PROGRAM REQUIREMENTS AND BASIS OF DESIGN

# Thatcher Building Addition to Chemistry

August 4, 2010

draft

VCBO ARCHITECTURE

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# 1.0 Executive Summary

## PROJECT BACKGROUND

The original Master Plan for the Department of Chemistry was completed in 2002. This document outlined suggestions for a physical chemistry addition, the current Gauss Haus, as well as seismic upgrades. The Gauss Haus was completed in 2008 and the seismic upgrades have yet to be completed. In the spring of 2005 a Master Plan update was commissioned by the Department of Chemistry. This revised document reviewed the current space allocations and needs of the department while assessing the future needs of Chemistry. The result of this update was to make the HEB South Tower addition, or Thatcher addition, the number one priority for the Chemistry Department.

The proposed addition is to be constructed in two phases. The first phase, Thatcher addition, will provide five levels of new laboratory and computational spaces in 41,740 SF. The new addition will be designed to provide an integrated biochemistry program for the Chemistry Department.

Thatcher Addition Building Site

The new addition will be located on the south side of the existing South Tower.

### Biological Chemical Facility

The completed 2005 Master Plan had a focus on biological chemistry and the new addition will house biochemistry study, research and theoretical spaces.

*"Biochemistry is the study of the chemical processes in living organisms. It deals with the structures and functions of cellular components such as proteins, carbohydrates, lipids, nucleic acids and other biomolecules. Over the last 40 years biochemistry has become so successful at explaining living processes that now almost all areas of the life sciences from botany to medicine are engaged in biochemical research. Today the main focus of pure biochemistry is in understanding how biological molecules give rise to the processes that occur within living cells which in turn relates greatly to the study and understanding of whole organisms." Wikipedia*

The phase 1 Thatcher Addition will include a variety of spaces to promote biochemical studies through the addition of state of the art teaching laboratories, a shared core laboratory and a variety of research group laboratory spaces as well as space for theoretical chemists. The integration of undergraduate, graduate the theoretical chemists will create and engaging and collaborative environment for the chemistry program and University.

### National Institute of Health Grant

The Thatcher addition will be partially funded by a grant from the National Institute of Health (NIH). The grant is based on creating additional biological chemistry learning spaces and encouraging interdisciplinary collaboration in the Biological Chemistry Physical Chemistry and Theoretical Chemistry fields of study.

An excerpt from the NIH grant proposal states, *"there is an urgent need for additional infrastructure to meet the growing needs of this increasingly important sub-discipline of chemistry. In addition, the most challenging frontiers in Biological Chemistry today require strong interactions between physical and biological chemists, as well as between theorists and experimentalists. This infrastructure proposal complements our new NMR facility, the Gauss Haus, and is a critical step in nucleating five key activities that need to be co-located and better integrated to achieve our teaching and research goals in Biological Chemistry."*

The proposed facility reflects the goals stated in the NIH grant application, while providing flexibility in use and encouraging collaboration.

As the design develops, all NIH protocols and procedures will be followed and the proper submittals at 15% schematic design, 35% design development, 70% construction documents, 95% construction documents and 100% construction documents will be delivered. In addition, the requirements set forth in the NIH Design Requirements Manual and Facilities Development Manual will be followed.

### USTAR Integration

In 2006, the Utah Legislature approved Senate Bill 75, which allocated hundreds of millions of dollars to the USTAR Economic Development Initiative, which was generated to facilitate the creation of scientific research and technology companies within Utah. This funding will go toward the development of new research facilities on both the University of Utah and Utah State campuses as well as funding for research and outreach programs.

*"This history of success is evidence the University of Utah can successfully commercialize technologies that create new businesses and jobs that strengthen Utah's economy. The objective of USTAR is to bolster Utah's research strengths and significantly increase technology commercialization to create many more high caliber jobs throughout the state." www.ustar.utah.edu*

The biological and chemistry sciences will be integral to the development and creation of the USTAR programs and the addition of the Thatcher Addition will provide key support facilities for scientists across the campus.

## THATCHER ADDITION VISION

The Thatcher Addition, as conceived by the Chemistry Department, was envisioned to benefit the both the students and Department in a number of ways. These are presented below.

### Provide additional and enhanced space for biochemistry

The new laboratory spaces will be designed for biochemistry. They will include the latest technology and provide all of the instrumentation and support for the biochemistry program.

### Create functional space for the Chemistry Theoreticians

Currently the Chemistry Theoreticians have office space in the ... building. This is located to the north of the Chemistry complex, xx miles, making it difficult for collaboration and impossible for spontaneous interactions between the theoreticians and other chemistry students. The new addition will provide space for the theoreticians and allow them to be integrated back into the Chemistry Department.

### Encourage interdisciplinary and integrated research and teaching

Shared instrumentation, shared core support laboratory

Provide flexible laboratories that can support a variety of research groups within the biochemical field.

### Attract and retain new hires / students

The new facility will provide the space, technology and amenities required by many prospective and new faculty members as well as students seeking a state of the art chemistry facility.

### Provide enhanced seminar and gathering space for lectures and events

The Thatcher Addition will include a new 100 person seminar room for school-wide lectures and events. This will be an amenity for the Department and allow all students and staff an opportunity to benefit from the new addition.

### Provide collaborative and inspiring spaces

The new addition will be designed with collaboration and integrated learning in mind. Visual transparency into the laboratories will allow the faculty and students to present their work to the building visitors and other students and faculty. This will create an exciting and engaging experience for building users.

Collaboration spaces will be integral in the design to allow for both planned and spontaneous collaboration as well provide students to see and engage in classes throughout the facility

### Advance science and technology

The Thatcher Addition will be an amenity for the entire Chemistry Department by providing technologically advanced, engaging spaces that will allow cutting edge science and research to occur. This space and the activities that occur within it will advance science on the University of Utah campus as well as within the Utah Biological Chemistry field.

### Priorities

As the design progresses on the Thatcher addition, it is important that the following priorities are met:

- Provide space for theoretical chemist in the Chemistry Building
- Design communal space for biochemical research labs and instrumentation
- Provide state of the art undergraduate teaching facilities
- Meet National Institute of Health laboratory requirements

## SCHEDULE

The following is the project schedule for the Thatcher Addition to Chemistry.

### Programming

The project schedule began with the Program Kick-off Meeting on June 2, 2010. The program included the following meetings and workshops:

| | |
|---|---|
| Workshop 1 | June 15-16, 2010 |
| Procedural and Site Analysis | June 22, 2010 |
| Workshop 2 | July 6-7, 2010 |
| Sustainability Charrette | July 21 |
| Workshop 3 | July 28, 2010 |
| Program Draft | August 4, 2010 |
| Final Document | September 7, 2010 |

### Design

Project design began in concurrence with the programming effort. The project design includes the following milestones:

| | |
|---|---|
| Schematic Design | August 4, 2010 |
| Design Development | December 4, 2010 |
| Construction Documents 100% | June 4, 2011 |

### Construction

The construction milestones are as follows:

| | |
|---|---|
| Bidding and Negotiating | June/July 2011 |
| Begin Construction | August, 2011 |
| Construction Completion | December 12, 2012 |

## BUILDING COST ESTIMATE

The following cost estimate was completed with the program verification and schematic design phase of this project. The complete cost estimate with additional detail can be found in Appendix A of this document.

| CSI # | Description | Unit Cost | |
|---|---|---|---|
| 02 | Existing Conditions | $1.71 | $76,855 |
| 03 | Concrete | $32.84 | $1,475,068 |
| 04 | Masonry | $10.90 | $489,600 |
| 05 | Metals | $7.81 | $350,973 |
| 06 | Woods & Plastics | $14.77 | $663,263 |
| 07 | Thermal and Moisture Protection | $10.50 | $471,799 |
| 08 | Doors and Windows | $16.01 | $719,070 |
| 09 | Finishes | $22.58 | $1,014,037 |
| 10 | Specialties | $4.18 | $187,773 |
| 11 | Equipment | $14.84 | $666,400 |
| 12 | Furnishings | $2.15 | $96,414 |
| 13 | Special Construction | - | - |
| 14 | Conveying Equipment | - | - |
| 21 | Fire Suppression | $2.85 | $128,016 |
| 22 | Plumbing | $7.59 | $340,762 |
| 23 | HVAC | $75.00 | $3,368,850 |
| 26 | Electrical | $29.00 | $1,302,409 |
| 31 | Earthwork | $12.31 | $553,012 |
| | | | |
| **Subtotal** | | **$265.02** | **$11,904,331** |
| | | | |
| | General Conditions | $15.90 | $714,260 |
| | Overhead & Profit | $10.60 | $476,260 |
| | Design Contingency | $31.80 | $1,428,520 |

| | | |
|---|---|---|
| **Total** | **$323.33** | **$14,523,284** |

# 2.0 Site Analysis

## SITE SUMMARY

The Chemistry complex is located on the lower portion of the University of Utah Campus. The Thatcher Addition will be an addition on the south facade of the existing South Tower of the Chemistry complex. The project site is currently a walkway and lawn area. The historic Fieldhouse is located to the south of the site, and 400 South and the Trax line to the south of the Fieldhouse. There is a parking lot on the west side of the site and a green space and parking lot to the east.

Chemistry Building Vicinity Map

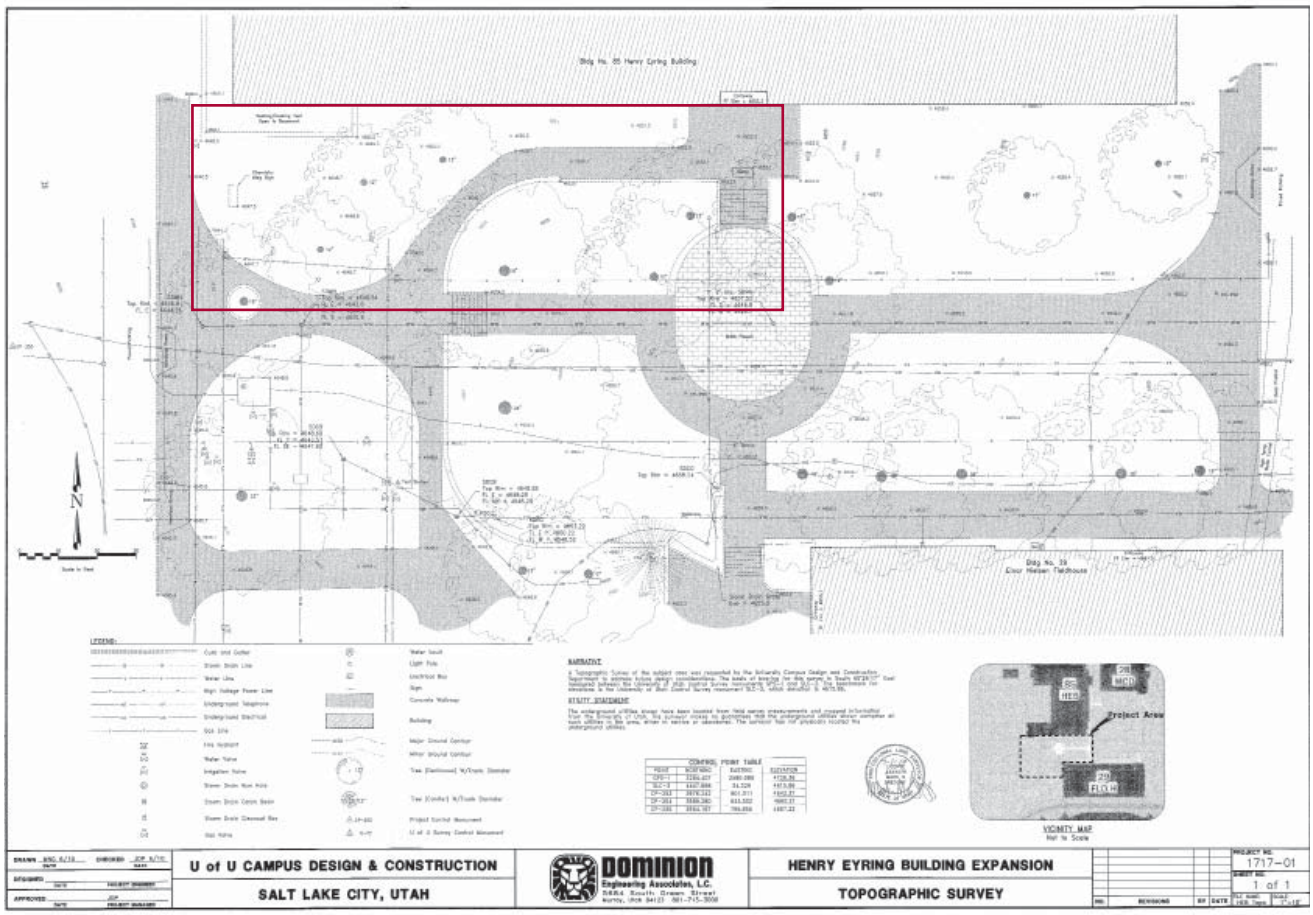
Chemistry Building 3D Analysis Model

## SITE FEATURES

### Physical features

The site slopes up from the west to the east side of the building site, approximately 5 feet. Due to topographic shifts, there is currently a stairway down from the main pedestrian walk to the South Tower entry.

The existing site also contains a 7 mature xxx trees that will have to be removed for construction. As the existing trees have reached maturity it will be very expensive to re-plant the trees, and their chance of surviving after being transplanted is reduced. But this is still being studied as it is very important to the building users that these beautiful trees are not wasted.




Existing Site Survey

caption here

The project site is located directly south of the South Tower of the HEB Chemistry complex. The building site has an existing stone retaining wall and walkways. As the site is re-developed, it is important to retain the mature trees and circulation paths to the south and east. The Landscape Design Considerations section of this document addresses the proposed site and landscape improvements to respond to the University of Utah Master Plan and enhance the circulation and site functionality.

Project Location on Site

Chemistry Building

As seen from the northwest.

Fieldhouse

Located on the south side of the project site, as seen from the northwest.

**Climate analysis**

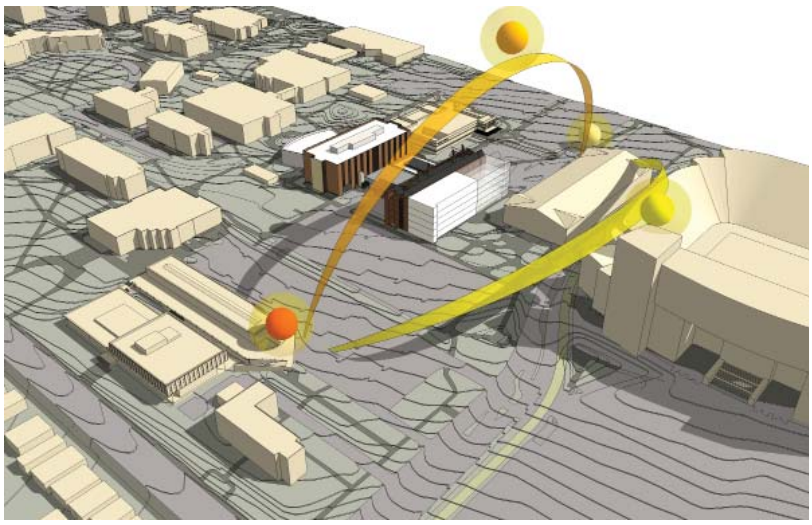
*"Salt Lake City is located in the Salt Lake Valley, a northern Utah valley surrounded by mountains on three sides with the Great Salt Lake to the northwest. The Wasatch Mountains five miles (eight kilometers) to the east have peaks to nearly 12,000 feet (3,660 meters) above sea level. Their orographic effects cause more precipitation in the eastern part of the city than over the western part. The Oquirrh Mountains seven to eight miles (eleven to thirteen kilometers) to the southwest of the city have several peaks above 10,000 feet (3,050 meters). The Traverse Mountain Range at the south end of the Salt Lake Valley rises to above 6,000 feet (1,830 meters). These mountain ranges shelter the valley from storms from the southwest in the winter, but are instrumental in developing thunderstorms which can drift over the valley in the summer.*

*Besides the mountain ranges, the most influential natural condition affecting the climate of Salt Lake City is the Great Salt Lake, about 10 miles (12 kilometers) northwest of the city. This large inland body of water, which never freezes due to its high salt content, moderates the temperatures of cold winter winds blowing from the northwest and helps drive a lake/valley wind system. The warmer lake water during the winter and spring also contributes to increased precipitation in the valley downwind from the lake—the "lake effect". The combination of the Great Salt Lake and the Wasatch Mountains often enhances storm precipitation in the valley.*

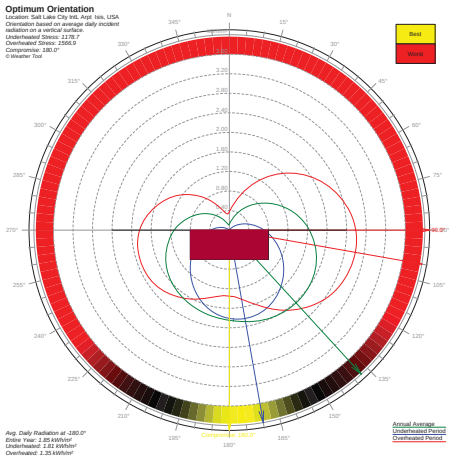
*Salt Lake City normally has a semi-arid continental climate with four well-defined seasons. Summers are characterized by hot, dry weather, but the high temperatures during this season are usually not oppressive, since the relative humidity is generally low and the nights usually cool. July is the hottest month with an average maximum reading in the low 90s F. (30s C.). The highest temperature on record is 107° F. (42°C.). January is the coldest month with an average daily minimum around 20° F. (-7°C.). The lowest recorded temperature is -30° F. (-34°C.)"* http://www.slcgov.com/info/area_info/climate.htm

## Solar Access

Salt Lake City has an average of 125 sunny days per year. The sun can be very strong in the summer and provide warming relief in the winter. Due to the Wasatch Front to the east, solar exposure on the east is minimized, as the sun is higher in the sky by the time it rises over the mountains. Solar exposure from the west, however, can be very harsh in the summer months as the low sun can reflect off the Salt Lake and cause additional glare in the valley. The optimal solar building orientation for Salt Lake is rectilinear with the long facades facing north and south. The proposed project will have the primary facade facing south.

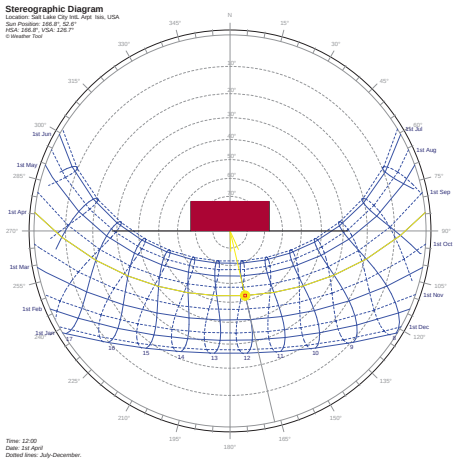


Solar Access Diagram



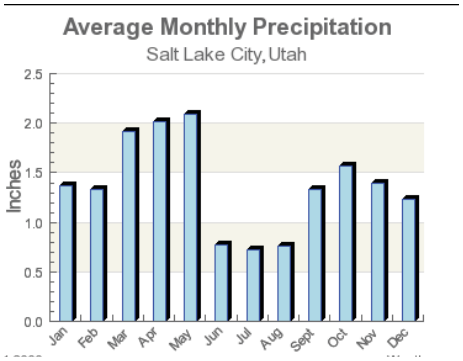

Optimum Orientation Diagram

Salt Lake City, Utah




Annual Solar Diagram

Salt Lake City, Utah




Annual precipitation

## Precipitation

Precipitation is generally light during the summer and early fall and heavier in the spring. The annual average precipitation ranges from about 16 inches (406 mm) at the airport to more than 30 inches (762 mm) in higher elevations. April is typically the wettest month of the year and July is the driest month. Between December and March the majority of the precipitation is in the form of snow. Snow accounts for about one third of the annual precipitation in Salt Lake City.

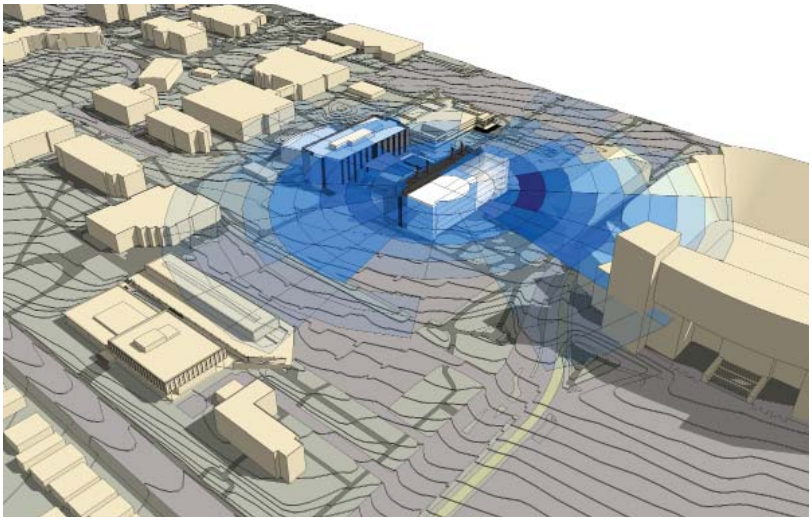
Salt Lake City Area (ThreadEx Station)
Monthly Totals/Averages
Precipitation (inches)
Years: 1971-2000

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average | 1.37 | 1.34 | 1.91 | 2.02 | 2.09 | 0.77 | 0.72 | 0.76 | 1.33 | 1.57 | 1.40 | 1.23 | 16.50 |

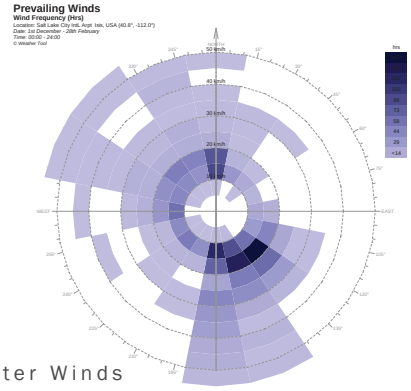
http://www.nws.noaa.gov/climate/xmacis.php?wfo=slc

## Wind Impacts

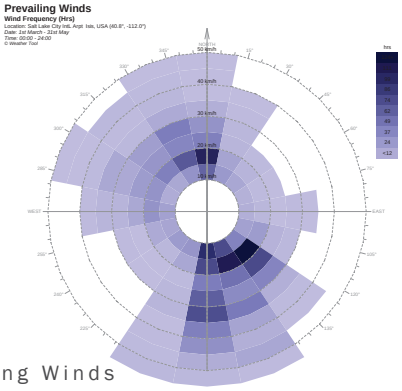
Winds are usually light in Salt Lake City, with a mean speed 8.8 mph (14.2 kph). There are occasional high winds associated with storms or easterly winds blowing out of the canyons. These canyon winds effect the University of Utah campus more than downtown Salt Lake City and may impact the project site. The overall prevailing wind direction is from the south-southeast.



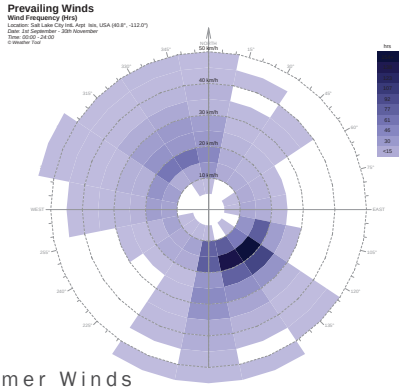
Annual Wind Diagram



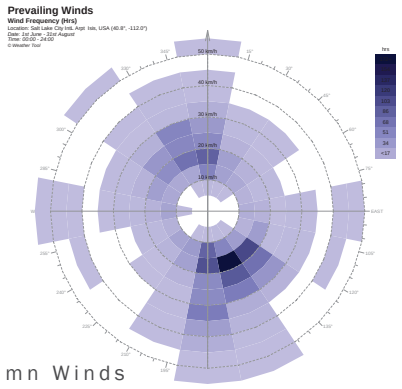

Winter Winds




Spring Winds




Summer Winds




Autumn Winds

### Temperature

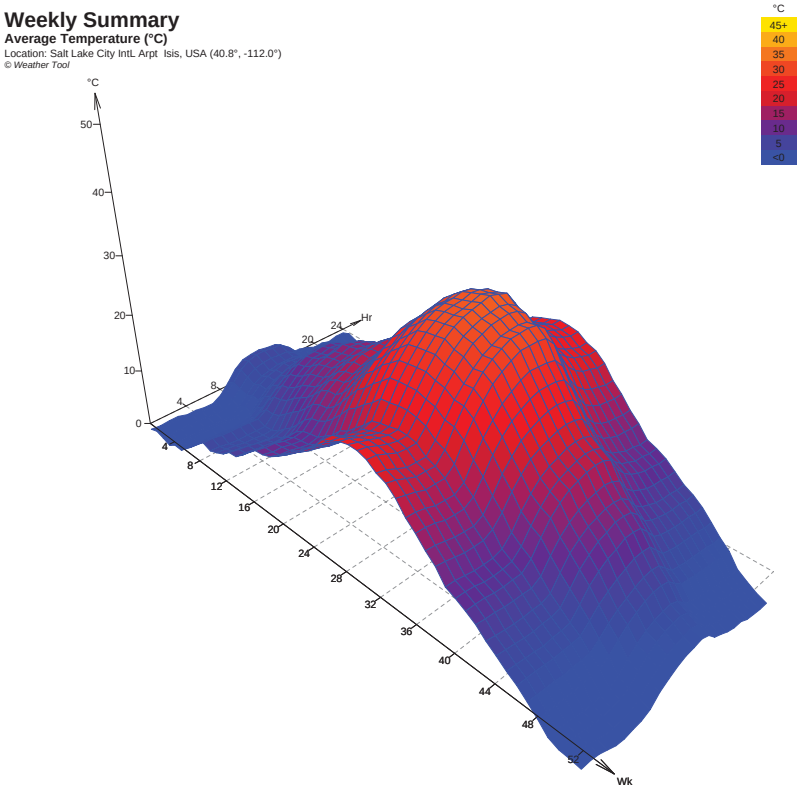
Due to Salt Lake City's 4 distinct seasons, a wide range of temperatures exist in the Valley. The temperatures typically range from the upper 90's in the summer to the teens in the winter.

The mean diurnal temperature range is about 30 degrees F. in the summer and 18 degrees F. during the winter. Temperatures above 102°F. (39°C.) in the summer or colder than -10°F. (-23°C.) in the winter are likely to occur one season out of four.

*Salt Lake City Area (ThreadEx Station)*
*Monthly Totals/Averages Temperature (degrees F)*
*Years: 1971-2000*

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Max. | 37.7 | 44.1 | 53.6 | 61.7 | 71.6 | 83.5 | 92.2 | 90.4 | 79.1 | 65.4 | 49.8 | 38.7 | 64.0 |
| Min. | 21.3 | 25.5 | 33.4 | 39.0 | 46.9 | 55.8 | 63.4 | 62.4 | 52.4 | 41.0 | 30.4 | 22.4 | 41.2 |
| HDD* | 1099 | 846 | 653 | 435 | 203 | 45 | 2 | 3 | 84 | 363 | 739 | 1059 | 5531 |
| CDD** | 0 | 0 | 0 | 4 | 37 | 191 | 406 | 365 | 114 | 6 | 0 | 0 | 1123 |

* HDD stands for Heating Degree Days
** CDD stands for Cooling Degree Days




Weekly Temperature Variation
Salt Lake City, Utah

### Views

Views exist from the project site toward Upper Campus and the Wasatch Front to the east, the stadium to the south and downtown Salt Lake City to the west. The mature trees located on the north side of the field house provide a beautiful foreground to views beyond.

In addition to views from the project site, it is important to acknowledge views toward the project site. This site is prominently located on a busy pedestrian path from the stadium Trax line to lower campus buildings. The new addition will be seen from the east, the southeast and the west. It will provide the new front door to the Chemistry complex and will be a prominent addition to lower campus.

Project Site

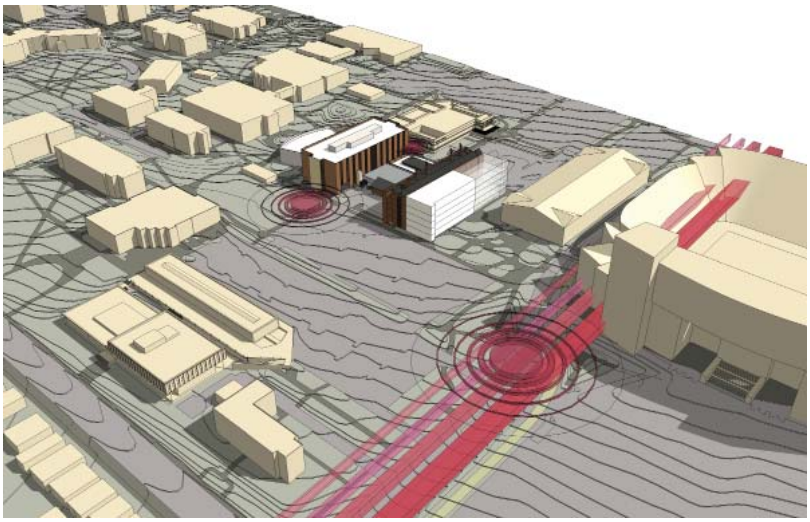
As seen from the west

Project Views

Views from the site. Looking toward the southeast in the top image, toward the south in the center image, and toward the southwest in the bottom image.

### Noise and Vibration

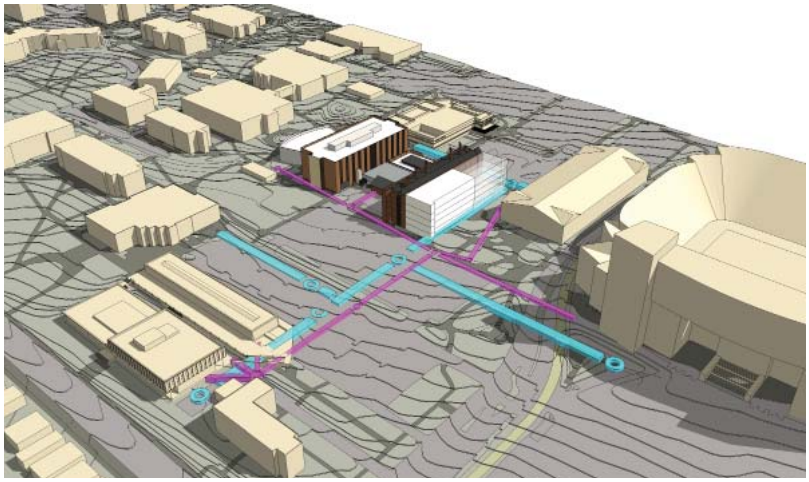
Noise and vibration from the Trax line along 400 South are a concern for the project. Vibration from the Trax trains should be considered and mitigated as vibration sensitive equipment may be located in the new addition. Additional noise and vibration sources exist to the north west of the project site where existing chillers are located. Ideally, all vibration sensitive equipment would be located in the basement, thus being buffered from the Trax line by the earth.



Noise and Vibration Diagram

### Site Utilities

Site Utilities are located under and adjacent to the project site. Currently water lines and storm drain lines run under the proposed building footprint and will need to be relocated. Electrical lines are located to the south of the project and will need to be protected as construction occurs.



Utility Diagram

## SITE ACCESS

### Pedestrian and Bicycle access

Currently, pedestrian and bicycle access to the building is from the east and the west. Building users entering from Trax or the stadium parking lot arrive from a tunnel under 400 South, and arrive diagonally from the southwest of the building site. Building users arriving from President's Circle to the north will arrive on either the east or west side of the building, and walk to the center of the South Tower to enter the building. There are bicycle racks on the west side of the complex, near the ramped entry to the Gauss Haus. There no bicycle racks on the south side of the South Tower, currently.

Pedestrian and Bicycle Route Diagram

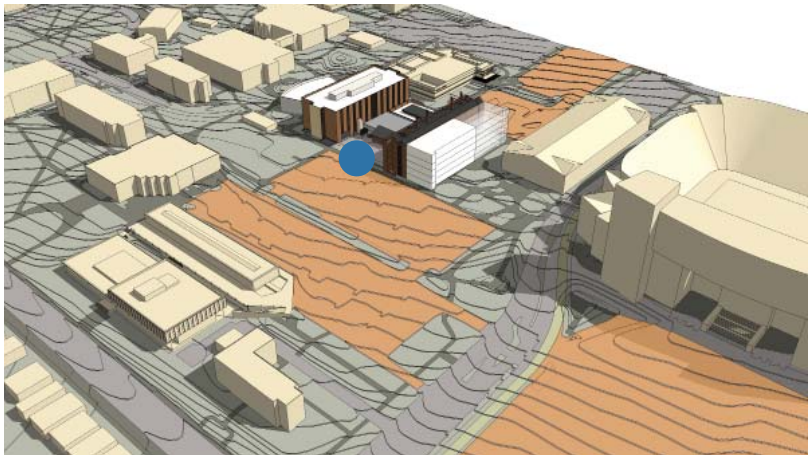
### Transit Access

Utah Transportation Association (UTA) has a light rail system (Trax) that provides access in and around the Wasatch Front. This train system also serves the University of Utah. One of the primary Trax stops is located on the west side of the stadium, to the southwest of the project site. This stop, in addition to bus stops near the stadium provide transit access very near the project site.

Transit Access Diagram

### Vehicular and Service access

Currently, parking lots abut the east and west sides of the project site. These parking lots serve students, faculty and visitor parking. Both parking lots are accessed from entries along 400 South. Service to the existing Chemistry building is located between the North and South Towers, to the west of the plaza building. This will continue to be the loading and service area for the new addition.



Parking Diagram

## LAND USE AND PLANNING CONSIDERATIONS

### Chemistry Master Plan

A Chemistry Department Master Plan was completed in 2002 and then updated in 2005. This Master Plan assess the existing conditions and needs of the department and then made recommendations for fire protection improvements, seismic upgrades and new additions. It then prioritized the projects to be completed. The updated plan in 2005 had the Thatcher addition as the number one priority. This addition has been slated to be added, in this location on the site for the last quarter century.

Master Plan Massing Diagram

### University of Utah Master Plan

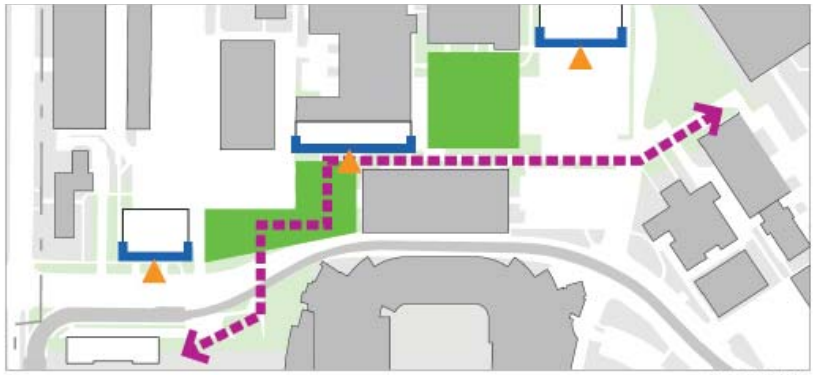
The University of Utah undertook a new Master Plan in 2008. This Master Plan defines a number of Transformative Projects on the campus. Two of these projects include the Chemistry Building.

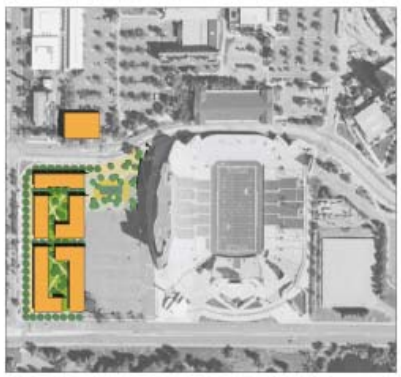
The first is a Stadium TRAX pedestrian link. This link will enhance the pedestrian experience from the TRAX stop to the lower campus core. The following is an excerpt from the Master Plan document regarding the improvements associated with this pedestrian link.

*The primary pedestrian routes into campus from the Stadium TRA station are University Street via the crosswalk located at the intersection of University Street and South Campus Drive, and the pedestrian underpass located at South Campus Drive which connects to the elevated walkway located at the south side of the Einar Neilson Field House building.*

*The sidewalk located on the east side of University Street is narrow and provides limited physical protection from adjacent vehicular traffic since there is no planted median or on-street parking. Even though the route is actively used, the elevated walkway located at the south side of the Field House also provides limited pedestrian comfort. Many students are coming from Presidents Circle academic buildings and walk through the large parking lot to the west of the Chemistry Building.*

*The Plan, therefore, proposes to upgrade the pedestrian connection from Stadium TRAX to Marriott library by directing pedestrians along the north side of the Einar Neilson Field House through a series of connected landscape spaces. The Stadium TRAX link is envisioned not only as a safe pedestrian circulation route, but also as a primary entrance into the heart of west campus, engaging pedestrians immediately in anew courtyards and open spaces associated with infill development.*



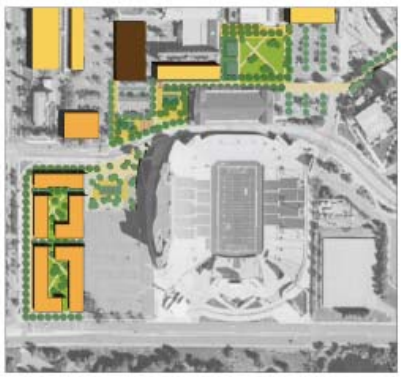




Image Excerpts from the 2008 University of Utah Master Plan

The top image illustrates the planned improvements along the Stadium TRAX pedestrian corridor and the lower image illustrates open space locations and primary building entrances. The new Thatcher Addition is aligned with the improvements highlighted in this section.

The second project is improving the Science Yard. This project proposes to enhance the pedestrian connections between the science facilities, at the north side of the Chemistry Building. The vision for this improvement is to transform the Science yard "into a core connective open space by extending lawn and tress westward across Parking Lot #6 to the downhill side of Library Plaza. Widened pedestrian connections along the north and south edges of the Yard, replete with shade trees, outdoor furniture and lighting, will help to reinforce the role of Science Yard as both an integral element of pedestrian circulation on campus, while a central lawn and shade trees will provide an intimate space for social and education interaction."

Image Excerpts from the 2008 University of Utah Master Plan

These images illustrate the planned improvements for the Science Quad. The Chemistry Building is a key component of this planning effort.

## CIVIL DESIGN CRITERIA

The Thatcher Addition is located directly south of the existing South tower. There are mature trees and site utilities located under or near the proposed building footprint. The civil design will respond to the existing conditions while retaining and preserving the site, around the building footprint as much as possible.

### Mass Excavation

It is proposed to shore the excavation of the Thatcher Addition on the west and south faces of the basement level. Existing utilities and trees preclude the use of sloped excavation.

Haul roads and sloped excavation are proposed to enter the site from the west face of the building footprint

### Site Utilities

The Thatcher Chemistry building is proposed to be located in an area served by utilities. No new utilities are anticipated for this project. Utilities in conflict with the new building footprint will be relocated.

### High Temperature Water (HTW)

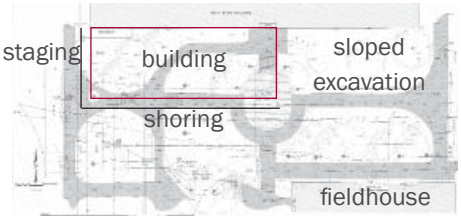
The Thatcher Chemistry building will be served from the existing HTW in the Chemistry building. No new mains or relocation of existing mains are required for this project.

### Culinary Water

A 10" water line lies within the footprint of the proposed Thatcher Chemistry building. This line will be relocated to the south. Fire hydrants are to be placed along the new mains as required by International Fire Code.

### Sanitary Sewer

The south wing of the Chemistry building is served by an 8" sewer lateral. It is proposed to connect to this lateral with the waste discharge from the Thatcher Chemistry building. Acid waste and sanitary waste will be extended outside the building and then combined into one system. It is anticipated that the chemical discharge from acid waste systems will be small in volume and dilute. Further dilution will be accomplished by combining this effluent with the sanitary waste. A sampling manhole will be provided for testing of the effluent in accordance with Salt Lake City Public Utilities requirements.




Thatcher Addition Site Configuration

The project site is between two existing buildings. This, in addition to existing utilities makes the shoring necessary on the south and west sides of the proposed footprint. Staging and site access will be from the west.

### Storm Drainage

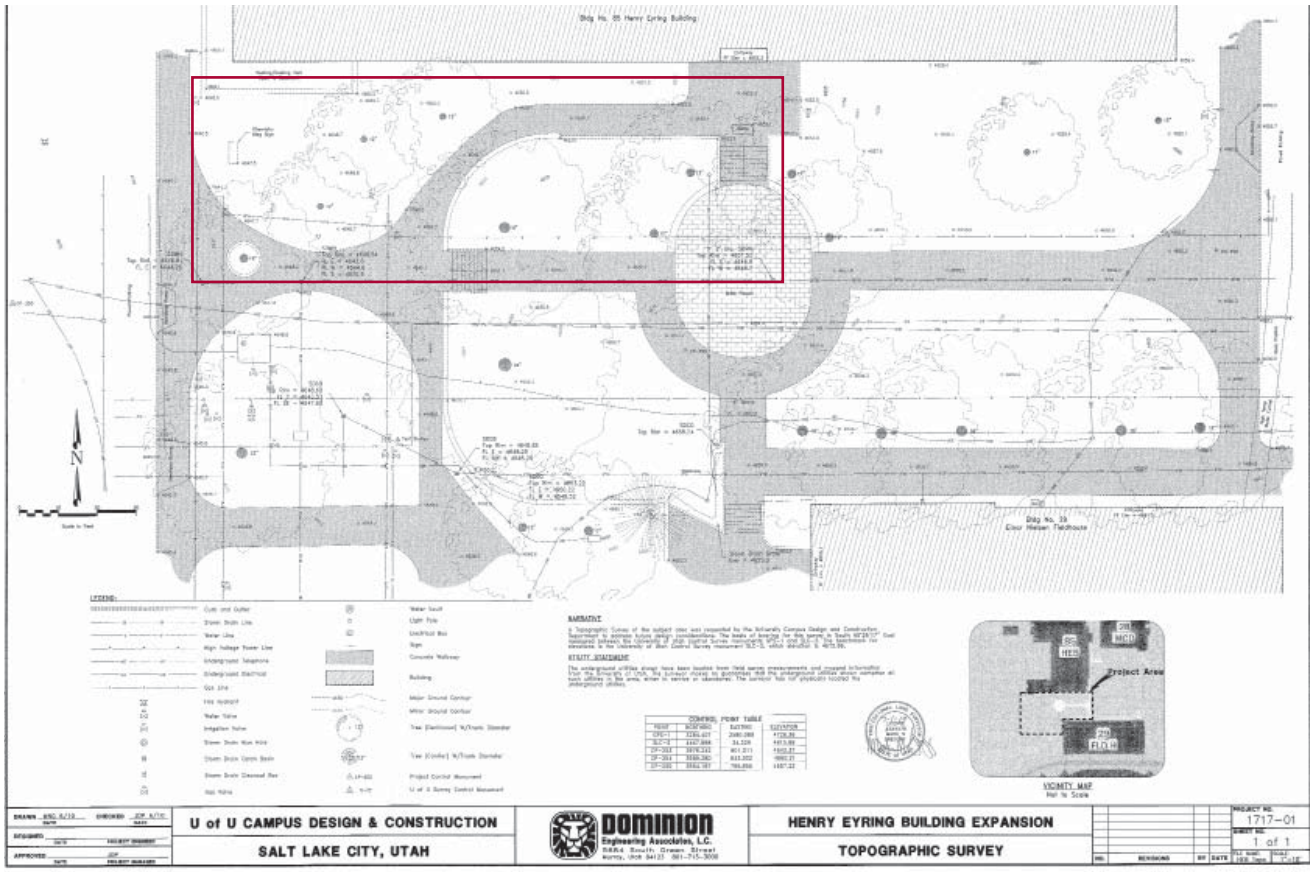
An existing 36” diameter storm drain line lies within the footprint of the proposed Thatcher Addition. This line will be relocated south of the proposed building. Roof drain storm water discharge will be directed to subterranean recharging vaults as calculated for retention of a 10-year, 24-hour storm event. Storm drainage from a 100-year event will be allowed to pass from the site with detention based upon 0.20 cfs/acre. This is in accordance with Salt Lake City rules and regulations.

### Natural Gas

No natural gas is to be relocated as part of this project. The existing natural gas main located south of the proposed building is to be maintained and protected.

### Chilled Water

No new chilled water piping outside the building is required for this project. All piping of chilled water will be internal to the existing Chemistry building.




Existing Site Survey

## ARCHITECTURAL DESIGN PRINCIPLES

### Codes and Standards

The minimum codes and standards that apply to the design of new buildings include current editions of the following:

- 2009 International Building Code
- DFCM Design Standards (Current Edition)
- University of Utah Design Standards
- NIH Design Requirements
- LEED for Building Design and Construction 2009
- ASHRAE 90.1- 2007
- ADA Accessibility Guidelines ANSI A117.1 2003

### Design concept

The Thatcher Addition design will create a front door for the south side of the Chemistry Building, becoming the new and enhanced identity for the Department of Chemistry. Because of its highly prominent and visible location, adjacent to major pedestrian, bicycle, vehicular, mass transit, and parking thoroughfares, this new facility must create a beautiful, positive experience for users and passersby.

The building design has incorporated a split level, two-story entry feature to facilitate circulation and flow to both the first and second levels from the front door. This entry will be a prominent building feature that will provide a clear building entrance. The combination of mass for prominence and glazing for transparency and daylight will create a welcoming and comfortable entrance into the building. The entry will be designed to highlight chemistry and put science on display to students and passersby. This front door will also connect directly to the circulation backbone of the entire chemistry building.

*Science on Display*

The building will be designed to highlight the sciences by providing visual access to the lab spaces as well as providing opportunities for displaying science work throughout the building. These opportunities can include signage, artwork, tack boards, display cases and interactive displays to showcase student and faculty projects and elevate the level of interest in, and excitement for the science that is taking place within the new facility.

In addition, the exterior design will be transparent in key locations to display the science to the campus, making science more accessible to the University community and kindling the interest and respect of visitors. In the current higher education paradigm, science programs are very competitive as far as attracting and retaining talent in both student and faculty alike. Providing attractive, functional, and most of all inspirational facilities is critical to the overarching mission of the department, and by extension, the University.

### Architectural Amenities

The Thatcher Addition will provide interactive and collaborative spaces that make the building more engaging and attractive to students and faculty. The addition will provide lounge spaces, unique group and individual study spaces and conference rooms to facilitate the exchange of ideas and provide an opportunity for engagement outside the traditional classroom.

The laboratories will be flexible, accessible and provide state of the art facilities for the sciences.

The seminar room on the top level of the addition will provide a beautiful venue for engaging presentations, events and other interactions within the Department of Chemistry. This space will be an amenity for the entire department and will be a source of pride for building users.

### Context

An important design objective is to ensure that the addition relates to existing buildings through massing and materials while reflecting contemporary architecture. The building's exterior design must resolve some conflicting desires. First, the Thatcher addition should aesthetically reflect a new generation of learning, technology and research both inside and out. Second, the facility is located directly among beloved historic buildings on the campus and it is desirable to acknowledge the rich architectural traditions of the campus. The design of the new building will resolve these desires by drawing from the proportions, form and traditional building materials of the adjacent historic structures and re-combining them into a building that addresses today's laboratory education needs, including, flexibility, daylight and laboratory safety. The exterior, which will reflect existing campus building styles and materials, will identify the addition as part of the University of Utah campus.

### Daylight and Views

The addition will provide views into and out of labs through highly transparent partitions and arrangement of casework and hoods to maximize transparency. Faculty and student spaces are optimally located for access to views and daylight. The primarily south orientation of the building allows ample daylight to enter the building. It will be important to mitigate the strong summer sun with the use of sunshades and high performance glazing while taking advantage of the solar gain in the winter. It will also be important to provide individual solar controls and orient furniture systems to avoid glare.

All of the spaces located on the south and west of the new addition will have direct access to daylight and views, and transparency through these spaces will allow shared access to daylight and views in spaces toward the north side of the addition. Corridors and collaboration spaces will also have direct access to exterior windows.

The seminar room will be specifically designed to highlight the dramatic views to the west of the Thatcher Addition, toward downtown Salt Lake City and the Great Salt Lake beyond. This space will entice people to attend functions and offer a stunning facility for events for the Department.

### Building Access and Circulation

Primary access to the building will be between the first and second levels. This entry will serve the especially well-trafficked first and second levels, with undergraduate teaching labs, and the core lab facility. This split entry will provide clear access to both levels, and allow continued access to the other building areas in the Plaza, North Tower and Auditorium areas.

The Thatcher Addition will be connected to the existing South Tower and will share both horizontal and vertical circulation routes with the existing building. Each level will have one or more connections to the South Tower and will allow shared use of the existing elevator and exit stairs. There will be a new stair tower in the addition. This stair will be designed with optimal daylight and views to encourage it's use and make it an architectural amenity for the project. This stair will also provide vertical interactions and visual connections between and within all the various levels.

The design of the Thatcher Building Addition will provide effective external circulation for people accessing the building, as well as delivery of materials and equipment and the removal of the laboratory waste on periodic basis.

Internal building circulation will provide safe pedestrian egress from each individual laboratory and laboratory support space through an uncomplicated path of egress to the building exterior. The circulation system will accommodate the relationships between laboratories, laboratory support spaces and offices.

### Interaction and Collaboration Spaces

Spaces are planned throughout the building to encourage both casual and formal encounters. Opportunities for interdisciplinary collaboration will be encouraged with spaces of all sizes and amenities including lounges, conference rooms, nooks, graduate student and faculty offices featured prominently on every level.

### Office and Workspace Design

The offices and individual workstations will be designed to be fully accessible and user friendly, promoting student/faculty interaction and collaborative opportunities. Natural daylight and solar controls through blind systems and exterior solar shading will be integral to each space. These spaces will be directly accessible from the corridor and be designed with transparent doors, sidelights and transoms to allow visual access for daylight and views from the labs and core spaces.

### Lab Design

All labs will be designed to be modular, flexible, changeable and adaptable—including all the systems required for research and teaching. Each lab will be designed to meet the needs of its specialized chemistry discipline, whether it be bio-organic chemistry, bioanalytical chemistry or biophysical chemistry. Maintaining transparency and openness in the lab spaces, and promoting student visibility, efficiency and interaction are key design components. Highly specialized casework and hood arrangements require these lab spaces to be precisely planned and laid out to optimize costly equipment and ensure safety.

*Lab Access and Circulation*

At least one door into each laboratory space should have a minimum 60” wide clear opening. This can be accomplished using doors with 3’-0” active leaf and one 2’-0” inactive leaf.

Doorways from laboratories into corridors should open into recessed alcoves serving the corridor. The doors should swing out from laboratories, in the direction of exit.

Circulation and fume hood locations within laboratory spaces should be coordinated to preclude primary exiting in front of the fume hoods.

## LABORATORY DESIGN CRITERIA

### Modular Planning

The Thatcher Building Addition laboratory space should be organized based on modular planning principles. The modular planning is used as an organizational tool to allocate space within a building. The module establishes a grid of standardized units or dimensions by which structural columns, walls and partitions are located. The modular planning provides flexibility of laboratory space allowing future modifications that may be required by changes in laboratory designation, equipment or departmental organization.

The planning modules could be combined to produce large, open laboratories or could be subdivided to produce small instrument or special-use laboratories without requiring reconstruction of structural or mechanical building elements. The modular planning concept is illustrated below.

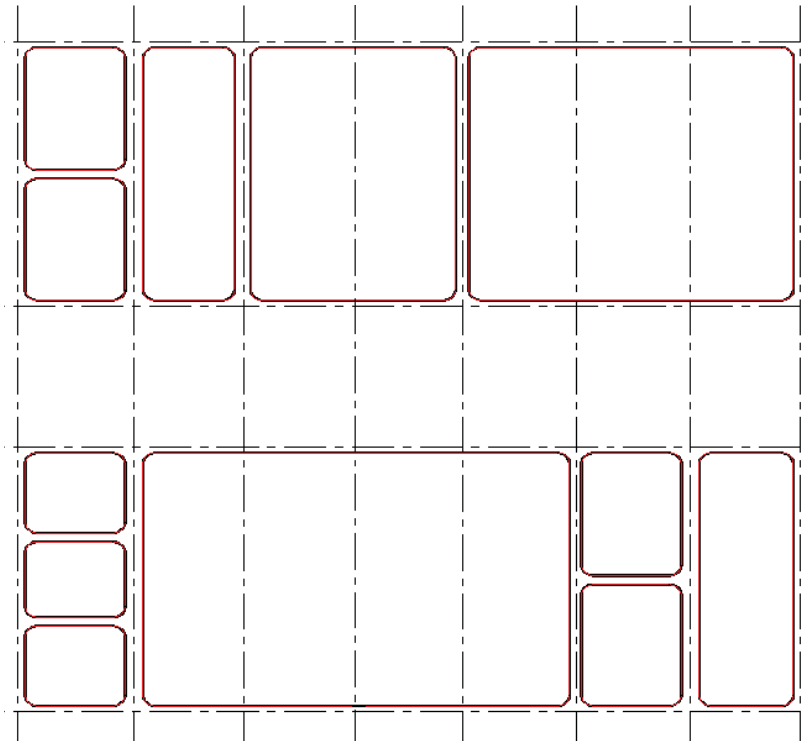


Fig. M1 - Modular Planning of Laboratory Space

The planning module includes organized and systematic delivery of laboratory piped services, HVAC, power and communication cables. The services are delivered to each laboratory unit in a consistent manner, facilitating additions or deletions that could be required by changes in laboratory use.

The laboratory planning module dimensions should result from analyzing the laboratory bench space, equipment and circulation space.

- The bench dimensions should accommodate technical work stations, instruments, and procedures.
- The space between benches is designed to allow people to work back-to-back at adjacent benches, allowing accessibility for disabled and movement of people and laboratory carts in the aisle.
- The module should provide adequate bench space for floor standing equipment.

The laboratory planning module for the Thatcher Building Addition is recommended to be 10'-6" wide by 30'-0" as shown in Fig. M2.

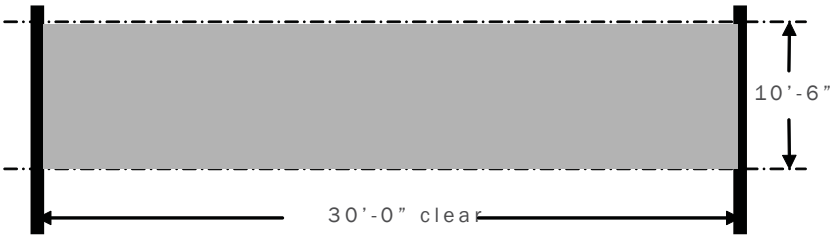



Fig. M2 - Laboratory Planning Module

Island benches are recommended to be 5'-0" deep. Wall benches should be 2'-6" deep.

5'-0" minimum aisle space between benches is recommended to minimize circulation conflicts and reduce potential safety hazards.

Overhead service carriers will provided electrical and other lab services to lab areas, allowing casework to be either fixed or flexible, depending on lab use and requirements.

The laboratory design will be flexible to allow future modifications to lab layouts and use, based on the lab module design. Specific layouts and requirements for individual labs can be found in the Space Requirements section of this document.

## SUSTAINABLE DESIGN CRITERIA

### Codes and Standards

The minimum codes and standards that guide the sustainable design of new buildings include current editions of the following:

- DFCM High Performance Building System (Current Edition)
- University of Utah Design Standards and Guidelines
- NIH Design Requirements
- Labs 21 Design Guidelines
- LEED for Building Design and Construction
- ASHRAE 90.1

### Sustainable Design Requirements

The State of Utah Division of Facilities and Construction (DFCM) has developed a High Performance Building Rating System (HPBRS) which requires all state projects to achieve LEED Silver Certification. This program also requires specific credits to be achieved. These include:

- 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

In addition, the HPBRS requires the project team to hold a sustainability charrette. This charrette took place in July of 2010 over the course of two days. The entire project team, including the steering committee, architecture team, energy modeler, mechanical and electrical consultants, Energy Program Director from the DFCM, Sustainability Director form UofU as well as the project managers from the University of Utah as well as DFCM were present. The sustainable design goals and key considerations presented below were discussed during this charette.

Other requirements of the State of Utah HPBRS include:

- Projects will be built to a 50 year life-cycle
- Life-cycle cost analysis should occur for key equipment and building systems.
- An energy model will be completed to demonstrate the building performance
- Meters and sub-meters must be included to allow the ongoing tracking of building energy performance with the Energy Star Portfolio Manager Program.

The State of Utah, University of Utah and NIH all have specific sustainable design criteria that must be achieved with the new addition.

Beyond the State requirements, the University of Utah Office of Sustainability has been spearheading sustainability programs on the campus. A number of new construction goals have been established, these are listed below.

- 40% energy reduction over code baseline. This may not be possible due to the existing building constraints, but should be pursued.
- Enhanced building system metering. This will include overall building gas, water, electricity metering as well as building lighting, plug load and major mechanical system metering.
- Appropriate window to wall ratios. The design team will assess various window/wall ratios to provide optimal daylight and views while providing an efficient envelope.
- Model laboratory design. The University of Utah is working to establish a model laboratory and the Thatcher Addition is a prime candidate for this program.
- Behavior modification program. The University is working on a variety of behavior modification programs and will work with the Chemistry Department to develop a program for the building.
- Smart equipment purchases. All new equipment for the addition as well as new equipment in the department should be assess for energy efficiency and life-cycle costs.

The National Institute of Health (NIH) also requires all projects that exceed 2 million dollars, must be LEED Silver Certified.

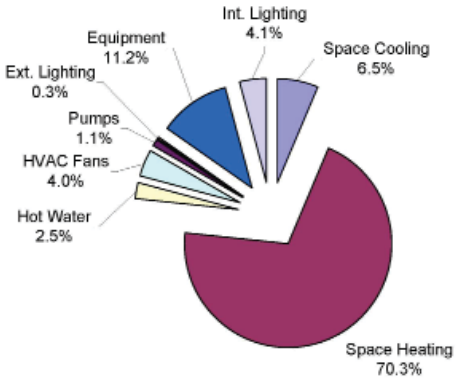
### Sustainable Design Goals

The following sustainable design goals were expressed by the users. discussed in the sustainability charrette mentioned above.

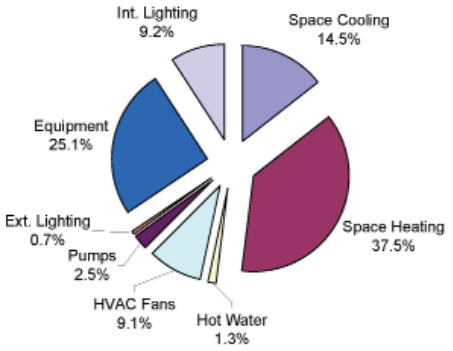
- Preserve the existing trees to the extent feasible. Where existing trees need to be removed, relocation will be explored.
- Provide a state of the art, LEED compliant facility. The State of Utah and the NIH both require a LEED Silver Certification.
- Create comfortable and efficient spaces. This is an overarching goal for this project.
- Design for optimal solar access, while mitigating negative solar impacts.
- Provide effective lighting.
- Design hoods to be as efficient as possible. Provide sensor and automatic energy saving devices where possible.
- Provide heating and cooling recovery. This will result in a large energy savings due to the 100% outside air requirement of laboratory buildings.
- Ensure the building systems work properly through commissioning and involve maintenance personnel in the commissioning process. The project should strive to reduce maintenance needs as much as possible and ensure building personnel are familiar with building systems.
- Provide system redundancy in case of emergencies. As campus systems tend to have annual failures, it is important that the new addition have redundancy in key spaces to avoid catastrophic losses.
- Encourage bicycling. The new addition will have bicycle storage and shower and changing rooms to encourage bicycle transportation.
- Provide active solar installations. The project should be designed for, and if feasible, include solar photovoltaic panels. Other campus roofs may also be considered for this use.
- Create a facility that inspires research.
- Use the building as a teaching tool. The building should reflect the sustainable and durable design components in order to teach the students and visitors about the building and systems, and how it has achieved its efficiencies.

Existing Laboratory

The existing labs experience a high level of wear and tear, making durability a key design component.




Baseline Energy Use Profile




Baseline Energy Cost Profile

**Key Considerations: Durability**

As mentioned in the DFCM requirements, the building is assumed to have a lifespan of 50 years or more. One of the largest concerns in the existing chemistry building is durability. Due to the nature of the sciences, chemical use, student behaviors and a high overall level of wear and tear that occurs in laboratories, it is vital that the building be designed with high performing, durable materials and systems. In addition, there is a limited operation and maintenance budget for the university so it is always better to design for durability and reduced maintenance now, rather than assume there will be funding for upgrades or improvements later on.

**Key Considerations: Energy Efficiency**

University of Utah has a goal of 40% energy savings. This will be attempted, but is more difficult as the facility is an addition and has existing constraints such as reduced floor to floor heights and requirements to tie into the campus high temp water system for heating.

The expected Energy Use Index for this facility is 400 watts/SF. This is approximately four times the energy use of an average office building. Key energy reduction strategies include:

- Designing an efficient building envelope. This will include enhanced insulation, high performance glazing and designing a tight building to minimize infiltration. In addition, and envelope consultant and commissioning agent will be used to verify the quality of detailing and construction for the building envelope.
- Taking advantage of thermal mass. The existing building is a concrete structure and this addition will also be concrete. The thermal mass provded by the structure can help mitigate and minimize thermal temperature variations and save energy.
- Providing an efficient mechanical system. Evaporative cooling, heat recovery, variable frequency drives on fans and a number of other mechanical system solutions will be evaluated for improved efficiency.
- Effective lighting design. The building lighting will be designed to provide a high level of light at workstations, while reducing lighting a circulation and non-essential areas.
- Integrated design with energy modeling. An energy model will be created to evaluate the building energy performance. This model will also be used as a tool to help evaluate various building systems for optimal efficiency.

**Key Considerations: Access to daylight and views**

In addition to a high performing facility, it is vital that the new addition be a comfortable, engaging and collaborative environment for the users. The building orientation is ideal for daylight and views on the south facade, but is limited by the existing building to the north. Transparency through spaces at the south side of the building through to the corridors as well as transparency from the corridors to the labs is preferred for building occupant comfort. Many of the graduate students and faculty spend more than 70 hours a week at the lab and a sense of weather and change of time is necessary to remain healthy.

**Other Key Considerations**

A number of other sustainable design features, including those mentioned in the goals section above, are important to the facility and will be integrated as the design progresses. The building users and steering committee are very committed to sustainable design and it will be a priority for the facility.

### LEED Checklist

The following LEED Checklist was established after the project sustainability charette was held. This checklist represents the sustainable goals and direction of the project, and may evolve as the project and design evolve.

## LEED 2009 for New Construction and Major Renovation

Project Checklist

Thatcher Addition to Chemistry

2-Aug-10

| 18 | 0 | 6 | **Sustainable Sites** | | Possible Points: | **26** |
|---|---|---|---|---|---|---|
| Y | N | ? | | | | |
| Y | | | Prereq 1 | Construction Activity Pollution Prevention | | |
| 1 | | | Credit 1 | Site Selection | | 1 |
| 5 | | | Credit 2 | Development Density and Community Connectivity | | 5 |
| | x | | Credit 3 | Brownfield Redevelopment | | 1 |
| 6 | | | Credit 4.1 | Alternative Transportation—Public Transportation Access | | 6 |
| 1 | | | Credit 4.2 | Alternative Transportation—Bicycle Storage and Changing Rooms | | 1 |
| | | 3 | Credit 4.3 | Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles | | 3 |
| 2 | | | Credit 4.4 | Alternative Transportation—Parking Capacity | | 2 |
| | x | | Credit 5.1 | Site Development—Protect or Restore Habitat | | 1 |
| | | 1 | Credit 5.2 | Site Development—Maximize Open Space | | 1 |
| | | 1 | Credit 6.1 | Stormwater Design—Quantity Control | | 1 |
| | | 1 | Credit 6.2 | Stormwater Design—Quality Control | | 1 |
| 1 | | | Credit 7.1 | Heat Island Effect—Non-roof | | 1 |
| 1 | | | Credit 7.2 | Heat Island Effect—Roof | | 1 |
| 1 | | | Credit 8 | Light Pollution Reduction | | 1 |

| 6 | 0 | 2 | **Water Efficiency** | | Possible Points: | **10** |
|---|---|---|---|---|---|---|
| Y | | | Prereq 1 | Water Use Reduction—20% Reduction | | |
| 2 | | 2 | Credit 1 | Water Efficient Landscaping | | 2 to 4 |
| | | | | Reduce by 50% | | 2 |
| | | | | No Potable Water Use or Irrigation | | 4 |
| | | | Credit 2 | Innovative Wastewater Technologies | | 2 |
| 4 | | | Credit 3 | Water Use Reduction | | 2 to 4 |
| | | | | Reduce by 30% | | 2 |
| | | | | Reduce by 35% | | 3 |
| | | | | X Reduce by 40% | | 4 |

| 12 | 0 | 8 | **Energy and Atmosphere** | Possible Points: **35** |
|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Fundamental Commissioning of Building Energy Systems | |
| Y | | | Prereq 2 | Minimum Energy Performance | |
| Y | | | Prereq 3 | Fundamental Refrigerant Management | |
| 10 | | 5 | Credit 1 | Optimize Energy Performance | 1 to 19 |
| | | | | Improve by 12% for New Buildings or 8% for Existing Building Renovations | 1 |
| | | | | Improve by 14% for New Buildings or 10% for Existing Building Renovations | 2 |
| | | | | Improve by 16% for New Buildings or 12% for Existing Building Renovations | 3 |
| | | | | Improve by 18% for New Buildings or 14% for Existing Building Renovations | 4 |
| | | | | Improve by 20% for New Buildings or 16% for Existing Building Renovations | 5 |
| | | | | Improve by 22% for New Buildings or 18% for Existing Building Renovations | 6 |
| | | | | Improve by 24% for New Buildings or 20% for Existing Building Renovations | 7 |
| | | | | Improve by 26% for New Buildings or 22% for Existing Building Renovations | 8 |
| | | | | Improve by 28% for New Buildings or 24% for Existing Building Renovations | 9 |
| | | | X | Improve by 30% for New Buildings or 26% for Existing Building Renovations | 10 |
| | | | | Improve by 32% for New Buildings or 28% for Existing Building Renovations | 11 |
| | | | | Improve by 34% for New Buildings or 30% for Existing Building Renovations | 12 |
| | | | | Improve by 36% for New Buildings or 32% for Existing Building Renovations | 13 |
| | | | | Improve by 38% for New Buildings or 34% for Existing Building Renovations | 14 |
| | | | | Improve by 40% for New Buildings or 36% for Existing Building Renovations | 15 |
| | | | | Improve by 42% for New Buildings or 38% for Existing Building Renovations | 16 |
| | | | | Improve by 44% for New Buildings or 40% for Existing Building Renovations | 17 |
| | | | | Improve by 46% for New Buildings or 42% for Existing Building Renovations | 18 |
| | | | | Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations | 19 |
| | | 1 | Credit 2 | On-Site Renewable Energy | 1 to 7 |
| | | | | 1% Renewable Energy | 1 |
| | | | | 3% Renewable Energy | 2 |
| | | | | 5% Renewable Energy | 3 |
| | | | | 7% Renewable Energy | 4 |
| | | | | 9% Renewable Energy | 5 |
| | | | | 11% Renewable Energy | 6 |
| | | | | 13% Renewable Energy | 7 |
| 2 | | | Credit 3 | Enhanced Commissioning | 2 |
| | | 2 | Credit 4 | Enhanced Refrigerant Management | 2 |
| | x | | Credit 5 | Measurement and Verification | 3 |
| | x | | Credit 6 | Green Power | 2 |

| 5 | 0 | 1 | | **Materials and Resources** | Possible Points: | **14** |
|---|---|---|---|---|---|---|
| Y | | | Prereq 1 | Storage and Collection of Recyclables | | |
| | x | | Credit 1.1 | Building Reuse—Maintain Existing Walls, Floors, and Roof | | 1 to 3 |
| | | | | Reuse 55% | | 1 |
| | | | | Reuse 75% | | 2 |
| | | | | Reuse 95% | | 3 |
| | x | | Credit 1.2 | Building Reuse—Maintain 50% of Interior Non-Structural Elements | | 1 |
| 2 | | | Credit 2 | Construction Waste Management | | 1 to 2 |
| | | | | 50% Recycled or Salvaged | | 1 |
| | | | | 75% Recycled or Salvaged | | 2 |
| | x | | Credit 3 | Materials Reuse | | 1 to 2 |
| | | | | Reuse 5% | | 1 |
| | | | | Reuse 10% | | 2 |
| 1 | | 1 | Credit 4 | Recycled Content | | 1 to 2 |
| | | | | 10% of Content | | 1 |
| | | | | 20% of Content | | 2 |
| 2 | | | Credit 5 | Regional Materials | | 1 to 2 |
| | | | | 10% of Materials | | 1 |
| | | | | 20% of Materials | | 2 |
| | x | | Credit 6 | Rapidly Renewable Materials | | 1 |
| | x | | Credit 7 | Certified Wood | | 1 |

| 10 | 0 | 2 | | **Indoor Environmental Quality** | Possible Points: | **15** |
|---|---|---|---|---|---|---|
| Y | | | Prereq 1 | Minimum Indoor Air Quality Performance | | |
| Y | | | Prereq 2 | Environmental Tobacco Smoke (ETS) Control | | |
| 1 | | | Credit 1 | Outdoor Air Delivery Monitoring | | 1 |
| 1 | | | Credit 2 | Increased Ventilation | | 1 |
| 1 | | | Credit 3.1 | Construction IAQ Management Plan—During Construction | | 1 |
| 1 | | | Credit 3.2 | Construction IAQ Management Plan—Before Occupancy | | 1 |
| 1 | | | Credit 4.1 | Low-Emitting Materials—Adhesives and Sealants | | 1 |
| | | 1 | Credit 4.2 | Low-Emitting Materials—Paints and Coatings | | 1 |
| | | 1 | Credit 4.3 | Low-Emitting Materials—Flooring Systems | | 1 |
| | x | | Credit 4.4 | Low-Emitting Materials—Composite Wood and Agrifiber Products | | 1 |
| 1 | | | Credit 5 | Indoor Chemical and Pollutant Source Control | | 1 |
| 1 | | | Credit 6.1 | Controllability of Systems—Lighting | | 1 |
| 1 | | | Credit 6.2 | Controllability of Systems—Thermal Comfort | | 1 |
| 1 | | | Credit 7.1 | Thermal Comfort—Design | | 1 |
| 1 | | | Credit 7.2 | Thermal Comfort—Verification | | 1 |
| | x | | Credit 8.1 | Daylight and Views—Daylight | | 1 |
| | x | | Credit 8.2 | Daylight and Views—Views | | 1 |

| | | | | | |
|---|---|---|---|---|---|
| 6 | 0 | 0 | **Innovation and Design Process** | Possible Points: | **6** |
| 1 | | | Credit 1.1 Innovation in Design: Building Education Program | | 1 |
| 1 | | | Credit 1.2 Innovation in Design: Exemplary Performance Reagonal Materials | | 1 |
| 1 | | | Credit 1.3 Innovation in Design: Laboratory Equipment Commissioning | | 1 |
| 1 | | | Credit 1.4 Innovation in Design: Low Mercury Lighting | | 1 |
| 1 | | | Credit 1.5 Innovation in Design: Enhanced Durability | | 1 |
| 1 | | | Credit 2 LEED Accredited Professional | | 1 |
| 1 | 0 | 2 | **Regional Priority Credits** | Possible Points: | **4** |
| | | 1 | Credit 1.1 Regional Priority:WEc1 - option 2 | | 1 |
| | | 1 | Credit 1.2 Regional Priority: EQc1 - 36% | | 1 |
| | x | | Credit 1.3 Regional Priority: IEQc8.1 | | 1 |
| 1 | | | Credit 1.4 Regional Priority: WEc3 - 40% | | 1 |
| 58 | 0 | 21 | **Total** | Possible Points: | **110** |

Certified 40 to 49 points  Silver 50 to 59 points  Gold 60 to 79 points  Platinum 80 to 110

## STRUCTURAL DESIGN CRITERIA

The southern expansion of the Henry Eyring Chemistry building will provide state-of-the art classroom, office, laboratory and research space for the chemistry complex at the University of Utah. Its development will utilize the most current provisions for structural design and will enable construction of space which will serve the university and the correlating research community for many decades. For its design, provisions outlined by the National Institute of Health (NIH) will be incorporated to ensure this facility serves its purpose as required. In addition, all of the appropriate provisions of codes currently adopted by the State of Utah will be satisfied to ensure the safety and welfare of the building occupants. As deemed prudent and as budget allows, enhancements to structural systems will be included which will promote maximum flexibility, enable superior seismic performance and will provide a highly sustainable end product.

### Codes and Standards

Structural design for the project will be in accordance with the 2009 edition of the International Building Code (IBC). Provisions beyond the IBC will be incorporated as prescribed by the NIH Design Requirements Manual. General provisions for structural design loads and other provisions are:

### Load Design Criteria

Dead Load:

| Self weight of all structural assemblies plus: | |
|---|---|
| Ceilings | 0.25 kPa (5.2 psf) |
| MEP Systems | 0.75 kPa (15.6 psf) |
| Light Partitions | (included in Live Load) |
| Roofing | 1.00 kPa (20.9 psf) |
| Brick Façade | 3.00 kPa (62.6 psf) |
| Curtain Wall | 1.00 kPa (20.9 psf) |
| CMU Partitions | 2.50 kPa (52.0 psf) |

Live Load:

| | |
|---|---|
| Laboratories | 5.0 kPa (104 psf) |
| Offices | 5.0 kPa (104 psf) |
| Conference Rooms | 6.0 kPa (125 psf) |
| Frozen Storage | 10.0 kPa (208 psf) |
| Stairs and Corridors | 5.0 kPa (104 psf) |
| Storage Rooms | 7.5 kPa (157 psf) |
| Roof | 1.0 kPa (20.9 psf) |
| Mechanical Areas | 7.5 kPa (157 psf) (or weight of equipment if greater) |

Seismic Loads (Per IBC 2009/ASCE 7 2005)

| | | |
|---|---|---|
| Site Class | C | |
| Spectral Accelerations | Ss=1.63g | S1=0.65g |
| Site Coefficients | Fa=1.0 | Fv=1.3 |
| Design Accelerations | Sds=1.09g | Sd1=0.56g |

Seismic Force Resisting System:

Special Reinforced Concrete Shear Wall

| | |
|---|---|
| Response Modification Factor (R) | 5 |
| System Overstrength Factor (Ωo) | 2.5 |
| Deflection Amplification Factor (Cd) | 5 |
| Importance Factor (Ie) | 1.0 |

Wind Loads (Per IBC 2009/ASCE 7 2005)

| | |
|---|---|
| Wind Speed (V) – 3 sec gust | 90 mph |
| Exposure | C |
| Internal Pressure Coefficient (GCpi) | 0.18 |
| Importance Factor (Iw) | 1.0 |

Snow Loads (Per IBC 2009/ASCE 7 2005 and SEAU Utah Snow Load Study)

| | |
|---|---|
| Ground Snow Load (Pg) | 2.05 kPa (43 psf) |
| Flat Roof Snow Load (Pf) | 1.43 kPa (30 psf) |
| Importance Factor (Is) | 1.0 |
| Snow Drift | Per ASCE 7 2005 |

Hanging Loads

Loads greater than 20kg (44 lbs) shall not be supported from non-composite metal roof deck. Such load shall be supported by structural members, embedded uni-strut or post installed anchors (in concrete).

**Vibration Design Criteria**

Vibration Design Criteria VC-A, which is 6,400 µm/sec (1968 µin/sec) based on a closed corridor walking pace of 90 steps/minute, an open ("ghost") corridor pace of 75 steps/minute and a cross aisle pace of 60 steps/minute, will be pursued for the upper levels. Vibration criteria VC-D will be pursued for the basement level. This is 800 µm/sec (246 µin/sec) based on a closed corridor walking pace of 90 steps/minute, an open ("ghost") corridor pace of 75 steps/minute and a cross aisle pace of 60 steps/minute.

### Footings and Foundations

Footings and foundations shall be comprised of conventional spread continuous footings to receive structural walls and individual spot footings to receive columns. The footings will bear atop undisturbed natural soils or on compacted fill extending to undisturbed natural soils. Soil bearing capacities are fairly good any may be as high as 10,000 pounds per square foot, depending on footing size and depth. At maximum allowable bearing loads, long term footing deflections and differential settlements are not expected to exceed 1 and ¾ inch respectively.

Abutting the new structure to the existing building at the north side will require a sharing of load between the foundations. The new and existing foundations will be rigidly tied together. Complications arising from high concentration of load within limited available working space may require the utilization of deep foundation elements such as micro-piles to enable the adjacency of new and existing structures.

### Superstructure

The structure is to be comprised primarily of cast-in-place concrete. The concrete will be reinforced with conventional mild steel reinforcing bars along with active post-tensioned cables for the upper floors comprised of relatively thin two-way concrete slabs. Concrete columns will be located typically at grid intersections and will be square in plan. Floor decks will have a minimum thickness of 12” for floors that are not post tensioned. Floors that are post tensioned will have minimum thicknesses of 8 inches. All floors will be comprised of two-way flat plate construction. This is deemed the most effective approach to enable maximum space utilization within the limited floor to floor height. Roof decks (outside of mechanical areas) will be comprised of open web steel joist and/or steel wide flange beams. These will support a standard non-composite metal roof deck. Concrete slabs will be utilized within mechanical penthouses to support rooftop equipment and enable effective vibration control. The penthouses themselves will be comprised of relatively simple structures comprised of steel beams, columns, braces and deck.

### Lateral Force Resisting System

Forces due to wind or seismic inertial effects will be resisted by the horizontal floor diaphragms which will collect these loads and distribute them to concrete shear walls which will comprise the vertical elements of the lateral force resisting system. Floor diaphragms will rigidly connected to the walls and the walls will resist the forces, ultimately causing their resolution into the footings and underlying soils. Primary shear walls will be located at the north, south, east and west portions of the structure with at least two walls acting in each primary direction.

The concrete shear walls provide a very rigid lateral force system that will minimize drifts due to wind and seismic forces. This translates to reduced inter-story deformations and less risk to damage for elements, equipment or systems spanning from story to story. Also, the reduced drift enables a minimized expansion joint between the new addition and the existing structure to the north.

### Progressive Collapse

Resistance to progressive collapse can be a vital consideration within any structure subject to threats which may compromise critical load carrying elements. Progressive collapse implies that failure of one key element leads to the successive failures of adjacent elements since the inherent strength within the system is not sufficient to enable alternate load paths. Contemporary approaches to prevent progressive collapse typically involve the removal of a single column at the base level of a structure. To prevent progressive collapse, the load resisted by this column must assume a new path. Oftentimes, such alternate paths can be developed through the appropriate structural detailing of the elements (beams and slabs) intersecting the column in question. Proper sizing and detailing of these beams can enable their performance as redundant load carrying systems that become active once a column is removed. For this project, this will likely entail the development of a concrete reinforcing scheme that provides continuous reinforcement across column intersections. The redundant load path then becomes the slab above the column in question. When the column is removed, the slab develops catenary (tension) properties and though it may deflect significantly, it may have sufficient strength to support the loads previously supported by the column below.

### Vibration Control

Facilities of this nature can have extraordinary requirements in terms of structural vibrations that may affect the ability of the building serve its intended purpose. Specifically, vertical floor vibrations due to pedestrian traffic, though imperceptible to humans, may render ultra-sensitive equipment incapable of serving its intended purpose. As such, specific and deliberate attention to floor vibration performance will be a vital component of the structural system design. With the proposed system (two way flat plate concrete slab), the primary approach for enabling suitable vibration performance will be to control the mass and stiffness of the slab. Mass and stiffness will be a function of slab thickness. Also, stiffness will be dependent upon the material specific properties of the concrete, primarily its elastic modulus which is generally determined as a function of the concrete strength (f'c). Specific vibration studies accounting for the bay geometry will be undertaken to determine the optimal slab thickness and concrete strength. This approach will enable the targeting of a specific vibration performance velocity consistent with the performance expectations of the space under consideration.

In addition to the vibration analysis approach outlined above, prudent space planning may be utilized to address vibration performance issues. Peak vibrations typically occur at the midpoints of structural bays while areas directly adjacent to structural columns typically experience minimized vibrations. Careful and strategic placement of specific rooms and/or equipment may enable satisfactory vibration performance for various areas and equipment within the building.

**Provisions for Future Expansion**

Future expansion plans do not include vertical expansion but do include an expansion to the east of the proposed building. The expansion is anticipated to be the same number of stories with the same transverse dimension as the current project yet with somewhat shorter longitudinal dimension so as to align with the existing structure to the north. Two options exist for tying the future expansion to the current project. The first is to utilize a seismic separation (expansion joint) between the two which would enable their independent structural behavior. The second is to anchor the two rigidly together which would require that the new addition be designed to act harmoniously with the project currently proposed. The optimal approach for this will be to utilize a symmetrical configuration of shear walls that would replicate those proposed for the current project in a mirrored fashion. Major departures from this may lead to unbalanced behavior which may compromise the seismic performance of current project, the future addition or both. For the second option, a feasibility study regarding potential structural options for the future expansion will be prudent. For the current project and the future addition, rigidly connecting to the existing post-tensioned structure to the north is deemed imprudent. Not only does this create issues for the lateral force resisting system, its feasibility is diminished due to the problems invariably appearing with major modifications to existing post-tensioned slabs.

## MECHANICAL DESIGN CRITERIA

### Codes and Standards

The HVAC System will comply with the following codes and design standards:

- University of Utah Design Standards- Dec 2009
- DFCM Design Criteria - March 2006
- University of Utah East Campus Central /Chilled Water Plant, Design Manual - August 2000
- International Building Code - 2009
- International Mechanical Code - 2009
- International Plumbing Code - 2009
- International Fire Code 2009
- Utah Energy Code, ASHRAE 90.1-2007

### Design Criteria

| | Summer | Winter |
|---|---|---|
| Design Temperatures, dry bulb/wb | 97.4°F/63.5°F | 0°F |
| Design Temperatures, wet bulb | 67°F | |

Indoor Design Conditions:

| | |
|---|---|
| Summer: | 75°F |
| Winter: | 72°F |
| Humidity: | 50% Max. / 0% Min |
| Laboratory: | 100% Outside Air |
| Occupancy: | 24 hrs./day, 7 days/week. |

### Internal Equipment Heat Gains

In addition to people and lighting loads, heat gains in all rooms will be based on anticipated equipment to be used in each room together with appropriate diversities. The following equipment heat gain rates for certain areas will be considered for preliminary load estimates. These internal heat gains will be discussed with the owner to determine a reasonable heat gain to avoid oversizing cooling systems.

| | |
|---|---|
| Research Labs | 30 Btuh/sf |
| Tissue Culture Labs | 60 Btuh/sf |
| Glasswash / Sterilization | 480 Btuh/sf |
| Equipment Spaces | 130 Btuh/sf |
| Office Areas | 10 Btuh/sf |

### Heating

The building will be heated with heat from the main campus high temperature water plant (HTW) through the existing high temperature heat exchangers within the north tower of the HEB Chemistry Building. An additional high temperature heat exchanger may be determined to be required and would be located in the existing room between the existing heat exchangers. High temperature water will be supplied at 390°F and will be returned at 250°F. High temperature water will be supplied to the primary side of the heat exchanger. The secondary (building side) of the heat exchanger will have building pumps for water distribution to the building mechanical systems. The maximum allowable pressure drop from the HTW mains, into the building and through the heat exchangers is 20 psig. The design of the HTW system will conform to the University of Utah Design Standards. The HTW piping will be connected to the existing 4” mains within the high temperature heat exchanger room.

The secondary heating water in the building will be 180°F. Heating water will be distributed to the new building through two new heating water pumps sized for 50% of the new building load. The pumps will be on VFDs.

Domestic and Industrial hot water will be provided from the existing system. The existing system is provided with hot water from existing high temperature heat exchangers in the HTW room.

The building will be designed for a variable flow secondary heating hot water system (VAV reheat). Control valves will be two-way with tight shut-off.

A glycol hot water heating system will be provided for preheat coils with local plate & frame heat exchangers and pumps at the air handler. Two heat exchangers will be sized each for 50% of the full load capacity. Two preheat pumps will be sized each for 50% of the full load capacity.

The building will be provided with a perimeter hydronic heating system, to provide occupant comfort, located where work stations are close to windows, consisting of hot water finned tubes enclosed in a floor mounted enclosure. Each exposure will be zoned independently and will be controlled based on solar intensity and outside dry bulb temperature.

### Chilled Water Cooling

It has been determined though meetings with the University Facilities Engineering that in order to provide sufficient chilled water for this project, additional capacity will need to be provided in the existing chilled water loop that serves this area of campus. The chilled water for this loop is provided by two 625 ton chillers located in the HEB Chemistry Building North Tower. These chillers were installed in 1994 and are nearing the end of their life expectancy. The design option being pursued will remove these two chillers and replace them with two larger chillers of sufficient capacity to provide chilled water for this phase of the chemistry addition as well as the next phase. The additional tonnage will be approximately 400 tons for both phases. Two new 850 ton centrifugal chillers with VFDs will be provided with additional pumping and flow capacity. New chilled water lines running in the Annex tunnel to the new addition will be required as well as new pumps and piping for the chilled water and condenser water.If this is not feasible, a second option of adding a new 350 ton chiller to serve the new addition only will be pursued.

A new cooling tower will be installed in the existing cooing tower enclosure. New condenser water piping to the tower will be required.

Chilled from this plant will be supplied at 42°F and will be returned to the plant at 54.5°F.

### Sterilization and Glass Wash

Steam for building glass wash needs and sterilization will be generated with the main campus high temperature water in the existing HTW room in the HEB North Tower. The intent is to utilize the existing HTW steam generator to provide the needed steam for the new addition.

### Air Conditioning

The building will be air conditioned with a three stage cooling system consisting of heat recovery coils, chilled water coils with chilled water from the central chilled water plant, and a spray direct evaporative cooling section. It is the intent to provide humidity in the laboratories from direct evaporative cooling section in the supply air unit.

A direct evaporative cooling section will also be provided in the exhaust air stream ahead of the heat recovery coil to provide additional effectiveness in the heat recovery system.

A primary/secondary pumping system will be utilized in the building and chilled water valves will be two-way tight shut-off. The campus design manual for piping will be used in the design.

**System Design**

The Laboratory HVAC system will consist of supply air, general room exhaust, and fume hood exhaust systems. These systems will be managed and controlled by a sophisticated control system to maintain the following operation:

- Fume hood face velocity will be constant at 100 fpm, independent of sash height.
- Rooms will be maintained at negative pressure relative to the corridor or adjacent spaces by varying room supply and exhaust air in conjunction with the fume hood exhaust system.
- Laminar flow type diffusers will be used to keep room supply air turbulence to a minimum around the fume hood.
- A hydronic heating coil will be used to reheat the supply air to maintain a specified room temperature and humidity settings.
- Motion sensors will be provided at the fume hoods to allow for decreased air flow when the hood is not in use or the room is unoccupied.
- The HVAC system will be designed for approximately 55 fume hoods.
- Room supply and exhaust air will be controlled through linear air terminal devices utilizing a volumetric differential room control device.

**Laboratories – General**

- All laboratory areas will be served by 100% outside air systems.
- Rooms will be maintained at a negative pressure with respect to adjacent areas. (see ANSI/AIHA Z9.5 - latest edition).
- Rooms will have a minimum of 6 air changes per hour when occupied,with final air changes per hour based on agreed upon internal loads.

- High air discharge velocities will be avoided (not more than 50 feet per minute in the immediate vicinity of the fume hood).
- Fume hood face velocity will be maintained at 100 fpm all sash positions. The system design will be based on 100 feet per minute hood face velocity when the fume hood sash is opened to a height of 18 inches. Fume hood will be equipped with a motion sensor which will reduce face velocity to 60 FPM when the area in front of the hood is not occupied. The mechanical supply, exhaust and duct systems will be designed to accommodate future fume hoods that have been noted on the plans.

The HVAC system will have features that enable control of the following:

- Supply and exhaust air volume
- Laboratory pressurization
- Hood face velocity
- Energy consumption
- Room Temperature

Laboratories will be provided with variable volume fume hoods. Room supply and exhaust air will be controlled through linear air terminal devices utilizing a volumetric room control device.

**Offices**

Design criteria for the office space HVAC system is based on the following:

- Office/lobby areas will be served by the 100% outside air VAV laboratory air handling units. Air from the Office area will be either transferred into the corridors for use as make up air into the laboratories or be returned via a return air plenum to the outside air intake of the lab air handler.

**General Exhaust**

Each toilet room will be exhausted to atmosphere via penthouse exhaust fans. Replacement air will be supplied at a constant volume through the laboratory air system.

**Communication Rooms**

Communication rooms will be cooled through the use of a combination of building air and dedicated fan coil units connected to a dedicated air cooled chiller.

### Special Exhaust Considerations

The selection of the fume hood and local exhaust type is critical to the design of the laboratory HVAC system.

The chemical exhaust ducting from the laboratories will be type 304 stainless steel up to the main manifolded exhaust, which will be galvanized sheet metal. The minimum recommended exhaust duct velocity will be 2,000 feet per minute.

To achieve acceptable concentration levels and desired concentration rates, the exhaust system will combine and mix exhaust volumes from multiple uses in a commonly ducted (manifolded) exhaust system. Exhaust concentrations of noxious or hazardous substances will be diluted within the ducts prior to exhausting to the atmosphere.

Laboratory exhaust fans will be housed within the penthouse and will be resistant to corrosion from the air stream vapors.

The exhaust to atmosphere is an important design consideration. Code requires a minimum discharge height of 10 feet above the highest roof level. The discharge velocity will be a minimum of 4,000 feet per minute. At a minimum, the fresh air intake will be 60 feet horizontally and 20 feet vertically from the exhaust stack position. Stacks will be designed to match the height of the adjacent South Tower building stacks.

### Controls

The Thatcher Building Addition should be provided with a micro-processor based, direct digital control building automation and energy management system. This system shall provide energy management, controls in all spaces and monitoring of the laboratory controls. The following items of equipment will be monitored and/or controlled:

- All central HVAC equipment including air handling units, heat exchangers, pumps, variable speed drives, and exhaust fans.
- All decentralized HVAC equipment such as variable air volume units, reheat coils, thermostats, meters, air and water temperature sensors, system pressure sensors.

A personal computer should be provided as an operator interface. The PC will store record data, provide analysis and reporting functions, and act as a graphical user interface with the networked controllers.

Unsafe levels of operation of the exhaust system should be indicated by local alarms in the rooms affected and should be capable of coupling with a central alarm monitored by building maintenance personnel. Local codes may require certain emergency or fire detection, monitoring and alarming which may affect the design of the laboratory ventilation system.

Monitoring of critical parameters of the ventilation system is important for safe operation and effective maintenance and management of the building. HVAC operational parameters of laboratories, cold and warm rooms and other critical spaces, should be recorded, reported, and alarmed.

Individual room temperature controls will be provided. Laboratory controls will include volume and pressure control for each space to assure that a negative pressure relationship will exist between each laboratory and the surrounding non-laboratory spaces.

A typical control system should provide the following minimal safety requirements in response to abnormal situations:

- Annunciate the equipment failure to a monitoring center and turn on the existing standby equipment.
- Maintain relative levels of pressurization in the laboratories.
- De-energize the supply air handling unit serving laboratory areas, in case of fire or smoke detection. The exhaust fans should continue to operate at a level that facilitates a safe evacuation of the building through doors between pressurized spaces. Reducing the level of exhaust to a desired pressurization could be obtained by ramping down the exhaust fans or by activation of bypass dampers on exhaust plenum. Capability of operating doors under fire alarm conditions must be tested and documented as part of the commissioning process.
- The supply and exhaust air flow regulators must be within ± 5% accuracy of design flow, specifically designed for laboratory use and must be pressure independent. The products must have a minimum of five years of installed field operating history. Commercial components are not acceptable.

The control system will be connected to the campus Metasys network or to the campus telecommunications Ethernet network.

### Air Handling Systems

Air handling systems will be designed to meet all of the above heating, cooling, ventilation and exhaust requirements of the project. Each supply and exhaust system will have multiple fans arranged such that if one fan is out of service the remaining fans can still supply 100% of the air to the space. The supply air units will have a fan wall section with multiple equally sized plenum fans. Air supply systems will be variable volume type with hot water reheat as needed. Laboratory supply and exhaust systems will be 100% outside air supply and 100% exhausted and will be variable volume. Laboratory areas will be kept at a negative pressure relative to the rest of the building at all times. All portions of the system will be ducted with the exception of the office return air.

The laboratory VAV control system shall perform the following functions:

- Control the hood volumetric flow rate to maintain the constant face velocity,
- Monitor room temperature to provide adequate air flow for removing the room heat gain.
- Monitor room occupancy to provide 100% of operational supply air when space is occupied.
- Reduce the air flow at scheduled level for unoccupied mode of operation,
- Control the fume hood exhaust, the general exhaust and the supply airflow to maintain the laboratory pressurization.
- Provide time delay in changing room air supply and exhaust flow to unoccupied mode based on room occupancy sensor.
- Provide time delay in changing the fume hood flow to standby mode based on fume hood motion sensor.

### Energy Conservation

As laboratory buildings necessitate the use of 100% outside air for air conditioning purposes, and the resulting energy requirements are high, in order to conserve energy the following design and control methods will be evaluated for incorporation into the building:

- Window blinds, heat absorbing or reflective glazing, external shading devices and heavyweight structure.
- Energy efficient motors will be used for all items of equipment.
- Variable air volume systems will be used wherever permitted.
- Variable speed drives will be used in lieu of inlet vane control.
- A heat recovery system, the glycol runaround type, will be used.
- Enlarged air handlers for decreased static pressure drops.
- Direct evaporative spray section on the exhaust system.
- Direct evaporative spray sections for incoming outside air.

The design of this building will be in compliance with the Standard for Energy in New State Buildings dated July 11, 2001 and as follows: This new state owned building will be designed to be at least 30%-40% more energy efficient than the performance of a similar reference building that just meets the minimum requirements of the ASHRAE 90.1-1999 Energy Standard For Buildings Except Low-Rise Residential Buildings with the modifications described below. The energy conservation design for each building system will be part of the value engineering sessions conducted during the design phases of the project. The design team will coordinate with the Utah State Office of Energy Services to model the energy consumption of proposed designs as required to arrive at an acceptable energy conserving design consistent with the goal above.

### Air Intakes and Exhaust

Air intakes will be positioned to avoid short-circuiting of exhaust air back into the building. Exhaust from laboratories must be discharged to the atmosphere through stacks at the top of the building with a minimum velocity of 4,000 fpm.

### Supply Air Filtration

In all air conditioned spaces pre-filters and final filters will be provided per latest codes and standards. Pre-filters will have an efficiency of 35% (MERV 8) and final filters an efficiency of 90% (MERV 14) based on ASHRAE Test Standard 52-76. Final filters will be installed at the point of discharge.

## PLUMBING DESIGN CRITERIA

### Water Supply

The addition will utilize the existing water supply that is installed in the adjoining south tower. New services for the addition will be branched off of the existing at its source in the existing mechanical room and run vertically in the existing utility shaft.

### Domestic Water

A domestic water system will be provided for all non-laboratory spaces in the building.

Domestic Cold Water

Domestic cold water will be connected to all non-laboratory plumbing fittings and fixtures, including emergency eye wash and shower stations. Emergency eyewash units will be installed with a double check valve and in-line back flow preventer and provided with independent control valves to regulate water pressure. Emergency shower and eyewash water is tempered to 90 degrees.

Domestic Hot Water

Domestic hot water will be provided from the existing system in the south tower. New lines serving this addition will be run in the addition near the toilet rooms for convenient service to these rooms. The domestic hot water will be recirculated. All lavatory sinks will be provide with thermostatic mixing valves.

### Reclaimed Water

Provide a complete reclaimed water system supplying all water closets and urinals with reclaimed water. This system will include a domestic backup up at the cistern in the event the cistern level drops below 20%. System shall use copper piping. Reclaimed water will be supplied from the RO system reject water.

### Industrial Laboratory Water

A separate industrial laboratory cold and hot water system will be provided with appropriate back flow prevention systems in place to prevent laboratory water from entering into the building's domestic water system. Industrial water is supplied to laboratory sinks and cupsinks, fume hoods, washing and sterilizing equipment, hose stations, laboratory ice machines and laboratory equipment. All fixtures utilizing industrial water shall have a sign stating "NON-POTABLE WATER". Industrial hot and cold water will be tapped off of the existing system in the south tower and run to the south tower utility shaft,

then distributed up the shaft to the laboratory fixtures. All laboratory fittings will be provided with vacuum breakers.

### Purified Water

A laboratory pure water, reagent grade system will be provided to supply 18 mega-ohm grade water for all laboratory benches. This system will be separate from the existing pure water system and will not be co-mingled to prevent contamination of the new system. The system will consist of dual softener, carbon filters, primary and secondary cartridge filters and a reverse osmosis system. Polishing will be accomplished through a separate bed deionizer, and ultraviolet sterilizer, pre and final filters and storage tanks and pumps. This piping system will have continuous recirculation using unpigmented virgin polypropylene or Spears LXT CPVC system for pure water.

For higher purity water requirements than is generated from the central system point of use, polishers will be used and are part of owner supplied equipment.

### Emergency Showers

Emergency showers will be provided in all laboratories with adjacent floor drains with trap primers. Tepid water shall be provided at these fixtures in accordance with University standards and will be recirculated.

### Sterilization

Glass washing, autoclaves and other steam needs will be supplied from existing steam generator. This steam will be generated with High Temperature Water from the campus central system.

### Laboratory Vacuum

A central laboratory vacuum system will be provided and designed to deliver vacuum at 19”-23” Hg to laboratory fittings. The distribution piping system will deliver vacuum to each laboratory. Piping will be Type L medical grade copper with brazed joints. If deeper vacuums are required, they will be generated locally with special vacuum pumps located in the laboratories.

### Laboratory Air

Compressed air will be provided in the addition by tapping off of the existing system in the South tower. Oil-free instrument grade compressed air (CA), Class 1.4.1 ISO 8573.1, dried to 2.1 grams of water per pound of dry air (37oF pressure dew-point), will be supplied through floor distribution loops at 100 psig. Pressure reducing valves will be provided downstream of laboratory point of connection for delivering laboratory compressed air (LA) of 15 psig to services. Other pressure requirements will be satisfied by local pressure regulator fixtures at the service. The compressed air system should be flexible with redundant compressors in duplex or triplex arrangement. The distribution system will deliver compressed air to all laboratory fittings.

Piping systems will be Type L medical grade copper with brazed joints.

### Natural Gas

A low pressure natural gas system will deliver gas to fittings in each laboratory as required. Natural gas will be supplied at low pressure of 4 to 7 inches of water. Each floor must have an isolation valve that is quickly accessible for emergency shutoff. Additional shutoff valves should be provided downstream of the point of connection in accessible locations for controlling the usage of natural gas in teaching laboratories. Gas piping will be welded or screwed Schedule 40, black steel pipe.

### Specialty Laboratory Gases

Most specialty gases will be supplied from gas cylinders placed within laboratories or gas cylinder stations located in designated closets serving adjacent laboratories. The gas cylinders will be manifolded providing redundancy and alarmed switch-over capabilities to ensure uninterrupted gas supply. Toxic, corrosive and flammable gas cylinders will be located in ventilated gas cabinets. Central distribution systems should be considered in cases of high density of services extended throughout the building. Central systems must have redundant components or cylinder backup to ensure uninterrupted supply.

### Nitrogen

A new nitrogen line will be run from the existing liquid nitrogen system at the existing dock area. Nitrogen will be distributed to individual lab rooms from a central location where meters can be placed on the distribution lines. Where 100 psi nitrogen is required a new service line will be provided from the existing high pressure nitrogen generators. Piping systems will be Type L medical grade copper with brazed joints.

### Service Distribution Materials

Piped services, except for laboratory waste and vent, will be distributed in the south tower utility chase. Tees, valves, and caps will be provided on a modular basis to facilitate extension of the services in the future to points of use in each laboratory module without disruption to services in adjacent modules.

### Isolation Valves

Each laboratory will be provided with isolation valves as the laboratory utilities enter the laboratory.

### Sanitary Sewer and Waste

A complete sanitary waste and vent system will be provided in accordance with International Plumbing Code (IPC) throughout the building. Extend to exterior mains as shown on site utilities plan. Provide grease, sand and or oil traps as needed.

### Laboratory Waste

A separate drainage and vent system constructed of acid resistant materials will be provided for laboratory waste. Laboratory waste may be piped into the sanitary sewer after it exits the building. Vents will be routed up through the roof and will not connect to sanitary vent piping.

Provisions will be made in the design of the wet laboratories for storage of appropriate containers for the collection of waste materials, such as solvents, oils, greases, sediments, and other materials. A central collecting area near the loading area will be provided for collection and for pickups by contracted waste disposal firms or disposed by other methods.

### Storm Drainage

A complete roof drainage system will tie into the exterior storm drain system. A separate overflow drain system will be provided by means of a piping system or a scupper system. This will be connected to a cistern for irrigation water use, if possible.

## FIRE PROTECTION SYSTEM CRITERIA

The building will be protected by a hydraulically calculated Class I Standpipe and automatic wet sprinkler system based upon an ordinary Hazard Group II occupancy. Hydraulic calculations will be based on water pressures available for design as noted in a water flow analysis report. The report will be prepared by a licensed engineer as required by the Utah State Fire Marshal's office and Campus Fire Marshal.

A double check/alarm valve assembly will be provided at the fire sprinkler system riser to protect the city water supply from contamination. The riser assembly will meet the requirements of the Utah State Fire Marshal's off ice and Campus Fire Marshal.

Each floor will be supplied with a floor control assembly that includes a flow switch and method of testing. Sprinkler systems will be supplied from the standpipe system.

Pre-action sprinkler systems will be included in the sprinkler system design where requested by an owner's representative.

### Fire Alarm

Comply with Utah State Fire Marshal's "Rules and Regulations" and the University of Utah Campus requirements. The following coordination and systems will be provided:

- Coordinate with campus facilities during design to ensure that any new system is acceptable to the campus.
- Design strobes visible from all locations except private offices and coordinate with furniture plans.
- Provide duct detectors and fan shutdown where required by NFPA and the IMC, including detection of smoke at all return air shafts serving multiple floors.
- Coordinate location of the building annunciator with the Campus fire marshal. All other detectors and functions will comply with the referenced codes and standards.
- All fire alarm wiring will be in conduit.
- Final programming of system will be coordinated with the Campus Fire Marshal to ensure that the program will be compatible with existing campus fire alarm programming.

## ELECTRICAL DESIGN CRITERIA

### Codes and Standards

Codes which are directly applicable to design of the electrical systems are listed below:

- ADA, Americans with Disabilities Act
- ASHRAE 90.1 Energy Code
- EIA/TIA, Electronics Industries Association/Telecommunications Industry Association
- International Building Code
- IESNA, Illuminating Engineering Society of North America
- NFPA, National Fire Protection Association (applicable sections including but not limited to):
- NFPA 70, National Electrical Code
- NFPA 72, National Fire Alarm Code
- UL, Underwriter's Laboratories
- Utah State Fire Marshal Laws, Rules and Regulations
- LEED NC, USGBC.
- University of Utah Campus Design Standards
- NIH Design Requirements Manual Version

### Site Electrical

The building will be served by the existing south tower. Currently the existing south tower is served by the campus medium voltage distribution network via two transformers. We anticipate that there is enough spare capacity on these existing building services to support the new addition. A load study will be conducted to determine if there is a need to upgrade the existing service to accommodate the additional load.

### Site Telecommunications Raceways

The cabling requirements for the new building are discussed in the Technology section of this narrative, and only the pathway requirements are identified here. Telecommunications service to the building will be via fiber optic cable and possibly some copper twisted pair. This work will be performed by University of Utah campus NETCOM.

### Building Service and Distribution

Main Service

The main switchboard in the new addition will be provided with digital metering. Service voltage will be 277/480V, 3-phase, 4-wire. Power for 120/208V equipment will be derived from step-down, dry type transformers. Transformers will be NEMA TP-1 high-efficiency type. For power quality, different types of loads will be separated onto different feeders and load centers, such as motors, lighting and convenience power. In general, large

motors and equipment will be served at 480V, 3 phase; lighting at 277V; outlets and small equipment at 120V. All distribution equipment will have integral transient surge suppression or TVSS to protect costly lab equipment from damage due to surges.

Panelboards

Panelboards will be provided in vertically stacked electrical rooms. The electrical rooms are centrally located as much as possible, while taking into account other building and architectural considerations. There is one electrical room per floor. Panelboards serving normal lighting and outlet circuits are located on the same floor as the circuits they serve. All branch panelboards will have hinged front covers, as opposed to screw-on or latching covers. Panelboards will be installed outside each lab for convenience. Common area loads will be served by the panels located in the electrical room. Small 480/277V and 208/120V distribution panelboards will be located on each floor to accommodate future growth and special equipment power requirements. All distribution and branch panels shall have copper only mechanical lugs.

Spare Capacity

Switchboards, panelboards, transformers and other distribution equipment will be provided with 25% spare capacity and 100% spaces/spares for future growth and flexibility. Electrical equipment rooms will have 25% additional space for future equipment.

### Branch Circuits

Branch circuits will be loaded to no more than 80% of what is allowed by NFPA 70. Where outlets are intended for a specific piece of equipment, the load of the outlet will be based on the equipment nameplate. Otherwise, no more than 6 convenience outlets per circuit or 4 outlets per circuit serving workstation computer terminals, on average, will be used. Sufficient capacity for plug-in task lights and other peripherals typical of desk items will be provided. Outlets with dedicated branch circuits (one outlet per circuit) are provided for vending machines, copy machines, break room counters, refrigerators, dishwashers, A/V cabinets and other locations likely to have equipment requiring dedicated circuits. Each branch circuit homerun will have no more than 3 circuits per raceway. All branch circuits shall have dedicated neutrals.

### Metering

Metering will be utilized to track the electrical energy use of the building by load type. System meters will be used to monitor total building usage in addition to sub-system metering to determine the energy used for lighting, plug loads and large equipment.

### Conductors

All conductors will be copper. Conductors for branch circuits will be sized to prevent voltage drop exceeding 3% at the farthest load. The total voltage drop on both feeders and branch circuits will not exceed 5%. When calculating the voltage drop, the load will be assumed to be at the most distant outlet and 80% of the ampacity of the branch circuit and feeder conductors.

### Raceways

All raceways are minimum ¾" conduit. Conduit is not allowed to be embedded in elevated concrete slabs. Cable tray system will be such that raceways do not extend more than 50' (approx.) to cable tray. Conduits will be stubbed to the cable tray and contain pull strings. Raceway is included for all security, audio/visual, and technology systems whether furnished as part of the construction contract or furnished by the Owner. The use of MC-Cable is strictly prohibited.

### Fault Current and Coordination Study

A fault current and coordination study will be performed to indicate available fault current at all points in the distribution system. New equipment will be rated for the amount of available fault current. Fuses or breakers will be selected to ensure minimum system outage due to overloads or fault currents. Set breakers with adjustable long time, short time, instantaneous and/or ground fault settings for optimum system coordination. Per the 2008 NEC, emergency systems will be selectively coordinated.

### Transient Voltage Surge Suppression

Transient voltage surge suppression (TVSS) and "noise" protection is provided at service equipment (each main), main 120/208V distribution panelboards and all branch panelboards in the facility. TVSS units will be integral to the panelboard or switchboard.

It is recommended that additional surge strips be provided under the furnishings and equipment budget on an as-needed basis. The surge strip should be commercial-grade quality and have at least 26 kA per phase maximum surge rating.

### Outlets

Outlets will be 20A, minimum. Unless noted otherwise, the following will be used as a general guideline where more specific requirements are not elsewhere identified. Each outlet location will be coordinated with the design team and end user during design. Where the term "outlet" is used, this refers to a 20A duplex receptacle outlet (unless otherwise noted).

- Classrooms, Lecture Halls and other Instructional Spaces: Provide outlets for instructor's station, audio/visual equipment and each student. Ensure that there is at least one duplex outlet for each 10' of wall space. Provide floor outlets where stations or equipment cannot be served directly from the wall without crossing aisle space. Where tables are fixed in place, coordinate power outlets mounted directly into the millwork.

- Student Commons, Lounges and Study Areas: Provide power outlets for laptop computers, at least one duplex for 20% of user seats, but no less than one outlet per each 12' of wall space. Provide floor outlets where stations or equipment cannot be served directly from the wall without crossing aisle space.

- Offices: For each workstation, provide one outlet dedicated to computer terminals and one normal outlet, and one additional normal outlet for every 10' of wall space. Provide sufficient outlets to accommodate task lighting for all staff workstations.

- Conference and Rooms: One outlet for every 10' of wall space, plus one outlet dedicate to computer terminals on two walls. Provide floor outlets underneath conference room tables. Coordinate installation of outlets in conference table tops with furniture/ millwork.

- Lounges/Breakrooms/Kitchenettes: GFI Outlets on dedicated circuits every 4' on counter top plus dedicated outlets for refrigerator, microwave, dish washer, ice machine and disposal (switched at counter top), plus one outlet for every 10' of other wall space in room.

- Counter tops (in general): One outlet every 4'; GFI where within 8' of a sink.

- Main Computer/Server/MDF: Several outlets on emergency power with circuit density to allow for at least 100 watts per square foot. Coordinate exact quantity required with the User groups and the anticipated equipment, including future provisions as well. Rack-mounted surge/outlet strips are assumed to be provided by others.

- Telephone/Data Closets (IDF): At least 6 quad outlets on emergency power with circuit density to allow for at least 50 watts per square foot. Provide a minimum 6-outlet surge/power strip in every equipment rack. Power these closets will be evaluated and coordinated with the User groups during the design.

- Electrical Rooms: At least one outlet on emergency power.
- Restrooms: One GFI outlet on wall adjacent to sink at counter height, plus one remote from sink at standard height for breast pumps, vacuum cleaner or power scrubber. Confirm final location with UVSC.
- Corridors, Lobbies: Provide at least one outlet every 15', on alternating sides of the corridor or lobby.
- Stairs: One outlet at each landing and intermediate landing.
- Storage Rooms (small), Janitors Closets: One outlet, near light switch.
- Building Exterior: One WP/GFI convenience outlet near each entrance, or a minimum of every 120 feet; additional outlets as needed for special events. Coordinate with users during design.
- Lab spaces: Outlet locations will be coordinated with RFD at each work bench.
- Other Areas: Refer to individual space plan data sheets, and where not defined allow one outlet for each 40 square feet of space and coordinate requirements with user during design.

### Grounding

All feeder and branch circuit raceways will include an insulated equipment grounding conductor. Provide a grounding riser system throughout the telecommunications closets, with grounding bus bars mounted accessibly in each closet. All grounding systems will be bonded together per NEC requirements. A ground bar will also be provided in each electrical room/ closet. The grounding system of the addition will be bonded to the existing grounding system of the existing south tower.

The need for a lightning protection system will be determined by the recommendations of NFPA 780 by conducting a study and discussions with the University facilities staff.

### Emergency Service and Distribution

An emergency diesel generator is provided for the new addition and will also be sized to support the existing emergency power requirements of the existing south tower and will replace the existing 125 kW generator located in the basement of the existing south tower. Generator will be outdoors in a screened area with weather-protective, sound-attenuating housing and skid-mounted, double-walled tank. Fuel supply will be minimum 12 hours at full load. Design at least two transfer switches: one for emergency and one for non-emergency ("stand-by") loads. Annunciate alarms adjacent to fire alarm panel. Design generator distribution panel with digital metering. The following will be provided with emergency power:

- Emergency egress and exit lighting
- Fire Alarm
- Elevators – Existing
- Communications and Server rooms (including main computer room) – outlets, lights and air conditioning
- Electrical rooms – lights and outlets
- Security systems
- Mechanical systems serving critical collections
- Plugs at specific locations in labs as determined by RFD and the users

## LIGHTING DESIGN CRITERIA

The lighting approach will meet the LEED requirements. In addition, there are a number of standards, some codified, that guide the lighting requirements in the addition. Construction codes like the IBC-2003 and the NEC-06 will guide the installation and emergency lighting in the building. The energy code IESNA/ASHRAE 90.1-04 and LEED will govern the amount of energy used and the control of lighting in the building. There are recommended practices from the Illuminating Engineering Society of North America that will guide the application of light and daylighting in the building. A partial list of these include;

- RP-01-04 American National Standard Practice for Office Lighting
- RP-5-99 Daylighting
- RP-3-00 Lighting for Educational Facilities
- HB9-00 IESNA Lighting Handbook - 9thEdition

### Interior Lighting

Lighting in a multi use building as this must be suitable to many tasks and as such must be flexible. Illuminance (the amount of light) will comply with the program and with the tasks at hand. For example, lighting in the Laboratory/ Classroom areas must be arranged to provide adequate lighting at the lab bench. Because these lights are on many hours each day, long life and exceptionally energy efficient versions of fluorescent lighting will be used for this area.

General Circulation areas are very important in this building. They transport visitors from one area to another, provide display and meeting areas, and generally dictate the overall “feeling” or statement to the visitors to the building. Being a high profile area, lighting will be a high order of quality, complete color rendition, and very comfortable to the occupants. Portions of these areas may extend into tall atrium areas which make maintenance a serious consideration. This is an area appropriate for decorative lighting fixtures, which will contribute to the ambience of the area.

Of course the major task in this building is reading. Leisurely reading, quick reading, even electronic reading all have to be accommodated. These activities share many characteristics as they have common and different lighting requirements. Glare, for example, must be minimized for all of these reading tasks. Paper based reading tasks requires more lighting than reading video displays. The risks of fatigue and headaches increase if the lighting is inappropriate for the task. Some “lounge type” reading areas are best lighted by direct lighting, others mostly electronic reading tasks are best lighted by uniform indirect lighting with lower illuminance levels. Circulation desks, workrooms, and classrooms require uniform comparatively higher lighting levels for rapid accurate reading of labels and operational paperwork.

70 Footcandles should be achieved at work benches, 30-40 footcandles at offices and conference rooms and down to 20 footcandles in circulation spaces.

Daylighting is available for many of these areas, but applied with care. Veiling Reflections (a type of disability glare) must be controlled. Heat and damaging ultra-violet rays in all light must be filtered or otherwise controlled.

Instructional spaces require lighting that is suitable for the task, i.e. front of room or white board enhanced lighting. All lighting in these rooms will be zoned for selective switching to meet the multiple needs for lighting in these rooms. Direct lighting sources are used for these spaces.

Spaces are in constant use and as such all sources will be selected for as long life as is practicable, and mounted in accessible locations. This will be a LEED certified building and as such the goal is to surpass the requirements of energy codes. Since the lifetime cost of energy and maintenance is generally considered to be thirty times the cost of initial installation, long term costs will be carefully considered.

Exit and egress lighting will comply with IBC. Emergency lighting for means of egress will be 1 fc Average to comply with IBC. Emergency lighting will be included in restrooms, electrical rooms, vaults and communication rooms. Where emergency lights are required in rooms with audio/visual, emergency transfer ballasts will be used that allow the emergency light to be switched off and then automatically turned on in a power failure.

In summary, lighting for the addition is complex, requiring many lighting solutions carefully matched to the task without losing sight of emergency and maintenance and operations.

The general approach to lighting will be to minimize the ambient lighting levels by maximizing local task lighting to meet the foot candle requirements for the task being performed.

Care will be taken to avoid installing fixtures in locations that make it difficult to maintain for the operation and maintenance staff.

The selection of lamps and light sources will be done such that it minimizes the variety and type making it easy for the operation and maintenance staff to stock replacement lamps and fluorescent lighting ballasts.

### Exterior Lighting

Exterior lighting will be mostly limited to building mounted lighting at access points to the building in the event that some site lighting is required the campus standard lighting fixtures will be used for walkways, parking and roadways, compatible with the campus surroundings.

### Lighting Control

All lighting fixtures in the building – interior and exterior – will be automatically controlled. Interior spaces that are enclosed will use occupancy sensors with manual on/off control. For large open areas such as common areas, corridors and laboratory areas the lighting will be controlled through a programmable lighting control system that is interfaced with the building automation for time schedule control. Where appropriate, daylighting will be harvested with interior photocells that will measure the amount of available daylight, and cut back on the artificial illumination. Rooms with audio/visual will have multiple levels and zones of control to allow the lighting levels to be adjusted, appropriate for AV presentations. All automatically controlled spaces will have manual over-ride buttons located near the entrance to the space for after hours operation. The lighting control system will be programmed to give a warning flash at a given time prior to turning off the lights so any occupants still in the building can plan accordingly. Exterior lighting will be controlled through the programmable lighting control system that is interfaced with the building automation system. The building automation system will use photocell inputs and time schedule control to optimize use.

## TELECOMMUNICATION RACEWAY CRITERIA

### Riser Distribution

Stacked telecommunications closets are provided to serve each floor of the building. Equipment layout and wall space will be coordinated with the Campus. Closets are located such that when cabling is routed through the raceway system provided, no cable length will exceed 290' regardless of the path. Consideration was given to the ease and accessibility of running new and future raceways and cables out of each room. Four 4" conduits from the MDF to the stacked IDF locations are provided and four 4" sleeves between floors. Both normal and emergency circuits are provided to each IDF, 3 each, with one fourplex per circuit. The air conditioning for these rooms will be on the generator.

### Horizontal Distribution

A cable tray distribution network is provided throughout each floor and into the IDF closets. Cable tray will be routed above corridors, common and similar areas. In all ceiling areas where accessible, provide ladder-type tray to match existing campus standard. Where ceilings are inaccessible, provide an equivalent conduit system bridging cable trays in accessible ceilings. It will be the designer's responsibility to size the cable tray and raceway system for the intended cabling installation. Specify that cable runs take routes that will limit the total cable distance, between termination end points, to 290' or less.

### Voice/Data Drops

Each voice/data outlet location will consist of a 4" square box with two gang mud ring and one 1" conduit stubbed to the nearest cable tray. Refer to program space plans for quantities and coordinate exact locations with the users during design. As a minimum, provide one voice/data drop for each workstation, fax machine, copy machine, vending machine, desk, computer terminal and teaching station. Allow one voice/data box per 80 square feet for areas that are not specifically defined. Where wireless networks are designed for student access, still allow sufficient empty raceways for future hardwired connections should the wireless system have insufficient bandwidth for evolving applications.

## TECHNOLOGY SYSTEM CRITERIA

### Technology Codes and Standards

Codes which are applicable to the design of the technology systems are listed below.

- ADA, Americans with Disabilities Act
- DFCM, Division of Facilities Construction and Management, Design Criteria
- EIA/TIA, Electronics Industries Association/Telecommunications Industry Association
- IBC 2000, International Building Code
- NFPA, National Fire Protection Association (applicable sections including but not limited to):
- NFPA 70, National Electrical Code
- NFPA 72, National Fire Alarm Code
- UL, Underwriter's Laboratories
- IEEE Compliance: Comply with applicable requirements of IEEE 208
- Utah State Fire Marshal Laws, Rules and Regulations

Standard Broadcast Wiring and Installation Practices", as excerpted from "Recommended Wiring Practices," Sound System Engineering, (2nd Edition), D. Davis

The Basics of Audio and Visual Systems Design, Revised Edition, Ray Wadsworth / International Communications Industries Association, INC.

## A/V SYSTEM CRITERIA

Audio/Video systems will be provided for the large conference/seminar room located on the 4 floor in addition to the other smaller conference spaces through-out the building. The system requirements will be coordinated with the users to ensure that these systems meet the intended functions of these spaces. Control systems will be provided in rooms with complex systems making them easier for users to interface and control.

### Access Control System

An access control system will be provided to control access to the building, corridors and other restricted areas as defined by the users. The access control system will be compatible with the existing system to avoid having to issue additional proximity cards to students and staff.

### CCTV System

A security camera system will be provided to monitor main access points into the building and other sensitive/restricted areas as directed by the users. Video will be captured via network connected DVR's to facility remote access and monitoring by campus police or other security staff.

### Distributed Antenna System

The users have expressed the desire to address poor cell phone reception on the basement level. One way of addressing this would be the installation of a distributed antenna system. At this time it is expected that such a system would be provided by U of U NETCOM.

## ACOUSTICAL CRITERIA

The design of the structural, mechanical and electrical systems shall address and mitigate the airborne and structure-borne transmission of noise from building sources. Most significant sources of noise are:

- Elevator equipment: motor/winch lifting assemblies and motor/generator sets of traction elevators or motor/tank/pump assemblies of the hydraulic elevators.
- Rotating and reciprocating equipment such as fans, compressors, pumps, and chillers.
- Fan noise transmitted through the building structure or through the duct system.
- Duct noise generated by pressure fluctuations caused by fan instability or turbulence resulted from abrupt change of direction in the duct system.
- Noise generated by air flowing past dampers, turning vanes, and terminal device louvers.
- Water circulation system noise caused by high velocities or sudden pressure changes.
- Magnetostrictive hum associated with the operation of electric motors, transformers, switchgear, lighting ballasts and dimmers.

The noise reduction methods should include:

- Sound absorption partitions,
- Selection quiet equipment,
- Selection of adequate velocities in piping and duct systems,
- Flexible pipe, duct or conduit paths or connections,
- Sound absorption and vibration isolating equipment,
- Isolated pipe and duct supports

The recommended NC levels for various spaces in non-occupied rooms with laboratory equipment off are presented in the table below.

Table N1-Recommended NC Levels in Laboratory Facilities

| **Area** | **NC Level** |
|---|---|
| Research laboratories | 40-45 |
| Teaching Laboratories | 45 |
| 36 inches in front of fume hoods | 50 |
| Audiology and pathology laboratories | 25 |
| Classrooms | 30-35 |
| Offices | 35 |
| Conference rooms | 25-30 |
| Corridors and support areas | 45 |
| Research animal housing areas | As required by animal species |

## COMMISSIONING CRITERIA

### Commissioning Role

The state of Utah will hire a Commissioning Agent (CxA) as a part of the project team. The CxA will be engaged in the project from design development through construction and final training and be available to the owner through the one year warranty period, after substantial completion. The initial role of the CxA is to verify that the project design meets the Owners Project Requirements (OPR), as outlined in this document and subsequent owner documents, as well as the building systems Basis of Design (BOD). This will be completed through reviews of the construction documents at the design development and construction document phases of the project design. The CxA does not have the power to make or approve changes to the design, but they will suggest modifications and clarifications to be made to the project design, which will be coordinated and implemented by the project team.

The Commissioning Agent will also observe and track the installation of building systems to provide the owner verification that the building systems are installed and functioning efficiently and properly prior to building occupancy. According to the State of Utah Preamble for Commissioning, "The CxA is not to replace the design architect and engineers in verifying that the work is constructed per the plans and specifications. They are to supplement the efforts of the design team. Close communication and coordination between the design team, the CxA and DFCM is required. It is the intent for the design team to continue to do both interim and final inspections noting items that do not comply with code or with the contract documents."

**Commissioned Systems**

Per the State of Utah Requirements, the following systems will be commissioned:

- Electrical Systems
- Mechanical and Plumbing Systems
- Operable Building Control Systems
- Audio and Visual Systems
- Telephone and Data Systems
- Building Security Systems
- Elevators and Conveyance Systems
- Scheduled or Occupancy Sensor Lighting Controls
- Daylight Dimming Controls
- Refrigeration Systems
- Emergency Power Generators and Automatic Transfer Switching
- Uninterruptible Power Supply Systems
- Life Safety Systems (fire alarm, egress pressurization, fire protection, smoke evacuation)
- Domestic and Process Water Pumping and Mixing Systems
- Equipment Sound Control Systems and Testing
- Paging Systems
- Renewable Energy Generating Systems
- Building Envelope Systems

In addition to the above systems, the laboratory equipment and systems, emergency systems and hardware systems will all be commissioned to guarantee the systems perform as designed.

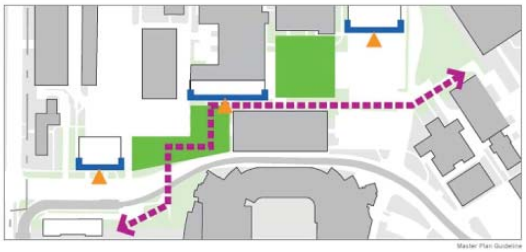
## LANDSCAPE DESIGN CRITERIA

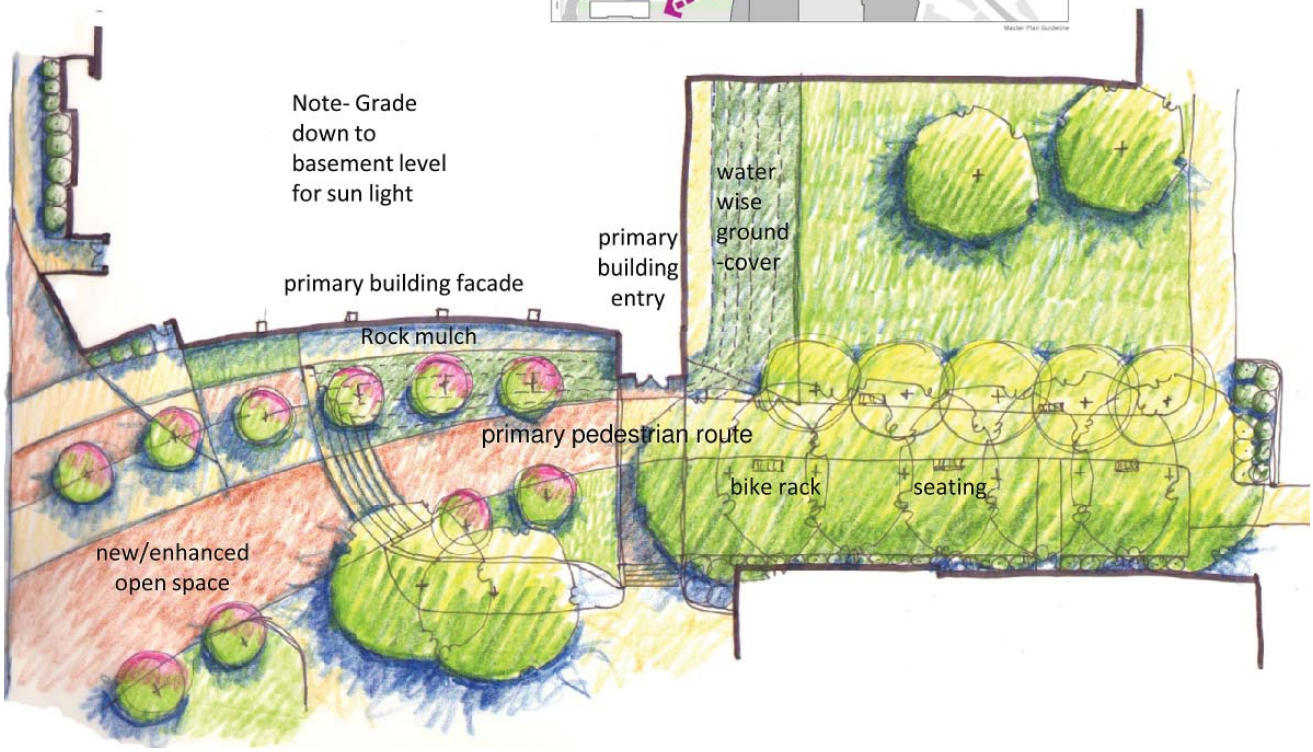
### Site Opportunities and Constraints

The existing site grades allow for seating to be made along the west existing retaining wall with an average height of 3 ft, which in turn creates an "amphitheater" of steps or seating opportunity. Level 0 of the building is below grade, however we have the run distance to pull the grade back at a 3:1 slope and allow light in to the building and plant the slope and not need a retaining wall.

The location of the main entry aligns with the campus master plan, and will create an opportunity for the entry to be linked with a primary path to campus and Trax station.

The pedestrian corridor along the south side of the building will be enhanced by the building and landscape design. This corridor can be enhance by paving materials, site amenities such as benches, and terminate west down a set of stairs into a plaza and onto the trax station.





### Site Design Principles

The site will be designed to respond to the Campus Master Plan, which was presented in the site analysis section of this document. This will include providing an enhanced pedestrian connection between the Stadium Trax line and the core campus, along the south side of the project site.

Other key design principles include highlighting the building through the landscape design, incorporating science and the curriculum into the landscape to promote the building and landscape as a learning tool and providing useful outdoor spaces for building users to encourage interaction and support the exchange of information.

The existing campus landscape features and concepts will be integrated in the landscape design to ensure the outdoor space melds with other campus areas and goals. In addition, a hierarchy of public and private spaces (size, purpose, etc.) will exist. The design of outdoor spaces will also support day-to-day activities as well as special events – outdoor classroom, gatherings, forums, presentations, ceremonies and gala events for the Thatcher Addition.

### Landscape Zones

There will be a series of landscape zones on the site. These include the primary pedestrian corridor along the south side of the site, the green space east of the building and the plaza space which is envisioned to be a the southwest terminus of the pedestrian corridor. Some landscape zones will be primarily native and adapted plant materials, some will include turf and some will be primarily plaza and hardscape.

The hardscape or plaza areas will include planter boxes, site furnishings such as benches, waste receptacles and bicycle storage areas to encourage their use.

### Site Sustainability

The site design and soil conditions will be studied to see if stormwater retention and detention may be feasible. Ideally the project will be able to capture water from impervious surfaces and capture for re-use for irrigation systems. Other stormwater design options include reducing site imperviousness and increasing landscape and pervious surfaces to reduce stormwater needs.

Additional sustainable site considerations include:

- Reducing the albedo of paving materials and using appropriate plants to reduce the urban heat island effect
- Providing bicycle storage on site
- Creating a welcoming and useful outdoor space that compliments the building and is beneficial to the users.

Site pollution reduction through landscape will also be a priority for the project. Small steps such as using rock mulch in planting beds on slopes helps reduce erosion and dust pollution.

### Site Landscape Considerations

Planting and landscape considerations include using native and adapted vegetation, grouping similar plant materials based on water needs and locating plants in appropriate locations based on solar needs. All of these considerations will be implemented on the site to prolong the life of the plant materials and reduce water use needed for irrigation.

The plant material used will provide benefit to the building through shading of the south facade, framing views and accenting special areas within the building and on the site. In addition, plant materials will add color and texture to the site and be designed to provide interest and beauty year round.

The project irrigation system will tie into the University Central Control System to take advantage of the campus weather station and use drip systems where feasible. Alternative water sources for landscape irrigation will be explored. These include daily flush from the evaporative cooling system and stormwater from roofs and impervious surfaces.

Lastly, it is a priority to save existing mature trees by grading techniques spay and replant or relocate on site or on campus.

# 4.0 Space Requirements

## SPACE PROGRAM AND AREA SUMMARY

The following space information has been completed at the programming level. The schematic design may vary from from these numbers slightly, but is in keeping with the allocated areas.

| | | 2005 Master Plan | July 27, 2010 |
|---|---|---|---|
| **1.0 Chemistry Labs** | | | |
| Teaching Laboratories | | 2,662 | 2,350 |
| Research Laboratories | | 6,305 | 6,760 |
| Laboratory Support | | 3,723 | 4,170 |
| | | | |
| Subtotal Chemistry Lab Area | | 12,690 | 13,880 |
| **2.0 Classrooms** | | | |
| Classroom Spaces | | 0 | 2,625 |
| Computer Spaces | | 1,321 | 0 |
| Support Spaces | | 0 | 275 |
| | | | |
| Subtotal Classroom Area | | 1,321 | 2,900 |
| **3.0 Offices** | | | |
| Offices | | 2,991 | 4,125 |
| Student Spaces | | 4,608 | 1,952 |
| | | | |
| Subtotal Office Area | | 7,599 | 6,077 |
| **4.0 Meeting / Collaboration** | | | |
| Conference Rooms | | 756 | 825 |
| Collaboration Spaces | | 197 | 1,005 |
| | | | |
| Subtotal Meeting / Collaboration Area | | 953 | 1,830 |
| **Total Net Square Footage** | | **22,563** | **24,687** |
| Assumed Net / Gross Ratio | | 0.59 | 0.58 |
| **Total Gross Square Footage** | | **38,242** | **42,564** |
| NIH Grant Gross Square Footage | | 40,915 | 40,915 |

## 1.0 Chemistry Laboratories

| Space Number | Space Name: | Quantity | Occupants | Space Net Area (Square Feet) | Total Program Net Area (Square Feet) | Comments |
|---|---|---|---|---|---|---|
| | | Space Requirements | | | | |
| **Teaching Laboratories** | | | | | | |
| 1.01 | Bio-Organic Chemistry Teaching Lab | 1 | 25 | 1300 | 1300 | |
| 1.02 | Instrumentation Teaching Lab | 1 | 13 | 950 | 950 | |
| 1.03 | Bioanalytical Chemistry Teaching Lab | 1 | 13 | 700 | 700 | |
| Subtotal | | 3 | 51 | | 2,950 | |
| | | | | | | |
| **Research Laboratories** | | | | | | |
| 1.11 | Bio-Organic Chemistry Research Lab | 4 | 28 | 700 | 2,800 | |
| 1.12 | Biophysical Chemistry Research Lab | 3 | 21 | 700 | 2,100 | |
| 1.13 | Bioanalytical Chemistry Research Lab | 2 | 26 | 930 | 1,860 | |
| Subtotal | | 9 | 75 | | 6,760 | |
| | | | | | | |
| **Laboratory Support** | | | | | | |
| 1.21 | Instrumentation Prep Lab | 1 | 3 | 470 | 470 | |
| 1.22 | Shared Instrument Room | 1 | 7 | 700 | 700 | |
| 1.23 | Core Instrument Room | 1 | 7 | 700 | 700 | |
| 1.24 | Stock Room | 1 | 4 | 600 | 600 | |
| 1.25 | Tissue Culture | 2 | 6 | 175 | 350 | |
| 1.26 | Cold room | 2 | 4 | 130 | 260 | |
| 1.27 | Bioanalytical Sample Prep | 1 | 3 | 550 | 550 | |
| 1.28 | Autoclave / Glasswash | 1 | 2 | 165 | 165 | |
| 1.29 | Equipment Room | 1 | 2 | 165 | 165 | |
| 1.30 | Radioisotope | 1 | 2 | 105 | 105 | |
| 1.31 | Confocal Microscopy | 1 | 2 | 105 | 105 | |
| Subtotal | | 13 | 42 | | 4,170 | |
| | | | | | | |
| **Total** | | | | | **13,880** | |

## 2.0 Classrooms

| Space Number | Space Name: | Quantity | Occupants | Space Net Area (Square Feet) | Total Program Net Area (Square Feet) | Comments |
|---|---|---|---|---|---|---|
| | | Space Requirements | | | | |
| **Classroom Spaces** | | | | | | |
| 2.01 | Seminar Room | 1 | 100 | 1,830 | 1.830 | |
| 2.02 | Active Learning Center | 1 | 28 | 795 | 795 | |
| Subtotal | | 2 | 128 | | 2,625 | |
| | | | | | | |
| **Computer Spaces** | | | | | | |
| 2.11 | Not Used | | | | | |
| Subtotal | | 0 | | | 0 | |
| | | | | | | |
| **Support Spaces** | | | | | | |
| 2.21 | Lecture Hall Storage | 1 | 0 | 140 | 140 | |
| 2.22 | Serving Area | 1 | 0 | 100 | 100 | |
| 2.23 | Audio-Visual Closet | 1 | 0 | 35 | 35 | |
| Subtotal | | 3 | 0 | | 275 | |
| | | | | | | |
| **Total** | | | | | **2,900** | |

## 3.0 Offices

| Space Number | Space Name: | Quantity | Occupants | Space Net Area (Square Feet) | Total Program Net Area (Square Feet) | Comments |
|---|---|---|---|---|---|---|
| | | Space Requirements | | | | |
| **Offices** | | | | | | |
| 3.01 | Faculty Office | 10 | 10 | 150 | 1,500 | |
| 3.02 | Visiting Faculty Office | 1 | 1 | 150 | 150 | |
| 3.03 | Post Doctorate Office | 3 | 9 | 145 | 435 | |
| 3.04 | Shared Student Office | 13 | 39 | 130 | 1,690 | |
| 3.05 | Administrative Assistant Office | 2 | 2 | 100 | 200 | |
| 3.06 | Core Lab Support Office | 1 | 1 | 150 | 150 | |
| | | | | | | |
| Subtotal | | 30 | 64 | | 4,125 | |
| | | | | | | |
| **Student Spaces** | | | | | | |
| 3.11 | Theory Student Cubicles | 34 | 34 | 48 | 1,632 | |
| 3.12 | Undergraduate Study Room | 1 | 12 | 320 | 320 | |
| | | | | | | |
| Subtotal | | 35 | 46 | | 1,952 | |
| | | | | | | |
| **Total** | | | | | **6,077** | |

## 4.0 Meeting / Collaboration

| Space Number | Space Name: | Quantity | Occupants | Space Net Area (Square Feet) | Total Program Net Area (Square Feet) | Comments |
|---|---|---|---|---|---|---|
| | | Space Requirements | | | | |
| **Conference Rooms** | | | | | | |
| 4.01 | Conference Room | 3 | 36 | 275 | 825 | |
| | | | | | | |
| Subtotal | | 3 | 36 | | 825 | |
| | | | | | | |
| **Collaboration Space** | | | | | | |
| 4.11 | Lounge | 3 | 60 | 335 | 1,005 | |
| | | | | | | |
| Subtotal | | 9 | 60 | | 1,005 | |
| | | | | | | |
| **Total** | | | | | **1,830** | |

### FULL TIME EQUIVALENT (FTE)

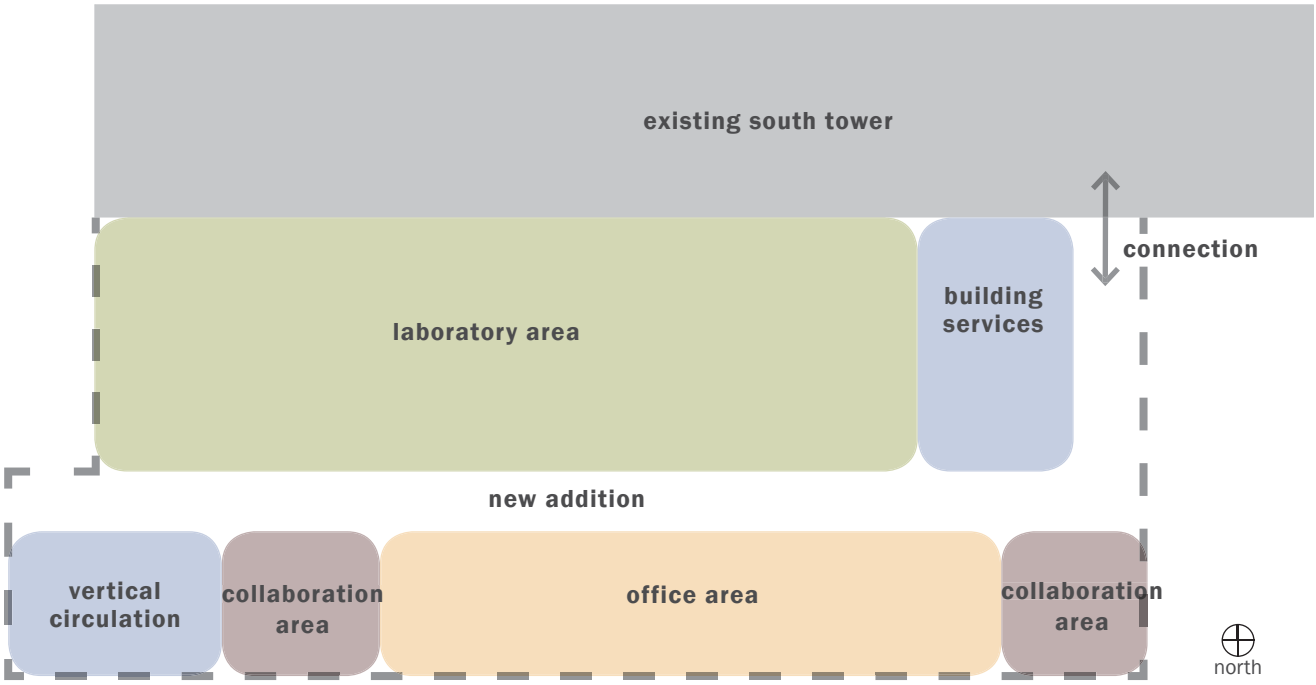
For LEED certification an FTE or full time equivilant occupant load is required. Based on the program areas and occupants, the following is an accurate FTE for the Thatcher Addition.

- Full time staff - 16
- Full time students - 118
- Part time students @ 4 hours/day - 192
- Maximum visitors - 224

FTE = 16+118+(192/2) = 230

## BUILDING ORGANIZATION

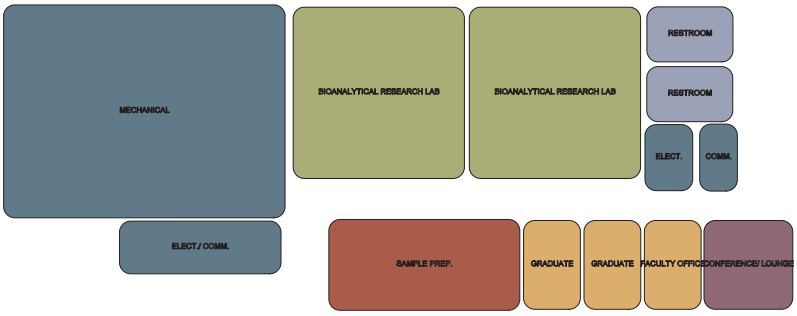
The building is an addition to the existing South Tower. The South Tower was originally designed to accommodate an addition, and has the core mechanical shafts located against the existing south wall. The Thatcher addition will take advantage of this shaft location and use the existing shafts for vertical circulation of mechanical duct work. The majority of the laboratory spaces will be located adjacent to the shaft, on the north side of the addition, to reduce the mechanical duct run. The offices and collaboration spaces will generally be located on the south side of the addition.



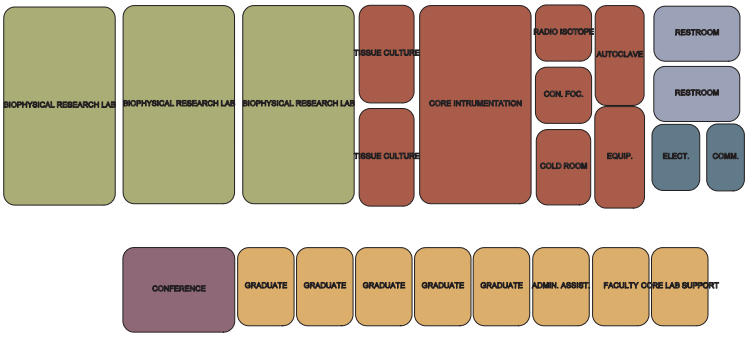

Building Organization Diagram

## 3D Stacking Diagrams

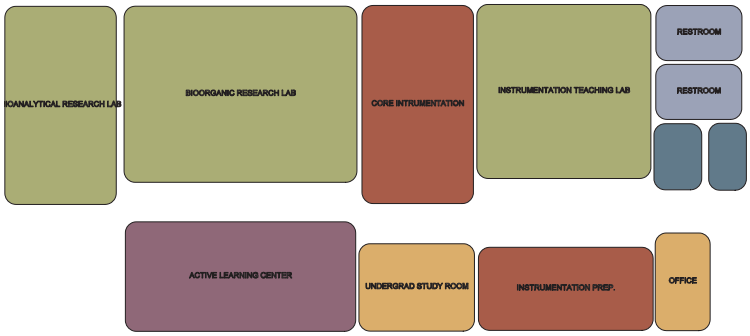
The following stacking diagrams represent the horizontal and vertical stacking and adjacencies for the Thatcher addition.



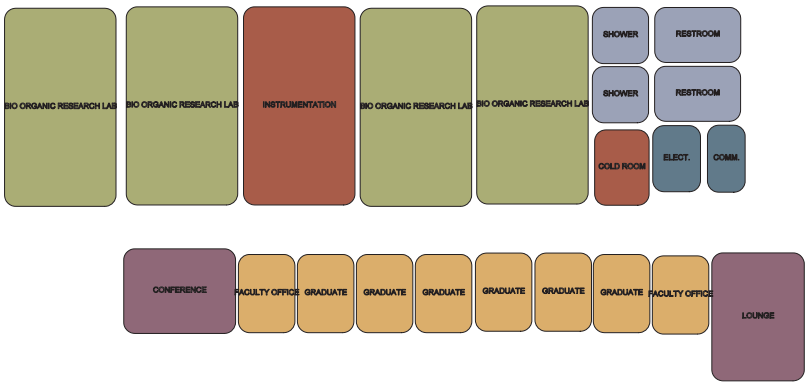

Level 0 Bubble Diagram



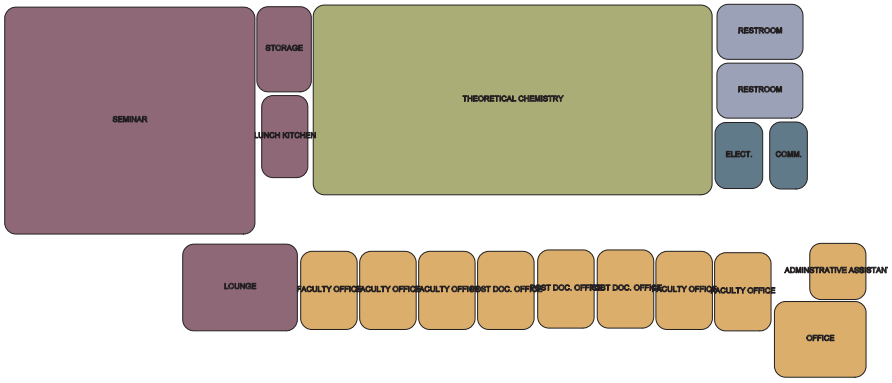

Level 1 Bubble Diagram




Level 2 Bubble Diagram



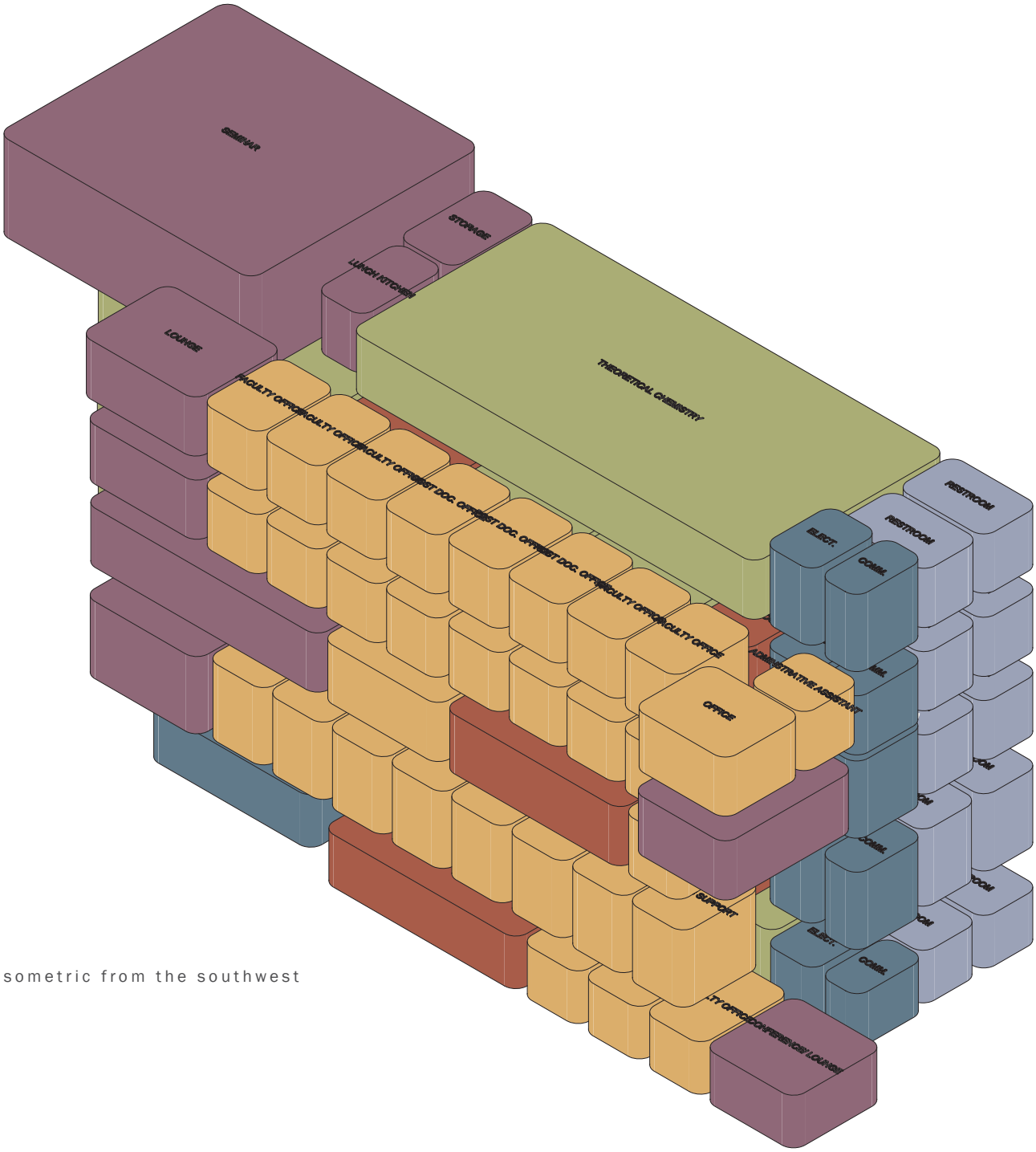

Level 3 Bubble Diagram



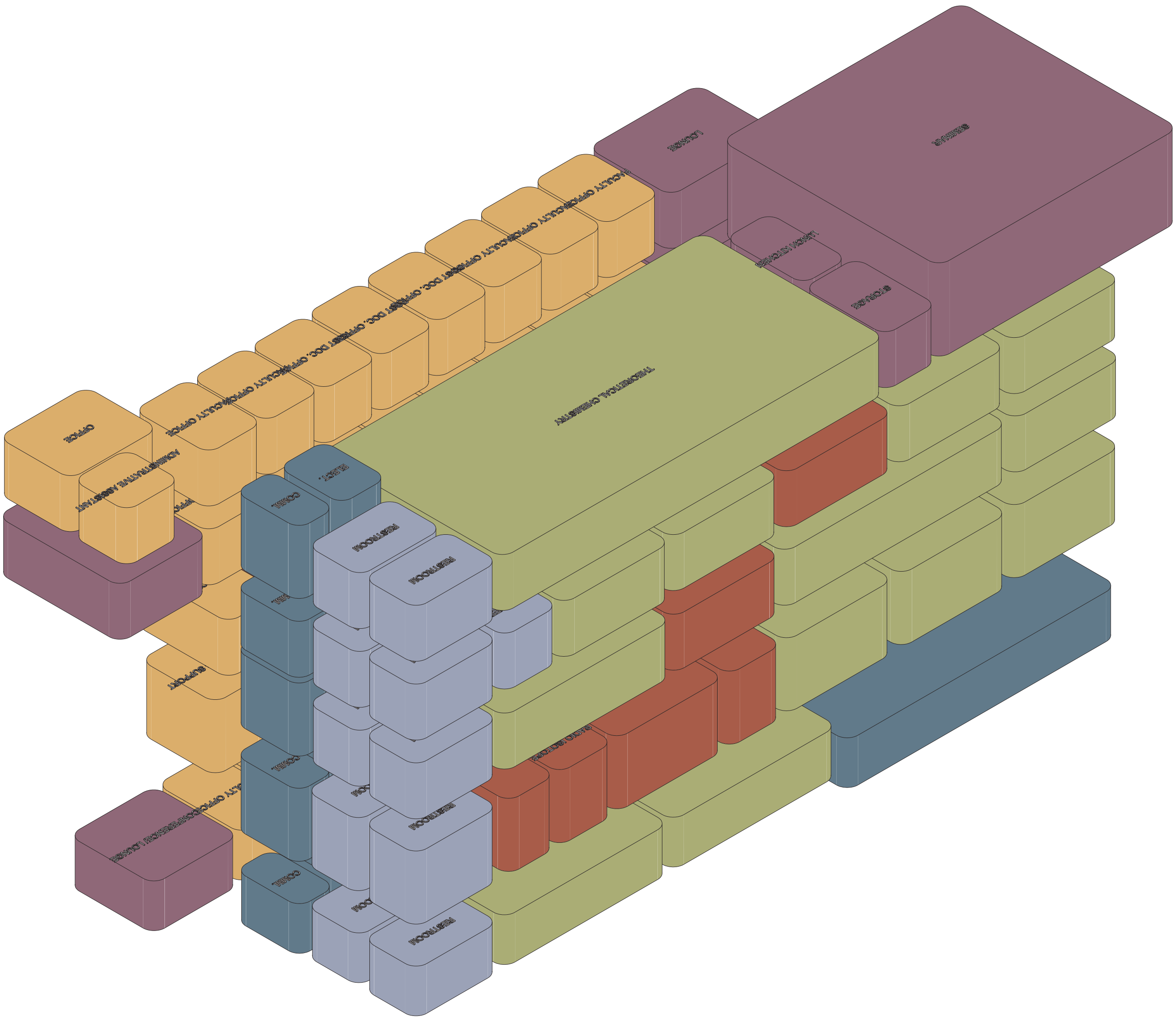

Level 4 Bubble Diagram

**Legend**

- *Laboratory*
- *Laboratory Support*
- *Office*
- *Collaboration*
- *Restrooms*
- *Building Services*




Isometric from the southwest



Isometric from the northeast

**Legend**

- *Laboratory*
- *Laboratory Support*
- *Office*
- *Collaboration*
- *Restrooms*
- *Building Services*

## DEPARTMENT AND KEY ADJACENCIES

The Thatcher Addition will be designed to facilitate interaction between biochemical disciplines as well as encourage collaboration within the facility. In addition, the building will be designed to put the sciences on display and highlight what is happening within the building. It is important that the undergraduate teaching laboratories and active learning center be highly visible to campus visitors passing by the building. To achieve this, these uses should be located on the first or second levels.

### Undergraduate Teaching Laboratories

The undergraduate teaching spaces, stock room and active learning center should all be located on one level.

### Core Laboratory

The Core Laboratory, which includes the Tissue Culture rooms, Confocal Microscopy, Radioisotope Microscopy, and Core Instrumentation as well as a Cold Room and Autoclave room. This Core lab area should be centrally located within the building and accessible to the South Tower to encourage it's use by all building occupants.

### Theoretician Open Office

The Chemical Theoreticians should be located on the top level as there is not a chemical need associated with these spaces. There is however, a need for a higher level of security and acoustic separation in this office area.

## SPACE SHEETS

The following space sheets present preliminary program level information for each building space based on workshops with users. Individual space configurations have been updated in the schematic design drawings.

The space sheets provide valuable information on equipment and finishes for each space and as such will be used as part of the owners project requirements. As the design develops, these sheets will be updated to reflect the actual design and needs of the individual spaces.

### ADA Accessibility

The building, and all spaces within the building will be designed to meet all accessibility requirements and guidelines. Although this is not directly stated on each space sheet, it will be an integral portion of the design.

## 1.01 Bio-Organic Teaching Lab

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 1300 |
| **Faculty** | 1 |
| **Students** | 24 |

**FUNCTION**

Provide laboratory teaching space for undergraduate bio-organic chemistry classes

**RELATIONSHIP / ADJACENCIES**

- Near Stock Room
- Adjacent to Active Learning Center
- Near Instrumentation Teaching Lab

**NON LAB EQUIPMENT / FURNITURE**

- Storage space for backpacks
- White board
- Projector

**NOTES:**

Provide views to exterior. Shared views through a corridor are acceptable.

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | See Laboratory Space Requirements |
| **Plumbing** | See Laboratory Space Requirements |
| **Ventilation** | See Laboratory Space Requirements |
| **Climate Control** | Yes - space to remain within ± 1°F |
| **Misc** | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | See Laboratory Space Requirements |
| **Outlets** | See Laboratory Space Requirements |
| **Lighting** | See Laboratory Space Requirements |
| **Other** | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Water resistant gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Sealed Concrete |
| **Ceiling** | Exposed, painted |

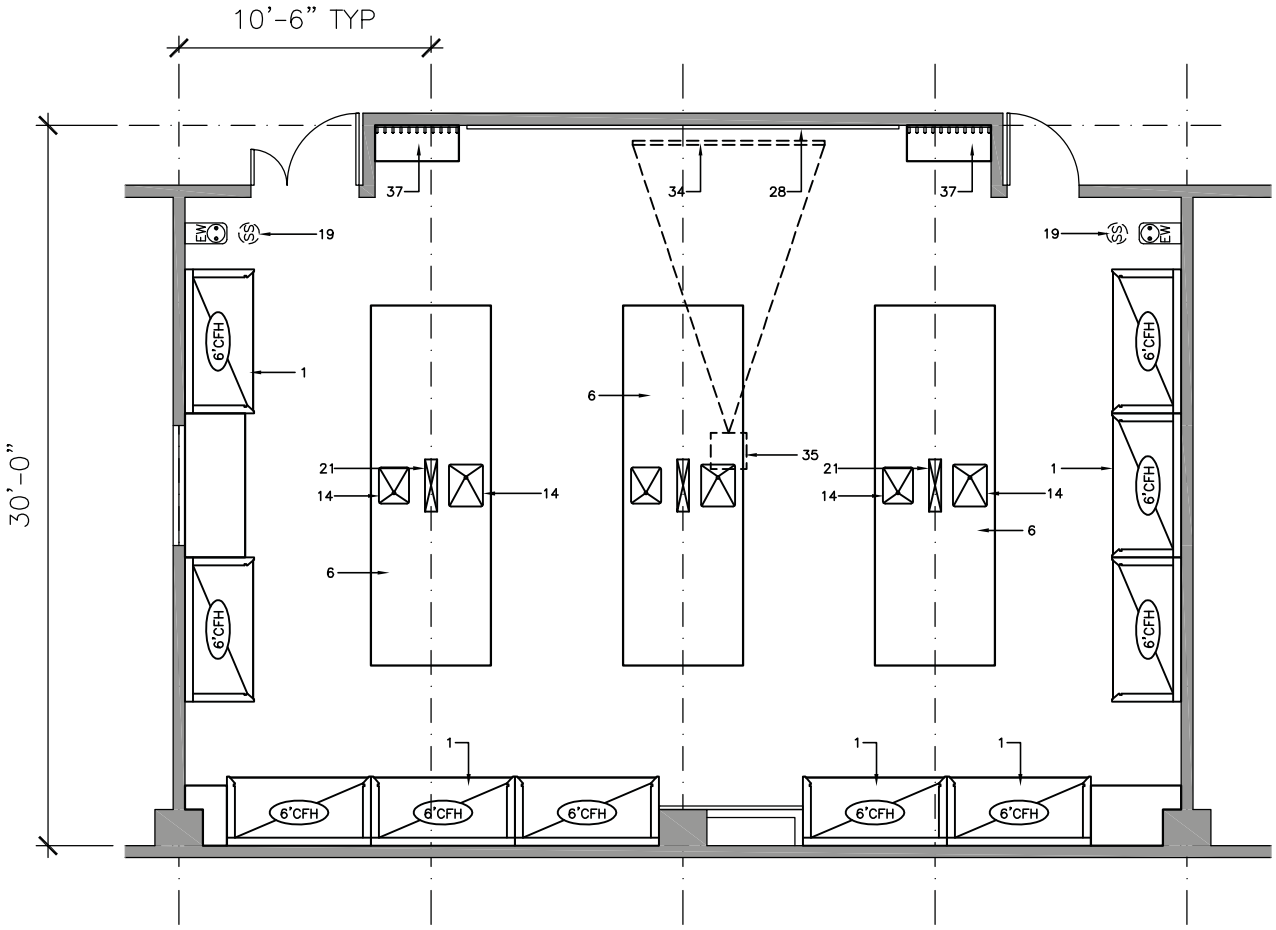
**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | $3^0$–$2^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | Aluminum storefront |
| **Electronics** | NA |

**SECURITY REQUIREMENTS**

Cameras in corridor to monitor for theft

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




0 1' 2' 4' 8'

**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 6 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

| HOODS | |
|---|---|
| Chemical Fume Hood | Note 1 |
| Radioisotope Hood | |
| Exhausted Laminar Flow Hood | |
| Biological Safety Cabinet | |
| Snorkel | |
| Canopy Hood | |
| Low Slotted Exhaust | |
| Equipment Exhaust | |

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

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | ● |
| Laboratory Vacuum (LV) | ● |
| Laboratory Air (LA) | ● |
| Compressed Air, 100 psi (A) | |
| Industrial Hot Water (IHW) | Note 2 |
| Industrial Cold Water (ICW) | Note 2 |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | Note 2 |
| Process Cooling Water | |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($C0_2$) | |
| Nitrogen Gas ($N_2$) | ● |
| Cylinder Gases | |
| Inert | |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | |
| Safety Shower/Eyewash (SS) | ● |
| Drench Hose (DH) | Note 2 |

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

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

| MOVEABLE EQUIPMENT | |
|---|---|
| Ovens | ● |

**REMARKS:**

1. (10) 6'-0" Chemical fume hoods
2. (6) Lab sinks (2 per bench)
3. Variacs at hoods

## 3D LAB IMAGE

3D Modeling was used to help the users visualize the Bio-Organic Teaching Lab. The image above illustrates one representation of this lab layout that was discussed.

## 1.02 Instrumentation Teaching Lab

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 950 SF |
| **Faculty** | 1 |
| **Students** | 12 |

**FUNCTION**

Provide instrumentation demonstration space for undergraduate chemistry classes

**RELATIONSHIP / ADJACENCIES**

- Adjacent to Stock Room (direct access)
- Adjacent to Instrument Prep
- Near faculty office

**NON LAB EQUIPMENT / FURNITURE**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | See Laboratory Space Requirements |
| **Plumbing** | See Laboratory Space Requirements |
| **Ventilation** | See Laboratory Space Requirements |
| **Climate Control** | Yes - space to remain within ± 1°F |
| **Misc** | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | See Laboratory Space Requirements |
| **Outlets** | See Laboratory Space Requirements |
| **Lighting** | See Laboratory Space Requirements |
| **Other** | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Water resistant gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Sealed Concrete |
| **Ceiling** | Exposed, painted |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | $3^0$–$2^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | Aluminum storefront |
| **Electronics** | NA |

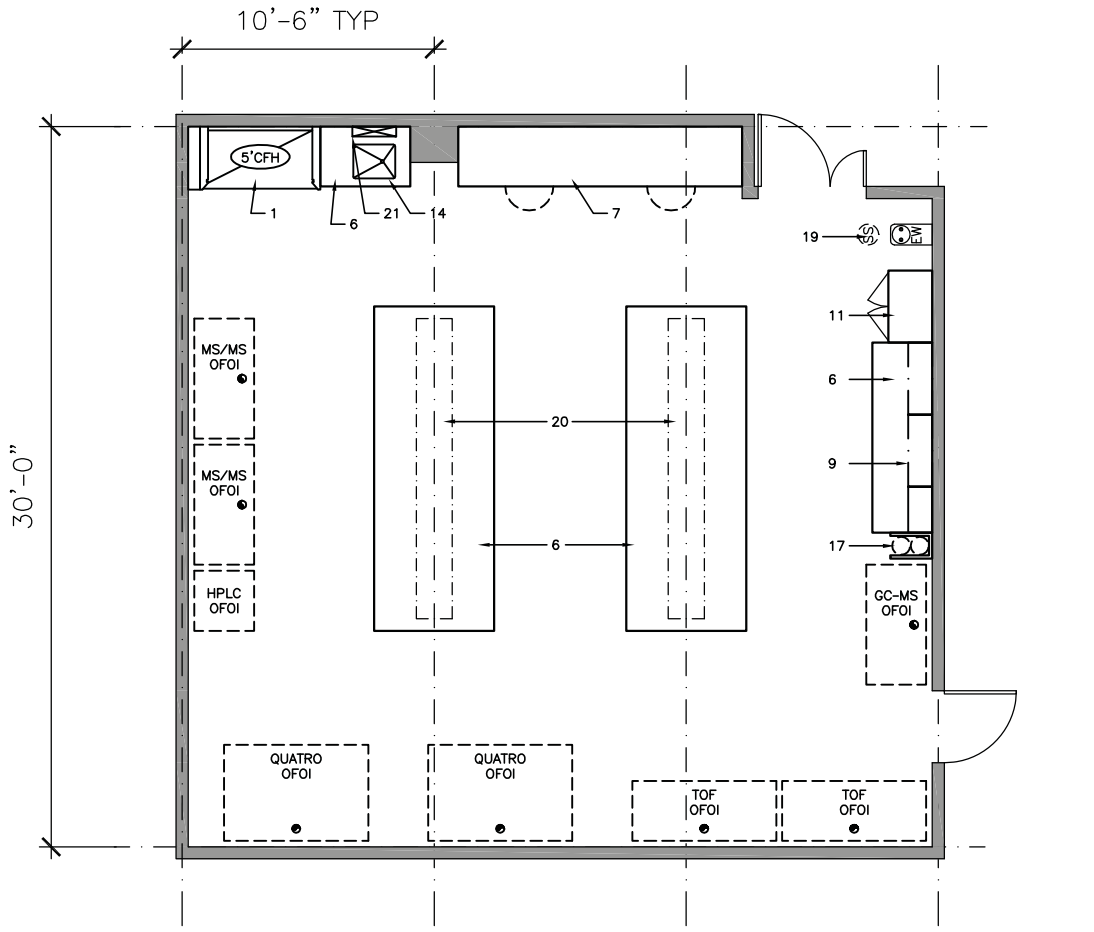
**SECURITY REQUIREMENTS**

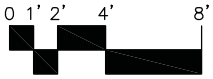
Cameras in corridor to monitor for theft

**NOTES:**

Provide views to lab from corridor

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




**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 6 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

| HOODS | |
|---|---|
| Chemical Fume Hood | Note 4 |
| Radioisotope Hood | |
| Exhausted Laminar Flow Hood | |
| Biological Safety Cabinet | |
| Snorkel | |
| Canopy Hood | |
| Low Slotted Exhaust | |
| Equipment Exhaust | ● |

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

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | ● |
| Laboratory Vacuum (LV) | ● |
| Laboratory Air (LA) | |
| Compressed Air, 100 psi (A) | |
| Industrial Hot Water (IHW) | ● |
| Industrial Cold Water (ICW) | ● |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | |
| Process Cooling Water | Note 2 |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($C0_2$) | |
| Nitrogen Gas ($N_2$) | Note 3 |
| Cylinder Gases | |
| Inert | Note 1 |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | |
| Safety Shower/Eyewash (SS) | ● |
| Drench Hose (DH) | ● |

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

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

| MOVEABLE EQUIPMENT | |
|---|---|
| GC-MS | (1) |
| HPLC | (1) |
| TOF-MS | (2) |
| Mass Spec/Mass Spec | (2) |

**REMARKS:**

1. Helium
2. For (2) mass spec/mass specs. Other Units are air-cooled.
3. 100 psig
4. (1) 5'-0" Chemical fume hood
5. Sound attenuating/absorbing material

## 1.03 Bioanlytical Chemistry Teaching Lab

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 700 SF |
| **Faculty** | 1 |
| **Students** | 12 |

**FUNCTION**

Provide laboratory teaching space for undergraduate bioanalytical chemistry classes

**RELATIONSHIP / ADJACENCIES**

- Near Stock Room
- Adjacent to Active Learning Center
- Near Instrumentation Teaching Lab

**NON LAB EQUIPMENT / FURNITURE**

- Storage space for backpacks
- White board
- Projector

**NOTES:**

Provide views to lab from corridor

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | See Laboratory Space Requirements |
| **Plumbing** | See Laboratory Space Requirements |
| **Ventilation** | See Laboratory Space Requirements |
| **Climate Control** | Yes - space to remain within ± 1°F |
| **Misc** | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | See Laboratory Space Requirements |
| **Outlets** | See Laboratory Space Requirements |
| **Lighting** | See Laboratory Space Requirements |
| **Other** | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Water resistant gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Sealed Concrete |
| **Ceiling** | Exposed, painted |

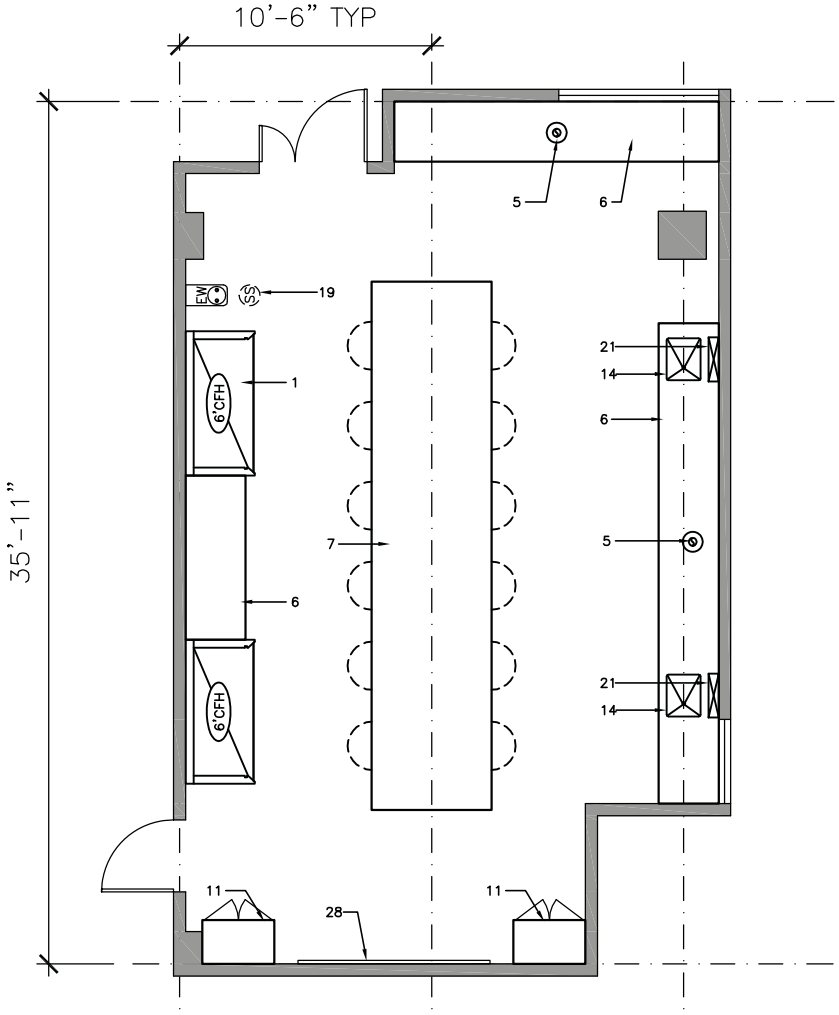
**WINDOWS, DOORS, HARDWARE**

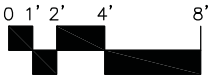
| | |
|---|---|
| **Doors** | $3^0$–$2^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | Aluminum storefront |
| **Electronics** | NA |

**SECURITY REQUIREMENTS**

Cameras in corridor to monitor for theft

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




**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 6 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

| HOODS | |
|---|---|
| Chemical Fume Hood | Note 1 |
| Radioisotope Hood | |
| Exhausted Laminar Flow Hood | |
| Biological Safety Cabinet | |
| Snorkel | |
| Canopy Hood | |
| Low Slotted Exhaust | |
| Equipment Exhaust | ● |

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

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | ● |
| Laboratory Vacuum (LV) | ● |
| Laboratory Air (LA) | ● |
| Compressed Air, 100 psi (A) | |
| Industrial Hot Water (IHW) | ● |
| Industrial Cold Water (ICW) | ● |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | ● |
| Process Cooling Water | ● |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($CO_2$) | |
| Nitrogen Gas ($N_2$) | ● |
| Cylinder Gases | |
| Inert | |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | |
| Safety Shower/Eyewash (SS) | ● |
| Drench Hose (DH) | ● |

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

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

**REMARKS:**

1. (2) 6'-0" Chemical fume hoods

## 1.11 Bio-Organic Chemistry Research Lab

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| **Quantity** | 4 |
| **Area** | 700 SF |
| **Faculty** | 1 |
| **Students** | 6 |

**FUNCTION**

Provide laboratory research space for bio-organic graduate classes

**RELATIONSHIP / ADJACENCIES**

- Near Instrumentation
- Near shared student offices
- Near faculty office(s)
- Provide a cold room on the same level
- Access to collaboration spaces

**NON LAB EQUIPMENT / FURNITURE**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | See Laboratory Space Requirements |
| **Plumbing** | See Laboratory Space Requirements |
| **Ventilation** | See Laboratory Space Requirements |
| **Climate Control** | Yes - space to remain within ± 1°F |
| **Misc** | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | See Laboratory Space Requirements |
| **Outlets** | See Laboratory Space Requirements |
| **Lighting** | See Laboratory Space Requirements |
| **Other** | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Water resistant gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Sealed Concrete |
| **Ceiling** | Exposed, painted |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | $3^0$–$2^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | Aluminum storefront |
| **Electronics** | NA |

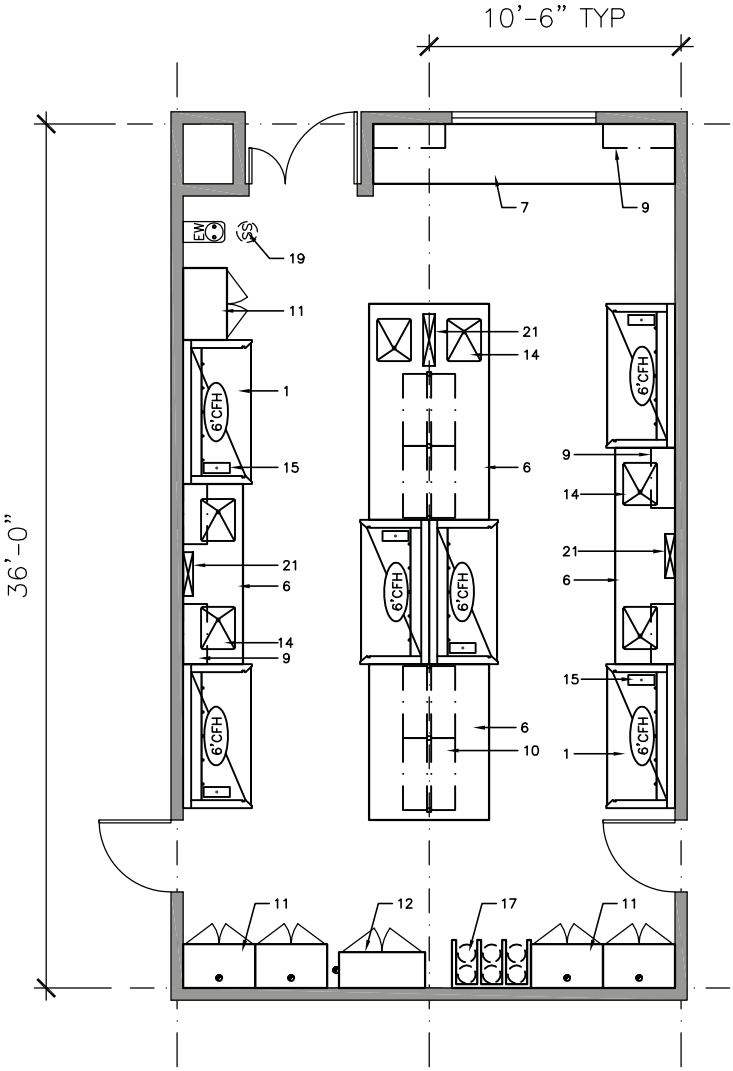
**SECURITY REQUIREMENTS**

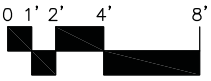
Cameras in corridor to monitor for theft

**NOTES:**

Provide views to the corridor.

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




**FURNISHINGS**

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

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

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

| HOODS | |
|---|---|
| Chemical Fume Hood | Note 1 |
| Radioisotope Hood | |
| Exhausted Laminar Flow Hood | |
| Biological Safety Cabinet | |
| Snorkel | |
| Canopy Hood | |
| Low Slotted Exhaust | |
| Equipment Exhaust | |

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

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | ● |
| Laboratory Vacuum (LV) | ● |
| Laboratory Air (LA) | |
| Compressed Air, 100 psi (A) | ● |
| Industrial Hot Water (IHW) | Note 2 |
| Industrial Cold Water (ICW) | Note 2 |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | Note 2 |
| Process Cooling Water | |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($C0_2$) | |
| Nitrogen Gas ($N_2$) | ● |
| Cylinder Gases | |
| Inert | |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | |
| Safety Shower/Eyewash (SS) | ● |
| Drench Hose (DH) | Note 2 |

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

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

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

| MOVEABLE EQUIPMENT |
|---|

**REMARKS:**

1. (6) 6'-0" Chemical fume hoods with lattice rod assemblies
2. (6) Lab sinks

## 1.12 Biophysical Chemistry Research Lab

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| **Quantity** | 3 |
| **Area** | 700 SF |
| **Faculty** | 1 |
| **Students** | 6 |

**FUNCTION**

Provide laboratory research space for graduate biophysical chemistry students.

**RELATIONSHIP / ADJACENCIES**

- Near Core Lab spaces
- Near shared student offices
- Near faculty office(s)
- Access to collaboration spaces

**NON LAB EQUIPMENT / FURNITURE**

**NOTES:**

Provide views to exterior. Shared views through a corridor are acceptable.

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | See Laboratory Space Requirements |
| **Plumbing** | See Laboratory Space Requirements |
| **Ventilation** | See Laboratory Space Requirements |
| **Climate Control** | Yes - space to remain within ± 1°F |
| **Misc** | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | See Laboratory Space Requirements |
| **Outlets** | See Laboratory Space Requirements |
| **Lighting** | See Laboratory Space Requirements |
| **Other** | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Water resistant gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Sealed Concrete |
| **Ceiling** | Exposed, painted |

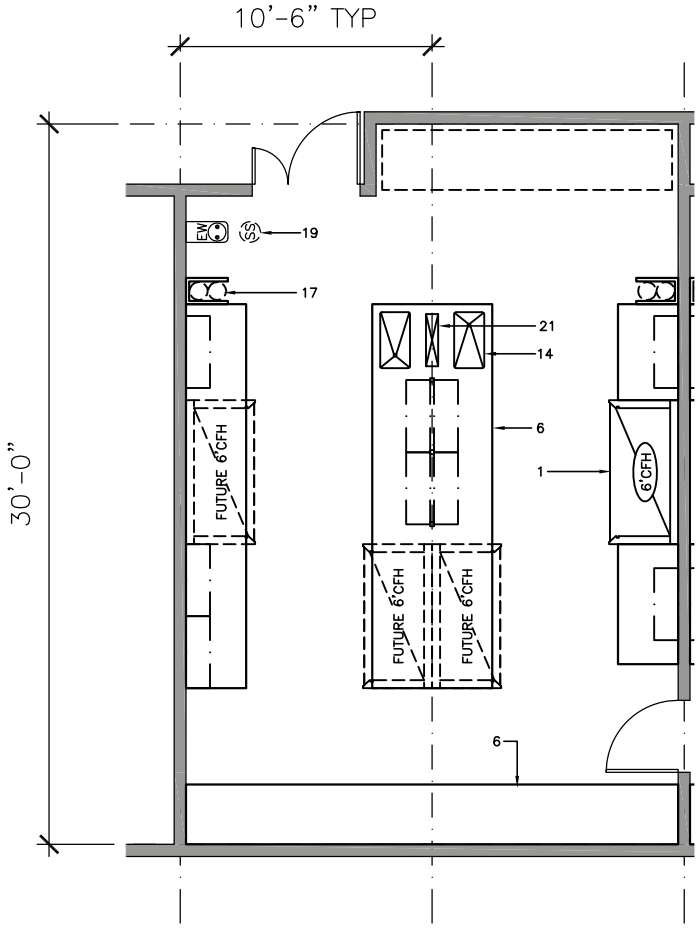
**WINDOWS, DOORS, HARDWARE**

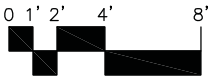
| | |
|---|---|
| **Doors** | $3^0$–$2^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | Aluminum storefront |
| **Electronics** | NA |

**SECURITY REQUIREMENTS**

Cameras in corridor to monitor for theft

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




**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 6 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

| HOODS | |
|---|---|
| Chemical Fume Hood | Note 1 |
| Radioisotope Hood | |
| Exhausted Laminar Flow Hood | |
| Biological Safety Cabinet | |
| Snorkel | |
| Canopy Hood | |
| Low Slotted Exhaust | |
| Equipment Exhaust | |

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

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | ● |
| Laboratory Vacuum (LV) | ● |
| Laboratory Air (LA) | ● |
| Compressed Air, 100 psi (A) | |
| Industrial Hot Water (IHW) | Note 2 |
| Industrial Cold Water (ICW) | Note 2 |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | Note 2 |
| Process Cooling Water | |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($C0_2$) | |
| Nitrogen Gas ($N_2$) | ● |
| Cylinder Gases | |
| Inert | |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | |
| Safety Shower/Eyewash (SS) | ● |
| Drench Hose (DH) | Note 2 |

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

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

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

| MOVEABLE EQUIPMENT |
|---|

**REMARKS:**

1. (1) 6'-0" Chemical fume hood; capacity for (3) future hoods
2. (2) Lab sinks

## 1.13 Bioanalytical Chemistry Research Lab

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| **Quantity** | 2 |
| **Area** | 930 SF |
| **Faculty** | 1 |
| **Students** | 12 |

**FUNCTION**

Provide laboratory research space for graduate bioanalytical chemistry students.

**RELATIONSHIP / ADJACENCIES**

- Near Bioanalytical Sample Prep
- Near shared student offices
- Near faculty office(s)
- Access to collaboration spaces

**NON LAB EQUIPMENT / FURNITURE**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | See Laboratory Space Requirements |
| **Plumbing** | See Laboratory Space Requirements |
| **Ventilation** | See Laboratory Space Requirements |
| **Climate Control** | Yes - space to remain within ± 1°F |
| **Misc** | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | See Laboratory Space Requirements |
| **Outlets** | See Laboratory Space Requirements |
| **Lighting** | See Laboratory Space Requirements |
| **Other** | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Water resistant gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Sealed Concrete |
| **Ceiling** | Acoustic ceiling tiles |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | $3^0$–$2^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | Aluminum storefront |
| **Electronics** | NA |

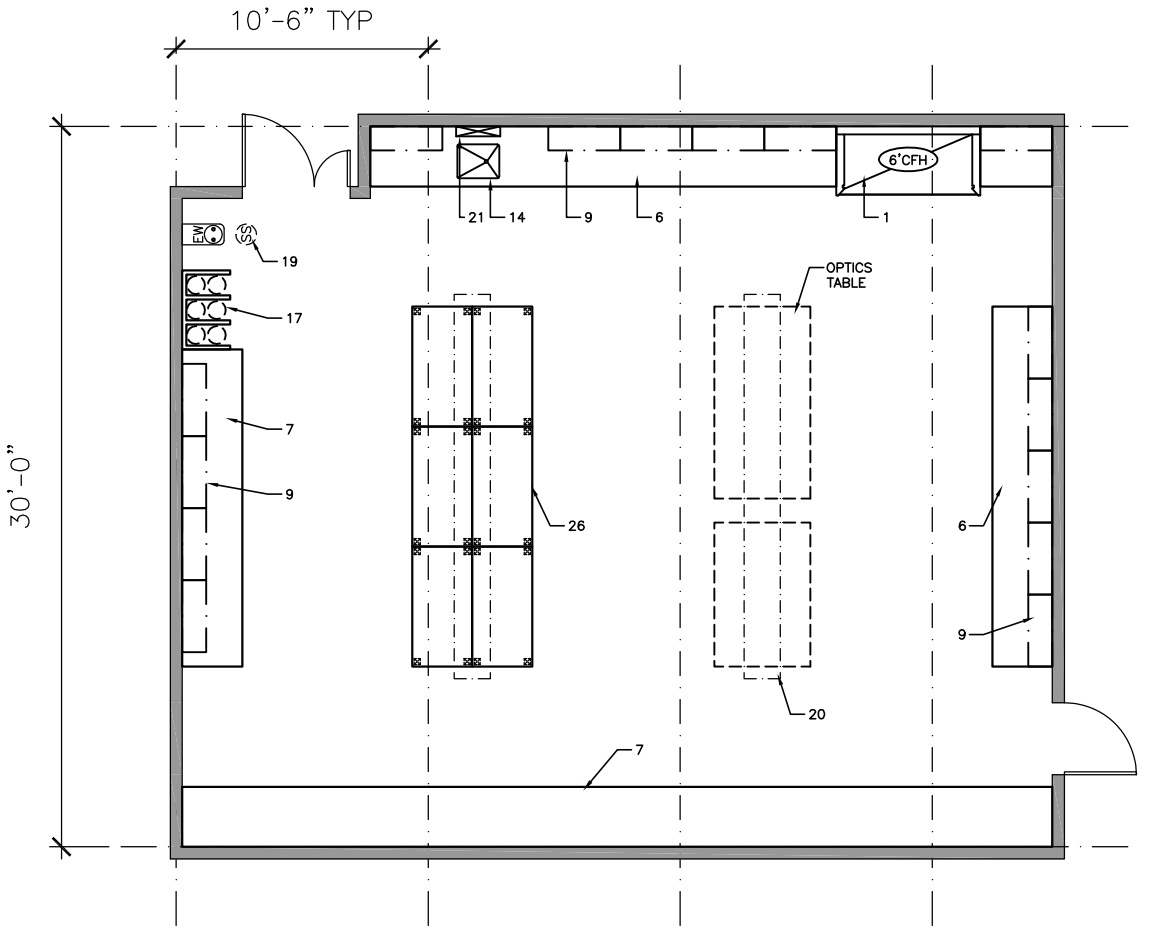
**SECURITY REQUIREMENTS**

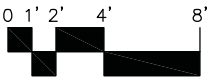
Cameras in corridor to monitor for theft

**NOTES:**

Provide views to lab from corridor

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




**FURNISHINGS**

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench, Standing Height
7. Laboratory Bench, Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
10. Reagent Shelves
11. Tall Storage Cabinet
12. Flammable / Corrosive Storage
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Corrosives Storage Cabinet
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
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30. Tackboard
31. Desk
32. Balance Table
33. Procedure Light
34. A/V Screen
35. Multi-Media Projector (Ceiling Mount)
36. File Cabinet
37. Coat/Book Bag Storage Unit

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| 68°-70° ± 1°F | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 6 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | ● |
| Additional Exhaust Air Filtration | |

| HOODS | |
|---|---|
| Chemical Fume Hood | Note 4 |
| Radioisotope Hood | |
| Exhausted Laminar Flow Hood | |
| Biological Safety Cabinet | |
| Snorkel | |
| Canopy Hood | |
| Low Slotted Exhaust | |
| Equipment Exhaust | ● |

| LABORATORY EQUIPMENT | |
|---|---|
| Vibration Sensitive | Note 3 |
| Light Sensitive | ● |
| Vibration Producing | |
| Heat Producing | |
| Noise Producing | |

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | |
| Laboratory Vacuum (LV) | |
| Laboratory Air (LA) | ● |
| Compressed Air, 100 psi (A) | ● |
| Industrial Hot Water (IHW) | ● |
| Industrial Cold Water (ICW) | ● |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | ● |
| Process Cooling Water | Note 1 |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($CO_2$) | |
| Nitrogen Gas ($N_2$) | Note 2 |
| Cylinder Gases | ● |
| Inert | |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | |
| Safety Shower/Eyewash (SS) | ● |
| Drench Hose (DH) | ● |

| ELECTRICAL | |
|---|---|
| 110V, 20A, 1 Phase | ● |
| 208V, 30A, 1 Phase | ● |
| 208V, 30A, 3 Phase | ● |
| 480V, 100A, 3 Phase | Note 5 |
| Isolated Ground Outlet | ● |
| Emergency Power | |
| UPS (OFOI) | |
| Phone | ● |
| Data | ● |
| In Use Light | ● |
| Task Lighting | |
| Lighting Level | |
| 100 fc at bench/desk | |
| 75 fc at bench/desk | ● |
| Safe light | |
| Special Lighting | |
| Darkenable | |
| Zoned Lighting | ● |
| Other | |

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

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

| MOVEABLE EQUIPMENT | |
|---|---|
| | |
| | |
| | |
| | |

**REMARKS:**

1. 4 gallon/min.
2. Metered Nitrogen
3. 250 µin/sec
4. (1) 6'-0" Chemical fume hood
5. (1) 480V, 60A connection

## 1.21 Instrumentation Prep Lab

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 470 SF |
| **Faculty** | 1 |
| **Students** | 2 |

**FUNCTION**

Provide instrumentation support, preparation and storage space for the Instrumentation Lab.

**RELATIONSHIP / ADJACENCIES**

- Near Instrumentation Teaching Lab
- Near Stock Room
- Near faculty office

**NON LAB EQUIPMENT / FURNITURE**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | See Laboratory Space Requirements |
| **Plumbing** | See Laboratory Space Requirements |
| **Ventilation** | See Laboratory Space Requirements |
| **Climate Control** | Yes - space to remain within ± 1°F |
| **Misc** | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | See Laboratory Space Requirements |
| **Outlets** | See Laboratory Space Requirements |
| **Lighting** | See Laboratory Space Requirements |
| **Other** | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Water resistant gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Sealed concrete |
| **Ceiling** | Open ceiling, painted |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | $3^0$–$2^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | Aluminum storefront |
| **Electronics** | NA |

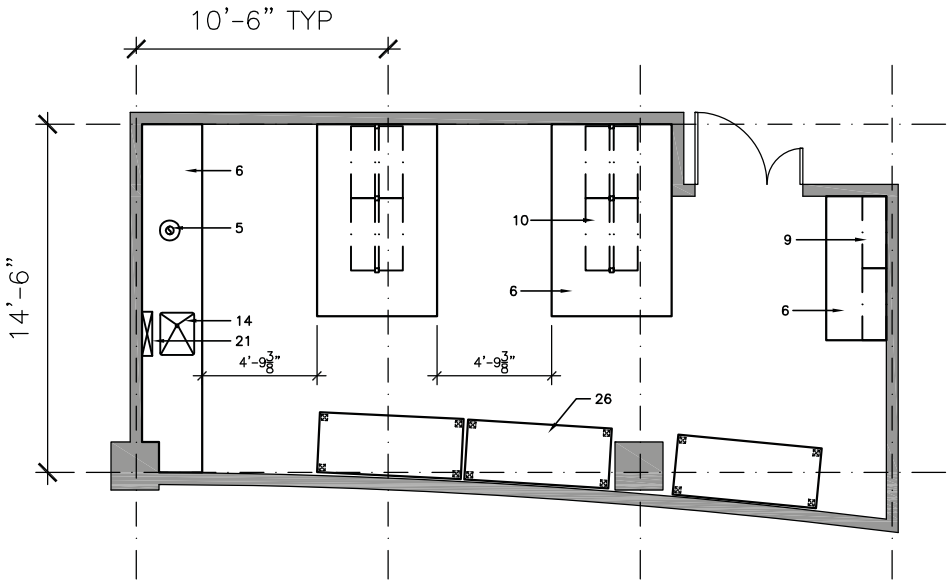
**SECURITY REQUIREMENTS**

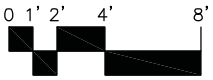
Cameras in corridor to monitor for theft

**NOTES:**

Provide views to lab from corridor

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




**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | ● |
| Uncontrolled | |
| Other | |
| Minimum Air Changes/Hour | 6 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

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

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

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | |
| Laboratory Vacuum (LV) | |
| Laboratory Air (LA) | |
| Compressed Air, 100 psi (A) | ● |
| Industrial Hot Water (IHW) | |
| Industrial Cold Water (ICW) | |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | |
| Process Cooling Water | |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($C0_2$) | |
| Nitrogen Gas ($N_2$) | Note 1 |
| Cylinder Gases | |
| Inert | |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | |
| Safety Shower/Eyewash (SS) | |
| Drench Hose (DH) | |

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

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

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

| MOVEABLE EQUIPMENT | |
|---|---|
| GC-MS | (2) |
| MS/MS (Future) | (1) |

**REMARKS:**

1. 100 psig

## 1.22 Shared Instrument Room

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 700 SF |
| **Faculty** | 1 |
| **Students** | 6 |

**FUNCTION**

Provide laboratory instrumentation storage and preparation space for Bio-Organic Chemistry Research labs.

**RELATIONSHIP / ADJACENCIES**

- Adjacent to and directly accessible from Bio-Organic Chemistry Research labs.

**NON LAB EQUIPMENT / FURNITURE**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | See Laboratory Space Requirements |
| **Plumbing** | See Laboratory Space Requirements |
| **Ventilation** | See Laboratory Space Requirements |
| **Climate Control** | Yes - space to remain within ± 1°F |
| **Misc** | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | See Laboratory Space Requirements |
| **Outlets** | See Laboratory Space Requirements |
| **Lighting** | See Laboratory Space Requirements |
| **Other** | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Water resistant gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Sealed concrete |
| **Ceiling** | Open ceiling, painted |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | $3^0$–$2^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | Aluminum storefront |
| **Electronics** | NA |

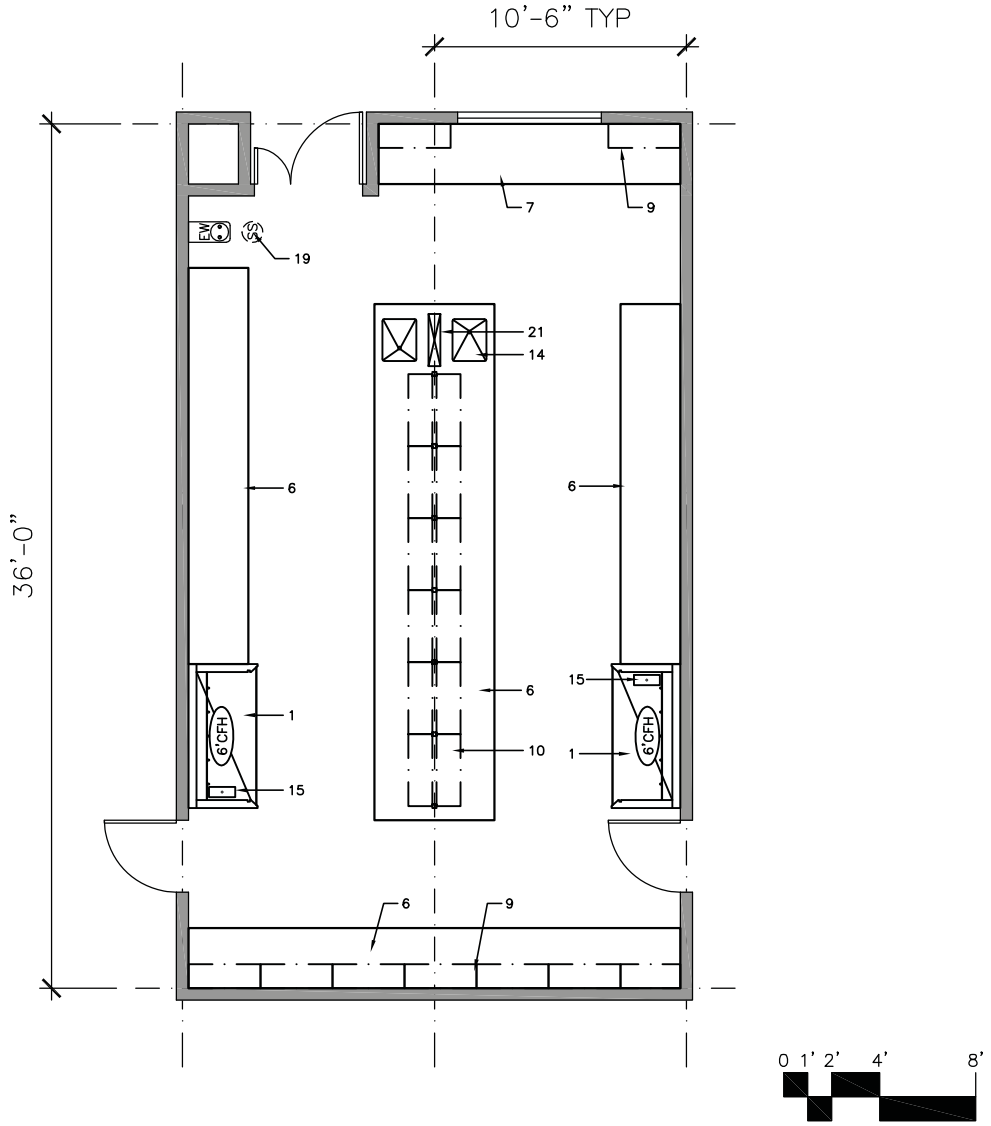
**SECURITY REQUIREMENTS**

Cameras in corridor to monitor for theft

**NOTES:**

Provide views to lab from corridor

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




**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 6 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

| HOODS | |
|---|---|
| Chemical Fume Hood | Note 1 |
| Radioisotope Hood | |
| Exhausted Laminar Flow Hood | |
| Biological Safety Cabinet | |
| Snorkel | |
| Canopy Hood | |
| Low Slotted Exhaust | |
| Equipment Exhaust | ● |

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

**REMARKS:**

1. (2) 6'-0" Chemical fume hoods

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | |
| Laboratory Vacuum (LV) | |
| Laboratory Air (LA) | |
| Compressed Air, 100 psi (A) | ● |
| Industrial Hot Water (IHW) | ● |
| Industrial Cold Water (ICW) | ● |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | ● |
| Process Cooling Water | ● |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($CO_2$) | |
| Nitrogen Gas ($N_2$) | ● |
| Cylinder Gases | |
| Inert | ● |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | |
| Safety Shower/Eyewash (SS) | ● |
| Drench Hose (DH) | ● |

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

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

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

| MOVEABLE EQUIPMENT | |
|---|---|
| Phosphorescent Imager | (1) |

## 1.23 Core Instrument Room

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 700 SF |
| **Faculty** | 1 |
| **Students** | 6 |

**FUNCTION**

Provide laboratory instrumentation storage and preparation space for the Core Lab.

**RELATIONSHIP / ADJACENCIES**

- Direct access to Tissue Culture
- Direct access to Confocal Microscopy
- Direct access to Radioisotope Microscopy
- Adjacent to Cold Room
- Near Equipment Room and Autoclave
- Near Core Lab Support Office

**NON LAB EQUIPMENT / FURNITURE**

.

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | See Laboratory Space Requirements |
| **Plumbing** | See Laboratory Space Requirements |
| **Ventilation** | See Laboratory Space Requirements |
| **Climate Control** | Yes - space to remain within ± 1°F |
| **Misc** | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | See Laboratory Space Requirements |
| **Outlets** | See Laboratory Space Requirements |
| **Lighting** | See Laboratory Space Requirements |
| **Other** | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Water resistant gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Sealed concrete |
| **Ceiling** | Open ceiling, painted, with Acoustic cloud |

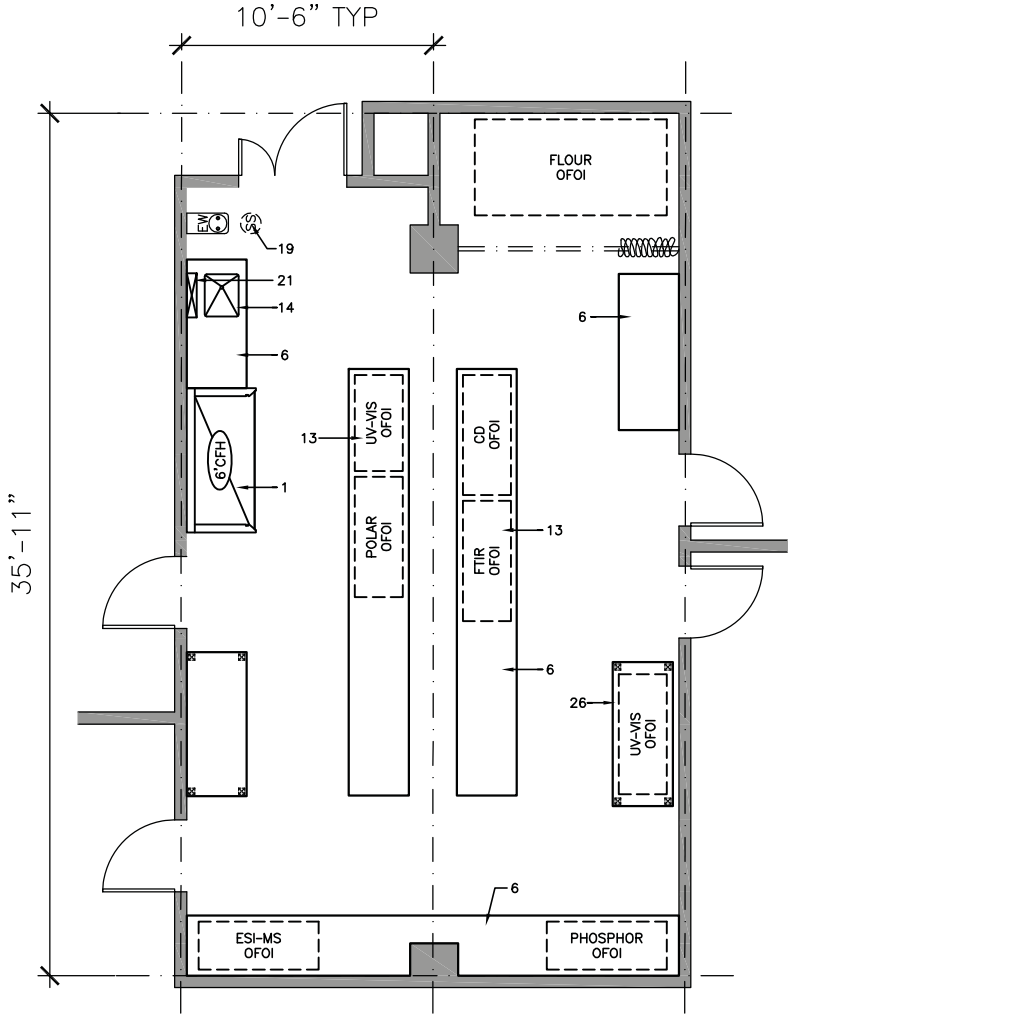
**WINDOWS, DOORS, HARDWARE**

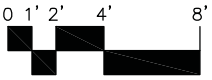
| | |
|---|---|
| **Doors** | $3^0$–$2^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | Aluminum storefront |
| **Electronics** | NA |

**SECURITY REQUIREMENTS**

Cameras in corridor to monitor for theft

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




**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 6 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

| HOODS | |
|---|---|
| Chemical Fume Hood | Note 1 |
| Radioisotope Hood | |
| Exhausted Laminar Flow Hood | |
| Biological Safety Cabinet | |
| Snorkel | |
| Canopy Hood | |
| Low Slotted Exhaust | |
| Equipment Exhaust | |

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

**REMARKS:**

1. (1) 5'-0" Chemical fume hood
2. 100 psig Nitrogen

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | |
| Laboratory Vacuum (LV) | |
| Laboratory Air (LA) | ● |
| Compressed Air, 100 psi (A) | ● |
| Industrial Hot Water (IHW) | |
| Industrial Cold Water (ICW) | |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | |
| Process Cooling Water | ● |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($CO_2$) | |
| Nitrogen Gas ($N_2$) | Note 2 |
| Cylinder Gases | |
| Inert | ● |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | ● |
| Safety Shower/Eyewash (SS) | |
| Drench Hose (DH) | ● |

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

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

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

| MOVEABLE EQUIPMENT |
|---|

## 1.24 Stock Room

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 600 SF |
| **Faculty** | 2 |
| **Students** | 2 |

**FUNCTION**

Provide a central stock location for undergraduate chemistry supplies and chemical storage and preparation area for Instrumentation Lab.

**RELATIONSHIP / ADJACENCIES**

- Direct access to Instrumentation Lab
- Direct access for corridor for student access
- Near undergraduate teaching laboratories

**NON LAB EQUIPMENT / FURNITURE**

- Transaction counter with overhead coiling security door

**NOTES:**

Fire protection and chemical control area considerations

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | See Laboratory Space Requirements |
| **Plumbing** | See Laboratory Space Requirements |
| **Ventilation** | See Laboratory Space Requirements |
| **Climate Control** | Yes - space to remain within ± 1°F |
| **Misc** | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | See Laboratory Space Requirements |
| **Outlets** | See Laboratory Space Requirements |
| **Lighting** | See Laboratory Space Requirements |
| **Other** | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Water resistant gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Sealed concrete |
| **Ceiling** | Open ceiling, painted, with Acoustic cloud |

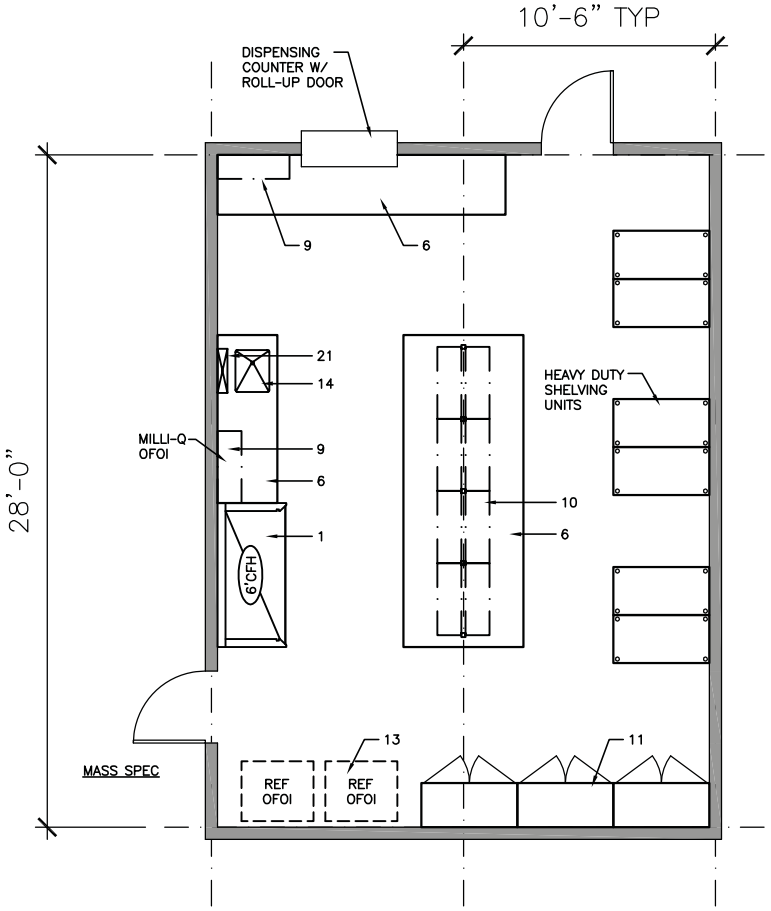
**WINDOWS, DOORS, HARDWARE**

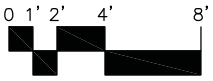
| | |
|---|---|
| **Doors** | $3^0$ leaf w/ transom |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | Aluminum storefront |
| **Electronics** | NA |

**SECURITY REQUIREMENTS**

Cameras in corridor to monitor for theft

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




**FURNISHINGS**

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench, Standing Height
7. Laboratory Bench, Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
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14. Laboratory Sink
15. Cupsink
16. Corrosives Storage Cabinet
17. Cylinder Rack
18. Gas Cabinet
19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Moveable Demonstration Bench
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
26. Moveable Laboratory Table
27. Wire Shelving Units
28. White Markerboard
29. Black Chalkboard
30. Tackboard
31. Desk
32. Balance Table
33. Procedure Light
34. A/V Screen
35. Multi-Media Projector (Ceiling Mount)
36. File Cabinet
37. Coat/Book Bag Storage Unit

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 6 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

| HOODS | |
|---|---|
| Chemical Fume Hood | Note 1 |
| Radioisotope Hood | |
| Exhausted Laminar Flow Hood | |
| Biological Safety Cabinet | |
| Snorkel | |
| Canopy Hood | |
| Low Slotted Exhaust | |
| Equipment Exhaust | |

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

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | ● |
| Laboratory Vacuum (LV) | ● |
| Laboratory Air (LA) | ● |
| Compressed Air, 100 psi (A) | |
| Industrial Hot Water (IHW) | Note 2 |
| Industrial Cold Water (ICW) | Note 2 |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | |
| Process Cooling Water | |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($C0_2$) | |
| Nitrogen Gas ($N_2$) | ● |
| Cylinder Gases | |
| Inert | |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | |
| Safety Shower/Eyewash (SS) | ● |
| Drench Hose (DH) | Note 2 |

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

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

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

| MOVEABLE EQUIPMENT | |
|---|---|
| Refrigerator | (1) |
| Freezer | (1) |

**REMARKS:**

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

## 1.25 Tissue Culture

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| **Quantity** | 2 |
| **Area** | 175 SF |
| **Faculty** | 1 |
| **Students** | 1 |

**FUNCTION**

Provide a space for tissue culture, biological sample preparation and cell and culture growth.

**RELATIONSHIP / ADJACENCIES**

- Direct access to Core Instrumentation
- Near Biophysical Research Labs

**NON LAB EQUIPMENT / FURNITURE**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | See Laboratory Space Requirements |
| **Plumbing** | See Laboratory Space Requirements |
| **Ventilation** | See Laboratory Space Requirements |
| **Climate Control** | Yes - space to remain within ± 1°F |
| **Misc** | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | See Laboratory Space Requirements |
| **Outlets** | See Laboratory Space Requirements |
| **Lighting** | See Laboratory Space Requirements |
| **Other** | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Water resistant gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Sealed concrete |
| **Ceiling** | Open ceiling, painted |

**WINDOWS, DOORS, HARDWARE**

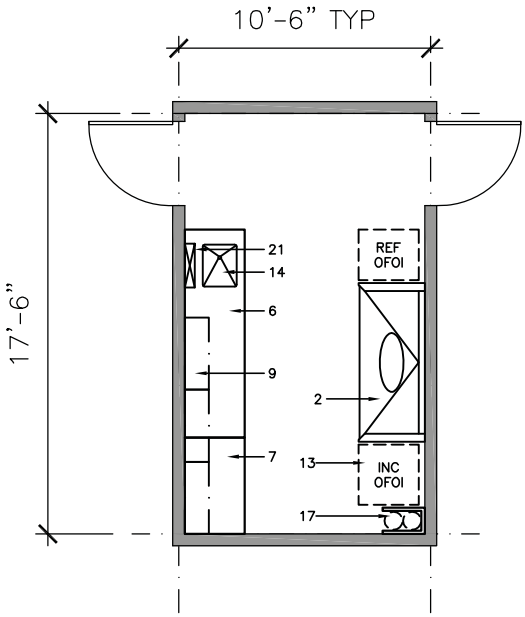
| | |
|---|---|
| **Doors** | $3^0$ leaf full lite |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | NA |
| **Electronics** | NA |

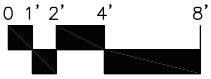
**SECURITY REQUIREMENTS**

Cameras in corridor to monitor for theft

**NOTES:**

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




**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 6 |
| Air Recirculation | |
| Air Pressure Positive | ● |
| Air Pressure Negative | |
| Additional Supply Air Filtration | ● |
| Additional Exhaust Air Filtration | |

| HOODS | |
|---|---|
| Chemical Fume Hood | |
| Radioisotope Hood | |
| Exhausted Laminar Flow Hood | |
| Biological Safety Cabinet | Note 1 |
| Snorkel | |
| Canopy Hood | |
| Low Slotted Exhaust | |
| Equipment Exhaust | |

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

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | ● |
| Laboratory Vacuum (LV) | ● |
| Laboratory Air (LA) | ● |
| Compressed Air, 100 psi (A) | |
| Industrial Hot Water (IHW) | Note 2 |
| Industrial Cold Water (ICW) | Note 2 |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | Note 2 |
| Process Cooling Water | |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($CO_2$) | |
| Nitrogen Gas ($N_2$) | |
| Cylinder Gases | |
| Inert | ● |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | |
| Safety Shower/Eyewash (SS) | |
| Drench Hose (DH) | Note 2 |

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

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

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

| MOVEABLE EQUIPMENT | |
|---|---|
| Refrigerator | (1) |
| Incubator | (1) |

**REMARKS:**

1. (1) 6'-0" Biological safety cabinet
2. (1) Lab sink
3. Mylar or vinyl - coated ceiling tiles

## 1.26 Cold Room

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| **Quantity** | 2 |
| **Area** | 130 SF |
| **Faculty** | 1 |
| **Students** | 1 |

**FUNCTION**

Provide a space for sample storage, protein purification and sample preparation.

**RELATIONSHIP / ADJACENCIES**

- Near Core Instrumentation
- Near Bio-Organic Chemistry Research Labs

**NON LAB EQUIPMENT / FURNITURE**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | See Laboratory Space Requirements |
| **Plumbing** | See Laboratory Space Requirements |
| **Ventilation** | See Laboratory Space Requirements |
| **Climate Control** | 4°C |
| **Misc** | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | See Laboratory Space Requirements |
| **Outlets** | See Laboratory Space Requirements |
| **Lighting** | See Laboratory Space Requirements |
| **Other** | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Water resistant gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Sealed concrete |
| **Ceiling** | Open ceiling, painted |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | $3^0$ leaf full lite |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | NA |
| **Electronics** | NA |

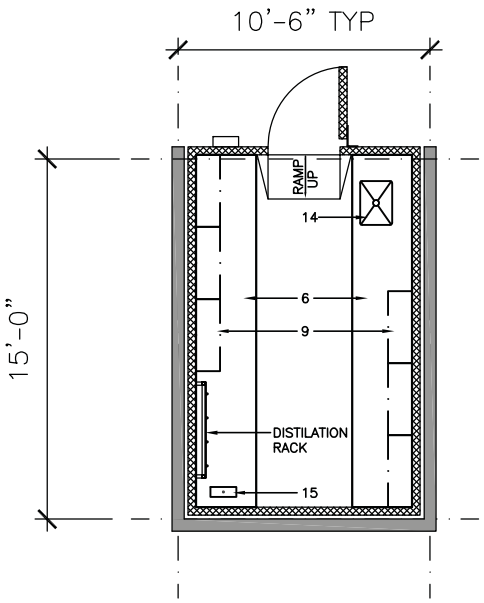
**SECURITY REQUIREMENTS**

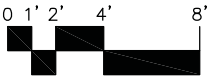
Cameras in corridor to monitor for theft

**NOTES:**

Cold room near Bio-Organic Chemistry Research Labs to have 6'-0" min. clear bench space.

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




**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | |
| 4°C | ● |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 2 |
| Air Recirculation | |
| Air Pressure Positive | ● |
| Air Pressure Negative | |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

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

| LABORATORY EQUIPMENT | |
|---|---|
| Vibration Sensitive | |
| Light Sensitive | |
| Vibration Producing | |
| Heat Producing | Note 1 |
| Noise Producing | Note 1 |

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | |
| Laboratory Vacuum (LV) | |
| Laboratory Air (LA) | ● |
| Compressed Air, 100 psi (A) | |
| Industrial Hot Water (IHW) | |
| Industrial Cold Water (ICW) | ● |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | |
| Process Cooling Water | Note 1 |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($C0_2$) | |
| Nitrogen Gas ($N_2$) | |
| Cylinder Gases | |
| Inert | |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | |
| Safety Shower/Eyewash (SS) | |
| Drench Hose (DH) | ● |

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

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

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

| MOVEABLE EQUIPMENT |
|---|

**REMARKS:**

1. For compressor/condenser

## 1.27 Bioanalytical Sample Prep

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| Quantity | 1 |
| Area | 550 SF |
| Faculty | 1 |
| Students | 2 |

**FUNCTION**

Provide a space for sample preparation and storage.

**RELATIONSHIP / ADJACENCIES**

- Adjacent to Bioanalytical Research Labs

**NON LAB EQUIPMENT / FURNITURE**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| HVAC | See Laboratory Space Requirements |
| Plumbing | See Laboratory Space Requirements |
| Ventilation | See Laboratory Space Requirements |
| Climate Control | Yes |
| Misc | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| Voice / Data | See Laboratory Space Requirements |
| Outlets | See Laboratory Space Requirements |
| Lighting | See Laboratory Space Requirements |
| Other | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| Wall | Water resistant gypsum board, painted |
| Base | Rubber base |
| Floor | Sealed concrete |
| Ceiling | Open ceiling, painted |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| Doors | $3^0$–$2^0$ leaf full lite w/ transom and sidelite |
| Hardware | Per NIH and UofU Standards |
| Glazing | Aluminum Storefront |
| Electronics | NA |

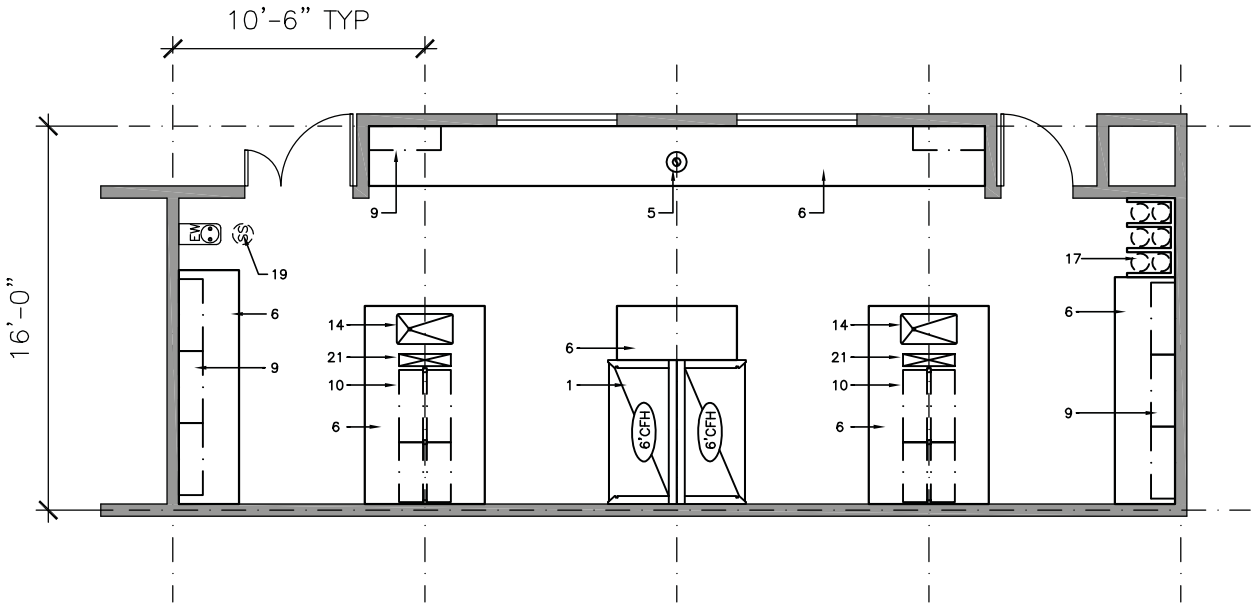
**SECURITY REQUIREMENTS**

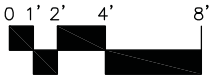
Cameras in corridor to monitor for theft

**NOTES:**

Provide views to lab from corridor

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




**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 6 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

| HOODS | |
|---|---|
| Chemical Fume Hood | Note 1 |
| Radioisotope Hood | |
| Exhausted Laminar Flow Hood | |
| Biological Safety Cabinet | |
| Snorkel | ● |
| Canopy Hood | |
| Low Slotted Exhaust | |
| Equipment Exhaust | ● |

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

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | |
| Laboratory Vacuum (LV) | ● |
| Laboratory Air (LA) | ● |
| Compressed Air, 100 psi (A) | |
| Industrial Hot Water (IHW) | ● |
| Industrial Cold Water (ICW) | ● |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | Note 2 |
| Process Cooling Water | |
| Steam | |
| Condensate Return | |
| Carbon Dioxide ($C0_2$) | |
| Nitrogen Gas ($N_2$) | ● |
| Cylinder Gases | |
| Inert | ● |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | |
| Safety Shower/Eyewash (SS) | ● |
| Drench Hose (DH) | ● |

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

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

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

| MOVEABLE EQUIPMENT | |
|---|---|
| Oven | ● |
| Freezer | ● |
| Refrigerator | ● |
| Vacuum Pump | ● |

**REMARKS:**

1. (2) 6'-0" Chemical fume hoods
2. 18 megaohm

## 1.28 Autoclave / Glasswash

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| Quantity | 1 |
| Area | 165 SF |
| Faculty | 1 |
| Students | 1 |

**FUNCTION**

Provide a space for disinfecting equipment and glasswash.

**RELATIONSHIP / ADJACENCIES**

- Near Core Instrumentation
- Adjacent to Equipment Storage

**NON LAB EQUIPMENT / FURNITURE**

- Heavy duty shelving

**MECHANICAL / PLUMBING**

| | |
|---|---|
| HVAC | See Laboratory Space Requirements |
| Plumbing | See Laboratory Space Requirements |
| Ventilation | See Laboratory Space Requirements |
| Climate Control | Shared with Equipment Storage |
| Misc | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| Voice / Data | See Laboratory Space Requirements |
| Outlets | See Laboratory Space Requirements |
| Lighting | See Laboratory Space Requirements |
| Other | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| Wall | Washable, water resistant surface |
| Base | Rubber base |
| Floor | Sealed concrete |
| Ceiling | Vinyl faced acoustic ceiling |

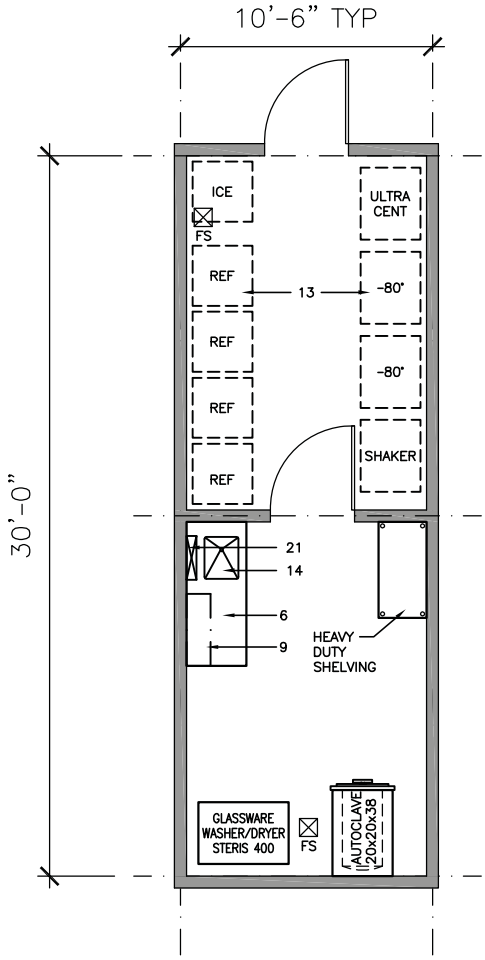
**WINDOWS, DOORS, HARDWARE**

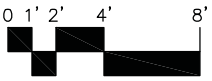
| | |
|---|---|
| Doors | $3^0$ leaf full lite |
| Hardware | Per NIH and UofU Standards |
| Glazing | NA |
| Electronics | NA |

**SECURITY REQUIREMENTS**

**NOTES:**

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




**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 4 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

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

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

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | |
| Laboratory Vacuum (LV) | |
| Laboratory Air (LA) | |
| Compressed Air, 100 psi (A) | ● |
| Industrial Hot Water (IHW) | Note 1 |
| Industrial Cold Water (ICW) | Note 1 |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | Note 1 |
| Process Cooling Water | |
| Steam | ● |
| Condensate Return | |
| Carbon Dioxide ($C0_2$) | |
| Nitrogen Gas ($N_2$) | |
| Cylinder Gases | |
| Inert | |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | ● |
| Safety Shower/Eyewash (SS) | |
| Drench Hose (DH) | Note 1 |

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

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

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

| MOVEABLE EQUIPMENT | |
|---|---|
| Autoclave | ● |
| Glassware Washer | ● |
| Ica Machine | ● |

**REMARKS:**

1. (1) Lab sink

## 1.29 Equipment Room

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| Quantity | 1 |
| Area | 165 SF |
| Faculty | 1 |
| Students | 1 |

**FUNCTION**

Provide a space for equipment storage

**RELATIONSHIP / ADJACENCIES**

- Near Core Instrumentation
- Adjacent to Autoclave / Glasswash

**NON LAB EQUIPMENT / FURNITURE**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| HVAC | See Laboratory Space Requirements |
| Plumbing | See Laboratory Space Requirements |
| Ventilation | See Laboratory Space Requirements |
| Climate Control | Shared with Equipment Storage |
| Misc | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| Voice / Data | See Laboratory Space Requirements |
| Outlets | See Laboratory Space Requirements |
| Lighting | See Laboratory Space Requirements |
| Other | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| Wall | Gypsum, painted |
| Base | Rubber base |
| Floor | Sealed concrete |
| Ceiling | Acoustic ceiling |

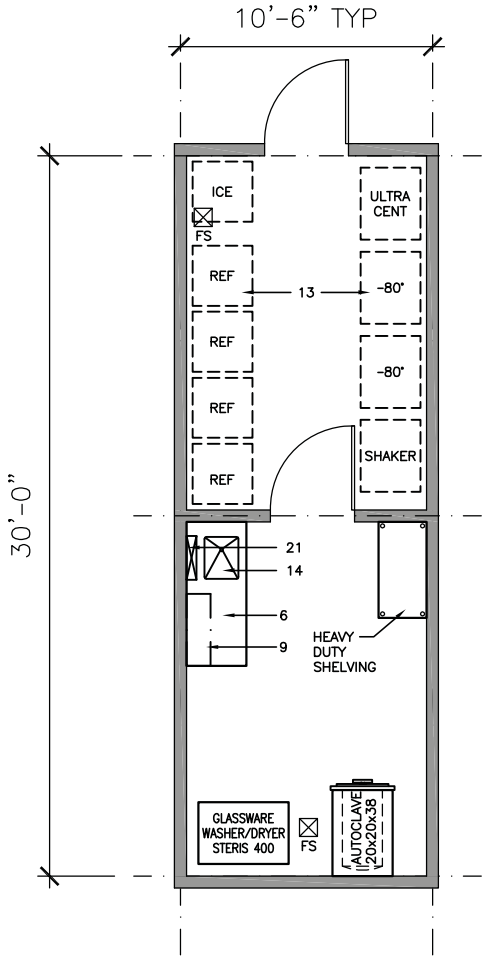
**WINDOWS, DOORS, HARDWARE**

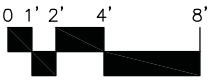
| | |
|---|---|
| Doors | $3^0$ leaf full lite |
| Hardware | Per NIH and UofU Standards |
| Glazing | NA |
| Electronics | NA |

**SECURITY REQUIREMENTS**

**NOTES:**

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




**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 4 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

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

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

| PLUMBING | |
|---|---|
| Laboratory Gas (LG) | |
| Laboratory Vacuum (LV) | |
| Laboratory Air (LA) | |
| Compressed Air, 100 psi (A) | ● |
| Industrial Hot Water (IHW) | Note 1 |
| Industrial Cold Water (ICW) | Note 1 |
| Potable Hot Water (HW) | |
| Potable Cold Water (CW) | |
| Purified Water (PW) | Note 1 |
| Process Cooling Water | |
| Steam | ● |
| Condensate Return | |
| Carbon Dioxide ($C0_2$) | |
| Nitrogen Gas ($N_2$) | |
| Cylinder Gases | |
| Inert | |
| Flammable | |
| Toxic | |
| Floor Drain (FD) | |
| Floor Sink (FS) | ● |
| Safety Shower/Eyewash (SS) | |
| Drench Hose (DH) | Note 1 |

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

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

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

| MOVEABLE EQUIPMENT | |
|---|---|
| Autoclave | ● |
| Glassware Washer | ● |
| Ica Machine | ● |

**REMARKS:**

1. (1) Lab sink

## 1.30 Radioisotope

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| Quantity | 1 |
| Area | 105 SF |
| Faculty | 1 |
| Students | 1 |

**FUNCTION**

Provide a space for radioactive biological sample preparation and characterization.

**RELATIONSHIP / ADJACENCIES**

- Direct access from Core Instrumentation

**NON LAB EQUIPMENT / FURNITURE**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| HVAC | See Laboratory Space Requirements |
| Plumbing | See Laboratory Space Requirements |
| Ventilation | See Laboratory Space Requirements |
| Climate Control | Yes |
| Misc | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| Voice / Data | See Laboratory Space Requirements |
| Outlets | See Laboratory Space Requirements |
| Lighting | See Laboratory Space Requirements |
| Other | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| Wall | Water resistant gypsum board, painted |
| Base | Rubber base |
| Floor | Sealed concrete |
| Ceiling | Open ceiling, painted |

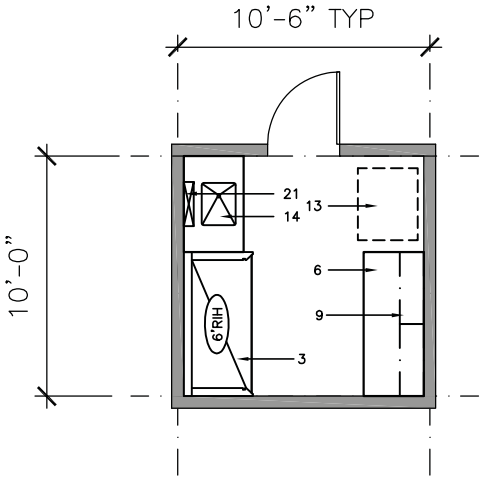
**WINDOWS, DOORS, HARDWARE**

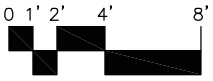
| | |
|---|---|
| Doors | $3^0$ leaf full lite |
| Hardware | Per NIH and UofU Standards |
| Glazing | NA |
| Electronics | NA |

**SECURITY REQUIREMENTS**

**NOTES:**

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




**FURNISHINGS**

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

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 6 |
| Air Recirculation | |
| Air Pressure Positive | |
| Air Pressure Negative | ● |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | ● |

| HOODS | |
|---|---|
| Chemical Fume Hood | |
| Radioisotope Hood | Note 1 |
| Exhausted Laminar Flow Hood | |
| Biological Safety Cabinet | |
| Snorkel | |
| Canopy Hood | |
| Low Slotted Exhaust | |
| Equipment Exhaust | |

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

**REMARKS:**

1. (1) 6'-0" Radioisotope hood

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

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

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

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

| MOVEABLE EQUIPMENT | |
|---|---|
| Scintillation Counter | (1) |
| Under-counter Refrigerator | (1) |

## 1.31 Confocal Microscopy

**DEPARTMENT:** **CHEMISTRY LABORATORIES**

**SPACE**

| | |
|---|---|
| Quantity | 1 |
| Area | 105 SF |
| Faculty | 1 |
| Students | 1 |

**FUNCTION**

Provide a space for tissue, cell and single molecule imaging.

**RELATIONSHIP / ADJACENCIES**

- Direct access from Core Instrumentation

**NON LAB EQUIPMENT / FURNITURE**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| HVAC | See Laboratory Space Requirements |
| Plumbing | See Laboratory Space Requirements |
| Ventilation | See Laboratory Space Requirements |
| Climate Control | Yes |
| Misc | See Laboratory Space Requirements |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| Voice / Data | See Laboratory Space Requirements |
| Outlets | See Laboratory Space Requirements |
| Lighting | See Laboratory Space Requirements |
| Other | See Laboratory Space Requirements |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| Wall | Water resistant gypsum board, painted |
| Base | Rubber base |
| Floor | Sealed concrete |
| Ceiling | Open ceiling, painted |

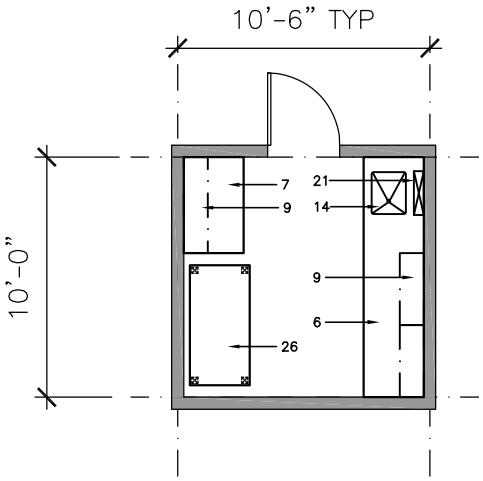
**WINDOWS, DOORS, HARDWARE**

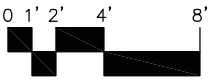
| | |
|---|---|
| Doors | $3^0$ leaf full lite |
| Hardware | Per NIH and UofU Standards |
| Glazing | NA |
| Electronics | NA |

**SECURITY REQUIREMENTS**

**NOTES:**

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




**FURNISHINGS**

1. Chemical Fume Hood
2. Biological Safety Cabinet
3. Radioisotope Hood
4. Vented Workstation
5. Snorkel Exhaust
6. Laboratory Bench, Standing Height
7. Laboratory Bench, Sitting Height
8. Wall Cabinet
9. Adjustable Shelves
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11. Tall Storage Cabinet
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19. Safety Shower/Eyewash
20. Overhead Service Carrier
21. Pipe Drop Enclosure
22. Moveable Demonstration Bench
23. Glassware Washer
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25. Autoclave
26. Moveable Laboratory Table
27. Wire Shelving Units
28. White Markerboard
29. Black Chalkboard
30. Tackboard
31. Desk
32. Balance Table
33. Procedure Light
34. A/V Screen
35. Multi-Media Projector (Ceiling Mount)
36. File Cabinet
37. Coat/Book Bag Storage Unit

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

| MECHANICAL | |
|---|---|
| Temperature | |
| 68°-75° ± 2°F | ● |
| Other | |
| Humidity | |
| Uncontrolled | ● |
| Other | |
| Minimum Air Changes/Hour | 4 |
| Air Recirculation | |
| Air Pressure Positive | ● |
| Air Pressure Negative | |
| Additional Supply Air Filtration | |
| Additional Exhaust Air Filtration | |

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

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

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

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

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

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

| MOVEABLE EQUIPMENT | |
|---|---|
| Microscopes | ● |

**REMARKS:**

## 2.01 Seminar Room

**DEPARTMENT:** **CLASSROOMS**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 1,830 SF |
| **Occupants** | 0 |
| **Visitors** | 100 |

**FUNCTION**

Provide a space for seminars, events and recruiting opportunities.

**RELATIONSHIP / ADJACENCIES**

- Top level with views to the west
- Near reception area
- Near kitchen for event preparation
- Near storage area
- Near audio/visual closet

**NON LAB EQUIPMENT / FURNITURE**

- Fixed, tiered seating with tablet arm
- Tables and chairs
- Shade and blackout blinds
- White board
- Projector
- Presentation table

**NOTES:**

- ADA accessible

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | Standard |
| **Plumbing** | NA |
| **Ventilation** | Yes, CO2 sensor activated |
| **Climate Control** | Yes |
| **Misc** | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | Audio Visual system / Wireless access |
| **Outlets** | Floor outlets at tables and amongst seating |
| **Lighting** | Fluorescent with dimming / presentation mode |
| **Other** | Photocell sensors |

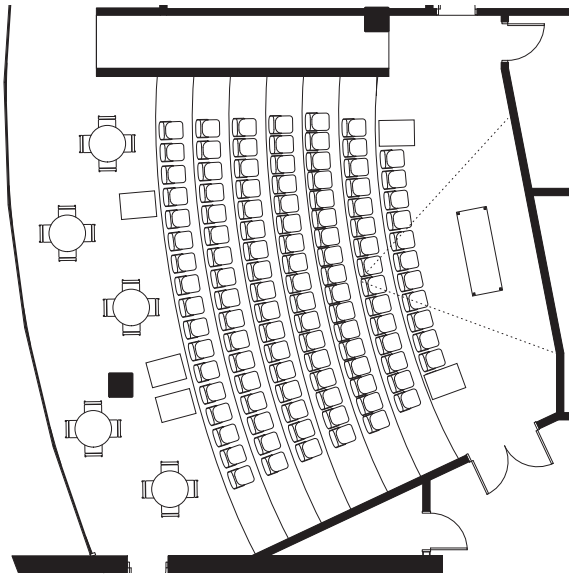
**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Wood wall panels and gypsum board, painted |
| **Base** | Wood base |
| **Floor** | Carpet and hard surface |
| **Ceiling** | Tiered, wood paneled |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | Wood doors, aluminum frames |
| **Hardware** | Per NIH and UofU Standards |
| **Glazing** | Curtainwall |
| **Electronics** | Electronic lighting and blind controls |

**SECURITY REQUIREMENTS**



## 2.02 Active Learning Center

**DEPARTMENT:** **CLASSROOMS**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 795 SF |
| **Occupants** | 0 |
| **Visitors** | 24 |

**FUNCTION**

Provide a space for pre lab presentations, student study groups and collaboration.

**RELATIONSHIP / ADJACENCIES**

- Adjacent to undergraduate teaching labs
- Near Undergraduate Study Room
- Visible from the exterior

**NON LAB EQUIPMENT / FURNITURE**

- Tables and chairs
- Shade and blackout blinds
- White board
- Projector

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | Standard |
| **Plumbing** | NA |
| **Ventilation** | Yes, CO2 sensor activated |
| **Climate Control** | Yes |
| **Misc** | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | Wireless access, projection |
| **Outlets** | Floor outlets near tables and at walls |
| **Lighting** | Fluorescent with dimming / presentation mode |
| **Other** | Photocell sensors |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Carpet or concrete |
| **Ceiling** | Acoustic ceiling cloud |

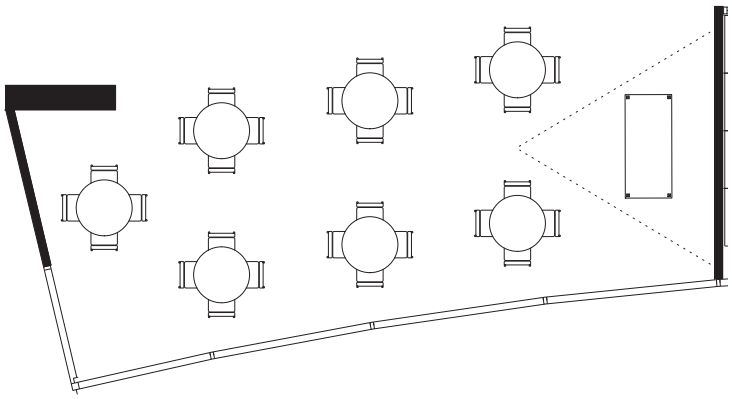
**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | NA |
| **Hardware** | NA |
| **Glazing** | Curtainwall |
| **Electronics** | Blind control |

**SECURITY REQUIREMENTS**

Cameras in corridor to monitor for theft.

**NOTES:**



## 2.21 Seminar Room Storage

**DEPARTMENT:** **CLASSROOMS**

**SPACE**

| | |
|---|---|
| Quantity | 1 |
| Area | 140 SF |
| Occupants | 0 |
| Visitors | 2 |

**FUNCTION**

Provide a space for storing tables, chairs and other seminar room furnishings.

**RELATIONSHIP / ADJACENCIES**

- Adjacent to seminar room
- Near lunch kitchen

**NON LAB EQUIPMENT / FURNITURE**

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| HVAC | Standard |
| Plumbing | NA |
| Ventilation | Yes |
| Climate Control | No |
| Misc | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| Voice / Data | None |
| Outlets | Per code |
| Lighting | Fluorescent |
| Other | Occupancy Sensor |

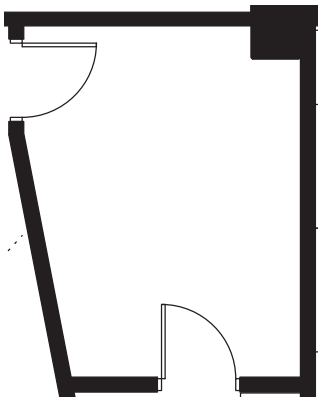
**FINISHES / ENVIRONMENT**

| | |
|---|---|
| Wall | Gypsum board, painted |
| Base | Rubber base |
| Floor | Carpet or concrete |
| Ceiling | Acoustic ceiling tile |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| Doors | Flush wood door with aluminum frame |
| Hardware | Per UofU Standards |
| Glazing | NA |
| Electronics | NA |

**SECURITY REQUIREMENTS**



## 2.22 Kitchen

**DEPARTMENT:** **CLASSROOMS**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 100 SF |
| **Occupants** | 0 |
| **Visitors** | 2 |

**FUNCTION**

Provide a space for storing and preparing lunches

**RELATIONSHIP / ADJACENCIES**

- Near lounge

**NON LAB EQUIPMENT / FURNITURE**

- Microwave
- Refrigerator
- Sink
- Coffee pot
- Base and upper cabinets

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | Standard |
| **Plumbing** | Sink |
| **Ventilation** | Yes, exhaust |
| **Climate Control** | No |
| **Misc** | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | None |
| **Outlets** | Per code, at appliance locations |
| **Lighting** | Fluorescent |
| **Other** | Occupancy sensor |

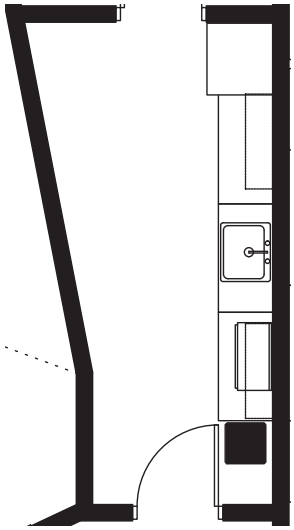
**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Concrete |
| **Ceiling** | Gypsum ceiling |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | Flush wood door with aluminum frame |
| **Hardware** | Per UofU Standards |
| **Glazing** | NA |
| **Electronics** | NA |

**SECURITY REQUIREMENTS**



## 2.23 Audio / Visual Closet

**DEPARTMENT:** **CLASSROOMS**

**SPACE**

| | |
|---|---|
| Quantity | 1 |
| Area | 35 SF |
| Occupants | 0 |
| Visitors | 1 |

**FUNCTION**

Provide a space for AV equipment and wiring

**RELATIONSHIP / ADJACENCIES**

- Adjacent to seminar room

**NON LAB EQUIPMENT / FURNITURE**

- AV shelves, as required

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| HVAC | Standard |
| Plumbing | NA |
| Ventilation | Yes |
| Climate Control | No |
| Misc | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| Voice / Data | Audio/Visual Systems connections racks |
| Outlets | Per code |
| Lighting | Fluorescent |
| Other | |

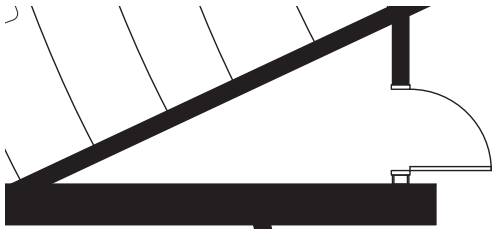
**FINISHES / ENVIRONMENT**

| | |
|---|---|
| Wall | Gypsum board, painted |
| Base | Rubber base |
| Floor | Carpet or concrete |
| Ceiling | Open |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| Doors | Flush wood door with aluminum frame |
| Hardware | Per UofU Standards |
| Glazing | NA |
| Electronics | NA |

**SECURITY REQUIREMENTS**



## 3.01 Faculty Office

**DEPARTMENT:** **OFFICES**

**SPACE**

| | |
|---|---|
| **Quantity** | 10 |
| **Area** | 150 SF |
| **Occupants** | 1 |
| **Visitors** | 2-3 |

**FUNCTION**

Provide a space for faculty to work and meet with students.

**RELATIONSHIP / ADJACENCIES**

- Near laboratories
- Near lab prep areas
- Near student offices

**NON LAB EQUIPMENT / FURNITURE**

- Systems Furniture, lockable
- Chair
- Table and chairs
- Bookshelves
- Roller Shades
- Whiteboard

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | Standard |
| **Plumbing** | NA |
| **Ventilation** | Yes |
| **Climate Control** | Yes |
| **Misc** | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | Telephone and data |
| **Outlets** | Per code |
| **Lighting** | Fluorescent with task and photocell sensor |
| **Other** | Occupancy sensor |

**FINISHES / ENVIRONMENT**

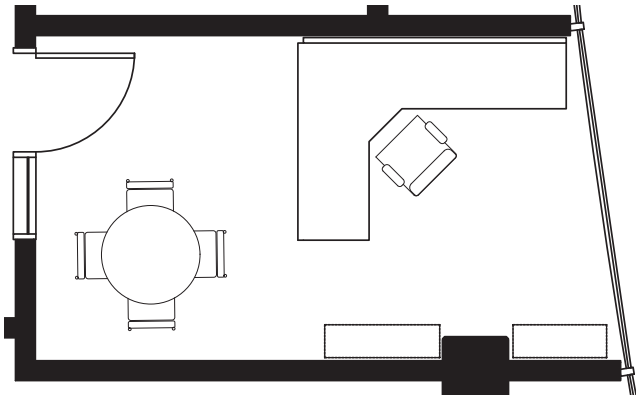
| | |
|---|---|
| **Wall** | Gypsum board, painted |
| **Base** | Wood base |
| **Floor** | Carpet |
| **Ceiling** | Acoustic ceiling panels |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | 3⁰ leaf full lite w/ transom and sidelite |
| **Hardware** | Per UofU Standards |
| **Glazing** | Aluminum Storefront or Curtainwall |
| **Electronics** | NA |

**SECURITY REQUIREMENTS**

Cameras in corridors to monitor for theft.



## 3.02 Visiting Faculty Office

**DEPARTMENT:** **OFFICES**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 150 SF |
| **Occupants** | 1 |
| **Visitors** | 2-3 |

**FUNCTION**

Provide a space for faculty to work and meet with students.

**RELATIONSHIP / ADJACENCIES**

- Near laboratories
- Near lab prep areas
- Near student offices

**NON LAB EQUIPMENT / FURNITURE**

- Systems Furniture, lockable
- Chair
- Table and chairs
- Bookshelves
- Roller Shades
- Whiteboard

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | Standard |
| **Plumbing** | NA |
| **Ventilation** | Yes |
| **Climate Control** | Yes |
| **Misc** | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | Telephone and data |
| **Outlets** | Per code |
| **Lighting** | Fluorescent with task and photocell sensor |
| **Other** | Occupancy sensor |

**FINISHES / ENVIRONMENT**

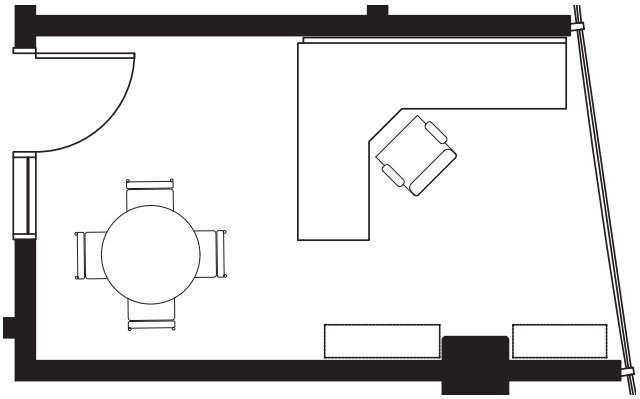
| | |
|---|---|
| **Wall** | Gypsum board, painted |
| **Base** | Wood base |
| **Floor** | Carpet |
| **Ceiling** | Acoustic ceiling panels |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | $3^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per UofU Standards |
| **Glazing** | Aluminum Storefront or Curtainwall |
| **Electronics** | NA |

**SECURITY REQUIREMENTS**

Cameras in corridors to monitor for theft.



## 3.03 Post Doctorate Offices

**DEPARTMENT:** **OFFICES**

**SPACE**

| | |
|---|---|
| **Quantity** | 3 |
| **Area** | 145 SF |
| **Occupants** | 2 |
| **Visitors** | 1 |

**FUNCTION**

Provide a space for post doctorate students to work.

**RELATIONSHIP / ADJACENCIES**

- Near Theoretical Chemistry open office area
- Near Theoretical Chemistry Faculty Offices

**NON LAB EQUIPMENT / FURNITURE**

- Systems Furniture, lockable
- (3) Chairs
- Bookshelves
- Roller Shades
- Whiteboard

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | Standard |
| **Plumbing** | NA |
| **Ventilation** | Yes |
| **Climate Control** | Yes |
| **Misc** | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | Telephone, data and wireless access |
| **Outlets** | Per code |
| **Lighting** | Fluorescent with task and photocell sensor |
| **Other** | Occupancy sensor |

**FINISHES / ENVIRONMENT**

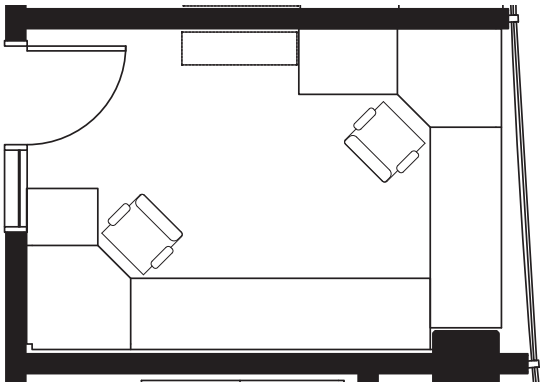
| | |
|---|---|
| **Wall** | Gypsum board, painted |
| **Base** | Wood base |
| **Floor** | Carpet |
| **Ceiling** | Acoustic ceiling panels |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | 3$^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per UofU Standards |
| **Glazing** | Aluminum Storefront or Curtainwall |
| **Electronics** | NA |

**SECURITY REQUIREMENTS**

Cameras in corridors to monitor for theft.



## 3.04 Shared Student Office

**DEPARTMENT:** **OFFICES**

**SPACE**

| | |
|---|---|
| Quantity | 13 |
| Area | 130 SF |
| Occupants | 3 |
| Visitors | 0 |

**FUNCTION**

Provide a space for graduate students to work.

**RELATIONSHIP / ADJACENCIES**

- Near laboratories
- Near Faculty Offices

**NON LAB EQUIPMENT / FURNITURE**

- Systems Furniture, lockable
- (3) Chairs
- Bookshelves
- Roller Shades
- Whiteboard

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| HVAC | Standard |
| Plumbing | NA |
| Ventilation | Yes |
| Climate Control | Yes |
| Misc | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| Voice / Data | Telephone, data and wireless access |
| Outlets | Per code |
| Lighting | Fluorescent with task and photocell sensor |
| Other | Occupancy sensor |

**FINISHES / ENVIRONMENT**

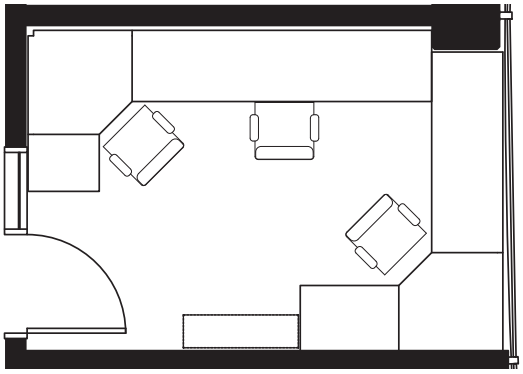
| | |
|---|---|
| Wall | Gypsum board, painted |
| Base | Rubber base |
| Floor | Carpet |
| Ceiling | Acoustic ceiling panels |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| Doors | $3^0$ leaf full lite w/ transom and sidelite |
| Hardware | Per UofU Standards |
| Glazing | Aluminum Storefront or Curtainwall |
| Electronics | NA |

**SECURITY REQUIREMENTS**

Cameras in corridors to monitor for theft.



## 3.05 Administrative Assistant Office

**DEPARTMENT:** **OFFICES**

**SPACE**

| | |
|---|---|
| Quantity | 2 |
| Area | 100 SF |
| Occupants | 1 |
| Visitors | 1 |

**FUNCTION**

Provide a space for administrative assistants to work.

**RELATIONSHIP / ADJACENCIES**

- Near Faculty Offices

**NON LAB EQUIPMENT / FURNITURE**

- Systems Furniture, lockable
- (2) Chairs
- Bookshelves
- Roller Shades
- Tackboard

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| HVAC | Standard |
| Plumbing | NA |
| Ventilation | Yes |
| Climate Control | Yes |
| Misc | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| Voice / Data | Telephone and data |
| Outlets | Per code |
| Lighting | Fluorescent with task and photocell sensor |
| Other | Occupancy sensor |

**FINISHES / ENVIRONMENT**

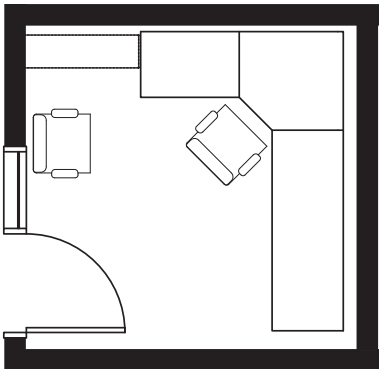
| | |
|---|---|
| Wall | Gypsum board, painted |
| Base | Rubber base |
| Floor | Carpet |
| Ceiling | Acoustic ceiling panels |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| Doors | $3^0$ wood leaf with aluminum frame |
| Hardware | Per NIH and UofU Standards |
| Glazing | Aluminum Storefront and/or Curtainwall |
| Electronics | NA |

**SECURITY REQUIREMENTS**

Cameras in corridors to monitor for theft.



## 3.06 Core Lab Support Office

**DEPARTMENT:** **OFFICES**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 150 SF |
| **Occupants** | 1 |
| **Visitors** | 2-3 |

**FUNCTION**

Provide a space for core lab faculty to work and meet with students.

**RELATIONSHIP / ADJACENCIES**

- Near core laboratories
- Near lab prep areas
- Near student offices

**NON LAB EQUIPMENT / FURNITURE**

- Systems Furniture, lockable
- Chair
- Table and chairs
- Bookshelves
- Roller Shades
- Whiteboard

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | Standard |
| **Plumbing** | NA |
| **Ventilation** | Yes |
| **Climate Control** | Yes |
| **Misc** | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | Telephone and data |
| **Outlets** | Per code |
| **Lighting** | Fluorescent with task and photocell sensor |
| **Other** | Occupancy sensor |

**FINISHES / ENVIRONMENT**

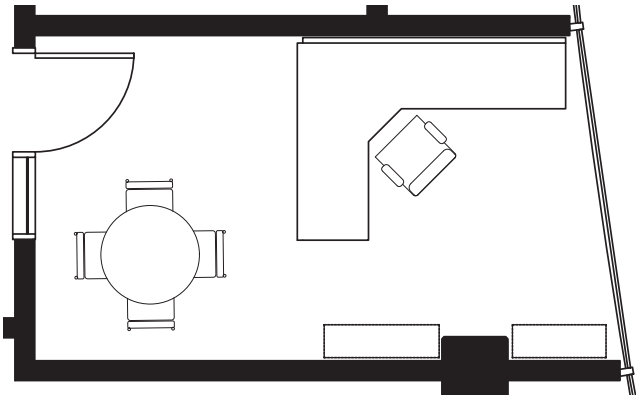
| | |
|---|---|
| **Wall** | Gypsum board, painted |
| **Base** | Wood base |
| **Floor** | Carpet |
| **Ceiling** | Acoustic ceiling panels |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | $3^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per UofU Standards |
| **Glazing** | Aluminum Storefront or Curtainwall |
| **Electronics** | NA |

**SECURITY REQUIREMENTS**

Cameras in corridors to monitor for theft.



## 3.11 Theory Student Cubicles

**DEPARTMENT:** **OFFICES**

**SPACE**

| | |
|---|---|
| **Quantity** | 34 |
| **Area** | 48 SF |
| **Occupants** | 1 |
| **Visitors** | 0 |

**FUNCTION**

Provide a space for theoretical chemistry students to work.

**RELATIONSHIP / ADJACENCIES**

- Near Theoretical Chemistry Faculty Offices
- Near Post Doctorate Offices

**NON LAB EQUIPMENT / FURNITURE**

- Systems furniture, lockable
- Chair

**NOTES:**

Undergraduate students can have slightly smaller work stations.

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | Standard |
| **Plumbing** | NA |
| **Ventilation** | Yes |
| **Climate Control** | Yes |
| **Misc** | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | Data and Wireless access |
| **Outlets** | Per code |
| **Lighting** | Fluorescent with task and photocell sensor |
| **Other** | Occupancy sensors |

**FINISHES / ENVIRONMENT**

| | |
|---|---|
| **Wall** | Gypsum board, painted |
| **Base** | Rubber base |
| **Floor** | Carpet |
| **Ceiling** | Acoustic ceiling panels |

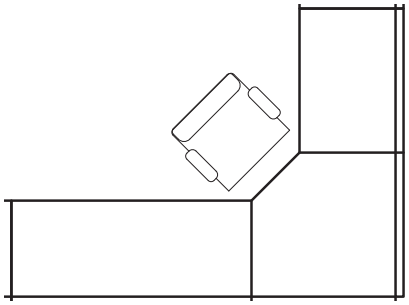
**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | NA |
| **Hardware** | NA |
| **Glazing** | Skylight |
| **Electronics** | NA |

**SECURITY REQUIREMENTS**

Cameras in corridors to monitor for theft.

Card reader access to Theoretical Chemistry area.



## 3.12 Undergraduate Study Room

**DEPARTMENT:** **OFFICES**

**SPACE**

| | |
|---|---|
| **Quantity** | 1 |
| **Area** | 320 SF |
| **Occupants** | 0 |
| **Visitors** | 12 |

**FUNCTION**

Provide a space for undergraduate students to study, have computer access and collaborate.

**RELATIONSHIP / ADJACENCIES**

- Near undergraduate teaching laboratories
- Near main circulation space
- Near Active Learning Center

**NON LAB EQUIPMENT / FURNITURE**

- Computer Desks
- 12 chairs
- Tables
- Bookshelves
- Whiteboard
- tackboard

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| **HVAC** | Standard |
| **Plumbing** | NA |
| **Ventilation** | Yes |
| **Climate Control** | Yes |
| **Misc** | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| **Voice / Data** | Data and wireless access |
| **Outlets** | Per code and floor boxes near tables |
| **Lighting** | Fluorescent with photocell sensor |
| **Other** | Occupancy sensor |

**FINISHES / ENVIRONMENT**

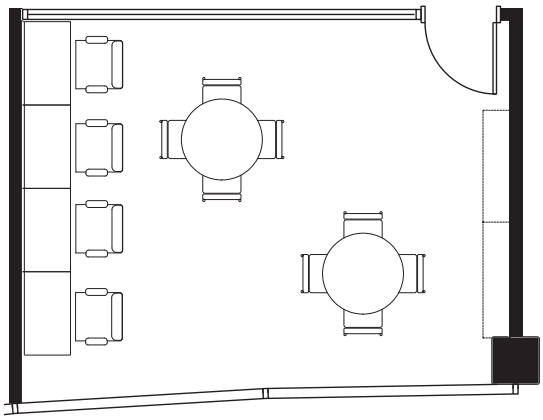
| | |
|---|---|
| **Wall** | Gypsum board, painted |
| **Base** | Wood base |
| **Floor** | Carpet |
| **Ceiling** | Acoustic ceiling panels |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| **Doors** | $3^0$ leaf full lite w/ transom and sidelite |
| **Hardware** | Per UofU Standards |
| **Glazing** | Aluminum Storefront or Curtainwall |
| **Electronics** | NA |

**SECURITY REQUIREMENTS**

Cameras in corridors to monitor for theft.



## 4.01 Conference Room

**DEPARTMENT:** **MEETING / COLLABORATION**

**SPACE**

| | |
|---|---|
| Quantity | 3 |
| Area | 275 SF |
| Occupants | 0 |
| Visitors | 12 |

**FUNCTION**

Provide a space for faculty and/or students to meet, collaborate and study.

**RELATIONSHIP / ADJACENCIES**

- Near laboratories
- Near main circulation space
- Near offices

**NON LAB EQUIPMENT / FURNITURE**

- Conference table
- 12 chairs
- White board
- Projector
- Bookshelves

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| HVAC | Standard |
| Plumbing | NA |
| Ventilation | Yes |
| Climate Control | Yes, CO2 sensors |
| Misc | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| Voice / Data | Wireless access, projection |
| Outlets | Per code and floor boxes at table center |
| Lighting | Fluorescent with presentation mode and |
| Other | photocell sensor and occupancy sensor |

**FINISHES / ENVIRONMENT**

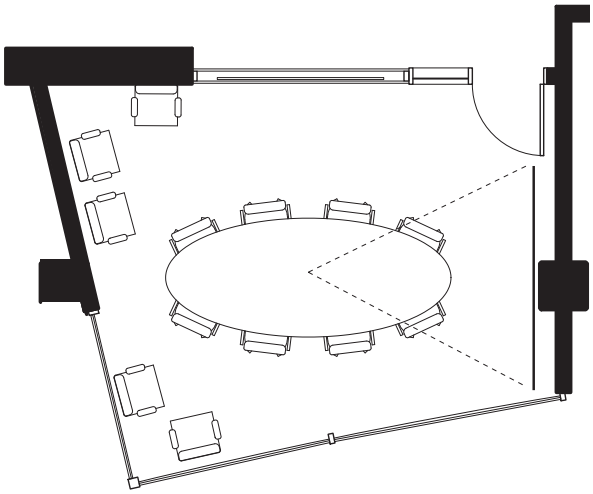
| | |
|---|---|
| Wall | Gypsum board, painted |
| Base | Wood base |
| Floor | Carpet |
| Ceiling | Acoustic ceiling panels |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| Doors | $3^0$ leaf full lite w/ transom and sidelite |
| Hardware | Per UofU Standards |
| Glazing | Aluminum Storefront or Curtainwall |
| Electronics | NA |

**SECURITY REQUIREMENTS**

Cameras in corridors to monitor for theft.



## 4.11 Lounge

**DEPARTMENT:** **MEETING / COLLABORATION**

**SPACE**

| | |
|---|---|
| Quantity | 3 |
| Area | 335 SF |
| Occupants | 0 |
| Visitors | 20 |

**FUNCTION**

Provide a space for collaboration, interaction and breaks

**RELATIONSHIP / ADJACENCIES**

- Near laboratories
- Near main circulation space
- Near offices

**NON LAB EQUIPMENT / FURNITURE**

- Tables and chairs
- White board
- Couch or lounge chairs

**NOTES:**

**MECHANICAL / PLUMBING**

| | |
|---|---|
| HVAC | Standard |
| Plumbing | NA |
| Ventilation | Yes |
| Climate Control | Yes, CO2 sensors |
| Misc | |

**ELECTRICAL / COMMUNICATIONS**

| | |
|---|---|
| Voice / Data | Wireless access |
| Outlets | Per code and floor boxes at tables |
| Lighting | Fluorescent with photocell sensor and |
| Other | occupancy sensor |

**FINISHES / ENVIRONMENT**

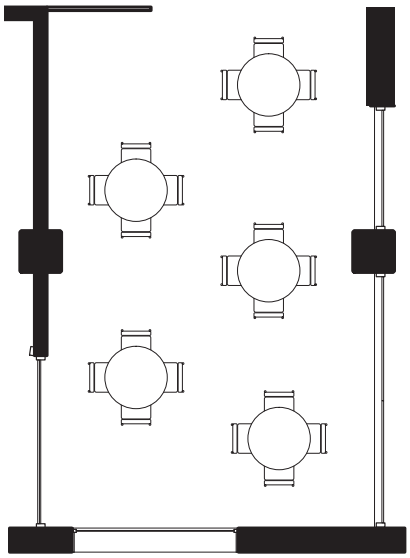
| | |
|---|---|
| Wall | Gypsum board, painted |
| Base | Wood base |
| Floor | Carpet or concrete |
| Ceiling | Acoustic ceiling cloud |

**WINDOWS, DOORS, HARDWARE**

| | |
|---|---|
| Doors | NA |
| Hardware | NA |
| Glazing | Aluminum Storefront or Curtainwall |
| Electronics | NA |

**SECURITY REQUIREMENTS**

Cameras in corridors to monitor for theft.

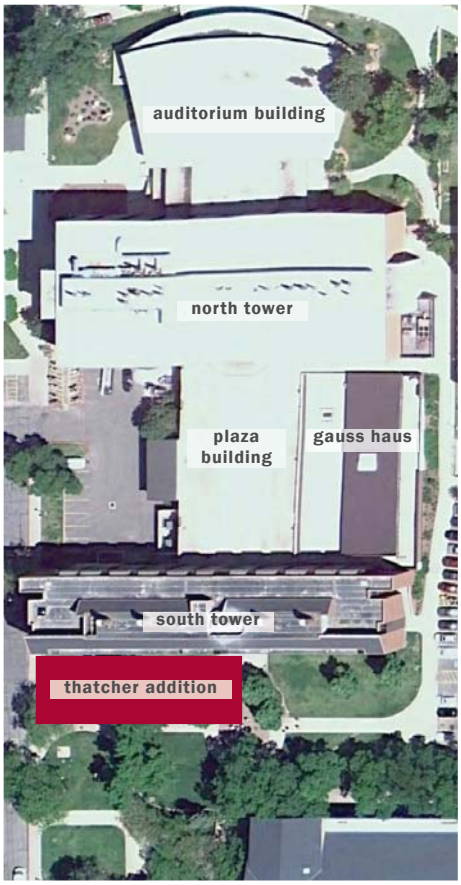


## CHEMISTRY DEPARTMENT AREA ANALYSIS

The chemistry department is composed of a series of facilities. There is the Auditorium Building, the North Tower, the South Tower and the connecting Plaza building and Gauss Haus buildings. The following allowable area analysis has been completed assuming the entire complex, including the new addition, has been designed as one fully sprinkled building.

The table on the following two pages presents a breakdown of the existing and allowed floor areas based on a type IIB construction with a B occupancy. Although there are assembly uses, they do not exceed 10% of the floor area, and are considered accessory uses. According to this area analysis, the project is less than the code allowed area, and fire separation is not required.

In addition, another future addition, to the east of the Thatcher Addition can be constructed within the same area allocation.




Aerial photograph of existing chemistry building

| BUILDING | | OCCUPANCY | AREA (sf) | VENT AREA | GROSS AREA |
|---|---|---|---|---|---|
| BASEMENT | | | | | |
| NORTH TOWER | | B | 22,525 | 1,748 | 20,777 |
| UTILITY TUNNEL | | B | 1,000 | | 1,000 |
| SOUTH TOWER | | B | 13,489 | | 13,489 |
| GAUSS HAUS | | B | 11,150 | | 11,150 |
| EXISTING TOTALS | | | 48,164 | | 46,416 |
| 2010 ADDITION | | B | 7,821 | | 7,821 |
| **Total** | | | 55,985 | | 54,237 |
| | | | | | |
| LEVEL ONE | | | | | |
| NORTH TOWER | | B | 30,597 | 1,748 | 28,849 |
| NORTH TOWER | | A-3 | 4,625 | | 4,625 |
| PLAZA | | B | 10,870 | | 10,870 |
| SOUTH TOWER | | B | 12,896 | 1,542 | 11,354 |
| GAUSS HAUS | | B | 11,720 | | 11,720 |
| EXISTING TOTALS | | | 70,708 | | 67,418 |
| 2010 ADDITION | | B | 7,982 | | 8,000 |
| **Total** | | | 78,690 | | 75,418 |
| | | | | | |
| LEVEL TWO | | | | | |
| NORTH TOWER | | B | 31,612 | 1,748 | 29,864 |
| NORTH TOWER | | A-3 | 3,610 | | 3,610 |
| SOUTH TOWER | | B | 13,194 | 1,542 | 11,652 |
| EXISTING TOTALS | | | 48,416 | | 45,126 |
| 2010 ADDITION | | B | 7,982 | | 8,000 |
| **Total** | | | 56,398 | | 53,126 |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| LEVEL THREE | | | | | |
| NORTH TOWER | | B | 22,152 | 1,748 | 20,404 |
| SOUTH TOWER | | B | 13,194 | 1,542 | 11,652 |
| EXISTING TOTALS | | | 35,346 | | 32,056 |
| 2010 ADDITION | | B | 7,982 | | 8,000 |
| **Total** | | | 43,328 | | 40,056 |
| | | | | | |
| LEVEL FOUR | | | | | |
| NORTH TOWER | | B | 22,152 | 1,748 | 20,404 |
| SOUTH TOWER | | B | 13,194 | 1,542 | 11,652 |
| EXISTING TOTALS | | | 35,346 | | 32,056 |
| 2010 ADDITION | | B | 7,982 | | 8,538 |
| **Total** | | | 43,328 | | 40,594 |
| EXISTING BUILDING TOTAL | | | 202,634 | | |
| **2010 BUILDING TOTAL** | | | **234,401** | | **209,194** |

| | | | | | |
|---|---|---|---|---|---|
| * IBC 2009, 506.4- total alowable building area with more than 1 story above grade plane | | | | | |
| Allowed area per story using type II-B | | | | 84,525 | |
| **Total Allowable area - 3 stories times 84,525** | | | | **253,575** | |

## CHEMICAL CONTROL AREA ANALYSIS

In addition to the overall area analysis, a chemical analysis has been conducted to define the chemicals used, quantities and control areas required. After conversations with the users, it has been determined that one control area per level is sufficient to meet the chemical quantity needs of the labs. The table on the next page is a summary of the chemicals permitted in a single control area.

The control area on Level 1 is permitted to have 100% of the chemical quantities listed, the Basement and Level 2 are permitted 75% of the chemical quantities listed and Level 3 is permitted 50% of the chemical quantities listed.

The users have reviewed this table, and based on their experience, have agreed that one chemical control area per floor is acceptable. In addition, the steering committee has provided a standard maximum chemical quantity list for the laboratories. This list reflects the highest quantity of chemicals that will be used and stored in any single laboratory suite. (See page 184)

Each chemical control area shall be separated by a 2 hour fire barrier at horizontal separations and a one hour fire barrier at vertical separations. As each floor will be a control area, a two hour barrier is required at the floors and a one hour barrier will be located between the new addition and the South Tower.

| | | Storage | | |
|---|---|---|---|---|
| Material | Class | solid pounds (cubic feet) | liquid gallons (pounds) | gas (cubic feet at NTP) |
| Combustible Liquid | II<br>IIIA<br>IIIB | | 240a<br>660a<br>unlimited | |
| Cryogenics, flammable | 1.4G | | 90 | |
| Cryogenics, flammable | NA | | | unlimited |
| Cryogenics, inert | NA | | 90 | |
| Cryogenics, oxidizing | NA | | | |
| Flammable gas | Gaseous<br>Liquefied | | (300)a | 2000a |
| Flammable liquid | IA,<br>IB and IC | | 60a<br>240a | |
| Flammable liquid combination (IA, IB, IC) | NA | | 240a<br>660a<br>unlimited | |
| Flammable solid | NA | 250a | | |
| Inert gas | Gaseous<br>Liquefied | | | unlimited<br>unlimited |
| Organic peroxide | UD<br>I<br>II<br>III<br>IV<br>V | 2a<br>10a<br>100a<br>250a<br>unlimited<br>unlimited | same as solid (in pounds) | |
| Oxidizer | 4<br>3<br>2<br>1 | 2a<br>20a<br>500a<br>unlimited | same as solid (in pounds) | |
| Oxidizing Gas | Gaseous<br>Liquefied | | 300e | 3000a |
| Pyrophoric material | NA | 8a | 8a | 50a |
| Unstable (reactive) | 4<br>3<br>2<br>1 | 1 a<br>10a<br>100a<br>unlimited | 1a<br>10a<br>100a<br>unlimited | 10a<br>100a<br>500a<br>unlimited |
| Water reactive | 3<br>2<br>1 | 10a<br>100a<br>unlimited | 10a<br>100a<br>unlimited | |

**Maximum Chemical Quantity per Control Area Summary**

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

The following shall not be included in determining the maximum allowable quantities:

Gaseous fuels in piping systems and fixed appliances regulated by the International Fire Code

Liquid fuels in piping system and fixed appliances regulated by the International Mechanical Code.

a. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinet, day boxes, gas cabinets or exhausted enclosures or in listed safety cans in accordance with the international fire code.

# ROOM CHEMICAL LIST

(HAZARDOUS MATERIALS, LIQUIDS AND CHEMICALS LIST)

**PROGRAM** _____ **PREPARED BY**: Ryan Looper

**LAB (ROOM)** Bio-Organic Laboratory Suite **TELEPHONE No**._____
**UNIT / GROUP** _____ **E-MAIL** . r.looper@utah.edu

Please classify and estimate the amount of chemicals to be stored in the facility. Please estimate on a **room by room basis** utilizing the following categories (***Please refer to the attached definitions for accurate materials classification):***

**A. PRESENTING "PHYSICAL HAZARD"**:

| | | | | |
|---|---|---|---|---|
| 1. | Combustible Liquid | Class II | 2.5 | GALS. |
| | | Class IIIA | 0.3 | GALS. |
| | | Class IIIB | 1.3 | GALS. |
| 2. | Combustible Dust (Pounds/1000 Cu. Ft.) | | 0.01 | LBS. |
| 3. | Combustible Fiber (Loose Baled) | | 5 | LBS. |
| 4. | Cryogenics, Flammable or Oxidizing | | 5.5 | GALS. |
| 5. | Explosives | | 1 | LBS. |
| 6. | Flammable Gas (Gaseous/Liquefied) | | 197 | CU.FT./GALS. |
| 7. | Flammable Liquid | Class 1A | 40 | GALS. |
| | | Class 1B | 40 | GALS. |
| | | Class 1C | | GALS. |
| | | Combination Class 1A, 1B, 1C | | GALS. |
| 8. | Flammable Solid | | .5 | LBS. |
| 9. | Organic Peroxide | Class UD | .5 | LBS. |
| | | Class I | 0 | LBS. |
| | | Class II | 0 | LBS. |
| | | Class III | 0 | LBS. |
| 10. | Oxidizer | Class 4 | 0 | LBS. |
| | | Class 3 | 0 | LBS. |
| | | Class 2 | 3 | LBS. |
| | | Class 1 | 5 | LBS. |
| 11. | Oxidizer-Gas | | 0 | CU. FT. |
| 12. | Pyrophoric | | 0 | LBS./CU.FT. |
| 13. | Unstable (Reactive) | Class 4 | 0 | LBS./CU.FT. |
| | | Class 3 | 0 | LBS./CU.FT. |
| | | Class 2 | 0 | LBS./CU.FT. |
| | | Class 1 | 0 | LBS./CU.FT. |
| 14. | Water Reactive | Class 3 | 0.1 | LBS. |
| | | Class 2 | 0.1 | LBS. |

**B. PRESENTING "HEALTH HAZARD":**

| | | | | |
|---|---|---|---|---|
| 1. | Corrosive | ___ LBS. | 2.6 GALS. | ___ CU. FT. |
| 2. | Highly toxic | 0.05 LBS. | | ___ CU. FT. |
| 3. | Irritant | ___ LBS. | 1.5 GALS. | ___ CU. FT. |
| 4. | Radioactive | Unsealed Source | 0 REM | |
| | | Sealed Source | 0 REM | |
| 5. | Sentisizer | ___ LBS. | 1.0 GALS. | ___ CU. FT. |
| 6. | Toxic | 0.1 LBS. | ___ GALS. | ___ CU. FT. |
| 7. | Other Health Hazards | 0.6 LBS. | ___ GALS. | ___ CU. FT. |

# A.1 Appendix 1 - Cost Estimate

| CSI # | DESCRIPTION | UNIT QTY | UNIT COST | |
|---|---|---|---|---|
| | **BUILDING COST ESTIMATE** | | | |
| 02 | EXISTING CONDITIONS | | $ 1.71 | $ 76,885 |
| 03 | CONCRETE | | $ 32.84 | $ 1,475,068 |
| 04 | MASONRY | | $ 10.90 | $ 489,600 |
| 05 | METALS | | $ 7.81 | $ 350,973 |
| 06 | WOODS & PLASTICS | | $ 14.77 | $ 663,263 |
| 07 | THERMAL & MOISTURE PROTECTION | | $ 10.50 | $ 471,799 |
| 08 | DOORS & WINDOWS | | $ 16.01 | $ 719,070 |
| 09 | FINISHES | | $ 22.58 | $ 1,014,037 |
| 10 | SPECIALTIES | | $ 4.18 | $ 187,773 |
| 11 | EQUIPMENT | | $ 14.84 | $ 666,400 |
| 12 | FURNISHINGS | | $ 2.15 | $ 96,414 |
| 13 | SPECIAL CONSTRUCTION | | $ - | $ - |
| 14 | CONVEYING EQUIPMENT | | $ - | $ - |
| 21 | FIRE SUPPRESSION | | $ 2.85 | $ 128,016 |
| 22 | PLUMBING | | $ 7.59 | $ 340,762 |
| 23 | HVAC | | $ 75.00 | $ 3,368,850 |
| 26 | ELECTRICAL | | $ 29.00 | $ 1,302,409 |
| 31 | EARTHWORK | | $ 12.31 | $ 553,012 |
| | SUBTOTAL | | $ 265.02 | 11,904,331 |
| | GENERAL CONDITIONS | 6% | $ 15.90 | 714,260 |
| | OVERHEAD & PROFIT | 4% | $ 10.60 | 476,173 |
| | DESIGN CONTINGENCY | 12% | $ 31.80 | 1,428,520 |
| | TOTALS | | $ 323.33 | $ 14,523,284 |

| CSI # | DESCRIPTION | UNIT QTY | UNIT COST | |
|---|---|---|---|---|
| **02** | **EXISTING CONDITIONS** | | | |
| | **Demolition** | | | |
| | Demo Exterior at existing building | 10,290 SF | $6.50 | $ 66,885 |
| | Saw cutting | 1 LS | $10,000.00 | $ 10,000 |
| | **Subtotal for Demolition** | | | **$ 76,885** |
| | **TOTAL EXISTING CONDITIONS** | | | **$ 76,885** |
| **03** | **CONCRETE** | | | |
| | Foundation Walls | 3,904 SF | $ 18.68 | $ 72,927 |
| | Area Well Walls | 1,950 SF | $ 19.68 | $ 38,376 |
| | Architectural Concrete Columns | 233 CY | $ 400.00 | $ 93,333 |
| | Concrete Shear wall | 13,200 SF | $ 24.68 | $ 325,776 |
| | Suspended concrete slab (pan) | 36,998 SF | $ 21.65 | $ 801,007 |
| | Spot Footings | 100 CY | $ 280.00 | $ 27,876 |
| | Footings Continuous | 80 CY | $ 270.00 | $ 21,680 |
| | Connection at existing building | 735 LF | $ 79.00 | $ 58,065 |
| | Stepped Slab at Auditorium | 820 SF | $ 9.65 | $ 7,913 |
| | Slab on Grade- 6" | 7,920 SF | $ 3.55 | $ 28,116 |
| | **TOTAL CONCRETE** | | | **$ 1,475,068** |
| **04** | **MASONRY** | | | |
| | Brick Veneer at building exterior | 27,200 SF | $ 18.00 | $ 489,600 |
| | **TOTAL MASONRY** | | | **$ 489,600** |
| **05** | **METALS** | | | |
| | Structural Steel at roof | 62,300 LB | $ 1.55 | $ 96,565 |
| | Metal Roof Deck | 8,900 SF | $ 2.70 | $ 24,030 |
| | South Stairs Decorative | 840 SF | $ 125.00 | $ 105,000 |
| | Free standing Railing at south stair | 355 LF | $ 290.00 | $ 102,950 |
| | Miscellaneous Metals | 6230 LB | $ 3.60 | $ 22,428 |

| CSI # | DESCRIPTION | UNIT QTY | UNIT COST | |
|---|---|---|---|---|
| | **TOTAL METALS** | | | **$ 350,973** |
| **06** | **WOOD & PLASTICS** | | | |
| | **Carpentry:** | | | |
| | Wood Wall Cap | 2,176 BF | $ 2.68 | $ 5,832 |
| | Blocking | 5,000 BF | $ 2.68 | $ 13,400 |
| | **Subtotal for Carpentry** | | | **$ 19,232** |
| | **Millwork:** | | | |
| | Moveable Lab Table 5' segment | 21 EA | $ 1,825.00 | $ 38,325 |
| | Full Height Cabinet | 118 LF | $ 225.00 | $ 26,550 |
| | Lab Island | 572 LF | $ 395.00 | $ 225,940 |
| | Vanity | 82 LF | $ 225.00 | $ 18,450 |
| | Lab Base Cabinet | 747 LF | $ 365.00 | $ 272,655 |
| | Adjustable Shelving | 316 LF | $ 59.00 | $ 18,644 |
| | Heavy Duty Shelving Units | 3 EA | $ 265.00 | $ 795 |
| | Other Millwork | 44,918 SF | $ 0.95 | $ 42,672 |
| | **Subtotal for Millwork** | | | **$ 644,031** |
| | **TOTAL WOOD & PLASTICS** | | | **$ 663,263** |
| **07** | **THERMAL & MOISTURE PROTECTION** | | | |
| | R-30 Rigid Insulation | 8,900 SF | $ 2.55 | $ 22,695 |
| | Batt Insulation at exterior furring | 27,200 SF | $ 0.75 | $ 20,400 |
| | Sound Batt Insulation | 47,100 SF | $ 0.48 | $ 22,608 |
| | Exterior Sheathing | 27,200 SF | $ 1.65 | $ 44,880 |
| | Air Barrier | 27,200 SF | $ 2.05 | $ 55,760 |
| | 2" Rigid Insulation at exterior wall | 27,200 SF | $ 2.65 | $ 72,080 |
| | Single Ply Membrane | 8,900 EA | $ 2.55 | $ 22,695 |
| | Foundation Waterproofing | 3,904 SF | $ 4.60 | $ 17,958 |
| | Metal Soffit | 1,850 SF | $ 30.00 | $ 55,500 |

| CSI # | DESCRIPTION | UNIT QTY | UNIT COST | |
|---|---|---|---|---|
| | Roof Expansion Joint | 147 LF | $ 79.00 | $ 11,613 |
| | Floor Expansion Joint | 588 LF | $ 98.00 | $ 57,624 |
| | Metal Wall Cap/ Raised Drip Edge | 340 LF | $ 9.65 | $ 3,281 |
| | Metal Flashings | 1,500 SF | $ 5.65 | $ 8,475 |
| | Fire Caulking | 44,918 SF | $ 0.25 | $ 11,230 |
| | Fire stopping | 1 Allow | $ 25,000.00 | $ 25,000 |
| | Caulking & Sealants | 1 LS | $ 20,000.00 | $ 20,000 |
| | **TOTAL THERMAL & MOISTURE PROTECTION** | | | **$ 471,799** |
| **08** | **DOORS & WINDOWS** | | | |
| | Interior Single Doors | 82 EA | $ 1,090.00 | $ 89,380 |
| | Double Interior Doors | 5 EA | $ 1,550.00 | $ 7,750 |
| | Offset Double Door | 17 EA | $ 2,650.00 | $ 45,050 |
| | Aluminum Single Doors | 1 EA | $ 2,850.00 | $ 2,850 |
| | Entry Double Doors | 2 PR | $ 3,850.00 | $ 7,700 |
| | Interior Aluminum Glazing | 2,272 SF | $ 30.50 | $ 69,296 |
| | Curtainwall | 4,620 SF | $ 60.00 | $ 277,200 |
| | Aluminum Storefront | 7,208 SF | $ 30.50 | $ 219,844 |
| | **TOTAL DOORS & WINDOWS** | | | **$ 719,070** |
| **09** | **FINISHES** | | | |
| | Exterior Stud wall | 27,200 SF | $ 3.60 | $ 97,920 |
| | Exterior Furring | 17,104 SF | $ 1.95 | $ 33,353 |
| | Metal Stud wall Framing | 47,100 SF | $ 1.95 | $ 91,845 |
| | 5/8" Gypsum board | 138,504 SF | $ 1.40 | $ 193,906 |
| | Suspended Gyp Ceiling | 1,807 SF | $ 4.00 | $ 7,228 |
| | Acoustic Ceiling Tile | 18,120 SF | $ 3.00 | $ 54,360 |
| | Lab Area Acoustic | 18,926 SF | $ 3.75 | $ 70,973 |
| | Floor tile at restrooms/ lockers | 1,807 SF | $ 11.65 | $ 21,052 |

| CSI # | DESCRIPTION | UNIT QTY | UNIT COST | |
|---|---|---|---|---|
| | **TOTAL SPECIALTIES** | | | **$ 187,773** |
| **11** | **EQUIPMENT** | | | |
| | Fume Hoods | 50 EA | $ 12,500.00 | $ 625,000 |
| | Bio Safety Cabinet 6' | 2 EA | $ 10,950.00 | $ 21,900 |
| | Snorkel Exhaust | 3 EA | $ 6,500.00 | $ 19,500 |
| | **TOTAL EQUIPMENT** | | | **$ 666,400** |
| **12** | **FURNISHINGS** | | | |
| | Entrance Mat | 200 SF | $ 29.65 | $ 5,930 |
| | Roller shades | 11,828 SF | $ 7.65 | $ 90,484 |
| | **TOTAL FURNISHINGS** | | | **$ 96,414** |
| **13** | **SPECIAL CONSTRUCTION** | | | |
| | **TOTAL SPECIAL CONSTRUCTION** | | | **$ -** |
| **14** | **CONVEYING EQUIPMENT** | | | |
| | Passenger Elevator n/a in existing building | | | |
| | **TOTAL CONVEYING EQUIPMENT** | | | **$ -** |
| **21** | **FIRE SUPPRESSION** | | | |
| | Fire Sprinkler System | 44,918 SF | $ 2.85 | $ 128,016 |
| | **TOTAL FIRE SUPPRESSION** | | | **$ 128,016** |
| **22** | **PLUMBING** | | | |
| | Lab Gas System | 44,918 SF | $ 1.25 | $ 56,148 |
| | ADA toilets | 10 EA | $ 625.00 | $ 6,250 |
| | Standard toilets | 15 EA | $ 600.00 | $ 9,000 |
| | Urinals | 5 EA | $ 520.00 | $ 2,600 |
| | Floor Drains | 12 EA | $ 95.00 | $ 1,140 |
| | Showers | 2 EA | $ 850.00 | $ 1,700 |
| | Counter lavs | 24 EA | $ 520.00 | $ 12,480 |
| | Wall Lavs | 1 EA | $ 600.00 | $ 600 |

| CSI # | DESCRIPTION | UNIT QTY | UNIT COST | |
|---|---|---|---|---|
| | Emergency Shower/ Eye wash | 20 EA | $ 965.00 | $ 19,300 |
| | Lab Sinks | 56 EA | $ 950.00 | $ 53,200 |
| | Mop sinks | 5 EA | $ 485.00 | $ 2,425 |
| | Water Cooler | 5 EA | $ 525.00 | $ 2,625 |
| | Supply Piping | 4,650 LF | $ 8.65 | $ 40,223 |
| | Waste/vent Piping | 3,116 LF | $ 14.68 | $ 45,736 |
| | Pure water System | 1 LS | $ 50,000.00 | $ 50,000 |
| | Reclaimed Water Cistern | 1 LS | $ 25,000.00 | $ 25,000 |
| | Roof Drains | 12 EA | $ 155.00 | $ 1,860 |
| | Roof Drain Piping | 720 LF | $ 14.55 | $ 10,476 |
| | **TOTAL PLUMBING** | | | **$ 340,762** |
| **23** | **HVAC** | 44,918 SF | $ 75.00 | **$ 3,368,850** |
| **26** | **ELECTRICAL** | | | |
| | **Service & Distribution** | 44,918 SF | $ 6.75 | **$ 303,197** |
| | **Power** | 44,918 SF | $ 5.65 | **$ 253,787** |
| | **Lighting** | 44,918 SF | $ 10.00 | **$ 449,180** |
| | **Lightning Protection** | 1 LS | $ 20,000.00 | **$ 20,000** |
| | **Telecommunication** | 44,918 SF | $ 1.65 | **$ 74,115** |
| | **Fire Alarm** | 44,918 SF | $2.25 | **$ 101,066** |
| | **Special Systems** | 44,918 SF | $2.25 | **$ 101,066** |
| | **TOTAL ELECTRICAL** | | | **$ 1,302,409** |
| **31** | **EARTHWORK** | | | |
| | **Earthwork:** | | | |
| | Site Clearing | 42920 SF | $ 0.39 | $ 16,739 |
| | Site Grading | 35000 SF | $ 0.31 | $ 10,850 |
| | Shoring | 1520 SF | $ 39.00 | $ 59,280 |
| | Building Excavation | 5867 CY | $ 5.00 | $ 29,333 |

| CSI # | DESCRIPTION | UNIT QTY | UNIT COST | |
|---|---|---|---|---|
| | Backfill and Compaction w/ imported fills | 1467 CY | $ 18.65 | $ 27,353 |
| | Remove Spoil | 5867 CY | $ 6.00 | $ 35,200 |
| | Gravel under slab | 155 TNS | $ 24.65 | $ 3,818 |
| | Building Grading | 7920 SF | $ 0.39 | $ 3,089 |
| | SWPP | 1 LS | $ 10,000.00 | $ 10,000 |
| | **Subtotal for Earthwork** | | | **$ 195,662** |
| | **Site Utilities** | | | |
| | Relocate Waterline | 220 LF | $ 40.00 | $ 8,800 |
| | Relocate 36" SD line | 220 LF | $ 90.00 | $ 19,800 |
| | Sewer Connection | 1 LS | $ 20,000.00 | $ 20,000 |
| | Storm Drainage | 1 LS | $ 25,000.00 | $ 25,000 |
| | **Subtotal for Site Utilities** | | | **$ 73,600** |
| | **Asphalt Paving** | | | |
| | Asphalt Patching | 2500 SF | $ 4.00 | $ 10,000 |
| | **Subtotal for Asphalt Paving** | | | **$ 10,000** |
| | **Landscaping** | 35000 SF | $ 3.00 | **$ 105,000** |
| | **Site Concrete** | 35000 SF | $ 4.25 | **$ 148,750** |
| | **Site Lighting** | 1 LS | $ 15,000.00 | **$ 15,000** |
| | **Site Specialties** | 1 LS | $ 5,000.00 | **$ 5,000** |
| | **TOTAL EARTHWORK** | | | **$ 553,012** |

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Calculation Sheet #_____

# Schematic Design Loading

*IBC 2009*

**PROJECT NAME:** Eyring Chemistry Addition
**LOCATION:** Design Loads
**ENGINEER:** TM
**DATE:** 8/3/2010

## Dead Loads:

**Typcial Floor**

| | | |
|---|---|---|
| Self Weight of Structure: | Program Calculated | |
| Ceilings: | 5.2 | psf |
| MEP Systems: | 15.6 | psf |
| Misc: | 4.2 | psf |
| Total: | 25psf + Self Weight of Structure | |

**Typcial Roof**

| | | |
|---|---|---|
| Self Weight of Structure: | Program Calculated | |
| Ceilings: | 5.2 | psf |
| MEP Systems: | 15.6 | psf |
| Roofing: | 20.9 | psf |
| Total: | 41.7psf + Self Weight of Structure | |

## Live Loads:

| | | |
|---|---|---|
| Typical Floors: | 125 | psf (Includes 10psf partition load) |
| Penthouse Floor: | 157 | psf |

## Snow Loads:

| | | |
|---|---|---|
| Typical Snow: | 35 | psf (Includes 5 psf for ponding) |

## Seismic Loads:

| | | | | | |
|---|---|---|---|---|---|
| $S_s$: | 1.63 | | | | |
| $S_1$: | 0.65 | | Seismic Mass: | 9860 | kips (Includes all DL + 10% LL) |
| Site Category: | C | | $C_s$: | 0.22 | |
| I: | 1 | | Static Base Shear: | 2820 | kips (Amplified by ρ) |
| ρ: | 1.3 | | | | |
| R: | 5 | (Special Reinforced Concrete Shear Walls) | | | |

## Wind Loads:

| | | |
|---|---|---|
| Wind Speed (V): | 90 | mph (3 second gust) |
| Exposure: | C | |
| Internal Pressure Coefficient (Gcpi): | 0.18 | |
| Importance Factor: | 1 | |

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sheet

project EYRING CHEMISTRY ADDITION

location STRUCTURAL SYSTEMS

date 8/3/10 by TM

MILD REINFORCED SUSPENDED SLABS

$t_{min} = l_n/30 = 30(12)/30 = 12''$

TOO THICK FOR REQ'D CLEARANCES. TRY PT SLAB.

P-T SLAB

$t_{min} = l_n/45 = 30(12)/45 = 8''$

8" ACCEPTABLE FOR CLEARANCES.

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Calculation Sheet #_____

# CONCRETE COLUMN ANALYSIS

*ACI 318*

Project: Eyring Chemistry Addition
Designation: Typical Columns Above 2nd Level

Date: 8/3/10
Engineer: TM

**Material Properties**

| | | |
|---|---|---|
| $f'c$: | 5 | ksi |
| $fy$: | 60 | ksi |
| Bar#: | 9 | |
| Cover: | 2 | inches |
| $\phi$: | 0.65 | |

**Factored Loads**

| | | |
|---|---|---|
| $Pu$: | 0 | kips |
| $Mu_x$: | 0 | kip-ft |
| $Mu_y$: | 0 | kip-ft |

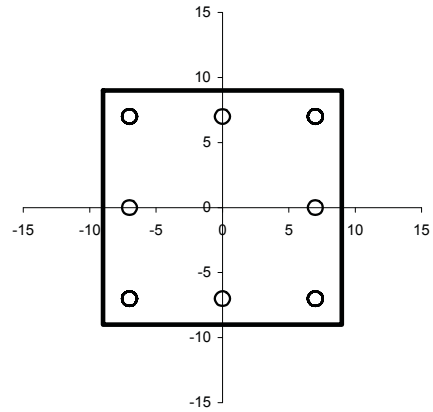
**Preliminary Calculations**

| | | |
|---|---|---|
| $Ag$ = | 324 | $in^2$ |
| $Ast$ = | 8 | $in^2$ |
| $\rho$ = | 0.024691 | |
| $\beta_1$= | 0.8 | |
| $\phi P_n$ = | 947.96 | kips |

**Column Geometry**

y
width: 18 inches

x
length: 18 inches



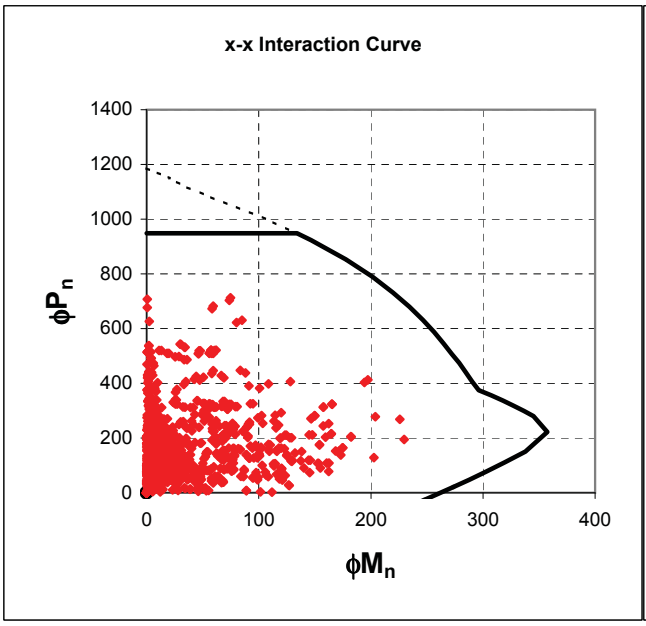

x
# Bars: 3

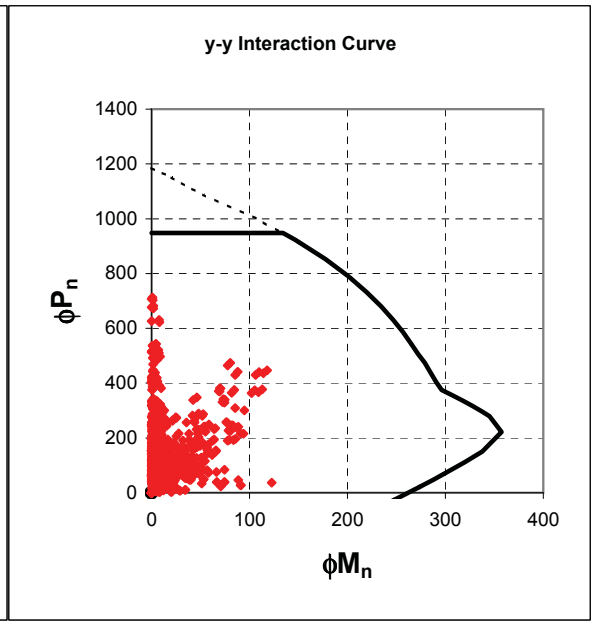
# Bars: 3

Minimum Tie Spacing

y

#3@ 18 Alternate Bars along width require ties.
#4@ 18 Alternate bars along length require ties.



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Calculation Sheet #_____

# CONCRETE COLUMN ANALYSIS

*ACI 318*

Project: Eyring Chemistry Addition
Designation: Typical Columns Below 2nd Level

Date: 8/3/10
Engineer: TM

**Material Properties**

| | | |
|---|---|---|
| $f'c$: | 5 | ksi |
| $fy$: | 60 | ksi |
| Bar#: | 9 | |
| Cover: | 2 | inches |
| $\phi$: | 0.65 | |

**Factored Loads**

| | | |
|---|---|---|
| $Pu$: | 0 | kips |
| $Mu_x$: | 0 | kip-ft |
| $Mu_y$: | 0 | kip-ft |

**Preliminary Calculations**

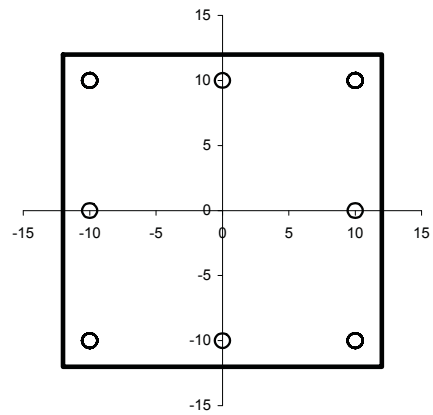
| | | |
|---|---|---|
| $Ag$ = | 576 | $in^2$ |
| $Ast$ = | 8 | $in^2$ |
| $\rho$ = | 0.013889 | |
| $\beta_1$ = | 0.8 | |
| $\phi P_n$ = | 1504.88 | kips |

**Column Geometry**

y
width: 24 inches

x
length: 24 inches

x
# Bars: 3

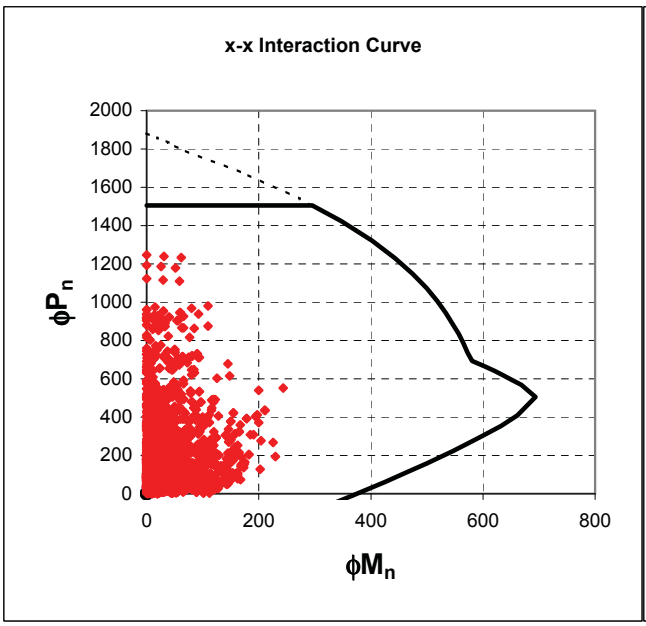


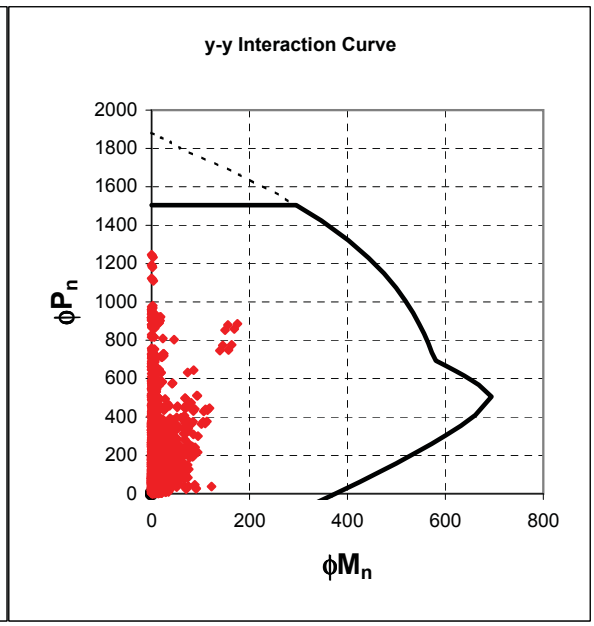

# Bars: 3

Minimum Tie Spacing

y

#3@ 18 All bars along width require ties.
#4@ 18.048 All bars along length require ties.



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Calculation Sheet #_____

# CONCRETE SHEARWALL DESIGN

***ACI 318-05 Building Code and Commentary Chapter 21.7***

Project: UofU Chemistry — Date: 8/3/2010
Wall: 16 W-8.1-2 2ND FLOOR — Engineer: TM

| | | | | | |
|---|---|---|---|---|---|
| Wall Height ($h_w$): | 16.92 | ft | $f'c$: | 5000 | psi |
| Wall Length ($l_w$): | 12 | ft | $fy$: | 60000 | psi |
| Thickness ($t_w$): | 24 | inches | $\beta_1$: | 0.8 | |

Design loads & Displacements:

| | | |
|---|---|---|
| $Pu$: | 605.21 | kips |
| $Mu$: | 12604.618 | kip-ft |
| $Vu$: | 517.42 | kips |
| $\delta_u$: | 1 | in |
| | 1.42128 | in Critical Deflection |

Wall Reinforcement:

| | | | | |
|---|---|---|---|---|
| Vertical: # | 9 | at | 12 | inches |
| Horizontal: # | 6 | at | 12 | inches |
| Curtains: | 2 | 2 Curtains Minimum Required. | | |

$\rho_v$= 0.00694 $\rho_h$= 0.00306 $\rho_{jamb}$= 0.0173

Flexural Analysis:
Calculation of 'c'

| | | |
|---|---|---|
| $a$ = | 21.22 | inches |
| $c$ = | 26.53 | inches |
| $Cc$ = | 2164.84 | kips |
| $\phi$= | 0.9 | Tension Controlled |
| $\phi Pn$ = | 605.21 | kips |
| $\phi Mn$ = | 16512.62 | kip-ft |

Current Output is Consistent.
Wall Flexural Capacity is Adequate.

Boundary Bars:

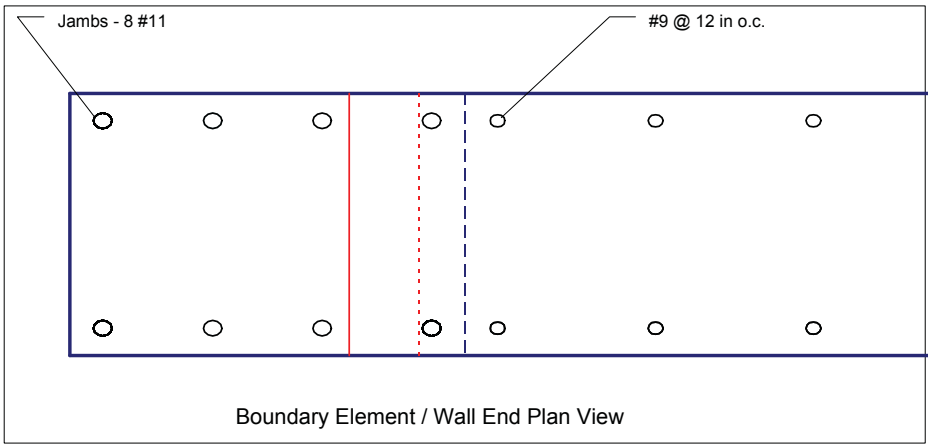
| | | |
|---|---|---|
| Bar # | 11 | |
| Bars along length: | 4 | |
| Bars along width: | 2 | |
| Min. cover to bar center: | 2.5 | inches |
| Length of Jamb: | 30 | inches |
| Total Bars= | 8 | |

Special Boundary Element Analysis — ◉ Stress Based ○ Deflection Based

Criteria: ACI 318-02 21.7.6.2 $l_w/(600(\delta_u/h_w))$= 34.2857143
No Special Boundary Element Detailing Required.

Criteria: ACI 318-02 21.7.6.3 $A$ = 3456 $in^2$ $S$ = 82944 $in^3$
Stress= 1.998703414 ksi
COMPRESSION ZONES REQUIRE SPECIAL BOUNDARY ELEMENT DETAILING!!

Shear Analysis:
ACI 318-02 21.7.4 $h_w/l_w$= 1.41 $\alpha_c$= 3
$\phi$ = 0.75 $\phi Vn$ = 1025.046233 kips Wall Shear Capacity is Adequate.




Boundary Element / Wall End Plan View

Horiz. Bars:
#6 @ 12 in o.c.
2 curtain(s)
(not shown)

*a* ————
*c* - - - - - - - -

Shear Friction:
$\rho_{dowel}$ = 0.00333
2 #4 @ 5 in o.c.
2 #5 @ 7.8 in o.c.
2 #6 @ 11 in o.c.
2 #7 @ 15 in o.c.
2 #8 @ 19.8 in o.c.

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# CONCRETE SHEARWALL DESIGN

ACI 318-05 Building Code and Commentary
Chapter 21.7

Wall Segment Design Summary

Project: UofU Chemistry
Wall: 16

| | | | | | |
|---|---|---|---|---|---|
| Wall Height ($h_w$)= | 16.92 | ft | $f'c$= | 5000 | psi |
| Wall Length ($l_w$)= | 12 | ft | $fy$= | 60000 | psi |
| Thickness ($t_w$)= | 24 | in | | | |

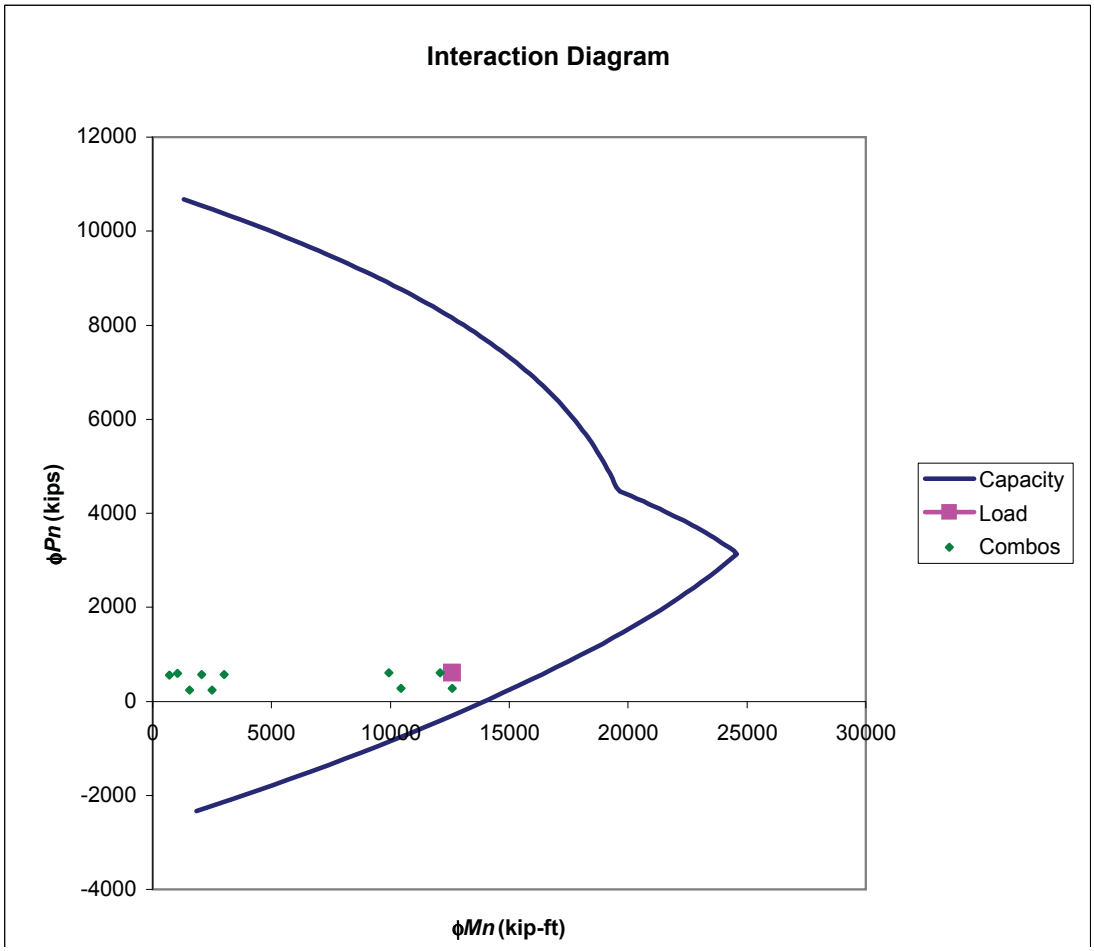
| | | |
|---|---|---|
| Jamb Column Length= | 30 | in |
| No. of Bars= | 8 | |
| Bar # | 11 | |

Reinforcement:
Verts= #9 @ 12 in o.c. 2 curtains
Horiz.= #6 @ 12 in o.c. 2 curtains
Min. cover= 2.5

Current design is Tension Controlled
$\phi$ = 0.9

Applied Loads:

| | | |
|---|---|---|
| Pu= | 605.21 | kips |
| Mu= | 12604.62 | kip-ft |
| Vu= | 517.42 | kips |



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Calculation Sheet #:_____

# RIGID MAT FOOTING DESIGN

***ACI 318 CODE AND COMMENTARY***

Project: Eyring Chemistry
Designation: Typ Spot Footing

Engineer: TM
Date: 8/3/2010

Sign Convention: Downward point and uniform loads are positive. Right hand rule applies for moments. For positive moments thumb points into the screen.

| Footing | | Incr. | | Material Properties | | Cover | |
|---|---|---|---|---|---|---|---|
| Width: | 10.0 | 0.5 | ft | f'c: | 4.5 ksi | Top bars: | 2.5 in |
| Length: | 10.0 | 0.5 | ft | fy: | 60 ksi | Bottom bars: | 3.5 in |
| Thickness: | 36 | 1 | in | Qa: | 10 ksf | Reverse E/W? | y |
| Unit Weight: | 150 | pcf | | % Increase: | 50% | | |

Point Loads (kips)

| | D | L | Lr or S or R | E | W | Loc. (ft) |
|---|---|---|---|---|---|---|
| 1 | | 915 | | | | 5 |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |

Mom Loads(k-ft)

| | D | L | Lr or S or R | E | W | Loc. (ft) |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |

☑ ☑ Allow Increase

Uniform Loads (klf)

| | D | L | Lr or S or R | E | W | Starts | Ends |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |

| case | Pressure (ksf) | Pressure/Qa |
|---|---|---|
| 1 | 0.5 | 0.0 |
| 2 | 9.6 | 1.0 |
| 3 | 0.5 | 0.0 |
| 4 | 7.3 | 0.7 |
| 5a | 0.5 | 0.0 |
| 5b | 0.5 | 0.0 |
| 6a | 7.3 | 0.5 |
| 6b | 7.3 | 0.5 |
| 7 | 0.3 | 0.0 |
| 8 | 0.3 | 0.0 |

Service Combinations

| case | D | L | Lr or S or R | E | W |
|---|---|---|---|---|---|
| 1 | 1.00 | | | | |
| 2 | 1.00 | 1.00 | | | |
| 3 | 1.00 | | 1.00 | | |
| 4 | 1.00 | 0.75 | 0.75 | | |
| 5a | 1.00 | | | | 1.00 |
| 5b | 1.00 | | | 0.70 | |
| 6a | 1.00 | 0.75 | 0.75 | | 0.75 |
| 6b | 1.00 | 0.75 | 0.75 | 0.53 | |
| 7 | 0.60 | | | | 1.00 |
| 8 | 0.60 | | | 0.70 | |

Factored Combinations

| case | D | L | Lr or S or R | E | W |
|---|---|---|---|---|---|
| 1 | 1.4 | | | | |
| 2 | 1.2 | 1.6 | 0.5 | | |
| 3a | 1.2 | 1.0 | 1.6 | | |
| 3b | 1.2 | | 1.6 | | 0.8 |
| 4 | 1.2 | 1.0 | 0.5 | | 1.6 |
| 5 | 1.2 | 1.0 | 0.2 | 1.0 | |
| 6 | 0.9 | | | | 1.6 |
| 7 | 0.9 | | | 1.0 | |
| A | 1 | | | | |
| B | 1 | | | | |

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# MEMORANDUM

To: Peter Brunjes, AIA
Derek Payne, AIA

From: Jerod G. Johnson, SE

Date: 7/2/10

Re: Thatcher Addition to HEB – University of Utah, Progressive Collapse Design

Gentlemen,

This memorandum is provided in reference to the NIH Design Requirements Manual and its application to the Thatcher addition to the Henry Eyring Chemistry Building at the University of Utah. In particular, Section 5-1: *Structural Design Considerations* Subheading C5.1 (Page 5-5) indicates the following:

*"Progressive collapse resistance shall be considered in the structural design of the facility and provided in accordance with GSA design requirements."*

While we appreciate the merits of a design which considers progressive collapse, it is our opinion that such requirements should not be applicable for this particular project. First, this project does not appear to house research of a controversial nature that might render it a likely terrorist target. Second, the site does not allow for setback distances and other geometric configurations commonly required for an anti-terrorist design scenario to mitigate the effects of failure induced by blast loading.

For these reasons, we recommend that progressive collapse not be included within the provisions of the structural design for this project.

Please contact us if there are any questions or concerns.

Kindest Regards,

Jerod Johnson

Jerod G. Johnson, SE
Principal, LEED(AP)

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MEMORANDUM

To: Peter Brunjes, AIA
Derek Payne, AIA

From: Jerod G. Johnson, SE

Date: / /10

Re: Thatcher Addition to HEB – University of Utah, Floor ibration Issues

Gentlemen,

This memorandum is provided to address the thickness of the floor slabs and the potential for floor vibrations for the Thatcher Addition to the Henry Eyring Chemistry Building at the University of Utah. We understand that an thick slab is the ma imum thickness that can be accommodated within the building design and that story height limitations do not allow for thicker slabs to provide increased vibration performance.

We have performed initial investigations of the thick slab as a primary solution for the floor structure. We have found that this thickness can support the prescribed loads but it must be comprised of post-tensioned concrete. In terms of vibration performance, the thick slab cannot achieve the relatively rigorous vibration requirements outlined in the NIH *Design equirements anual*. As part of the initial investigation, we determined a floor thickness of appro imately 1 would be required to enable a vibration velocity of 2,000 micro-inches per second, a vibration performance standard common for laboratory environments. For the thick slab, a vibration performance consistent with typical office environments should be e pected. For this, the vibration velocities could be in the range of 1 ,000 to 2,000 micro-inches per second. While this may be satisfactory in terms of occupant comfort, it may not be amenable to sensitive laboratory equipment.

Our recommendation is to locate any equipment having heightened vibration sensitivity at the ground level at the slabs on grade or on their own inertia slabs at this level. Increased vibration performance should easily be reali ed at the ground level. Equipment resting on the higher level suspended slabs which may be vibration-sensitive may be required to be supported by isolation tables or it may be required to be located adjacent to a building column where floor vibrations are diminished.

Please contact us if there are any questions or concerns.

Kindest Regards,

Jerod Johnson

Jerod G. Johnson, SE
Principal, LEED(AP)