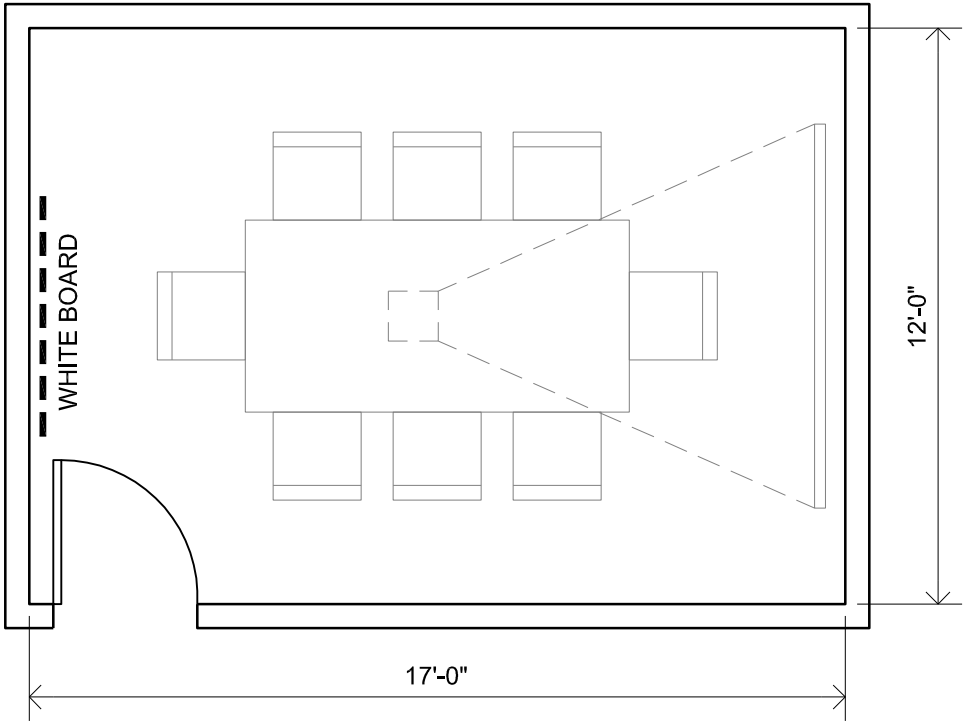
Floor Area: 200
Adjacencies: Reception, Dean's Office, Open Office

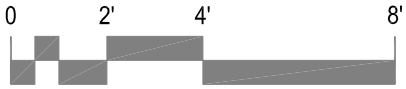
ARCHITECTURAL	
Occupancy Type	B
Load Factor	15
Occupancy Load	13
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Wood
Countertops	-
Open Shelving	-
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table/Chairs	Yes (6-8 people)
Files	-
Casegoods	-
Marker Board	Yes
Projection System/AV	Yes
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	50
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


WHITE BOARD
12'-0"
17'-0"


0
2'
4'
8'

3.0.6
CoS - Pantry/Break

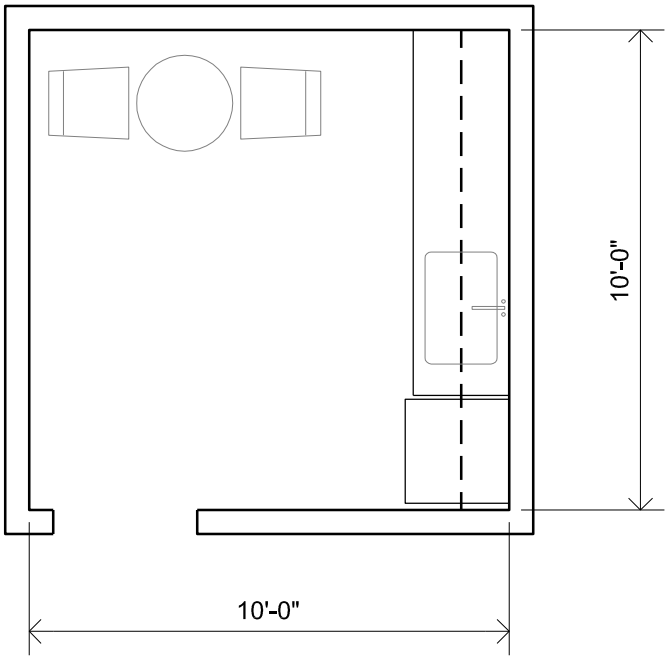
Floor Area: 100
Adjacencies:

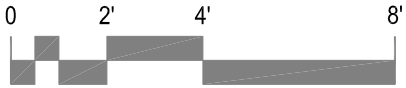
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	Plastic Lam.
Open Shelving	-
Shielding	-
Door Width	-
Door Height	-
Door Type	-
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table/Seating	Yes
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat, 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	Yes
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	(1) 18"x12"12"
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


10'-0"
10'-0"


0
2'
4'
8'

3.0.7
CoS - Copy

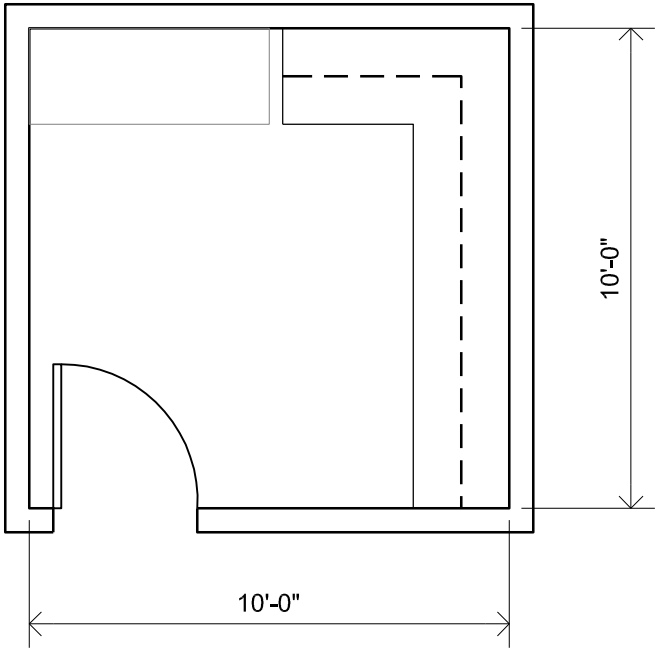
Floor Area: 100 SF
Adjacencies:

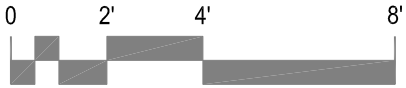
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	Plastic Lam.
Open Shelving	Yes
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	75
Relative Humidity	-
Ventilation	See Exhaust
Exhaust Air	0.5 cfm/sf
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	4
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


10'-0"
10'-0"


0
2'
4'
8'

3.0.8
CoS - Storage

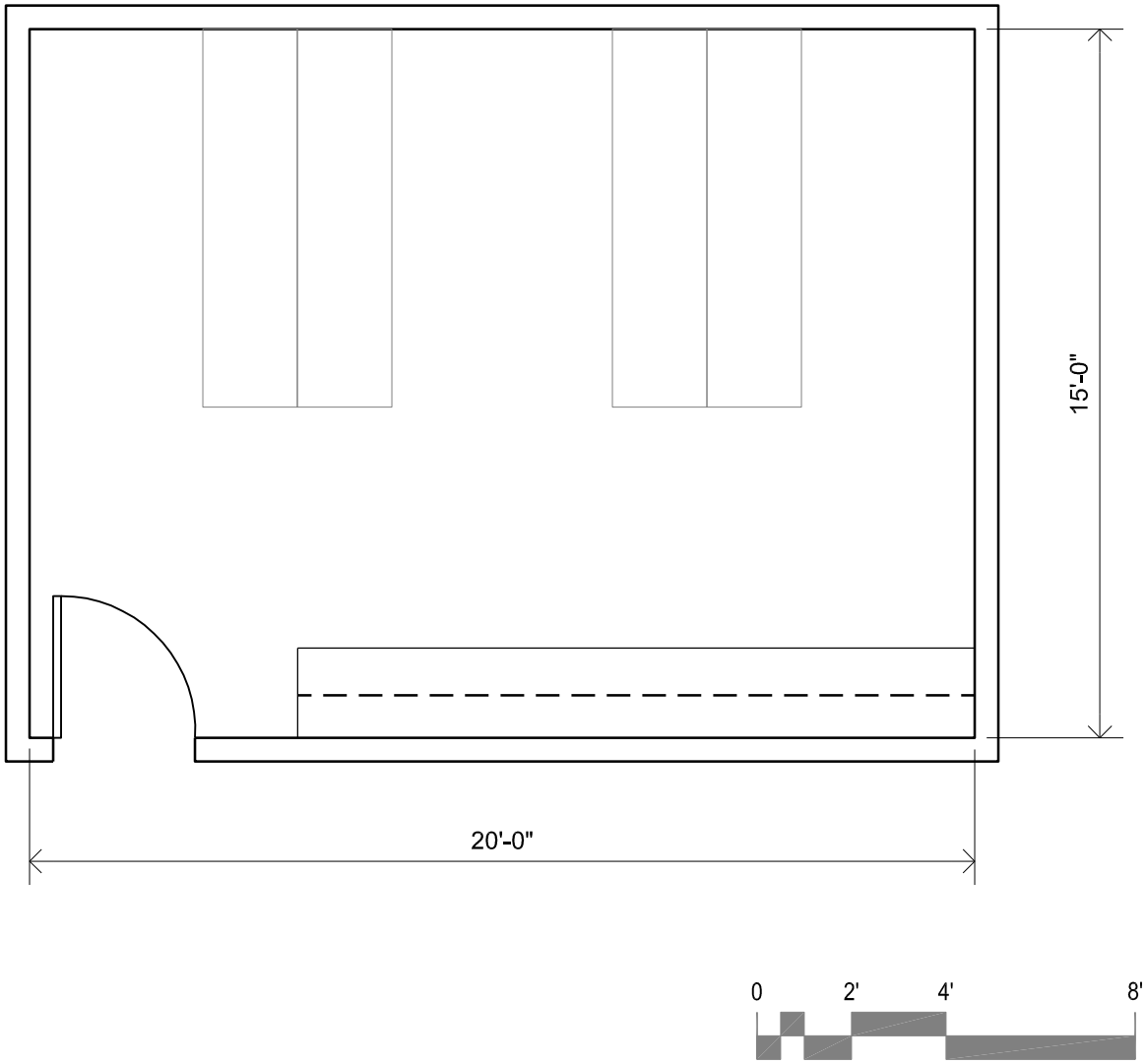
Floor Area: 300 SF
Adjacencies:

ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	Plastic Lam.
Open Shelving	Yes
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	Yes
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	-
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	-
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	10
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


15'-0"
20'-0"
0
2'
4'
8'

4.0.1
Tech Incubator - Wet Lab

Floor Area: 400 SF
Adjacencies: Public Spaces, Offices

ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	7
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral cove
Floor Finish	Sheet Vinyl
Ceiling Finish	Acoustical Tile
Ceiling Height	10'-0"
Casework Finish	Metal
Countertops	Epoxy
Open Shelving	Metal
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	Desirable
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Key

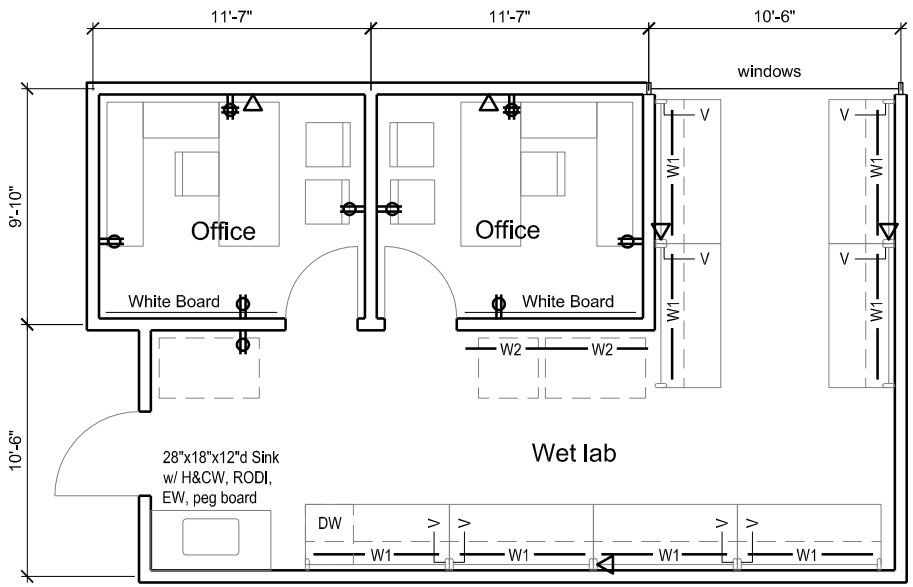
EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	6' Flex Benches
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72°F ± 2°F
Relative Humidity	20-50%
Ventilation	6 ACH occ, 4 ACH Unocc
Exhaust Air	100%
Return Air	No
Makeup Air	-
Filtration	Standard
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	RO/DI
Chilled Water	-
Floor Drain	Yes
Sink(s)	(1) 28"x 18"x12"
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	Yes
Gasses	-
Compressed Air	-
Vacuum	Yes

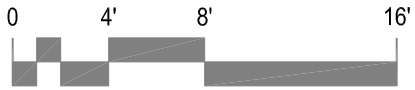
ELECTRICAL	
Voltage/Phase	120/208
Estimated Loads	-
Emergency Power	Yes (Freezers)
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	3
Data (qty and security)	5
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	80
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:

Hours of operation: 24/7

Provide Dishwasher


11'-7"
11'-7"
10'-6"
windows
9'-10"
10'-6"
Office
Office
White Board
White Board
W1
W2
V
28"x18"x12"d Sink
w/ H&CW, RODI,
EW, peg board
Wet lab
DW


0
4'
8'
16'

4.0.2
Tech Incubator - Office

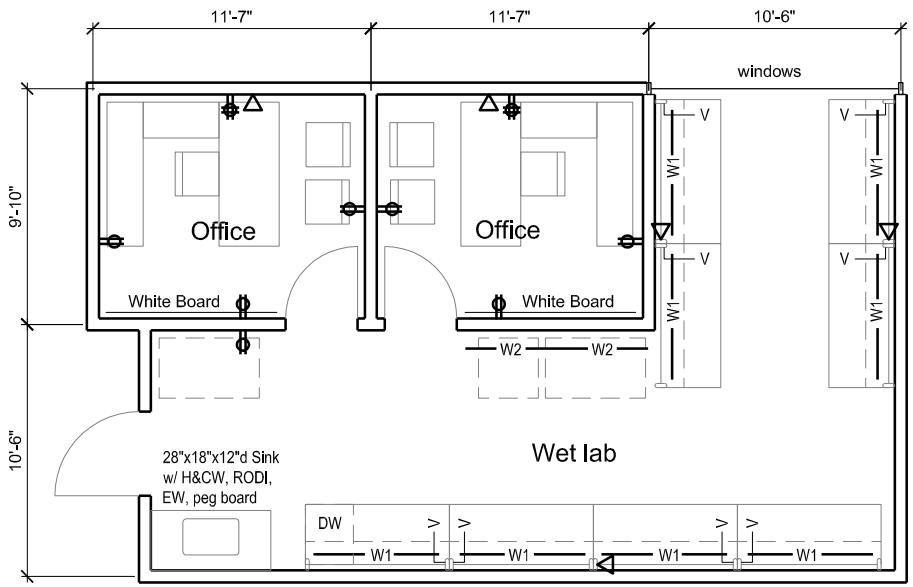
Floor Area: 120 SF
Adjacencies: Wet Lab

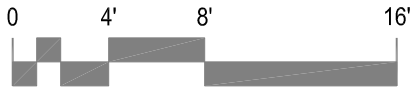
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	2
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	-
Open Shelving	-
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock/Card Access

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk/Seating	Yes
Table	-
Files	Yes
Casegoods	-
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	Positive to Lab
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	1
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


11'-7"
11'-7"
10'-6"
windows
9'-10"
10'-6"
Office
Office
White Board
White Board
W1
W2
V
28"x18"x12"d Sink
w/ H&CW, RODI,
EW, peg board
Wet lab
DW


0
4'
8'
16'

5.0.1
Lobby/Exhibit Space

Floor Area: 1,500 SF
Adjacencies: Cafe, Atrium

ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	2
Live Load	-
Wall Finish	Abuse Rest. Gyp. Bd.
Baseboard	Match Existing
Floor Finish	Carpet
Ceiling Finish	Acoustic Tile/Plaster
Ceiling Height	Match Existing
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	-
Door Width	Existing
Door Height	Existing
Door Type	Double (Stainless Steel)
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
Displays	Yes
Desk	-
Table /Soft Seating	Yes
Files	-
Casegoods/Displays	Yes
Marker Board	-
Projection System/AV	Yes - Monitors
MECHANICAL	
Temperature (F)	75 Heat / Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	-
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	20
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	Yes
Dimmable	Yes
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:

5.0.2
Atrium

Floor Area: 1,000 SF
Adjacencies: Cafe, Lobby, Education/Research

ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	2
Live Load	-
Wall Finish	Abuse Rest. Gyp. Bd.
Baseboard	Match Existing
Floor Finish	Carpet
Ceiling Finish	Skylight
Ceiling Height	Open to Above
Casework Finish	Plastic Lam.
Countertops	-
Open Shelving	-
Shielding	-
Door Width	-
Door Height	-
Door Type	-
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Tables/Seating	Informal/Formal Seating
Files	-
Casegoods	-
Marker Board	Yes
Projection System/AV	Yes/ Monitors
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Air Changes	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	Yes (Smoke Control)
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	-
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	20
Fixture Type	LED
Safe Light	-
Special Lighting	Pendents/Can
Dimmable	Yes
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:

5.0.3
Seminar (Small)

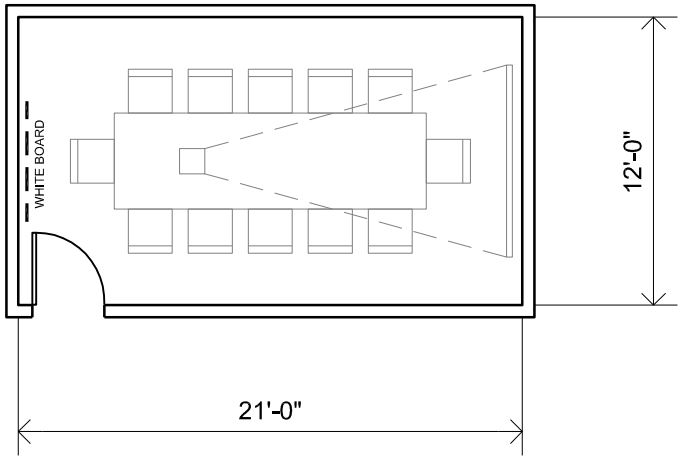
Floor Area: 250
Adjacencies: Public Spaces

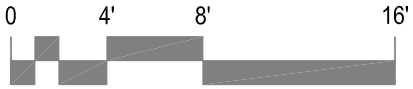
ARCHITECTURAL	
Occupancy Type	B
Load Factor	15
Occupancy Load	17
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	-
Door Width	6'-0"
Door Height	8'-0"
Door Type	Double
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight/Glass Walls	Yes
Daylighting	If possible
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	
Table	Yes (12 seats)
Files	-
Casegoods	Yes - Bench Seat
Marker Board	Yes
Projection System/AV	Yes
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	13/pers, 0.156/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	12
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30-40
Fixture Type	LED
Safe Light	-
Special Lighting	Pendent/Can
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


WHITE BOARD
12'-0"
21'-0"


0
4'
8'
16'

5.0.4
Seminar (Large)

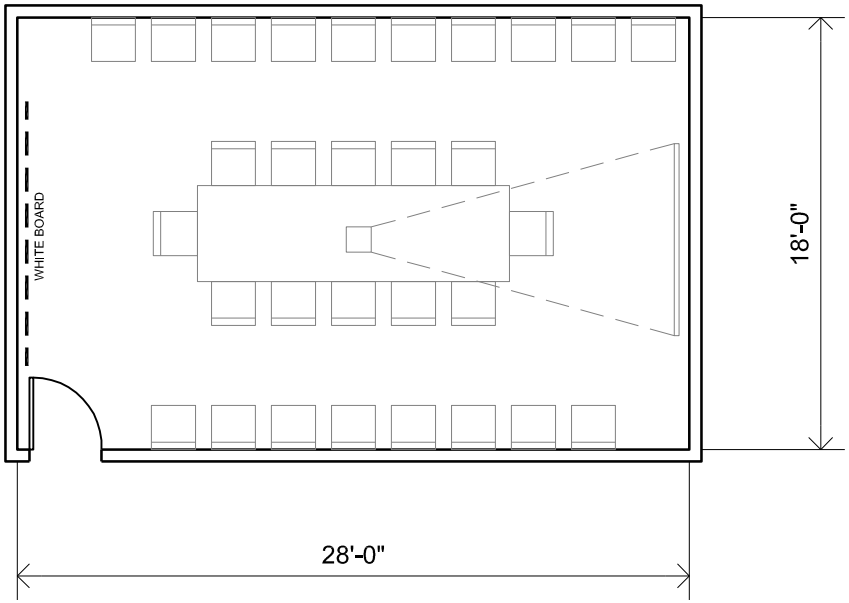
Floor Area: 500 SF
Adjacencies: Public Spaces

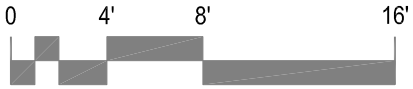
ARCHITECTURAL	
Occupancy Type	B
Load Factor	15
Occupancy Load	33
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	-
Open Shelving	-
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight/Glass Walls	Yes
Daylighting	If possible
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	Yes (30 seats)
Files	-
Casegoods	Credenza
Marker Board	Yes
Projection System/AV	Yes
MECHANICAL	
Temperature (F)	72 Heating / 75 Cooling
Relative Humidity	-
Air Changes	9.75/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	12
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30-40
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	Yes
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


WHITE BOARD
18'-0"
28'-0"


0
4'
8'
16'

5.0.5
Cafe

Floor Area: 500 SF
Adjacencies: Public Spaces, Atrium, Lobby

ARCHITECTURAL	
Occupancy Type	B
Load Factor	15
Occupancy Load	33
Exits	1
Live Load	-
Wall Finish	Gyp. Bd. Painted/Existing
Baseboard	4" Rubber
Floor Finish	VCT/Carpet
Ceiling Finish	Acoustical Tile/Existing
Ceiling Height	9'-0"
Casework Finish	Wood
Countertops	Solid Surface
Open Shelving	-
Shielding	-
Door Width	-
Door Height	-
Door Type	-
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	If possible
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

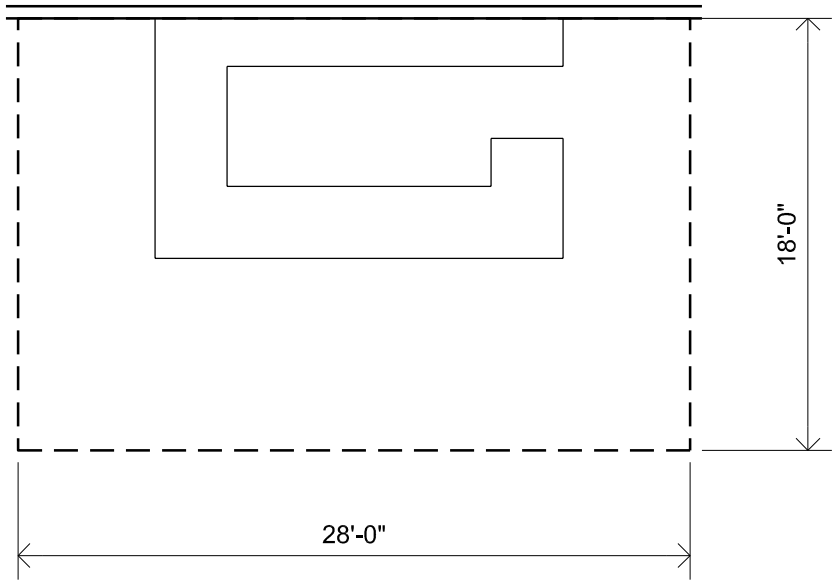
EQUIPMENT/FURNISHINGS	
Cafe Equip.	Yes
BSC	-
Desk	-
Tables/Chairs/Soft Seating	Yes
Files	-
Casegoods	Yes
Marker Board	-
Projection System/AV	Yes/ Monitors
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	9.75/pers, 0.234/sf
Exhaust Air	As Req'd
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	negative
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

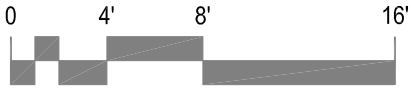
ELECTRICAL	
Voltage/Phase	120/208
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	2
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	Yes - Exist. Light Covers
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:

Space scheduled to be in historic delivery room - refer to preservation plan for restoration requirements.

Final Cafe needs and equipment requirements to be approved by college of science and U of U.


18'-0"
28'-0"


0
4'
8'
16'

5.0.6
Pantry/Break

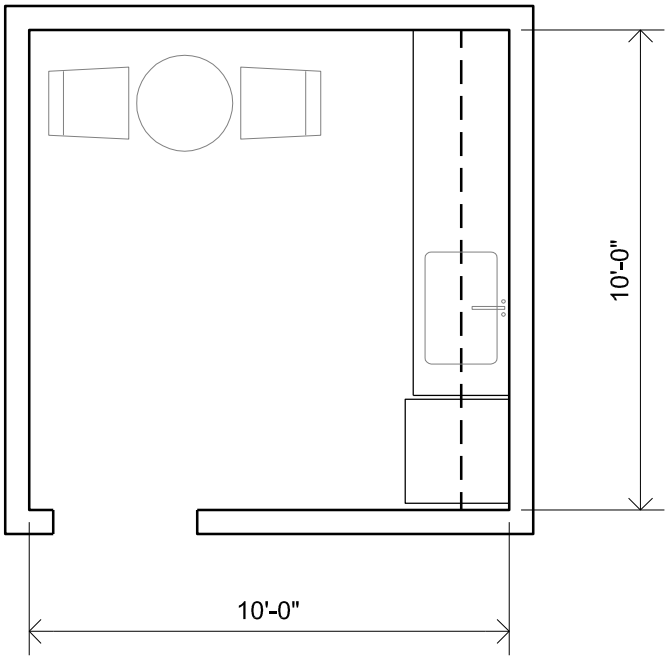
Floor Area: 100
Adjacencies:

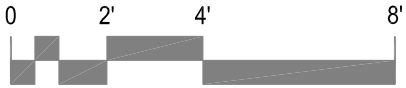
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	Plastic Lam.
Open Shelving	-
Shielding	-
Door Width	-
Door Height	-
Door Type	-
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Yes
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table/Seating	Yes
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	Yes
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	(1) 18"x12"12"
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	-
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


10'-0"
10'-0"


0
2'
4'
8'

5.0.7
CoS - Lactation

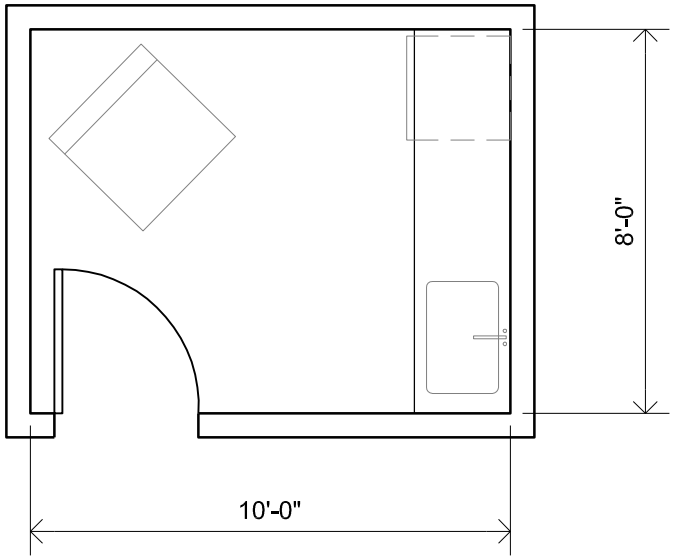
Floor Area: 80 SF
Adjacencies:

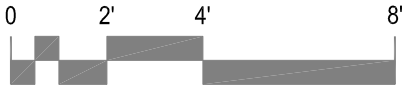
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	1
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	Plastic Lam.
Open Shelving	-
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Under Counter Refridgerator	Yes
BSC	-
Desk	-
Soft Seating	Yes
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	9.75/pers, 0.156/sf
Exhaust Air	Yes
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	(1) 12"x12"12"
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	-
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30
Fixture Type	LED
Safe Light	-
Special Lighting	-
Dimmable	Yes
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


8'-0"
10'-0"


0
2'
4'
8'

5.0.8
Copy

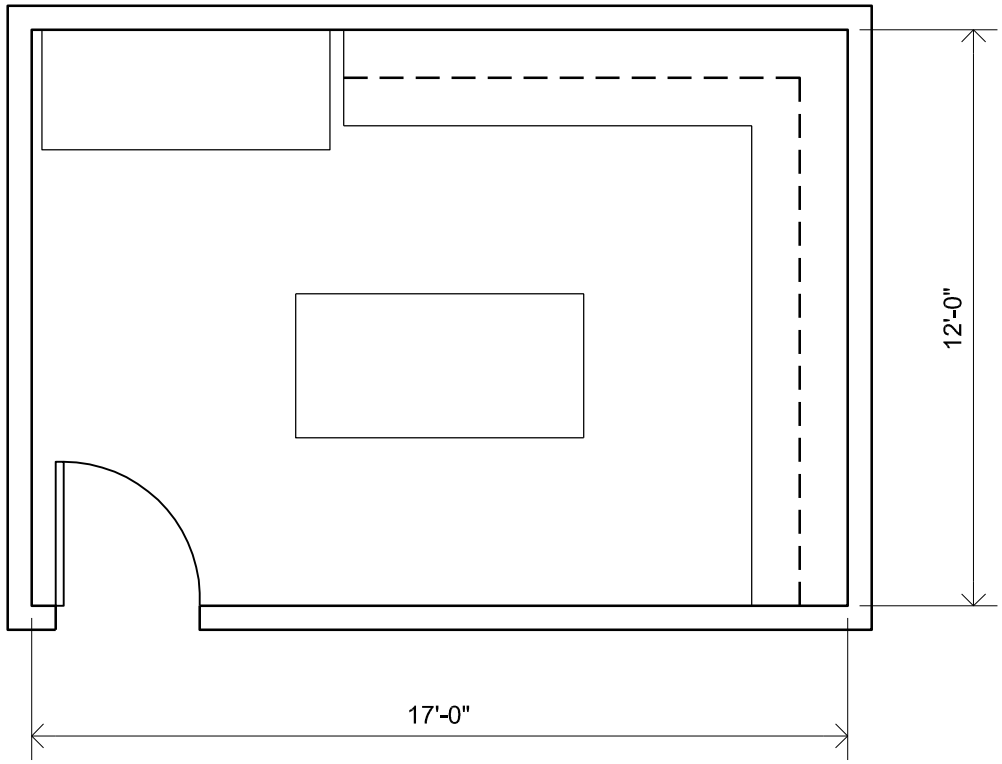
Floor Area: 200 SF
Adjacencies:

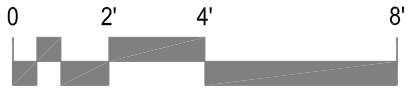
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	Plastic Lam.
Open Shelving	Plastic Lam.
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	Yes - Counter
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	75
Relative Humidity	-
Ventilation	See Exhaust
Exhaust Air	0.5 cfm/sf
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	4
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


12'-0"
17'-0"


0
2'
4'
8'

5.0.9
Server Room

Floor Area: 500 SF
Adjacencies:

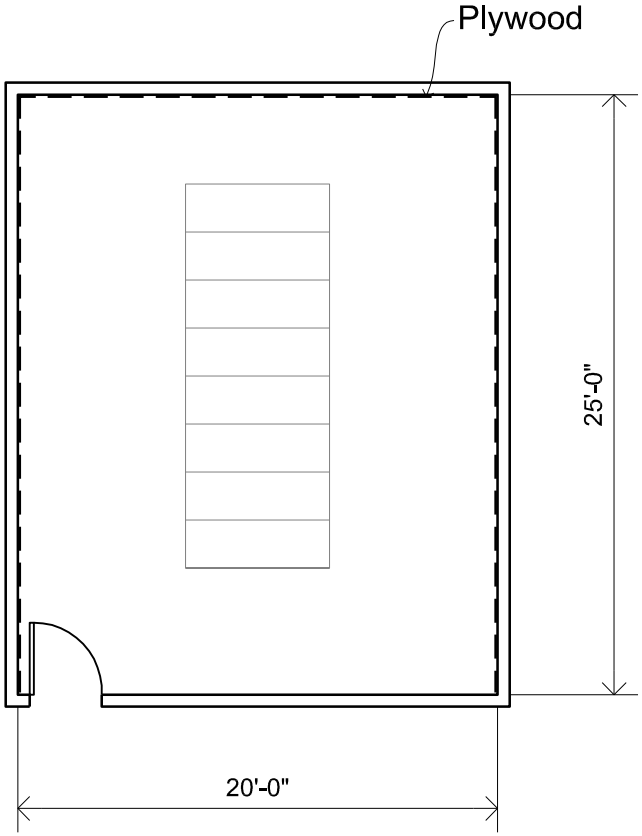
ARCHITECTURAL	
Occupancy Type	B
Load Factor	300
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Plywood Painted - 8'-0"
Baseboard	4" Rubber
Floor Finish	Sealed Concrete
Ceiling Finish	Open to Structure
Ceiling Height	-
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

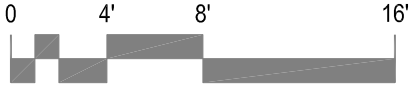
EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	68 Heat, 78 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	No
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	Yes
UPS	Yes
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	-
Wi-Fi	-
Equipment Alarm	Yes
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	70
Fixture Type	-
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	100
Vibration Criteria (mips)	-

Notes:

Overhead cable tray with power outlets
2 pipe fan coil (cooling)


Plywood
25'-0"
20'-0"


0
4'
8'
16'

5.0.10
IT Work Room

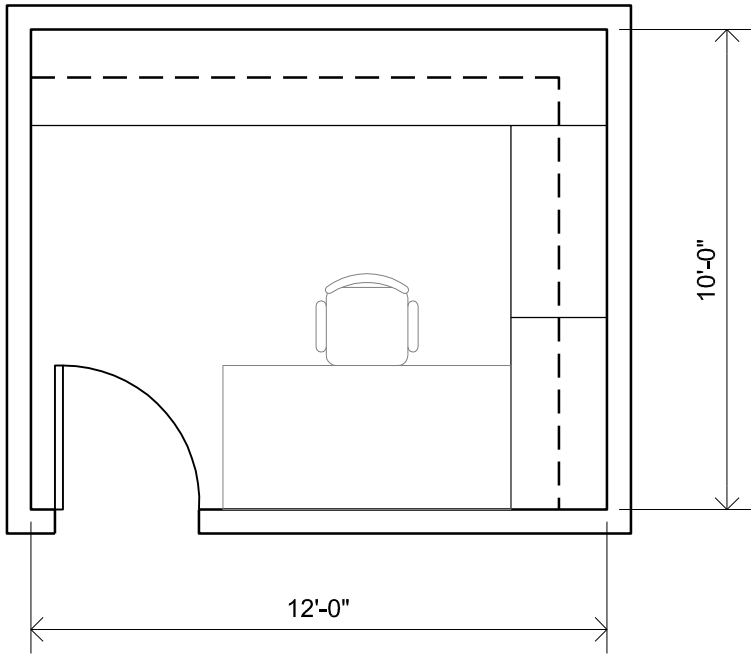
Floor Area: 120 SF
Adjacencies: Server Room

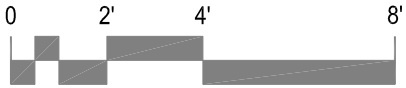
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	2
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	4" Rubber
Floor Finish	Carpet
Ceiling Finish	Acoustical Tile
Ceiling Height	9'-0"
Casework Finish	Plastic Lam.
Countertops	Plastic Lam.
Open Shelving	Plastic Lam.
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	Yes
Daylighting	Prefers
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Lock

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk /Chairs	Yes
Table	-
Files	Yes
Casegoods	Yes
Marker Board	Yes
Projection System/AV	-
MECHANICAL	
Temperature (F)	72 Heat / 75 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.078/sf
Exhaust Air	-
Return Air	Yes
Makeup Air	-
Filtration	MERV 13
Pressurization	-
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	4
Wi-Fi	Yes
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30 Ambient / 50-70 Task
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


10'-0"
12'-0"


0
2'
4'
8'

5.0.11

Showers (Bike/Joggers)

Floor Area: 200 SF
Adjacencies:

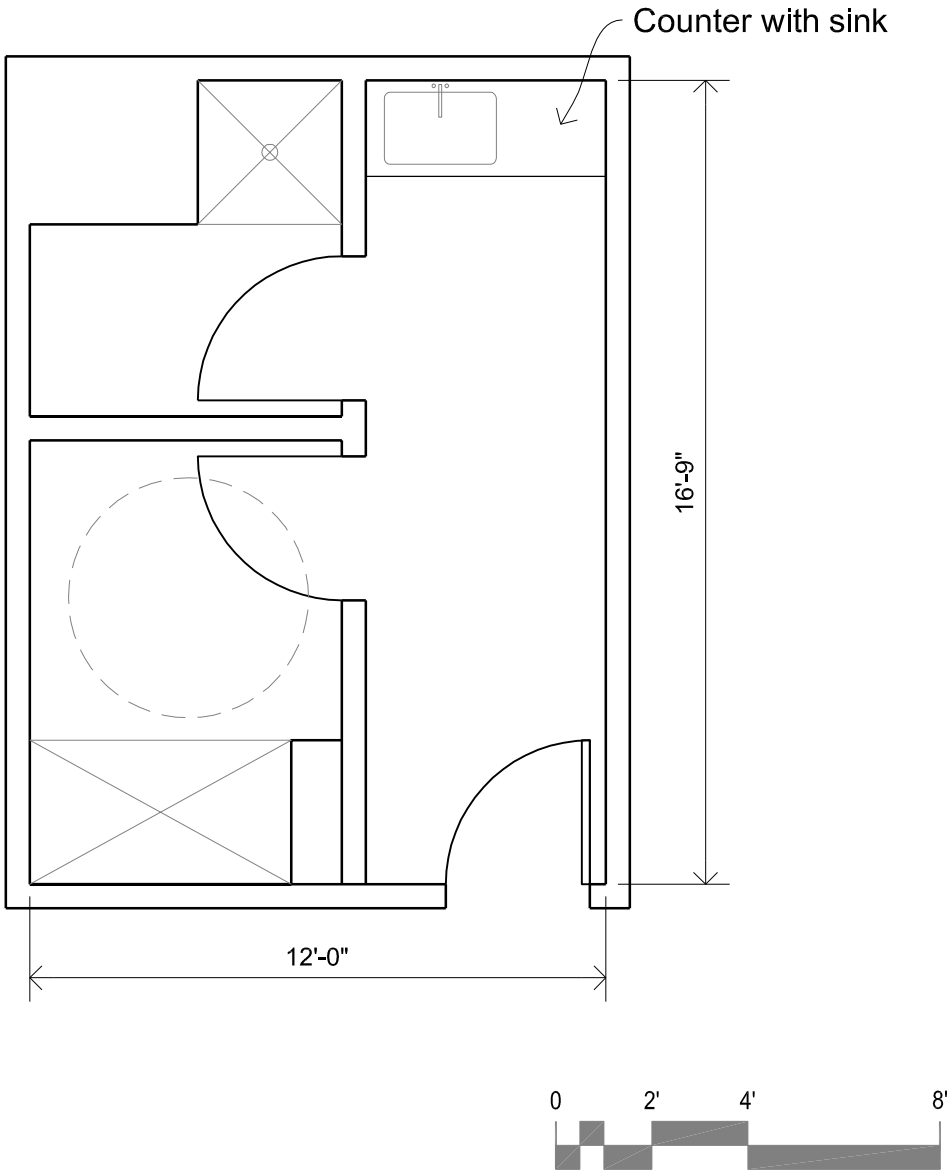
ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Tile
Baseboard	Tile
Floor Finish	Tile
Ceiling Finish	Epoxy Painted Gyp. Bd.
Ceiling Height	9'-0"
Casework Finish	Metal Lockers
Countertops	Plastic Lam.
Open Shelving	-
Shielding	-
Door Width	3'-0"
Door Height	8'-0"
Door Type	Single
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Lockers	Yes
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	74 Heat / 78 Cool
Relative Humidity	-
Ventilation	-
Exhaust Air	1 cfm/sf
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	Yes
Hot Water	Yes
Pure Water	-
Chilled Water	-
Floor Drain	Yes, w/ Deep Seal Trap
Sink(s)	Yes
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120 (GFI)
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	-
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	Water Resistant
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:

Accessible shower


Counter with sink
16'-9"
12'-0"
0
2'
4'
8'

5.1.1
Receiving

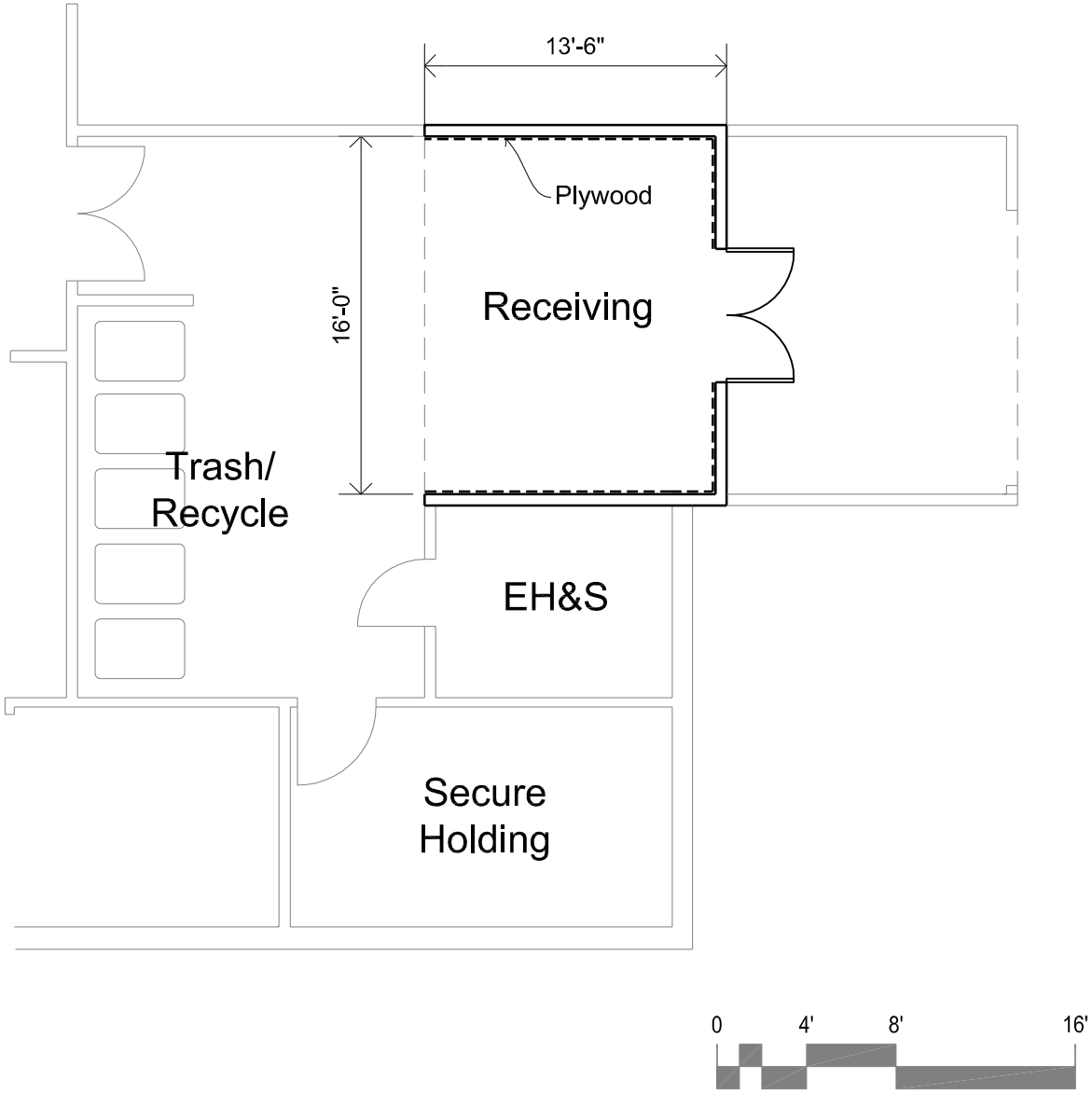
Floor Area: 200 SF
Adjacencies:

ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp.Bd., Painted/Plywood
Baseboard	4" Rubber
Floor Finish	Sealed Concrete
Ceiling Finish	Open Structure
Ceiling Height	14'-0"
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	-
Door Width	8'-0"
Door Height	9'-0"
Door Type	Metal
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	55 Heat, n/a Cool
Relative Humidity	-
Air Changes	13/pers, 0.156/sf
Exhaust Air	No
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Positive
PLUMBING	
Cold Water	Hose Bibb
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	-
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	30
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


13'-6"
Plywood
16'-0"
Receiving
Trash/
Recycle
EH&S
Secure
Holding
0
4'
8'
16'

5.1.2
Trash Cart/Holding

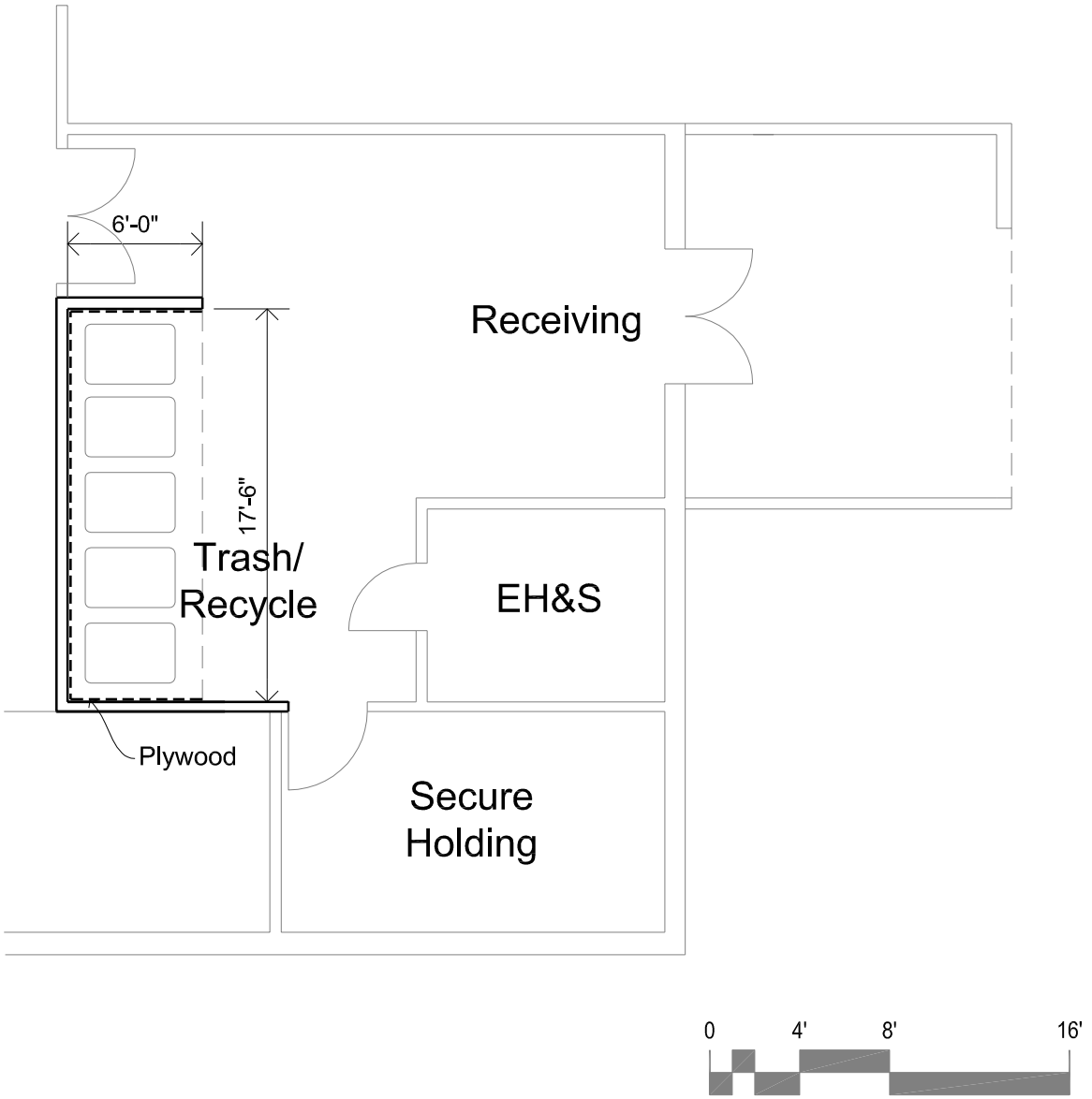
Floor Area: 100 SF
Adjacencies: Receiving, Loading Dock

ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Plywood, Painted
Baseboard	4" Rubber
Floor Finish	Sealed Concrete
Ceiling Finish	Open Structure
Ceiling Height	-
Casework Finish	-
Countertops	-
Open Shelving	-
Shielding	-
Door Width	-
Door Height	-
Door Type	-
Door Vision Panel	-
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	-

EQUIPMENT/FURNISHINGS	
Fume Hood	-
Recycle Bins	Yes
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	68 Heat, 80 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.156/sf
Exhaust Air	1 cfm/sf
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	Hose Bibb
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	Yes
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	-
Data (qty and security)	-
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	10
Fixture Type	Fluorescent
Safe Light	
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


6'-0"
17'-6"
Receiving
Trash/
Recycle
EH&S
Plywood
Secure
Holding
0
4'
8'
16'

5.1.3
EH&S Biomedical Waste Room

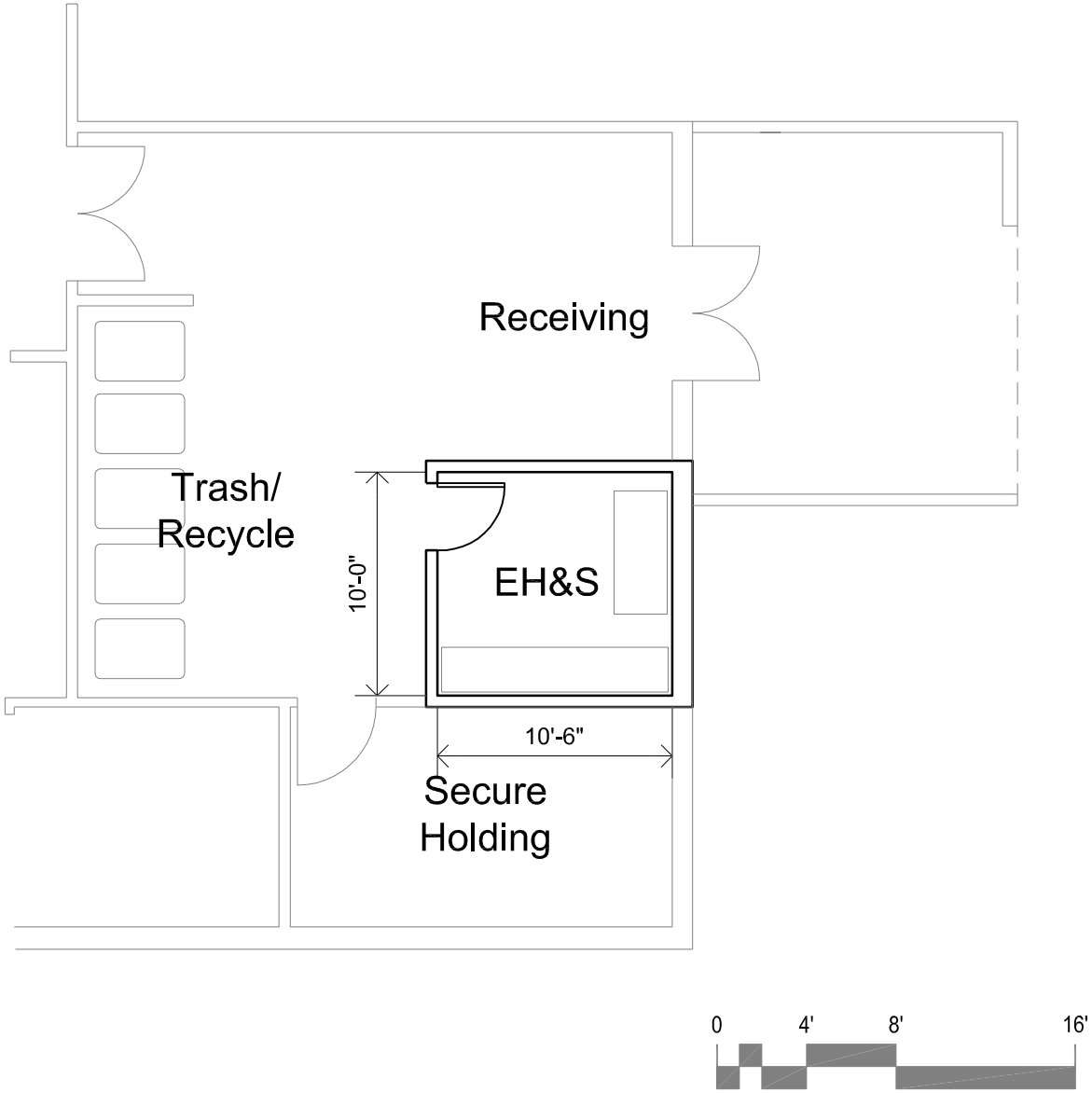
Floor Area: 100 SF
Adjacencies:

ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Gyp. Bd., Painted
Baseboard	Integral Cove
Floor Finish	Epoxy
Ceiling Finish	Open Structure
Ceiling Height	-
Casework Finish	-
Countertops	-
Open Shelving	Yes
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Metal
Door Vision Panel	Yes
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Access

EQUIPMENT/FURNISHINGS	
Fume Hood	-
Free Standing Shelves/Cabinets	Yes
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	68 Heat, 80 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.156/sf
Exhaust Air	1 cfm/sf
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	-
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	-
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	-
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	50
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


Receiving
Trash/
Recycle
10'-0"
EH&S
10'-6"
Secure
Holding
0
4'
8'
16'

5.1.4
Transfer/Holding

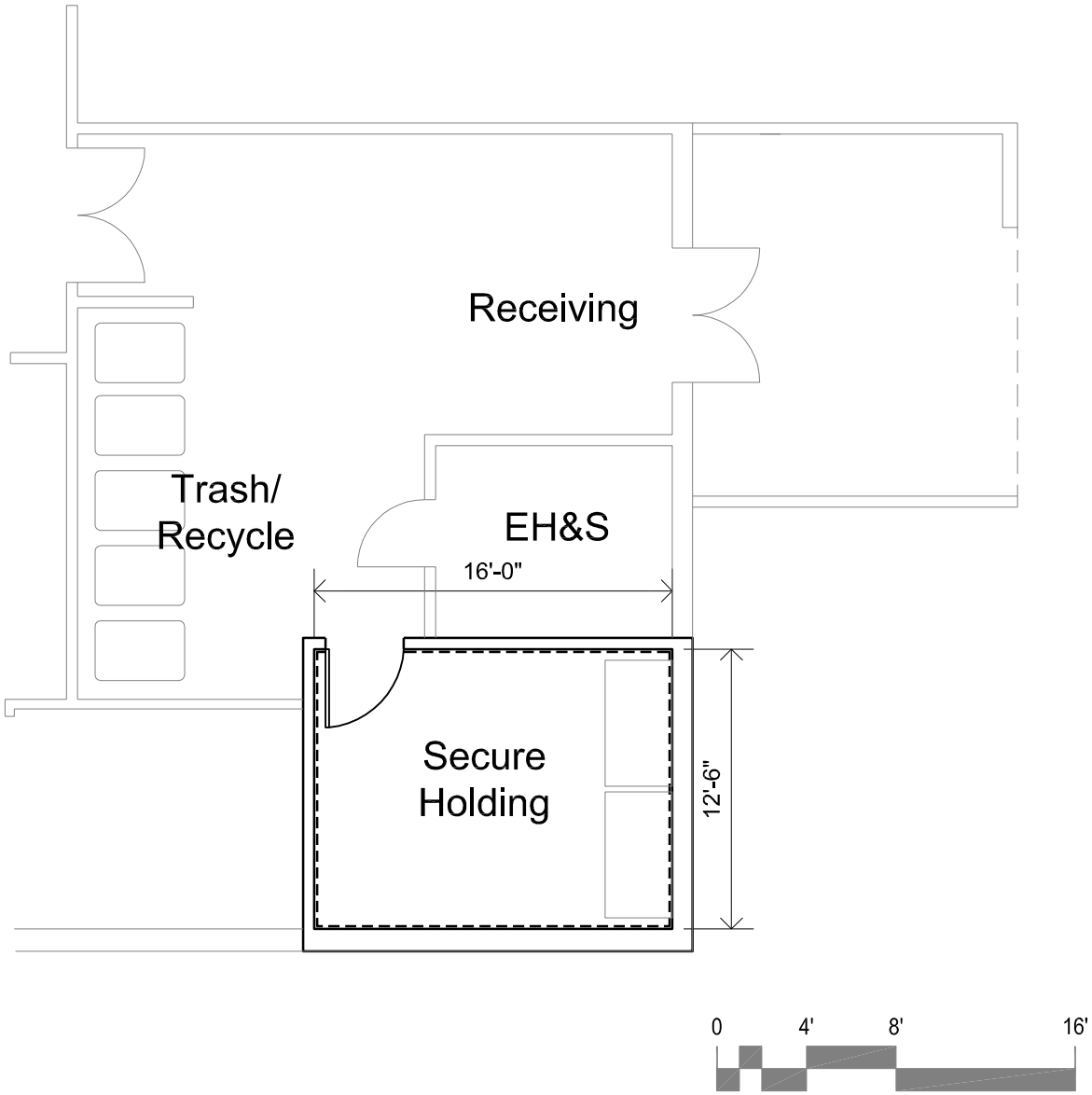
Floor Area: 200 SF
Adjacencies:

ARCHITECTURAL	
Occupancy Type	B
Load Factor	100
Occupancy Load	Accessory
Exits	1
Live Load	-
Wall Finish	Plywood Painted
Baseboard	4" Rubber
Floor Finish	Sealed Concrete
Ceiling Finish	Open Structure
Ceiling Height	-
Casework Finish	-
Countertops	-
Open Shelving	Metal
Shielding	-
Door Width	3'-6"
Door Height	8'-0"
Door Type	Metal
Door Vision Panel	No
Door Seals	-
Door Threshold	-
Sidelight	-
Daylighting	-
Biological Safety Level	-
Level of security	-
Access (Lock, Card, Other)	Card Access

EQUIPMENT/FURNISHINGS	
Fume Hood	-
BSC	-
Desk	-
Table	-
Files	-
Casegoods	-
Marker Board	-
Projection System/AV	-
MECHANICAL	
Temperature (F)	68 Heat, 80 Cool
Relative Humidity	-
Ventilation	6.5/pers, 0.156/sf
Exhaust Air	1 cfm/sf
Return Air	No
Makeup Air	-
Filtration	MERV 13
Pressurization	Negative
PLUMBING	
Cold Water	Hose Bibb
Hot Water	-
Pure Water	-
Chilled Water	-
Floor Drain	Yes
Sink(s)	-
Steam	-
Cooling Water	-
Condensate	-
Safety Shower	-
Eyewash	-
Gasses	-
Compressed Air	-
Vacuum	-

ELECTRICAL	
Voltage/Phase	120
Estimated Loads	-
Emergency Power	-
UPS	-
Sensitive Instrument Ground	-
COMMUNICATION	
Phone (qty and security)	1
Data (qty and security)	-
Wi-Fi	-
Equipment Alarm	-
In-use Warning Sign	-
LIGHTING	
F.C. at Work Surface	50
Fixture Type	Fluorescent
Safe Light	-
Special Lighting	-
Dimmable	-
Darkenable	-
Zoned Lighting	-
STRUCTURAL	
Floor Loading (psi)	-
Vibration Criteria (mips)	-

Notes:


Receiving
Trash/
Recycle
EH&S
16'-0"
Secure
Holding
12'-6"
0
4'
8'
16'

07.

CODE CONSIDERATIONS

Applicable Codes
Referenced Standards and Regulations
Building Code Summary

APPLICABLE CODES/ STANDARDS/REGULATIONS

- 2012 International Building Code (IBC)
- 2012 International Fire Code (IFC)
- 2012 International Plumbing Code (IPC)
- 2012 International Mechanical Code (IMC)
- 2011 National Electrical Code (NEC)
- 2009 International Energy Conservation Code (IECC)
- 2009 ANSI/A117.1
- 2012 International Plumbing Code (IPC)
- 2012 International Fuel Gas Code (IFGC)

BUILDING CODE SUMMARY

The Crocker Science Center project will be considered a remodel and addition to the existing George Thomas Building (GTB) located on the University of Utah campus. The existing GTB is a 3-story concrete/ masonry structure, which will be partially demolished and seismically upgraded to meet current codes. A proposed 3-story infill addition will be added on the south side of the building. Based on current program level test fits the completed building will be approximately 120,000 gross square feet.

Site

The existing GTB is located directly off President's Circle. Service/fire access to the existing building is handled through a service drive (1400 E) located to the east of the building. Adjacent buildings include the William Stewart Building, Alfred Emery Building and Life Science Building. The existing building is approximately 55' feet above grade on the north/east sides. The site slopes towards the southwest corner of the building (Cottam's Gulch area) is approximately 65' feet above grade at its lowest point.

Approximate existing adjacencies/distances to GTB

- President's Circle – 35'
- 1300 East – 220'
- 1400 East – 75'
- William Stewart Building – 70'

Building Occupancy

- The primary occupancy for the building is Business Group B. There are also portions of the building that will be classified as Assembly Group A-3. Per previous DFCM projects this A-3 classification is based on the occupant load of the space being greater than 49 and requiring (2) exits. There may also be yet to be defined areas classified as S-2 (Low Hazard Storage).
- It is proposed that the A-3 occupancy be classified as non-separated occupancy to the main B occupancy per the IBC Section 504. The allowable building area and height of the building will be based on the more restrictive of the two occupancies (in this case, A-3). As such, no separation is required between the various B and A-3 portions of the building.

Building Type

- To the best of the program team's knowledge, the existing building is a comprised of concrete columns/roofs/floors and hollow unreinforced masonry units. This construction appears to be consistent with a non combustible Type II-B construction. During the design phase of the project additional investigation will be necessary to verify the building type classification. The new infill portion of the project will be constructed primarily of steel and concrete to meet the Type II-B classification. Both the existing and new structures will be fully sprinklered.

Allowable Height and Area

Per table 503 of the IBC the tabular allowable area for an A-3 and B building is as follows:

TABLE 7.1.1 FROM TABLE 503, IBC

OCCUPANCY	CONSTRUCTION TYPE	ALLOWABLE (HEIGHT/AREA)
A-3	IIB	2 Story 9,500 s.f./story
B	IIB	4 Story 23,000 s.f. /story

- Factoring in allowable area modifications for frontage increases and automatic sprinkler systems the allowable area and height can be expected to increased to the following:

	Area Mod. (At + [At X If] + [At X Is])*	Allowable Area/Story	Allowable Height with Mod.
A-3	9,500+(9,500 x .50) + (9,500 x 2)	33,250 s.f.	3 Stories
B	23,000+(23,000 x .50) + (23,000 x 2)	80,500 s.f.	5 Stories

*Note: Calculation anticipates future reduction of public way width based on building addition.

- Based on the preliminary program test fit plans the gross square footage for the new CSC is as follows:

	Base-ment	Level-1	Level-2	Level-3	Total
A-3	2,083	-	9,739	-	11,822
B	30,457	33,273	21,569	22,046	107,345
Total	32,540	33,273	31,308	22,046	119,167

- It is important to note that the anticipated floor areas are in some cases approaching the modified allowable square footage based on the proposal that the most restrictive (A-3 occupancy) classification must be met. Based on the level of detail at the programming phase it is rational to assume that the non-separated occupancy can be achieved. If the floor areas do push above the modified allowable portions, of the building (including the historic reading room) could be considered a separated A-3.

Sprinkler and Fire Alarm

- New B occupancy buildings are required to have an approved automatic sprinkler system when they have a floor with an occupant load of 30 or more. A fire alarm system is required in occupancies that have an atrium. Manual fire alarm boxes are not required when B occupancies are equipped throughout with an automatic sprinkler system and the alarm notification appliances will activate upon sprinkler water flow.
- Because the new construction will be an addition to the existing building , the existing building will need to be upgraded to provide complete sprinkler protection for the entire building. The existing fire sprinkler and alarm system will be replaced in their entirety.

Atrium

- Consideration should be given to using the space between the existing building and the new construction as a new atrium space. As such, the project will need to meet the requirements identified in Section 104 of the IBC. Automatic sprinklers, fire alarm and smoke control system will be installed to meet the requirement of section 104. During design, consideration should be give to limit the size of the atrium space by strategically placing 1-hour fire barriers between adjoining spaces.

Chemical Storage

- Control areas will be established to provide an alternative method for handling of hazardous materials without classifying portions of the building as occupancy group H. Control areas must be separated from each other by fire barriers (IBC 707) or horizontal assemblies (IBC 711). The allowable hazardous quantities and number of control areas vary per floor level. The following table summarized the applicable requirements from IBC Table 414.2.2

Floor Level		% of Maximum Allowable Quantity per Control Area	Number of Control Areas per Floor	Fire Resistance Rating (Hours)
Above Grade	3	50	2	1
	2	75	3	1
	1	100	4	1
Below Grade	1	75	3	1

- A chemical inventory was initiated for the CCGS labs that are anticipated to move into the CSC. However, this inventory will need to be formally confirmed by the University during the design phase.

Occupant Loads

- Based on the proposed space list for the building occupant load factors were applied to the various program components to arrive at an assumed total occupant load of 1400 (500 A-3 occupants and 900 B occupants). These numbers will need to be reevaluated during the design phase based on the final occupancy classification and square footages. For programming purposes, the proposed occupancy, load factor and occupant load have been included on the room criteria data sheets.

Plumbing Fixtures

- Based on the assumed occupant load and Table 2902.1 the minimum number of required plumbing fixtures was established. See Table 7.1.2.

TABLE 7.1.2 PLUMBING FIXTURE REQUIREMENTS FOR THE CROCKER SCIENCE CENTER

	Occupant Load	Assumed 50/50 male to female	Water Closets Male		Water Closets Female		Lavatories		Drinking Fountains		Service Sink
A-3	500	250	1 per 125	2.0	1 per 65	3.8	1 per 200	2.5	1 per 500	1.0	1
B	900	450	1 per 25 (first 50) + 1 per 50	9.0	1 per 25 (first 50) + 1 per 50	10.0	1 per 40 (first 80) + 1 per 80	12.3	1 per 100	9.0	1
Total	1400			11.0		13.8		14.8		10.0	2

08.

BUILDING SYSTEM PERFORMANCE CRITERIA

Structural
Mechanical and Plumbing
Electrical Systems
Lighting Systems
Communication/Data Systems
Auxiliary Systems

STRUCTURAL

The 2012 International Building Code will be used as the minimum code and standard for this project. This includes the current editions of the standards referenced by the 2012 International Building Code, such as ASCE 41-06. This project will conform to the latest DFCM Standards for Structural Engineering. Listed below is a summary of general design criteria. This building is classified as a Risk Category III structure per IBC 2012.

DESIGN CRITERIA

The structural systems in the facility shall be designed to meet the requirements of the 2012 International Building Code (IBC). The following minimum requirements should be anticipated:

TABLE 8.2.1: DESIGN CRITERIA

Risk Category	Category III – Buildings and other structures with an occupant load greater than 500 for colleges or adult education facilities
Wind Loads: Wind Velocity	120 mph, (Risk Category III)
Wind Loads: Exposure Type	"C"
Seismic Loads: Short Period Mapped Acceleration	Ss = 1.269 g
Seismic Loads: Long Period Mapped Acceleration	S1 = 0.473 g
Site Class	D (to be confirmed by geotechnical investigation)
Seismic Design Category	D
Seismic Importance Factor, Ie	1.25 (Risk Category III)
Roof Loads: Ground snow, pg	Approximate site elevation = 4650' Estimated Ground Snow Load pg = 44 psf. Calculate roof snow load as specified in the Utah Uniform Building Standard Act Rules R156-56 issued January 1, 2002. Design for snowdrift where appropriate. Roof live loads shall not be less than that specified in IBC 1607.11.
Snow Importance Factor, Is	1.10 (Risk Category III)
Floor Live Loads	Minimum floor live loads as required by occupancy per IBC or as required by DFCM design standards. DFCM standards require a minimum live load of 80 psf which may be in excess of IBC requirements for many uses.
Vibration Performance: Office space	8000 micro-inches/sec
Vibration Performance: General laboratories	4000 micro-inches/sec
Vibration Performance: Sensitive equipment rooms on suspended slabs	2000 micro-inches/sec
Vibration Performance: Basement slab on graded imaging core	500 micro-inches/sec
Existing Bldg. Seismic Rehabilitation	Basic Safety Objective (BSO) of ASCE 41-06

Other minimum codes and standards that apply to the design of this project include current editions of the following:

- International Building Code 2012
- ASCE 7 Minimum Design Loads for Buildings and Other Structures
- ASCE 41 Seismic Rehabilitation of Existing Buildings
- ACI 318 Building Code Requirements for Reinforced Concrete
- ACI 530 Building Code Requirements for Masonry Structures
- American Institute of Steel Construction (AISC) Code with Commentary
- 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

ANTICIPATED BUILDING STRUCTURAL SYSTEMS

The construction of the Crocker Science Center building is anticipated to be a mix of rehabilitation of the existing George Thomas Building and a new addition to the south. For the new construction, a steel frame gravity system is assumed to be the most cost effective. Steel wide flange beams and columns will support floors consisting of concrete fill over steel decks. Roof systems are likely to incorporate open web steel joists and girders supporting steel roof deck.

The potential lateral force resisting system will consist of concrete shear walls strategically placed to enhance the existing building and support the new construction. See Figures 8.2.7 through 8.2.10 for proposed shear wall locations. The concrete shear walls will be approximately 16” thick normal weight concrete. Collector elements (drag struts) will be added to connect the shear walls to the existing building diaphragm.

The existing masonry facade will need to be braced and stabilized. This can be accomplished with metal studs with polyurethane and metal lath as shown in the accompanying detail (Figure 8.2.2). It is possible that bracing and stabilization will only be required at the paths of egress.

Center coring is an option for addressing the unreinforced masonry which serves as backing for the facade. This is an excellent approach and provides superior performance but can be costly, invasive and time consuming. Hence, it should be considered only as an alternative to the polyurethane and metal lath approach.

Vibration performance is anticipated to be a concern at the lab spaces due to sensitive equipment. The performance criteria has been outlined in the design criteria section. Figures 8.2.3 and 8.2.4 show two sample bays which represent a typical 21’-0” x 28-3” bay from the proposed space layout. The first bay depicts typical framing sizes for the office space vibration criteria while the second bay represents typical framing sizes for the general laboratory areas.

Foundation Design

The potential footing and foundation system will consist of micropiles and pile caps at the existing building and mat foundations in the new construction. The larger foundations will be located under the concrete shear walls

A large, 2’ thick mat of reinforced concrete is anticipated to support some very sensitive lab equipment. See first 8.2.6.

Structural Foundation Plan

Depressed slabs in the basement mechanical room should be designed where the existing slabs would be removed, materials excavated to the bottom of existing footings and new slab cast around existing footings, which would gain roughly 18” to 24” of clearance. This process can be seen in the accompanying details (Figure 8.2.4).

Nonlinear Structural Analysis

Further structural analysis of the project will benefit from nonlinear studies. These analyses could validate the use of existing materials or optimize the new systems as they interact with the existing structure. Material testing can be anticipated with these studies. It is anticipated that these studies would require an extensive use of ASCE 41, Seismic Rehabilitation of Existing Structures.

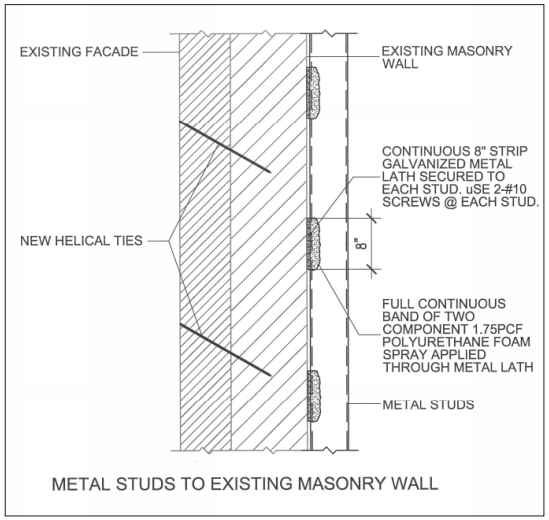


FIGURE 8.2.2: METAL STUDS TO EXISTING MASONRY WALL

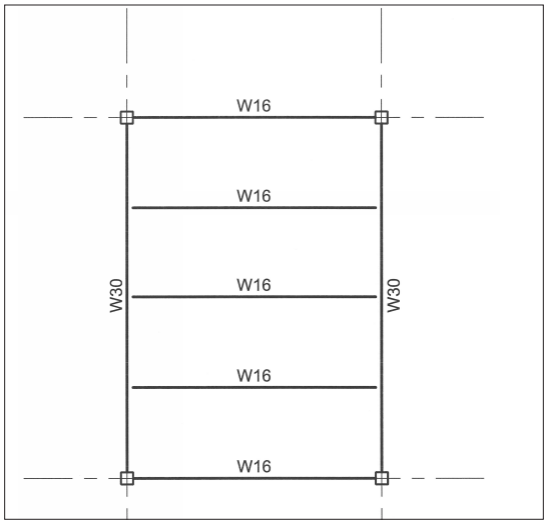


FIGURE 8.2.5: TYPICAL BAY FOR GENERAL LABORATORIES

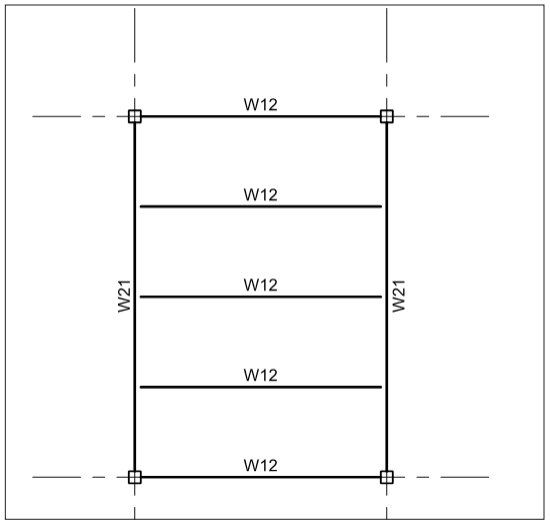
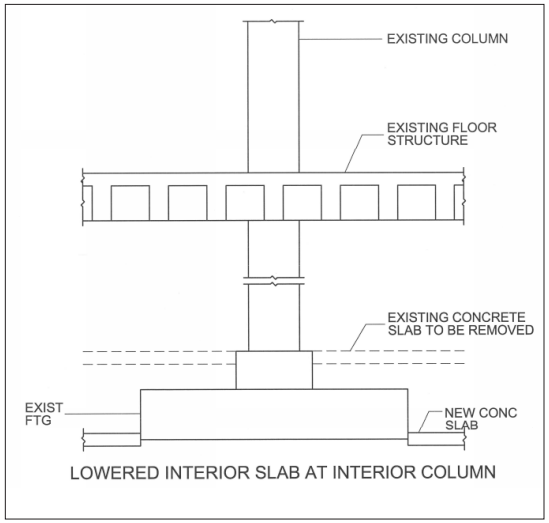


FIGURE 8.2.3: TYPICAL BAY AT OFFICE SPACE



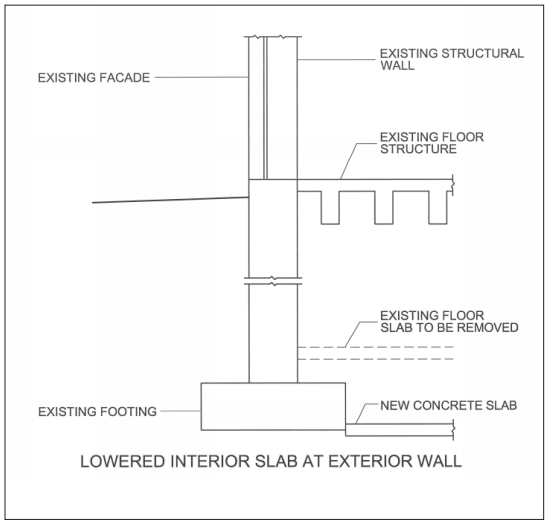


FIGURE 8.2.6: STRUCTURAL FOUNDATION PLANS IN MECHANICAL ROOM

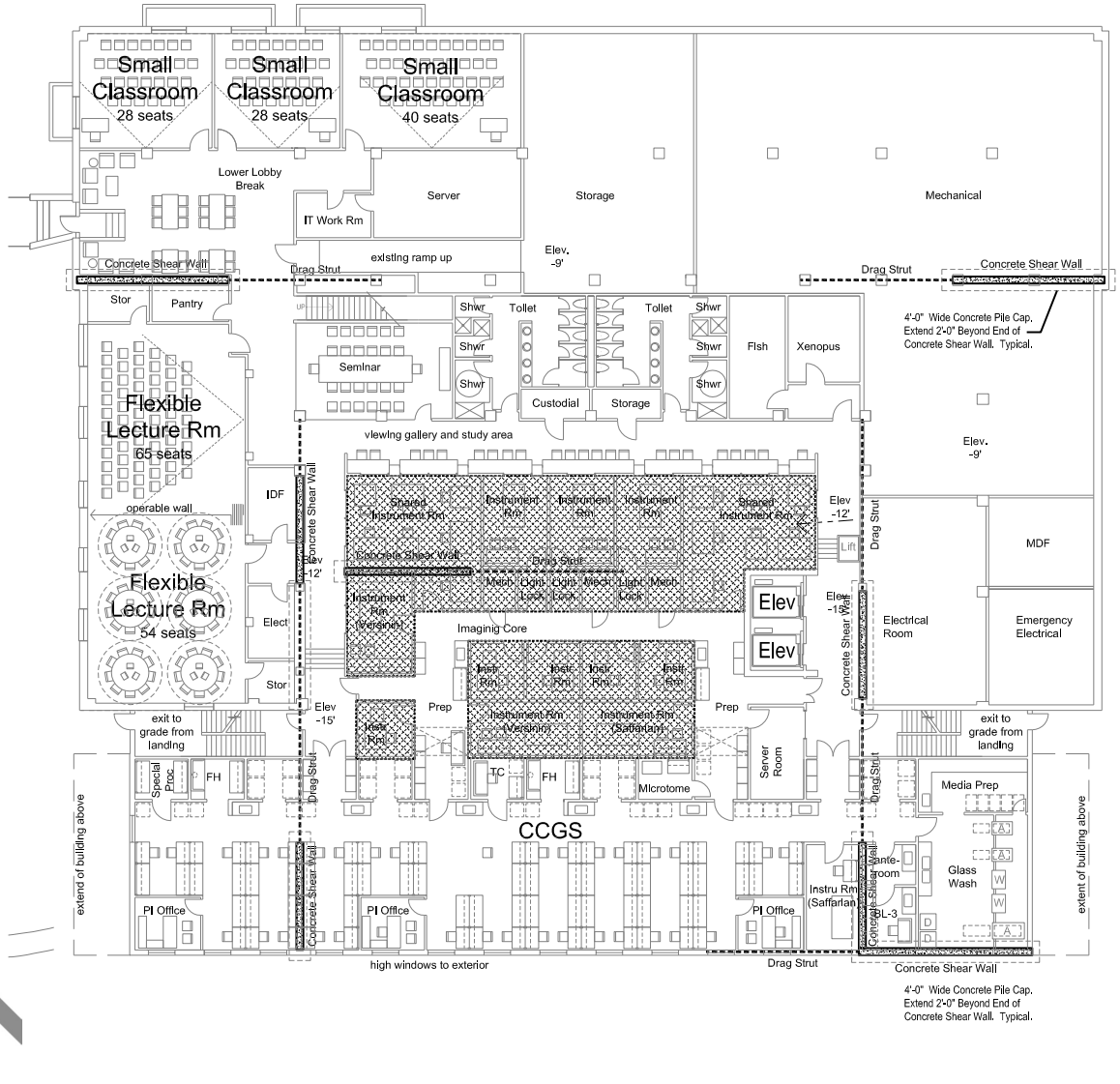


FIGURE 8.2.7: PROPOSED CONCRETE SHEAR WALL DIAGRAM FOR BASEMENT LEVEL

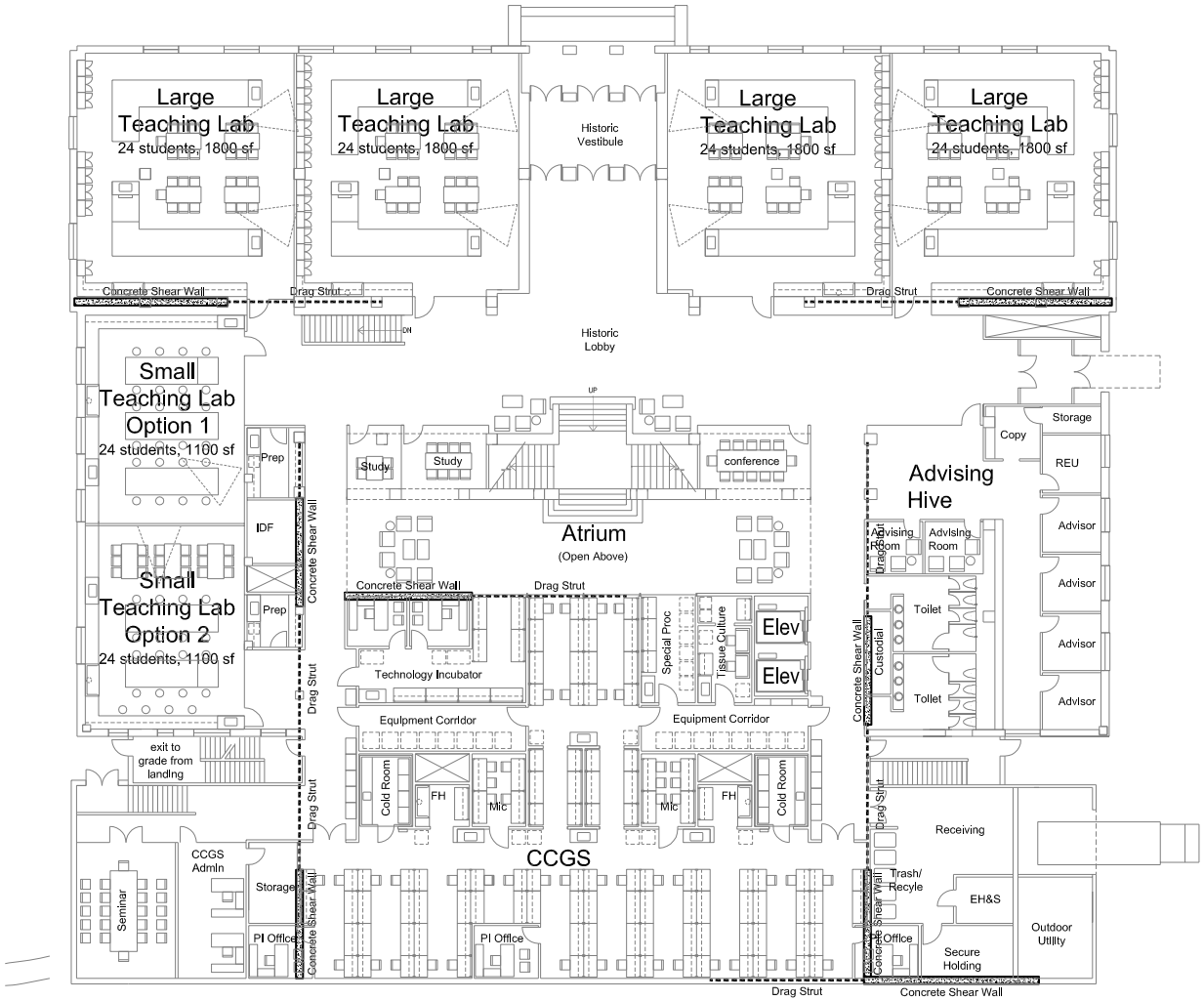


FIGURE 8.2.8: PROPOSED CONCRETE SHEAR WALL DIAGRAM FOR FIRST FLOOR

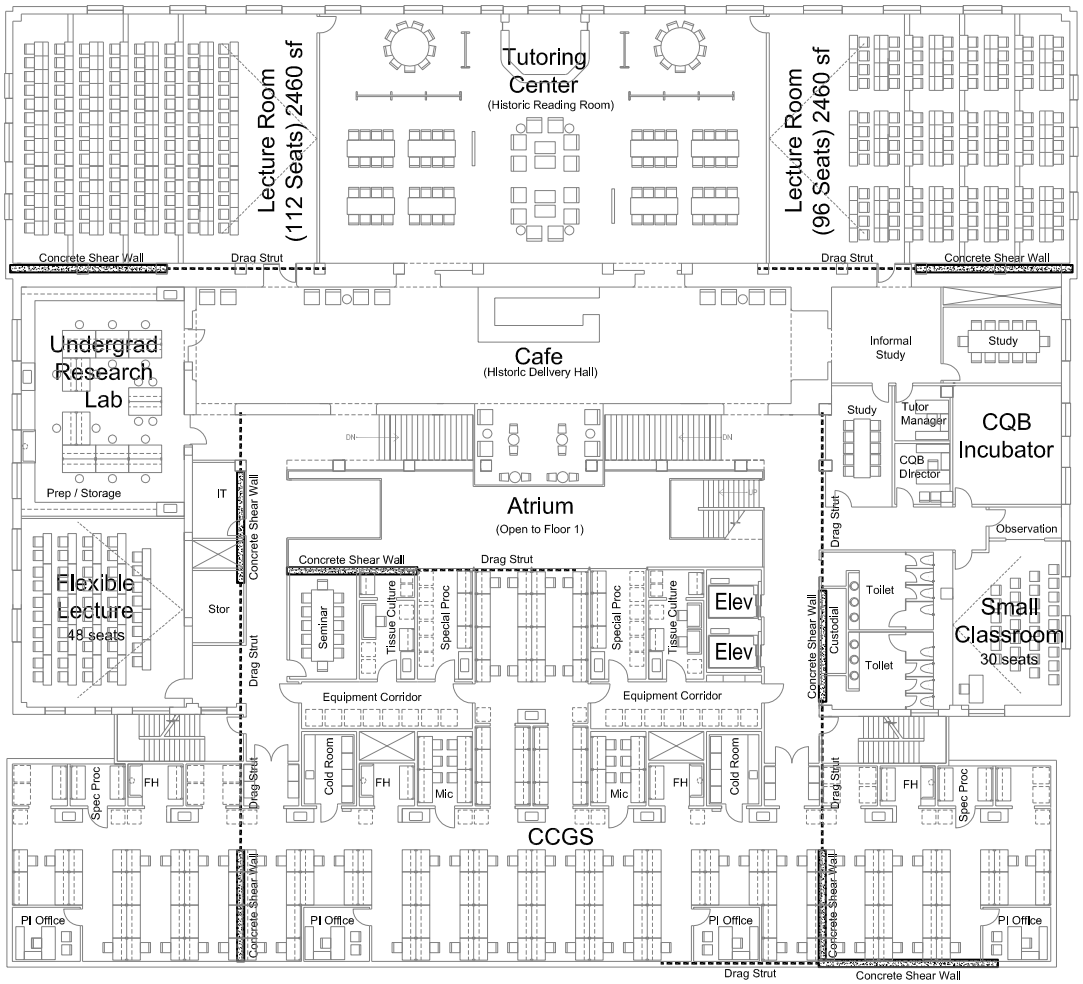


FIGURE 8.2.9: PROPOSED CONCRETE SHEAR WALL DIAGRAM FOR SECOND FLOOR

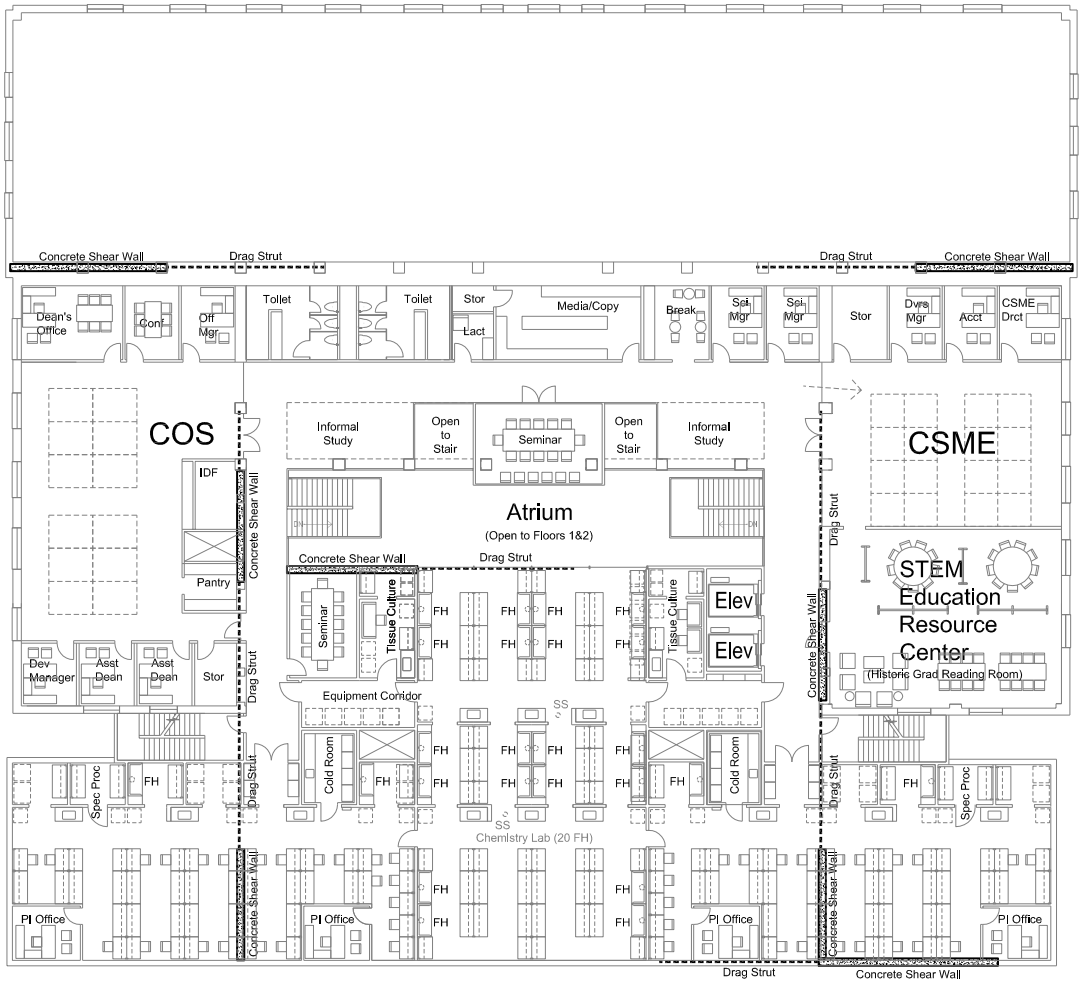


FIGURE 8.2.10: PROPOSED CONCRETE SHEAR WALL DIAGRAM FOR THIRD FLOOR

MECHANICAL

APPLICABLE CODES AND STANDARDS

Conform to the latest edition of the following codes and standards, or the requirements defined in this program, whichever is more restrictive:
2012 IBC
2012 IMC
2012 IPC
2012 IFC
2012 IECC
DFCM Design Manual, University of Utah Supplement, September 2012, or most current at beginning of design
ANSI/AIHA Z9.5-2012 – Laboratory Ventilation
LEED-NC 2009

AVAILABLE UTILITIES

High temperature water. High temperature water is available from the central campus system. Reference DFCM Design Manual, University of Utah Supplement, 3.5 Mechanical, Part 3: High Temperature Hot Water System, for specific requirements for connections to or modifications of the University's High Temperature Water System. Anticipated peak demand is 4,800 mbh, and service size is 3"

Chilled water. Chilled water will be available from the new southwest chiller plant. However, completion of that plant may not correspond with the project completion date. In anticipation that the central chilled water will not be immediately available when the building is completed, but will be shortly after, provide a temporary air-cooled chiller, and provide future central plant connection to the chilled water lines in the building. Anticipated demand is 350 tons, and anticipated service size is 6".

Culinary water. Extend a 3" culinary water line and an 8" fire protection line to the project site from a new 8" line. It is anticipated that the water pressure is approximately 80 psig.

Sanitary sewer. Sanitary sewer size will be 6". Sanitary sewer will be routed to the northeast, to a manhole in President's Circle.

Stormwater. Stormwater will be routed to the south.

Natural gas. There is no natural gas demand anticipated for the new building.

GENERAL REQUIREMENTS

Temperature
Reference DFCM Requirements, University of Utah Supplement, 3.5-G-6

Outdoor design temperatures
Winter 0 °F
Summer 97DB/62WB °F
Cooling tower 70WB °F

Indoor design temperature (see Table 8.3.1)

Hours of Operation
Research laboratories, support spaces, service corridors, chemical storage, cold rooms, tissue culture rooms, vivarium, microscopy, and all other spaces associated with the CCGS will operate continuously. All other spaces--including common areas, teaching labs, and classroom---will operate as follows:

Day of Week	Occupied
M-F	0700 – 2200
Sat	0800 - 1600
Sun/Holiday	0800 - 1600

HUMIDITY

Humidification is not required in normally occupied spaces, but the spaces should be maintained at 45% maximum in the summer.

The vivarium requires humidity control in the range of 40% - 60%. Note that the vivarium mechanical system is not part of the base building system, but will be provided as a separate system at a later date.

MEASUREMENT AND VERIFICATION

Comply with the University of Utah M+V Protocol. Energy meters to provide local as well as remote readouts, using Modbus RTU protocol.
Install continuous metering equipment for the following uses:

High Temperature Water

- Ultrasonic digital flow meter, Fluxus ADM 7407, providing the following information: HTW Flow rate, supply and return temperature, instantaneous energy flow rate, totalized energy flow rate.

Chilled Water

- Ultrasonic digital flow meter, Fluxus ADM 7407, providing the following information: Chilled water flow rate, supply and return temperature, instantaneous energy flow rate, totalized energy flow rate.

Additionally, coordinate with electrical engineer for electrical panel submetering for lighting and plug circuits.

Note that all three available points of LEED EA Credit 5: Measurement and Verification must be achieved.

PROJECT DOCUMENTATION

Provide a design narrative that includes the following:

- Basis of design, including all information required to prepare the design
- Sequence of operation of all systems, as well as their interaction with other systems
- System description, including operating parameters and assumptions
- A description of the methods used by the design team to achieve sustainability, including the integrated design process; and a description of the results, i.e. a description of the sustainable elements included in the design. Include in this section how the requirements of this program were met.
- Results of the energy simulation, with a design energy performance standard for the building.

TABLE 8.3.1: LABORATORY SPECIFIC REQUIREMENTS

Room Type	Temperature				Noise
	Summer		Winter		RC Mark II RC(N)
	Occupied	Unoccupied	Occupied	Unoccupied	
Open Public Areas	75	85	72	65	35 – 40
Private Offices	75	85	72	65	30 – 35
Open Offices/Shared Space	75	85	72	65	35 – 40
Conference Rooms	75	85	72	65	25 – 30
Classrooms	75	85	72	65	25 - 30
Teaching Laboratories	75	85	72	65	35 - 40
Research Laboratories	75	75	72	72	35 - 40
Restrooms	75	85	72	65	n/a
Storage	80	85	60	55	n/a
Copy Rooms	75	85	72	65	n/a
Mechanical Rooms / Penthouse	80	80	55	55	n/a
Elevator Rooms	80	85	60	55	n/a

Reference Room Data Sheets for more specific criteria

TABLE 8.3.2 UNIVERSITY OF UTAH ENERGY PERFORMANCE REQUIREMENTS

Construction Type	Area	LEED-NC v3.0 EA CR 1 Points	Energy Cost Reduction
New Construction	32,308	15	40%
Existing Building Renovation	10,213	15	36%
New Hospital/Clinics (Research Laboratory)	35,594	5	20%
Crocker Science Center	78,115	10	30%

ENERGY PERFORMANCE REQUIREMENTS

The University of Utah has established energy performance requirements listed in Table 8.3.2.

INTERNAL LOADS

Reference room data sheets for specific temperature, humidity and ventilation requirements.
The University of Utah has established energy performance requirements as listed in Table 8.3.2.

Additionally, account for the following:

- Demand Controlled Ventilation (DCV) in zones with significant variation in occupant loading, or ventilation rates >0.30 cfm/ft^2.
- Ventilation rate is per ASHRAE 62.1-2007, with additional 30% to comply with LEED EQ Credit 2 Ventilation Credit.
- Lighting Power Density: per ASHRAE 90.1-2007
  People: 250 Btuh, sensible; 200 Btuh, latent.
- Equipment:
  1 laptop PC @ 50 W each per person in lecture halls and classrooms
  1 desktop PC @ 125 W per seat in offices
  1 copier @ 300 W per 10 people in office groups

Additionally, since this is a DFCM project, LEED Silver must be achieved.

The following are goals, but are not required

- Provide as much on-site renewable energy as is cost-effective, based on life cycle cost analyses under the FEMP rules based on 10 CFR 436.
- Reduce CO_2 emissions related to building energy consumption by 50%, compared to current Campus standard.

Reference sustainability section for proposed energy efficiency measures and strategies.

VENTILATION/INDOOR AIR QUALITY

Comply with ASHRAE Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality, as well as LEED IEQ Credit 2 (30% increased ventilation) for minimum ventilation requirements. Reset the outdoor air intake flow and/or space or zone airflow as operating conditions change, in accordance with Section 6.2.7 of the Standard, for the zones noted as DCV in the space summaries.

Design a ventilation system that results in an air change effectiveness greater than or equal to 0.9 as determined by ASHRAE 129-1997. Follow recommended design approaches in ASHRAE 2009 Fundamentals, Chapter 32.

Develop and implement an IAQ Construction Management Plan that includes the use of high efficiency filters (Minimum Efficiency Reporting Value (MERV) = 8, as determined by ASHRAE 52.2-1999), at each return air grille for systems used during construction.

Provide MERV 5 pre-filters and MERV 13 final filters at central air handlers upon completion of project.

In addition to toilet exhaust, provide separate exhaust system for janitor closets and dedicated copy rooms at the rate of 0.5 cfm/ft^2, and demonstrate that the rooms are maintained at a negative pressure of 0.03" wg relative to adjoining spaces.

COMMISSIONING

Reference DFCM Design Requirements for commissioning. Coordinate with commissioning agent retained for the project, and comply with requirements for building commissioning detailed in DFCM Solicitation for Commissioning Services

SYSTEMS

General Description

Use central station air handlers with cooling and heating coils as required to meet minimum ventilation standards. Use backward-inclined centrifugal fans with variable speed control. Locate air handling equipment indoors in basement or penthouse mechanical room with adequate service clearance. Provide variable volume supply to offices, classrooms and laboratories. Provide single duct air distribution to VAV boxes in all zones. Use variable speed return/relief fans.

At a minimum, use constant volume primary, variable volume secondary pumping for the heating water system, variable volume primary only pumping for chilled water, and constant volume primary only pumping for condenser water. Use redundant pumps for all systems. Provide HOA switches on all pumps and fans

Classroom/Teaching Lab Air Handlers

- 2" double wall construction
- 4.0" TSP
- MERV 7 filter bank, face velocity = 375 fpm
- Multiple backward inclined, 12 blade direct drive plenum fans

- Heating coil: 5/8" diameter 0.035" thick tubes, 2 rows, 6 fpi, 450 fpm face velocity
- Chilled water coil: 5/8" diameter 0.035" thick tubes, 4 rows, 10 fpi, 450 fpm face velocity
- Provide pressure relief door in supply main

Research Laboratory Air Handler

- 100% outside air
- Emergency power
- 2" double wall construction
- 5.0" TSP
- MERV 7 filter bank, face velocity = 375 fpm
- Multiple backward inclined, 12 blade direct drive plenum fans
- Preheat Coil: 5/8" diameter 0.035" thick, 2 rows, 4 fpi in airstream ahead of filters
- Heating coil: 5/8" diameter 0.035" thick, 2 rows, 6 fpi, 450 fpm face velocity
- Chilled water coil: 5/8" diameter 0.035" thick tubes, 4 rows, 10 fpi, 450 fpm face velocity
- Energy Recovery (Runaround) Coil: 40% propylene glycol, 5/8" diameter 0.035" thick tubes, 6 rows, 10 fpi, 450 fpm face velocity
- Provide pressure relief door in supply main

Laboratory Exhaust Systems

- Provide a continuous exhaust to the laboratory fume hood system under fire alarm and loss of primary building power.
- Do not return air from laboratories. Re-circulated air from other areas of the building may be used.
- Use variable volume exhaust and supply to reduce airflow when possible while maintaining required pressure differential.
- Manifold duct horizontally as possible/practical on a floor. It is also permissible to manifold between floors.
- Use Type 316 welded stainless steel for horizontal runs from hood common manifold . Use galvanized duct for vertical manifolded duct. Size duct for 2,000 fpm maximum.
- Provide redundant exhaust fans for each exhaust riser, located in rooftop penthouse.
- Discharge exhaust at least 10 feet above roof surface, at a minimum velocity of 3,000 fpm.
- Design supply air diffusers to maintain design airflow at hood face, and avoid airflow disturbances.
- No perchloric acid or radioisotope hoods are planned.

TABLE 8.3.3 LABORATORY VENTILATION RATES

	Occupied	Unoccupied	Emergency
Research Laboratory ACH	6 ACH	4 ACH	3 ACH
Teaching Laboratory ACH	6 ACH	0 ACH	3 ACH
Sash Face Velocity	100 fpm	60 fpm	As req'd

Vivarium

The vivarium will be provided with an independent air handling system as part of tenant finish, and is not part of the base system.

Heating

There is a new HTW heat exchanger in the basement of the building that generates steam for use in a converter in the George Thomas Building, as well as steam for the Stewart Building to the south.

- Replace the existing HTW converter with three convertors installed in an exterior vault, located at the east side of the new building, at the west end of the current HTW tunnel. Design components as detailed in 3.0 DFCM requirements, 3.5 Mechanical, Part 3: High Temperature Hot Water System.
- One converter to provide steam for Stewart, approximately 1,000 lbh at 15 psig.
- Two converters, each sized at 2/3 peak load (approximately 3,200 mbh each), operating in parallel to provide heating water at 180°F to the Crocker Science Center.
- Locate building service isolation valves and heat exchanger in exterior vault room. Install safety shutoff valve and all pumps and drives outside the vault.
- Generate building heating hot water through a shell and tube heat exchanger. Maximum allowable pressure drop on each side of the heat exchanger is 10 ft w.c.
- Provide perimeter radiation in existing building.
- Design heating water transport energy consumption (in the building, exclusive of central plant transport) as follows:

TABLE 8.3.4 MAX. WATER TRANSPORT ENERGY

	Maximum Water Transport Energy	
	(bhp/mmbh)	(W/gpm)
Full Load	2.50	19.0
50% Load	1.15	10.7

Cooling

- Chilled water will be provided from the campus chilled water system. Isolate the campus system from the building system with a flat plate heat exchanger, and assume campus supply temperature = 45°F.
- Design the building side chilled water for 15°F temperature rise at design wet-bulb hour, using variable volume primary-only pumping and two-way valves.

- Design the chilled water transport energy consumption (in the building, exclusive of central plant transport) as follows:

TABLE 8.3.5 MAX. WATER TRANSPORT ENERGY

Load	Maximum Water Transport Energy	
	(bhp/ton)	(W/gpm)
Full Load	0.05	10.9
50% Load	0.04	8.7

Air Distribution

- Document fan sizing calculations with zone by zone load calculations
- Document critical path supply duct pressure loss, and show process used to review fittings and duct sizing in order to minimize fan pressure requirements.
- Use automatic dampers on exhaust fans in lieu of barometric dampers.
- Require pressure testing of all duct systems in accordance with 2012 IMC
- Provide each space with individual room temperature control. Provide zoning plan during schematic design review that indicates proposed zoning plan for review and approval by Campus Planning staff.
- Document that transport energy consumption meets the following criteria:

TABLE 8.3.6 MAX. AIR TRANSPORT ENERGY

Load	Maximum Air Transport Energy (bhp/1,000 cfm)
Full Load	0.75
50% Load	0.30

CONTROLS

- Provide Direct Digital Control (DDC) system. Reference University of Utah Design Standards, for general DDC requirements
- Integrate the mechanical and electrical systems. Provide microprocessor to microprocessor communication between the DDC and variable frequency drives, air handler(s), electrical distribution, lighting, emergency generators, UPS system and building power. Additional points shall be made available for non-mechanical/electrical monitoring that may be required by the engineering department.
- Provide written sequence of operation on drawings for all systems controlled by the DDC system. Provide graphical representation of sequence of operations on the Building Automation System graphics.
- Label the areas served by air handlers and other fan systems on the BAS graphics. Provide temperature sensors at airside inlet and outlet of all terminal units.

SMOKE CONTROL

An active smoke control system is required.
It is recommended that analysis of the atrium and calculation of the required smoke exhaust rates be performed by an independent third-party.
Design of the smoke control system will be in accordance with applicable codes, and the results of the third-party smoke system analysis.
Assume that there will be three smoke control fans, at 50,000 cfm each, located at the top of the atrium. Additionally, provide make-up air through pneumatically operated doors and windows at the bottom of the atrium, with air directed to the base of the fire at a rate less than 200 fpm. Provide a firefighter control panel in a room easily accessible from the main entrance.

PLUMBING

Reference DFCM Design Manual, University of Utah Supplement, 3.5 Mechanical, Part 1

Domestic Water Supply

- Install water meter, pressure regulator, and two full sized reduced pressure principle backflow preventers, piped in parallel, at building service entry.
- Provide water softener for all chilled water and heating water makeup, as well as for domestic hot water. If softener is located in an inaccessible location, provide remote filling option for salt brine.
- Use type L hard drawn copper with wrought copper fittings and lead free solder pipe for all distribution. PEX piping is not permitted.
- Provide isolation valves at toilet rooms to allow any toilet room to be removed from service without impacting other services.

Domestic Hot Water

- Generate hot water using the hydronic heating system as the source, and provide combination of generation and storage as required to meet standby as well as peak flow requirements.
- Generate water at 140 deg F and distribute at same temperature. Use only softened water

Laboratory Water

- Provide a separate hot and cold water system, with backflow prevention at point of cross-connection.
- Circulate laboratory hot water at 140 °F.

Treated/Purified Water

- Generate laboratory Type I ultrapure water (18 Megohm-cm) using a reverse osmosis process. Circulate water to benchtops using unpigmented virgin polypropylene, in conformance with ASTM D2146, without additives.

Compressed Air

- Provide a compressed air system to deliver air at 80 psig, using a single stage, oil-free, positive displacement, non-pulsating liquid ring compressor.
- Distribute compressed air in Type L hard drawn copper with wrought copper solder fittings and lead free solder.
- Provide each laboratory with an accessible filter/drier.

Vacuum

- Provide a laboratory vacuum system to deliver vacuum at 18" Hg, using a single stage, oil-free positive displacement, non-pulsating liquid ring vacuum pump.
- Use Type L hard drawn copper with wrought copper solder fittings and lead free solder.

Sanitary Sewer/Waste/Roof Drains

- Use cast-iron pipe and no-hub fittings.
- Minimum size for buried piping is 4"

Laboratory Waste

- Use acid resistant tailpiece and piping at all horizontal waste piping from laboratory sinks. Allowable materials include tempered and annealed borosilicate glass, schedule 40 flame retardant polypropylene, or CPVC

Natural Gas

- Not used

Plumbing Fixtures

- Use wall-hung water closets, urinals and lavatories. Use manual flush valves on water closets and lavatories, battery powered sensor valves on urinals.
- Use swing down eye wash stations, not deck mount.
- Provide floor drain at eye wash stations and emergency showers.
- Use deep seal traps, not trap primers.

Fire Protection

- Provide fire sprinkler protection throughout building. System to comply with NFPA, campus fire marshal building official and IBC requirements and State of Utah Fire Marshal requirements.
- A fire pump is not anticipated, because the flow and pressure requirements can likely be met from the campus system. Conduct a fire flow analysis per DFCM criteria during the design phase to confirm this assumption.
- Provide individual floor control assembly, including zone check assembly, at each floor.

Sprinkler Occupancy Hazard Classifications are as follows:

Office and Public Areas:	Light Hazard.
Service Areas:	Ordinary Hazard, Group 1.
Mechanical Equipment Rooms:	Ordinary Hazard, Group 1.
Building Service Areas:	Ordinary Hazard, Group 1.
Electrical Equipment Rooms:	Ordinary Hazard, Group 1.
General Storage Areas:	Ordinary Hazard, Group 1.
Laboratories:	Ordinary Hazard, Group 1.

Minimum Density for Automatic-Sprinkler Piping Design as follows (reduce Design areas with quick response heads when applicable and increase design area as required for pitched ceilings:

Light-Hazard Occupancy:	0.10 gpm over 1500 ft^2 area.
Ordinary-Hazard, Group 1 Occup:	0.15 gpm over 1500 ft^2 area.

Maximum Protection Area per Sprinkler: As follows (except as modified by authorities having jurisdiction):

Office Space:	225/400 ft^2.
Storage Areas:	130/400 ft^2.
Mechanical Equipment Rooms:	130 ft^2.
Electrical Equipment Rooms:	130 ft^2.
Other Areas:	According to NFPA 13 recommendations, unless otherwise indicated.

- Components and Installation: Capable of producing piping systems with 175-psig minimum working-pressure rating, unless otherwise indicated. All piping and components are Schedule 40 minimum, and of domestic manufacture.
- Class I, standpipe system design shall be designed assuming 150 psi available at fire department connection. Pressure and required flow shall be provided by fire pumper truck.

ELECTRICAL SYSTEMS

CODES AND STANDARDS

International Building Code (IBC) 2012
International Fire Code (IBC) 2012
National Electrical Code (NEC) 2011
International Energy Conservation Code (IECC) 2012
Institute of Electrical and Electronic Engineers (IEEE)
Illuminating Engineering Society of North America (IESNA)
University of Utah Design Standards
Division of Facilities Construction and Management Design Criteria for Architects and Engineers
Laws, Rules, and Regulations of the Utah State Fire Marshal
Underwriters Laboratories (UL)
Electronics Industrial Association / Telecommunications Industry Association 568/569 (EIA/TIA)
ADA Accessibility Guidelines 2010

In all cases the most recent editions and references apply. The above list is presented only to highlight currently applicable codes and issues and is not a complete list of applicable codes.

ELECTRICAL SERVICE AND DISTRIBUTION

The medium voltage supply power for the Crocker Science Center from substations to the site is described in Section 3.6.1 Electrical Utilities of this report. A 600 amp padmount switch with three source switches and 3 VFI switches will be installed under the 2012 Utility Distribution Upgrade project to provide power to this building and surrounding buildings. Two of the VFI switches will be used for this building. One switch will feed the 12470-208Y/120V, 750 KVA, transformer which is being installed under the Utility Upgrade Project to upgrade of the existing service to the George Thomas Building and allow for the removal of an existing medium voltage transformer from within the building. This existing transformer should be reused to feed the new Crocker Science Center provided that it is large enough to handle the required 208Y/120 volt load of the new science building. The other switch should be used to feed a new 12470-480Y/277V transformer, which should be used to feed mainly lighting and mechanical loads of the new building. The new transformer(s) provided should be liquid-filled using Envirotemp FR3 fluid and meet all University requirements. The use of these two distribution transformers will reduce the need to have dry-type transformers within the facility and is preferred by the University. Consideration should be given to provide a sunken area well for the two transformers to minimize the visual impact of this equipment and to provide for a better more efficient secondary distribution. A sunken well would help reduce the amount of exterior service equipment required, by allowing the service entrance disconnects to be located inside the building rather than outside adjacent to the transformers. Reconfiguration of the medium voltage wiring from the switch to the transformer (s) may be required. It would be best that the medium voltage switch not be moved once it is installed under the 2012 Utility Upgrade Project because of other building connections. The removal of the switch out of service would be nearly impossible without major interruptions of power to multiple buildings.

Each of the transformer secondary sides should supply a main distribution section with a main circuit breaker that supplies distribution sections. The main circuit breakers should be electronic type with long term, short term, and instantaneous (LSI) adjustment. Circuit breakers in the distribution section should supply major feeders to lighting panels, motor control centers, power distribution panels, transfer switches, and large utilization equipment. Fused switches shall not be used. Each main switchboard shall be provided with Square D "Powerlogic" type digital metering that is connected by Ethernet to the main campus utility management system. Each main distribution switchboard shall be provided with 50% spare capacity and breaker space. All switchboards shall be provided with silver plated copper bus bars and lugs that are rated for copper only. The existing 208Y/120V distribution panel for the George Thomas Building that was supplied under the 2012 Utility Upgrade Project may be reused provided it's given capacity will meet the design load requirements and the existing supplied breakers align with the new design .

The estimated total connected load of the building will be between 20 and 25 watts per square feet. However, actual design loads should be used to calculate the total connected load during design. To insure that the building has sufficient capacity for future remodels and expansions, the distribution transformers and main service switchboards at a minimum should be sized for the two different building uses (Classroom/Education and Research Laboratory) and based on the loads shown in the tables below:

TABLE 8.4.1: CLASSROOM/EDUCATION

Load	Watts/Square Feet
Lighting	3.0
Receptacles	2.0
HVAC	6.0
Teaching Lab Equipment	3.0
Elevators	0.5
Miscellaneous	1.0
Total Design Load	15.0

TABLE 8.4.2: RESEARCH LABORATORY

Load	Watts/Square Feet
Lighting	2.5
Receptacles	4.5
HVAC	8.0
Lab Equipment	14.0
Elevators	0.5
Miscellaneous	1.0
Total Design Load	30.5

FEEDERS AND DISTRIBUTION EQUIPMENT

Different load types should be separated onto different feeders and distribution equipment , such as lighting, motors, utilization equipment, convenience power, and sensitive computer equipment. In general, lighting loads should be served at 277V, single phase; large motors and equipment at 480V, 3 phase; and power outlets and small equipment at 120V, single phase. Distribution feeders shall be sized to limit voltage drop to 2% at full capacity. Feeders shall be copper only, aluminum conductors are not allowed. All neutrals used in distribution systems shall be sized for non-linear loads.

Panelboards serving normal lighting and appliance circuits shall be located on the same floor as the circuits they serve. Panelboards that serve laboratory spaces may be located close to the lab either outside the lab in corridor walls or where practical inside the lab. These panelboards shall also be fed from distribution panels located on that same level. All distribution panels and appliance branch panelboards shall have copper bussing with lugs that are rated copper only. Distribution panels and appliance panelboards shall be sized with 50% spare capacity and space. All 208/120V distribution panels and branch panelboards shall be provided with a 200% neutral bus, a bonded ground bus, and an isolated ground bus. Lighting and appliance branch panelboards shall be provided with door-in-door construction. Where panelboards are flush mounted in walls, a minimum of six (6) ¾" conduits shall be stubbed out of the panel into an accessible ceiling space. Design feeders and distribution equipment as detailed in 3.0 DFCM requirements, 3.6 Electrical.

BRANCH CIRCUIT WIRING

All branch circuit wiring shall be copper with a minimum of #12 AWG. Aluminum wiring is not acceptable. Generally, branch circuits shall be loaded to not more than 80% of what is allowed by the NEC. Outlets that feed specific equipment shall be sized based on the actual nameplate rating of the equipment. In no case, shall more than four convenience outlets be circuited to a branch circuit that feeds educational/office space or laboratory space. Each branch circuit homerun should have no more than three (3) circuits. Each circuit shall be provided with a dedicated neutral conductor. All branch circuits shall include a code sized equipment ground conductor. In all lab spaces, the minimum size conductor used shall be a #10 AWG. This will allow for flexibility for change and help reduce the voltage drop on a circuit. The maximum allowable voltage drop from the branch panelboard to the farthest load shall be 3%. The total allowable voltage drop from the service entrance switchgear to the farthest load in the building shall not exceed 5%. When calculating voltage drop, the load shall be assumed to be 80% of the ampacity of the branch circuit. Branch circuit wiring shall run overhead to allow for ease and flexibility for future changes and modifications. Branch circuits feeding floor boxes should be the only circuits that are run in concrete slabs.

RACEWAYS

All raceways that are designed should be a minimum of ¾" C. Type MC or AC cables are not allowed on University of Utah projects. Provide raceway systems for all card access, security, CCTV, audio/visual and other technology systems whether furnished in the building construction contract or whether provided by the University/Owner. A 200lb. nylon pull string shall be provided in all empty conduits. Provide rigid metal conduit or intermediate metal conduit in areas where conduit is subject to damage. Schedule 40 PVC conduit shall be used in location below grade or under slabs on grade.

GROUNDING

A main common ground bus shall be provided in the main electrical room in the basement that is bonded to all grounding electrodes. As a minimum, the grounding electrodes shall consists of building steel, the building cold water pipe, a UFER ground, and a minimum of two ground rods located outside the building. The design engineer shall review the soils report to determine the resistivity of the existing soil to determine whether additional grounding techniques would be required. The grounding system resistance to ground should measure 5 Ohms or less. Provide a grounding system riser throughout all communication/data rooms with a ground bus in each room. An isolated equipment ground conductor shall be provided for all 208/120V distribution panels and branch panelboards. Where laboratories require special grounding, a separate ground bar shall be installed with a minimum 1/0 AWG. copper conductor run back to the main common ground bus in the basement.

LIGHTNING PROTECTION

Provide a lightning protection system for this building. The lighting protection system shall consist of air terminals with down conductors, ground rods, and a ground ring that encircles the building. Provide a UL Master Label and comply with NFPA 780. Provide design details showing how to install down conductors in areas of the existing building that are historically sensitive. The lightning protection system shall connect to the main common ground bus located in the main electrical room.

SURGE SUPPRESSION

Surge protective devices (SPDs) should be installed in the service entrance switchboards and any branch panelboards serving sensitive electronic equipment. The SPD devices shall be located integral with the equipment and sized for the level of exposure that is encountered.

SHORT CIRCUIT AND SELECTIVE COORDINATION STUDY

For all electrical distribution systems at the University of Utah, selective coordination and short circuit studies shall be completed by the A/E and submitted as part of the Construction Documents phase submittal.

The A/E shall assume an infinite bus on the primary side of all building service transformers. Settings for all adjustable trip breakers shall be provided to the Contractor prior to the electrical system startup. All equipment shall be rated adequately to withstand the current that may be available during any fault or overload condition. The selective coordination study shall include the standby emergency power system. From this study, the engineer shall provide copies of arc flash labels for each piece of the electrical distribution equipment as specified in NEC 70E.

ELECTRICAL ROOMS

Consideration shall be given to locating the main electrical room in the basement in the southeast corner of the existing George Thomas Building for ease of connection to the incoming power feed from the two distribution transformers. However, this space must allow for a minimum 9' floor to ceiling height to allow conduits to get in and out of the distribution equipment. Electrical rooms should be vertically stacked and be centrally located to the greatest extent possible to limit the distance to any remote electrical device to a maximum of 150 feet. If there are electrical devices in excess of this distance, consideration should be given to locating additional branch panelboards in those areas. These rooms should be dedicated to electrical distribution and should not be used for communication/data equipment, storage, or any other purpose. All electrical rooms shall be provided with out-swinging doors with panic hardware. The main electrical rooms shall be provided with two entrance/exits. Because there will be a smoke evacuation system for this building, the standby emergency power source and its transfer switches shall be in a room separate from the normal power source and vented directly to and from the exterior. This room shall be enclosed with not less than 1-hour fire barriers built in accordance with the IBC. When locating equipment within these rooms, consideration should be given to providing spaces within these rooms to allow for vertical routing of feeders. Rooms shall be sized large enough to allow for future equipment to be installed.

RECEPTACLES / SPECIAL PURPOSE OUTLETS

Power receptacles should be located as described and shown in the room data sheets. However, locations that are not clearly shown, the following guidelines should be followed. In all cases, the location and number of outlets should be coordinated with the building users to ensure that their needs are met. Outlets shall utilized standard NEMA configurations and the minimum rating shall be 20 amps.

Offices

For each work station, provide one duplex outlet dedicated to computer terminals and one duplex outlet that can be switched. Provide additional duplex outlets one spaced for every 10' of wall space.

Conference Rooms

Provide a minimum of two dedicated duplex outlets, located on opposite walls, for computer use. Provide additional duplex outlets one spaced for every 10' of wall space. Provide a floor box under each table for power and communication/data conveyance for the conference room table.

Lounge / Break Rooms

Provide GFCI duplex outlets space every 4' along counters. A minimum of two branch circuits shall be used to feed outlets on each counter. No more than two outlets shall be on each branch circuit. Provide dedicated outlets for each refrigerator, microwave, vending machine, disposal and other kitchen equipment requiring a dedicated circuit. For large kitchen equipment (vending machine, refrigerator, etc.) provide a GFCI breaker at the panelboard for easy reset accessibility.

Gathering Spaces

Provide outlets in spaces where people gather. Provide one outlet for every four (4) chairs to allow for computers to be plugged in.

General Use Counter Tops

Provide duplex outlets spaced every 4' along the counter. No more than two outlets shall be on each branch circuit.

General Lab Spaces

Provide a two compartment, aluminum or steel wiremold, mounted above the lab bench to provide power and communication requirements. Outlets shall be spaced 24" on center. Any outlets that are located within 6' of sinks shall be GFCI type. Each bench shall be provided with a minimum of six (6) 20 amp 120 volt and one (1) 30 amp 120 volt outlets. Additionally, each bench shall have one (1) 20 amp 120 volt outlet that is on emergency power. Provide additional emergency power for specific equipment that is required to be on emergency power. Provide special purpose outlets for any lab equipment requiring special power requirements. The design engineer will be responsible for coordinating this with the users. If pre-wired laboratory benches are provided, it will be the responsibility for the design engineer to coordinate the number of outlets that will be provided to ensure sufficient outlets are provided to meet user needs.

Classrooms/Teaching Spaces

Provide outlets around the room spaced a maximum of 10' apart. Provide outlets for the teacher's station and any A/V equipment. Where equipment cannot be fed from a nearby wall without causing a tripping hazard, provide a floor box/poke-through with power and data receptacles. The design engineer shall coordinate with the user during design to determine outlet locations for specific equipment. If there is fixed in place casework, locate outlet in the casework.

Electrical Rooms

Provide a minimum of one outlet on emergency pow-

er for the smaller electrical rooms on the upper levels. For the main electrical rooms, provide a minimum of two outlets on emergency power.

Generator Location
Provide one outlet on emergency power.

Transformer Pad/Vault
Provide one outlet on emergency power.

Communication/Data Rooms
Quadplex power receptacles, with separate 20 amp feeders and isolated grounds, should be mounted on every wall in the equipment room, spacing should be on six foot (6') centers and located eighty four inches (84") above the finished floor. Confirm during design which outlets shall be on emergency power. Provide (2) 20 amp, 208 volt 1ph, dedicated outlets on emergency power for each data rack provided. These outlets may be fed with either a central UPS or local UPS. Assume a minimum power density of 6000 watts for each rack. Outlets shall be coordinated with equipment racks and wall mounted equipment locations. Provide one outlet on normal power for convenience.

Corridors / Lobbies
Provide at least one outlet every 25', on alternating sides of the corridor or lobby.

Stairs
Provide one duplex outlet at each stair landing at each building level. Mid level landings do not require outlets.

Storage Rooms, Janitor Closets
Provide one outlet. For janitor closets, provide a GFCI outlet located at 48" AFF.

Building Exterior
Provide one GFCI outlet near each entrance/exit. In addition, provide GFCI outlets in areas where students and faculty may congregate.

MECHANICAL EQUIPMENT WITH HEATING/ COOLING COILS

Provide special purpose 20 amp, 208v, 1p for each location for pressure washer.

EMERGENCY POWER SYSTEM

An emergency standby power system shall be provided for the Crocker Science Center. Emergency power shall be provided for life safety systems (egress lighting and alarm systems), critical lab process requiring emergency power (cold rooms, freezer farms holding irreplaceable samples), smoke control systems, HVAC systems serving fume hood exhaust and make-up air, and vivarium spaces. The generator shall be diesel with a skid mounted fuel tank with a minimum fuel capacity to provide 8 hours of operation at full load. The generator shall meet the latest EPA Tier Standard. The generator shall be provided with a minimum level II sound attenuated enclosure rated as required based on the adjacencies to residential communities. Four pole automatic transfer switches (ATS) with manual bypass shall be provided. Multiple transfer switches shall be provided for the different emergency branches as defined in article 700 of the NEC. A remote annunciator shall be provided and located in a constantly attended location if possible. Emergency distribution and branch panelboards shall meet the same requirements as the normal power systems. A minimal amount of dry-type transformers will be required for the emergency system. All distribution and branch panelboards shall have a minimum 50% spare capacity and breaker space. The emergency generator shall have a minimum 25% spare capacity. Consideration should be given in locating a space to place this equipment. It is desirable to provide a sunken area well for the generator to minimize the visual impact of this equipment with the surrounding views. The size of the required generator is estimated to be around 1500 KW. However, the actual size shall be determined during design based on actual design loads.

UNINTERRUPTIBLE POWER SUPPLY (UPS)

If a central Uninterruptible Power Supply is provided, it must be approved early in the design by the University Project Manager. UPS power shall be provide to supply outlets for communication/data MDF and IDF rooms and any critical lab equipment. The UPS system shall be backed up by the emergency power system. The UPS system(s) shall have a back-up battery system with a capacity of 15 minutes at full load. The UPS system shall be provided with 25% spare capacity.

LIGHTING SYSTEMS

INTERIOR LIGHTING SYSTEMS

Interior lighting design shall provide for the use of standard lighting fixtures that are highly efficient, high quality, and will meet the needs of each type of space within the Crocker Science Center. Light fixtures selected should complement the architecture of the space. Fixtures used shall be placed within spaces to allow for ease of maintenance. Do not place fixtures over stairways or high on atrium ceilings unless there is access from above. As a general rule, fixtures should be mounted no higher than 12'-15' above the finished floor. The lighting design shall comply with the illumination levels and uniformity criteria of IESNA and its recommended best practices, including RP-1-04 "Office Lighting" and RP-3-00 "Lighting for Educational Facilities". All lighting design shall meet DFCM's High Performance Building Standards. Consideration should be given for lighting pollution reduction.

LIGHTING ILLUMINATION

Adequate lighting levels should be used to ensure that there is enough illumination for the specific use and task of each defined space. Provide the required Illumination levels as recommended by IESNA. These

TABLE 8.3.5 ILLUMINANCE LEVELS

Space	Illuminance (Avg. Footcandles
Offices	30 (ambient) – 50 (task)
Conference / Meeting spaces	50
Classroom / Education spaces	50
Corridor / Stairways	10
Laboratories	50 (ambient) – 100 (task)
General Storage	30
Mechanical / Electrical Rooms	20

levels shouldn't be compromised for energy use reduction. With the use of sustainable practices, DFCM's High Performance Building Standards, fixture efficiencies, day light harvesting techniques, task lighting, and lighting control, energy usage can be reduced. The total lighting load for the Crocker Science Center should not exceed the calculated lighting power budget, minus 10%, as determined by ASHRAE 90.1-2012. It should be the goal of the lighting designer to reduce the lighting power budget even lower than the 10% better than code. The illumination levels shown in table 8.5.3 are the target levels for the Crocker Science Center.

LIGHT FIXTURE CRITERIA

In general, high efficient, high quality fixtures shall be used. Light sources that may be used included fluorescent, LED, and metal halide. Incandescent lamps should not be used and if used, require approval by DFCM. Where dimming is required, LED fixtures shall be used. If fluorescent dimming must be used, step dimming is preferred. Compact fluorescent down lights shall not be used.

Lighting fixtures should be selected based on the size, configuration, and specific functional needs of the space. Due to the historic requirements for spaces within the existing George Thomas Building, some areas will have specific fixture requirements. Light fixtures used in the historic reading room shall be placed in existing light fixture locations and shall match the original fixture configuration. Refer to the section O4. Preservation Considerations for additional spaces where new light fixtures will need to resemble current configurations. In some cases, there may be existing fixtures that shall be reused and fixture restoration may be required.

LAMP AND BALLAST CRITERIA

Low energy consuming premium lamps and ballasts combinations should be used. All fluorescent ballasts shall be programmed start and meet University of Utah design standards.. Lamp and ballast combinations should provide for an efficacy of 75% or higher. Fluorescent lamps shall be T-8 with a minimum color rendering index (CRI) of 86. Lamp color should be specified based on the requirements of the space, however, it is preferable that the minimum color temperature is 3500 Kelvin. Differing lamp types shall be kept to a minimum for ease of maintenance. Fluorescent lamps should be specified to comply with the EPA TCLP requirements.

LIGHTING CONTROL

Lighting control shall be used to meet energy code requirements and to reduce overall building energy use. To meet the requirements of the International Energy Conservation Code (IECC 2012), a method to automatically shut-off all lighting in a building is required. All interior lighting shall be connected to some system or device that will meet the requirements of the energy code. The system(s) used shall provide for precise control while allowing for simplicity, flexibility (multiple users and departments), and low maintenance. As a minimum, controls shall include an occupancy sensor and local switch(es) for each space to allow for automatic switching and manual override of the space. A building wide lighting control system complete with manual switches for override capabilities, could be used for building areas such as, corridors, open office, and laboratory spaces. Smaller walled in areas could utilize occupancy sensors or timer switches.. In addition, spaces that have light fixtures located within 15' of exterior fenestrations shall utilize daylight harvesting techniques to reduce energy usage and meet energy code requirements. Consideration should be given for using integral daylight sensors in light fixtures.

Large classroom/education and conference spaces shall include a lighting control system that allows for zoned switching and interfacing with audio/video system. Exact requirements shall be determined during design.

EMERGENCY LIGHTING

Emergency lighting shall be provided for all of the paths of egress. Additionally, emergency lighting shall be provided for the following areas:

- Where critical experiments or other activities warrant continued occupancy of the space during a power outage
- Transformer Vaults / pads
- Emergency Generator Areas
- Main electrical rooms
- Telecommunication Rooms
- Mechanical spaces
- Any other specific location where emergency lighting is deemed necessary

EXTERIOR LIGHTING

All exterior lighting should be designed in compliance with RP-33-99 and per University of Utah standards. Utilize University standard light fixtures for walkways and plaza areas. Care should be taken when designing the illumination levels and fixture type for exterior building lighting. Up-lighting shall be kept to a minimum and exterior building-mounted lights fixtures shall be classified as full cut-off. Furthermore, the number of exterior building mounted fixtures shall be kept to a minimum, near entrance and exit lo-

cations 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) and to provide a level of security. It is very important to control the amount of light pollution from the building site for LEED considerations.

Exterior lighting circuits shall be controlled by a 50 A, 3P, 480V lighting contactor with a hands-off-auto switch and a photocell. Exterior security lighting shall be programmed to be switched on at dusk and timed off as directed by the University of Utah.

Exterior fixtures should utilize metal halide and LED lamp sources to the greatest extent possible. In concrete, in-ground, and bollard lights are not allowed. Light poles shall meet University standards and should be hinged at the base.

COMMUNICATION/DATA SYSTEMS

COMMUNICATION/DATA ROOMS

There shall be one main communication room (MDF) that is located in the basement. It is best to locate the MDF central to the building to minimize cable lengths. The size of the MDF shall be a minimum of 10' X 15' per University standards, however, the exact size shall be determined during design. This room shall house the main computer and phone equipment that serves the building. The MDF room shall be connected to the University Communication System through a single pathway entrance into the building. One additional pathway is desirable, but based on the current system in place, the second pathway is not available. Refer to section O3. Site Utilities and Infrastructure for additional information. This pathway shall have four (4) 4" conduits that run to existing and or new communication vaults (manholes). A pre-action fire suppression system shall be standard for this space. The room shall also have a minimum 2 hour fire rating.

Each additional floor shall have at least one communication room (IDF) that shall be sized as a minimum 10' X 12' per University standards, however, the exact size shall be determined during design. These IDF rooms shall be central to the building and stacked to allow for ease of communication/data distribution. A minimum of six (6) 4" conduits shall be run between each level. It is important to ensure that cable lengths do not exceed 100 meters (300 ft.). Additional IDF rooms should be provided on each level as necessary to keep cable lengths to within industry standard lengths.

MDF and IDF rooms should be separated from electrical rooms by a minimum of 6'-0" to help reduce possible interference from electromagnetic interference (EMI). Each MDF and IDF rooms shall have a minimum of three 84' X 19" floor standing racks. Plywood terminal boards should be installed on all walls. Cable tray should be installed around the perimeter of the room for cable management. Provide dedicated power outlets on UPS power for all communication/data equipment located in the room.

WIRE MANAGEMENT

Each floor shall have a dedicated cable tray system that connects to the communication room(s) on that level. Generally, the cable tray shall be routed in corridors/hallways and coordinated with ducts, piping, and electrical conduits to ensure easy access in and out of the tray when construction is complete. It is anticipated that an 18" wide by 6" deep basket style 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. This tray may be used for the following systems:

1. Communication/data
2. Card Access System
3. CCTV System
4. Building Management system

All cables that use the cable tray shall be properly labeled and identified. Where communication/data cabling is run through plenum rated space, the cabling shall be plenum rated.

COMMUNICATION/DATA RACEWAY REQUIREMENTS

Each communication/data outlet shall utilize a 4-11/16" X 4-11/16" X 2-1/8" deep junction box with a single-gang or double-gang mudring. One or two 1" conduits with a nylon pull rope (depending on requirements) 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. The conduit system that is provided shall allow for flexibility and change.

In office locations, provide a minimum of two (2) comm/data jack locations. In classrooms, provide the required number of location based on what is needed by the user. For lab benches, provide one data location for every 4' of lab bench. Exact locations and quantity shall be coordinated with the users during the design effort. Where telephone/data or power is needed in open areas of suspended floors, provide floor boxes only; poke-through devices should not be used. Provide telephone outlets for payphones, elevator panels, fire alarm panels, building automation system, security system, wall phones, and other required equipment. Provide junction boxes and raceways for wireless network points. These locations should be located in corridors and open lab / classroom spaces. Some additional locations may be required for exterior wireless capability. Coordinate locations with University IT during design.

Due to the nature of the building with research labs, the communication/network systems should be secured.

STRUCTURED CABLING SYSTEM

The structured cabling system will be provided by the University of Utah's IT division Netcom. They will provide all fiber optic cabling (Communication/data) to support the uses within this building. Century Link will provide the copper cables as detail in section O.3 Site Utilities and Infrastructure Fiber optic cable will run from the MDF room to each IDF room for communication/data distribution. Fiber optic cable may also run to specific spaces. Specific locations should be coordinated during the project design. 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 designed per the University of Utah's design standards. Horizontal cabling will consist of using Cat 6E data cabling. These cables shall not exceed 100 meters in length. A minimum of three (3) cables shall run to each device location.

AUXILIARY SYSTEMS

FIRE ALARM SYSTEM

The fire alarm system shall be designed in compliance with the Utah State Fire Marshal's "Rules and Regulations" and the University of Utah's design standards. The only approved fire alarm manufacturer is Fire Control Instruments (FCI) per University Standards. Coordinate the location of the building fire alarm control panel and annunciator panel with the campus fire marshal.

A non-coded, addressable fire alarm system shall be provided with the capability of being tied into the University of Utah's system at building 301. Horn/strobes shall be installed in all public spaces, conference rooms, restrooms, large open office areas, classrooms, laboratory spaces, and mechanical and electrical control rooms. Install additional notification appliance circuit panels on each floor to provide power to the horn/strobes devices associated with that floor. 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 for that level.

Smoke detectors shall be installed in all paths of egress. 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. Due the historic nature of the existing portion of the George Thomas Building that is to remain, consideration should be given to using a VESDA system for the large reading room as well as the proposed atrium. Because this building will have an atrium, a smoke control system will be required and the fire alarm system shall interface with this system. All fire extinguishers shall be monitored by the fire alarm system.

The fire alarm wiring shall be installed in a Class A loop configuration in metal conduit, minimum size of 3/4". Generally, minimum wire size shall be 16 gauge for audible alarm circuits, and 18 gauge for signal initiation circuits. Strobes shall be wired separately from audible devices.

CARD ACCESS SYSTEM

A building wide card access system shall be provided to control access in and out of the building as well as spaces within 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 approved card access system for this project is the University of Utah's approved system. Verify with the end user and the University of Utah how and who shall monitor the system. Regardless of the specific nature of the card access/security system designed, it should adhere to the University of Utah's standards. 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 and to preserve the historic nature of the building.

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. Card readers should be located at entrances into research lab space and other areas that are determined to required restricted access. Card readers may be required in the elevators to restrict travel between floors. 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.

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 pathways leading to and 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 system should be integrated with the card access system to allow for a flexible, user-friendly setup. All University of Utah standards should be followed when designing CCTV systems. Cameras shall be digital type power over Ethernet.

ALARM INDICATING SYSTEM

Due to the inherent cost and risks associated with this type of facility, an alarm annunciation system must be in place to alert personnel of an impending possible incident or system mal-function. This alarm system 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.

BUILDING CLOCK SYSTEMS

A self-correcting clock system shall be installed in this building Clocks shall be placed in locations as determined during the project design. Coordinate with the users for specific locations. The clock system's wireless front end controller shall be located in one of the communication/data rooms where Ethernet access is available. The clock system shall be manufactured by either SimplexGrinnell, Primex Wireless, or Sapling, Inc.

AUDIO AND VIDEO SYSTEMS

Audio and video systems will be part of the building construction work and shall be specified as part of the design. Coordinate directly with the user groups to determine specific requirements for each space within the building. Audio/video systems shall be designed and specified in compliance with University standards. Provide all calculations necessary to properly specify the audio and video system for this building in the construction drawings. Provide any audio and video equipment necessary to meet any requirements of the American with Disabilities Act.

Large Lecture Room

Large lecture rooms shall have a fully integrated audio and video system that can be integrated with the lighting control system to allow for a variety of video and audio presentations. The audio system shall be specified to provide enough sound pressure to allow for all listeners in the room to clearly hear the presenter without loss of comprehension. Lapel mounted wireless and lectern mounted microphones shall be used to broadcast the spoken word. The audio and video system shall allow for various media sources or other inputs into the system. These media sources could include computers, DVD / VCR players, document cameras, etc. Audio amplification shall take place for both the spoken word and for other program audio from the other media sources. Video systems for large screen display shall be provided. The projector shall be ceiling mounted using either a fixed position or recessed lift mechanism. The Projector shall be selected and positioned in the room to ensure that there are good site lines, proper image sizes, and good resolution base on the most current industry standards. A touch screen panel shall be provided to allow for the control of the audio, video and lighting systems.

Flexible Lecture Room

Flexible lecture rooms shall have a fully integrated audio and video system that can be integrated with the lighting control system to allow for a variety of video and audio presentations. The audio system shall be specified to provide enough sound pressure to allow for all listeners in the room to clearly hear the presenter without loss of comprehension. Lapel mounted wireless and lectern mounted microphones shall be used to broadcast the spoken word. The audio and video system shall allow for various media sources or other inputs into the system. These media sources could include computers, DVD / VCR players, document cameras, etc. Audio amplification shall take place for both the spoken word and for other program audio from the other media sources. Video systems for large screen display shall be provided. The projector shall be ceiling mounted using either a fixed position or recessed lift mechanism. The Projector shall be selected and positioned in the room to ensure that there are good site lines, proper image sizes, and good resolution base on the most current industry standards. A touch screen panel shall be provided to allow for the control of the audio, video and lighting systems.

Small Classroom

Small classrooms shall have an integrated audio and video system that can be integrated with the lighting control system to allow for video and audio presentations. Design speaker systems to provide sufficient sound pressure to allow for all listeners in the room to clearly hear transmitted audio without loss of comprehension. The audio and video system shall allow for various media sources or other inputs into the system. These media sources could include computers, DVD / VCR players, document cameras, etc. The audio system shall be specified to provide amplification for only program audio from other media sources. Video systems for large screen display shall be provided. The projector shall be ceiling mounted using either a fixed position or recessed lift mechanism. The Projector shall be selected and positioned in the room to ensure that there are good site lines, proper image sizes, and good resolution base on the most current industry standards. A touch screen panel will be provided to allow for the control of the audio and video systems. A touch screen panel shall be provided to allow for the control of the audio, video and lighting systems.

Teaching Lab (Large)

Large Teaching Labs shall have a fully integrated audio and video system that can be integrated with the lighting control system to allow for a variety of video and audio presentations. Design the speaker system to provide sufficient sound pressure to allow for all listeners in the room to clearly hear transmitted audio without loss of comprehension. Lapel mounted wireless and lectern mounted microphones shall be used to broadcast the spoken word. The audio and video system shall allow for various media sources or other

inputs into the system. These media sources could include computers, DVD / VCR players, document cameras, etc. The audio system shall be specified to provide amplification for only program audio from other media sources. Video systems for large screen display shall be provided. Up to two projectors will be provided for this type of space. The projectors shall be ceiling mounted using either a fixed position or recessed lift mechanism. The Projectors shall be selected and positioned in the room to ensure that there are good site lines, proper image sizes, and good resolution base on the most current industry standards. A touch screen panel shall be provided to allow for the control of the audio, video and lighting systems.

Teaching Lab (Small)
Small Teaching Labs shall have a fully integrated audio and video system that can be integrated with the lighting control system to allow for a variety of video and audio presentations. Design the speaker system to provide sufficient sound pressure to allow for all listeners in the room to clearly hear transmitted audio without loss of comprehension. Lapel mounted wireless and lectern mounted microphones shall be used to broadcast the spoken word. The audio and video system shall allow for various media sources or other inputs into the system. These media sources could include computers, DVD / VCR players, document cameras, etc. The audio system shall be specified to provide amplification for only program audio from other media sources. Video systems for large screen display shall be provided. The projector shall be ceiling mounted using either a fixed position or recessed lift mechanism. The Projector shall be selected and positioned in the room to ensure that there are good site lines, proper image sizes, and good resolution base on the most current industry standards. A touch screen panel will be provided to allow for the control of the audio, video and lighting systems.

Seminar (Large)
Small Teaching Labs shall have a fully integrated audio and video system that can be integrated with the lighting control system to allow for a variety of video and audio presentations. Design the speaker system to provide sufficient sound pressure to allow for all listeners in the room to clearly hear transmitted audio without loss of comprehension. Lapel mounted wireless and lectern mounted microphones shall be used to broadcast the spoken word. The audio and video system shall allow for various media sources or other inputs into the system. These media sources could include computers, DVD / VCR players, document cameras, etc. The audio system shall be specified to provide amplification for only program audio from other media sources. Video systems for large screen display shall be provided. The projector shall be ceiling mounted using either a fixed position or recessed lift mechanism. The Projector shall be selected and positioned in the room to ensure that there are good site lines, proper image sizes, and good resolution base on the most current industry standards. A touch screen panel shall be provided to allow for the control of the audio, video and lighting systems.

VERTICAL TRANSPORTATION

It is anticipated that the Crocker Science Center will have two elevators within the building; one passenger and one freight elevator. These elevators will provide vertical transportation for building occupants to all floors including the basement level. While the exact elevator sizes and loading carrying capacities have not been determined, it is critical that the freight elevator capacity be coordinated with the final lab equipment list and the specified mechanical equipment, to ensure the elevator load carrying capacity accommodates the weight of the equipment. The size of the freight elevator cab, the clear ceiling height, and the door opening width should also be coordinated to allow for movement of equipment in and out of the building.

09.

SUSTAINABILITY GOALS

Site
Building Systems
High Performance Building Rating System
LEED Checklist
Energy Modelling

INTRODUCTION

During the Programming Phase for the Crocker Science Center Building, the project's stakeholders and designers agreed on a set of goals and requirements for sustainability. The state of Utah requires that all construction projects comply with the Department of Facilities and Construction Management Design Requirements . The project must also meet the University of Utah sustainability goals.

The sustainability requirements for the project are as follows:

- Achieve LEED Silver Certification
- Achieve the following credits in the LEED rating system
    - WE Credit 1.1: Water Efficient Landscaping: Reduce by 50%
    - EA Credit 3 Enhanced Commissioning
    - EQ Credit 3.1 Construction IAQ Management Plan: During Construction
    - EQ Credit 4.1: Low-Emitting Materials: Adhesives and Sealants
    - EQ Credit 4.2: Low-Emitting Materials: Paints and Coatings
- Complete an energy model to demonstrate the building design performance relative to a code compliant building.
- Model building systems to analyze and make selection based on life-cycle cost.
- Include meters and sub-meters in the building to measure energy consumption on an on-going basis.
- Document Sustainability Charrette Summary, Life Cycle Cost Analysis, LEED submittals and Submittal Comments, Commissioning Report, and the Energy Analysis to comply with High Performance Building Requirements.

In addition to the requirements above, the Crocker Science Center team has set several sustainability goals. These goals reflect the most important environmental issues for the Utah climate, for science teaching, and for the Crocker Science Center site.

- Reduce energy cost by 30% compared to a code-compliant building (pending confirmation from University).
- Reduce total water use, including process water, as much as possible to assist in the University's "water-neutral" goal.
- Enhance human experience of building, especially access to daylight.
- Design for durability & long building life.
- Contribute to the success of University of Utah's Climate Action Plan.

FIGURE 9.1.1 MONTHLY DIURNAL AVERAGES FOR SALT LAKE CITY

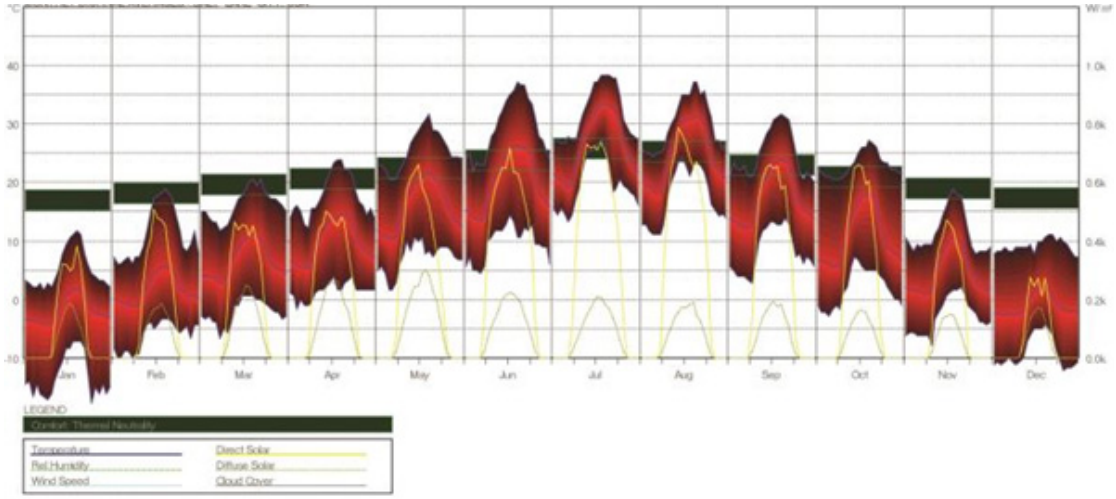
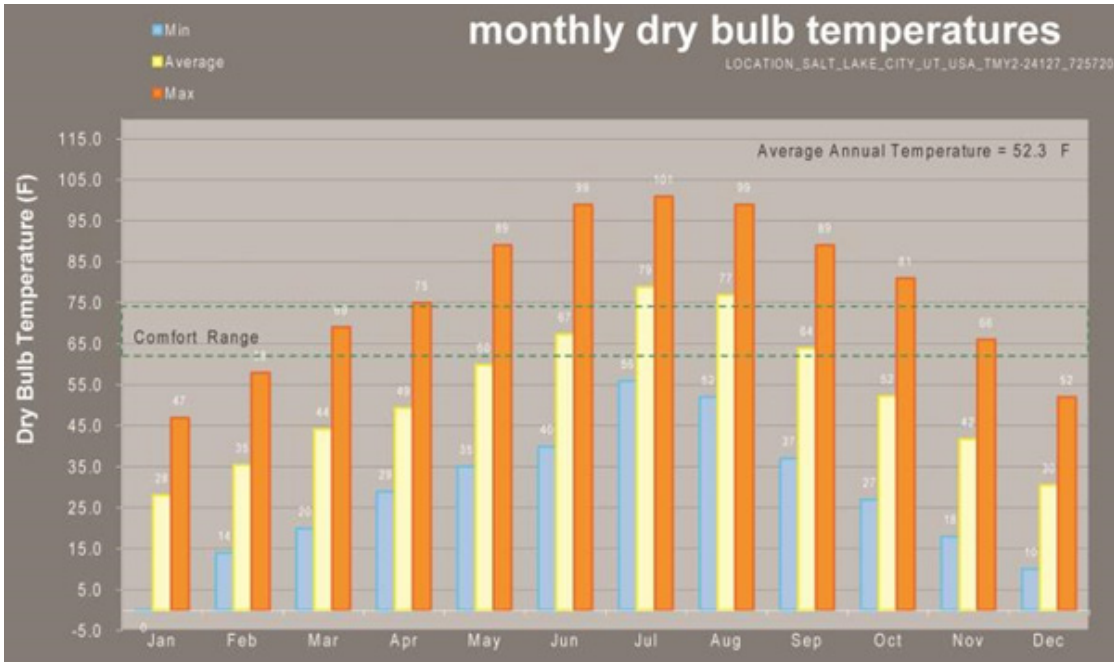


FIGURE 9.1.2 MONTHLY TEMPERATURES FOR SALT LAKE CITY



CLIMATE ANALYSIS

Any design that attempts to respond to the local environmental condition must be based on a close analysis of that climate. The degree to which the building needs to provide shelter and how the requirements for shelter change over the day and year, directly influence the optimal design of the building and its systems. Critical climate factors are air temperature, humidity, and solar radiation. The following section of this study graphs annual weather data for Salt Lake City. Statistically average data is used, which has been compiled over a long time span so that no abnormal weather is included.

MONTHLY DATA

Figure 9.1.1 shows in green the temperature band at which building occupants would feel comfortable. The red areas show the range of daily temperature fluctuations for each month of the year. The blue line in this graph shows the average daily temperature range. What is immediately apparent from this data is that for most of the year the temperatures are below the comfort band, indicating that heating needs will dominate the conditioning requirements throughout the year. In the summer months, however, average temperatures exceed the comfort zone. In summer and winter there is a large difference between daytime and nighttime temperatures, indicating that a strategy using thermal mass might be effective for cooling.

AMBIENT TEMPERATURES

Figure 9.1.2 shows the minimum, maximum and average temperatures for each month in a statistically average year. While maximum temperatures in June through August are near 100°F, the data also shows that the average temperature during this period is in a more comfortable range of 67-79°F. Minimum temperatures can be as low as 40°F during this period, showing that heating may be required at night even during the summer. The winter period also clearly

indicates a heating demand with minimum temperatures close to 0°F in January. The average temperature for this statistically average year is 52.3°F, confirming that this site is in a heating dominated climate. This graph also shows that there are large temperatures swings between day and night, which again indicates a potential for using thermal mass to heat and cool the building.

TEMPERATURE FREQUENCIES

Another way of looking at annual temperature distribution is to chart annual temperature frequency. Figure 9.1.3 shows that out of 8,760 hours in a year, 1,014 hours are above 82°F and therefore warmer than the comfort zone. 6,650 hours are below 68°F and thus require heating, confirming that this is a heating dominated climate. The temperature drops below freezing for 1,475 hours per year, showing that this climate is very cold. For 1,093 hours annually the weather is in the comfort zone without any conditioning. The small number of hours that fall within the comfort zone show that active conditioning will be needed most of the year.

HUMIDITY FREQUENCIES

Thermal comfort is not only affected by air temperature, but also by the amount of humidity in the air. The graph (Figure 9.1.4) of humidity frequencies shows that humidity in Salt Lake City exceeds the maximum comfortable level of 80 grains/bulb for only 48 hours per year. This indicates that high humidity will not be a major concern, and that in a typical year dehumidification will not be necessary.

PSYCHROMETRIC CHART

Since humidity and temperature both affect comfort, they should be analyzed simultaneously. The psychrometric chart (Figure 9.1.5) displays the relationship between dry bulb air temperature (x-axis) and humidity (y-axis). The range of temperatures and humidities that most people consider comfortable is outlined in yellow. The annual weather data for this

FIGURE 9.1.3 ANNUAL TEMPERATURE DISTRIBUTION FOR SALT LAKE CITY

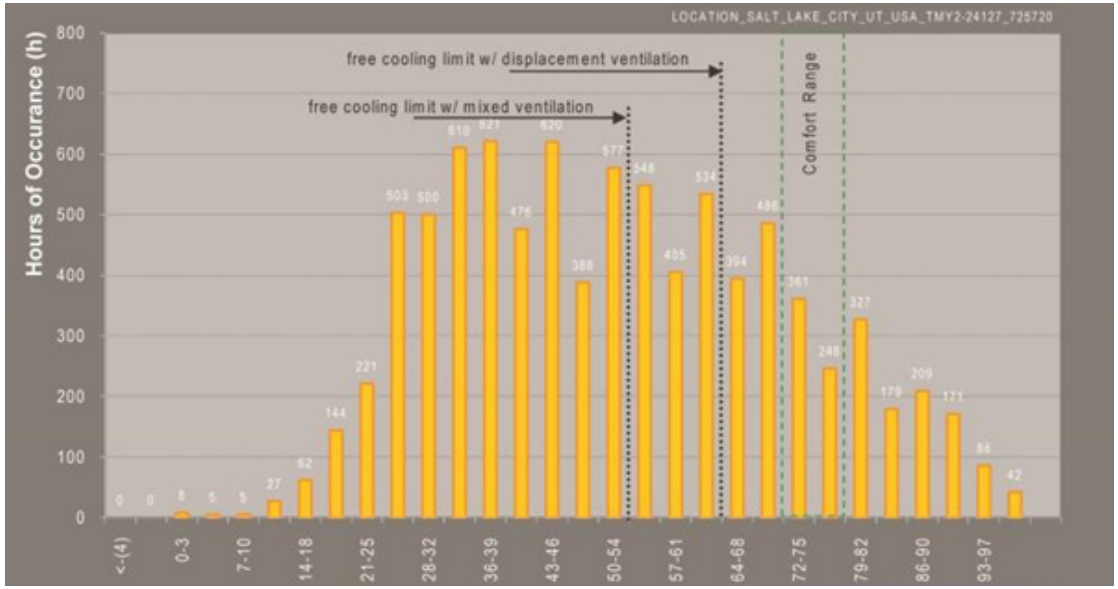


FIGURE 9.1.4 ANNUAL HUMIDITY DISTRIBUTION FOR SALT LAKE CITY

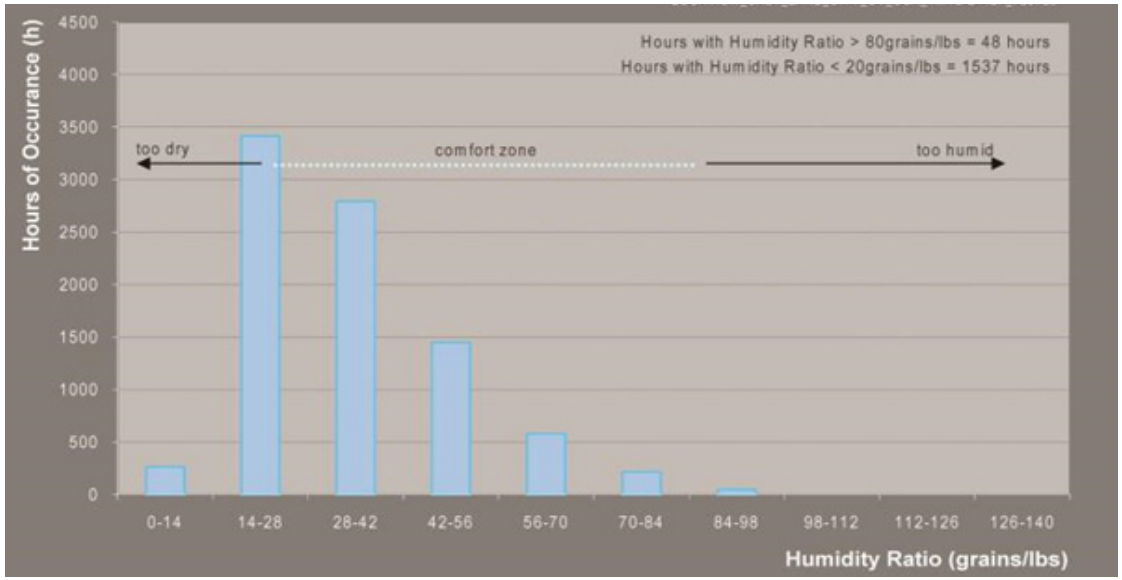


FIGURE 9.1.5 PSYCHOMETRIC CHART FOR SALT LAKE CITY

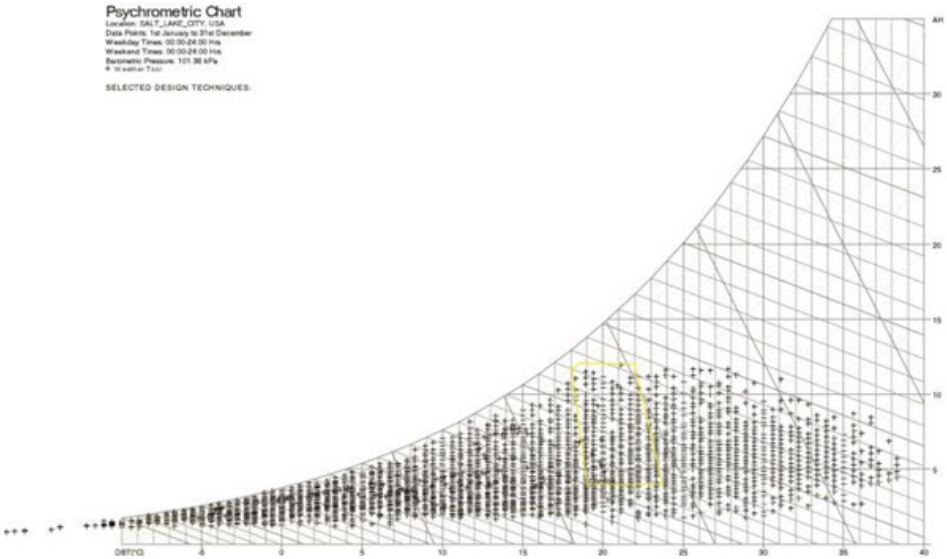
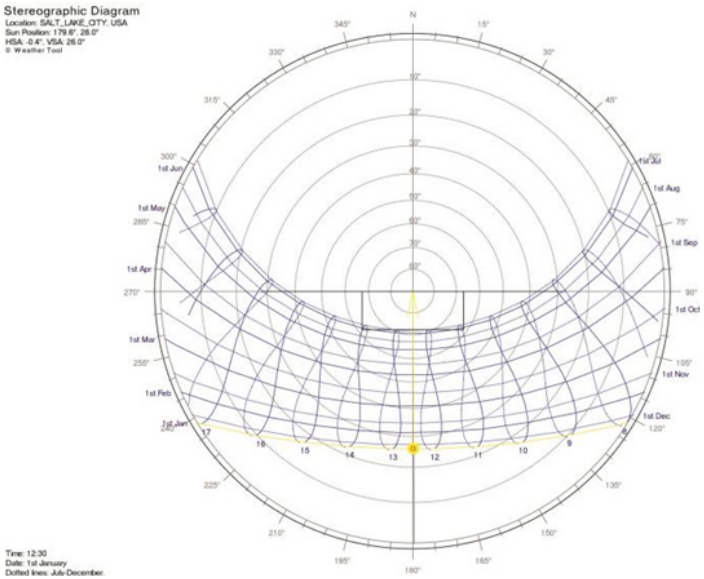


FIGURE 9.1.6 PSYCHOMETRIC CHART FOR SALT LAKE CITY



site, plotted on the psychrometric chart, shows that humidity is low, seldom rising above the comfortable level of 12.0 g/kg or 80 grains/lb. Most of the data points fall to the left of the comfort zone, indicating a need for heating. A smaller number fall to the right of the comfort zone, indicating that temperatures are above a comfortable level.

SOLAR PATH DIAGRAM

Heating and cooling requirements are greatly influenced by the amount of solar radiation available. Solar heat gain can beneficially offset heating requirements in one season while detrimentally increasing cooling requirements in another. The amount of solar heat gain within a space depends on the size and orientation of openings in relation to the position of the sun. A sun path diagram maps the movement of the sun by plotting solar azimuth (compass direction) and altitude (vertical sun angle) throughout the year. The sun path diagram for this site (Figure 9.1.6) shows that in summer months the sun is high in the sky (altitude of 73°) at noon, and in mornings and evenings comes from the northeast and northwest respectively. In the winter the sun has a very low altitude (altitude of 26° at noon) and travels during the day from southeast to southwest.

This means that south-facing windows are well positioned to collect solar radiation in the winter. Minimizing windows to the east will help avoid overheating in summer. Large western windows will require screening to minimize late day solar gain during the summer.

INCIDENT RADIATION

While the solar path diagram is a useful tool to analyze the direction of incident solar radiation, it does not evaluate the intensity of this radiation. The amount of solar radiation is influenced by cloud cover and other atmospheric factors. In Figure 9.1.7, the available incident solar radiation is plotted for each hour of the day (y-axis) and each week of the year (x-axis). The data shows that the highest amount of

FIGURE 9.1.7 WEEKLY SUMMARY OF INCIDENT SOLAR RADIATION

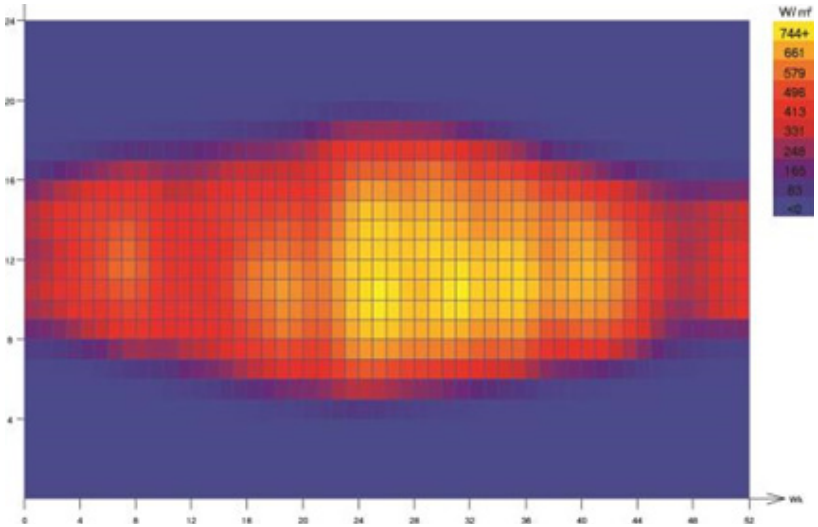


FIGURE 9.1.8 MONTHLY INCIDENT SOLAR RADIATION FOR SALT LAKE CITY

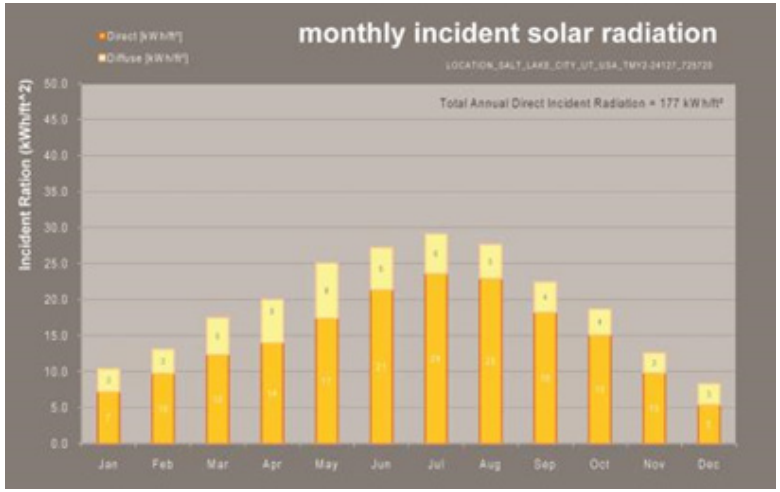
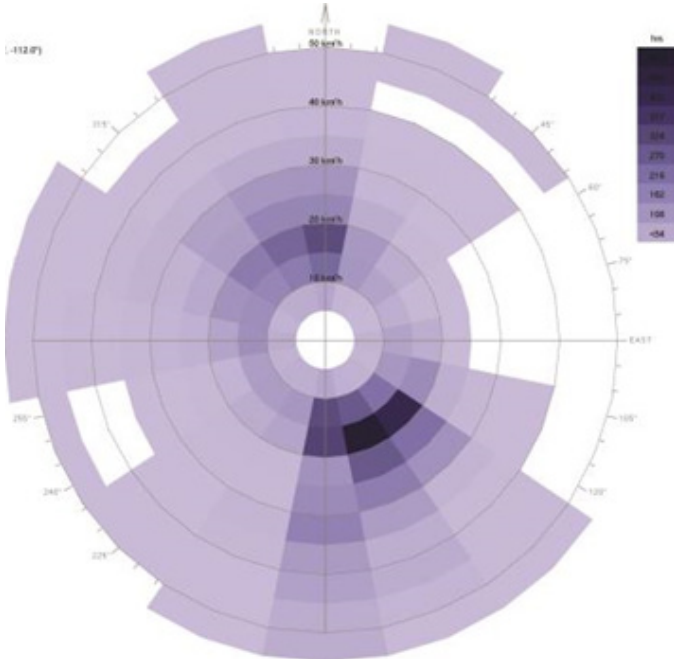


FIGURE 9.1.9 PREVAILING WINDS FOR SALT LAKE CITY



direct horizontal solar incident radiation is available from mid-June to early September. The monthly solar incident radiation (shown in the Figure 9.1.8) shows the split between direct and indirect solar radiation. The majority in this climate is direct, with a total annual incident radiation of 177 kWh/ft2.

ANNUAL WIND PATTERN

A map (Figure 9.1.9) of annual wind speed and direction indicates that the velocity of wind (areas at the outer region of the graph below) is highest from the south, while the prevailing wind direction (the darker areas) is the north and southeast. While the weather information is taken near Salt Lake City, wind occurrences on a particular site are greatly affected by local obstructions. Thus, the available wind data should be considered as indicative of general trends only.

BUILDING ENVELOPE & DAYLIGHT

The massing and envelope of a building is crucial to its environmental performance and to human experience inside the building. If well-designed it can reduce heat loss and gain, thereby decreasing the amount of energy and equipment needed to condition the interior space. The design of the fenestration can provide daylight to interior spaces which decreases the need for electric light. Views to the outside can also provide a sense of connection to the site and surrounding community. The treatment of the glazing affects glare and visual comfort. Thermal comfort of occupants near the perimeter of the building is also affected by radiative heat losses through the envelope. In the programming phase, these factors have been considered to inform massing, program layout, and potential energy performance.

MASSING

The massing and orientation of the Crocker Science Center Building will be relatively fixed at the start of design by existing building and site constraints. The narrow depth floor plate of the new building enables access to daylight. The longer facade of the new building faces south and therefore must address solar gains using a high-performance envelope that shields the building from the extreme climate of Salt Lake City. The atrium and skylight provide light to the deepest part of the building.

The existing building is challenging for daylight access, as the depth of the floor plates is greater than the distance that daylight will reach from the perimeter. The interior spaces therefore are recommended to be organized to optimize daylight to the extent possible.

Strategies for consideration are:

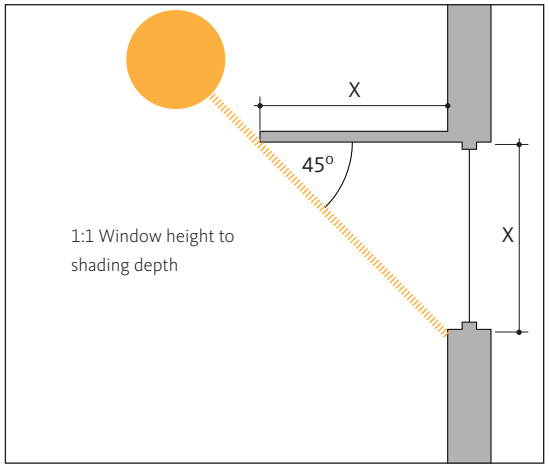
- Continue to maintain a narrow floor plate that allows daylight access in the lab area of the new building.
- Glaze atrium walls at each floor to allow borrowed daylight to the core of the building.
- Utilize area around the central atrium for regularly occupied spaces such as open labs, offices, conference room, etc.

BUILDING ENVELOPE

The Crocker Science Center Building is oriented along a north-south axis. The building's prominent south exposure will be subjected to both the high solar heat gains from the south and low-angle sunlight that comes from southeast and southwest. External shading will be needed to mitigate this heat gain and glare.

The local code requires that the window to wall ratio for the south facade be limited to 25%. As a result, the south facade's solar gains will be easier to block with shading. The following diagram is the suggested cut off angle for exterior shading. The existing building on the east and west facades cannot add external shading due to the project's preservation goals, instead they may have to include internal operable shades to avoid glare in the classrooms during morning and afternoon hours. The skylight openings should be oriented and shaded carefully to provide daylight without solar gains or glare. Because of their openness to the sky, high levels of light are admitted through small skylights which could overwhelm the top floor if designed improperly.

Designing a well-insulated opaque wall assembly will also reduce energy consumption and improve thermal comfort in perimeter interior spaces in winter. The walls of the Crocker Science Center should perform significantly better than what is allowed by applicable standards. The minimum R-value required by ASHRAE 90.1- 2007 for Salt Lake City is R-16 walls (using continuous insulation) and R-21 roofs. Atelier Ten recommends higher thermal performance: R-25 to R-30 continuous insulation for exterior walls, and R-30 to R-40 continuous insulation for roofs. The existing building assembly is made of structural concrete with face masonry. Although there are opportunities for adding insulation to the interior, the systems will require design such that condensation and freeze-thaw cycles do not damage the existing masonry layers.



Window 100% shaded from mid-March through September.
Window partially shaded remainder of the year

FIGURE 9.1.10 SUGGESTED SHADING FOR THE CSC

Strategies for consideration are:

- High performance insulated glazing with low-e coating for all new windows & atrium skylight.
- High performance insulated glazing with low-e coating for existing windows.
- Thermally broken frames or silicon joints for windows.
- Well insulated exterior walls (R-30) and roof (R-40).
- Insulation materials based on R-value and environmental characteristics.
- External shading for the atrium and south facade.
- Internal shades or blinds to reduce glare on east and west facade of the existing building.

LIGHTING AND DAYLIGHT

Access to daylight will be important for both energy savings and human experience. Private and open spaces along the south facade of the new building should receive enough daylight during most occupied hours to dim electric lights, even with a robust shading strategy. Classrooms along north, east and west facades will not have daylight access at the perimeter. Skylights are remarkably effective at delivering daylight to spaces like the atrium. This will bring daylight to public spaces at the core. The size and location of atrium skylight may be optimized during design to maximize daylight and minimize solar heat gains and glare. Higher light levels are required in the areas of the building that receive the least daylight, underscoring the importance of optimizing the efficiency of lighting in the laboratory spaces.

Functional zoning that allow grouping of areas by tasks will be effective in delivering daylight to majority of reading intensive activities. Similarly, selection of surfaces with high reflectance, lighting power and dramatically improves lighting quality in a laboratory environment. Bench tops, shelves, walls, ceilings and floors can all contribute to a lower lighting power if they are of high reflectance. Locating luminaires near the task concentrates high intensity light where it's needed, allows for greater occupant control, and requires a less energy-intensive general lighting system.

Strategies for consideration are:

- Clerestory glazing on south to limit direct light on lab benches.
- Glass partitions to allow light distribution and views.
- Interior operable shades to reduce visual discomfort on west, east and south facades.
- Light transport technology for lab and subterranean spaces.
- Interior finishes with higher reflectances.
- Energy efficient lighting system and controls to reduce energy consumption.
- Daylight dimming and occupancy sensors.

ENERGY PERFORMANCE

The Crocker Science Center at the University of Utah will be a combination of new construction and major renovation, and as such, it will pursue LEED certification under LEED 2009 BD&C or LEED BD&C v. 4. The building will house programs including laboratory research spaces, academic classrooms and offices. This combination of existing building renovation and energy intensive laboratories prompted a review of the University of Utah's energy performance requirement as applicable to these spaces. The following formula is proposed to calculate the project's minimum energy target and represents a floor for the Crocker Science Center's energy performance. The details of the proposed target are included in the appendix .
Annual Energy Cost Reduction Target = (% Existing Building: Academic Floor Area * 15 points) + (% Existing Building: Lab Floor Area * 5 points) + (% New Building: Academic Floor Area * 15 points) + (% New Building: Lab Floor Area * 5 points)

Using the formula above minimum energy cost savings of 30% over an ASHRAE 90.1-2007 Baseline Building have been proposed for this project. Atelier Ten conducted a Programming phase energy analysis to determine a range of strategies that would be needed to achieve an energy cost savings of 30% over an ASHRAE 90.1-2007 Baseline Building.

This section explains the findings of this analysis and recommendations to achieve the project's energy goals. The analysis compares three cases; each subsequent case incorporates increasing number of Energy Efficiency Measures (EEMs). The details for each iteration are included at the end of this section.

1. Proposed Design (minimum energy performance case) represents the performance of Crocker Science Center at this Programming Phase.
2. Medium Performance Design represents a case with additional EEMs that exceed the minimum requirements of ASHRAE 90.1-2007 standard.
3. High Performance Design represents a case with EEMs that enable meeting the 30% energy target.

This analysis does not compare the project directly to an ASHRAE Baseline Building, but rather compares the project to the Proposed Design, which represents the current design at Programming Phase, this Proposed Design is slightly better than an ASHRAE 90.1-2007 Baseline Building. Since the ASHRAE Baseline Case is believed to be less efficient than the Proposed Design included here, it is expected that achieving energy cost savings greater than 30% over the Proposed Case also yields more than 30% sav-

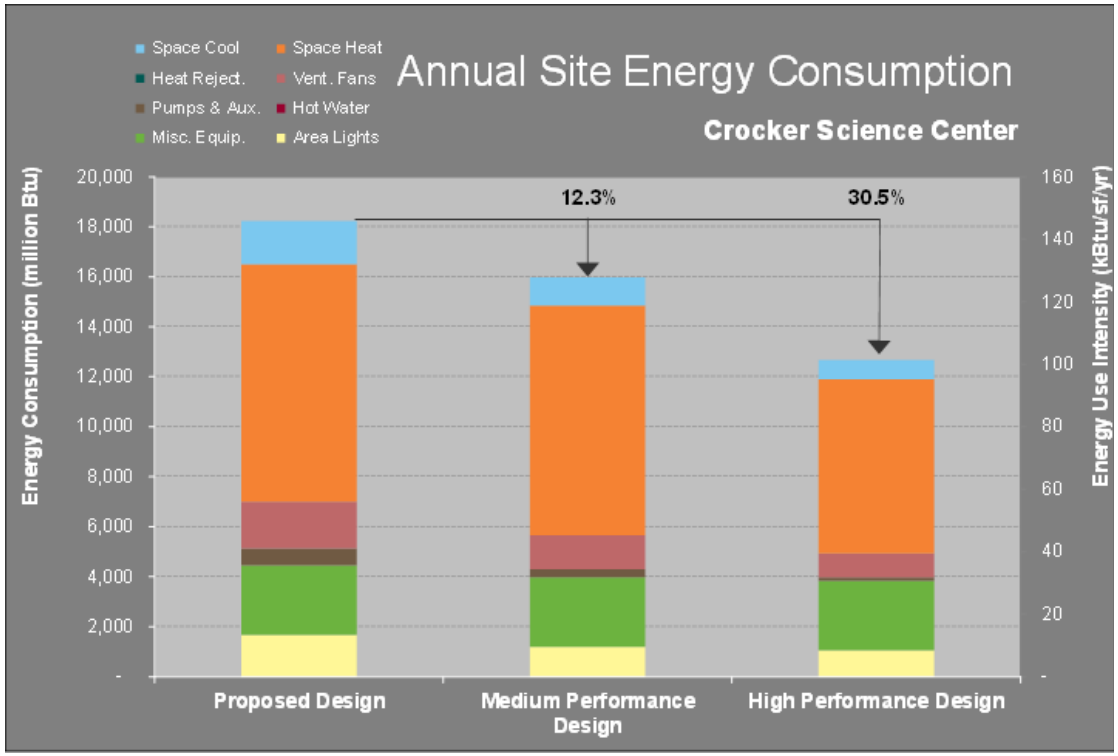
ings over a less efficient Baseline Building. The High Performance Case demonstrates that the project has the potential to achieve over 30.5% in annual energy consumption savings and 32.5% annual cost savings, if the measures tested are incorporated into the design. The measures which provide the greatest energy savings include improving building envelope performance, lowering lighting power, active chilled beams with dedicated outside air, energy recovery ventilator and lowering lab ventilation rates.

SUMMARY OF RESULTS

The results of the analysis indicate that HVAC energy is the most significant energy use in the building, and accounts for almost 70% of total energy use. The building load is dominated by heating the outside air needed to make up for general laboratory supply air and lab fume hood exhaust and for reheat in the summer. While the results of this analysis show that the facade plays a limited role in the overall annual energy consumption, the high performance facade in the current design, including double glazing, well-insulated walls and roof, south-west facade exterior shading, and roof overhangs decreases the heat gains and losses through the envelope and minimizes the peak heating and cooling loads in the spaces. The performance of the facade also improves perimeter spaces both in terms of thermal and visual comfort (heat gain and glare).

The Crocker Science Center building will be connected to the University of Utah's central plant. Both chilled and hot water will be supplied to the building via the campus loop. It is expected that the central plant will be new and therefore efficient. However, since the exact efficiency is still unknown, this analysis uses the minimum ASHRAE 90.1 2007 equipment efficiency consistently in all three cases thereby taking no credit or penalty from the primary heating and cooling equipment efficiency.

FIGURE 9.1.11 ANNUAL SITE ENERGY CONSUMPTION COMPARISON FOR CSC



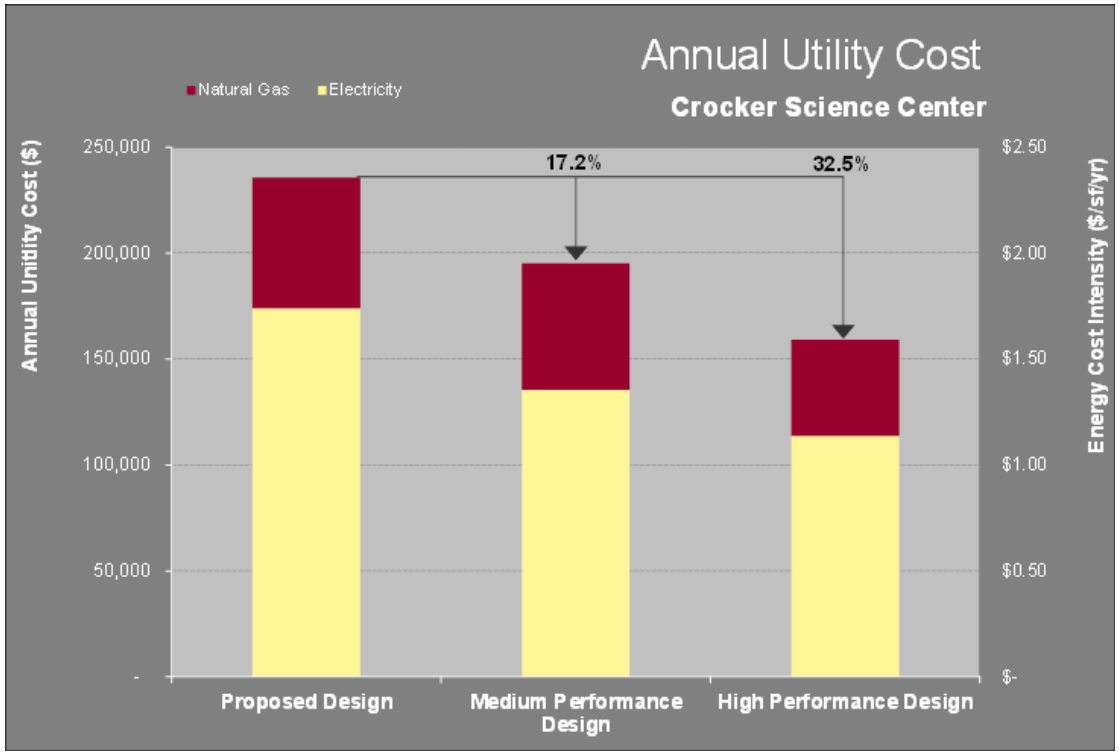
UTAH DEPARTMENT OF FACILITIES AND CONSTRUCTION MANAGEMENT'S HIGH PERFORMANCE BUILDING STANDARD

The state of Utah requires that all construction projects comply with the DFCM Design Requirements (DFCM standard). Section 5.0 2009 High Performance building Rating System states that the high performance buildings are to be built for a 50 year life cycle. Life Cycle Cost Analysis will be performed during the design phase to assist in decision making.

Strategies for Consideration:

- Lower outside air volume brought into the space by:
  - High performance fume hoods.
  - VAV fume hoods.
  - Exhaust rate monitoring systems.
  - Proximity sensors for fume hoods.
  - Occupancy sensors to reduce back ground ventilation rates.
- Recovery heat and energy from exhaust air by:
  - Energy recovery ventilators for background lab exhaust.
  - Sensible heat recovery for fume hood exhaust.

FIGURE 9.1.12 ANNUAL UTILITY COST COMPARISON FOR CSC



- Efficient cooling systems
  - Indirect evaporative cooling, as required by DFCM standard.
  - Low energy sensible cooling systems such as chilled beams & high performance fan coil units.
- Include meters and sub meters to measure the individual facility's energy consumption on an ongoing basis as required by the DFCM standard.

ZONING

The first step in designing conditioning and energy systems for efficiency is zoning of these systems. The Crocker Science Center building contains a variety of program areas which have quite different conditioning needs. The labs, equipment rooms, have critical life-safety needs and high internal loads, which will require energy-intensive conditioning systems. The offices, conference rooms, circulation, and classrooms have needs that are similar to an office building, and a wide variety of conditioning solutions are possible for these spaces. The atrium is a large volume space with variable occupancy, making its requirements different from the rest of the building.

Strategies for consideration are:

- Physically separate graduate student/research investigator and principal investigators' workstations from the lab zone.
- Segregate lab equipment rooms as much as possible.
- Use alternative sensible cooling systems in areas dominated by cooling load.

LAB VENTILATION

The current design is a mixed-air system with overhead supply, general exhaust, and exhaust through fume hoods. This is a standard solution for labs. Most of the ventilation will come from outside air, but some will come from the office exhaust ("cascade air"), which will reduce heating and cooling energy. The current university standard of exchange rate is 6 air changes per hour (ACH). Reducing lab ventilation further, while maintaining safety, will have a large impact on energy savings.

Strategies for consideration are:

- Reduce occupied background ventilation air change rate to 4ACH and unoccupied rate to 2 ACH.
- Occupancy sensors in each lab to control the ventilation rate so labs can operate independently.
- Use exhaust air monitoring system such as Aircuity OptiNet system.
- Fume hoods with proximity sensors.

WATER

Water conservation is an important environmental aspiration, not only because fresh water is a valuable natural resource in its own right, but also because of the energy required to distribute water to the areas where it is used. Conserving water is especially important in the western United States, where the supply of fresh water is not expected to increase in proportion to the rapidly expanding population. Atelier Ten recommends, at minimum, specifying efficient fixtures, which would significantly reduce the building's water use at little or no added cost.

Strategies for consideration are:

- Water efficient fixtures.
- Investigate codes and water rights to confirm whether storm water reuse is now allowed.
- Consider tank and filtration equipment to include in mechanical room planning.
- Consider reuse of other water streams such as RODI wastewater, graywater, or condensate.

LANDSCAPE & SITE

There are several sustainable opportunities both on Crocker Science Center site and within the University of Utah master plan. Hardscape design, although useful as a public space, increases storm water runoff and contributes to the heat island effect, where an increase in local temperatures affect local habitat and increase building cooling energy use. Reducing water use, reducing fertilization and phosphorous, providing habitat, reducing the urban heat island effect, aesthetics, and providing a sense of connection to the local ecology should be considered for landscape. The University of Utah has established a guideline of acceptable plants for the campus that includes many native/adapted species. The design team should ensure that the vegetation selected is native or adapted.

Site lighting should be designed to be as efficient as possible by directing light to where it is most useful. Street lamps should be full-cutoff fixtures and provide no more illumination than necessary for safety and way finding.

Strategies for consideration are:

- Reduce hardscape area as much as possible.
- Hardscape should mitigate the heat-island effect by being light-colored or shaded.
- Plantings also provide passive cooling through evapotranspiration.
- Consider open grid paving, or pervious concrete for promoting infiltration.
- Efficient exterior lighting fixtures.

MATERIALS

There are several types of materials that may be considered environmentally preferable and should be used in the Crocker Science Center building. Post-consumer recycled products (material that has been through the public recycling process) are preferable because, in addition to reducing waste, they create incentive for manufacturers to buy recycled material from municipal recycling centers. Local, rapidly renewable, and low-emitting materials should also be used. The building should eliminate the use of materials with HCFCs, which are found in some insulation and foam products. Eliminating or reducing PVC is recommended; it is often found in resilient floor tiles and pipework, for which there are alternatives available.

Embodied energy is a measurement of the energy it takes to extract, process, transport, install, and eventually discard a product. Local materials reduce embodied energy by minimizing transportation. Recycled materials or those with minimal processing will also have lower embodied energy.

Strategies for consideration are:

- FSC-certified wood.
- Rapidly renewable material such as wheat board for lab casework and bamboo panelling.
- Reused materials such as salvaged wood products, especially flooring.
- Materials with low VOC (volatile organic compound) in carpets, paints, adhesives, sealants and finishes.
- Recycled and local materials.
- Reduce or eliminate use of HCFCs and PVC.

LEED

Crocker Science Center is targeting LEED Silver, per the DFCM requirement. A preliminary scorecard shows that this is an achievable goal with approximately 64 points estimated that can be achieved.

The Sustainable Sites, Indoor Environmental Quality, and Materials and Resources sections are key areas where Crocker Science Center will do well. Energy and Atmosphere, and Water Efficiency are more challenging, but are important in Utah's climate. The project will also aim for as many Innovation in Design credits as possible. The Regional Priority credits selected for Salt Lake City will be very challenging for this building.

FIGURE 9.1.13 ENERGY ANALYSIS ASSUMPTIONS

6682 - Crocker Science Center			
General Information			
ASHRAE Climate Zone	5B		
Building Area (sf.)			
Basement	33,088		
First	33,088		
Second	33,088		
Third	24,195		
Total	**123,459**		
Floor to floor height	13 feet		
Floor to ceiling height	11 feet		
Building Description	**Minimum Performance**	**Medium Performance**	**High Performance**
Envelope			
Existing			
Wall (U-Value)	1' 8" masonry / brick, U-value = 2.5, R-value =0.4	Total Assembly R-Value 11	Total Assembly R-Value 15
Roof (U-Value)	0.048, R-Value = 21. Assumed min. ASHRAE compliant values.	Total Assembly R-Value 30	Total Assembly R-Value 40
Floor construction	0.074, R-Value = 14, Assumed min. ASHRAE compliant values.	same	same
Below grade wall	C-0.119, Assumed min. ASHRAE compliant values.	Interior insulation - R-10	interior - R-15
Slab on grade	F-0.730, unheated slab	Vertical int bed, R-8	Vertical int bed, R-9
Fenestration	U-value = 1.18, SHGC =0.81	Viracon VE1-2M [0.29/0.38]	Viracon VE1-2M [0.29/0.38]
Window to wall ratio	30% (estimated from existing building drawings)	same	same
New			
Wall (U-value)	0.064, R-Value = 16	Total Assembly R-Value 22	Total Assembly R-Value 30
Roof (U-value)	0.048, R-Value = 21	Total Assembly R-Value 30	Total Assembly R-Value 40
Floor construction	0.074, R-Value = 14	same	same
Below grade wall	C-0.119	Interior - R-10	Interior - R-15
Slab on grade	F-0.730, unheated slab	Vertical int bed, R-8	Vertical int bed, R-9
Fenestration	U-value = 0.55, SHGC =0.40	Viracon VE1-2M	Viracon VRE-54 [0.30/0.31]
Window to wall ratio	30%	30%	30%
Horizontal shading	none	1.5 ft overhangs	1.5 ft. overhangs + 0.5 ft. fins
Lighting power (W/sf.) &	controls	20% reduction	30% reduction
Admin	1.1	0.88	0.77
Labs	1.4	1.12	0.98
Classrooms	1.4	1.12	0.98
BOH & support spaces	1.4	1.12	0.98
Transition Spaces	0.6	0.48	0.42
Daylighting	none	Yes, in all perimeter spaces, dimming to 50 fc	Yes, in all perimeter spaces, dimming to 40 fc
Occupancy sensors	per ASHRAE 90.1-2007. in conference & break rooms		
Equipment Power (W/sf)			
Basic lab equipment	1.75	1.75	1.75
High intensity lab	5	5	5
Offices	1.2	1.2	1.2
Classrooms	0.5	0.5	0.5
BOH & support spaces	0.5	0.5	0.5

Building Description	Minimum Performance	Medium Performance	High Performance
HVAC System Parameters			
(°F)	Cooling: 75°F, Heating: 72°F		
Humidity Set point	60 RH max. no lower limits		
Airside Systems			
System Type	Standard VAV with Reheat. One system per floor. All AHUs 100 OA	Standard VAV in lab building, Radiant System in Non-Lab spaces	DOAS with chilled beams, secondary mild temperature radiant heating in Non Lab
Cooling / heating	CHW & HW coils at AHU	CHW & HW coils at AHU	CHW & HW coils at AHU
Supply air temp	Cooling: 55, Heating: 87	Cooling: 55, Heating: 88	Cooling: 55, Heating: 89
Supply & Return (exhaust) Fans	5" W.C. of water for both with VSD	4" W.C. for supply, 2.5" W.C. for relief	3" W.C. for supply, 2" W.C. for relief
Energy Recovery	Heat recovery as required by ASHRAE 90.1-2007.. Sensible heat recovery only	Enthalpy recovery ventilator for non-fume hood exhaust	Enthalpy recovery ventilator for non-fume hood exhaust, sensible recovery for fume hood exhaust
Air side economizer	75 drybulb	enthalpy based	enthalpy based
Supply air temperature reset	Reset higher by 5°F under the minimum cooling load	same	same
Demand controlled ventilation	in conference rooms only	In conference rooms and all teaching labs	In conference rooms and all teaching labs
Preconditioning	none	none	Indirect evaporative pre-conditioner
Motors	High efficiency motors	High efficiency motors	Premium efficiency motors
VAV turn down ratio	40%	30%	30%
Waterside Systems			
Cooling equipment	On-site chillers (ASHRAE min. efficiency chillers)	ASHRAE min. efficiency chillers	ASHRAE min. efficiency chillers
Cooling equipment efficiency	COP 6.1	COP of 6.1	COP of 6.5
Chilled water temperature (oF) & dT	44/12	same	same
Flow control	VSD	VSD with load reset	VSD with load reset
Pump power	22 W/GPM, primary constant speed, variable speed on secondary pumps	Variable speed drives on all pumps	Variable speed drives on all pumps, 20% reduction in pumping power
Heating equipment	80% efficient boilers (ASHRAE min. efficiency)	80% efficient boilers (ASHRAE min. efficiency)	80% efficient boilers (ASHRAE min. efficiency)
Pump power	19 W/GPM, VSD	Variable speed drives on all pumps	Variable speed drives on all pumps, 20% reduction in pumping power
Hot water temperature (°F) & dT	180/50	180/50	180/50, 140/30 for mild loop
Flow control	VSD, high efficiency	VSD, premium efficiency	VSD, premium efficiency
Laboratory Specific			
Background ventilation rate (ACH/CFM)	6 ACH occupied	6 ACH occupied, 4 ACH unoccupied	4 ACH occupied, 2 ACH unoccupied
Fume hoods (nos.)			
Basement	2		
First	2		
Second	4		
Third	24		
Fume hood controls & setback	none	yes,reduced face velocity of 80 FPM	Yes, reduced face velocity of 80 FPM for occupied hours & 60 FPM for un-occupied times
Utility Rates			
Electricity	$ 0.068 per kWh		
Natural Gas	$ 0.65 per therm		

FIGURE 9.1.14 PROPOSED LEED CHECKLIST FOR THE CROCKER SCIENCE CENTER

LEED 2009 for New Construction
6682 Crocker Science Center

Achievability				
hi	med	low	NP	
60	14	14	22	64 Projected Points

Certified 40 to 49 points **Silver** 50 to 59 points **Gold** 60 to 79 points **Platinum** 80 or more points
Achievability rating: **Hi** = 90%, **Med** = 60%, **Low** = 10%, **NP** = not possible.

					Prerequisites	**Standard**
Y				SS Prereq 1	**Construction Activity Pollution Prevention**	Create and implement erosion control plan that meets the 2003 EPA Construction General Permit.
Y				WE Prereq 1	**Water Use Reduction:** 20%	Reduce water use by 20% over the baseline specified in LEED.
Y				EA Prereq 1	**Fundamental Commissioning of Building Energy Systems**	Engage commissioning agent, and develop and execute a commissioning plan.
Y				EA Prereq 2	**Minimum Energy Performance**	Reduce energy cost by 10%, compared to ASHRAE 90.1-2007, Appendix G
Y				EA Prereq 3	**Fundamental Refrigerant Management**	Eliminate CFCs in building HVAC&R.
Y				MR Prereq 1	**Storage & Collection of Recyclables**	Provide space for the collection and storage of paper, cardboard, glass, plastic, and metals.
Y				IEQ Prereq 1	**Minimum IAQ Performance**	Meet sections 4 through 7 of ASHRAE 62.1-2007.
Y				IEQ Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Prohibit smoking inside building, and locate exterior smoking areas at least 25 feet away from building.
19	5	1	1		**Sustainable Sites**	**Standard**
1				SS Credit 1	**Site Selection**	Do not develop sites that are prime farmland, floodplains or wetlands, parkland, or key habitat.
5				SS Credit 2	**Development Density and Community Connectivity**	Locate project in dense areas or near key community services.
			1	SS Credit 3	**Brownfield Redevelopment**	Locate project on a remediated brownfield site.
6				SS Credit 4.1	**Alternative Transportation:** Public Transportation Access	Locate project within 1/2 mile of a rail station or 1/4 mile of two bus lines.
1				SS Credit 4.2	**Alternative Transportation:** Bicycle Storage & Changing Rooms	Provide bicycle racks for 5% of building occupants and showers for 0.5% of FTE occupants.
	3			SS Credit 4.3	**Alternative Transportation:** Low-Emitting and Fuel-Efficient Vehicles	Provide preferred parking for hybrid vehicles for 5% of the project's parking capacity.
2				SS Credit 4.4	**Alternative Transportation:** Parking Capacity	Do not exceed zoning parking requirements; provide preferred carpool parking for 5% of parking capacity.
		1		SS Credit 5.1	**Site Development:** Protect or Restore Habitat	Restore 50% of site open space or 20% of the total site, whichever is greater, for native /adapted vegetation.
	1			SS Credit 5.2	**Site Development:** Maximize Open Space	Exceed zoning open space requirements by 25%.
1				SS Credit 6.1	**Stormwater Design:** Quantity Control	No net increase site runoff, OR, reduce over existing conditions by 25%.
1				SS Credit 6.2	**Stormwater Design:** Quality Control	Develop stormwater plan that meets local best management practice, and removes 80% TSS.
1				SS Credit 7.1	**Heat Island Effect:** Non-Roof	Use open-grid paving, light-colored paving, or provide shade on 50% of all hardscape.
1				SS Credit 7.2	**Heat Island Effect:** Roof	Use light-colored membrane for 75% of roof or vegetated roof for 50% of roof.
	1			SS Credit 8	**Light Pollution Reduction**	No nighttime light trespass from building AND meet exterior lighting requirements of ASHRAE 90.1-2007.
4	0	4	2		**Water Efficiency**	**Standard**
2				WE Credit 1	**Water Efficient Landscaping:** 50% Reduction	Reduce potable water used for irrigation by 50%
			2	WE Credit 1	**Water Efficient Landscaping:** No Potable Water	No potable water use for irrigation.
		2		WE Credit 2	**Innovative Wastewater Technologies**	Reduce water used for sewage conveyance by 50%.
2		2		WE Credit 3	**Water Use Reduction:** 30% / 35% / 40%	Reduce water use by 30%/35%/40% over the baseline specified in LEED.

atelier ten

17	1	5	12	Energy & Atmosphere		Standard
3				EA Credit 1	**Optimize Energy Performance:** 12% / 14% / 16%	Reduce building energy cost by 12%/ 14%/ 16% compared to ASHRAE 90.1-2007, Appendix G.
3				EA Credit 1	**Optimize Energy Performance:** 18% / 20% / 22%	Reduce building energy cost by 18%/ 20%/ 22% compared to ASHRAE 90.1-2007, Appendix G.
3				EA Credit 1	**Optimize Energy Performance:** 24% / 26% / 28%	Reduce building energy cost by 24%/ 26%/ 28% compared to ASHRAE 90.1-2007, Appendix G.
1	1	1		EA Credit 1	**Optimize Energy Performance:** 30% / 32% / 34%	Reduce building energy cost by 30%/ 32%/ 34% compared to ASHRAE 90.1-2007, Appendix G.
			3	EA Credit 1	**Optimize Energy Performance:** 36% / 38% / 40%	Reduce building energy cost by 36%/ 38%/ 40% compared to ASHRAE 90.1-2007, Appendix G.
			4	EA Credit 1	**Optimize Energy Performance:** 42% / 44% / 46% /48%	Reduce building energy cost by 42%/ 44%/ 46%/ 48% compared to ASHRAE 90.1-2007, Appendix G.
		2		EA Credit 2	**On-Site Renewable Energy:** 1% / 3%	Produce renewable energy on-site for 1%/ 3% of building energy consumption, calculated by cost.
			2	EA Credit 2	**On-Site Renewable Energy:** 5% / 7%	Produce renewable energy on-site for 5%/ 7% of building energy consumption, calculated by cost.
			3	EA Credit 2	**On-Site Renewable Energy:** 9% / 11% / 13%	Produce renewable energy on-site for 9%/ 11%/ 13% of building energy consumption, calculated by cost.
2				EA Credit 3	**Enhanced Commissioning**	Design review, post occupancy review, recommissioning manual.
2				EA Credit 4	**Enhanced Refrigerant Management**	Select refrigerants with low global warming potential and ozone depletion potential.
3				EA Credit 5	**Measurement & Verification**	Develop and implement an M&V plan that meets IPMVP, Options B or D.
		2		EA Credit 6	**Green Power**	Purchase Green-e certified electricity supply for 2 years, for 35% of building's electricity demand.

6	3	1	4	Materials & Resources		Standard
2		1		MR Credit 1.1	**Building Reuse:** Maintain Existing Walls, Floors, & Roof, 55% / 75%/ 95%	Maintain existing structure and envelope for 55% / 75% / 95% of the existing building.
			1	MR Credit 1.2	**Building Reuse:** Maintain Existing Interior Nonstructural Elements, 50%	Use existing interior nonstructural elements in at least 50% of the completed building.
2				MR Credit 2	**Construction Waste Management:** 50% / 75%	Create a construction waste management plan and recycle and/or salvage construction waste.
			2	MR Credit 3	**Materials Reuse:** 5% / 10%	Use salvaged, refurbished, or reused materials for 5% / 10% of construction materials, calculated by cost.
1	1			MR Credit 4	**Recycled Content:** 10% / 20% (post-consumer + 1/2 pre-consumer)	Use materials or products with recycled content for 10% / 20% of construction materials, calculated by cost.
1	1			MR Credit 5	**Regional Materials:** 10% / 20%	Use materials extracted and manufactured within 500 miles for 10%/20% of construction materials, calculated by cost.
			1	MR Credit 6	**Rapidly Renewable Materials**	Use rapidly renewable materials for 2.5% of construction materials, calculated by cost.
	1			MR Credit 7	**Certified Wood**	Use FSC-certified wood for 50% of wood-based materials, calculated by cost.

10	2	2	1	Indoor Environmental Quality		Standard
1				IEQ Credit 1	**Outdoor Air Delivery Monitoring**	Install monitoring of outdoor air on ventilation systems and monitor CO2 concentrations.
	1			IEQ Credit 2	**Increased Ventilation**	Increase ventilation rates by 30% above ASHRAE 62.1-2007.
1				IEQ Credit 3.1	**Construction IAQ Management Plan:** During Construction	Develop an IAQ plan that meets SMACNA IAQ Guidelines for Occupied Buildings Under Construction.
1				IEQ Credit 3.2	**Construction IAQ Management Plan:** Before Occupancy	Provide air quality testing or building flush-out prior to occupancy.
1				IEQ Credit 4.1	**Low-Emitting Materials:** Adhesives & Sealants	Use adhesives and sealants that comply with the SCAQMD Rule #1168
1				IEQ Credit 4.2	**Low-Emitting Materials:** Paints & Coatings	Use products with VOC levels specified in Green Seal Standard GS-11 and GC-03, and SCAQMD Rule 1113.
1				IEQ Credit 4.3	**Low-Emitting Materials**: Flooring Systems	Use carpet that meets the CRI Green Label requirements and FloorScore compliant hard surface flooring.
1				IEQ Credit 4.4	**Low-Emitting Materials:** Composite Wood & Agrifiber Products	Use materials with no added urea-formaldehyde resins or adhesives.
1				IEQ Credit 5	**Indoor Chemical & Pollutant Source Control**	Floor grates at doors, MERV 13 filters, and exhausts and hazardous liquid container in chemical use areas.
1				IEQ Credit 6.1	**Controllability of Systems:** Lighting	Provide lighting controls for 90% of individuals AND 100% of group lighting controls.
			1	IEQ Credit 6.2	**Controllability of Systems:** Thermal Comfort	Provide comfort controls or operable windows for 50% of individuals AND 100% of group spaces.
1				IEQ Credit 7.1	**Thermal Comfort:** Design	Meet ASHRAE 55-2004, Thermal Comfort Conditions for Human Occupancy.
		1		IEQ Credit 7.2	**Thermal Comfort:** Verification	Meet IEQc7.1, provide permanent monitoring system, and perform a thermal comfort survey after occupancy.
		1		IEQ Credit 8.1	**Daylight & Views:** Daylight	Meet prescriptive requirements, or achieve 25 footcandles, in 75% of regularly occupied spaces.
	1			IEQ Credit 8.2	**Daylight & Views:** Views	Provide direct views to the outside in 90% of regularly occupied spaces.

4	2	0	0	Innovation in Design		Standard
1				ID Credit 1.1	**Innovation in Design**, Green Building Education	Pending GBCI judgment.
1				ID Credit 1.2	**Innovation in Design**, SSc4 exemplary performance, campus TDM plan	Pending GBCI judgment.
1				ID Credit 1.3	**Innovation in Design**, Green cleaning	Pending GBCI judgment.
	1			ID Credit 1.4	**Innovation in Design**, Process water savings	Pending GBCI judgment.
	1			ID Credit 1.5	**Innovation in Design**, Greatly exceed credit, TBD	Pending GBCI judgment.
1				ID Credit 2	**LEED™ Accredited Professional**	LEED Accredited Professional on design team.

0	1	1	2	Regional Priority		Standard
	1			RP Credit 1.1	**Regional Priority**, SSc8.1	See above
		1		RP Credit 1.2	**Regional Priority**, WEc3, 40% reduction	See above
			1	RP Credit 1.3	**Regional Priority**, WEc1, No Potable Water OR EQc8.1 Daylight	See above
			1	RP Credit 1.4	**Regional Priority**, EAc1, 36 new/32% existing OR EAc2, 5%	See above

10.

COST ANALYSIS

Detailed Estimate

UPDATED PROJECT ESTIMATE

In the previous studies and in the programming process, there have been a number of costs estimates that have been developed to evaluate how much of the project could be realized, based on a fixed budget of $50,000,000. It was clearly identified that the entire renovation, remodel and addition to the George Thomas Building could not be accomplished within the defined budget of $50,000,000. It was determined that the program document would identify a "Base Building" cost which would include the build out of approximately equal amounts of square footage of both educational and research space. It was also understood that the balance of the unfinished "Shelled Space" within the building could not be occupied until additional funds become available to complete the space. It was hoped that the shelled space would not exceed 25% of the of the overall project square footage.

In order to address the budget constraints it was agreed in the programming process that the project budget would be increased to $55,000,000.

There was a significant collaborative effort on the part of the College of Science and the Center for Cell and Genome Science to identify specific spaces that would be built out in the Base Building with the understanding that core educational and teaching spaces as well as the minimal number of required research labs required would be accommodated. See Project Estimate in this chapter for the summary of Base Building and Shelled Space.

While the cost model has been based on the Loft scheme it was previously determined that there was no significant cost difference between the Loft scheme and the Cube scheme due to the fact that the project is in the programming phase. It is understood that the programming cost model will provide guidance in the future design phase of the project where a final project estimate will be developed based on a $55,000,000 budget and a final design yet to be determined.

UPDATED CAPITAL BUDGET ESTIMATE (CBE)

During the previous 2010 Study, a Capital Budget Estimate, CBE, was developed by the University of Utah to establish a total project budget of $74,398,241. As the budget and cost model have been further refined in the programming process the CBE has been updated to reflect the current project soft costs. See CBE Detail in this chapter.

SQUARE FOOTAGE / COST OPTIONS

In order to better evaluate the amount of educational and research space that could be built out for the initial $50,000,000 budget, four (4) distinct building components were identified within the project:

1. **Existing shell** - this represents the total work to demolish the existing library stacks including the floors, prep the remaining 'U' shape portion of the building and seismically brace the building;
2. **Existing build-out** - this work represents the total work necessary to prepare the existing spaces for occupancy/use and would include all the finishes, mechanical and electrical work;
3. **New shell** - this represents the construction necessary to add the new Loft building addition including the excavation, structure, roof system and exterior skin, and core mechanical and electrical systems (without distribution);
4. **New build-out** - this represents the work required for occupancy/use and would include all the finishes, mechanical and electrical work, and furnishings.

Given the distinct range of construction activities and associated costs each of these four areas were broken out in the accompanying matrix (See Figure 10.1.1) and assigned a cost per square foot. The cost model also utilized historical data collected from multiple projects . The laboratory projects used to determine system allocations include: the Westminster College Meldrum Science Center, U of U Pharmacy building, Unified State Labs, and the U of U Thatcher Chemistry building addition. The historical renovation costs were collected from projects including: The renovation of the Ogden High School, auditorium, and gymnasium, Utah State Capital Renovation, and Park City History Museum. In conjunction with these benchmarking costs, the project's academic, research and administrative scope was determined and included in the cost model. These resources include the following: The room data sheets, equipment lists, test fit plans, concept exterior elevations, and historic preservation recommendations. Construction Control Corporation in association with Gramoll Construction further analyzed the project relative to scheduling, staging, construction means and methods, and implications.

FIGURE 10.1.1. PRELIMINARY COST MODEL (4/15)

Component	Area	Cost	Subtotal
Existing Shell	70,820	$143.32	$10,149,922
Existing Build-out	53,115	$199.74	$10,609,190
New Shell	52,430	$221.73	$11,625,303
New Build-out	39,323	$251.16	$9,876,239
		Total	$42,260,655
		Escalation	$4,226,065
		Soft Costs	$8,311,358
		Total	$54,798,079

CROCKER SCIENCE CENTER ESTIMATE

LOFT SCHEME TOTAL PROJECT

ROJECT ESTIMATE CONSTRUCTION CONTROL CORPORATION 7/16/2013

ROJECT NAME.....UOFU CROCKER SCHEINCE CENTER **LOFT SCHEME**
OCATION.....SALT LAKE CITY, UTAH
RCHITECT.....EDA Total Bldg SF 123,250
TAGE OF DESIGN.....PROGRAMMING

SI #	DESCRIPTION	RENOVATION	ADDITION	BASE BUILDING	SHELL IMPROVEMENT
	BUILDING A COST SUMMARY				
02	SITEWORK & DEMOLITION	$ 194,755	$ 1,254,477	$ 1,449,232	$ -
03	CONCRETE	$ 24,787	$ 842,380	$ 867,167	$ -
04	MASONRY	$ 146,340	$ 883,188	$ 1,029,528	$ -
05	METALS	$ 110,612	$ 1,919,239	$ 2,029,851	$ -
06	WOODS & PLASTICS	$ 430,150	$ 1,001,821	$ 1,431,971	$ 640,214
07	THERMAL & MOISTURE PROTECTION	$ 656,658	$ 746,810	$ 1,403,467	$ 41,368
08	DOORS & WINDOWS	$ 1,915,904	$ 1,434,394	$ 3,350,298	$ 441,286
09	FINISHES	$ 2,842,146	$ 1,759,375	$ 4,601,521	$ 972,634
10	SPECIALTIES	$ 246,057	$ 206,567	$ 452,624	$ 139,679
11	EQUIPMENT	$ 173,811	$ 648,460	$ 822,271	$ 160,127
12	FURNISHINGS	$ 39,826	$ 34,135	$ 73,962	$ -
13	SPECIAL CONSTRUCTION	$ 1,764,980	$ 331,800	$ 2,096,780	$ -
14	CONVEYING SYSTEMS	$ 200,000	$ 392,000	$ 592,000	$ -
15	MECHANICAL	$ 4,431,913	$ 5,131,433	$ 9,563,346	$ 2,081,783
16	ELECTRICAL	$ 2,210,497	$ 1,666,859	$ 3,877,356	$ 638,017
	SUBTOTAL	$ 15,388,436	$ 18,252,939	$ 33,641,375	$ 5,115,108
	GENERAL CONDITIONS	$ 923,306	$ 1,095,176	$ 2,018,482	$ 306,906
	OVERHEAD & PROFIT	$ 615,537	$ 730,118	$ 1,345,655	$ 204,604
	DESIGN CONTINGENCY	$ 2,308,265	$ 2,737,941	$ 5,046,206	$ 767,266
	TOTAL CONSTRUCTION COST	$ 19,235,545	$ 22,816,173	$ 42,051,718	$ 6,393,885

PROJECT ESTIMATE **CONSTRUCTION CONTROL CORPORATION** **7/16/2013**

PROJECT NAME……..…..UOFU CROCKER SCHEINCE CENTER **BASE BUILDING RENOVATION**
LOCATION……..……..SALT LAKE CITY, UTAH
ARCHITECT……..…EDA Project Size 70,820 SF
STAGE OF DESIGN……PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
	BUILDING A COST SUMMARY			
02	**SITEWORK & DEMOLITION**		$ 2.75	$ 194,755
03	**CONCRETE**		$ 0.35	$ 24,787
04	**MASONRY**		$ 2.07	$ 146,340
05	**METALS**		$ 1.56	$ 110,612
06	**WOODS & PLASTICS**		$ 6.07	$ 430,150
07	**THERMAL & MOISTURE PROTECTION**		$ 9.27	$ 656,658
08	**DOORS & WINDOWS**		$ 27.05	$ 1,915,904
09	**FINISHES**		$ 40.13	$ 2,842,146
10	**SPECIALTIES**		$ 3.47	$ 246,057
11	**EQUIPMENT**		$ 2.45	$ 173,811
12	**FURNISHINGS**		$ 0.56	$ 39,826
13	**SPECIAL CONSTRUCTION**		$ 24.92	$ 1,764,980
14	**CONVEYING SYSTEMS**		$ 2.82	$ 200,000
15	**MECHANICAL**		$ 62.58	$ 4,431,913
16	**ELECTRICAL**		$ 31.21	$ 2,210,497
	SUBTOTAL		$ 217.29	15,388,436
	GENERAL CONDITIONS	6%	$ 13.04	923,306
	OVERHEAD & PROFIT	4%	$ 8.69	615,537
	DESIGN CONTINGENCY	15%	$ 32.59	2,308,265
	TOTAL CONSTRUCTION COST		$ 271.61	$ 19,235,545
	LOWER EXISTING BASEMENT SLAB	18000 SF	$ 24.92	$ 448,513

PROJECT ESTIMATE **CONSTRUCTION CONTROL CORPORATION** **7/16/2013**

PROJECT NAME……..…..UOFU CROCKER SCHEINCE CENTER **BASE BUILDING RENOVATION**
LOCATION……..……..SALT LAKE CITY, UTAH
ARCHITECT……..……..…EDA Project Size 70,820 SF
STAGE OF DESIGN……PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
02	**SITEWORK & DEMOLITION**			
	Demolition			
	Selective Interior Demolition	70820 SF	$ 2.75	$ 194,755
	Remove Standing Seam Metal Roof	16067 SF	$1.15	$ 18,477
	Remove Single Ply membrane	5356 SF	$0.95	$ 5,088
	Subtotal for Demolition			**$ 194,755**
	TOTAL SITEWORK & DEMOLITION			**$ 194,755**
03	**CONCRETE**			
	Floor Patching	70820 SF	$ 0.35	$ 24,787
	TOTAL CONCRETE			**$ 24,787**
04	**MASONRY**			
	Touch up Terracotta exterior	29268 SF	$ 5.00	$ 146,340
	TOTAL MASONRY			**$ 146,340**
05	**METALS**			
	Miscellaneous Steel	70820 SF	$ 0.38	$ 26,912
	Renovate Railing	372 LF	$ 225.00	$ 83,700
	TOTAL METALS			**$ 110,612**
06	**WOOD & PLASTICS**			
	Carpentry:			
	Wood Plates & Blocking	70820 SF	$0.31	$ 21,955
	Subtotal for Carpentry			**$ 21,955**
	Millwork			
	Base Cabinet with Resin Top	142 LF	$ 295.00	$ 41,890
	Wall Hung Cabinets	142 LF	$ 185.00	$ 26,270
	Full Height Cabinets	30 LF	$ 262.00	$ 7,860
	Lab Upper Cabinets	80 LF	$ 195.00	$ 15,600
	Lab Island with Resin Top	480 LF	$ 325.00	$ 156,000
	Base Cabinet with Plam Top	100 LF	$ 195.00	$ 19,500
	6' Flexible Bench	32 EA	$ 2,190.00	$ 70,080
	Reception Desk	32 LF	$ 565.00	$ 18,080
	Miscellaneous Millwork	52915 SF	$ 1.00	$ 52,915
	Subtotal for Millwork			**$ 408,195**
	TOTAL WOOD & PLASTICS			**$ 430,150**
07	**THERMAL & MOISTURE PROTECTION**			
	R-19 Insulation at Exterior Walls	39024 SF	$0.72	$ 28,098
	Rigid Roof Insulation	21423 SF	$2.55	$ 54,629
	Sound Batt	191378 SF	$0.48	$ 91,862
	Roof Garden	3000 SF	$15.00	$ 45,000
	Standing Seam Metal Roof	16067 SF	$9.00	$ 144,606
	Single Ply membrane	5356 SF	$2.65	$ 14,193
	Soffit	4134 SF	$30.00	$ 124,020
	Metal Wall Cap	1278 LF	$7.65	$ 9,777
	Building Fireproofing	70820 SF	$1.65	$ 116,853
	Fire Stopping/ Caulking	70820 SF	$0.18	$ 12,748
	Caulking & Sealants	70820 SF	$0.21	$ 14,873
	TOTAL THERMAL & MOISTURE PROTECTION			**$ 656,658**

PROJECT ESTIMATE **CONSTRUCTION CONTROL CORPORATION** **7/16/2013**

PROJECT NAME……..…..UOFU CROCKER SCHEINCE CENTER **BASE BUILDING RENOVATION**
LOCATION……..……..SALT LAKE CITY, UTAH
ARCHITECT……..…EDA Project Size 70,820 SF
STAGE OF DESIGN……PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
08	**DOORS & WINDOWS**			
	Doors	52915 SF	$10.03	$ 530,741
	Replace Exterior Glazing w/ steel windows-	9383 SF	$105.00	$ 985,163
	Interior Glazing	10000 SF	$40.00	$ 400,000
	TOTAL DOORS & WINDOWS			**$ 1,915,904**
09	**FINISHES**			
	Exterior Metal Stud Furring	31275 SF	$2.25	$ 70,369
	Furring at Hall	7749 SF	$8.00	$ 61,992
	Interior Metal Stud Partitions	191378 SF	$2.25	$ 430,601
	Gyp Board Walls	421781 SF	$1.30	$ 548,315
	Ceiling	70820 SF	$8.65	$ 612,593
	Historic Finish Restoration	70820 SF	$6.00	$ 424,920
	Carpet	22785 SF	$3.33	$ 75,874
	Lab Sheet Vinyl	7840 SF	$6.65	$ 52,136
	Epoxy Flooring	698 SF	$7.00	$ 4,886
	VCT	698 SF	$7.65	$ 5,340
	Flooring other areas	20894 SF	$7.65	$ 159,842
	Wall Coverings	52915 SF	$7.47	$ 395,278
	TOTAL FINISHES			**$ 2,842,146**
10	**SPECIALTIES**			
	Specialties	52915 SF	$4.65	$ 246,057
	TOTAL SPECIALTIES			**$ 246,057**
11	**EQUIPMENT**			
	6' Fume Hood	4 EA	$9,850.00	$ 39,400
	4' Fume Hood	1 EA	$12,500.00	$ 12,500
	Bio Safety Cabinets	EA	$13,650.00	$ -
	Fixed Seats at Lecture	60 EA	$268.00	$ 16,080
	Miscellaneous Equipment	52915 SF	$2.00	$ 105,831
11	**EQUIPMENT**			**$ 173,811**
12	**FURNISHINGS**			
	Walk-Off Mats	400 SF	$13.95	$ 5,580
	Blinds	9383 SF	$3.65	$ 34,246
	TOTAL EQUIPMENT			**$ 39,826**
13	**SPECIAL CONSTRUCTION**			
	Non Structural Seismic items	70820 SF	$10.00	$ 708,200
	Demo Floor Slab at piles	2160 SF	$1.89	$ 4,082
	Slab Sawcutting at Shearwalls	440 LF	$2.65	$ 1,166
	Excavation at Pile Cap	53 CY	$29.00	$ 1,547
	Remove Excess	53 CY	$10.00	$ 533
	Micropiles- 60'	86 EA	$3,500.00	$ 301,000
	Pile Cap	160 CY	$350.00	$ 56,000
	Concrete Shearwall- 16"	11448 SF	$29.56	$ 338,352
	Diaphram Improvements/ Drag Struts	70820 SF	$5.00	$ 354,100
	TOTAL SPECIAL CONSTRUCTION			**$ 1,764,980**

PROJECT ESTIMATE **CONSTRUCTION CONTROL CORPORATION** **7/16/2013**

PROJECT NAME……..…..UOFU CROCKER SCHEINCE CENTER **BASE BUILDING RENOVATION**
LOCATION……..……..SALT LAKE CITY, UTAH
ARCHITECT……..…EDA Project Size 70,820 SF
STAGE OF DESIGN……PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
14	**CONVEYING SYSTEMS**			
	Replace Existing Elevator4-stop	1 EA	$180,000.00	$ 180,000
	ADA Lift at basement	1 EA	$20,000.00	$ 20,000
	TOTAL CONVEYING SYSTEMS			**$ 200,000**
15	**MECHANICAL**			
	HVAC:	39283 SF	$35.00	**$ 1,374,918**
	HVAC Shell Area	17905 SF	$20.00	**$ 358,092**
	Lab Area HVAC	13632 SF	$140.00	**$ 1,908,480**
	Fire Protection:	70820 SF	$2.55	**$ 180,591**
	Plumbing	52915 SF	$9.65	**$ 510,633**
	Plumbing Shell Only	17905 SF	$2.00	**$ 35,809**
	Lab Gas System	13632 SF	$4.65	**$ 63,389**
	TOTAL MECHANICAL			**$ 4,431,913**
16	**ELECTRICAL**			
	Service & Distribution:	52915 SF	$8.34	**$ 441,314**
	Service & Distribution Shell Area	17905 SF	$5.65	**$ 101,161**
	Power:	52915 SF	$5.65	**$ 298,972**
	Power Shell Area	17905 SF	$1.95	**$ 34,914**
	Lighting:	52915 SF	$8.00	**$ 423,323**
	Lighting Shell Area	17905 SF	$8.00	**$ 143,237**
	Telecommunication System:	52915 SF	$4.35	**$ 230,182**
	Telecommunication System Shell Area	17905 SF	$0.95	**$ 17,009**
	Fire/Smoke System:	52915 SF	$3.00	**$ 158,746**
	Fire/Smoke System Shell Area	17905 SF	$1.95	**$ 34,914**
	Special Systems:	52915 SF	$5.65	**$ 298,972**
	Special Systems Shell Area	17905 SF	$1.55	**$ 27,752**
	TOTAL ELECTRICAL			**$ 2,210,497**

CROCKER SCIENCE CENTER ESTIMATE

LOFT SCHEME BASE BUILDING

PROJECT ESTIMATE	CONSTRUCTION CONTROL CORPORATION	7/16/2013

PROJECT NAME……..…..UOFU CROCKER SCHEINCE CENTER **BASE BUILDING LOFT SCHEME ADDITION**
LOCATION……..……..SALT LAKE CITY, UTAH
ARCHITECT…..……..…..EDA Project Size 52,430 SF
STAGE OF DESIGN……..PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
	BUILDING A COST SUMMARY			
02	SITEWORK & DEMOLITION		$ 23.93	$ 1,254,477
03	CONCRETE		$ 16.07	$ 842,380
04	MASONRY		$ 16.85	$ 883,188
05	METALS		$ 36.61	$ 1,919,239
06	WOODS & PLASTICS		$ 19.11	$ 1,001,821
07	THERMAL & MOISTURE PROTECTION		$ 14.24	$ 746,810
08	DOORS & WINDOWS		$ 27.36	$ 1,434,394
09	FINISHES		$ 33.56	$ 1,759,375
10	SPECIALTIES		$ 3.94	$ 206,567
11	EQUIPMENT		$ 12.37	$ 648,460
12	FURNISHINGS		$ 0.65	$ 34,135
13	SPECIAL CONSTRUCTION		$ 6.33	$ 331,800
14	CONVEYING SYSTEMS		$ 7.48	$ 392,000
15	MECHANICAL		$ 97.87	$ 5,131,433
16	ELECTRICAL		$ 31.79	$ 1,666,859
	SUBTOTAL		$ 348.14	18,252,939
	GENERAL CONDITIONS	6%	$ 20.89	1,095,176
	OVERHEAD & PROFIT	4%	$ 13.93	730,118
	DESIGN CONTINGENCY	15%	$ 52.22	2,737,941
	TOTAL CONSTRUCTION COST		$ 435.17	$ 22,816,173

PROJECT ESTIMATE **CONSTRUCTION CONTROL CORPORATION** **7/16/2013**

PROJECT NAME……..…..UOFU CROCKER SCHEINCE CENTER **BASE BUILDING LOFT SCHEME ADDITION**
LOCATION……..……..SALT LAKE CITY, UTAH
ARCHITECT……..…..…EDA Project Size 52,430 SF
STAGE OF DESIGN……PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
02	**SITEWORK & DEMOLITION**			
	Demolition			
	Demolition Existing Building Stacks	352800 CF	$ 0.29	$ 102,312
	Site Clearing	62947 SF	$ 0.89	$ 56,023
	Subtotal for Demolition			**$ 158,335**
	Earthwork- In Parking Structure			
	Building Excavation	9590 CY	$ 6.00	$ 57,542
	Backfill and Compaction w/ imported fills	2398 CY	$ 19.65	$ 47,113
	Remove Spoil	9590 CY	$ 7.00	$ 67,133
	Underpinning at existing	1 LS	$ 100,000.00	$ 100,000
	Building Grading	12947 SF	$ 0.69	$ 8,933
	Gravel under Slab	514 TNS	$ 30.00	$ 15,421
	Subtotal for Earthwork			**$ 296,142**
	Site Utilities			
	Site Utilities	1 LS	$ 150,000.00	$ 150,000
	Hi Temp Water line at site	1 LS	$ 75,000.00	$ 75,000
	Chilled Water at site	1 LS	$ 75,000.00	$ 75,000
	Subtotal for Site Utilities			**$ 300,000**
	Site Improvments	50000 SF	$ 10.00	**$ 500,000**
	TOTAL SITEWORK & DEMOLITION			**$ 1,254,477**
03	**CONCRETE**			
	Footings	1319 CY	$ 275.00	$ 362,636
	Foundation Wall	9270 SF	$ 24.00	$ 222,480
	Slab on Grade	12947 SF	$ 5.69	$ 73,668
	Topping Slab	39483 SF	$ 4.65	$ 183,596
	TOTAL CONCRETE			**$ 842,380**
04	**MASONRY**			
	CMU at Stair Enclosure	10440 SF	$ 15.28	$ 159,523
	Masonry Exterior	24122 SF	$ 30.00	$ 723,665
	TOTAL MASONRY			**$ 883,188**
05	**METALS**			
	Miscellaneous Steel	52430 SF	$ 0.38	$ 19,923
	Metal Floor Deck	39483 SF	$ 2.75	$ 108,578
	Metal Roof Deck	13643 SF	$ 1.95	$ 26,604
	Floor Structure 19#/SF	750177 LB	$ 1.55	$ 1,162,774
	Roof Structure- 7#/SF	95501 LB	$ 1.55	$ 148,027
	Atrium Stair	1095 SF	$ 150.00	$ 164,250
	Decorative Railing	590 LF	$ 300.00	$ 177,000
	Concrete Filled Stair Pans	837 SF	$ 59.00	$ 49,383
	Free Standing Railing	330 LF	$ 125.00	$ 41,250
	Wall Mounted Handrail	330 LF	$ 65.00	$ 21,450
	TOTAL METALS			**$ 1,919,239**

PROJECT ESTIMATE **CONSTRUCTION CONTROL CORPORATION** **7/16/2013**

PROJECT NAME……..UOFU CROCKER SCHEINCE CENTER **BASE BUILDING LOFT SCHEME ADDITION**
LOCATION……..SALT LAKE CITY, UTAH
ARCHITECT……EDA Project Size 52,430 SF
STAGE OF DESIGN……..PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
06	**WOOD & PLASTICS**			
	Carpentry:			
	Wood Plates & Blocking	52430 SF	$0.31	$ 16,254
	Subtotal for Carpentry			**$ 16,254**
	Millwork			
	Base Cabinet with Resin Top	198 LF	$ 295.00	$ 58,410
	Full Height Cabinets	192 LF	$ 262.00	$ 50,304
	Lab Upper Cabinets	346 LF	$ 195.00	$ 67,470
	Base Cabinet with Plam Top	16 LF	$ 195.00	$ 3,120
	SS Counter	148 LF	$ 225.00	$ 33,300
	6' Flexible Bench	212 EA	$ 2,190.00	$ 464,280
	4' Flexible Bench	181 EA	$ 1,460.00	$ 264,260
	Miscellaneous Millwork	44423 SF	$ 1.00	$ 44,423
	Subtotal for Millwork			**$ 985,567**
	TOTAL WOOD & PLASTICS			**$ 1,001,821**
07	**THERMAL & MOISTURE PROTECTION**			
	R-19 Insulation at Exterior Walls	26078 SF	$0.72	$ 18,777
	3" Rigid at Building Exterior	26078 SF	$2.95	$ 76,930
	Rigid Roof Insulation	13643 SF	$3.15	$ 42,975
	Sound Batt	141683 SF	$0.48	$ 68,008
	Wall Sheathing	24122 SF	$1.65	$ 39,802
	Vapor Barrier	24122 SF	$1.25	$ 30,153
	Waterproofing at underground structure	4000 SF	$8.00	$ 32,000
	Roof Garden	3000 SF	$15.00	$ 45,000
	Single Ply membrane	13643 SF	$2.95	$ 40,247
	Soffit	4134 SF	$30.00	$ 124,020
	Wall Cap	1278 LF	$20.00	$ 25,560
	Connection at existing Building	1220 LF	$79.00	$ 96,380
	Building Fireproofing	52430 SF	$1.65	$ 86,510
	Fire Stopping/ Caulking	52430 SF	$0.18	$ 9,437
	Caulking & Sealants	52430 SF	$0.21	$ 11,011
	TOTAL THERMAL & MOISTURE PROTECTION			**$ 746,810**
08	**DOORS & WINDOWS**			
	Doors	52430 SF	$10.03	$ 525,873
	Exterior Glazing Aluminum (30% of Exterior)	7823 SF	$65.00	$ 508,521
	Interior Glazing	10000 SF	$40.00	$ 400,000
	TOTAL DOORS & WINDOWS			**$ 1,434,394**
09	**FINISHES**			
	Exterior Metal Stud Framing	26078 SF	$3.20	$ 83,450
	Interior Metal Stud Partitions	141683 SF	$2.25	$ 318,786
	Gyp Board Walls	309443 SF	$1.30	$ 402,277
	Ceiling	44783 SF	$5.65	$ 253,024
	Carpet	1620 SF	$3.33	$ 5,395
	Lab Sheet Vinyl	24951 SF	$6.65	$ 165,924
	Epoxy Flooring	698 SF	$7.00	$ 4,886
	VCT	698 SF	$7.65	$ 5,340
	Flooring other areas	16816 SF	$7.65	$ 128,642
	Wall Coverings	52430 SF	$7.47	$ 391,652
	TOTAL FINISHES			**$ 1,759,375**

PROJECT ESTIMATE **CONSTRUCTION CONTROL CORPORATION** **7/16/2013**

PROJECT NAME……..…..UOFU CROCKER SCHEINCE CENTER **BASE BUILDING LOFT SCHEME ADDITION**
LOCATION……..……..SALT LAKE CITY, UTAH
ARCHITECT……..…..…EDA Project Size 52,430 SF
STAGE OF DESIGN……PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
10	**SPECIALTIES**			
	Specialties	44423 SF	$4.65	$ 206,567
	TOTAL SPECIALTIES			**$ 206,567**
11	**EQUIPMENT**			
	6' Fume Hood	27 EA	$9,850.00	$ 265,950
	4' Fume Hood	1 EA	$12,500.00	$ 12,500
	Bio Safety Cabinets	11 EA	$13,650.00	$ 150,150
	Small Steam Sterilizer	2 EA	$15,000.00	$ 30,000
	Glass Washer	2 EA	$25,000.00	$ 50,000
	Medium Steam Sterilizer	1 EA	$20,000.00	$ 20,000
	Dryers	2 EA	$7,500.00	$ 15,000
	Miscellaneous Equipment	52430 SF	$2.00	$ 104,860
	TOTAL EQUIPMENT			**$ 648,460**
12	**FURNISHINGS**			
	Walk-Off Mats	400 SF	$13.95	$ 5,580
	Blinds	7823 SF	$3.65	$ 28,555
	TOTAL EQUIPMENT			**$ 34,135**
13	**SPECIAL CONSTRUCTION**			
	Micropiles at shearwalls	26 EA	$ 3,500.00	$ 91,000
	Pile Cap	80 CY	$350.00	$ 28,000
	Concrete Shearwall- 16"	7200 SF	$29.56	$ 212,800
	TOTAL SPECIAL CONSTRUCTION			**$ 331,800**
14	**CONVEYING SYSTEMS**			
	Elevator- 4 Stop	2 EA	$196,000.00	$ 392,000
	TOTAL CONVEYING SYSTEMS			**$ 392,000**
15	**MECHANICAL**			
	HVAC:	19472 SF	$35.00	**$ 681,520**
	HVAC Rough- in	8007 SF	$20.00	**$ 160,140**
	Lab Area HVAC	24951 SF	$140.00	**$ 3,493,140**
	Fire Protection:	52430 SF	$2.55	**$ 133,697**
	Plumbing	52430 SF	$9.65	**$ 505,950**
	Plumbing Shell Only	8007 SF	$2.00	**$ 16,014**
	Lab Gas System	24951 SF	$5.65	**$ 140,973**
	TOTAL MECHANICAL			**$ 5,131,433**

PROJECT ESTIMATE **CONSTRUCTION CONTROL CORPORATION** **7/16/2013**

PROJECT NAME……..…..UOFU CROCKER SCHEINCE CENTER **BASE BUILDING LOFT SCHEME ADDITION**
LOCATION……..……SALT LAKE CITY, UTAH
ARCHITECT……..…EDA Project Size 52,430 SF
STAGE OF DESIGN……..PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
16	**ELECTRICAL**			
	Service & Distribution:	44423 SF	$8.34	**$ 370,488**
	Service & Distribution Shell Area	8007 SF	$5.65	**$ 45,240**
	Power:	44423 SF	$5.65	**$ 250,990**
	Power Shell Area	8007 SF	$1.95	**$ 15,614**
	Lighting:	44423 SF	$8.00	**$ 355,384**
	Lighting Shell Area	8007 SF	$2.00	**$ 16,014**
	Telecommunication System:	44423 SF	$4.35	**$ 193,240**
	Telecommunication System Shell Area	8007 SF	$0.95	**$ 7,607**
	Fire/Smoke System:	44423 SF	$3.00	**$ 133,269**
	Fire/Smoke System Shell Area	8007 SF	$1.95	**$ 15,614**
	Special Systems:	44423 SF	$5.65	**$ 250,990**
	Special Systems Shell Area	8007 SF	$1.55	**$ 12,411**
	TOTAL ELECTRICAL			**$ 1,666,859**

CROCKER SCIENCE CENTER ESTIMATE

LOFT SCHEME SHELLED SPACE

PROJECT ESTIMATE **CONSTRUCTION CONTROL CORPORATION** **7/16/2013**

PROJECT NAME……..…..UOFU CROCKER SCHEINCE CENTER **SHELL IMPROVEMENTS**
LOCATION……..……..SALT LAKE CITY, UTAH
ARCHITECT……..……..…EDA Project Size 30,038 SF
STAGE OF DESIGN……PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
	BUILDING A COST SUMMARY			
02	**SITEWORK & DEMOLITION**		$ -	$ -
03	**CONCRETE**		$ -	$ -
04	**MASONRY**		$ -	$ -
05	**METALS**		$ -	$ -
06	**WOODS & PLASTICS**		$ 21.31	$ 640,214
07	**THERMAL & MOISTURE PROTECTION**		$ 1.38	$ 41,368
08	**DOORS & WINDOWS**		$ 14.69	$ 441,286
09	**FINISHES**		$ 32.38	$ 972,634
10	**SPECIALTIES**		$ 4.65	$ 139,679
11	**EQUIPMENT**		$ 5.33	$ 160,127
12	**FURNISHINGS**		$ -	$ -
13	**SPECIAL CONSTRUCTION**		$ -	$ -
14	**CONVEYING SYSTEMS**		$ -	$ -
15	**MECHANICAL**		$ 69.30	$ 2,081,783
16	**ELECTRICAL**		$ 21.24	$ 638,017
	SUBTOTAL		$ 170.29	5,115,108
	GENERAL CONDITIONS	6%	$ 10.22	306,906
	OVERHEAD & PROFIT	4%	$ 6.81	204,604
	DESIGN CONTINGENCY	15%	$ 25.54	767,266
	TOTAL CONSTRUCTION COST		$ 212.86	$ 6,393,885

PROJECT ESTIMATE CONSTRUCTION CONTROL CORPORATION 7/16/2013

PROJECT NAME……..UOFU CROCKER SCHEINCE CENTER **SHELL IMPROVEMENTS**
LOCATION……..SALT LAKE CITY, UTAH
ARCHITECT……..EDA Project Size 30,038 SF
STAGE OF DESIGN……PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
02	**SITEWORK & DEMOLITION**			
	TOTAL SITEWORK & DEMOLITION			**$ -**
03	**CONCRETE**			
	TOTAL CONCRETE			**$ -**
04	**MASONRY**			
	TOTAL MASONRY			**$ -**
05	**METALS**			
	TOTAL METALS			**$ -**
06	**WOOD & PLASTICS**			
	Carpentry:			
	Wood Plates & Blocking	30038 SF	$0.31	$ 9,312
	Subtotal for Carpentry			**$ 9,312**
	Millwork			
	Base Cabinet with Resin Top	216 LF	$ 295.00	$ 63,720
	Wall Hung Cabinets	30 LF	$ 185.00	$ 5,550
	Full Height Cabinets	72 LF	$ 262.00	$ 18,864
	Lab Upper Cabinets	96 LF	$ 195.00	$ 18,720
	Lab Island with Resin Top	192 LF	$ 325.00	$ 62,400
	Base Cabinet with Plam Top	40 LF	$ 195.00	$ 7,800
	SS Counter	102 LF	$ 225.00	$ 22,950
	Lab Island with Resint Top	388 LF	$ 325.00	$ 126,100
	6' Flexible Bench	86 EA	$ 2,190.00	$ 188,340
	4' Flexible Bench	53 EA	$ 1,460.00	$ 77,380
	Reception Desk	16 LF	$ 565.00	$ 9,040
	Miscellaneous Millwork	30038 SF	$ 1.00	$ 30,038
	Subtotal for Millwork			**$ 630,902**
	TOTAL WOOD & PLASTICS			**$ 640,214**
07	**THERMAL & MOISTURE PROTECTION**			
	Sound Batt	81174 SF	$0.48	$ 38,964
	Caulking & Sealants	30038 SF	$0.08	$ 2,404
	TOTAL THERMAL & MOISTURE PROTECTION			**$ 41,368**
08	**DOORS & WINDOWS**			
	Doors	30038 SF	$10.03	$ 301,286
	Interior Glazing	3500 SF	$40.00	$ 140,000
	TOTAL DOORS & WINDOWS			**$ 441,286**
09	**FINISHES**			
	Interior Metal Stud Partitions	81174 SF	$2.25	$ 182,641
	Gyp Board Walls	162347 SF	$1.30	$ 211,051
	Ceiling	30038 SF	$5.65	$ 169,717
	Carpet	7838 SF	$3.33	$ 26,101
	Lab Sheet Vinyl	10744 SF	$6.65	$ 71,448
	Epoxy Flooring	543 SF	$7.00	$ 3,801
	Tile	400 SF	$7.65	$ 3,060

PROJECT ESTIMATE **CONSTRUCTION CONTROL CORPORATION** **7/16/2013**

PROJECT NAME……..UOFU CROCKER SCHEINCE CENTER **SHELL IMPROVEMENTS**
LOCATION……..SALT LAKE CITY, UTAH
ARCHITECT……EDA Project Size 30,038 SF
STAGE OF DESIGN……PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
	Flooring other areas	10513 SF	$7.65	$ 80,428
	Wall Coverings	30038 SF	$7.47	$ 224,387
	TOTAL FINISHES			**$ 972,634**
10	**SPECIALTIES**			
	Specialties	30038 SF	$4.65	$ 139,679
	TOTAL SPECIALTIES			**$ 139,679**
11	**EQUIPMENT**			
	6' Fume Hood	6 EA	$9,850.00	$ 59,100
	Bio Safety Cabinets	3 EA	$13,650.00	$ 40,950
	Miscellaneous Equipment	30038 SF	$2.00	$ 60,077
	TOTAL EQUIPMENT			**$ 160,127**
12	**FURNISHINGS**			
	TOTAL EQUIPMENT			**$ -**
13	**SPECIAL CONSTRUCTION**			
	TOTAL SPECIAL CONSTRUCTION			**$ -**
14	**CONVEYING SYSTEMS**			
	TOTAL CONVEYING SYSTEMS			**$ -**
15	**MECHANICAL**			
	HVAC Finish	18751 SF	$15.00	**$ 281,272**
	Lab Area HVAC Finish	11287 SF	$120.00	**$ 1,354,440**
	Fire Protection:	30038 SF	$2.55	**$ 76,598**
	Plumbing	30038 SF	$9.65	**$ 289,871**
	Lab Gas System	30038 SF	$2.65	**$ 79,602**
	TOTAL MECHANICAL			**$ 2,081,783**
16	**ELECTRICAL**			
	Service & Distribution:	30038 SF	$2.69	**$ 80,803**
	Power:	30038 SF	$3.70	**$ 111,142**
	Lighting:	30038 SF	$6.00	**$ 180,231**
	Telecommunication System:	30038 SF	$3.40	**$ 102,131**
	Fire/Smoke System:	30038 SF	$1.35	**$ 40,552**
	Special Systems:	30038 SF	$4.10	**$ 123,158**
	TOTAL ELECTRICAL			**$ 638,017**

CROCKER SCIENCE CENTER

CAPITAL DEVELOPMENT PROJECTS

CAPITAL BUDGET ESTIMATE (CBE) SUMMARY

Project Name:	Crocker Science Center (George Thomas Building)
Agency/Institution:	University of Utah
Project Manager:	Jennifer Still

Cost Summary		**$ Amount**	**Cost Per SF**	**Notes**
Facility Cost	$	45,351,495	$367.96	
Utility Fee Cost	$	53,924	$0.44	
Additional Construction Cost	$	-	$0.00	
Site Cost	$	-	$0.00	
High Performance Building	$	-	$0.00	
Total Construction Cost	**$**	**45,405,419**	**$368.40**	
Soft Costs:				
Hazardous Materials	$	180,163		
Pre-Design/Planning	$	463,515		
Design	$	3,178,379		
Property Acquisition	$	-		
Furnishings & Equipment	$	1,328,319		
Information Technology:	$	247,000		
Utah Art (1% of Construction Budget)	$	454,054		
Testing & Inspection	$	449,514		
Contingency	$	2,366,037		
Moving/Occupancy	$	150,000		
Builder's Risk Insurance (0.15% of Construction Budget)	$	68,108		
Legal Services (0.1% of Construction Budget)	$	45,405		
DFCM Management	$	64,578		
User Fees	$	150,000		
Commissioning	$	300,000		
Other Costs	$	149,509		
Total Soft Costs	**$**	**9,594,581**	**$77.85**	
TOTAL PROJECT COST	**$**	**55,000,000**	**$446.25**	
Previous Funding	**$**	**-**		
Other Funding Sources	$	21,000,000		
REQUEST FOR STATE FUNDING	**$**	**34,000,000**		

Project Information

Gross Square Feet	123,250	Base Cost Date	3-Jul-12
Net Square Feet	-	Estimated Bid Date	1-Mar-15
Net/Gross Ratio	0%	Est. Completion Date	0-Jan-00
		Last Modified Date	0-Jan-00
Capital Development CBE Form 5-5-11		Print Date	8/27/2013

CROCKER SCIENCE CENTER

CAPITAL DEVELOPMENT PROJECTS

CBE DETAIL

Project Name:	**Crocker Science Center (George Thomas Building)**				
Agency/Institution:	**University of Utah**				
Project Manager:	**Jennifer Still**				
Description	**Explanation**	**Units**	**Unit Cost**	**Cost**	**Escalated Cost**
Facility Cost		**GSF**			
New Facility Cost Details:					
Build out new addition		52,430	$ 435.17	$ 22,815,963	$ 24,606,516
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
Subtotal - New Facility Costs		**52,430**		**$ 22,815,963**	**$ 24,606,516**
Remodel Facility Cost Details:					
		70,820	$ 271.61	$ 19,235,420	$ 20,744,979
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
Subtotal - Remodel Facility Costs		**70,820**		**$ 19,235,420**	**$ 20,744,979**
TOTAL FACILITY COST		**123,250**		**$ 42,051,383**	**$ 45,351,495**
Utility Cost Details:					
Water Utility Fee				$ -	$ -
Sewer Utility Fee				$ -	$ -
Electricity Utility Fee				$ -	$ -
Storm Sewer Utility Fee				$ -	$ -
Connection Fees				$ -	$ -
	Allowance for all of the above	1	$ 50,000	$ 50,000	$ 53,924
				$ -	$ -
TOTAL UTILITY FEE COST				**$ 50,000**	**$ 53,924**
Additional Construction Cost Details:					
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
TOTAL ADDITIONAL CONSTRUCTION COST				**$ -**	**$ -**
Site Cost Details:					
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
				$ -	$ -
TOTAL SITE COST				**$ -**	**$ -**
HIGH PERFORMANCE BUILDING	If N/A, change YES to NO. To supercede 1-1/2% calculation enter amount in unit cost	**no**		**$ -**	**$ -**
TOTAL CONSTRUCTION COST				**$ 42,101,383**	**$ 45,405,419**
OTHER PROJECT INFORMATION:					
Total Net Square Feet:			**To add rows, copy a row and insert it**		
Base Cost Date:	**7/3/2012**		**in the same section above the last detail**		
Estimated Bid Date:	**3/1/2015**		**row in that section.**		
Estimated Completion Date:					
Last Modified Date:					
Inflation Escalation Factor Included:	**2.95%**				
Location Factor Included:	**0.00%**				

Hazardous Materials Cost Details:						
Pre-Construction Survey		1	$ 5,000	$ 5,000	$ 5,148	
				$ -	$ -	
Plan and Monitoring		1	$ 20,000	$ 20,000	$ 20,590	
				$ -	$ -	
Abatement/Removal		1	$ 150,000	$ 150,000	$ 154,425	
				$ -	$ -	
TOTAL HAZARDOUS MATERIALS COST				**$ 175,000**	**$ 180,163**	
Pre-Design/Planning:						
Planning Fund Reimbursement	DFCM use only			$ -		
				$ -		
Programming		45,351,495	1%	$ 453,515		
				$ -		
Environmental Assessment				$ -		
				$ -		
Geotechnical Investigation/Surveys		1	$ 10,000	$ 10,000		
				$ -		
TOTAL PRE-DESIGN/PLANNING COST				**$ 463,515**		
Design Costs:						
A/E Design Fees						
		$ 45,405,419	7.00%	$ 3,178,379		
				$ -		
				$ -		
				$ -		
				$ -		
Total A/E Design Fees				$ 3,178,379		
Additional Printing Costs				$ -		
High Performance Design	If N/A, change YES to NO. To supercede 1/4% calculation enter amount in unit cost	**no**		**$ -**		
Value Management Costs				$ -		
				$ -		
TOTAL DESIGN COST				**$ 3,178,379**		
Property Acquisition:						
				$ -		
				$ -		
				$ -		
				$ -		
TOTAL PROPERTY ACQUISITION COST				**$ -**		
Furnishings & Equipment Costs:						
Furnishings Detail:						
	Allowance	1	$925,720	$ 925,720		
				$ -		
				$ -		
				$ -		
				$ -		
				$ -		
				$ -		
				$ -		
Total Furnishings				$ 925,720		
Equipment Detail:						
		1	$175,572	$ 175,572		
				$ -		
				$ -		
				$ -		
				$ -		
				$ -		
				$ -		
Total Equipment				$ 175,572		
FF&E Design Costs		45,405,419	0.50%	$ 227,027		
				$ -		
TOTAL FURNISHINGS & EQUIPMENT COSTS				**$ 1,328,319**		
Information Technology Costs:						
	Basic wiring in hard cost per new DFCM req.			$ -		
	Cell booster costs	123,500	$ 2	$ 247,000		
				$ -		
				$ -		
				$ -		
TOTAL INFORMATION TECHNOLOGY COST				**$ 247,000**		

UTAH ART	If N/A, change YES to NO. To supercede 1% calculation enter amount in unit cost	**yes**			**$ 454,054**
Testing & Inspection Costs:					
Building Code Inspection		45,405,419	0%		$ 149,838
					$ -
Material Testing		45,405,419	0.3%		$ 149,838
					$ -
Special Inspections		45,405,419	0.3%		$ 149,838
					$ -
TOTAL TESTING & iNSPECTION COSTS					**$ 449,514**
Moving/Occupance Costs:					
	Allowance	1	$ 150,000		$ 150,000
					$ -
					$ -
					$ -
					$ -
TOTAL MOVING/OCCUPANCY COSTS					**$ 150,000**
DFCM Management:					
		1	$ 64,578		$ 64,578
					$ -
TOTAL DFCM MANAGEMENT					**$ 64,578**
User Fees:	Fee for "nonstate funding" as defined				
PM Fee Based on UofU Policy	in the UofU policy				$ -
		1	$ 150,000		$ 150,000
					$ -
					$ -
TOTAL USER FEES					**$ 150,000**
Commissioning:					
	Allowance	1	$ 300,000		$ 300,000
					$ -
					$ -
					$ -
TOTAL COMMISSIONING COSTS					**$ 300,000**
Other Costs:					
Energy Study	$10K if withing RMP area, $25K otherwise	1	$ 10,000		$ 10,000
Integrated Modeling	Energy modeling for LEED and full building analysis	1	$ 5,000		$ 5,000
Security System	Included in hard cost				$ -
Keying	None				$ -
Signage/branding	This is just donor signage all other in hard cost.	1	$ 84,509		$ 84,509
Shutdowns & Campus Orders		1	$ 50,000		$ 50,000
					$ -
TOTAL OTHER COSTS					**$ 149,509**
Previous Funding:					
(Only show state appropriated funding & include costs covered by that funding in appropriate category.)					
					$ -
					$ -
TOTAL PREVIOUS FUNDING					**$ -**
Other Funding Sources:					
(List and describe each source)					
Donor Funding		1	$ 21,000,000		$ 21,000,000
					$ -
					$ -
					$ -
TOTAL OTHER FUNDING SOURCES					**$ 21,000,000**

11.

APPENDIX

Preliminary CCGS Equipment List
Site Utility Plans
Concept Renderings
GTB Preservation Plan (separate attachment)
Geotechnical Report (separate attachment)

PRELIMINARY CCGS EQUIPMENT LIST

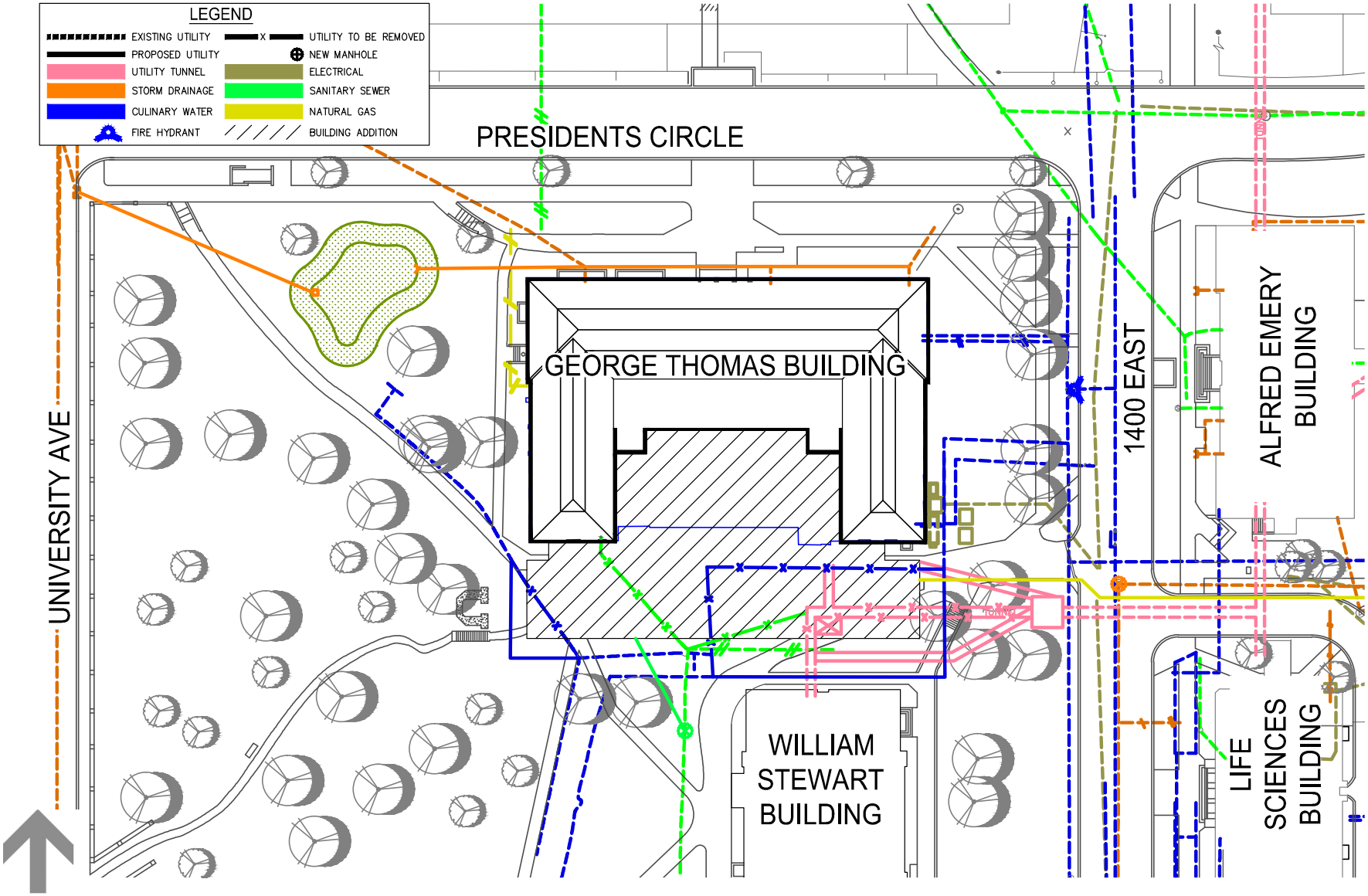
The nine faculty labs that have been identified for inclusion in the CCGS have made preliminary counts of their bench and floor standing equipment. The list is included on Page 11.3 (opposite page). The list is a snapshot in time and will need to be updated and utility requirements confirmed at the time of building design. In addition to the Equipment on these PI list, there will be building equipment including: autoclaves, glass washers, dryers, under-counter dish washers, and stand-alone aquarium systems

CENTER FOR CELL AND GENOME RESEARCH

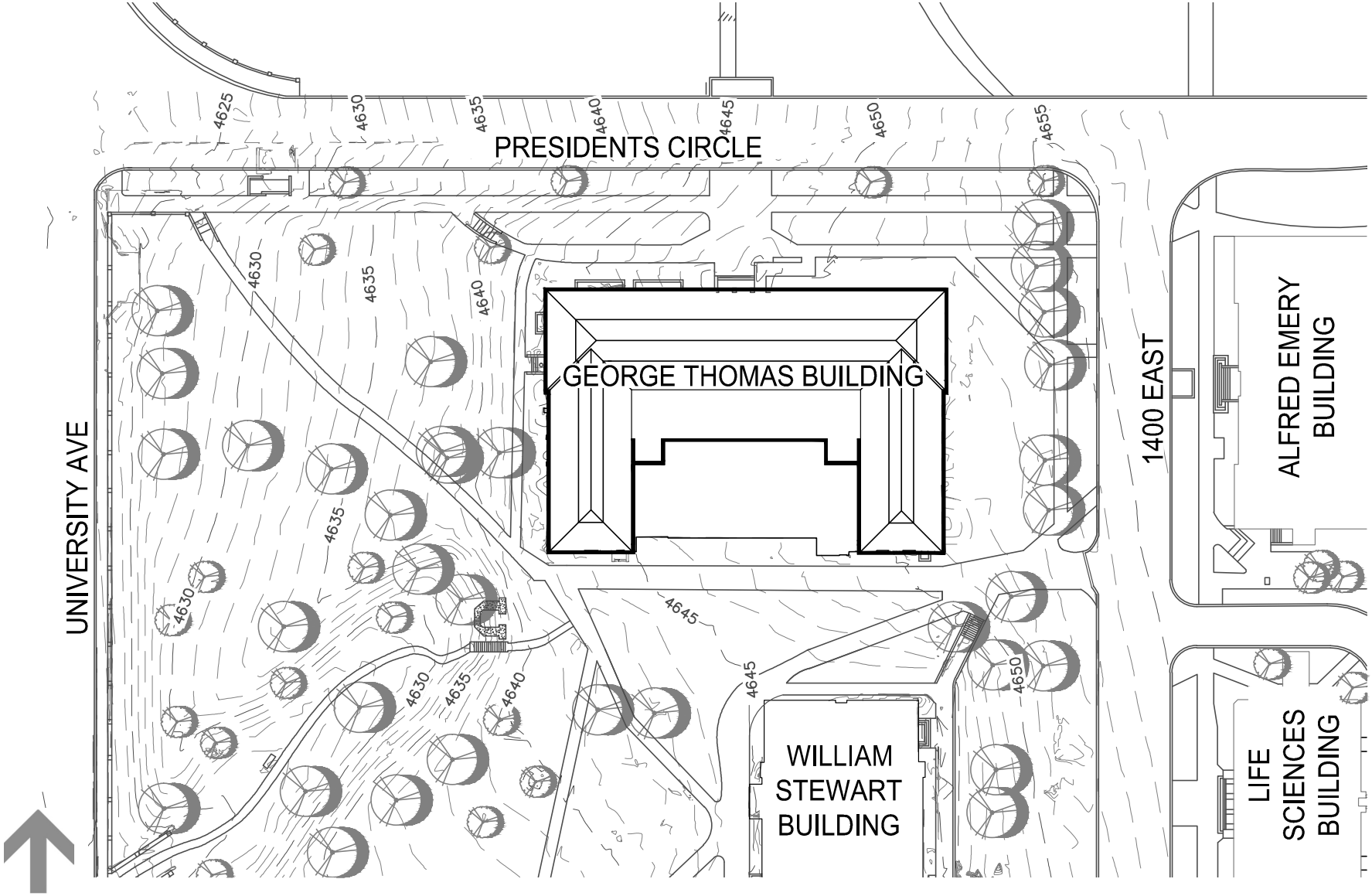
Requested Space (based on questionnaires, equipment lists and equivalent linear foot (ELF analysis) 21 May 2013

	Office					Laboratory												Support Spaces														
						4' Write up		Benches		5' Sink cab		6' FH		Floor Eq	Storag	Lab Totals																
	Number of PI				ASF	Number of Staff	LF (Staff x 4')	Dedicated LF (Staff x 6')	Common LF (fr eq lists)	Number of Sinks	LF	Number of Hoods	LF	LF (fr eq lists)	LF	ELF	ASF (ELF x 7)	LF Noisy Eq	Microscope	# BSC in TC	Cold room	Radio Isotope	Plant growth	Envir chamber	Micro-Inj	Work room	server	Electro-phy rig	Dark Room	Chem Weigh	BSL-3	electro-phy rig
General Open Lab																																
Jorgensen	**1**	@	120	=	120	**22**	88	132	132	3	15	2	12	54	24	457	3,199	29	3	1	1				1	1	1	2	1			3
Hollien	**1**	@	120	=	120	**7**	28	42	64	2	10	1	6	6	10	166	1,162	11	1	2	1	1								1		
Clark	**1**	@	120	=	120	**11**	44	66	54	3	15	1	6	11	10	206	1,442	11	1		1		1	1								
Babst	**1**	@	120	=	120	**7**	28	42	55	4	20	1	6	17	43	211	1,477	17	1	1	1	1										
Marciq	**3**	@	120	=	360	**13**	52	90	100	3	15	3	18	63	40	378	2,646	29	4	1	1							3				3
Versinin	**1**	@	120	=	120	**3**	12	18	60	1	5			28	24	147	1,029	7	2	1												
Saffarian	**1**	@	120	=	120	**9**	36	54	84	4	20	1	6	10	40	250	1,750	4	2	1											1	
(Future PI)	**1**	@	120	=	120	**10**	40	60	30	2	10	1	6	20	12	178	1,246	10	1	1		1										
(Future PI)	**1**	@	120	=	120	**10**	40	60	30	2	10	1	6	20	12	178	1,246	10	1	1		1										
(Future PI)	**1**	@	120	=	120	**10**	40	60	30	2	10	1	6	20	12	178	1,246	10	1	1		1										
Heemstra	**1**	@	120	=	120	**10**	40								33	73	511			1												
Ji	**1**	@	120	=	120	**11**	44								33	77	539		1	1	1	1										
Subtotal, General Lab	**14**				**1,680**	**123**	**492**	**624**	**639**	**26**	**130**	**12**	**72**	**249**	**293**	**2,499**	**17,493**															
Chemistry Lab																																
Heemstra								60	51	3	15	7	42	8		176	1,232	15														
Ji								66	48	3	15	13	78	30		237	1,659	11														
Subtotal, Chemistry Lab								**126**	**99**	**6**	**30**	**20**	**120**	**38**		**413**	**2,891**															
Total	**12**				**1,680**	**102**				**32**		**32**		**249**	**227**		**20,384**	**164**	**18**	**12**	**6**	**6**	**1**	**1**	**1**	**1**	**1**	**5**	**1**	**1**	**1**	**6**

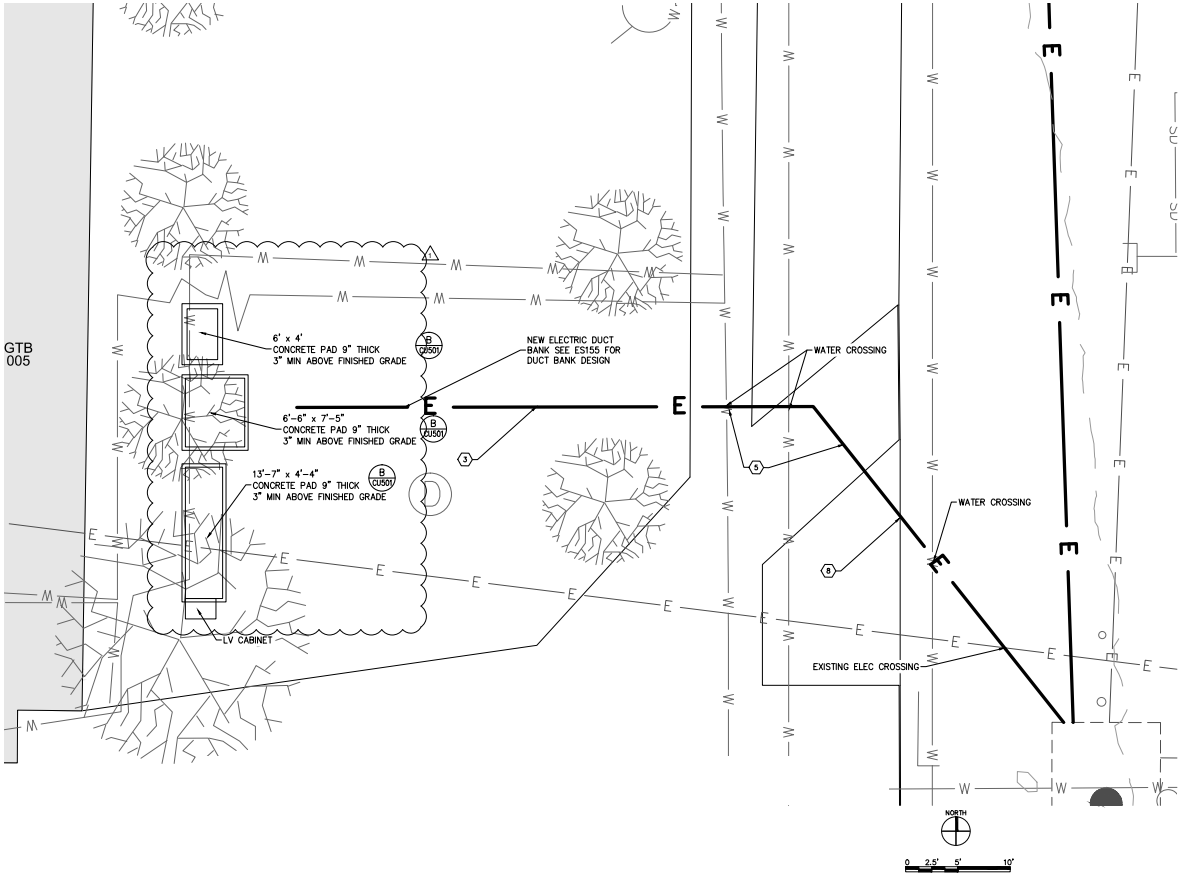
Write up station width: 4 ft
ASF per LF: 7
Sink cab width 5 ft



SITE UTILITY PLAN AREA



SITE TOPOGRAPHIC PLAN



SYMBOL LEGEND

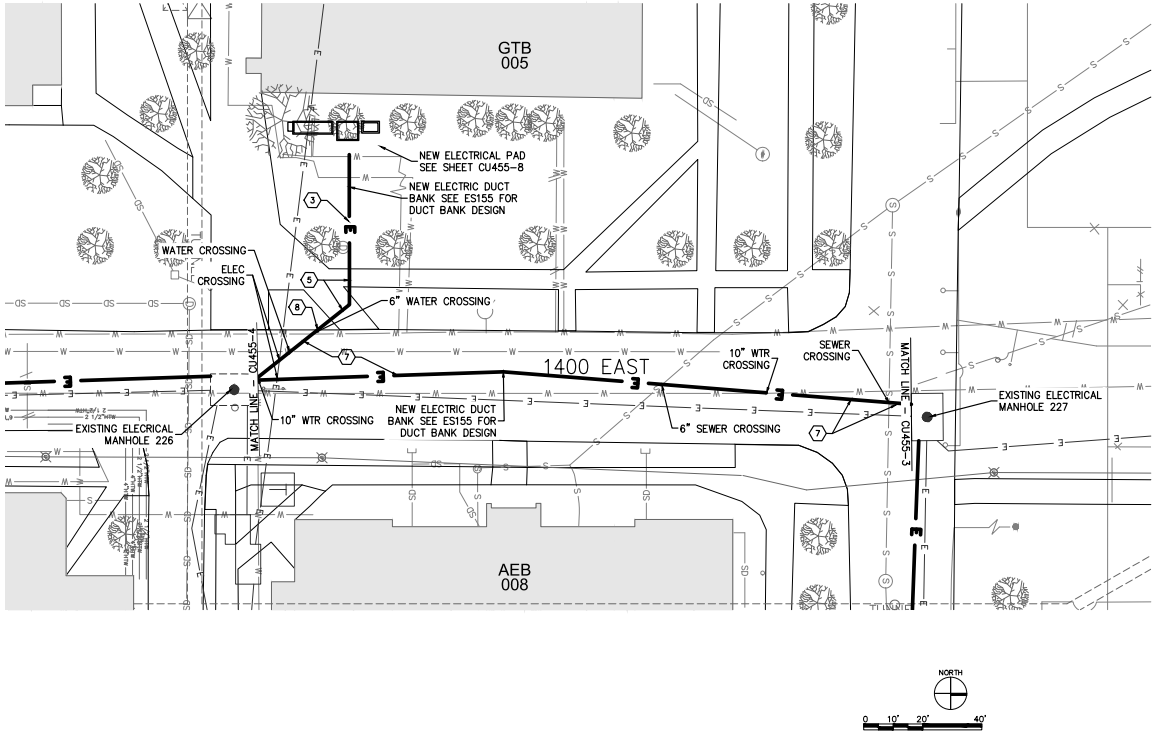
- WATER MANHOLE
- SANITARY SEWER MANHOLE
- STORM DRAIN MANHOLE
- NATURAL GAS MANHOLE
- TELE/COMMUNICATIONS MANHOLE
- TELE/COMM/ELEC MANHOLE
- LIGHT POST
- WATER VALVE
- FIRE HYDRANT
- SD CATCH BASIN (CB)
- ELECTRIC MANHOLE/VAULT
- EXISTING TREE

- NEW ELECTRICAL LINE
- WATER LINE
- SANITARY SEWER LINE
- STORM DRAIN LINE
- NATURAL GAS LINE
- CHEVRON PETROLEUM LINE
- COMMUNICATIONS LINE
- ELECTRICAL LINE
- IRRIGATION LINE
- LIGHTING LINE
- HIGH TEMPERATURE WATER LINE
- CHILLED WATER LINE

SHEET KEYNOTES

1. CONTRACTOR TO REMOVE AND REPLACE EXISTING LIGHT POLE. COORDINATE WITH UNIVERSITY PERSONNEL
2. CONTRACTOR WILL REPLACE LANDSCAPE IN AREAS DISTURBED BY CONSTRUCTION OF ELECTRIC DUCT BANKS
3. CONTRACTOR WILL INSTALL SOD IN ALL GRASS AREAS DISTURBED BY CONSTRUCTION OF ELECTRIC DUCT BANKS
4. REMOVE EXISTING TREE OR BUSH. TWO TREES WILL BE REQUIRED FOR EVERY TREE REMOVED. CONTRACTOR WILL COORDINATE WITH SUE POPE FOR LOCATION AND TYPE OF EACH TREE REQUIRED.
5. CONTRACTOR SHALL REMOVE AND REPLACE SIDEWALK. SEE DETAILS A1&A2 SHEET CU505
6. CONTRACTOR WILL RELAY ANY IRRIGATION LINES OR ASSOCIATED EQUIPMENT AND RECONNECT TO EXISTING SYSTEM. LINES SHALL BE TESTED TO ENSURE THAT THEY ARE IN WORKING ORDER.
7. CONTRACTOR SHALL REMOVE AND REPLACE PAVEMENT ABOVE NEW DUCT BANK PER DETAILS A4–A6 SHEET CU506 AND MATCH EXISTING PAVEMENT SECTION. ASPHALT STRIPING SHALL BE REPLACED TO MATCH EXISTING.
8. CONTRACTOR SHALL REMOVE ONE SECTION OF CURB AND GUTTER ABOVE NEW DUCT BANKS PER DETAIL A3 SHEET CU505 MATCH EXISTING SIZE OF CURB.
9. REVEGETATE DISTURBED AREAS WITH NATURAL SEED MIX TO MATCH EXISTING.
10. CONTRACTOR SHALL REPAIR WATERWAY ACCORDING TO DETAIL B ON SHEET CU506.
11. PROTECT EXISTING TREE, IF UNABLE TO DO SO CONTRACTOR WILL NEED TO REPLACE WITH TWO TREES. SEE NOTE #4
12. CROSSING OF THE SALT LAKE CITY AQUEDUCT LINES SHALL BE COORDINATED WITH SALT LAKE CITY DEPARTMENT OF PUBLIC UTILITIES. CONTRACTOR RESPONSIBLE FOR LOCATING LINES AND OBTAINING APPROPRIATE CROSSING PERMITS
13. CONTRACTOR RESPONSIBLE FOR COORDINATING BORING UNDER SOUTH CAMPUS DR. WITH UDOT, UTA, SALT LAKE CITY AND ANY OTHER JURISDICTIONAL AGENCY. CONTRACTOR RESPONSIBLE FOR LOCATING EXISTING UTILITY LINES IN BORE PATH.
14. CONTRACTOR TO REPAIR OR REPLACE ADA RAMP PER UNIVERSITY OF UTAH STANDARDS.

ENLARGED ELECTRICAL PAD FOR GEORGE THOMAS BUILDING



ENLARGED UTILITY PLAN AREA 10

SHEET KEYNOTES

1. CONTRACTOR TO REMOVE AND REPLACE EXISTING LIGHT POLE. COORDINATE WITH UNIVERSITY PERSONNEL
2. CONTRACTOR WILL REPLACE LANDSCAPE IN AREAS DISTURBED BY CONSTRUCTION OF ELECTRIC DUCT BANKS
3. CONTRACTOR WILL INSTALL SOD IN ALL GRASS AREAS DISTURBED BY CONSTRUCTION OF ELECTRIC DUCT BANKS
4. REMOVE EXISTING TREE OR BUSH. TWO TREES WILL BE REQUIRED FOR EVERY TREE REMOVED. CONTRACTOR WILL COORDINATE WITH SUE POPE FOR LOCATION AND TYPE OF EACH TREE REQUIRED.
5. CONTRACTOR SHALL REMOVE AND REPLACE SIDEWALK. SEE DETAILS A1&A2 SHEET CU505
6. CONTRACTOR WILL RELAY ANY IRRIGATION LINES OR ASSOCIATED EQUIPMENT AND RECONNECT TO EXISTING SYSTEM. LINES SHALL BE TESTED TO ENSURE THAT THEY ARE IN WORKING ORDER.
7. CONTRACTOR SHALL REMOVE AND REPLACE PAVEMENT ABOVE NEW DUCT BANK PER DETAILS A4-A6 SHEET CU506 AND MATCH EXISTING PAVEMENT SECTION. ALL STRIPING SHALL BE REPLACED TO MATCH EXISTING.
8. CONTRACTOR SHALL REMOVE ONE SECTION OF CURB AND GUTTER ABOVE NEW DUCT BANKS PER DETAIL A3 SHEET CU505 MATCH EXISTING SIZE OF CURB.
9. REVEGETATE DISTURBED AREAS WITH NATURAL SEED MIX TO MATCH EXISTING.
10. CONTRACTOR SHALL REPAIR WATERWAY ACCORDING TO DETAIL B ON SHEET CU506.
11. PROTECT EXISTING TREE, IF UNABLE TO DO SO CONTRACTOR WILL NEED TO REPLACE WITH TWO TREES. SEE NOTE #4
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SYMBOL LEGEND

- WATER MANHOLE
- SANITARY SEWER MANHOLE
- STORM DRAIN MANHOLE
- NATURAL GAS MANHOLE
- TELE/COMMUNICATIONS MANHOLE
- TELE/COMM/ELEC MANHOLE
- LIGHT POST
- WATER VALVE
- FIRE HYDRANT
- SD CATCH BASIN (CB)
- ELECTRIC MANHOLE/VAULT
- EXISTING TREE
- NEW ELECTRICAL LINE
- W — WATER LINE
- S — SANITARY SEWER LINE
- SD — STORM DRAIN LINE
- GAS — NATURAL GAS LINE
- PET — CHEVRON PETROLEUM LINE
- C — COMMUNICATIONS LINE
- E — ELECTRICAL LINE
- IRRIGATION LINE
- LIGHTING LINE
- HTW — HIGH TEMPERATURE WATER LINE
- CW — CHILLED WATER LINE

View of the south and west elevations of the Crocker Science Center.

View of the historic main lobby and grand stair connecting to the new atrium (beyond) of the Crocker Science Center.

View of the new atrium space connecting both academic and research spaces of the Crocker Science Center.

View of the new cafe and informal learning area housed in the historic George Thomas Book Delivery Room with atrium.

View of the east Lecture Room with moveable glass partition opening onto the new Tutoring Center (beyond) housed within the historic George Thomas Reading Room.

View of a new large teaching laboratory on the main floor of the Crocker Science Center, showing flexible discussion and lab space.