BUILDING PROGRAM

New Science Building

SNOW COLLEGE

VCBO ARCHITECTURE

APPROVALS

4-22-15

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President, Snow College

Date

4/22/15

Spencer Hill
Vice President, Finance and Administration

Date

4-22-15

Dr. Steve Hood
Provost, Snow College

Date

4-22-15

Dan Black
Chair, Division of Natural Science and Mathematics

Date

4-28-15

Brian Bales
Project Director, DFCM

Date

ACKNOWLEDGEMENTS

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Snow College continues a tradition of excellence, encourages a culture of innovation, and cultivates an atmosphere of engagement to advance students in the achievement of their educational goals.

Snow College strives to fulfill its mission by:

Honoring its history and advancing its rich tradition of learning by providing a vibrant learning environment that empowers students to achieve their educational goals, encouraging and supporting innovative initiatives that create dynamic learning experiences for the college community, and creating learning and service opportunities, locally and globally, to engage students, faculty, staff, and surrounding communities.

http://www.snow.edu/provost/images/mission.pdf

BACKGROUND

"Snow College, founded in 1888, is one of the oldest two-year state colleges in the western United States. It is a dynamic institution, devoted to retaining the best of the past and to answering the demands of changing times. Snow College has an important place in the history of education in Utah. Its story is an integral part of the long struggle to establish schools, first in the Utah Territory and then in the State. In the true sense of the word, Snow College is a pioneer school.

In 1923, the college's name was changed to Snow College, which it has retained since that time. In addition to offering the traditional two-year pre-university education, Snow has offered applied technology courses throughout its century-long history. In 1998, the Utah State Legislature merged the former Sevier Valley Applied Technology Center, located in Richfield, with Snow College. The Richfield campus adds a strong program of applied technology education offerings and a growing number of academic courses to complement the offerings on the Ephraim campus. Today, Snow College is a state college offering liberal arts, applied technology, short-term training and vital student support services.

Over the years, the emphasis on quality has made Snow College the intellectual, artistic, musical, educational and sports hub of central Utah. Encouraged by

Snow's high academic standards and dedication to the pursuit of knowledge, thousands of graduates have gone on to earn higher degrees at colleges and universities throughout the country. Thousands of others have graduated from Snow fully prepared to find employment in a wide variety of fields, and to take their place in family and community life. Today, as in the past, the best evidence of Snow's success is its successful graduates."

http://www.snow.edu/general/catalog/history.pdf

["BEST TWO-YEAR COLLEGE IN AMERICA"]

The Division of Natural Science and Mathematics was formally created by President Lester B. Whetten during his time at the College, between 1953-1956. The Hans Reed Christensen Science Building that currently houses the Division administration, science classrooms, support spaces and faculty offices was constructed in 1973. The building, originally designed to meet the needs of the 700 students, has not undergone significant renovations over the last forty years. The facility has served the Division well, but no longer meets the modern scientific needs nor the changing learning and teaching pedagogues.

PROJECT OBJECTIVES

The new Snow College Science Building will be a state-of-the-art teaching and learning facility for the Snow College community. The new facility will provide a variety of learning, exploration, collaboration and working spaces that promote learning, inspire students and complement the greater goals of the College. The building will be a Science Center for the greater six county service area of the College - engaging students of all ages and backgrounds to explore and learn about science and our natural world.

This space program presents the goals and objectives for the new Snow College Science Building while outlining the specific building, space and system performance expectations. The information within this document reflects the vision and discussions portrayed during the programming process.

The space program also provides programming-level project costs and a proposed design and construction schedule. These two elements will evolve as the project progresses, however, the information presented in this program can be used for future planning of this important educational facility.

PROGRAMMING PROCESS

The programming process occurred over a six month period between August 2014 and January 2015. During this time, the programming team was selected, a steering committee formed and the program document created. The Steering Committee for this project included key College Administration and Division of Natural Sciences and Mathematics faculty as well as representation from the Division of Facilities Construction and Management from the State of Utah.

A number of key meetings and workshops were held to assess the Division needs. These meetings were as follows:

- Kick-Off Meeting
- Steering Committee Meeting
- Workshop 1
- Steering Committee
- Building Tours
- Workshop 2
- Workshop 3

Each workshop consisted of a series of individual meetings with key department representatives that will be working and teaching in this new building. Additionally, we had meetings with the College facility management staff and the consulting engineers. During these key sessions both the building and specific space attributes were discussed as well as the specific site considerations, and recommended building systems.

Beyond the specific space requirements, the area needed to effectively meet the learning targets and achieve academic objectives put forward by Snow College. The new facility, and the spaces defined in this program, will meet the current department needs, with some capacity for future growth. Additional growth for the Division will be planned in a future facility on campus.

The information presented in this program reflects the discussions and outcomes of these productive meetings.

The word cloud shown above was developed for the project through word association discussions with the project stakeholders.

SPACE SUMMARY

The new science building contains the following building areas:

	Department	Programmed Area
1.0	Biology	9,083 sf
2.0	Chemistry	5,943 sf
3.0	Physics	1,890 sf
4.0	Geology	1,943 sf
5.0	Engineering & Computer Science	2,040 sf
6.0	Shared Spaces	14,515 sf
	Total Net Area	**35,414 sf**
	Total Gross Area (.626 grossing factor)	**56,600 sf**

PROJECT COSTS

Project Costs

This estimate of the probable cost of construction has been carefully considered for this science and math learning facility and has been created based on the programmatic information that has been assembled for the project. The programmed building area, level of finishes (interior and exterior) anticipated for the building, structural, mechanical and electrical systems, required sitework, utilities and soil conditions at the site have all been taken into consideration when compiling this estimate. The projected construction costs noted here, include only the 'hard' construction costs for the building. An inflation factor must be considered for implementation to the project, depending on when the project is bid.

An independent cost consultant has been contracted to develop this cost of probable construction. This estimate has been generated from their previous experience and data-base of actual costs of other science building projects that have been constructed for higher education institutions in the State of Utah.

Building Cost Summary Table*

Building Cost Summary	Unit Quantity	Unit Cost	Subtotal
Construction Subtotal	56,600 SF (gross)	$ 250.92/SF	$14,201,839
General Conditions	5%	$12.55/SF	$710,092
Overhead & Profit	3%	$7.53/SF	$426,055
Bonds and Insurance	1.7%	$ 4.27/SF	$241,431
Design Contingency	10%	$ 25.09/SF	$1,420,184
Construction Total*		$300.35/SF	$16,999,601

**Notes:*
These costs are inclusive of the hard construction costs for the facility. The soft costs (all other project related costs, including fees, furnishings, testing, etc.) will need to be added to the construction budget by DFCM to arrive at the final Capital Budget Estimate (CBE) for the project. This estimate is in today's construction dollars. The final number will need to be adjusted to reflect an accurate cost of inflation from now until the time that the project is bid.

Refer to the location factor adjustment section to the right, as this could result in a higher construction cost.

A comprehensive analysis of the work by construction division is included in the Appendix of this document.

Location Factor Adjustment

A "Location Factor Adjustment" which adds a percentage cost penalty to reflect the distance that some construction trades may have to travel to get to the work in Ephraim must be analyzed at specific milestones in the design/ bidding process. These milestones may be at the beginning and midway through design, beginning and midpoint of construction documents and at project bidding. If the construction bid market is still aggressive (as it stands at the time of this printing), then this adjustment may be very close to 0%. If, however, the construction bid market becomes saturated with numerous available projects (closer to the Salt Lake valley), this adjustment factor could be higher. The specific adjustment of this 'factor' can be better evaluated at the time of bidding of the construction documents.

$16,999,601 minus
contingency $ 1,420,180=
$ 15,579,421

PROJECT SCHEDULE

Proposed Design Schedule

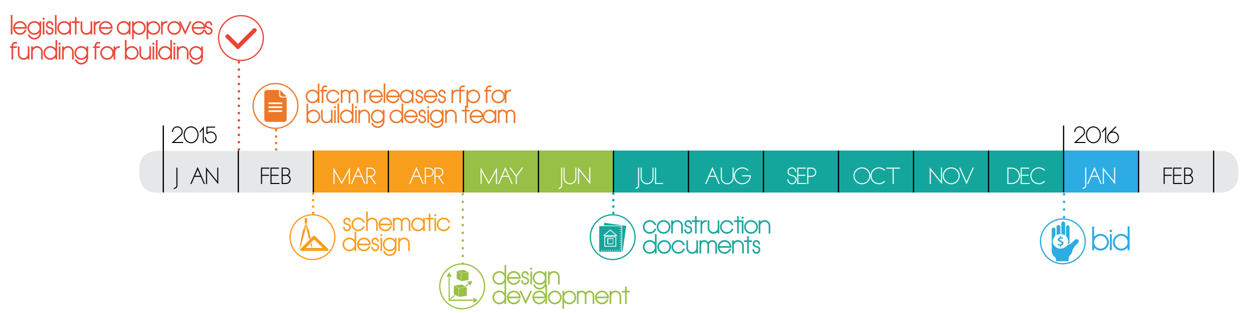
It is the intent of Snow College and DFCM to expedite the schedule for this project as much as is practicable. A relatively aggressive design and construction schedule for the project would allow the building to be ready for occupancy for the 2017/2018 academic school year. The following critical milestone design dates will keep the new Science Building on this projected timeline.

- February 2015 — Legislature approves funding for building
- February 2015 — DFCM releases RFP for building design team
- March 2015 — A/E Team chosen and begins work on building design
- April 2015 — Schematic design of building complete
- June 2015 — Design development of building complete
- January 2016 — Construction documents available for bidding.

Proposed Construction Schedule

The design schedule (outlined above) would allow the construction of the Science Building to begin in March of 2016 where construction activities could begin in a limited manner so as to not disrupt academic activities at the end of that school year. Construction would occur throughout the Summer of 2016 and the school year 2017/2018.

The final occupancy of the building should be slated for July of 2017, which would facilitate the building to be used for the school year 2017-2018.



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SITE ANALYSIS

Snow College is operated as part of the Utah System of Higher Education and includes two campuses, the Epraim Campus and the Richfield Campus. For the purpose of this program, only the Epraim Campus will be assessed, as this will be the home of the new science building.

Snow College is located in Ephraim, Utah. Ephraim is the largest city in Sanpete County, with a population of 6,135 at the 2010 census. The City is located along U.S. Route 89, just east of I-15, and is home to Snow College.

SNOW COLLEGE CAMPUS

Snow College is a unique and close-knit campus. The College includes a central main campus core that is supported by athletic fields two blocks north of the core campus and two separate community-oriented satellite areas to the west.

The central, or core campus area is the primary academic, student service and student activity area for the College. The existing buildings on campus range in scale and architectural expression. The historic Noyes Administration Building is the architectural and cultural icon of the campus, as shown to the left.

The campus, located between Central and College Avenues and 100 and 400 East, features large expanses of grass areas with beautiful, mature trees. The combination of open space and groves of trees create an idyllic setting that frames the buildings on campus. There is also a central green boulevard that runs through the middle of campus. This central area is a primary pedestrian thoroughfare running east/west through campus.

Current and future buildings located on the campus have four front faces. The buildings address the public streets on one to two sides and the green boulevard and pedestrian walkways on the other sides.


athletic fields
student housing and campus support
satellite west campus
core campus

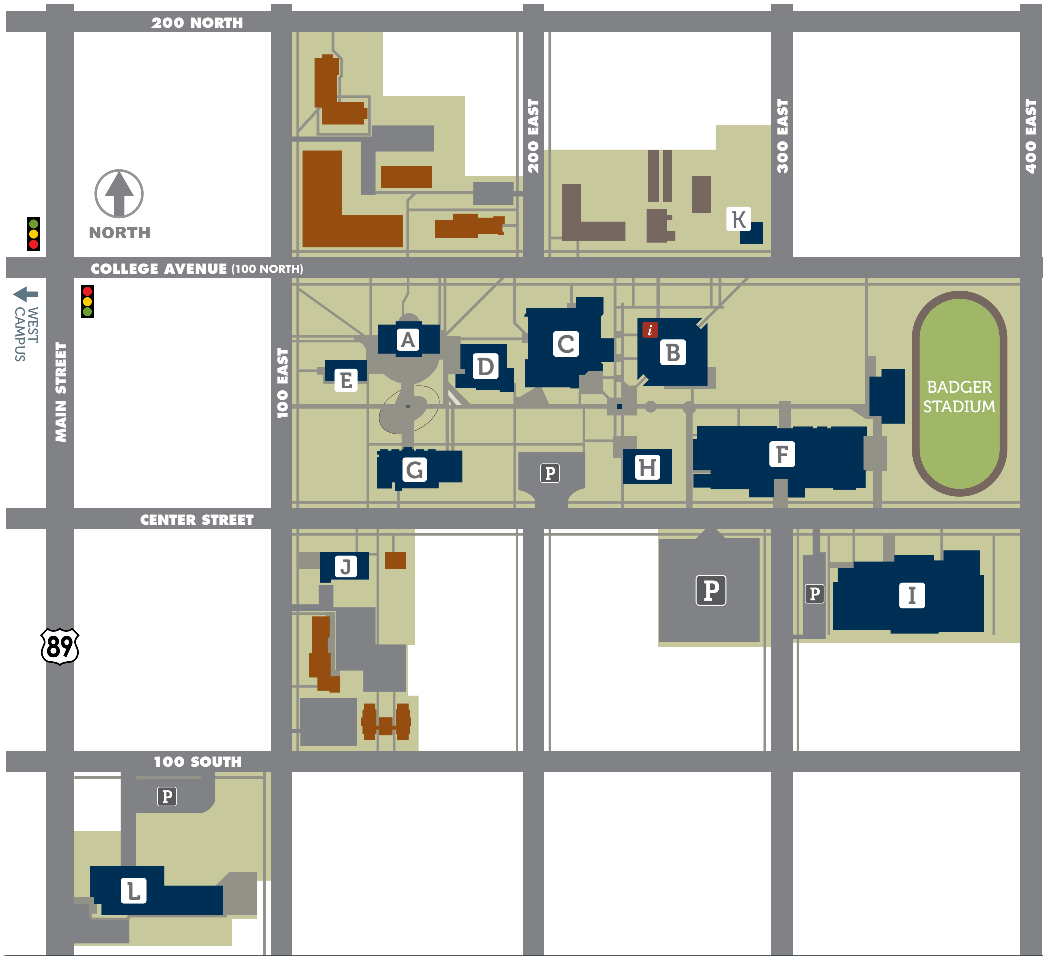
SNOW COLLEGE

P VISITOR PARKING

i VISITOR INFO

STUDENT HOUSING & RESIDENTIAL SUITES

FACILITIES BUILDINGS



BUILDINGS

A	Noyes (Administration)
B	Greenwood Student Center
C	Humanities & Fine Arts
D	Science Building
E	Social Science Building
F	Eccles Performing Arts Center
G	Karen H. Huntsman Library
H	Lucy Philips Building
I	Horne Activity Center
J	Home & Family Studies
K	TBSInstitute
L	Business Management

150 East College Ave.
Ephraim, UT 84627
1-800-848-3399
www.snow.edu
snowcollege@snow.edu
Campus Tours begin at the Greenwood Student Center

The core campus houses the student life, core academic facilities as well as the competitive basketball and football facilities. Housing, campus support and parking flank the core campus.

CLIMATE IMPACTS

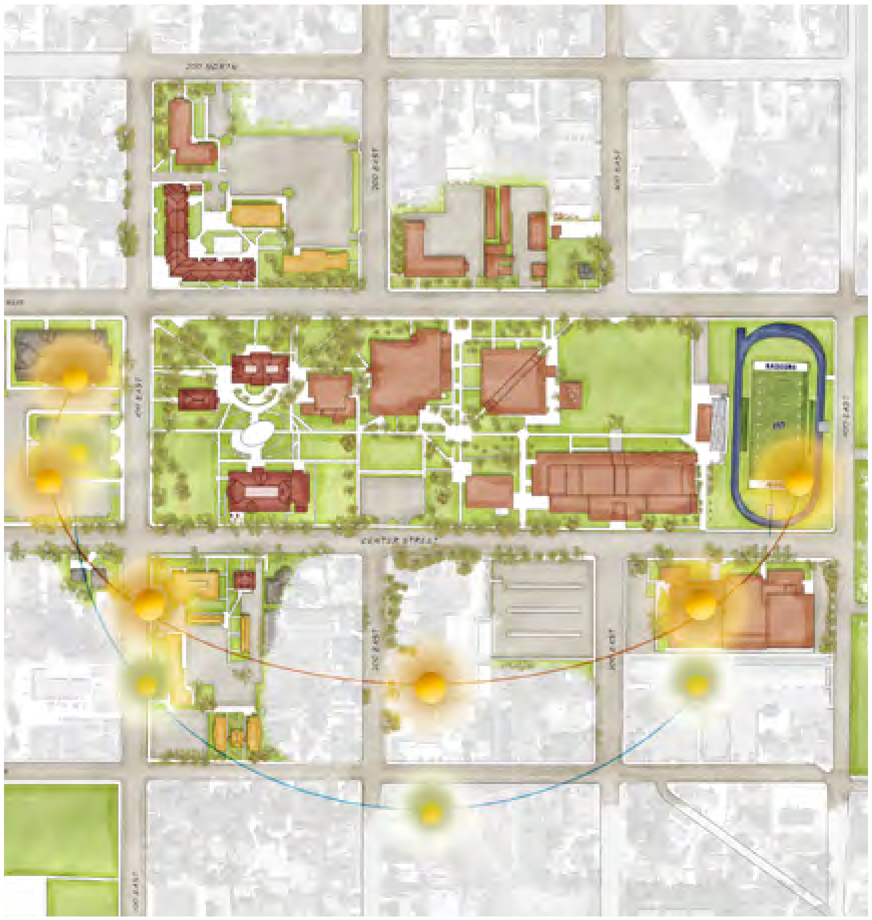
Climate Summary

Snow College is located in Ephraim, Utah and Sanpete County. Ephraim is considered to have a cold semi-arid climate. Although this area is considered a climate zone 5B based on the International Energy Conservation Code, the weather patterns and specifically the winter low temperatures are more in keeping with a climate zone 6B. Per the table below, during the winter months temperatures do not often rise above freezing, and can dive well below freezing.

The weather during the spring and fall seasons is very comfortable with temperatures ranging from just below freezing to the upper sixties and seventies. The summer temperatures are also very comfortable with the average high in the high eighties. There are a few days per year that reach above ninety degrees, but this is relatively rare for Ephraim.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Average High in °F:	34	40	50	58	69	80	88	86	76	63	48	35	60.6
Average Low in °F:	10	14	23	28	35	43	50	49	40	29	20	10	29.3
Av. Precipitation in inch:	0.94	1.06	1.38	1.22	1.26	0.79	0.75	0.87	1.18	1.42	1.06	1.18	13.11
Average Snowfall in inch:	5	3	3	1	0	0	0	0	0	0	1	8	21

http://www.usclimatedata.com/climate/ephraim/utah/united-states/usut0074.



Solar Access

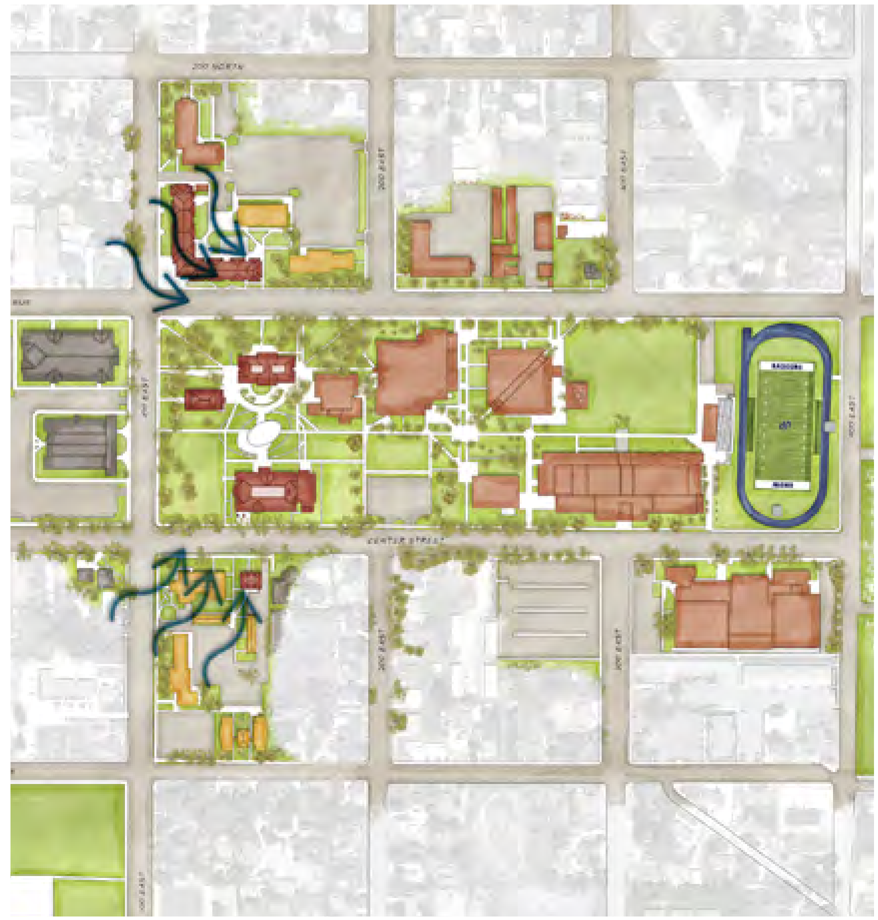
The campus is oriented with the long axis running east / west. This is an ideal solar orientation for new buildings, as shown on the diagram to the left. There are no tall buildings that would cast shadows on the two potential buildings sites, and the existing trees are deciduous, which is ideal for summer shading and winter solar heat gains. The following table provides solar altitude and azimuth information for Ephraim City, and should be used to establish solar orientation and sun shading devices for the building.

	Summer Solstice			Winter Solstice		
	Time	Altitude	Azimuth	Time	Altitude	Azimuth
Sunrise	6:30 am	4.4o	63o	8:00 am	2.3o	122.9o
Peak Sun	1:30 pm	74o	205.3o	12:30 pm	27.2o	181.4o
Sunset	9:00 pm	-1.4o	302.3o	5:00 pm	0.7o	181.5o

Additionally, the site has the potential to generate approximately 6 kilowatt hours of energy per square meter per day using solar photovoltaics. Solar photovoltaics are a great opportunity to demonstrate energy generation and meet sustainability goals for the project.

Prevailing Winds

Ephraim does not typically experience strong winds. However, the prevailing winds are from the southwest with strong winter storms from the northwest. The image to the right shows the typical wind patterns.



CAMPUS OPEN SPACE

There is a significant green boulevard that runs the entire length of the core campus of Snow College from the football stadium to the east to the LDS Institute Buildings to the west. Although the width of this green space limits it to being used primarily as a pedestrian circulation corridor, there is potential to make this space more of a traditional campus quad that provides space for students to lounge, study and collaborate in the outdoors. Currently, there are several open spaces on the core campus that are not occupied by buildings. These outdoor spaces serve as impromptu and planned campus activity space. These outdoor spaces are especially valuable when young learners flock to Snow College for instructional camps in the summer. The open space west of the football stadium is especially critical for campus intramural athletics. Eventually, these spaces will likely be filled in with future campus buildings, but for the short term, their value to the campus should not be underestimated.

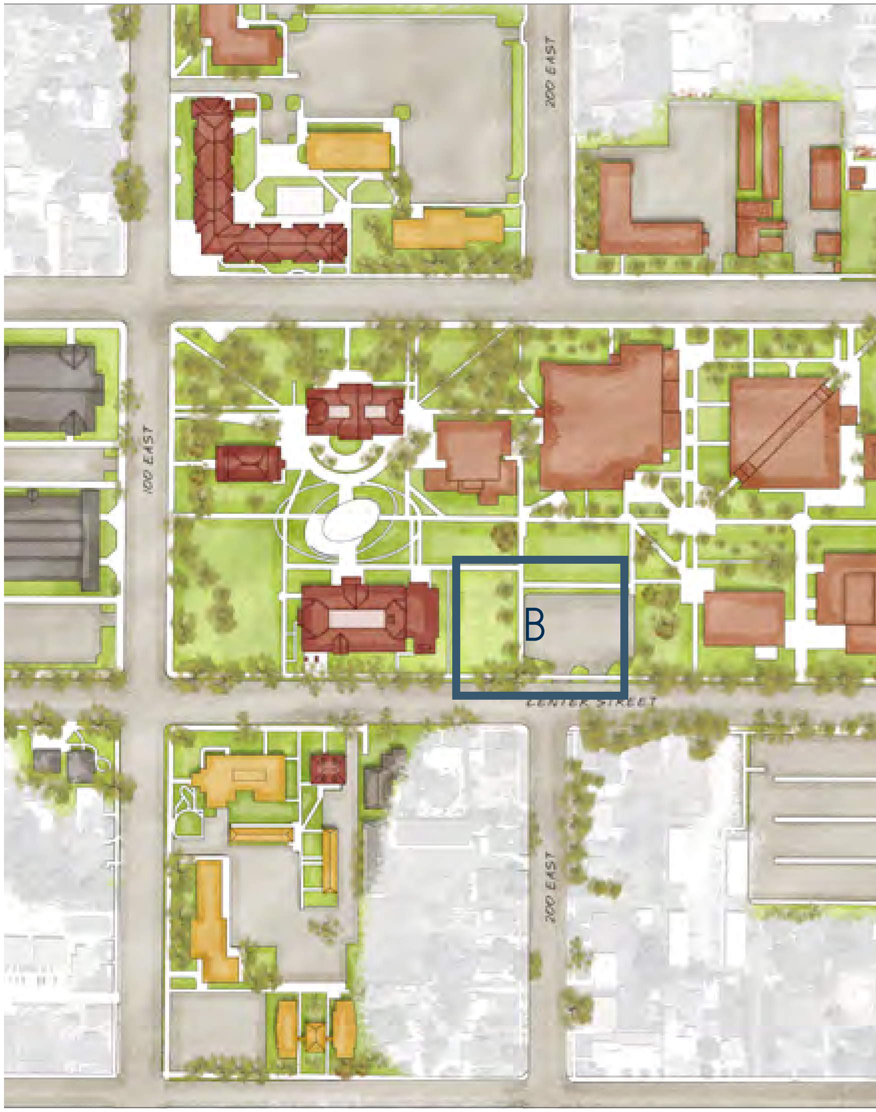
BUILDING SITE ALTERNATIVES

Two sites are being considered for the placement of the new Science Building. A summary of the two available sites follows:

Site A

Site A is the preferred site for the new building given its' highly visible corner location whereby the Science and Mathematics Division (the Division) is given a prominence that is well deserved. This corner location also gives the Division an opportunity to create a very visible billboard, of sorts, to proudly display their intentions of creating a significant science destination/ museum for Central Utah. The corner site is immediately adjacent to campus utilities and the utility tunnel that runs to the west of the Huntsman Library. Connecting those utilities to a building at this site is relatively easy, efficient and economical.

There is a very old specimen tree on 100 East that would need to be protected during the design and construction of the new Science Building. There will also likely be a few fully mature campus trees that will need to be removed to accommodate building construction on this site.



Site B

The alternative, Site B is also a fine site for the new Science Building. There is adequate footprint to the east of the Huntsman Library that would accommodate not only this anticipated building, but would support a major expansion/addition to this building. That capacity for expansion is not available on Site A. In planning a building on Site B, care would need to be taken so that all of the view from the west study deck of the Huntsman Library would not be blocked by a new building. In addition, the utilities available to a building on Site B, are only a bit more complicated to connect to than the utilities on Site A.

One key component of Site B is the existing parking lot. Removing this parking and replacing it with a building would benefit the campus through creating an enhanced pedestrian experience and creating a more cohesive core. However, this parking lot was recently replaced and provides convenient faculty parking for the campus.

CAMPUS CONNECTIVITY

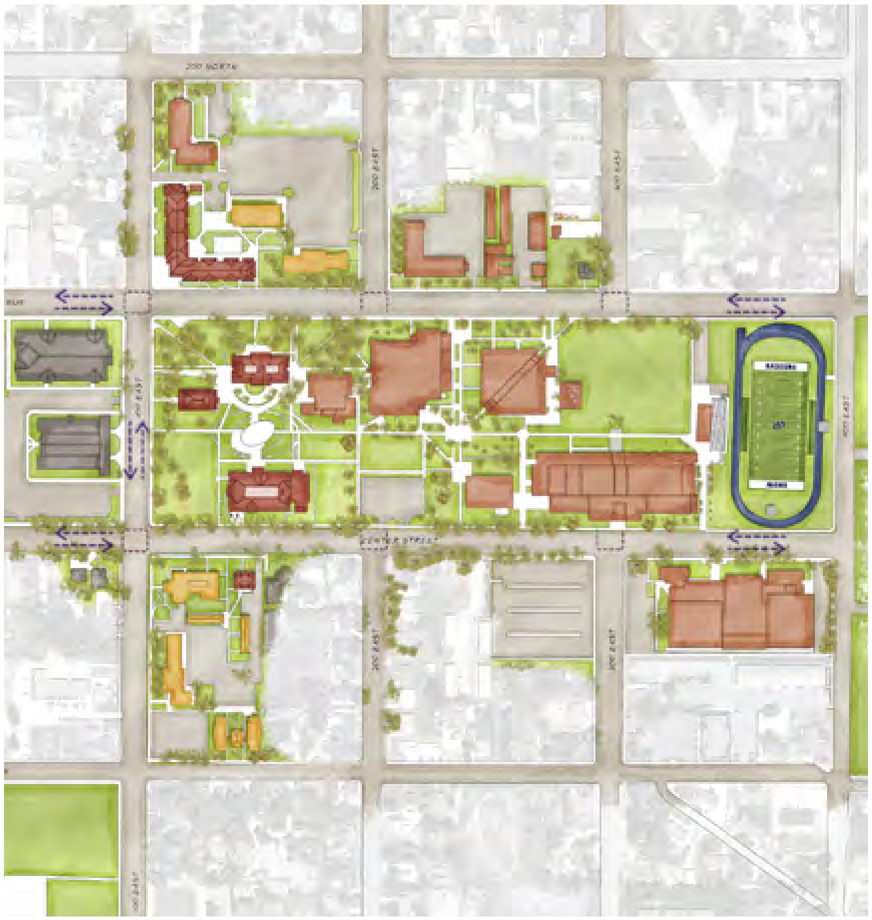
The new science building will be a campus landmark, and will inform the travel patterns and experiences of the entire campus community. The external building materials and massing should be designed to enhance the campus experience. See the Building Design Requirements for additional information.

Pedestrian Access

The new science building will be prominently located on campus. As such, it will have convenient pedestrian access to the green boulevard as well as Center Street and 100 East. The site design should reinforce and enhance current pedestrian paths and access points in and through campus.

Bicycle Access

In addition to pedestrian access, convenient bicycle access should be a priority for the building and the campus. Connection to existing bicycle paths on campus as well as ample bicycle parking both at the exterior of the campus as well as the core of campus should be included in the project.



Vehicular Access

The new building will not impact vehicular access around the campus. If site A is selected, no parking will be impacted. A building on Site A has the opportunity to reinforce the secondary campus gateway at the corner of 100 East and Center Street.

If site B is selected, some parking from the center of campus will be lost, and will not be replaced within the scope of this project.

Service Access

There is a need for service access to the building. This will most likely occur off of Center Street, or potentially 100 East. The service access should not impede pedestrian traffic, bicycle traffic, or vehicular traffic to the extent feasible. All exterior service areas should be screened from view at the ground level as well as views from adjacent buildings' upper levels.

SITE DESIGN

Anderson Wahlen & Associates (AWA) has been asked to evaluate two locations for the new Science Building at Snow College. AWA has reviewed the Snow College master plan, record plans, and made a site visit to understand the site elements at both locations. In addition to this, AWA has met with the College staff to review the programming possibilities for this project.

The first site considered is located at the Northeast corner of 100 East Street and Center Street and is referred to herein as Site A. The second site is located just east of the existing Library on Center Street and is referred to herein as Site B.

EXISTING CONDITIONS / INFRASTRUCTURE

Site A

The existing conditions on this site consist of open space with lawn and mature trees. The area is currently used for activities and games on the campus. The old Social Science building was demolished from this site as well as it was noted that this site was once an old farm with structures located on it before the college was built. There is a good possibility that there is undocumented fill on this site from the removal of these structures. Also, there is a possibility of other improvements such as piping, footings, etc still located onsite from these structures.

The Snow College staff also informed us that during the Huntsman Library construction, large silage pits were found and were required to be over-excavated and filled in with structural fill.

A final geotechnical report is included in the appendix that evaluates the soil of the site. The final design should consider options to handle the potential for undocumented fills and improvements that might need to be removed.

There is an existing Snow College sign on the corner. Staff has indicated that this sign can be removed and a new entry sign feature will be considered at this corner.

Staff identified an existing Oak tree on the north end of this site that is considered a historic element that must remain. The tree shall be protected and maintained during construction.

Site B

The existing conditions of this site consists of a parking lot and open space. This site will require the demolition of the existing parking lot and associated drainage system. A geotechnical report evaluates this area as well. The final design should take these potential issues into consideration as discussed above.

SITE LAYOUT & GRADING

The building will be oriented to interact with the street frontage and have access to the interior of the campus at either site. The building will be set on a podium/raised similar to the library to the east. The basement elevation will be set to match the grade of the existing tunnel system. If public space is planned in the basement the grading of the site should be designed to allow for daylighting to enter the basement similar to the library.

UTILITIES

Water is available in Center Street for either site. A separate water service and meter shall be provided off the water main line in Center Street to the new building. A fire line shall be provided from this main line as well. Fire hydrant spacing shall be reviewed with the final design as it appears additional hydrants may be needed for these sites. It was reported that the existing water pressure for this area is approximately 90-100 psi which is adequate for this project.

Sewer is available in Center Street for either site. There is an existing sewer running through the interior of the campus, however, staff has requested this building be connected to the City main in Center Street. A new sewer service shall be provided from the sewer main in Center Street to this building. It should be noted that the sewer is not deep enough to serve the basement level. Therefore, any sewer in the basement will need to be pumped up to the main level sewer lateral.

Storm Drain for the campus is handled with on-site retention and percolation of the storm water into the ground. A percolation estimate is provided from the geotechnical engineer with the attached report to assist in the final design of the drainage system. The storm water should be treated for silt, debris, and oils prior to infiltrating into the ground.

LANDSCAPE DESIGN

General Theme

The landscape architecture of the new Snow College Science Center will embrace the curriculum of the classes within and work to draw learning experiences beyond the building to engage with the site. Many of the disciplines within the department focus on communities and relationships whether they are between plants, animals or microbes. We would like to instill the idea of community building within each program by creating group learning spaces both inside and outside the building of varying size and use. We would like to showcase the study of genetic variation with colorful swaths of the many variations of a plant that is native to the region. Together these expressions of the science program will engage those who pass through the site and give the Science Center a sense of place.

DFCM High Performance Building Standard

In accordance with the Utah State Higher Education requirements, the new Snow College Science Center will achieve the DFCM High Performance Building Standard pertaining to the site and landscape. The emphasis on sustainability and regional context will work hand-in-hand with the Science Center's goals to improve the students' understanding of the natural world they live in. The landscape architecture of the site will focus on efficient irrigation systems, drought tolerant landscape materials, maximizing open space and reducing the heat island effect.

Vehicular Access

The primary vehicular routes to the Science Center are on the adjacent streets – Center Street and 100 East in Ephraim, Utah. Both of these streets have angled or parallel parking that will remain free and without time limit. An opportunity for a vehicular drop-off should be explored as well as time-limit parking to ensure the parking available directly adjacent to the building is more readily available to building users.

Additionally, the presence of the science center on campus and the adjacent streets could make it a location for future bus stops of the Snow College Campus Shuttle or the proposed connecting bus service through the region provided by Elevated Transit.

Service access to the building to be carefully considered because all sides of the building are prominent to campus users and visitors. It is recommended that the service access to the building be located away from areas of highest pedestrian use i.e. the north plaza.

Pedestrian Access and Universal Accessibility

Based on relatively level grades on site, all site paths, sidewalks, and entry ways are to meet ADA guidelines. Pedestrian paths are to be at least 4 feet wide and slopes to meet ADA guidelines.

Bicycle Circulation

Preserving and honoring bicycle paths as a form of transportation for students and staff is a priority. In reflection of the safety efforts to eliminate pedestrian/ bicycle and vehicular/bicycle conflicts, paths should be wide enough to accommodate multiple transportation types.

Relationship between the building and the landscape

The Science Center's goal to create connections with adjacent buildings will benefit from strengthening the indoor/outdoor relationship between the internal uses and the site/landscape. Consider both the experience of the user inside the building perceiving the environment beyond as well as the user outside the building looking in. Linking the building with the landscape is not limited to interfacing with the immediate surrounding site. Consider the opportunities to link the building and site with views, especially to the northeast and southwest.

Streetscapes on Center Street and 100 East The existing street trees within project boundaries should be preserved. The large trees strengthen the corridors. These corridors collect campus visitors and funnel them into central campus. The corner of the building on the Center Street/100 East intersection presents an opportunity for a glass façade that allows views into the building. The site should be treated in a way that preserved these views and is sensitive to their year-round visual quality.

North Plaza

A study and plaza area should be included in the site design adjacent to the building. This will ease the indoor to outdoor relationship of the building to the grounds and provide an excellent space for students to enjoy campus.

Relationship to Central Plaza and Central Campus

Located southwest of the student center, library, and central plaza, the site should support the existing infrastructure and not attempt to replace it. Site paths are to connect to existing paths and match the widths and treatments so as not to disrupt the rhythm of the campus. Careful analysis of the central plaza should occur evaluating opportunities to make the area more useable through treatment of the science center site.

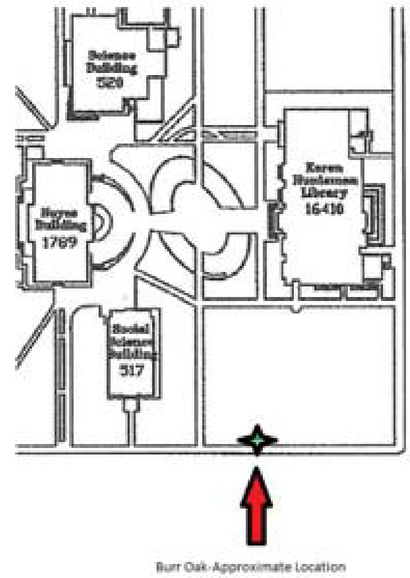
Historical Elements

The following elements are to be preserved at the request of Snow College. Explore opportunities to highlight these features with educational signage explaining history and significance.

- Heritage tree to be protected (picture), Burr Oak Quercus macrocarpa aka. Mossycup Oak, Blue Oak
- Entry Sign on the southwest corner of campus.

Native and Adapted Plant Materials

Native and adapted plant materials will be used throughout the design to achieve several goals for the New Science Center. First, they will decrease the need for irrigation water. Second, they will tie the architecture into the regional context of the drainage basin. Third, they can be used as an extension of the Science Center classrooms and become an outdoor, living laboratory. Turf areas will be limited in order to reduce irrigation water usage and maintenance. Additional materials such as durable steel edging and rock mulch will be used to improve the health and longevity of the plant materials and require little maintenance from the facilities management team.



DRAFT

Native and locally-adapted plant materials should be used, specifically, plantings should be within USDA Plant Zones 2 and 4. Enhanced signage or identification should be considered to integrate with curriculum and encourage learning.

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

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

DRAFT

Site Materials

The materials used in the site design should tie this project into the existing campus, and particularly the historical elements. The materials should complement the building materials and complement the facility as the gateway to the southwest campus corridor on Center Street. Consideration should be given to the selection of the materials and construction detailing, to contribute to the overall sustainability of the project and to minimize extensive long-term maintenance. Sustainable materials may include:

- Alternate forms of energy: solar, geo-thermal, etc.
- Re-use of existing topsoil for newly formed planting areas
- Porous pavement materials
- Albedo of materials – lighter and textured materials diffuse reflected heat and reduce heat gain
- High fly-ash concrete
- Bicycle facilities
- Utilization of local materials, where feasible
- Materials with a longer life cycle
- Bark mulch to be dark brown, campus standard (as pictured)
- Rock mulch to be from South Town Gravel Yard, campus standard (as pictured)

Bark mulch to be dark brown, campus standard, as shown to the left.

Rock mulch to be from South Town Gravel Yard, campus standard, as shown to the left.

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Maximizing Open Space

The landscape architects and architects will collaborate throughout the design process in order to maximize the amount and quality of open space adjacent to the Science Center. Hardscape areas will be limited to circulation routes, building entrances and plaza spaces. Open space such as shrub beds and lawn areas will be maximized to provide relief from the adjacent parking areas and wide expanses of concrete as well as to soften and compliment the building. These open spaces will also serve a variety of other purposes such as outdoor learning areas, botanical displays, storm water mitigation and reducing the heat island effect. Open space for the Science Center may extend to the roof where a roof garden could be used as an extension of the indoor greenhouse or as a gathering space and to improve downward views from the upper levels of the building.

Reducing the Heat Island Effect

The heat island effect is created when the general temperature of an area rises due to the presence of materials that absorb and radiate heat, such as asphalt. One way to decrease this effect in the landscape is to use lightly colored, reflective materials for the hardscape, such as light gray concrete. Another way to reduce the heat island effect is to increase plant material and use large shade trees which shade the pavement and buildings, reduce glare and regulate the general temperature of the area.

Site Furnishings

Site furnishings for the Snow College Science Center will likely include benches, tree grates, trash receptacles, bicycle racks, lighting and a possibility of tables and chairs. Site furnishings are to match the existing color, style and material of existing site furnishings on campus and meet any Snow College standards provided.

The site furnishings will provide continuity across campus and help to integrate the Science Center into the existing site.

Amenities such as benches and study areas will increase the functionality of outdoor spaces. Bike racks will improve accessibility to the building and proper lighting will aid in creating a space that is safe and beautiful.

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

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Utilities

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

Efficient Irrigation System

The overall goal of the irrigation system is to work in conjunction with an adapted-plant palate to efficiently irrigate the site and reduce the amount of water waste.

Irrigation equipment should be selected according to the campus standards, available from the Campus Landscape Management representative, Preston Bown, reached at 435.283.7118 or preston.bown@snow.edu.

The Science Center irrigation system is to be connected to the existing campus WeatherTRAK controller running on culinary water.

Continuation of smart irrigation controllers will be used to tailor the site's irrigation usage according to local weather conditions, thus preventing the system from running during a storm event. Smart irrigation controllers also monitor the amount of water running through the system and will alert the

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owner if any unusual water usage occurs, such as a pipe break. Additionally, use of hydro-zoning, which groups irrigation zones based on plant material type, soil type, sun exposure, etc. will ensure that each plant receives only as much water as it needs.

Rotary heads and or bubblers will be used in all shrub bed areas, drip to be used in areas where spray heads may conflict with glazing and highly efficient rotors will be used in turf areas that will minimize wasted water from overspray and misting.

Irrigation on site should reflect the following:

- Large areas, use Rainbird 5000, Falcons
- Small areas, Rainbird 1800 heads, Rotary heads, Bubblers and or Xeri Pops. Limit the use of drip tubing to areas with glazing to the finish grade or areas deemed necessary by the College.
- Rainbird DV 100 and PEB remote valves
- Campus currently installed Weather TRAK Controller
- Valve box lids color to match mulch and or grass
- On culinary water, Back Flow Preventer required and to meet local and national codes

The existing chiller plant, shown above, serves both the science building and the Noyes Administration building, and must remain operational.

EXISTING SCIENCE BUILDING DEMOLITION

Science Building

The existing science building will remain in operation throughout the construction of the new science building. Upon completion of the new building Snow College will need time to move into the new facility. After the building is vacated, abatement of the existing building will occur. Coordination of the existing utility work and/or re-configuration will need to be addressed in the project construction schedule. Once the building is vacated and abated it can be demolished as part of the construction project.

The existing science building is served from a chiller plant, shown to the left, that also serves the Noyes Administration building. This chiller plant will need to remain in place and operational throughout and after the demolition process.

This building may be replaced with turf grass and landscaping, in keeping with the core campus landscape aesthetic, and prepared as a future building site. If the greenhouse remains in place, it will be important to maintain the utilities that serve the greenhouse, from the existing science building.

BUILDING DESIGN

ARCHITECTURAL DESIGN

Campus Context

Traditional Architectural Character - Ephraim

The community that is now Ephraim was established in Central Utah in 1854 and served Sanpete County and Utah as a fort. This presence provided a draw for a diverse group of settlers to the area. The area thrived because of the location and proximity to the fort and later because of extensive agriculture in the area. Ephraim drew primarily settlers of Scandinavian descent. Even today, it is known as "Little Denmark."

In 1871 the Ephraim United Order Cooperative Building was constructed. This Greek Revival structure, built using locally quarried limestone, served the agricultural community as a marketplace and resource to the farmers in the area. This influential, and still standing building, set an informal standard for future architecture in the area.

Campus Architectural Character

In 1888, the LDS Sanpete Stake Academy was founded in Ephraim, with the first campus building beginning construction in 1889 with completion in 1908. This building was later named the Noyes Building after the school's first principal. The style of the Noyes Building was influenced by the Ephraim Cooperative Building borrowing important architectural elements such as roof form, window shapes and proportions, stone course headers, and similar exterior materials. Being renovated in 1999 into the College's administration building, the Noyes Building remains a remarkable structure and to this day, the iconic symbol and figurehead of Snow College.

Most of the remaining buildings on the core campus of Snow College have been influenced less by the traditional building qualities of the Noyes Building, but are characterized by simple massing, solid masonry walls and limited windows. These building traits have often-times mistakenly been associated with the International Style of architecture. The use of smaller windows may have been more of an outcome of educational philosophies of the time as well as energy constraints experienced in the mid 1970's. The fact that there are fewer windows in these buildings that face onto the green space in the center of campus, detaches them somewhat from the heart of campus. In the programming team's opinion, more transparency onto the campus green would engage future buildings more fully into the campus community and activate both the buildings and the open space.

The latest campus buildings constructed at Snow College have been more clearly inspired by the Noyes Building's architectural character. Most recently, the Karen H. Huntsman Library has been dubbed the 'Noyes Twin' and sits directly opposite the Noyes Building creating bookends to the plaza space formed between. The new Snow College housing, north of College Street, uses similar building massing and materiality to the Noyes Building. This new housing complex, in tandem with the Noyes Building, forms an outstanding new gateway to the campus as visitors arrive via automobile on College Street.

The Huntsman Library more literally draws inspiration from the Noyes Building, using window shapes, proportions and the distinctive arched window top at the second level windows. The roof forms with the pediments above the entry and the similar use of brick and locally quarried stone make the label of 'Noyes Twin' appropriate.

BUILDING DESIGN

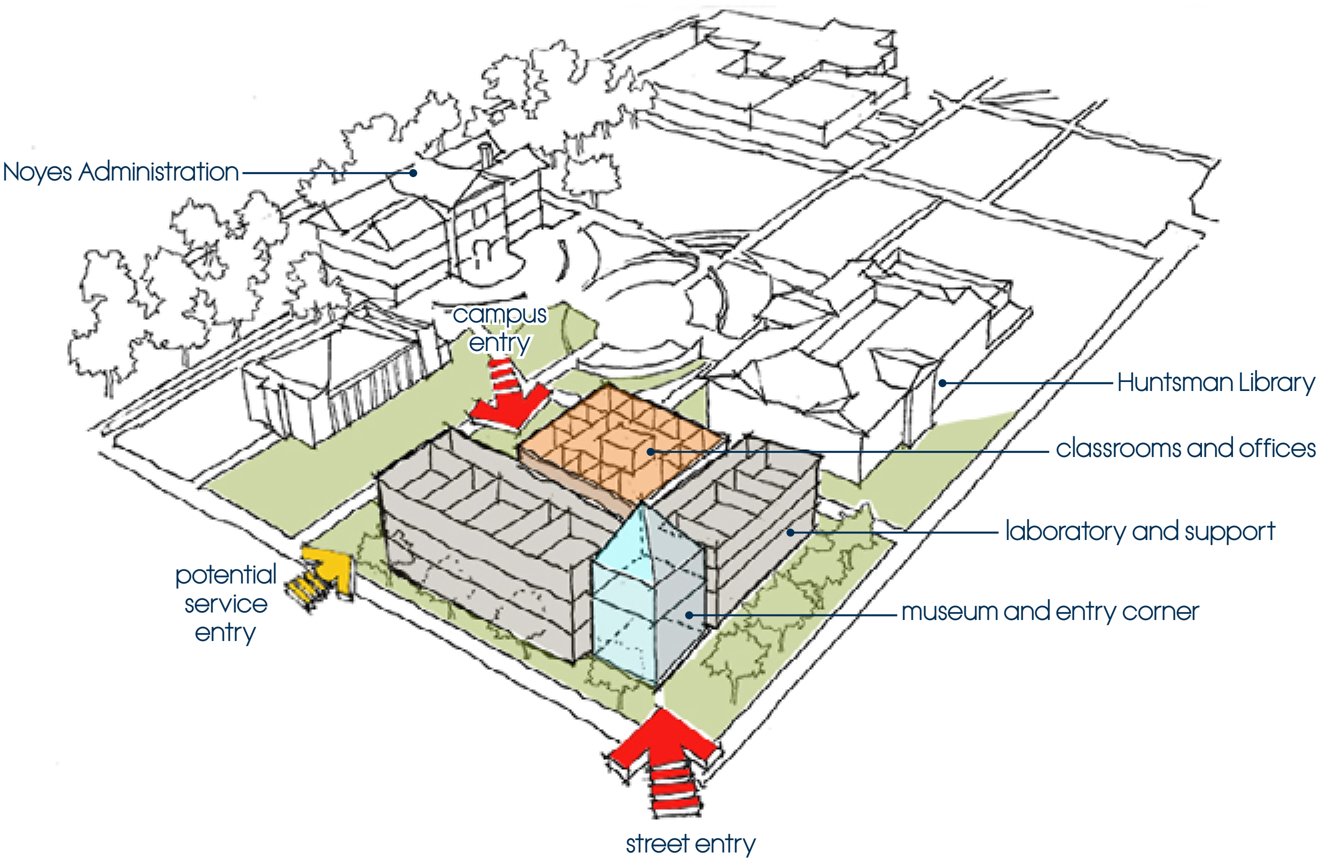
Site Planning Considerations

Both of the possible sites studied for the new Science Building are directly adjacent to the Noyes Building, the Social Sciences Building and the Huntsman Library. Therefore, the building solution for the new Science Building should draw some of its' architectural character from these neighboring buildings. The building should reflect some of the historical architectural flavor that characterizes this quadrant of the campus. This can be done more literally as in the case of the Huntsman Library or more abstractly whereby window proportions, roof form and exterior materials are similar in character to the Noyes Building. For purposes of this discussion, the preferred site of the programming team and the Snow College stakeholders is the corner site at Center Street and N 100 East Street.

This corner building site offers the opportunity to create another gateway experience for Snow College. Visitors coming down Center Street either by foot or by automobile, will be welcomed to the College by the new Science Building. This is wholly appropriate since science and math form the basis of many of the areas of study on campus. It is especially critical that the new building hold the street edges of the campus while also providing an iconic corner, entry element. This entry element must be visually striking because it is the introduction statement to the College's desire to make the building a science destination for Central Utah. It is the beginning of this museum experience for the building that must evoke a WOW experience. The diagram below represents a preferred concept that addresses these issues and was discussed during the programming process.

From this building concept arose other discussion topics that were essential to the College. First, views into the campus and especially to the Noyes building are still highly desirable, even though a building may be placed in front of that view. The new Science Building should not completely obscure these views due to its' alignment. Secondly, a Science courtyard, dedicated to science demonstrations and student collaborations should be planned for the side of the building that fronts the interior of campus. This exposure of the building should also include a welcoming entry element from the green boulevard at the center of campus. This courtyard element provides an opportunity to include some of the ideas outlined in the landscape design section of this program.

concept sketch



Building Organization

The new Science Building for Snow College will mix numerous important functions into the facility in order to enhance the instruction of Math and Science at the College. These proposed uses include:

Teaching Laboratories

These spaces in the new building support the laboratory activities for each of the science departments at Snow College whereby all of the science students will have access to modern, fully functioning labs that are flexibly configured and equipped so that multiple courses can be taught. Most of these laboratories are so flexible that they can also facilitate lectures for a significant portion of the departments curricula. Some laboratories are more specialized, such as the Organic Chemistry and Microbiology laboratories. However, even these two labs will also have the ability to facilitate lecture classes within them.

The greenhouse is a teaching laboratory space that is not currently in the base building area and cost, and is anticipated to be an add-alternate. However, the greenhouse needs to be considered during the design as it requires direct southern solar exposure.

Laboratory Support and Research Spaces

There are numerous laboratory preparation and storage areas, and a couple of undergraduate research spaces within the building. These spaces are necessary to enable the activities that occur within the Teaching Laboratories and are typically located adjacent to the Teaching Lab that they support.

Lecture Classrooms, Seminar Rooms and Computer Classrooms

These spaces are included within the Science Building to provide for the lecture portion of the curriculum for each of the science departments and will also be utilized by the Mathematics department. These technology-rich and fully reconfigurable classrooms will flexibly accommodate numerous pedagogies and the evolving nature of higher education learning for decades to come. Four of the classrooms will also be equipped to support the burgeoning distance education curriculum that the Division is now providing.

Student Spaces

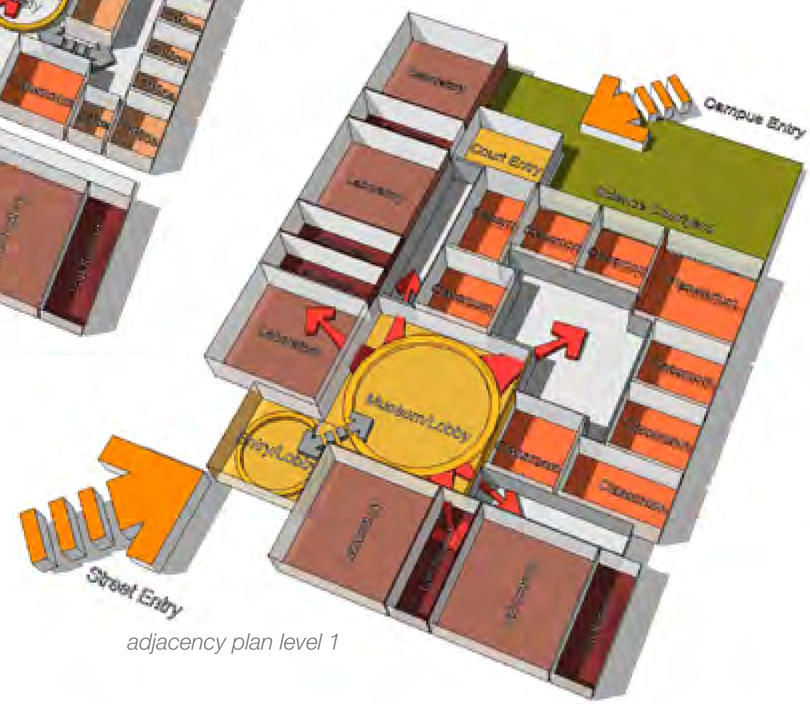
Snow College has requested that student spaces be provided within the building that will support student success goals. Student study areas, a student kitchenette, a commons area and seminar rooms will be provided for the benefit of the Division's students.

Office Suites

Individual private office space for most of the Division's faculty is slated to be housed in the new building. The Division has made it very clear that the student study spaces should be adjacent to the office suites. Preliminarily, the offices have been planned to be on levels two and three of the programmatic test fits that have been produced.

Numerous programmatic test fits of the building program square footage on the site have been studied. The program for the building is best accommodated in a structure that is three stories tall with approximately 7,000 square feet of area in a below grade (basement) construction. The test fits have also assumed that the laboratory spaces are in a portion of building that could be easily separated from the office and classroom spaces. The theory behind this layout is that the laboratories will utilize a separate mechanical system with these spaces needing to be 100% exhausted, thus making it easier to split mechanical systems for the building. The offices and classrooms are clustered in another portion of the building, thus, gaining the ability to be more easily separated.

adjacency plan level 2 (level 3 is similar)



adjacency plan level 1

Architectural Character

There are specific architectural characteristics that should be considered when planning the design of the new Science Building:

Roof Form

In reviewing possible building options, Snow College stakeholders have preferred those options that include sloped roof alternatives covered in a composite shake/shingle material. Whether the roof is pedimented like the Noyes Building, or includes hipped roof forms, sloping the roof of the facility will tie the form of this building to the historically-oriented adjacent structures.

A portion of the roof shall be flat and accessible. This area should be designed to accommodate a future observatory and host a class.

Entry Element

The entry procession to the building from the south provides an opportunity to provide the Sciences with a striking and inviting gateway to their building. This is especially appropriate because the Division wants to create a Science Discovery destination. This entry point provides that interaction with the public at large.

Window Proportions/Sizes

In 1973 an energy crisis gripped the world. Buildings across the country were being built with a limited amount or no windows at all. Completed in 1974, the existing Snow College science facility was one such building. Students and faculty at the College have had to work for decades in laboratories and classrooms without access to natural light. That lack of access to daylight makes one yearn for actual windows. This is definitely the case for the Snow College faculty and students. One of the top priority items for them is to create labs filled with daylight.

This would suggest that a significant percentage of the exterior wall surface will be windows. This is certainly the case of the Noyes Building and the Huntsman Library. Approximately 25 – 30% of the wall surface is window, a good range for the new Science Building. The proportions of the window openings on the new Science Building should closely align with the configuration of the windows in the adjacent buildings. With a similar wall opening percentage and proportion of window to the Noyes Building, the new Science Building's occupants would feel this to be a significant upgrade from the existing Science facility.

The details surrounding the windows are another interesting issue. The windows of the Noyes Building are exquisitely crafted with rectilinear stone headers over the windows on the main level and arched stone headers over the windows on the second level. The amount of window detailing of stone headers, sills and other items will need to be addressed in the eventual design of the facility.

Exterior Finish Materials

Most of the buildings on campus follow the basic tenant that the majority of the building exterior skin is modular brick with accents of either stone or precast concrete, typically at window headers or sills. This rule of thumb would be wise to follow with the new Science Building. The character sketches produced for this program utilize those rules using stone as a base for the building, similar to the Noyes Building, and as accent lines that run continuously as horizontal bands through the brick at strategic heights. These sketches also show a greater proportion of window than other buildings on campus, in an attempt to create more liveable spaces on the interior of the building.

Interior Character

The interior of the proposed Science Building should be completely modern in its' approach to materials (texture and color), lighting, and furniture. Walking into the building, a prospective student or visitor should immediately get the sense that 'science happens here' and that it is a technology equipped, 'state of the art' facility.

In tours of similar facilities, the Snow College stakeholders were excited by seeing into labs and getting a sense of the activity in those labs. There should be a great degree of transparency into the laboratories from the hallways so that people can see science happening by putting it on display. In turn, seeing into the labs and perhaps out the other side to the outdoors, connects those occupants back to the campus-at-large.

Interactive Science Center

Creating a Regional Science and Mathematics Destination

It is the dream of the Snow College Science and Mathematics Division (the Division) to create a learning destination right here in Ephraim that includes an interactive museum experience for visitors, young and old, from the six-county area. It is envisioned that this museum include engaging science artifacts, but more importantly hands-on science and math demonstrations. Science and Mathematics will be on display with the opportunity of making the building a true teaching tool. The exhibits and artifacts will demonstrate the science associated with this Central Utah location and will be coupled to the science and math curricula being taught in the building. As an example, an experiment that tests the hardness of the various limestone varieties that are quarried in the area would come directly from the course-work of the College's geology department.

It is the goal of this museum experience to stimulate the interest of school-age children in the sciences and in math, with the ultimate outcome of increasing the enrollment of the Division at Snow College. The exhibits would be planned to be located in the entry lobby of the building and throughout the entire building, allowing the experiences to unfold to create an exciting, learning experience for the visitors. These exhibits and hands-on demonstrations are not anticipated to be funded by the '1% for the arts' program but are critical to the eventual success of this building and are considered to be an essential component of this building program. A Foucault pendulum in a tall entry or primary circulation location has been discussed as a preferred installation to engage students and visitors using scientific exhibits. Additional building budget should be set aside for this important facet of the facility.

1% for the Arts - Integration into the Project

As mandated by the State of Utah funding procedures, the new Science Building will include an art installation with a budget of 1% of the construction costs of the building. This artwork presents an opportunity for Snow College and the State of Utah to choose an artist and an accompanying body of work that can be integrated into the building concepts and the theming ideas that have been recommended by the Division. The process to choose an artist for this work should begin as early in the design phases as possible so that the artwork can be fully integrated into the early design concepts of the building.

The programming team has recommended that the proposal process of selecting an artist team be discussed with the Utah Arts Council representative (Jim Glen) as soon as this project begins the design process. The process should be open to prospective talents that would hopefully include scientists, engineers, designers and artists to form collaborative teams to compete for this important commission.

The final work that is chosen and developed through the collaboration with Snow College stakeholders, building team and the artist holds the opportunity to unite the Arts with the Science and Math curricula being taught in the facility.

Some of the important themes that the Division has discussed are:

- Mining Heritage of the Area
- Agricultural Heritage (Turkey and Hay)
- The Birth of the Forest Service
  - The bulk of the research on range management took place at the Great Basin Experimental Station on the Manti National Forest outside of Ephraim
- Proximity to the Mountains
- Unique Geology of the Area

LIFE SAFETY ANALYSIS

Codes and Standards

The new Snow College Science Building will need to meet all applicable codes and standards. The Design Team shall be responsible to verify the latest revisions, updates, or State of Utah amendments to any of these applicable codes and standards. The following list of governing codes for the project is current at the time of this writing:

- International Building Code 2012 (with any applicable State of Utah Amendments)
- International Fire Code 2012
- International Mechanical Code 2012
- International Plumbing Code 2012
- National Electric Code 2011
- NFPA 101 (2012 edition with State of Utah Amendments)
- Laws, Rules and Regulations of the Utah State Fire Marshall
- Design Guidelines - Snow College
- Design and Construction Standards for Architects, Engineers and Contractors -
- Facilities Management - Snow College
- Americans with Disabilities Act, Title III, (with 2013 updates)
- ANSI 117-119-2003
- ANSI – Accessible and Usable Buildings and Facilities 2009
- Planning and Design Criteria to Prevent Architectural Barriers for Aged and Physically Handicapped
- State of Utah DFCM High Peformance Building Criteria
- USGBC LEED Green Building Rating System 2009
- NIH Laboratory Design Standard Guidelines (2013 revisions)
- Nuclear Regulatory Commission Regulations (Title 10, 2013 updates)

A preliminary life safety code analysis has been done on the proposed new learning and research laboratory facility, using the 2012 International Building Code. For the purposes of this study the new facility has been assumed to be three (3) stories above grade with a lower level that will be below grade. This lower level will be categorized as a basement for analysis purposes.

The results of this life safety review may be found in the appendix of this program study.

Project Description:

This three story multiple use facility will house classrooms, teaching laboratories, student study space, offices and storage areas. The following building occupancy types will occur within the building:

A3	Assembly	The lobby of the facility
B	Offices/Classrooms/Labs	Teaching spaces with less than 50 occupants
H2	Hazardous Occupancy	This occupancy is the central chemical storage
S2	Storage	These spaces are the common lab storage areas

The A3, H2, and S2 areas of the building are anticipated to be less than 10% of the total square footage of the level that they are located upon; therefore, the areas will be considered accessory uses and will not need to be factored into a mixed use occupancy calculation for the building.

For purposes of this preliminary code review, laboratory spaces that are over 1,000 square feet will not contain more than 30 students and would not technically qualify as an A3 assembly occupancy. We would, however, recommend that two exits be designed from these laboratory learning environments, and that this approach be verified with the DFCM and Snow College governing code authorities before design begins.

Control Areas

Specific areas or rooms within the facility will need to be designated as "Control Areas." These areas are allowed by the building code to be repositories for chemically hazardous materials within the facility. The amount of chemical quantities able to be stored within the building varies by floor according to the distance that floor is above the grade level of the building. Control areas may be defined as storage rooms or they may be specified to be an entire floor of a building, if chemicals are being distributed and used with great frequency on a floor level of the building. There may be multiple control areas on each level of the building and the number of control areas per floor is defined by the International Building Code. These control areas will need to be fire separated from the rest of the spaces within the facility. A summary of number of control areas allowed per building level and the amounts of hazardous chemicals allowed per control area can be found in the appendix of this study.

Required Fire Separations

Fire separations will need to occur between the different occupancy groups in the building. The building may not be required to be analyzed with separated uses.

Building may be analyzed with non-separated uses, if any, since the other occupancies would be considered accessory uses.

Project Assumptions

- Assume a Type IIB Construction Type
- Building is to be equipped with an automatic fire sprinkling system

Basic Allowable Areas and Height: (From Table 503)

B – Construction Type IIB

Allowable Area	23,000 square feet
Height	3 stories (above grade)

Allowable Area Increases

Frontage Increase (If)

If = 100(F/P - .25) x W/30	=	
If = 100(584/584 - .25) x 30/30	=	75%
Fire Sprinkler Increase		200%

Multi-Story Increase (For total building)

(2 stories maximum) Area x 3

Allowable Area (after increases) per floor

Aa (B) = 23,000 sf + (23,000 x 75/100) + (23,000 x 200/100)

B allowable = 86,250 square feet/level

The total square footage on the largest level of the building is approximately 17,000 square feet. The facility square footage on this level does not exceed the allowable area per floor of the allowable B area of 86,205 square feet. OK

Allowable Areas (after multi-story increase) – entire building

B 86,250 sf x 3 stories = 258,750 square feet

The total square footage of the building is approximately 56,600 square feet. The facility square footage does not exceed the allowable area of a B area of 258,750 square feet.

Entire building may be classified as a B occupancy and is within the allowable building area for that occupancy. OK

LABORATORY DESIGN REQUIREMENTS

Codes and Standards

The design and construction of the New Science Building should comply with the most recent editions of the codes, standards and references listed in this section. They should be considered minimum requirements and are not meant to prevent the architect, engineer, or consultant from exceeding the applicable requirements.

Applicable Codes: Utah Building 2012 IBC

- Mechanical 2012 IMC
- Plumbing 2012 IPC
- Electrical 2011 NEC
- Energy 2012 IECC
- Gas 2012 IFGC
- Fire 2012 IFC
- Accessibility
- Elevator ASME A17.1-2010

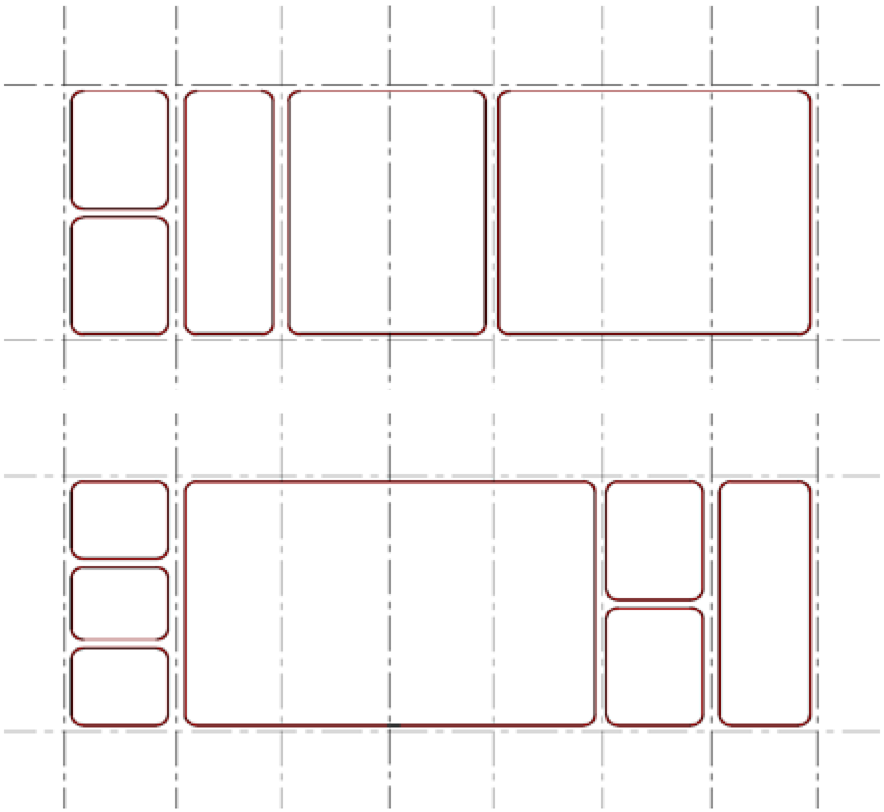
Document	Reference	Summary of Purpose
ADA Standards for Accessible Design	(ADA 2010)	Furnishes special considerations that must be given to accommodate laboratory workers with physical impairments. This includes wheel chair accessibility, work bench height, and access to controls.
ANSI/ICC A117.1, Standard on Accessible and Usable Buildings and Facilities.	(ANSI 2009)	Provides specs for elements used in making functional spaces accessible to allow persons with physical disability to independently get to, enter, and use a site, facility, building, or element.
ANSI/AIHA Z9.5, Laboratory Ventilation	(AIHA 2012)	Establishes minimum requirements and procedures for the design and operation of laboratory ventilation systems used to protect personnel from overexposure to harmful or potentially harmful contaminants.
ANSI Z358.1, American National Standard for Emergency Eyewash and Shower Equipment	(ANSI 2009)	Establishes minimum performance and use requirements for eye wash and shower equipment for the emergency treatment of the eye or body of a person who has been exposed to injurious materials.
ANSI/ASHRAE Standard 110, Method of Testing Performance of Laboratory Fume Hoods	(ASHRAE 1995)	Provides a method to quantify fume hood performance. It tests the competence of a fume hood at a given point in time to establish a baseline for quantifying a fume hood's performance.
ANSI/ASHRAE Standard 55, Thermal Environmental Conditions for Human Occupancy	(ASHRAE 2013)	Forms the basis for the indoor design temperature and humidity for most spaces.
ANSI/ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality	(ASHRAE 2013)	Forms the basis for the minimum outside air requirements for most spaces and stipulates when treatment of outside air and exhaust air is necessary.

Document	Reference	Summary of Purpose
ASHRAE 90.1, Standard for Energy Conservation in New Building Design	(ASHRAE 2013)	Provides guidelines for designing energy efficient HVAC systems.
ASHRAE Handbook, HVAC Applications, Chapter 16, Laboratories	(ASHRAE 2011)	Provides guidelines for laboratory ventilation and applications to various laboratory facilities.
Biosafety in Microbiological and Biomedical Laboratories (5th Edition)	(CDC/NIH 2009)	Provides Biosafety procedures and guidelines for the manipulations of etiologic agents in Level 1 to 4 microbiological/biomedical laboratories and animal facilities. The four levels of control that are defined range from safely dealing with microorganisms that pose no risk of disease for normal healthy individuals to dealing with the high risk of life-threatening diseases.
Primary Containment for Biohazards. Selection, Installation and use of Biological Safety Cabinets	(CDC/NIH 2009)	Presents information on selection, function and use of biological safety cabinets.
Guidelines for Laboratory Design	(DiBerardinis et al. 2013)	Provides reliable design information related to specific health and safety issues for new and renovated laboratories. Factors such as efficiency, economics, energy conservation, and design flexibility are considered.
Operations Manual for Laboratories. SHEMP (Safety, Health and Environmental Management Program)	(EPA 1998)	This document provides guidance on management and administration, hazard identification and evaluation, laboratory Safety, Health and Environmental Division programs, engineering controls, protective clothing and equipment, work practice controls and laboratory emergency situations.
NFPA 30, Flammable and Combustible Liquids Code	(NFPA 2015)	Provides the most up-to-date requirements for dealing with flammable and combustible liquids and is therefore useful to design engineers, enforcing officials, insurers, and laboratory workers.
NFPA 45, Fire Protection for Laboratories using Chemicals	(NFPA 2015)	Provides the minimum fire protection requirements for fire safe design and operation in educational and industrial laboratories using chemicals.

Document	Reference	Summary of Purpose
NFPA 101, Life Safety Code	(NFPA 2015)	Addresses the construction, protection, and occupancy features needed to minimize danger to life from fire, smoke, and panic. Forms the basis for law in many national jurisdictions.
NFPA 801, Standard for Fire Protection for Facilities Handling Radioactive Materials	(NFPA 2014)	Identifies guidelines for decreasing the risk of explosion or fire and the severity of contamination from a fire or explosion at facilities (except nuclear reactors) that handle radioactive materials.
Guidelines for the Laboratory Use of Chemical Carcinogens	NIH 81-2385	Provides guidelines for the laboratory use of chemical carcinogens.
Prudent Practices in the Laboratory, Handling and Disposal of Chemicals	(NRC 2011)	Recommends several prudent practices that stimulate a culture of safety for chemical laboratory operations. Provides information and cross-references on how to handle compounds that pose special hazardous risks.
NSF/ANSI 49,Biosafety Cabinetry: Design, Construction, Performance, and Field Certification	(NSF/ANSI 2008)	Provides comprehensive information and guidance on the principles and applications of air filtration, which supplies the level of particulate cleanliness required by HVAC systems.
OSHA 29 CFR 1910.1030, Occupational Exposure to Bloodborne Pathogens	(OSHA 1990c)	Provides worker protection from exposure to blood-borne pathogens.
OSHA 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories	(OSHA 1990b)	Provides protection for all laboratory workers engaged in the use of hazardous chemicals.

Document	Reference	Summary of Purpose
OSHA 29 CFR 1990, Identification, Classification, and Regulation of Carcinogens	(OSHA 1991b)	Determines various criteria and procedures for the identification, classification, and regulation of potential occupational carcinogens that exist in each workplace in the United States and that are regulated by the Occupational Safety and Health Act of 1970 (the Act).
SEFA 1-2010, Laboratory Fume Hoods, Recommended Practices	(SEFA 2010)	Provides information on design, materials of construction, use, and testing of laboratory fume hoods. These tests establish the average face velocity and adequacy of the airflow throughout the overall open face area of fume hoods.
SEFA 2-2010, Installation of Scientific Furniture and Equipment, Recommended Practices	(SEFA 2010)	Provides information for architects, specifying engineers, contractors, and other purchasers about the installation practices recommended by manufacturers of scientific laboratory furniture and equipment.
SEFA 8, Laboratory Furniture, Recommended Practices	(SEFA 2007)	Provides manufacturers, specifiers, and users with tools for evaluating the safety, durability, and structural integrity of laboratory casework and complementary items.
Industrial Ventilation, A Manual of Recommended Practices, 24th Edition	(ACGIH 2001)	Recommends best practices, including research data and information on the design, maintenance, and evaluation of industrial exhaust ventilation systems. Basic ventilation principles and sample calculations are also presented.
Handbook of Facilities Planning, Volume 1, Laboratory Facilities	(Ruys 1990)	Gives hands-on guidance to a wide range of topics including differences and similarities between various laboratories, laboratory planning, communication enhancing design, and the definition of building systems.

In addition to the above standards, close coordination with the owner's representatives is required during the design and construction phases. The project team may need to incorporate additional requirements as laboratory and support spaces are more definitively outlined.



Modular planning concept diagrams are shown above.

Modular Planning

The New Science Building 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 to the left.

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.

By utilizing the laboratory planning module as the basis for the structural grid design, it is possible to provide laboratory spaces which are not obstructed by columns.

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 persons and movement of people and laboratory carts in the aisle.
- The module should provide adequate open space for floor standing equipment.

The laboratory planning module for the New Science Building is recommended to be 10’-6” wide by 30’-0” as shownto the right.

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.

Typical laboratory planning module.

Circulation

The design of the New Science Building should assure effective external circulation for people accessing the building, delivery of materials and equipment, and the removal of the laboratory waste on regular basis.

Internal building circulation should provide safe pedestrian egress from each individual laboratory and laboratory support space through an uncomplicated path of egress to the building exterior at grade. The circulation system should accommodate the preferred adjacencies identified for the relationships between laboratories and laboratory support spaces and between laboratories and offices.

At least one door into each laboratory space should have a minimum 52" wide clear opening. This can be accomplished using doors with 3'-0" active leaf and one 1'-6" inactive leaf.

Equipment lists should be carefully reviewed to verify that individual pieces of equipment can be transported and maneuvered between spaces. Future equipment should be anticipated.

Interior circulation corridors are recommended to be 9'-0" width to allow for adequate movement of students and equipment.

Doorways accessing 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.

Interaction

The design of the New Science Building should explore concepts that would directly support interaction at different levels. Interaction areas should be linked to the circulation schemes.

Spaces should be assigned within laboratories, between laboratories and other spaces, on each floor and in public areas.

Formal interaction spaces such as Conference Rooms and Lecture Rooms can be remote. Informal interaction spaces include:

- Casual meeting/interaction spaces for short duration interaction.
- Outdoor gathering spaces should be highly visible and inviting.
- Display/announcement boards serves as gathering places for informal contact.
- Connections to other campus facilities will facilitate interaction with researchers and staff in nearby buildings.

Provisions for informal interaction:

- Side-by-side connections of laboratories; cross corridor laboratory connections; and through laboratory support space connections.
- Shared support spaces (equipment and instrument rooms) close to laboratories.
- Visual and physical link between outdoor gathering spaces and interior interaction spaces.
- Inviting and visible horizontal and vertical circulation systems can also serve as interaction spaces. Circulation systems should encourage sharing of support functions.

Accessibility

The New Science Building facility must conform to applicable local, state and federal regulations for providing universal access to persons with disabilities. Early considerations should be given to the following accessibility aspects:

- All parts of the building should be accessible by persons with disabilities.
- All faculty lecture or demonstration positions should be accessible to persons with disabilities.
- All staff preparation areas should be accessible by persons with disabilities.
- Accessible work stations, sinks, fittings and fume hoods should be provided in the laboratories, faculty demonstration areas and staff prep areas, based on the requirements of the Authority Having Jurisdiction in response to the Americans with Disabilities Act.
- Location of accessible work stations should be in close proximity to eyewash and safety showers.
- 18" clearance on the pull side and 12" clearance on the push side of the strike side of doors is required for interior doors.

General criteria and guidelines for accessible work stations in laboratories are as follows:

- Work surfaces 30" - 34" above floor with 27" minimum vertical wheelchair clearance below. Adjustable work surfaces can provide a range of possible height adjustments.
- Laboratory service controls and equipment controls should be placed within easy reach for persons with limited mobility. Controls should have single-action levers or blade handles for easy operation.
- Aisle widths and clearances adequate for maneuvers of wheelchair bound individuals. Aisles 5'-0" wide are recommended with turnaround areas.

Noise Control

The design of the structural, mechanical and electrical systems should address and mitigate the airborne and structure-borne transmission of noise from building sources. The 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 systems.
- Duct noise generated by pressure fluctuations caused by fan instability or turbulence resulting from abrupt changes of direction in the duct systems.
- 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 Table N1.

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

SUSTAINABLE BUILDING GOALS

DFCM High Performance Building Standard (2014 HPBS) will be met.

Site Design Considerations

The corner of Center Street and 100 East is currently the key campus gateway. This site will require special attention be paid to the quality and character of the building to reflect the greater campus while also engaging the corner and enhancing pedestrian access.

This site is currently flanked with a number of beautiful trees that should be preserved to the extent feasible.

Per the previous Site Analysis Section, ten years of climate data has been provided from the weather station located atop the current science building. There is a unique opportunity to design the building and engineer systems that respond to the specific site and climate impacts.

Alternative Transportation and Access

Currently, pedestrian walkways exist to the east, south and north of the site. These should be maintained and enhanced as the majority of students walk to campus. (There are more than a dozen student housing complexes within 2 blocks of campus)

After walking, driving is the second most dominant mode of transportation to campus, with few people carpooling. There are currently 297 parking stalls in lots for the core campus, and 421 stalls adjacent to student housing at the periphery of campus. On-street parking adds an additional 300 parking stalls available for the campus community, located around the periphery of the core campus.

Approximately 100 students and faculty ride a bike to campus each day. There is a need for bicycle racks near the building entryway(s). A single unisex shower and changing room will also need to be provided for faculty and staff that ride to work or exercise during the day.

There is also a large community of skateboarders. Skateboard storage may want to be considered inside the building.

There is no public transit available on campus, or in Ephraim.

Open Space Design

The landscape and open space will be designed and constructed to reduce water consumption through the integration of native and adapted landscaping. Large, usable open space areas that exceed 300 square feet can be water-wise turf. All other spaces will be low water use plants and groundcover. The irrigation system will be tied to the campus system, which is a weather controlled, water-efficient system. The irrigation system uses culinary water, and therefore, water efficiency at the landscape is a priority for the City to conserve available resources. The project landscape design and irrigation system shall meet the WaterSense budget, per the High Performance Building Standards.

Stormwater Design

The project site is currently open, turf landscape. As such, the current stormwater is percolated into the site. The new science building and site should be designed to maintain and percolate stormwater on-site.

Heat Island Effect

The site hardscape will have an SRI of 29 or less. This will result in new concrete or light colored finishes. The roof should be designed with roofing materials that meet the durabililty requirements of 30-50 years as well as the campus context. The roof color at high, low-slope roofs should be assessed for energy performance and heat-island implications prior to choosing a final color and material.

Exterior Lighting

All exterior lighting shall be LED. Full cut-off light fixtures that meet dark sky requirements are required for all exterior lighting. All exterior site lighting shall match the prescribed fixture that will be installed throughout campus with the lighting upgrade in early 2015. Exterior lighting shall be controlled by a photocell sensor.

Energy Efficiency

The new science building is a laboratory dominant facility. This will result in a more energy intensive facility than a typical classroom facility. Per the State of Utah High Performance Building Standard, this building is required to achieve a 20% annual energy cost improvement, when compared to an ASHRAE 90.1-2010 Baseline energy model, where life-cycle cost effective. Life-cycle cost effectiveness of prospective energy efficiency measures will be assessed through a collaborative effort of the design team, with the DFCM hired Energy Engineer.

A variety of systems will work in tandem to achieve these efficiency goals. Mechanical, Electrical and Architectural disciplines will collaborate with the Energy Engineer, College, and DFCM to develop a list of potentially appropriate energy efficiency measures, during Schematic Design. Each of these will be explicitly evaluated for their potential contribution toward energy cost improvement, and life-cycle cost effectiveness, during the early stages of Design Development.

Building Envelope

The building envelope should be optimized for the Ephraim climate. Envelope thermal performance (and perhaps HVAC sizing/selection) should be assessed with consideration of the weather data that has been collected on campus, to account for the observed cold climate conditions.

The building envelope should be designed to meet the infiltration requirements stated in the 2014 High Performance Building Standard.

High performance glazing that is responsive to each façade with effective solar shading at the south façade and glare control at the east and west facades should be integrated into the façade design. Additionally, the window to wall ratios and location of windows shall be designed to ensure optimal thermal envelope and integration of daylight and views.

Integrated Systems

See the mechanical and electrical narratives for specific system requirements.

Key sustainable design strategies should include reducing the mechanical system sizing to respond to lighting and envelope efficiency as well as laboratory equipment efficiencies. All lighting will be LED, and fully dimmable. Lighting within 15' of an exterior window will require a photocell sensor to ensure the lights are dimmed when daylight is available.

Interior Water Efficiency

The interior plumbing fixtures will be water efficient and meet the EPA waterwise requirements. The toilets and urinals will be low flow with a 1.2 and .25 gallon flush, respectively. The lavatory faucets will be sensor operated and metered to reduce water consumption in the restrooms. Aerators should be considered for laboratory sinks to reduce water consumption. Laboratory systems should be assessed for efficiency through flow reduction or the integration of closed loop systems where applicable.

Materials and Resources

Snow College has a burgeoning recycling program, where they currently recycle mixed paper, #1 and #2 plastics and cardboard. There is a metal recycling program available through facilities, but this has not been adopted throughout the campus. To foster recycling, bins should be located throughout the building, with special attention paid to common areas, break and workrooms, print rooms and vending spaces. Additionally, an exterior location for recycling bins should be provided adjacent to the dumpsters.

The design and construction processes shall incorporate best practices of identifying and specifying local and recycled materials as well as certified wood products. The contractor will also be responsible for construction waste recycling to the extent feasible based on travel distance to recycling facilities. As a best practice, the contractor should pay additional attention to efficient material utilization to reduce the overall quantity of waste for the project.

Indoor Environment Quality

The integration of daylight, access to views and ample ventilation are all very important to the College and the Division. The students and faculty will have healthy spaces to learn and work.

Daylight and Views

Exterior windows with direct or shared daylight will be integrated into all laboratory areas as well as offices and classrooms. Daylight should also be a key component in the entry, student study spaces, informal collaboration areas and faculty offices.

Healthy Environments

An indoor air quality plan during construction along with the installation of low emitting materials, will contribute to improved indoor environment. Additionally, the laboratory spaces and chemical storage areas will be directly exhausted to the exterior and use 100% outdoor air for ventilation. A high level of filtration will also be used to ensure a high quality of indoor air for users.

Controllability of Systems

The individual offices, workstations, classrooms, laboratories and study areas will all have individual lighting controls. This may be multiple lighting levels available or a combination of overhead and task lighting to provide this enhanced control. Thermostats should be provided in all labs, classrooms and seminar rooms. Offices will be clustered with no more than 3 offices per thermostat.

Building Education and Outreach

The sustainable building features and programs will be presented to building users on digital signage. Information on the efforts made during design and construction as well as building resource consumption monitoring should be integrated into the system. Snow College is currently assessing various building dashboard systems. The new science building should integrate the selected standard dashboard system into the building in a visible and accessible location.

STRUCTURAL SYSTEMS

Structural systems for the new science building at Snow College should hold the primary aim of enabling the building to meet its programmatic function while also meeting the demands of code prescribed criteria for vertical and lateral loads. Serviceability issues should also be addressed within the context of structural deflections under load and vibration performance that can affect not only the operability of equipment, but the comfort of building occupants.

Coordination

Development of a successful design stems from the successful integration of all building systems and spaces. At the early stages of design, careful attention should be lent to the spatial layout of architectural, mechanical and electrical systems and how these systems interface with the structural system to establish the optimal bay dimensions and story heights in terms of function and price.

Codes and Standards

- 2012 International Building Code
- DFCM Design Criteria for Architects and Engineers
- American Institute of Steel Construction (AISC) 360-10 Specification for Structural Steel Buildings
- American Institute of Steel Construction (AISC) 341-10 Seismic Provisions for Structural Steel Buildings
- ACI 318-11 Building Code Requirements for Reinforced Concrete
- ACI 530-11 Building Code Requirements for Masonry Structures
- American Iron and Steel Institute (AISI) Specifications for the design of Cold-Formed Steel Structural Members
- American Welding Society (ANSI/AWS) D1.1 Structural Welding Code
- Steel Joist Institute (SJI) for open web Joists and Girders and Steel Deck Institute (SDI) for Metal floor and roof Decks

Structural Design Criteria

- Risk Category: III (Buildings and other structures with a capacity greater than 500 for colleges or adult education facilities).
- Importance Factors: Is = 1.10 (snow), Ii = 1.25 (ice), Iw = 1.0 (wind), Ie = 1.25 (seismic)

Loads

Floor: Live Load = 80 psf Live Load + 15 psf Moveable Partition Load, 100 psf Live Load at exits and corridors. Mechanical Rooms: 125 psf Live Load, or actual weights if higher. UPS Battery Storage areas – 250 to 450 psf as appropriate Live Load reductions for columns and footings only.

Roof: Derived from 43 psf Ground Snow, Snow Drift per ASCE 7-10.

Wind: Basic Wind Speed = 120 mph, Exposure C

Seismic: Spectral Accelerations per ASCE 7-10, Site Class D. Ss = 0.623g, S1 = 0.184g, Site Class D.

Vibration Performance

Control of suspended floor and roof structure vibrations due to human and mechanically induced excitation forces shall be considered in the selection of the building structural floor and roof framing systems. Floor structures in general shall be designed for a maximum vibration velocity of 16,000 micro-inches per second. Lab spaces shall be designed for a maximum vibration velocity of 8,000 micro-inches per second. The design shall accommodate more strict vibration performance as predicated by the demands of equipment (i.e. imaging suites) to be utilized as set forth in the program.

Serviceability

Permitted deflections of structural elements shall be in accordance with applicable codes. Supporting members of brick façades shall be designed to accommodate peak vertical deflections not greater than span/600.

Foundations

The building may be supported on conventional continuous or shallow concrete spread footings. At the basement level, foundations may be constructed on undisturbed natural soils or on compacted structural fill. Foundations above the basement (near grade) may also be shallow concrete spread footings but shall be supported on at least 2 feet of compacted structural fill.

Footings on in-situ undisturbed natural soils may be designed for an allowable net bearing pressure of 1,500 psf. This value may be increased to 2,000 psf and 3,000 psf for footings bearing atop 2 feet and 4-1/2 feet of compacted structural fill respectively. These allowable bearing pressures may be increased by 50% for transient loading conditions such as wind and seismic loads.

More aggressive treatment of in-situ soils may be necessary to adequately prepare the subgrade to support the foundation system. Issues that may affect the criteria for the foundation system include: limited geotechnical borings used to develop the criteria above, potential presence of collapsible soils below the proposed building footprint and non-native and undocumented fills below the proposed building footprint

Should soils be encountered which reflect a lack of ability to support the loads indicated above, a deep foundation system may be required to satisfactorily stabilize the soils. Rammed aggregate piers may serve to pre-consolidate the soils and enable the development of standard footings bearing atop the aggregate piers and the adjacent pre-consolidated soils.

Framing

Basic framing of the building may be developed with concrete and metal deck floors designed to act compositely with supporting steel wide flange beams and girders. Girders and beams shall be supported by either HSS or wide flange steel columns extending to the foundations. Roof framing may be comprised of either open web joists or wide flange beams which support a standard non-composite steel deck. Penthouse structures may be developed with framing consistent with the primary building or may be developed with light-gauge framing members such as metal studs. Inertia bases, housekeeping pads and other such elements shall be used to support mechanical equipment as required.

The concrete/metal deck and steel framing solution is believed to be the most amenable in consideration of future changes and remodel. Penetrations through and adaptations to these assemblies can be readily accommodated with minimal interruption of occupied spaces and with relatively simple and straightforward reinforcements (if needed).

Lateral System

Existing buildings on campus adjacent to the proposed site are either clad with or are comprised of brick assemblies. As such, a brick veneer is anticipated for the new science building as it will complement structures already present. Such facades are most readily accommodated with seismic force resisting systems with reduced story drifts and displacements. Special reinforced concrete shear walls or special steel braced frames (buckling restrained braces) are deemed the most amenable lateral force resisting systems to address this concern. Furthermore, such systems offer options for exposing and expressing the structure so as to enable the building itself to become and instructional medium.

Future Building Expansion

The A/E designers of the building shall not consider potential future horizontal and/or vertical expansions because future vertical expansion is not anticipated and future horizontal expansion of the structure is not anticipated.

Testing and Inspections

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

MECHANICAL SYSTEMS

General Description

The building heating, ventilation and air conditioning needs will be provided utilizing a Variable-Air-Volume (VAV) reheat system consisting of heating hot water and chilled water systems. The heating water system will be produced using a steam-to-water heat exchanger and will consist of distribution pumps, hydronic piping and water-to-glycol heat exchangers at each air handler. A water-cooled chiller and cooling tower will provide chilled water to the building, and a 3-stage cooling system including direct cooling (air washers located in the air handlers) will provide the cooling for the building. The system also includes primary distribution pumps and a distribution piping system. Custom built air handlers will serve the different areas throughout the building.

The lab spaces will require careful control of temperature, relative space pressures, air cleanliness, odor control, air motion and sound. A primary concern will be the safety of personnel. Mechanical system energy efficient design is crucial and shall be accessible for proper maintenance and flexible to accommodate future requirements.

Codes and Standards

The Mechanical System shall comply with the following codes and design standards:

Codes

- International Building Code, 2012 edition.
- International Mechanical Code, 2012 edition.
- International Plumbing Code, 2012 edition.
- International Fire Code, 2012 edition.
- International Energy Code, 2012, ASHRAE 90.1 2010
- Utah State Boiler Code

Standards

- Utah Division of Facilities and Construction Management Design Criteria
- American Industrial Hygiene Association (AIHA). ANSI/AIHA Z9.5 National Standard for Laboratory Ventilation.
- American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE). Laboratory Design Guide
- ASHRAE Fundamentals Handbook, HVAC Applications Handbook, Systems and Equipment Handbook.
- National Fire Protection Association (NFPA). NFPA 15 Fire Protection for Laboratories Using Chemicals.

- Occupational Safety and Health Administration (ASHA). 29 CFP Part 1910.1450.
- Scientific Equipment & Furniture Associates (SEFA). Laboratory Fume Hood Recommended Practices.

Design Criteria

	Summer	Winter
Design Temperatures, dry bulb	93 F	-3 F (Extreme -21 F)
Design Temperatures, Wet bulb	66 F	
Indoor Design Conditions:	72 F	72 F
Occupancy:	Varies. Typical weekdays from 7:00 am to 6:00 pm.	

Design Parameters

Chemical Fume Hood Exhaust

- Occupied Mode Face Velocity - 100 feet/minute
- Unoccupied Mode Face Velocity – 60 feet/minute
- Use of proximity sensors to reduce air flow when hood is not in use.

Minimum Air Change Rates

- Typical Lab Space, Occupied Mode – 4 ACH (Air Changes per Hour)
- Typical Lab Space, Unoccupied Mode – None

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

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

Heat Recovery:

- Provide heat recovery from general exhaust.
- Provide heat recovery from fume hood exhaust.

Laboratory plug load design

- For preliminary design purposes use 5 watts/square foot
- Final loads to be determined during design process.

Humidification Requirements

Typical Laboratories

- Summer 50% RH Max.
- Winter NA

Acoustic Design: The HVAC-related background noise shall comply with ASHRAE Handbook HVAC Applications 2007:

Laboratories (with fume hoods)Testing/Research	RC(N)
Speech communication	40 to 50
Group Teaching	35 to 45
Offices	25 to 35
Conference Rooms	25 to 35

Internal Equipment Heat Gains

In addition to people and lighting loads, heat gains in all rooms should be based on anticipated equipment to be used in each room together with appropriate diversities. The following equipment heat gain rates for certain areas should be considered for preliminary load estimates:

Lab Area	8-10 Watts/sq.ft.
Equipment/Electrical/ Comm Spaces	40 Watts/sq.ft.
General	1 Watt/sq.ft.
Office Areas	1 computer and 2 monitors per space 220 Watts/Office

Heating System

The heating source will be from the Campus Central Steam System. The existing campus steam heating plant consists of steam boilers that provide medium pressure steam (80 psig) distributed throughout the campus to individual buildings through utility tunnels. No changes to the steam heating plant are anticipated.

Medium pressure steam is available in the tunnel at multiple locates for extension into the building. The tunnel will be extended pump room located in the new building.

The building will be served by a variable flow heating water system consisting of a (2) steam-to-water heat exchangers for full redundancy, duplex electric condensate pump, primary/secondary base-mounted pumps with VFD's. Heating water will be distributed throughout the building to air handlers, VAV reheat boxes, unit heaters, etc.

A heating water-to-glycol heat exchanger will be located in each fan room to provide glycol freeze protection for the pre-heat coil located in the air handler.

Chilled Water System

The cooling source will be from a stand-alone chilled water system located at the new building. A water-cooled chiller and cooling tower will provide chilled water to the building. A 3-stage cooling system including direct cooling (air washers located in the air handlers), indirect cooling and mechanical cooling shall provide the cooling for the building. Chilled water will be circulated utilizing a variable flow, primary-only system consisting of primary/standby base-mounted pumps with VFD's. The chilled water pumps shall operate to maintain differential pressure, subject to maintaining minimum chiller flow requirements.

Air Distribution System

Support Area and Office Areas

The support and office areas shall consist of variable volume supply air system from an air handler located in a fan rooms. The air handlers shall be provided with an outside/return air mixing section, pre filters (30%) MERV 8 rating, pre heat coils, supply air fans, indirect chilled water coil, chilled water coils, and direct evaporative cooling section. The air handler supply fans and relief fans shall be a fan array to provide a level of redundancy within the air system and a smaller foot print within the building.

The air handler shall be located such that routine maintenance can take place. Space shall be provided for filter and coil removal without removing any piping or equipment. In general, the space adjacent to an air handler shall be equal to the length of the longest coil in the air handler.

Air shall be distributed throughout the building through a medium pressure supply duct system and return air will be ducted return. Outside air will be drawn from one side of the fan room through louvers and the relief air will be discharged through exterior louvers.

Each independent controlled space shall be provided with a variable volume reheat box. Reheat shall be hot water from the building hot water heating piping system. Each space shall be controlled from a space thermostat that shall control the variable volume box and its reheat coil to maintain space temperature.

Laboratory Spaces

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

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

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

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

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

The laboratory area shall be served by a 100% outside air handler and a 100% exhaust air handler. The 100% outside air handling system shall consist of variable volume supply air system located in a fan room. The air handler shall consist of an outside damper section, pre filters (30%) MERV 8 rating, heat recovery coil, pre heat coil, supply air fans (fan array), indirect cooling coil, chilled water coils, and direct evaporative cooling section. The air handler supply fans shall be a fan array to provide a level of redundancy within the air system and a smaller foot print within the building.

The 100% exhaust air handling system shall consist of variable volume exhaust air system located in a fan room. The air handler shall consist of an exhaust damper section, pre filters (30%) MERV 8 rating, heat recovery coil, bypass section, exhaust air fans (fan array), and discharge section.

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

General Exhaust and Ventilation/Indoor Air Quality

Restrooms, janitor closets, photography and foods rooms shall be exhausted at minimum rates as stated by the International Mechanical Code and as recommended by ASHRAE 62 standard. Outside air will be introduced into the space through the air handling system at rates that comply with the ASHRAE 62 standard. Demand Controlled Ventilation (DCV) will be incorporated in such areas as conference rooms, classrooms, etc.

Electrical and Communication Rooms

Electrical rooms and communication rooms will be conditioned to maintain an adequate room temperature. Exhaust fans and ductless split systems will be utilized to provide conditioning to the spaces.

Automatic Temperature Controls

The Building Management System (BMS) shall be an extension of the existing campus wide system. Provide individual room temperature controls where required. For the majority of the spaces, temperature zoning will be employed such that spaces with similar exposure and uses shall be grouped together.

The control system shall be a direct digital control (DDC) system with electric driven actuators. The direct digital control system shall monitor, control and adjust the building controls from an in-building location. The following items of equipment shall 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.
- The control system shall be connected to the main campus network through the Ethernet network. This building shall be able to be monitored remotely.

Energy Conservation and Verification

In order to conserve energy the following design and control methods shall be evaluated for consideration into the building:

- Premium efficiency motors should be used for all items of equipment.
- Variable frequency drives shall be used.
- Evaporative cooling.
- Oversize the ductwork to reduce static pressure.
- Oversize the air handler cabinet to reduce pressure drop across the coils and filters.
- Measurement & verification should be integrated to ensure ongoing system performance.

Energy and Atmosphere

Minimum Energy performance. The building and HVAC systems will need to meet the energy performance requirements from the 2014 HPBS.

There will not be any CFC's used in this project. The intent is to reduce ozone depletion.

The following mechanical items will be considered in helping improve the energy performance of the building. Actual items incorporated will depend on the mechanical system option which is selected. The intent is to achieve higher energy efficiencies compared to the minimum code requirements.

1. Evaporative cooling system.
2. Variable volume air systems.
3. Variable volume pumping system.
4. Demand Control Ventilation.

It is important to provide for ongoing accountability of building energy consumption. Metering shall be provided per the 2014 HPBS and Snow College facility department needs.

Indoor Environmental Quality

Minimum IAQ Performance. The HVAC system will be designed to meet this prerequisite. The intent is to establish minimum indoor air quality performance and enhance indoor air quality.

Outdoor Air Delivery Monitoring. The use of CO2 sensors to control the ventilation may be included in the mechanical system design for demand based ventilation control. The intent is to monitor and control ventilation air to help sustain occupant comfort and wellbeing. Outdoor air measurement stations will be provided.

Indoor Chemical and Pollutant Source Control. The use of exhaust to remove hazardous gases or chemicals from the building and provide a higher filtration level of the ventilation air prior to occupancy. The intent is to minimize exposure of building occupants to hazardous particulates and chemical pollutants.

Thermal Comfort. The basic design should meet the requirements of this credit. The intent is to provide a high level of thermal comfort for the individual occupants.

Air Handling Systems

Air handling systems shall be designed to meet all of the heating, cooling, ventilation and exhaust requirements of the project. Each supply system shall have multiple fans arranged such that if one fan is down the other fan can still supply some air to the space. Air supply systems shall be variable volume type with hot water reheat as needed. Return air shall utilize a plenum return air system.

Air Intakes and Exhaust

Air intakes shall be positioned to avoid short circuiting of exhaust air back into the building. Every effort shall be made to minimize any entrainment of fumes by strategic location of air intakes.

In all air conditioned spaces pre filters and final filters shall be provided per latest codes and standards. Pre filters should have an efficiency of 30% (Merv 8) and final filters an efficiency of 90% (Merv 14) based on ASHRAE Test Standard 52. Final filters shall be installed at the point of discharge.

PLUMBING SYSTEMS

General

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

Domestic Hot and Cold Water Systems

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

Water Softening System

A duplex water softener will be provided. The domestic hot water will be softened.

Acid Waste and Vent System

Provide a dedicated acid waste and vent system with an automatic central wastewater PH control system with acid and caustic injection.

Laboratory Air System

Provide a central system with two compressors for redundancy.

Laboratory Gases

Natural gas should be supplied at low pressure of 4 to 7 inches of water. Each floor and laboratory space should 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.

Domestic Hot Water

A steam-to-domestic water heat exchanger shall be provided to generate the domestic hot water for the building. The building hot water temperature off the heaters shall be set for 160°F to kill any Legionella bacteria that could be present in the water. A domestic hot water mixing station shall be provided downstream from the heaters. This mixing station shall moderate the temperature to the building at 118°F. The building shall be provided with recirculating hot water pumps which shall be piped into the domestic hot water mixing station.

Water Efficiency

Water Use Reduction. The intent is to maximize water efficiency within buildings

1. Pint flush urinals will be used for helping achieve this point.
2. Dual flush water closets.
3. Low flow shower heads and faucets.

Fire Sprinkling

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

ELECTRICAL SYSTEMS

Codes And Standards

Codes which are applicable to the design of the electrical systems are listed below. Comply with each of the latest adopted publications.

- Division of Facilities Construction and Management (DFCM), Design Criteria
- Division of Facilities Construction and Management (DFCM), High Performance Building Standard
- EIA/TIA, Electronics Industries Association/Telecommunications Industry Association
- IBC 2012, International Building Code
- IEEE 1100-1999, Recommended Practice for Power and Grounding Electronic Equipment
- IESNA, Illuminating Engineering Society of North America
- International Energy Conservation Code (IECC) 2012
- NFPA, National Fire Protection Association (applicable sections including but not limited to):
  - NFPA 70, National Electrical Code
  - NFPA 72, National Fire Code
- UL, Underwriter's Laboratories
- Utah State Fire Marshal Laws, Rules and Regulations
- Snow College Design and Construction Standards for Architects and Engineers

Site Electrical And Telecommunications

Site Electrical Utilities

Snow College obtains electrical service from Ephraim City Power, and owns and maintains their own medium-voltage distribution system. The distribution voltage is 12,470/7,200 V, 3-phase grounded wye. Feeders originate from the main 15 kV fusible gear located at the Lucy Phillips Building, and for the most part are looped using load-break junction cabinets and pad-mounted switches. All new medium-voltage work shall maintain a looped distribution structure. The two potential sites for the new building are addressed below:

West of Karen Huntsman Library: An existing underground duct bank runs west of the existing tunnel, west of the new Library. This duct bank may conflict with the new building foundations and shall be verified by the design team whether it will have to be relocated. An existing switch and load-break cabinet sits on the southwest corner of the Library. It does not have proper clearances and the campus would like this corrected. One option is to replace this equipment with a new 5-way switch to maintain the existing loop, obtain proper clearances, reefed the existing Library, and feed the new Science Building.

West of Lucy Phillips: An existing duct bank runs east-west along the south side of this site. The duct bank appears to be out of the way of a potential new building, but shall be verified by the design team and relocated if required. That duct bank can be intercepted, and a new switch provided to feed the new Science Building.

Regardless of which site or option is selected, the design team shall engage the campus facilities department in the discussion and final decision of the medium-voltage system modifications and feed to the new building. It is believed that the distribution system still has capacity for this building, but this shall be confirmed by the design team. Both sites will require some relocation of existing underground electrical (branch wiring). All new duct banks shall be concrete-encased with minimum (2) 5" conduits. The campus is considering expansion to the south in the future, and so distribution modifications shall take this into account and make provisions, if possible, to expand the distribution loop southward across Center Street in the future.

Telecommunications Utilities

The campus telecommunications distribution consists of copper and fiber distributed underground in duct banks and tunnels, all originating from Lucy Phillips Building. The site west of the new Library has a telecommunications duct bank running north-south, paralleling the tunnel on the west side. This duct bank may require relocation, and shall be verified by the design team. Provide a minimum of (2) 4" conduits stubbed to the nearest tunnel, and another (2) 4" conduits stubbed to the nearest telecommunications pedestal. Coordinate exact routes and connection points with the campus IT department.

Building Power Systems

Low Voltage Service and Distribution

Provide a new pad-mounted transformer for the Science Building, fed from the campus medium-voltage distribution system. It is anticipated that a single 277/480V transformer and service will be sufficient. The design engineer may explore the possibility of a second 120/208V pad-mounted transformer to avoid using dry-type step down transformers in the building. The pad-mounted transformer(s) should be as close to the building as practical, and may be screened for aesthetics. Provide environmentally-safe liquid transformers, such as the FR3 type. The equipment yard may also need to accommodate the medium-voltage switch that may be required for the project, and will depend upon the final design arrangement.

A main electrical room is to be located in the building, near the pad-mounted transformer. The main switchboard shall be provided with digital metering to monitor all important electrical parameters of the building such as volts, amps, kVA, demand, power factor and harmonic distortion. This meter shall have the capability to be remotely monitored from the building management system (BMS), as well as be accessible via a web browser. The switchboards shall have provisions to add breakers for future load growth. The main switchboard shall distribute power to the various branch panelboards for lighting, outlets and miscellaneous loads. Where a single 277/480V service is provided for the building, provide dry-type, 480-120/208V transformers with secondary distribution switchboards located in main electrical room and on each floor of the building. Transformers shall have sound levels at least 3 dB below NEMA standards. For power quality and sub-metering purposes (for measurement and verification), separate loads onto different feeders based on load type, such as motors, lighting and outlets. Another requirement for feeder and load separation will be the different load types based on life safety and standby needs.

Utilization Voltages:

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

Non-laboratory branch panelboards shall be provided in centrally-located electrical rooms. The rooms shall be stacked, and the number of rooms per floor will depend on the proximity of the loads served, such that maximum branch circuit runs will not exceed 120’ – 150’. Panelboards serving normal lighting and appliance circuits shall be located in each electrical room. Lab spaces with higher density power needs may require panelboards in the lab space. Provide at least 25% spare capacity for future growth and flexibility.

208Y/120 volt power from the secondary distribution switchboards should be distributed to laboratory spaces via dedicated panelboards (typical 42 pole), mounted flush in walls outside individual laboratory spaces, with one panelboard per 2-4 laboratory modules. Panelboards serving laboratory areas should be sized with a 225-amp bus, served with a 225-amp feeder, and provided with a 150-amp main circuit breaker. A minimum of 20% spare capacity should be provided in laboratory panelboard space by floor. Lighting and non-laboratory area electrical loads should be served by panelboards that do not supply laboratory loads.

Outlet and lighting branch circuits shall be loaded to no more than 80% of what is allowed by NFPA 70. Dedicated circuits shall be provided where the load requires. On average, 6 outlets per circuit shall be used. No more than 4 computer terminals per circuit will be allowed. In some cases, fewer outlets shall be on a circuit as required by the loads. Outlets with dedicated branch circuits (one outlet per circuit) are required for vending machines, copy machines, break room counters, refrigerators, dishwashers, A/V cabinets, lab equipment and other locations likely to have equipment requiring dedicated circuits. Each branch circuit homerun conduit shall have no more than 3 circuits. All 120V multi-wire branch circuits shall have a dedicated neutral conductor for each circuit.

Conductors shall be all copper and installed in raceways, minimum 0.75” diameter. Insulation shall be XHHW-2 for main service entrances and THWN-2 for feeders and branch circuits. MC cable may be used only above accessible ceilings. Branch circuits shall be sized to prevent voltage drop exceeding 3% at the farthest load. The total voltage drop on both feeders and branch circuits shall be designed to not exceed 5%. This will ensure that all equipment in the building operates most efficiently and minimize power quality problems relating to voltage drop.

A fault current and coordination study shall be performed by a licensed electrical engineer to indicate available fault current at all points in the distribution system. New equipment shall be adequately rated for the amount of available fault current. System coordination shall be studied, and fuses or breakers selected to ensure minimum system outage due to overloads or fault currents. The breakers shall be set with adjustable long time, short time, instantaneous and/or ground fault settings for optimum system coordination. Demonstrate compliance with the NEC regarding selective coordination of overcurrent protective devices serving emergency systems and elevators.

Equipment and Furniture: Power shall be run to any equipment indicated in the program as requiring power and empty raceway. Obtain equipment cut sheets and shop drawings and incorporate requirements into the design to ensure that the proper power and conduit is run to the equipment.

Equipment Sizing Criteria

The Equipment Sizing Criteria are presented in the tables that follow:

Branch Circuit Load Calculations

Branch Circuit	Load
Lighting	Actual installed wattage
Receptacles	180 VA per outlet
Surface Wireway	250 VA per outlet
Equipment Outlets	Actual VA of equipment served
Motors	125% of motor wattage

Demand Factors

	Demand Factors
Lighting	100% of total wattage
Receptacles	100% of first 10 kVA plus 50% of all over 10 kVA
Motors	125% of wattage of largest motor plus 100% of wattage of all other motors
Fixed Equipment	100% of total wattage

Minimum Panelboard Bus Sizes

Electrical Panel	Current
480Y/277V Lighting Panels	100A
208Y/120V Lab Equipment Panels	225A
208Y/120V General Receptacle Panels	225A

Load Calculation Criteria

The preliminary overall connected Volt-Ampere per Square Foot is shown in the table below:

	Overall Connected Load (VOlt-Amp / SF)	
Space	Lighting	Receptacles
Classroom / Conference Room	1.2	2.0
Office	1.0	5.0
Laboratory	2.0	20-35
Laboratory Support	2.0	60-100
Storage	0.8	-
Corridor	0.8	0.5
Mechanical / Electrical Areas	0.5	0.2 (plus actual equipment load ratings)

Power Quality and Reliability

Surge protective devices (SPD's) and "noise" protection shall be provided at service equipment and on 120/208V distribution panelboards that serve sensitive electronic equipment such as computers and lab equipment. To the greatest extent possible, SPD units shall be integral to the panelboard or switchboard to ensure that lead lengths do not raise the clamping voltage and negate the use of the SPD unit. The SPD shall protect the sensitive electronics from disturbances that are generated inside or outside of the building.

Provide a lightning protection system per NFPA 780. A system of lightning rods on the roof with down conductors to a counterpoise ground is proposed. Special attention shall be given to the communications antennas, dishes and other equipment that is located on the roof and site, so that these items are bounded to the building lightning protection and grounding system. The system shall have a UL Master Label.

Grounding

Many power quality problems can be attributed to grounding. Poor grounding can cause equipment failures. The grounding system shall be installed per NFPA 70 requirements. A complete equipment grounding system should be provided such that metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, and all other conductive materials enclosing electrical conductors or equipment, or forming part of such equipment, should be connected to earth so as to limit the voltage to ground on these materials. A separate green insulated equipment grounding conductor shall be provided in all feeder and branch circuit raceways. Other guidelines shall be followed, such as IEEE Standard 1100-1999, Power and Grounding Sensitive Electronic Equipment.

Outlets

The program space data sheets shall be used as a guideline for placing outlets, however, adjustments shall be made to suit the end users' needs during the design and review process with the user groups. Where requirements cannot be identified, the following shall be used as a general guideline.

Offices/Workstations: 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.

Conference Rooms and Meeting Rooms: One outlet for every 10' of wall space, plus one outlet dedicated to computer terminals on two walls. Include at least one floorbox underneath conference room table for power and data. Provide outlets as required for audio-visual equipment.

Classrooms and other Instructional Spaces: Provide outlets for instructor's station, audio/visual equipment and each occupant. Ensure that there is at least one outlet for each 10' of wall space. Provide floor outlets, poke-throughs or underfloor duct where stations or equipment cannot be served directly from the wall without crossing aisle space and where no access floor is provided.

Instructional Lab Areas: Outlets sufficient for programmed equipment, plus outlets along work benches or tables – no greater than 2' on center (unless otherwise identified in the space plan sheets or Lab Program).

Commons Areas, Lounges and Waiting Rooms: Provide power outlets for laptop computers for planned 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.

Breakrooms, Kitchenettes: Outlets on dedicated circuits every 4' on counter top plus dedicated outlets for refrigerator, microwave, 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.

Restrooms: One GFI outlet near sink.

Locker/Shower Rooms: One GFI outlet on a dedicated circuit near each grooming counter top.

Main Computer/Server Rooms: Outlets for each equipment rack served from standby and UPS power with circuit density to allow for 100 VA per square foot.

Telephone/Data Closets: At least 6 quad outlets on standby and UPS power with circuit density to allow for at least 50 VA per square foot.

Electrical Rooms: At least one outlet on emergency power.

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

Stairs: One outlet at the landing of each level.

Storage Rooms (small), Janitors Closets: One outlet.

Building Exterior: One WP/GFI outlet near each entrance.

Emergency, Standby And Uninterruptible Power Supply

Emergency/Standby Service and Distribution

Provide an emergency/standby diesel generator for the new building. Locate generator outdoors in a screened area with weather-protective, sound-attenuating housing and skid-mounted, double-walled tank. Fuel supply shall be minimum 24 hours at full load. Design at least two transfer switches: one for emergency and one for standby loads. Annunciate alarms adjacent to fire alarm panel. Design generator distribution panel with digital metering. There is an existing 80 kW generator at the old Science Building that may be relocated, however, it is anticipated that it will not have the capacity needed for the new building. The following shall be provided with emergency power:

- Emergency egress and exit lighting
- Fire Alarm
- Elevators (where required by IBC, and if requested by Snow College or DFCM)
- Smoke Control Systems (if required)
- Communications rooms – outlets, lights and air conditioning
- Electrical rooms – lights and outlets
- Security systems
- Critical Lab Equipment, such as freezers, refrigerators, hoods, and ventilation systems.

UPS System

A central UPS system is not planned for the building. UPS requirements will be met with Owner-furnished, small plug-in UPS units.

Lighting

General

The basis for design shall be the IES and its Recommended Practices. For exterior lighting, indirect lighting, and other specialized task lighting, a point-by-point plot of illuminance establishing conformance with the Recommended Practices shall be furnished.

IECC 2012 requirements shall be met and exceeded to meet the overall project requirement as well as the 2014 HBPS. Energy savings design techniques such as daylighting control, occupancy sensors, centralized and de-centralized control systems, and LED lamps shall be used where practical to maximize energy efficiency.

Parking, Pedestrian, and Street Lighting

Provide only campus-standard or otherwise approved light poles. The majority of exterior lighting fixtures shall be full cut-off to avoid sky glow and light trespass conditions. Control exterior lighting utilizing combination photocell and time schedule control. LED light sources shall be used for energy conservation. Lighting shall be zoned such that lights can be cut back, while leaving more critical lights on all night.

Interior Lighting

Quantitative and qualitative factors must be considered when designing lighting systems for the interior environments of this facility. Refer to the schedule below, the cited references and to room data sheets for the desired illuminance levels for each space, and balance this with the requirements for energy conservation. Important considerations include quality of light, uniformity ratio, glare reduction, color rendering and contrast. To the greatest extent possible, a task-ambient lighting approach will be used to reduce energy consumption by reducing the overall ambient lighting level and then using separately switched task lights for work surfaces. LED lamps should be considered as the predominant lighting source in the building.

For offices, training rooms and meeting rooms, pendant indirect lighting should be strongly considered, but must be carefully coordinated in rooms with projectors so that the fixtures will not interfere with the projected image. Select luminaires for areas where VDTs are planned which are designed to minimize veiling reflections, and provide multilevel lighting control and task lighting to reduce the illuminance on the VDT. In addition, in rooms with audio visual, design lighting with variable or switched levels as indicated with a separate controlled zone to reduce glare and illuminance on the audio visual display. In rooms with projectors, provide a separate bank of lighting control switches or station near the instructor position for ease of controlling lighting during presentations.

For spaces where glare control is not required lay-in fixtures may be used. This includes corridors, workrooms, restrooms, common areas, equipment rooms and storage rooms. Recessed LED downlights shall be used in areas where aesthetics call for an upgraded appearance, such as in main lobbies.

All interior lighting shall be controlled by some automatic means. This shall include vacancy/occupancy sensors for smaller enclosed areas and relay control with clock and/or timer supervision for larger areas. Consider occupancy sensors in zones for large open office areas. Manual on/off switches shall be provided for each user with a work station, in addition to the automatic means of control. Uniformity must be maintained when in reduced lighting modes. Provide dual-level switching where practical to allow users to reduce light in a uniform manner. The corridors and common areas shall be controlled through the building management system with local wall switch override. Wherever natural daylight is provided, incorporate daylighting controls to promote energy savings by using artificial lighting only as needed. This can be accomplished with automatic dimming, stepped switching or simple on/off control depending on the functional needs of the space. All lighting shall be “instant on” to facilitate quick response to demand and power interruptions.

Exit and emergency lighting shall comply with the IBC. Emergency lighting for means of egress to 1 fc average, 0.3 fc minimum, shall be provided. The emergency lighting shall be shut off during non-business hours to avoid energy waste from 24-hour burn time. Minimal "night-lights" could be considered as way-finding. Emergency lighting shall be included in restrooms, electrical rooms, and communication rooms.

Lighting Summary

Typical Area	Illuminance In Footcandles	Comments
Offices	30-40	Task/ambient
Classrooms	10-50	Variable, multi-zoned
Conference Rooms	10-50	Variable, multi-zoned
Labs	50/100	Task/ambient
Kitchenette. Break Rooms	30	UC lighting
Lobby	30	Daylight Responsive
Locker Rooms	40	
Corridors	15	
Restrooms	30	UT Health Dept Code
Storage	10-20	

Fire Alarm

Comply with campus standards and Utah State Fire Marshal requirements. Provide a fire alarm and detection system in compliance with NFPA, IFC, federal, state and local codes. Design an addressable, Class A system capable of reporting back to a central station. The fire alarm system will include, but not be limited to, manual fire alarms, automatic smoke detection, audible/visible alarm notification appliances, and required control equipment. Strobes shall be visible from all locations except private offices and coordinate with equipment that may hinder visibility. Provide duct detectors and fan shutdown where required by NFPA and the IMC. The detailed fire alarm system design will evaluate electrical distribution zoning and incorporate automatic de-energization of equipment in affected area of smoke detector alarm. Coordinate location of the building annunciator with the fire marshal. All other detectors and functions shall comply with the referenced codes and standards. All fire alarm wiring shall be in metal conduit. The approved fire alarm manufacturer on campus is Simplex.

Telecommunications Pathways

General

Provide pathways for all telephone, data, radio and communications cabling. Coordinate all design with the voice/data cabling installer, the communications equipment manufacturers and the Owner.

Site Service

Refer to site electrical plan and telecommunications drawings for site service to the building.

Riser Distribution

Telecommunications closets shall be provided in each area of the building and stacked. The minimum size of the main (ER) telecommunications room is 10' x 12', and the satellite (TR) rooms 9' x 9'. Coordinate size, equipment layout and wall space with all communications, security, audio/visual and other equipment that will be housed in these rooms. Closets shall be located such that when cabling is routed through the raceway system provided, the distance will not exceed 290 feet to the furthest outlet. Provide a minimum of four 4" conduits from the MDF to the each IDF location. Twenty-four hour HVAC is required in each closet and shall be supplied with emergency power. Conduits shall be stubbed to the roof from each telecommunications room for roof-mounted dish and antennas.

Horizontal Distribution

Provide a cable tray distribution network throughout the building and into the IDF and communications closets. Extend the cable tray around inside of the IDF closet to allow cables to be routed within the room. Consider ease of access to the tray system when the building is in full operation. Limit cable tray routing to be above corridors, common and similar areas. Where ceilings are exposed or inaccessible, then provide a bridge of equivalent conduit connecting the cable trays in the accessible ceiling areas. Do not load the cable tray and raceway system to more than 50% of what is allowed by cable fill requirements of NFPA 70.

Voice/Data Drops

Each voice/data outlet location, or "drop", shall consist of a 4" square box with mud ring and one 1" conduit stubbed to the nearest cable tray. Locations will be coordinated with the users during design. As a minimum, provide one voice/data drop for each workstation, fax machine, copy machine, desk, computer terminal and teaching station. Within each drop may be installed up to (4) cables for voice and data per location. Where wireless networks are being considered for student access, still allow sufficient empty raceways for future hardwired connections should the wireless system have insufficient bandwidth for evolving applications.

Other Empty Conduit Systems

Provide empty conduit and boxes for other low-voltage signal and communications wiring systems that may be provided in this or other contracts, such as audio/visual systems.

TECHNOLOGY SYSTEMS

TECHNOLOGY SYSTEMS CODES AND STANDARDS

Codes which are applicable to the design of the technology systems are listed below. Comply with each of the latest adopted publications. They are part of this program by reference and are not restated in the design narrative.

- BICSI, Building Industry Consulting Services International
- ANSI/TIA/EIA, American National Standards Institute/Telecommunications Industry
  - Association/Electronics Industries Association
- IBC, International Building Code
- NFPA, National Fire Protection Association (applicable sections including but not limited to):
  - NFPA 70, National Electrical Code
- UL, Underwriter's Laboratories
- IEEE Compliance: Comply with applicable requirements of IEEE 208
- ADA, Americans with Disabilities Act
- Standard Broadcast Wiring and Installation Practices", as excerpted from "Recommended Wiring Practices," Sound System Engineering, (2nd Edition), D. Davis

Structured Cabling Systems

Site Telecommunications

Telecommunications cabling is distributed throughout the campus via underground duct banks and tunnels, all originating from Lucy Phillips Building. Distribution shall include both loose tube fiber optic cabling and multi-pair UTP Category 3 outside plant rated cabling to the point of origin. All outside plant cable quantities are to be determined during design and verified with the campus IT department.

Entrance Facilities and Main Equipment Rooms

Entrance Facility shall have hybrid single/multi mode fiber and category 3 UTP multi pair cable between the building POP (point of presence) and the main equipment room (MC). Additional equipment rooms (ER) are to be provided as required by individual departments. Each ER shall have hybrid single/multi mode fiber and category 3 multi pair cable from the MC. All fiber optic cable strand and UTP pair counts will be determined.

General Structured Cabling Systems

Voice-data cabling (structured cabling systems) will include 4 pair Category 6 station cabling, multi-pair copper (UTP) and fiber backbones, all terminations, wall plates, fiber termination panels, copper patch cables, 110 type IDC punch down blocks, racks and wire management. The installer of the voice and data cabling system will be have on staff a BICSI certified RCDD and all onsite installers shall be BICSI Level II certified. In addition the installer shall provide a warranty for the complete installation through the installed connectivity/cable manufacturer warranty program. Every strand of fiber and every conductor of copper will be tested in full compliance with the current ANSI/TIA/EIA 568.C standards. All fiber will be tested at all applicable window for single and multi mode cables. All test results will be documented on 8 ½" x 11" papers and electronically in an owner identified software format for every conductor of copper and fiber cable. The campus standard manufacturer is Commscope Systimax throughout.

Backbone and Horizontal Cable

From the main equipment room (MC), provide a combination of multimode and single mode fiber cabling for data to each termination room (TR) on each of the floors for voice and data signal distribution. Provide UTP riser pair and fiber strand counts as required by owner. All fiber will be terminated into separate fiber termination panels (FTP) at each end with SC connectors. Rack mount all cable termination equipment inside open frame 2 post racks. Provide the EF, MC, all ER's, and all TR's with ¾" plywood painted with fire retardant paint on a minimum of two walls. Locate entrance facility cables on 110 type punch down blocks for termination on plywood walls. Locate all riser multi-pair UTP cables on rack mounted 110 type punch down blocks. Locate FTP's for termination of all fiber cable, and all patch panels for termination of all horizontal copper cable in 7', 19" 2- post open frame equipment racks. Provide cable runway (ladder rack) around the entire perimeter of all rooms at 7' 6" above the finished floor, with lateral runs extending from wall to wall over the top of all equipment racks. Provide 7' high, 6" wide, dual sided vertical wire managers every equipment rack, and horizontal wire managers at the top and bottom of each equipment rack, as well as between all equipment and patch panels in equipment racks. Design a minimum of two rack-mounted, 6-outlet TVSS power strips in designated switch/electronics equipment racks.

Horizontal Cabling

Horizontal cabling will be provided from each voice-data outlet to the nearest TR on the same building level. All horizontal cable specified for workstation connections, both voice and data, will be Category 6 UTP plenum rated cable and will be terminated to category 6 compliant RJ-45 (8 pin) patch panels and faceplate modules. A typical voice/data drop will consist of 2 cables, however, more may be required for specific applications.

Wireless Network

Non-classified non-secure building areas, and immediately adjacent outdoor areas, shall be provided with reliable wireless local area network coverage. Provide data outlets at owner designated locations for wireless access points to cover all interior areas as well as to spill-out into all immediately adjacent outdoor areas. Wireless access point data outlets shall consist of 2 Category 6 data jacks mounted on a double gang wall plate.

Telephone Outlet

Design voice outlets for elevator panels, fire alarm panels, wall phones and other required uses. Install 4 pair Category 6 cable in a suitable wall plate for the application.

Voice and Data System Active Electronics and Passive Devices

All active voice and data system electronics including, but not limited to, hubs, routers, servers, PBX's, etc… will be provided from a separate building FF&E budget and are not part of the construction budget. All passive devices including, but not limited to cabling, termination devices, wall plates, patch panels, copper patch cables, fiber patch cords, connectors, open frame equipment racks, cable runway, and cable management systems are part of the construction budget.

Security Systems

Security systems shall be comprised of three main elements – intrusion detection and duress alarm, access control (card readers), and video surveillance. These three elements shall be integrated to perform as a single enterprise command and control system, with separate partitions, monitor and control capabilities, and recording at various "satellite" locations to be determined during the design process. Comply with campus standards. New equipment shall be compatible and integrated with existing systems and equipment.

Intrusion Detection/Duress

The planned facilities will be a mixture of 24/7 occupied spaces and regular business hours which will be monitored using zone partitions. Areas can be "secured" while other spaces remain "alarm-free". Door contact indicators and motion detectors will be the main sensing devices. Duress buttons will be provided at all public interface locations.

Access Control

Electronic access control of doors using proximity type card readers shall be provided. Base system compatibility shall follow Snow College standards. Access control system alarms (forced doors or propped open) shall be integrated into the alarm monitoring system and annunciation. Regular authorized usage of cards shall be executed in the "background" of the system, not burdening system with regular traffic.

Video Surveillance

Unless otherwise noted, an IP camera system will be implemented. A mixture of megapixel and standard high resolution digital cameras, both fixed and pan-tilt-zoom, will be installed at all public entrances and exits, waiting areas, reception and public counters, elevator lobbies, stairwells and all "emergency exit only" doors. In addition, cameras shall be located viewing all duress button locations and/or designated sensitive or critical access control locations. Megapixel cameras are to be installed at all high traffic locations and areas where subsequent video forensics may want to be used (license plate reads, facial recognition, high definition zooms, etc. Standard high resolution cameras will be used where general viewing and monitoring of staff or low traffic areas is desired. All cameras are always active and subject to 24/7 recording based on current video diagnostic programming (motion sensed, time/calendar, masked, behavioral, etc.). Surveillance system is to be fully integrated with duress and access control systems to provide immediate video image call-ups for all alarms.

Distributed Antenna System

A distributed antenna system shall be provided throughout the facility to boost signals for both emergency radios. The option of adding capability for cellular phone coverage as well shall be explored and presented during the design process.

Audio And Video Systems

General

Audio and video systems will be specified for installation as part of the building construction work, to be completed with all building trades. Audio and video systems will be specified for full compliance with the Program Report standards. All video system displays will be planned for low energy consumption utilizing LED and other emerging technologies. Displays will be RoHS compliant and will have built-in eco-power consumption modes.

Classrooms (Including Labs)

Classrooms will be provided with fully integrated audio, video, and control systems. Audio systems will be used to amplify program audio originating from media source playback devices, and will consist of left and right wall mounted full-range speakers mounted at the front of the classrooms.

Several media source devices will be provided. These devices will include, but not be limited to, wired connections to portable computers, wireless connections to tablet computers, computers resident in teaching stations, Blu-ray/DVD players, document cameras, and television tuners. Audio originating from source devices will be selected, processed, and amplified to a speaker system. In compliance with the Americans with Disabilities Act, a wireless assisted listening system will be provided.

One electric roll-up, tensioned cabled, 16:9 or 16:10 video projection screen will be provided for the display of media content. The projection screen will be sized using AV industry-wide accepted standards for the nearest and furthest viewers. Carefully coordinate the projection screen location with seating layouts to assure appropriate viewing sight lines. Specify a standard-throw, ceiling mounted projector with a minimum native resolution of 1920 X 1080 in a 16:9 format or 1920 X 1200 in a16:10 format. As with screen sizing, apply AV industry-wide accepted standards in calculating the required light output for each projector to assure that images will not be "washed out" by ambient room lighting. Additionally, specify an approximate 21.5" LED monitor with a native resolution and aspect ratio that matches the specified projector for use on the lectern. At the Owner's direction during the design process, some rooms may be provided with the ability to write electronically (annotate) over displayed images. Video systems will be equipped with matrix switchers to allow for the display of separate images on the projection screen and lectern monitor.

Fully integrated control systems will be provided for control of all audio and video system functions and room lighting systems. The resident user interface (UI) will be a touch panel located at the teaching station. Additionally, specify the capability for faculty wireless tablet computers to be used as the UI. Program UI graphics specific to the room in which it is deployed. To the extent directed by the Owner during the design process, specify that single control commands will result in the execution of multiple AV system, lighting system, and, if applicable, motorized window covering events (Macros). Program all control system processors to be networked with a building-wide control system management software.

Distance Learning Classrooms

In addition to the AV system equipment and capabilities described above in the classroom narrative, at least two classrooms will be provided with additional equipment required for distance learning/video conferencing. In order to facilitate lecture recording, lecture streaming, and distant communication, the spoken word originating from presenters or lectern-mounted gooseneck microphones. Table mounted boundary element microphones will be provided to capture student questions. Additionally, provide: a video conferencing codec with HD robotic cameras positioned to capture the images of instructors and students; large screen LED flat panel monitors positioned so that the instructor and students can monitor the outgoing and incoming video images; and a facilitator station with a Smart Podium annotation monitor and codec controller. All audio, video, and control system equipment will comply with the Utah Educational Network standards.

Seminar/Conference Rooms

Each room will be provided with fully integrated audio, video, and control systems. Specify a large, LED flat panel monitor sized in compliance with AV industry-wide standards based on viewing distances for room seating layouts. Video system signal switching, processing, and distribution will be provided to select video sources and route the signals to the flat panel monitor. Resident source devices will not be provided. Rather, specify connection panels at multiple locations on walls and in furniture in each room to accept various audio and video signal types. In addition, specify wireless connections to tablet computers, TV tuners and connections to the central control room.

Provide an audio system in each room for the playback of media content with audio. Voice reinforcement systems will not be provided. Speakers will be attached to the large, LED flat panel monitors. Audio system digital signal processors and power amplifiers will be provided for processing and distribution of audio signals originating from input connection panels and wireless tablet computers. Audio originating from source devices will be selected, processed, and amplified to the speaker system.

Simple, integrated control panels will be wall-mounted in each room to facilitate user control. All audio and video system control functions, and possibly lighting control functions, will be accessible via the control panel. All control system processors will be networked with the campus-wide control system management software.

TV Distribution System

An RF TV distribution system will be provided for distribution of campus cable system. Audio and video signals throughout the building. The TV distribution system will be provided with cable, amplifiers, splitters, directional couplers, terminators, outlets, and connectors. The system will be the broadband type, for distribution of modulated audio and video signals onto a carrier frequency. A minimum 750 MHz bandwidth will be specified, and all outlets will be provided with between +5 and +10 dBu at each building television outlet. TV outlets will be provided to all rooms with AV systems.

Facility-wide Digital Signage System

A digital signage system will be provided throughout the building. Approximately 46" diagonal LCD flat panel monitors will be located at elevator lobbies, public lobbies, and select other locations on each floor with appropriate mounting hardware. Small form factor central processing units will be located at each monitor position for IP addressable, Ethernet distribution of content and basic monitor control. The digital signage system will integrate with either the "Building Dashboard" system or the "Science on Display" system. The digital signage system will also include provisions for visual signage of public address announcements for compliance with the American's with Disabilities Act.

Clock System

Provide battery operated clocks throughout the building, and a GPS receiver/transmitter at a central location. Specify clocks to be correctable by the GPS receiver/transmitter via a wireless connection directly to each clock.

BUILDING COMMISSIONING

The state of Utah will hire a Commissioning Agent (CxA) as a part of the project team, per the State of Utah High Performance Building Standards. 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 High Performance Building Standard(HPBS), DFCM shall determine the systems and assemblies to be commissioned, per the OPR, in the project's team's scope. The following systems must be commissioned as a minimum.

- Cooling systems
- Heating systems
- Steam systems
- Air handling systems
- Smoke controls systems including fans ductwork and interconnected air handling/supply systems
- Plumbing systems
- Emergency power systems
- On-site renewable energy systems
- Electrical systems
- Building Automation Systems (BAS), including verification of correctly installed data points and meters

Envelope Commissioning

Per the HPBS, a high performance building shall be commissioned in general compliance with ASTM E2813-12 Standard Practice for Building Enclosure Commissioning. The extent and scope of the envelope commissioning will be based on the project budget and goals. The envelope commissioning agent shall be engaged during the design phase. The Owners Project Requirements shall reflect the goals of the building envelope, and the design and construction phases shall reflect these goals.

SPACE SUMMARY

BUILDING SUMMARY

The new science building contains the following building areas:

	Department	Programmed Area
1.0	Biology	9,083 sf
2.0	Chemistry	5,943 sf
3.0	Physics	1,890 sf
4.0	Geology	1,943 sf
5.0	Engineering & Computer Science	2,040 sf
6.0	Shared Spaces	14,515 sf
	Total Net Area	35,414 sf
	Total Gross Area (.626 grossing factor)	**56,600 sf**

BIOLOGY

Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Laboratory					
1.01	Microbiology Teaching Lab	1,260	1	1,260	
1.02	Majors Teaching Lab	1,260	1	1,260	
1.03	General Biology Teaching Lab	1,260	1	1,260	
1.04	Anatomy and Physiology Teaching Lab	1,575	1	1,575	
1.05	Research Lab	630	1	630	
	Subtotal			**5,985**	
Laboratory Support					
1.10	Microbiology Prep Room	210	1	210	
1.11	Microbiology Autoclave Room	210	1	210	
1.12	Microbiology Equipment Room	210	1	210	
1.13	Herbarium Storage / Work Room	630	1	630	
1.14	Museum and Animal Storage	630	1	630	
1.15	Field Equipment Wash-Off / Storage	473	1	473	
1.16	General / Human Bio Prep / Storage	630	1	630	
1.17	Greenhouse	1,260	0	0	Add Alternate
1.18	Laboratory Tech. Office	105	1	105	
	Subtotal			**3,098**	
	Total			**9,083**	

CHEMISTRY

Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Laboratory					
2.01	General Chemistry Teaching Lab	1,260	2	2,520	
2.02	Organic Chemistry Teaching Lab	1,890	1	1,890	
2.03	Research Lab	798	1	798	
	Subtotal			**5,208**	
Laboratory Support					
2.10	Chemistry Prep / Storage	630	1	630	
2.11	Lab Tech. Office	105	1	105	
	Subtotal			**735**	
	Total			**5,943**	

PHYSICS

Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Laboratory					
3.01	Physics Teaching Lab	1,260	1	1,260	
	Subtotal			1,260	
Laboratory Support					
3.10	Physics Storage / Prep	630	1	630	
	Subtotal			**630**	
	Total			1,890	

GEOLOGY

Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Laboratory					
4.01	Geology Teaching Lab	1,260	1	1,260	
	Subtotal			**1,260**	
Laboratory Support					
4.10	Geology Sample Storage	315	1	315	
4.11	Plant & Soil Science Storage	158	1	158	
4.12	Rock / Sample Prep	210	1	210	
	Field Equipment Wash-Off / Storage				Shared with Biology 1.15
	Subtotal			**683**	
	Total			**1,943**	

ENGINEERING & COMPUTER SCIENCE

Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Laboratory					
5.01	Computer Science Teaching Lab	725	1	725	
5.02	Engineering Computer Lab	725	1	725	
	Subtotal			**1,410**	
Laboratory Support					
5.10	Equipment and Project Lab (Shop)	630	1	630	
	Subtotal			**630**	
	Total			**2,040**	

SHARED SPACES

Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Classrooms					
6.01	Seminar Room - Small	300	1	300	
6.02	Seminar Room - Medium	450	1	450	
6.03	Classroom	500	5	2,500	
6.04	Distance Education Classroom	500	3	1,500	
6.05	Planetarium / Classroom	870	1	870	
	Subtotal			**5,620**	
Administration					
6.10	Faculty Office - Biology	120	9	1,080	
6.11	Faculty Office - Chemistry	120	6	720	
6.12	Faculty Office - Physics	120	3	360	
6.13	Faculty Office - Geology	120	1	120	
6.14	Faculty Office - Engineering & Computer Science	120	3	360	
6.15	Faculty Office - Math	120	7	840	
6.16	Faculty Work Room	350	1	350	
6.17	Faculty Reading Room	250	1	250	
	Subtotal			**4,080**	

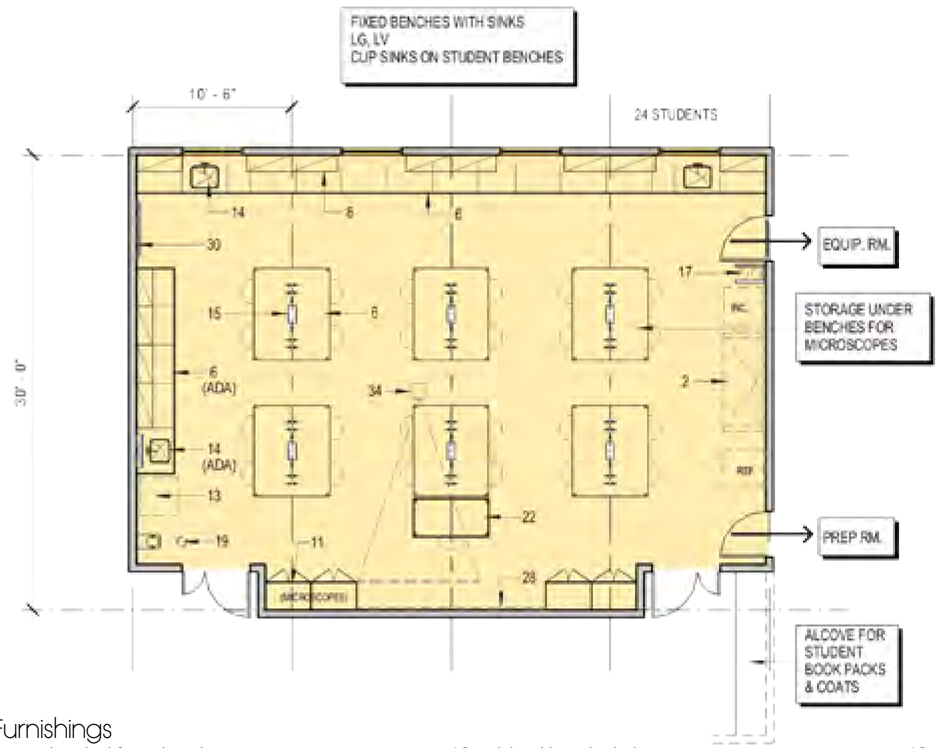
Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Student Study					
6.20	Student Study Area	600	1	600	
6.21	Kitchenette	100	1	100	
6.22	Engineering Commons / Lockers	300	1	300	
	Subtotal			**1,000**	
Building Support					
6.30	Lobby	2,000	1	2,000	
6.31	Receiving & Cylinder Storage	315	1	315	
6.32	Mechanical / Electrical	1,500	1	1,500	
	Subtotal			**3,815**	
	Total			**14,515**	

BIOLOGY

Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Laboratory					
1.01	Microbiology Teaching Lab	1,260	1	1,260	
1.02	Majors Teaching Lab	1,260	1	1,260	
1.03	General Biology Teaching Lab	1,260	1	1,260	
1.04	Anatomy and Physiology Teaching Lab	1,575	1	1,575	
1.05	Research Lab	630	1	630	
	Subtotal			**5,985**	
Laboratory Support					
1.10	Microbiology Prep Room	210	1	210	
1.11	Microbiology Autoclave Room	210	1	210	
1.12	Microbiology Equipment Room	210	1	210	
1.13	Herbarium Storage / Work Room	630	1	630	
1.14	Museum and Animal Storage	630	1	630	
1.15	Field Equipment Wash-Off / Storage	473	1	473	
1.16	General / Human Bio Prep / Storage	630	1	630	
1.17	Greenhouse	1,260	0	0	Add Alternate
1.18	Laboratory Tech. Office	105	1	105	
	Subtotal			**3,098**	
	Total			**9,083**	

1.01 MICROBIOLOGY TEACHING LAB

Area	1,260 sf
Quantity	1
Function	Flexible microbiology teaching lab
Occupants	24 students, 1-2 faculty
Adjacency	Microbiology prep, equipment and autoclave rooms
Floor	Chemical resistant, laboratory resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10’-0”, suspended acoustic ceiling
Doors	3’-0” Wood with lite and operable 1’-0” leaf
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC .60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy and photocell sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.

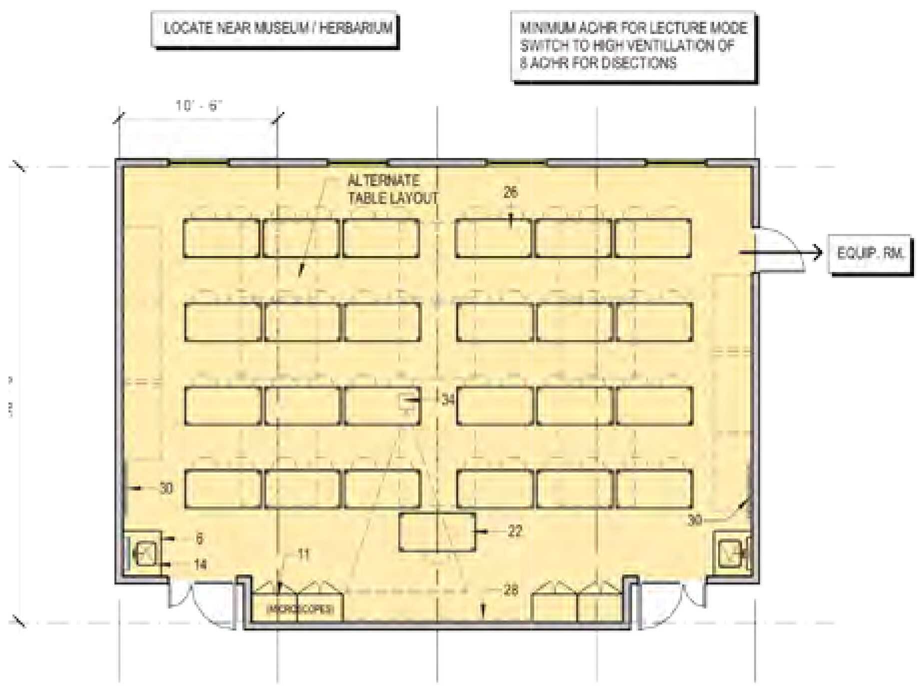


Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.02 MAJORS TEACHING LAB

Area	1,260 sf
Quantity	1
Function	Major's biology teaching lab
Occupants	24 students, 1-2 faculty
Adjacency	Microbiology equipment room
Floor	Chemical resistant, laboratory resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and operable 1'-0" leaf
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC .60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy and photocell sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.

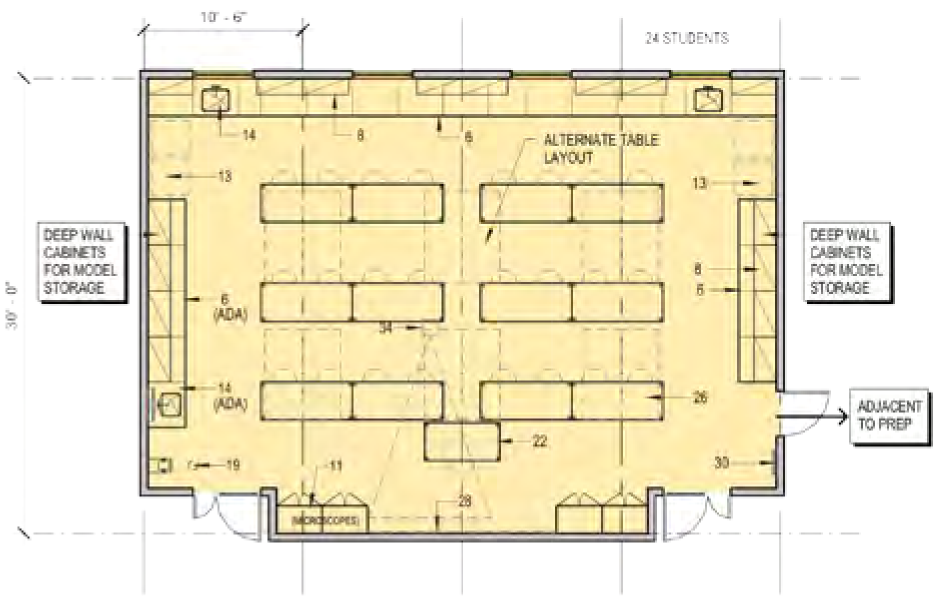


Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.03 GENERAL BIOLOGY TEACHING LAB

Area	1,260 sf
Quantity	1
Function	General and human biology teaching lab
Occupants	24 students, 1-2 faculty
Adjacency	Biology prep room
Floor	Chemical resistant, laboratory resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and operable 1'-0" leaf
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC .60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy and photocell sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.

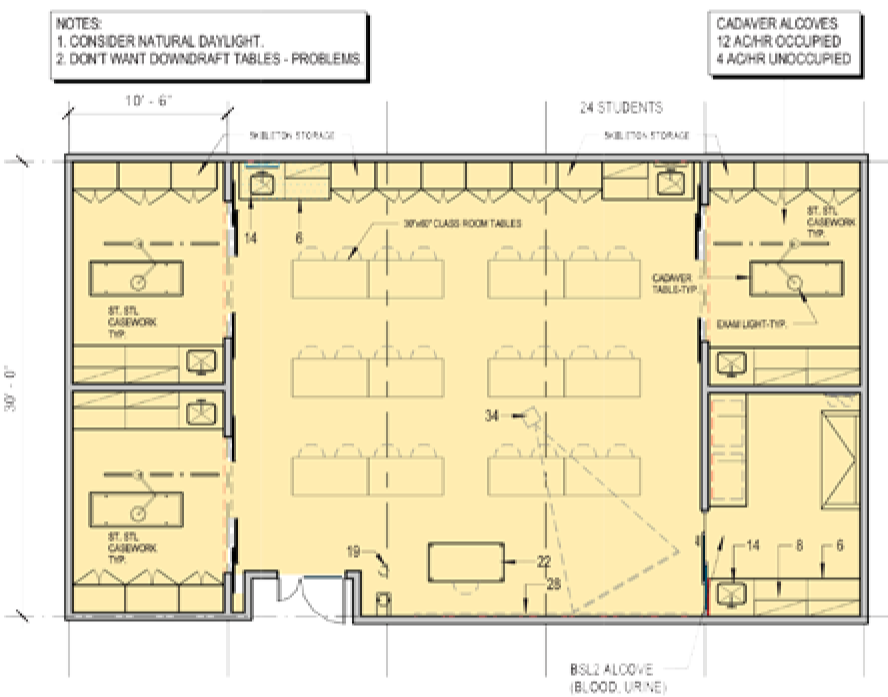


Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.04 ANATOMY AND PHYSIOLOGY TEACHING LAB

Area	1,575 sf
Quantity	1
Function	Human anatomy and physiology teaching lab
Occupants	24 students, 1-2 faculty
Adjacency	Biology teaching labs and support spaces
Floor	Chemical resistant, laboratory resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and operable 1'-0" leaf, sliding glass doors with privacy frosting at interior partitions
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC .60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy and photocell sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.

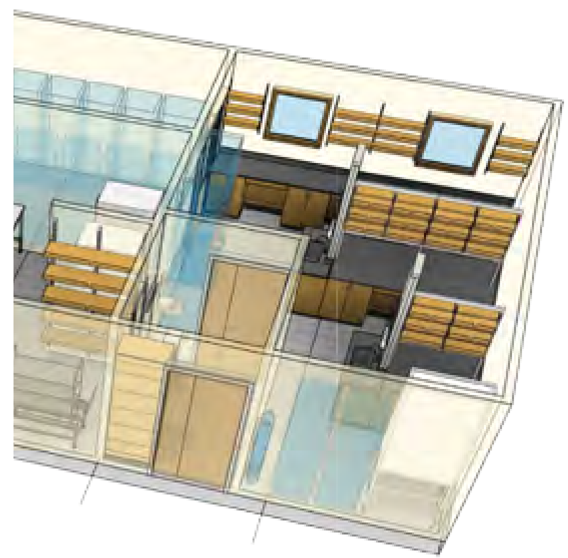


Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.05 RESEARCH LAB

Area	630 sf
Quantity	1
Function	BSL-2 Microbiology research lab and ante room
Occupants	8 students, 1-2 faculty
Adjacency	Ante room and biology equipment and prep rooms
Floor	Chemical resistant, laboratory resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and operable 1'-0" leaf
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC .60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy and photocell sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.

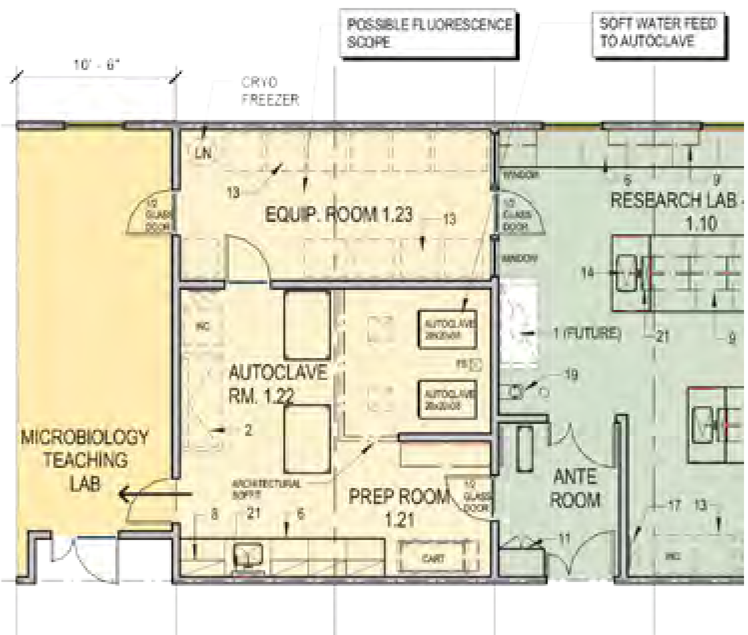


Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet / lockers
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.10 MICROBIOLOGY PREP ROOM

Area	210 sf
Quantity	1
Function	Biology laboratory preparation room
Occupants	1-2 faculty or staff
Adjacency	Microbiology teaching lab, research lab and equipment room
Floor	Chemical resistant, laboratory resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite
Windows	N/A
Acoustics	STC 45 at walls, NRC .60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.



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 wall shelves
10. island bench shelves
11. tall storage cabinet
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13. equipment space
14. laboratory sink
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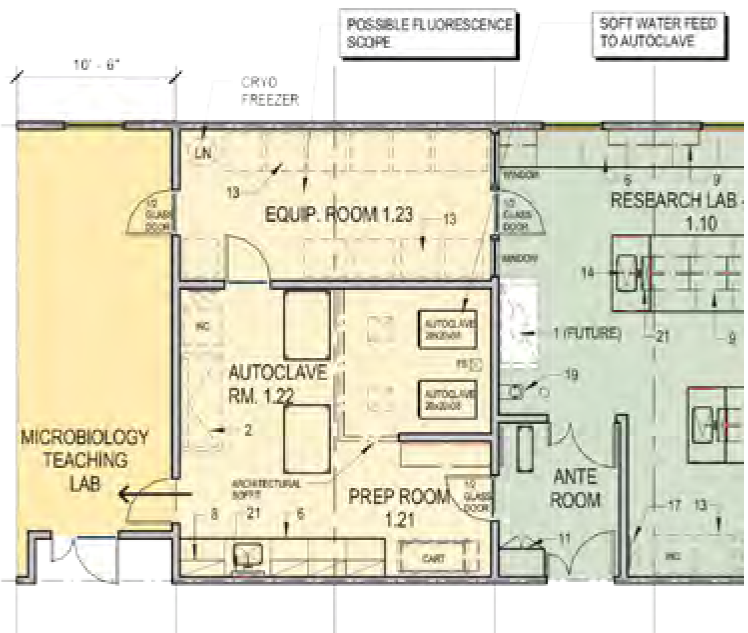
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.11 MICROBIOLOGY AUTOCLAVE ROOM

Area	210 sf
Quantity	1
Function	Biology autoclave room
Occupants	1-2 faculty or staff
Adjacency	Microbiology teaching lab, research lab and equipment room
Floor	Chemical resistant, laboratory resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling with soffit to delineate space
Doors	N/A
Windows	N/A
Acoustics	STC 45 at walls, NRC .60 min. at ceiling
Mechanical	Shared thermal environment
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.

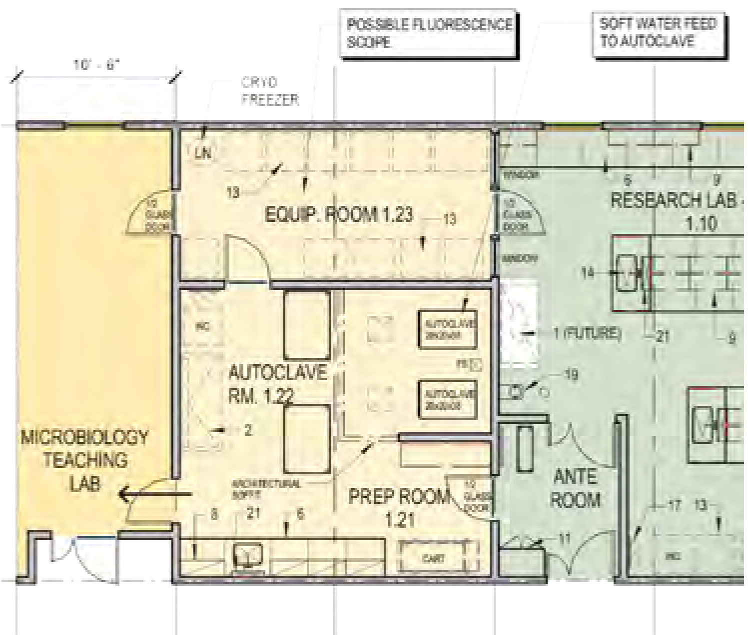


Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.12 MICROBIOLOGY EQUIPMENT ROOM

Area	210 sf
Quantity	1
Function	Biology equipment room
Occupants	1-2 faculty or staff
Adjacency	Microbiology teaching lab, research lab and prep room
Floor	Chemical resistant, laboratory resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite
Windows	N/A
Acoustics	STC 45 at walls, NRC .60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.

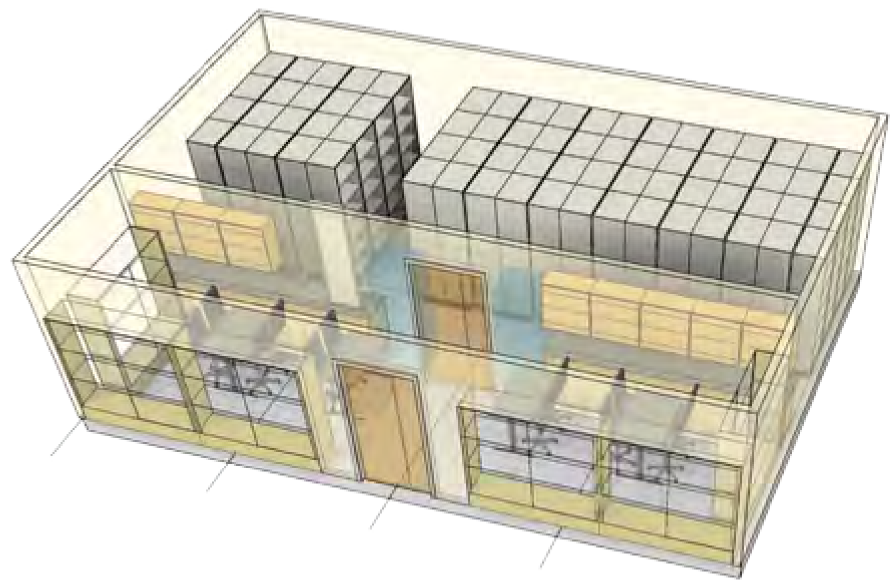


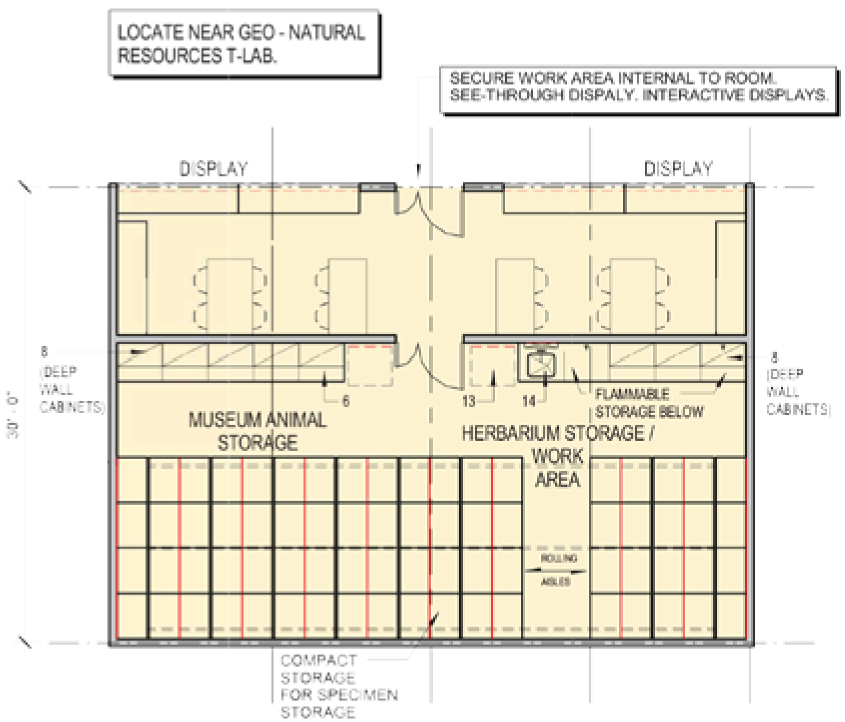
Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.13 HERBARIUM STORAGE / WORK ROOM

Area	630 sf
Quantity	1
Function	Biology herbarium, storage and work room
Occupants	1-2 faculty or staff
Adjacency	Near general biology laboratories
Floor	Resilient flooring
Wall	Painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and 1'-0" operable leaf
Windows	Shared light as available
Acoustics	STC 45 at walls, NRC .60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.



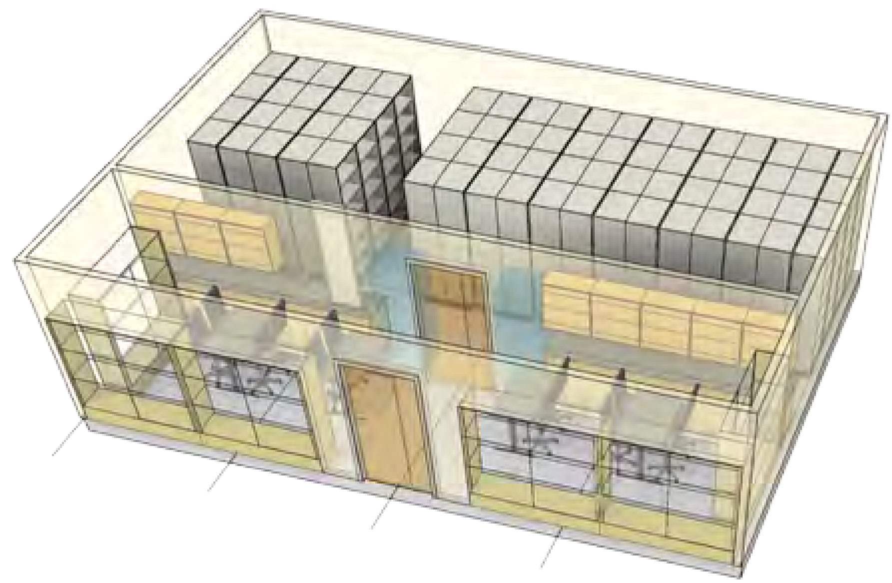


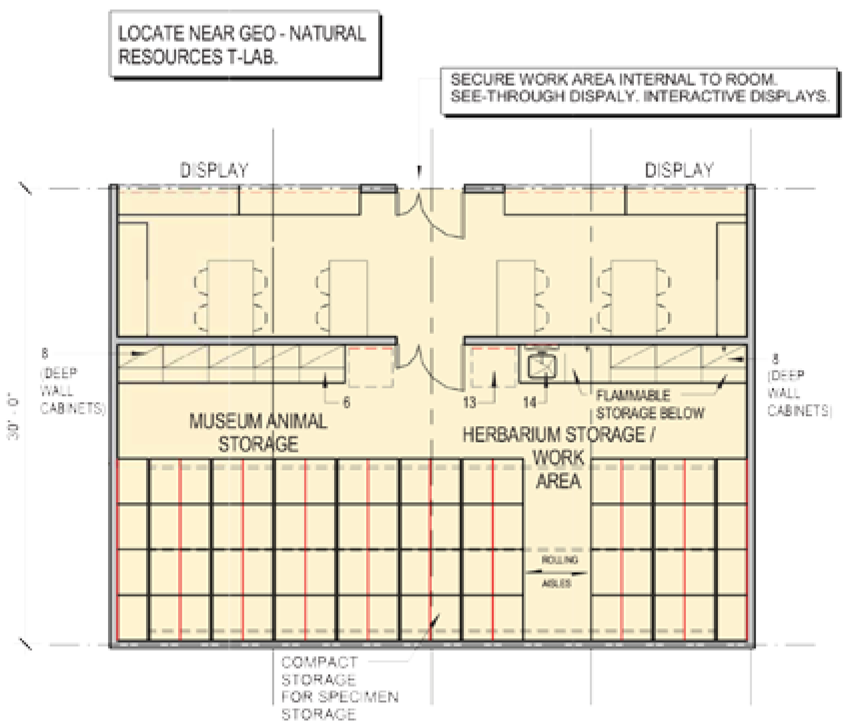
Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.14 MUSEUM AND ANIMAL STORAGE

Area	630 sf
Quantity	1
Function	Biology specimen storage and work room
Occupants	10-12 students and 1-2 faculty or staff
Adjacency	Near geology and natural resources teaching lab
Floor	Resilient flooring
Wall	Painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and 1'-0" operable leaf
Windows	Shared light as available
Acoustics	STC 45 at walls, NRC .60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical | AV | IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors.
Equipment | Furniture	See room diagram for furnishings and equipment.



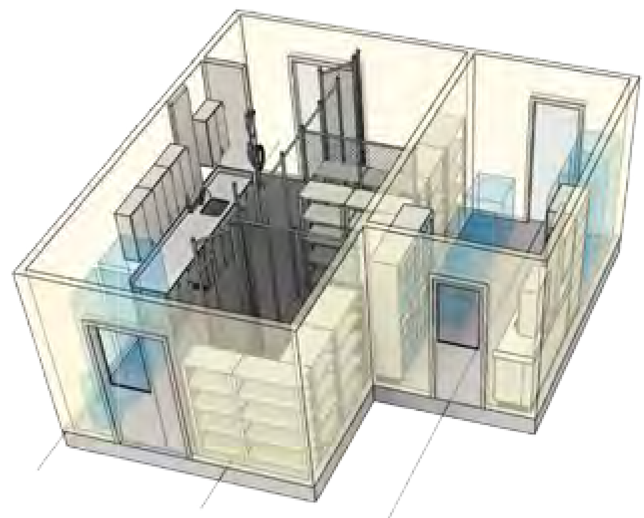


Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.15 FIELD EQUIPMENT WASH-OFF / STORAGE

Area	473 sf
Quantity	1
Function	Biology field equipment wash-off and storage
Occupants	10-12 students and 1-2 faculty or staff
Adjacency	Directly accessible from the exterior and near the elevators for equipment and material movement, as necessary
Floor	Sealed concrete
Wall	Painted gypsum board over moisture resistant wainscot
Ceiling	Exposed structure
Doors	3'-0" Wood with lite and 1'-0" operable leaf
Windows	N/A
Acoustics	STC 45 at walls
Mechanical	Shared thermal environment
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors
Equipment I Furniture	See room diagram for furnishings and equipment.



NOTES:
1. LOCATE NEAR A VEHICLE TURN OUT FOR FIELD TRANSPORT.
2. SHARED WITH GEOLOGY, BOTANY, SOILS.
3. SURVEY EQUIPMENT SECURE STORAGE.
4. CONSIDER COLLOCATING FIELD EQUIP. ADJACENT TO MACHINE SHOP.

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
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20. overhead service carrier
21. pipe drop enclosure
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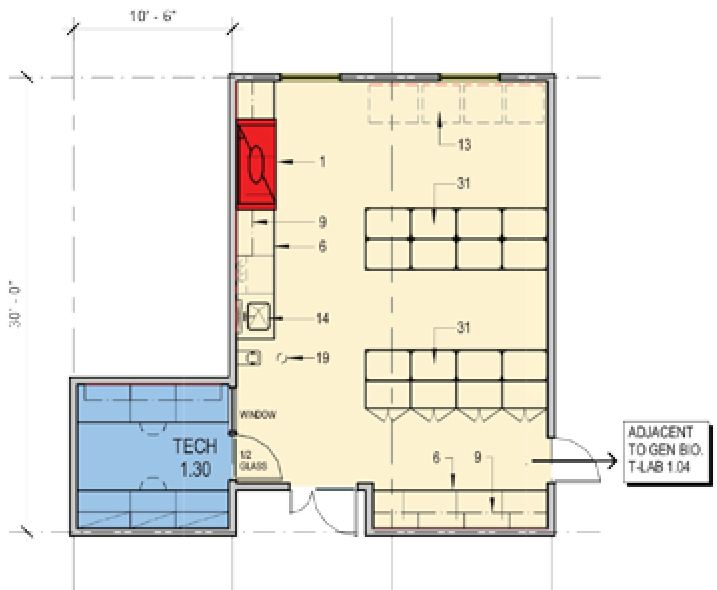
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.16 GENERAL / HUMAN BIO PREP / STORAGE

Area	630 sf
Quantity	1
Function	Biology laboratory preparation and storage space
Occupants	1-2 faculty or staff
Adjacency	Directly accessible from the laboratory technician office
Floor	Resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and 1'-0" operable leaf
Windows	N/A
Acoustics	STC 45 at walls
Mechanical	Shared thermal environment
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors
Equipment I Furniture	See room diagram for furnishings and equipment.



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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
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27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
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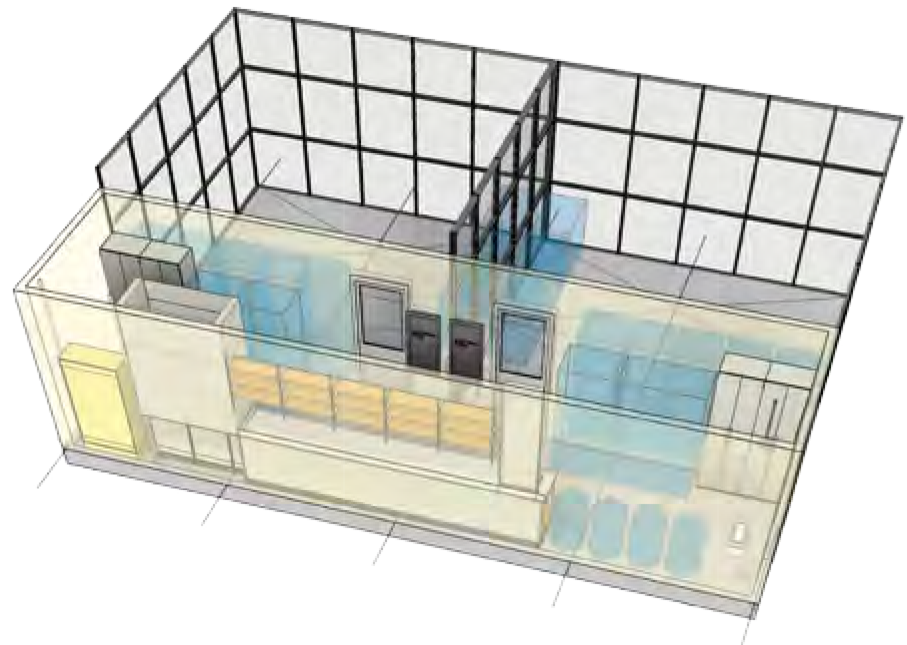
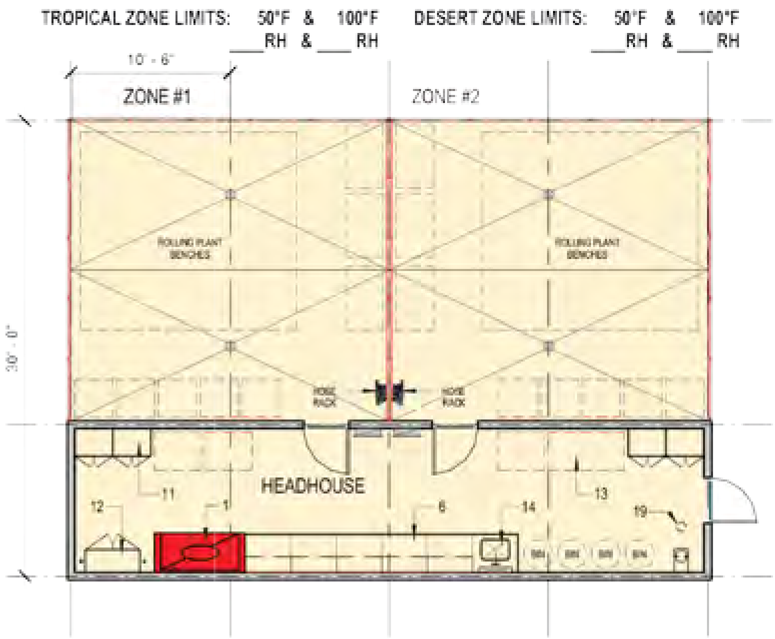
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.17 GREENHOUSE

Area	1,260 sf
Quantity	0 (Add alternate in bid documents)
Function	Biology head house and greenhouse
Occupants	10-12 students, 1-2 faculty or staff
Adjacency	Direct south orientation for optimal solar access
Floor	Sealed concrete
Wall	Glass with operable shades
Ceiling	Glass with operable shades
Doors	Storefront
Windows	See wall above
Acoustics	STC 45 at walls
Mechanical	Individual thermal controls as needed, natural ventilation
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead as needed for plant growth, integrated photocell sensors
Equipment I Furniture	See room diagram for furnishings and equipment.





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
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11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
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18. gas cabinet
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20. overhead service carrier
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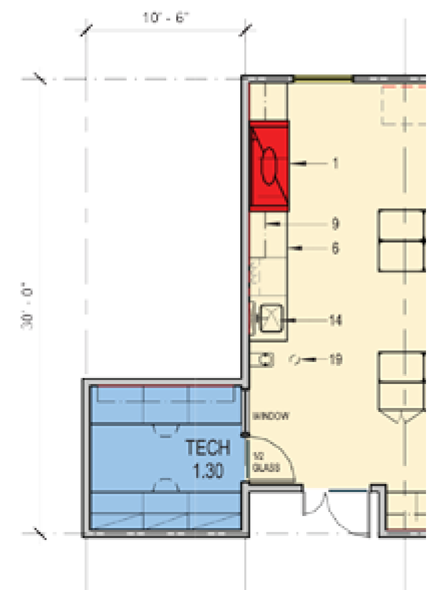
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

1.18 LABORATORY TECH. OFFICE

Area	105 sf
Quantity	1
Function	Biology laboratory technician office
Occupants	1-2 staff
Adjacency	Directly accessible from the general biology storage and prep room
Floor	Resilient flooring
Wall	Painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite
Windows	As feasible
Acoustics	STC 45 at walls
Mechanical	Shared thermal environment
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	Power and data as needed for equipment and convenience outlets at the walls
Lighting	Overhead 30 footcandles at work surface with task lighting and occupancy sensors
Equipment I Furniture	• Millwork with work station(s) • Upper cabinets for storage • (2) task chairs • Glass white board

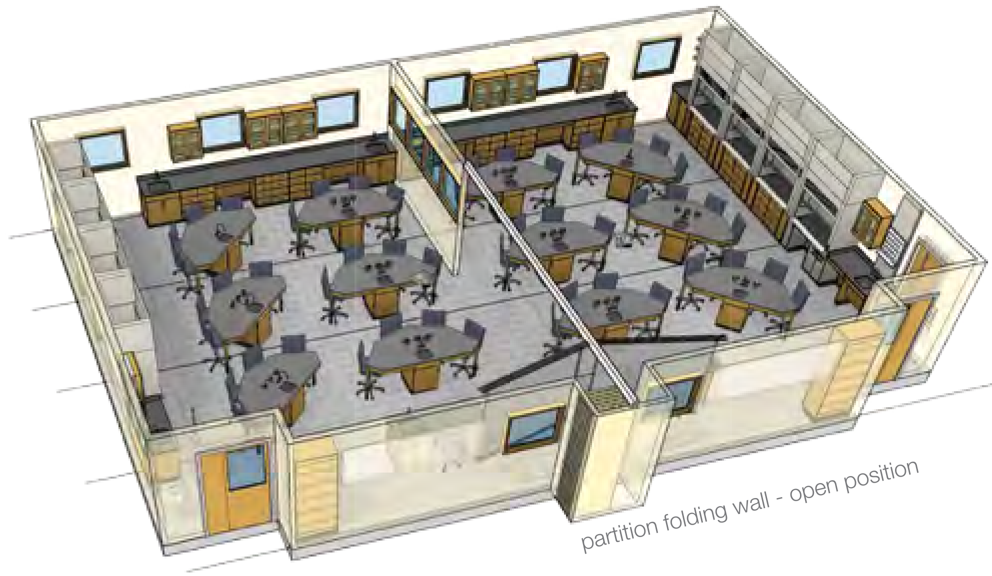


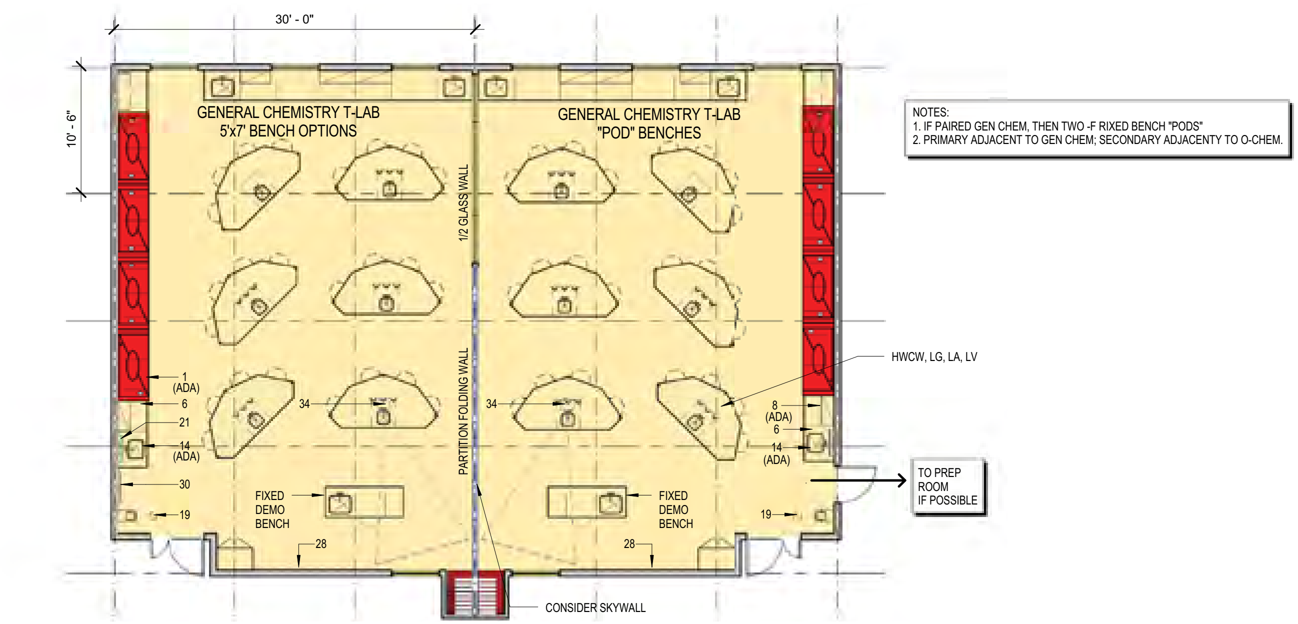
CHEMISTRY

Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Laboratory					
2.01	General Chemistry Teaching Lab	1,260	2	2,520	
2.02	Organic Chemistry Teaching Lab	1,890	1	1,890	
2.03	Research Lab	798	1	798	
	Subtotal			**5,208**	
Laboratory Support					
2.10	Chemistry Prep / Storage	630	1	630	
2.11	Lab Tech. Office	105	1	105	
	Subtotal			**735**	
	Total			**5,943**	

2.01 GENERAL CHEMISTRY TEACHING LAB

Area	1,260 sf
Quantity	2 (1 set of paired labs)
Function	General chemistry teaching laboratory
Occupants	24 students, 1-2 faculty
Adjacency	Directly adjacent to second general chemistry teaching lab and near organic chemistry teaching lab and storage room
Floor	Chemical resistant, laboratory resilient flooring
Wall	Epoxy painted gypsum board, operable partition between teaching labs to allow for 48 student lectures
Ceiling	10’-0”, suspended acoustic ceiling
Doors	3’-0” Wood with lite and operable 1’-0” leaf
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC.60 min. at ceiling, integrated sound system for 48 student lectures
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy and photocell sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.



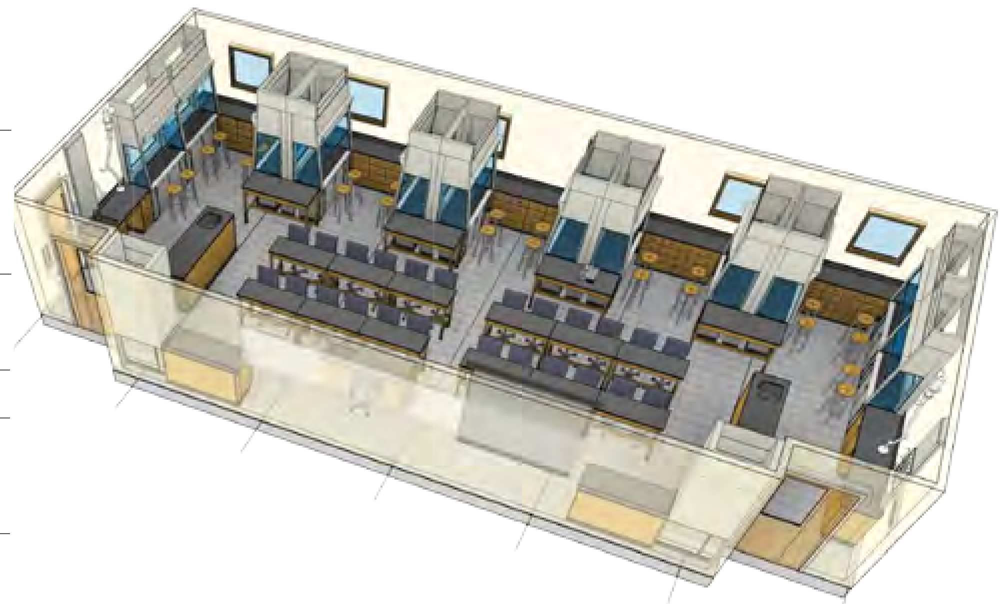


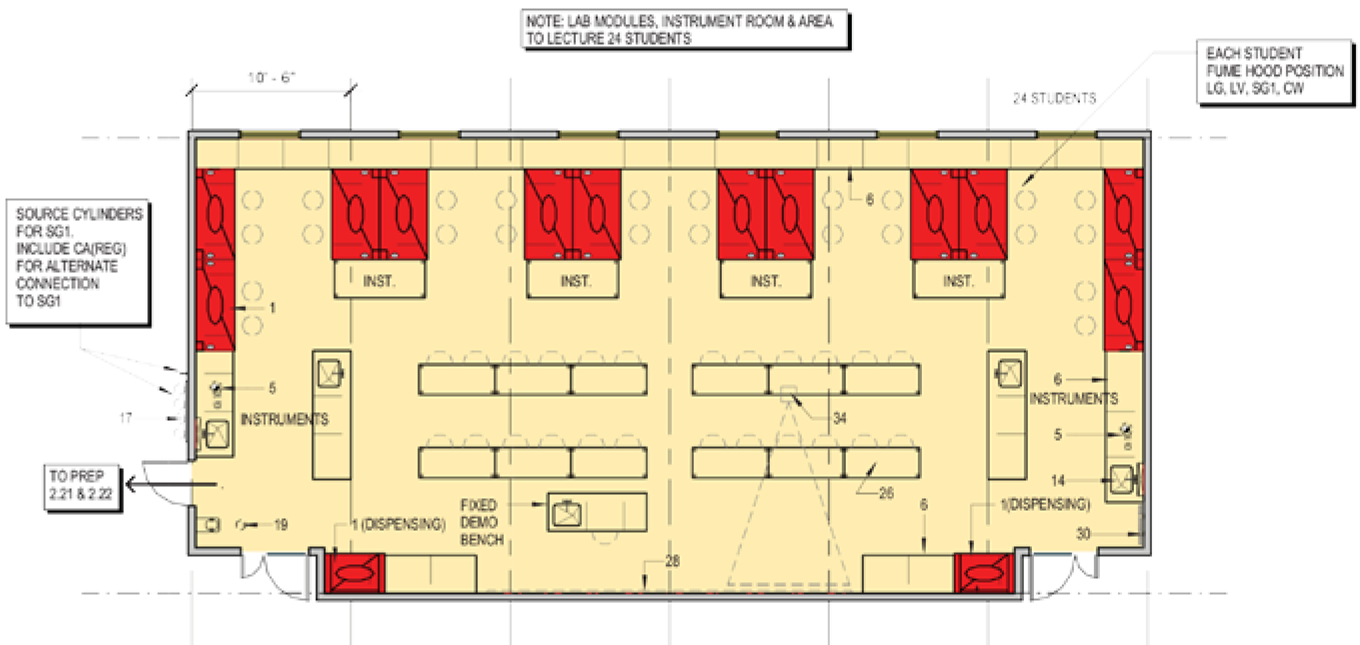
Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

2.02 ORGANIC CHEMISTRY TEACHING LAB

Area	1,890 sf
Quantity	1
Function	Organic chemistry lecture and teaching laboratory
Occupants	24 students, 1-2 faculty
Adjacency	Near general chemistry teaching lab and chemistry storage room
Floor	Chemical resistant, laboratory resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and operable 1'-0" leaf
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC.60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy and photocell sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.



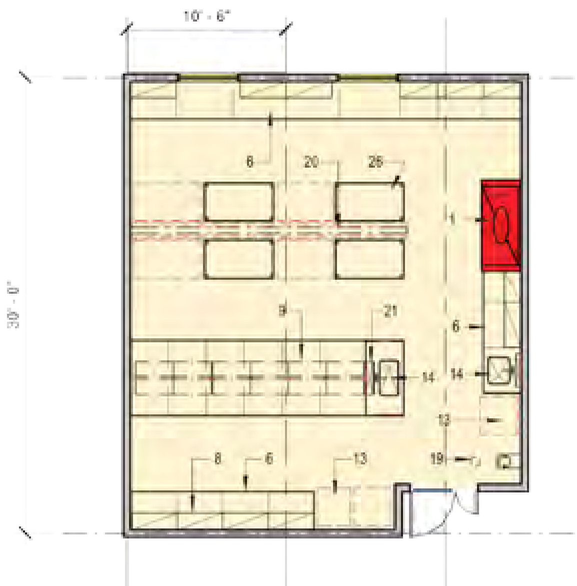


Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

2.03 RESEARCH LAB

Area	798 sf
Quantity	1
Function	Chemistry research laboratory
Occupants	6-8 students, 1-2 faculty
Adjacency	Near chemistry teaching labs and prep rooms
Floor	Chemical resistant, laboratory resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and operable 1'-0" leaf
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC.60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy and photocell sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.

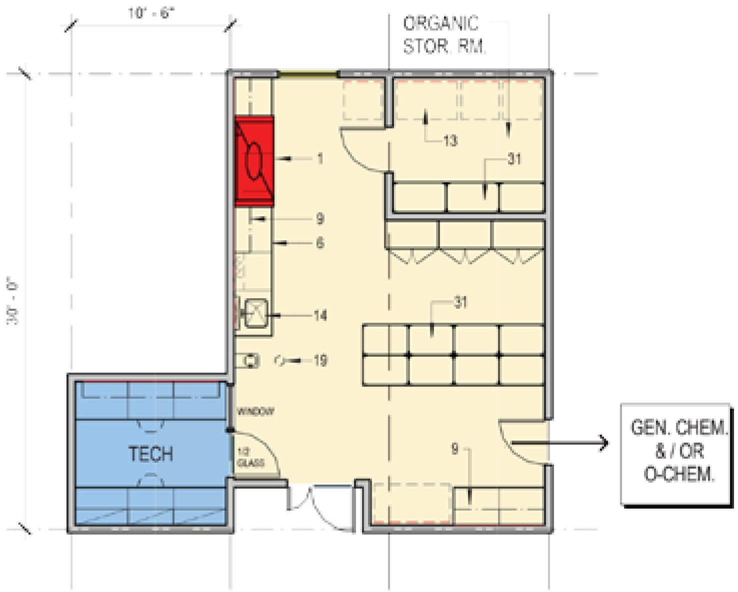


Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

2.10 CHEMISTRY PREP / STORAGE

Area	630 sf
Quantity	1
Function	Chemistry laboratory preparation and storage space, includes organic storage room
Occupants	1-2 faculty or staff
Adjacency	Directly accessible from the laboratory technician office, near organic and general chemistry teaching labs
Floor	Resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and 1'-0" operable leaf
Windows	N/A
Acoustics	STC 45 at walls
Mechanical	Shared thermal environment
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors
Equipment I Furniture	See room diagram for furnishings and equipment.



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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
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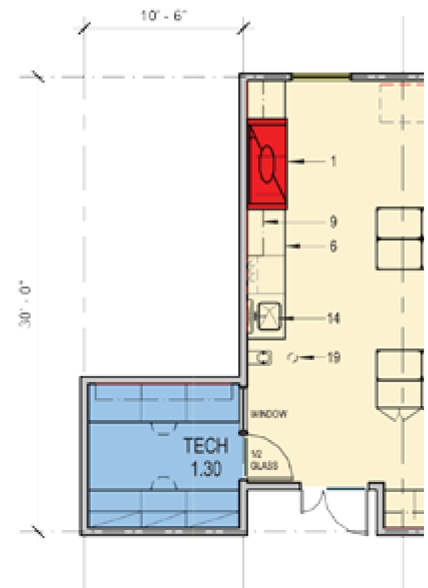
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

2.11 LAB TECH. OFFICE

Area	105 sf
Quantity	1
Function	Chemistry laboratory technician office
Occupants	1-2 staff
Adjacency	Directly accessible from the chemistry prep room
Floor	Resilient flooring
Wall	Painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite
Windows	As feasible
Acoustics	STC 45 at walls
Mechanical	Shared thermal environment
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	Power and data as needed for equipment and convenience outlets at the walls
Lighting	Overhead 30 footcandles at work surface with task lighting and occupancy sensors
Equipment I Furniture	• Millwork with work station(s) • Upper cabinets for storage • (2) task chairs • Glass white board

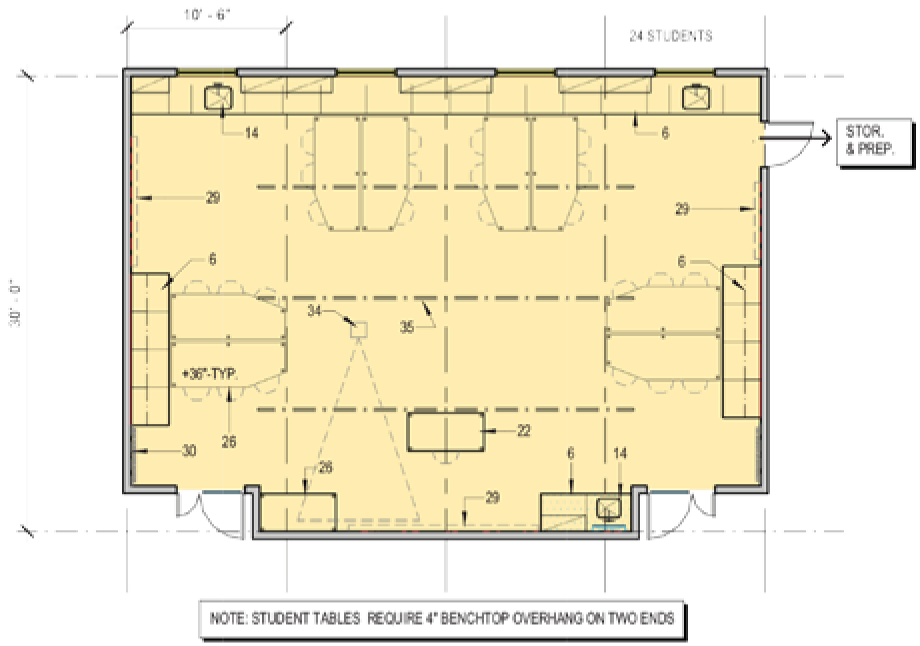


PHYSICS

Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Laboratory					
3.01	Physics Teaching Lab	1,260	1	1,260	
3.02	Planetarium				See shared Spaces 6.04
	Subtotal			1,260	
Laboratory Support					
3.10	Physics Storage / Prep	630	1	630	
	Subtotal			**630**	
	Total			1,890	

3.01 PHYSICS TEACHING LAB

Area	1,260 sf
Quantity	1
Function	Physics teaching laboratory
Occupants	24 students, 1-2 faculty
Adjacency	Directly adjacent to physics storage and prep room
Floor	Resilient flooring
Wall	Painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling, unistrut structure for experimentation
Doors	3'-0" Wood with lite and operable 1'-0" leaf
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC.60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy and photocell sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.



Furnishings

1. chemical fume hood
2. biological safety cabinet
3. radioisotope hood
4. vented workstation
5. snorkel exhaust
6. laboratory bench, standing height
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27. wire shelving
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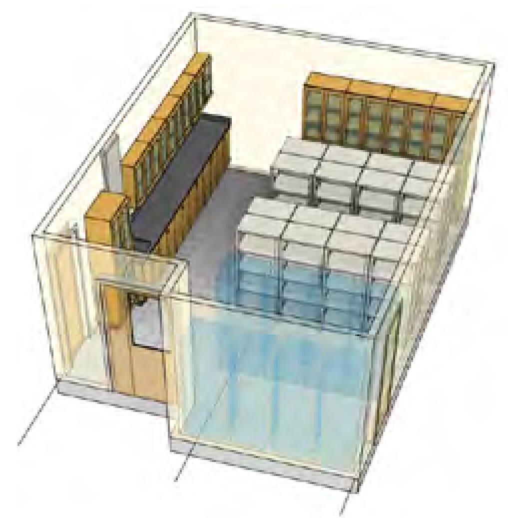
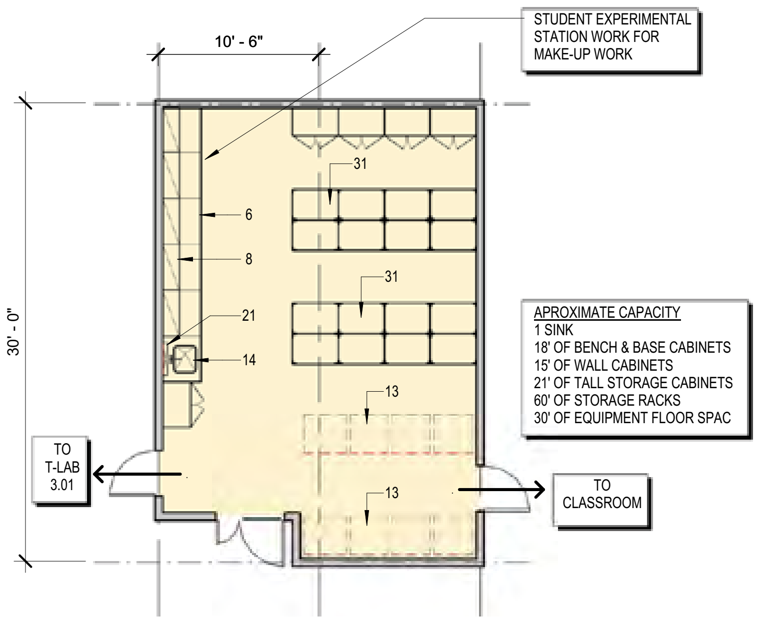
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

3.10 PHYSICS STORAGE AND PREP

Area	630 sf
Quantity	1
Function	Physics laboratory preparation and storage space
Occupants	1-2 faculty or staff
Adjacency	Directly accessible from the physics teaching lab
Floor	Resilient flooring
Wall	Painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and 1'-0" operable leaf
Windows	N/A
Acoustics	STC 45 at walls
Mechanical	Shared thermal environment
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors
Equipment I Furniture	See room diagram for furnishings and equipment.





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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

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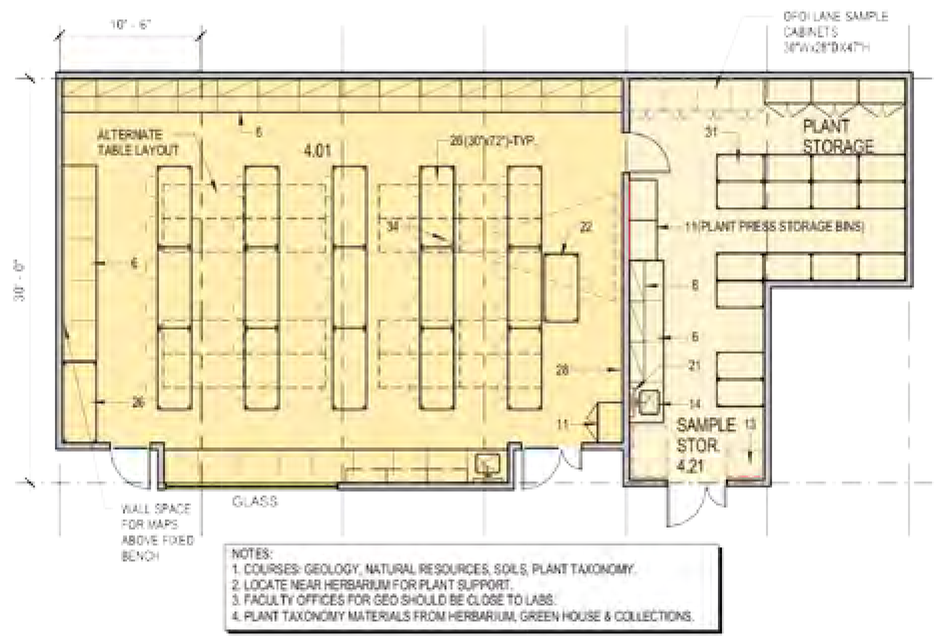
GEOLOGY

Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Laboratory					
4.01	Geology Teaching Lab	1,260	1	1,260	
	Subtotal			**1,260**	
Laboratory Support					
4.10	Geology Sample Storage	315	1	315	
4.11	Plant & Soil Science Storage	158	1	158	
4.12	Rock / Sample Prep	210	1	210	
	Field Equipment Wash-Off / Storage				Shared with Biology 1.15
	Subtotal			**683**	
	Total			**1,943**	

4.01 GEOLOGY TEACHING LAB

Area	1,260 sf
Quantity	1
Function	Geology and natural resources teaching laboratory
Occupants	30 students, 1-2 faculty
Adjacency	Directly adjacent to sample storage and plant storage
Floor	Resilient flooring
Wall	Epoxy painted gypsum board, operable partition between teaching labs to allow for 48 student lectures
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and operable 1'-0" leaf
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC.60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy and photocell sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.

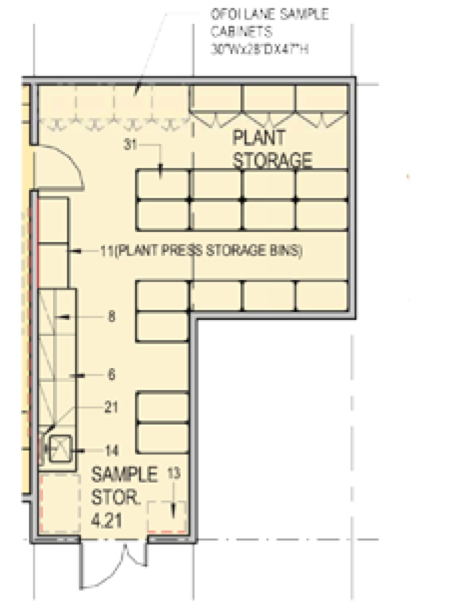


Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

4.10 GEOLOGY SAMPLE STORAGE

Area	315 sf
Quantity	1
Function	Geology sample storage space
Occupants	1-2 faculty or staff
Adjacency	Directly accessible from the geology teaching lab
Floor	Resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and 1'-0" operable leaf
Windows	N/A
Acoustics	STC 45 at walls
Mechanical	Shared thermal environment
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors
Equipment I Furniture	See room diagram for furnishings and equipment.



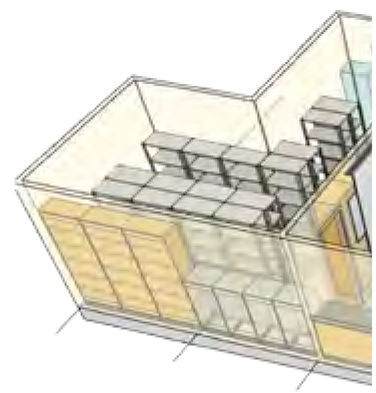
NOTES:
1. COURSES: GEOLOGY, NATURAL RESOURCES, SOILS, PLANT TAXONOMY.
2. LOCATE NEAR HERBARIUM FOR PLANT SUPPORT.
3. FACULTY OFFICES FOR GEO SHOULD BE CLOSE TO LABS.
4. PLANT TAXONOMY MATERIALS FROM HERBARIUM, GREEN HOUSE & COLLECTIONS.

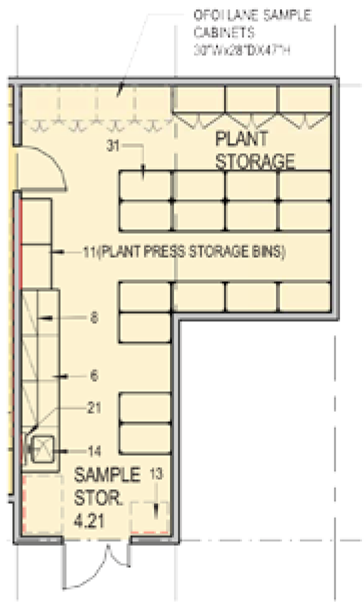
Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

4.11 PLANT & SOIL SCIENCE STORAGE

Area	158 sf
Quantity	1
Function	Plant storage space
Occupants	1-2 faculty or staff
Adjacency	Directly accessible from the geology teaching lab
Floor	Resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10’-0”, suspended acoustic ceiling
Doors	3’-0” Wood with lite and 1’-0” operable leaf
Windows	N/A
Acoustics	STC 45 at walls
Mechanical	Shared thermal environment
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors
Equipment I Furniture	See room diagram for furnishings and equipment.





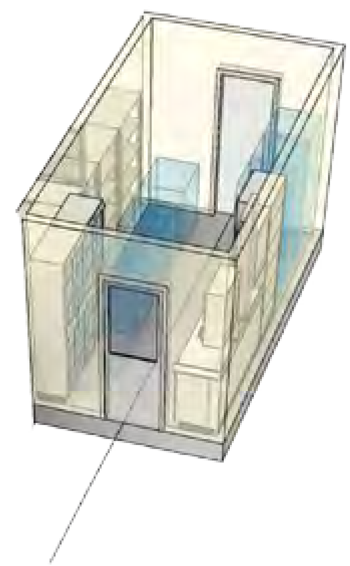
NOTES:
1. COURSES: GEOLOGY, NATURAL RESOURCES, SOILS, PLANT TAXONOMY.
2. LOCATE NEAR HERBARIUM FOR PLANT SUPPORT.
3. FACULTY OFFICES FOR GEO SHOULD BE CLOSE TO LABS.
4. PLANT TAXONOMY MATERIALS FROM HERBARIUM, GREEN HOUSE & COLLECTIONS.

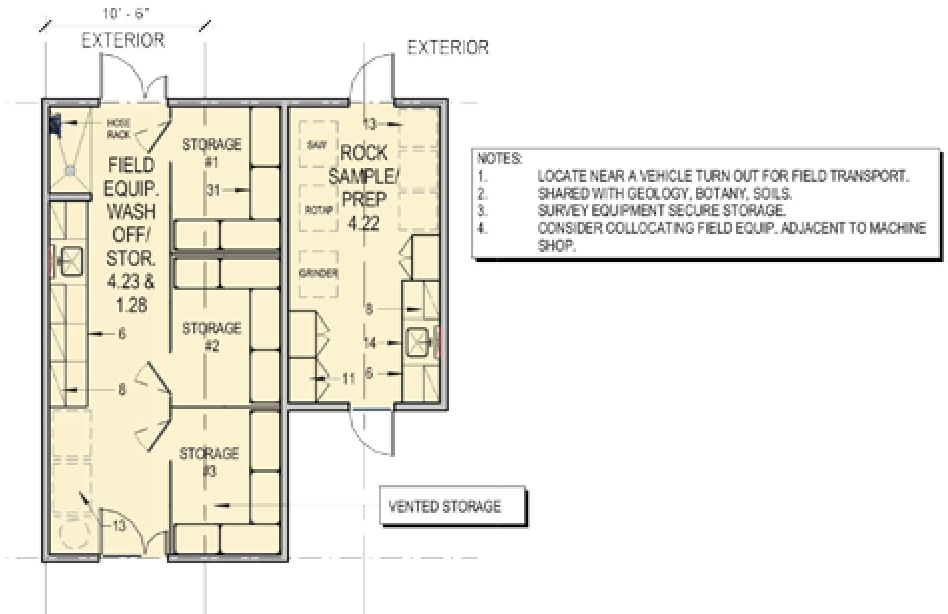
Furnishings

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

4.12 ROCK / SAMPLE PREP

Area	210 sf
Quantity	1
Function	Geology rock sample prep room
Occupants	1-2 faculty or staff
Adjacency	Directly accessible from the geology teaching lab
Floor	Resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and 1'-0" operable leaf
Windows	N/A
Acoustics	STC 45 at walls
Mechanical	Shared thermal environment
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors
Equipment I Furniture	See room diagram for furnishings and equipment.





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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

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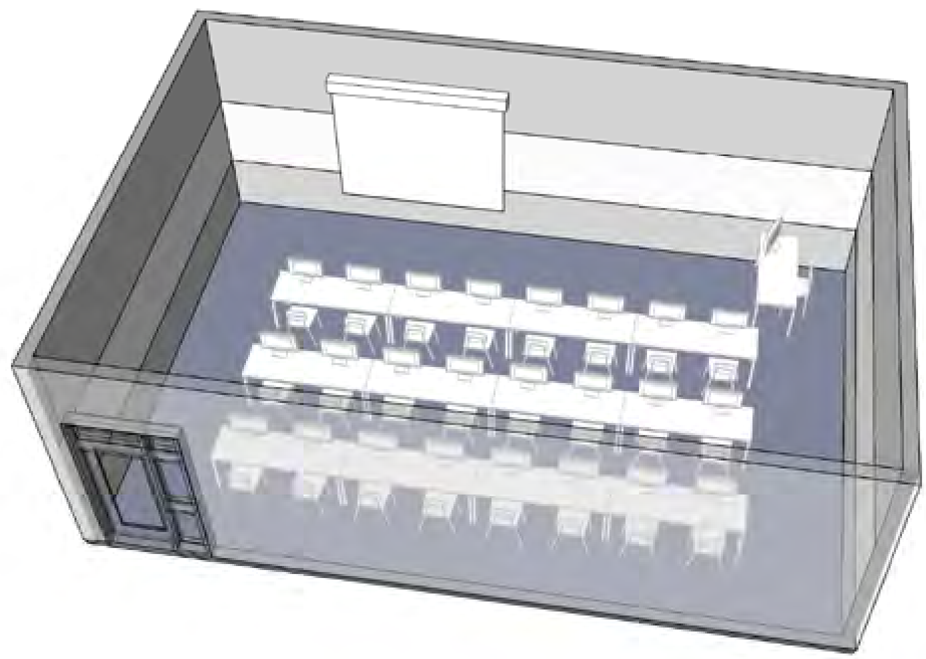
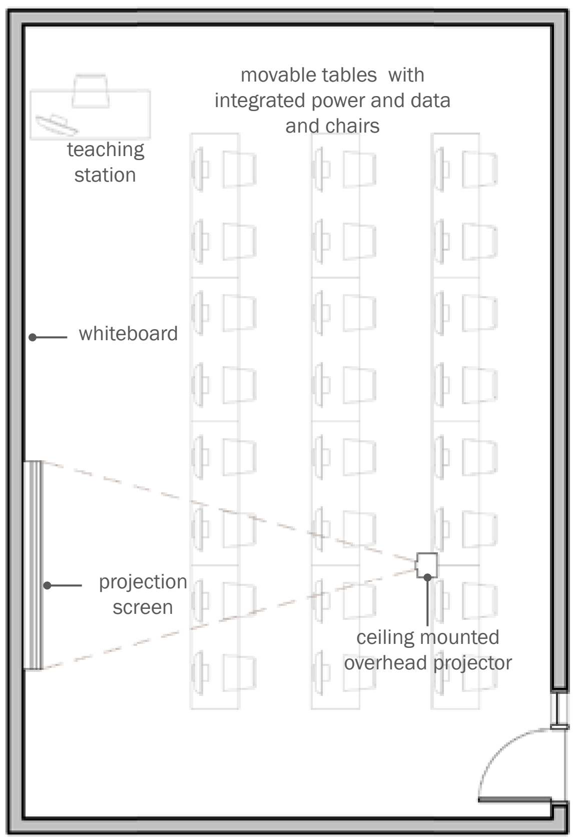
ENGINEERING & COMPUTER SCIENCE

Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Laboratory					
5.01	Computer Science Teaching Lab	725	1	725	
5.02	Engineering Computer Lab	725	1	725	
	Subtotal			**1,410**	
Laboratory Support					
5.10	Equipment and Project Lab (Shop)	630	1	630	
	Subtotal			**630**	
	Total			**2,040**	

5.01 COMPUTER SCIENCE TEACHING LAB

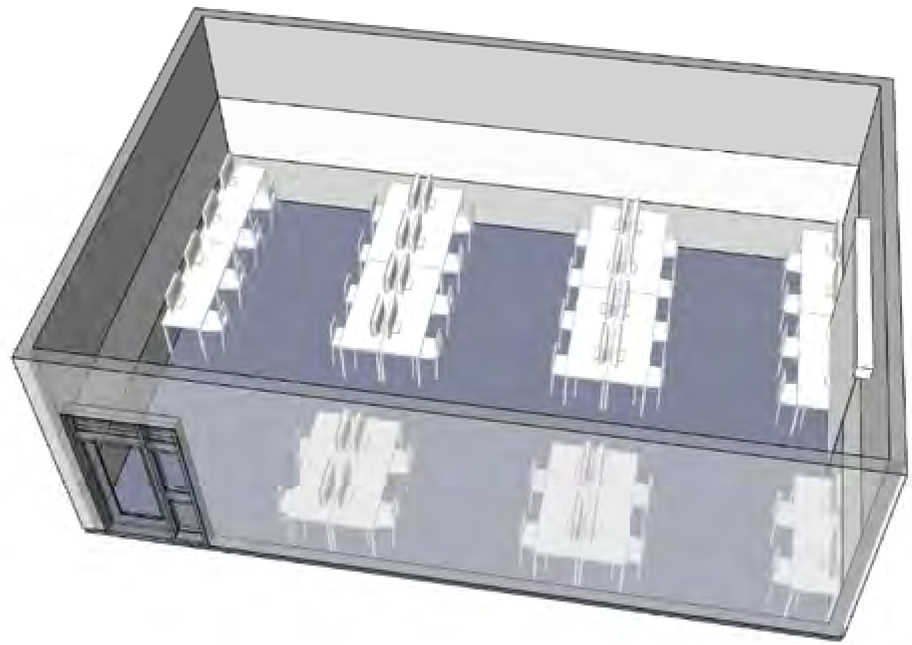
Area	725
Quantity	1
Function	Computer science teaching lab
Occupants	24 students 1-2 teachers
Adjacency	Adjacent to the engineering computer teaching lab
Floor	Carpet
Wall	Painted gypsum board
Ceiling	10’-0”, Suspended acoustic ceiling
Doors	Wood with lite
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC .60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	N/A
Electrical I AV I IT	As needed for computers and equipment.
Lighting	Overhead 50 footcandles at work surface with occupancy and photocell sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.

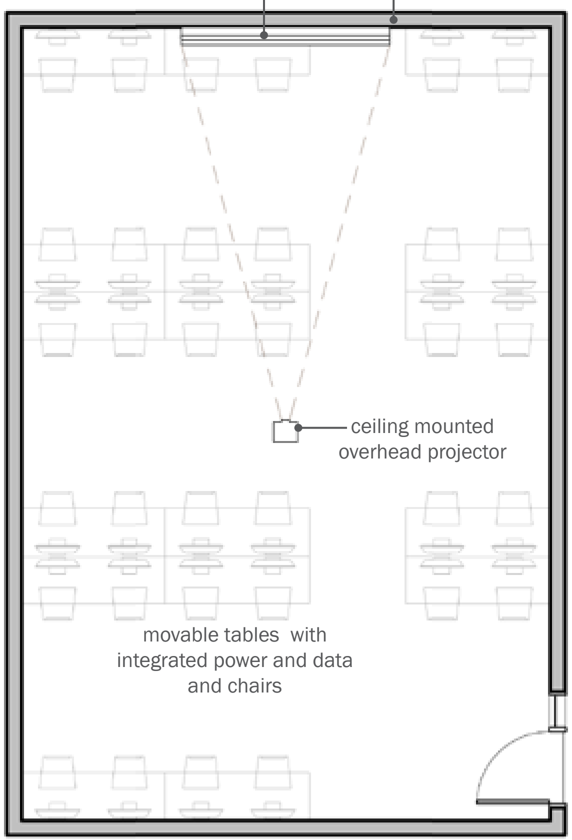



movable tables with
integrated power and data
and chairs
teaching
station
whiteboard
projection
screen
ceiling mounted
overhead projector

5.02 ENGINEERING COMPUTER LAB

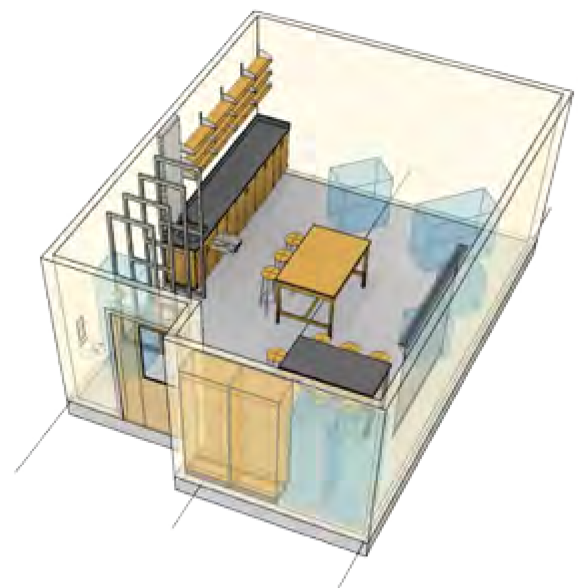
Area	725
Quantity	1
Function	Engineering computer lab and individual student work lab
Occupants	30 students 1-2 teachers
Adjacency	Adjacent to computer science teaching lab
Floor	Carpet
Wall	Painted gypsum board
Ceiling	10'-0", Suspended acoustic ceiling
Doors	Wood with lite
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC .60 min. at ceiling
Mechanical	Individual thermostat
Plumbing	N/A
Electrical I AV I IT	As needed for computers and equipment.
Lighting	Overhead 50 footcandles at work surface with occupancy and photocell sensors.
Equipment I Furniture	See room diagram for furnishings and equipment.

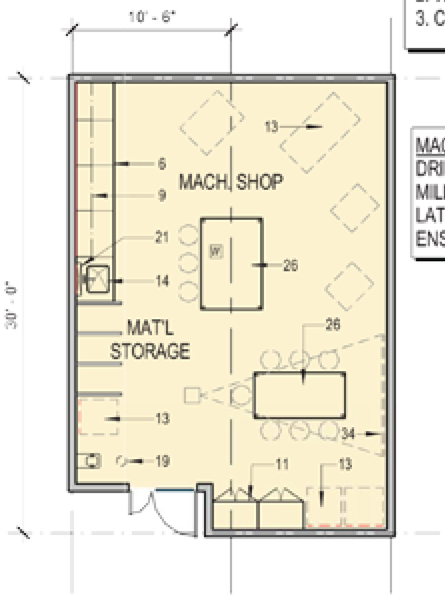



projection screen
whiteboard
ceiling mounted overhead projector
movable tables with integrated power and data and chairs

5.10 EQUIPMENT AND PROJECT LAB (SHOP)

Area	630 sf
Quantity	1
Function	Engineering lab, bust-em space and shop
Occupants	10-12 students and 1 faculty or staff
Adjacency	Near the engineering computer lab and physics teaching lab
Floor	Resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10'-0", suspended acoustic ceiling
Doors	3'-0" Wood with lite and 1'-0" operable leaf
Windows	N/A
Acoustics	STC 45 at walls
Mechanical	Shared thermal environment
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors
Equipment I Furniture	See room diagram for furnishings and equipment.





NOTES:
1. CONSIDER ADJACENCY TO PHYSICS / ENGINEERING LAB.
2. WORK IN A TEACHING AREA IN THIS LAB.
3. COULD BASE THE SURVEY LAB FROM HERE.

MACHINE SHOP EQUIPMENT:
DRILL PRESS
MILL
LATHE
ENSTRON TESTER

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 wall shelves
10. island bench shelves
11. tall storage cabinet
12. flammable storage cabinet
13. equipment space
14. laboratory sink
15. cupsink
16. processing sink
17. cylinder rack
18. gas cabinet
19. safety shower/eyewash
20. overhead service carrier
21. pipe drop enclosure
22. movable demonstration bench
23. glassware washer
24. glassware dryer
25. autoclave
26. movable laboratory table
27. wire shelving
28. white markerboard
29. black chalkboard
30. coat rack
31. open industrial metal shelving units
32. balance table
33. writing table
34. multi-media projector (ceiling mount) & a/v screen
35. overhead unistrut rails

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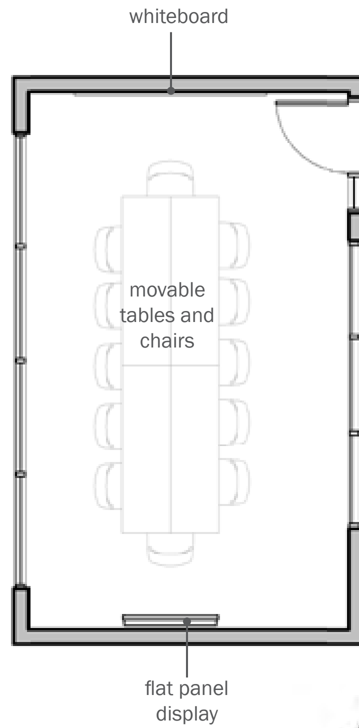
SHARED SPACES

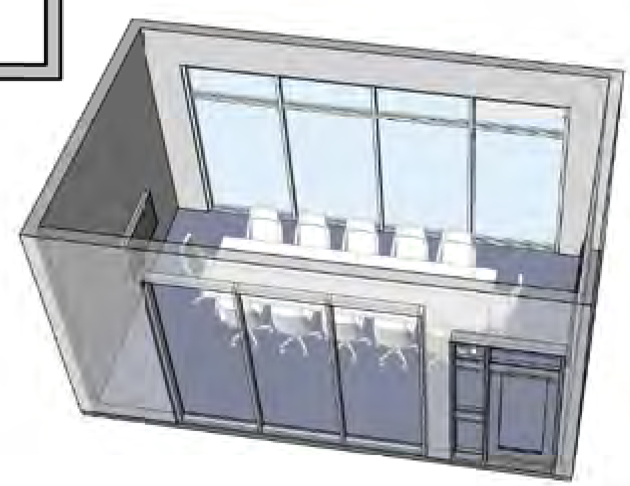
Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Classrooms					
6.01	Seminar Room - Small	300	1	300	
6.02	Seminar Room - Medium	450	1	450	
6.03	Classroom	500	5	2,500	2 adjacent classrooms with operable partition to allow 48 student lecture
6.04	Distance Education Classroom	500	3	1,500	2 adjacent classrooms with operable partition to allow 48 student lecture
6.05	Planetarium / Classroom	870	1	870	
	Subtotal			**5,620**	
Administration					
6.10	Faculty Office - Biology	120	9	1,080	
6.11	Faculty Office - Chemistry	120	6	720	
6.12	Faculty Office - Physics	120	3	360	
6.13	Faculty Office - Geology	120	1	120	
6.14	Faculty Office - Engineering & Computer Science	120	3	360	
6.15	Faculty Office - Math	120	7	840	
6.16	Faculty Work Room	350	1	350	
6.17	Faculty Reading Room	250	1	250	
	Subtotal			**4,080**	

Space Designation	Space Name	Area	Quantity	Total NSF	Notes
Student Study					
6.20	Student Study Area	600	1	600	
6.21	Kitchenette	100	1	100	
6.22	Engineering Commons / Lockers	300	1	300	
	Subtotal			**1,000**	
Building Support					
6.30	Lobby	2,000	1	2,000	
6.31	Receiving & Cylinder Storage	315	1	315	
6.32	Mechanical / Electrical	1,500	1	1,500	
	Subtotal			**3,815**	
	Total			**14,515**	

6.01 SEMINAR ROOM - SMALL

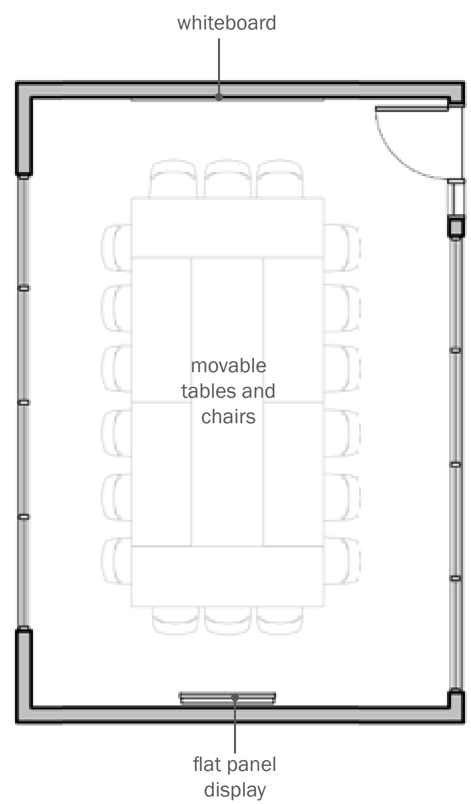
Area	300 SF
Quantity	1
Function	Small seminar room
Occupants	10-12 students and faculty
Adjacency	Central circulation
Floor	Carpet
Wall	Gypsum board
Ceiling	10' high, suspended acoustic ceiling with gypsum soffit
Doors	Wood with lite
Windows	Exterior window with interior shades, black-out shades for presentations,
Acoustics	STC 55 at walls, NRC .60 at ceiling
Mechanical	Thermostat w/ range 68-76 degrees
Plumbing	N/A
Electrical I AV I IT	Electrical and IT at floor for flexible space layout
Lighting	Variable scenes for presentation or work modes, occupancy sensor, daylight sensors as needed.
Equipment I Furniture	• Movable tables and 12 chairs • Flat panel display • White board • Video conference capability

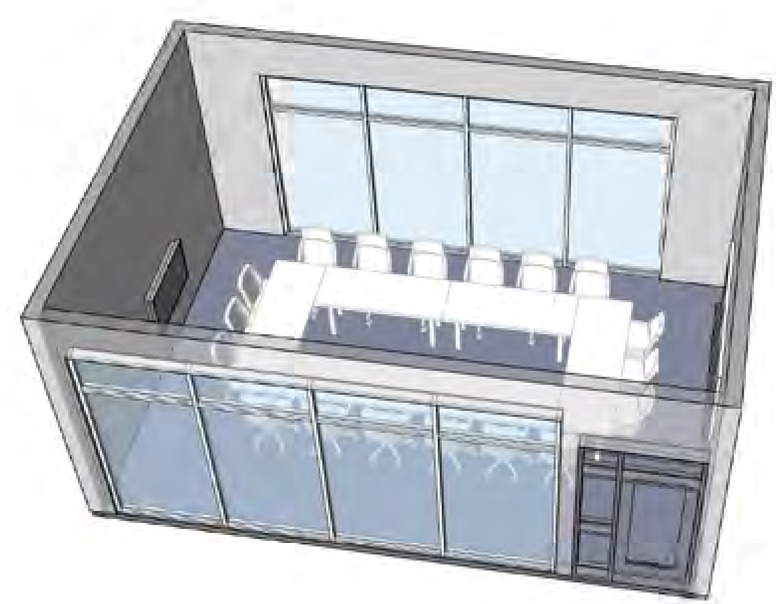




6.02 SEMINAR ROOM - MEDIUM

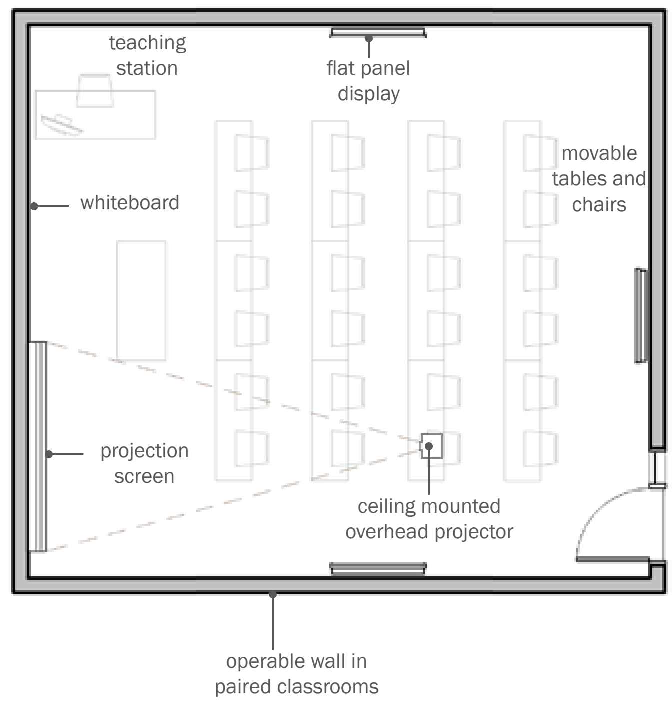
Area	450 sf
Quantity	1
Function	Small seminar room
Occupants	18-20 students and faculty
Adjacency	Central circulation
Floor	Carpet
Wall	Gypsum board
Ceiling	10' high, suspended acoustic ceiling with gypsum soffit
Doors	Wood with lite
Windows	Exterior window with interior shades, black-out shades for presentations,
Acoustics	STC 55 at walls, NRC .60 at ceiling
Mechanical	Thermostat w/ range 68-76 degrees
Plumbing	N/A
Electrical I AV I IT	Electrical and IT at floor for flexible space layout
Lighting	Variable scenes for presentation or work modes, occupancy sensor, daylight sensors as needed.
Equipment I Furniture	• Movable tables and 20 chairs • Flat panel display • White board • Video conference capability

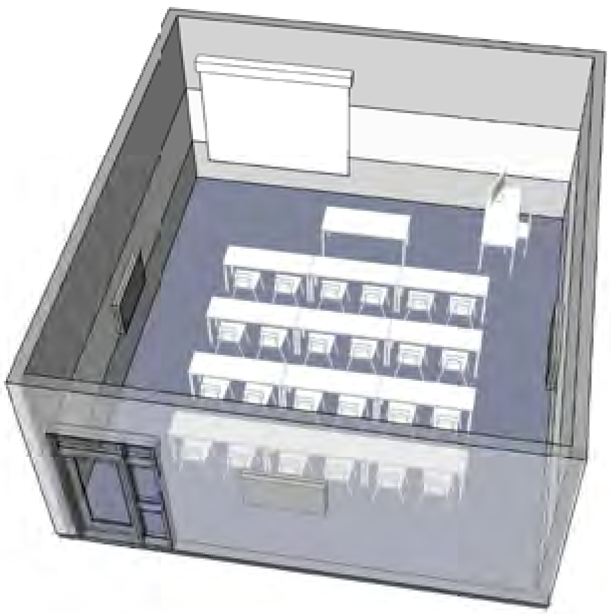


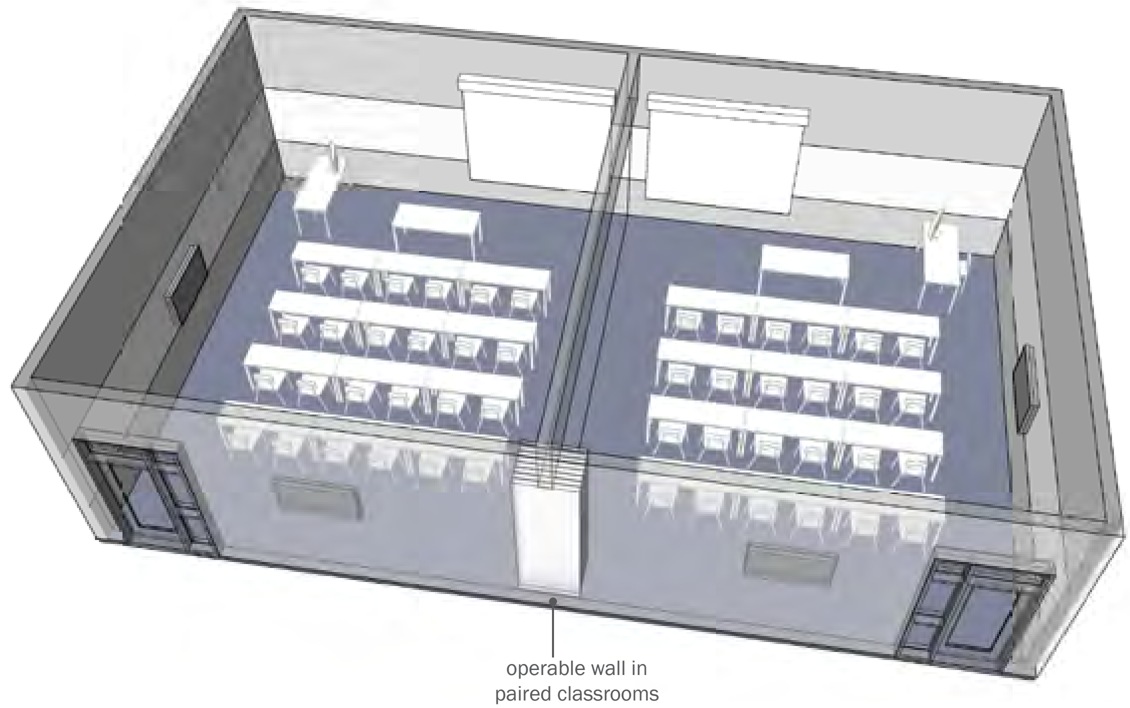


6.03 CLASSROOM

Area	500 sf
Quantity	5 (3 individual classrooms and 1 set of paired classrooms)
Function	General use classroom
Occupants	24 students, 1 faculty
Adjacency	Adjacent to other classrooms, near offices and student study spaces
Floor	Carpet
Wall	Painted gypsum board, operable wall in paired classroom configuration
Ceiling	10' high, suspended acoustic ceiling
Doors	Wood with center lite and sidelite
Windows	Exterior window with roller shades, interior window to computational lab
Acoustics	STC 55 at walls, NRC .60 at ceiling
Mechanical	Thermostat w/ range 68-76 degrees
Plumbing	N/A
Electrical I AV I IT	Power and data to all computer work stations, integrated into furniture. Conduit for future distance education equipment integration.
Lighting	Overhead lighting at 40-45 footcandles with photocell sensors and vacancy sensor
Equipment I Furniture	• Movable tables and chairs for 25 students • White boards • Projection screen • Overhead projector • Flat panel displays • Integrated teaching station with A/V and IT

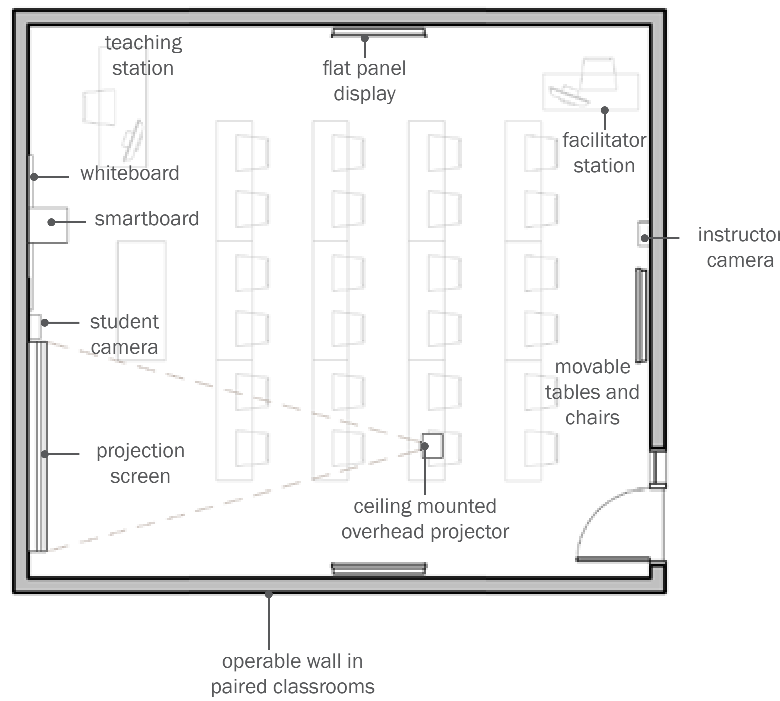


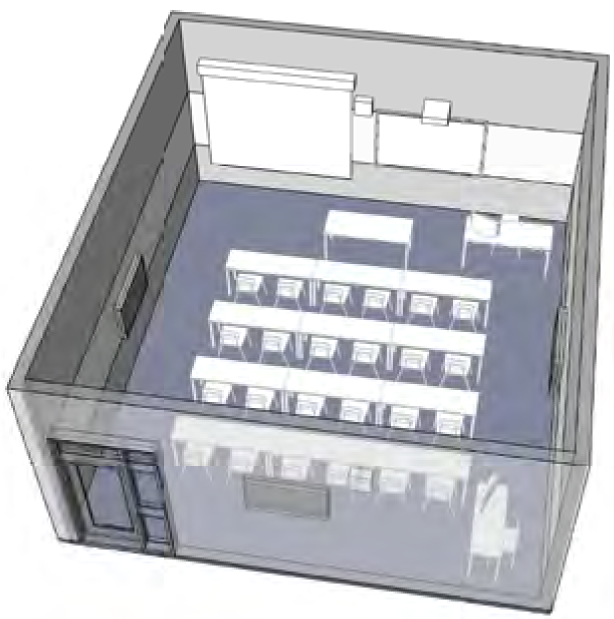



operable wall in
paired classrooms

6.04 DISTANCE EDUCATION CLASSROOM

Area	500 sf
Quantity	3 (1 individual classrooms and 1 set of paired classrooms)
Function	General use, distance education enabled classroom
Occupants	24 students, 1 faculty
Adjacency	Adjacent to other classrooms, near offices and student study spaces
Floor	Carpet
Wall	Painted gypsum board with special attention to wall coloring for distance education, operable wall in paired classroom configuration
Ceiling	10' high, suspended acoustic ceiling
Doors	Wood with center lite and sidelite
Windows	Exterior window with roller shades, interior window to computational lab
Acoustics	STC 55 at walls, NRC .60 at ceiling
Mechanical	Thermostat w/ range 68-76 degrees
Plumbing	N/A
Electrical I AV I IT	Power and data to all computer work stations, integrated into furniture. A/V and IT for distance education equipment. Ceiling integrated microphones and speakers
Lighting	Overhead lighting at 40-45 footcandles with photocell sensors and vacancy sensor
Equipment I Furniture	• Movable tables and chairs for 25 students • White boards • Smartboard • Overhead projector • Flat panel displays • Integrated teaching station with A/V and IT

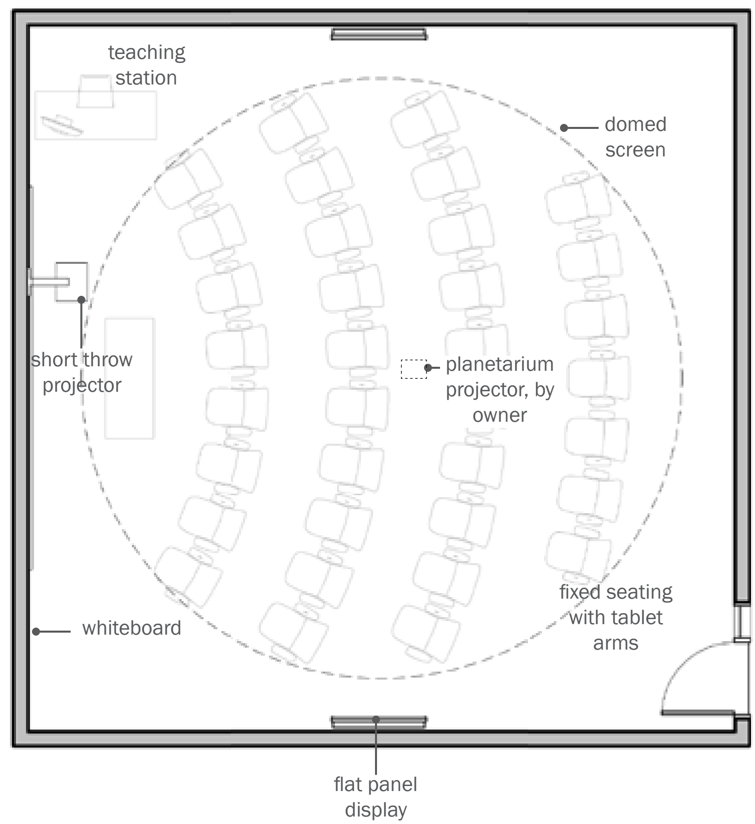


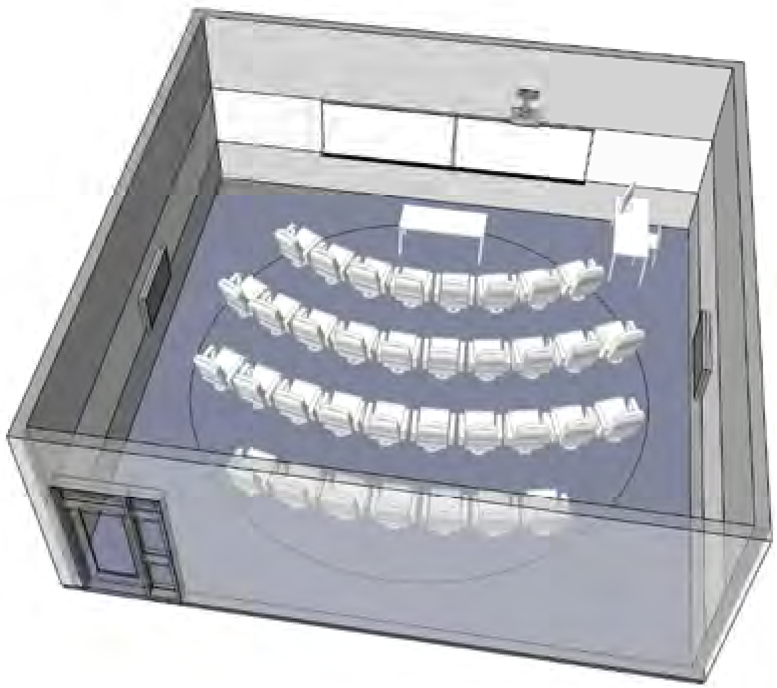



operable wall in
paired classrooms

6.05 PLANETARIUM / CLASSROOM

Area	870 sf
Quantity	1
Function	Planetarium and general use classroom
Occupants	35 students, 1-2 faculty
Adjacency	Adjacent to other classrooms, near offices and student study space
Floor	Carpet
Wall	Gypsum board
Ceiling	Domed gypsum board
Doors	Wood with center lite and sidelite
Windows	Exterior window with roller shades, interior window to computational lab
Acoustics	STC 55 at walls, NRC .60 at ceiling
Mechanical	Thermostat w/ range 68-76 degrees
Plumbing	N/A
Electrical | AV | IT	Power and data to all computer work stations, integrated into furniture. A/V and IT infrastructure as needed for planetarium projector to be provided by owner.
Lighting	Overhead lighting at 40-45 footcandles with photocell sensors and vacancy sensor
Equipment | Furniture	• Fixed seating with tablet arms for 35 • Short throw projector for general instruction • Domed screen and projector to be provided by owner • Flat panel displays at sides of the



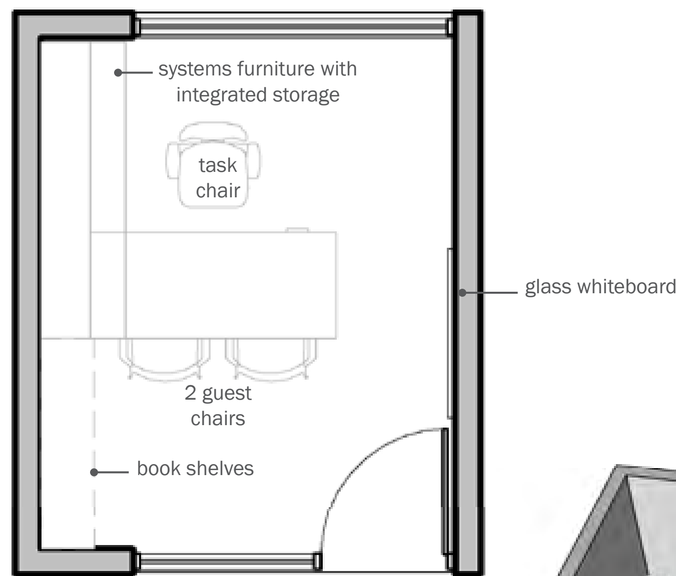


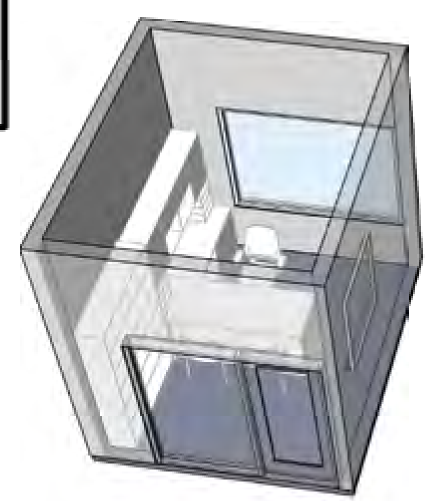
6.10 FACULTY OFFICE - BIOLOGY

Area	120 SF
Quantity	9
Function	Future faculty offices
Occupants	1 FTE, 2 visitors
Adjacency	Near student study areas, faculty workroom
Floor	Carpet
Wall	Gypsum board
Ceiling	10' high, suspended acoustic ceiling
Doors	Wood
Windows	Exterior window with roller shades, interior glass partition at 3'-0" above finished floor.
Acoustics	STC 50 at walls, NRC .60 at ceiling
Mechanical	Thermostat w/ range 68-76 degrees
Plumbing	N/A
Electrical | AV | IT	Electrical and IT as needed for equipment Convenience outlets at walls
Lighting	Overhead 30 footcandles with occupancy sensor, task lighting at work surface.

Equipment | Furniture

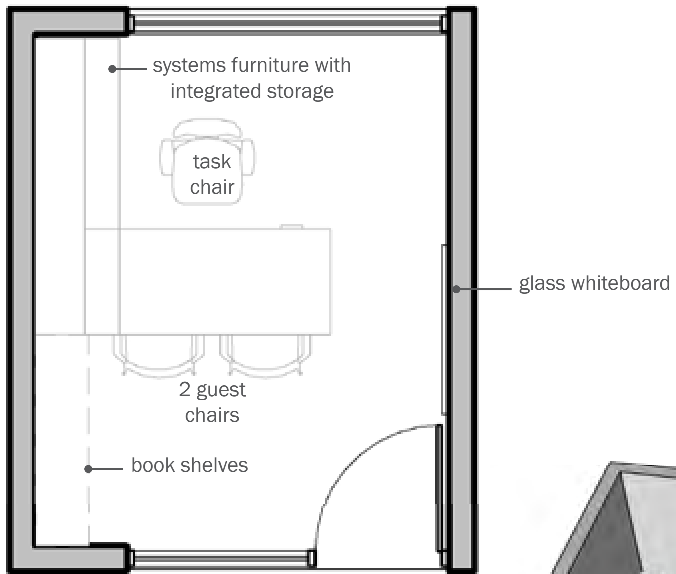
- office desk
- task chair
- computer & printer
- 2 visitor chairs
- glass white board
- bookshelves

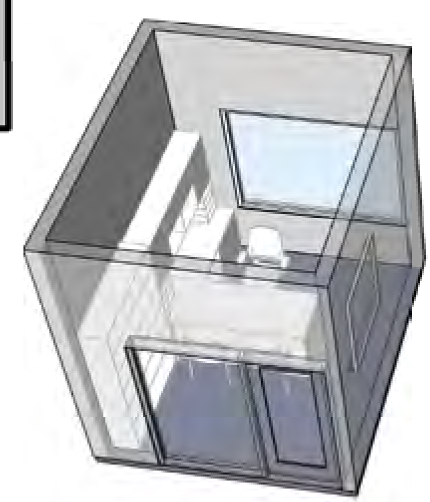




6.11 FACULTY OFFICE -CHEMISTRY

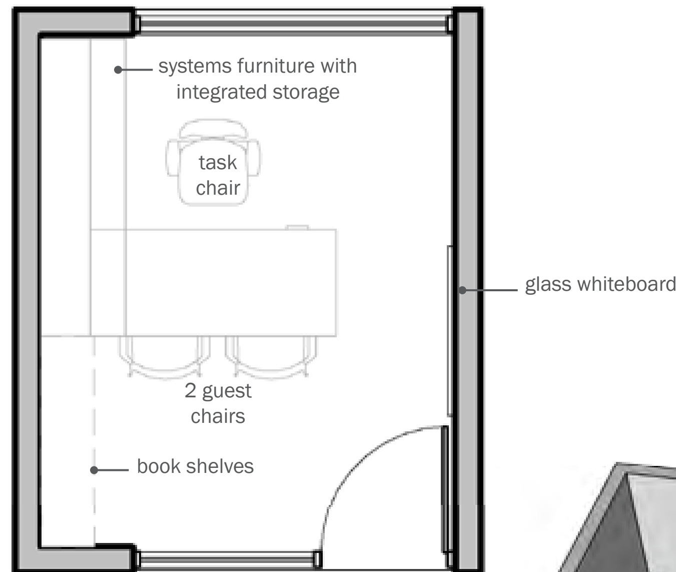
Area	120 SF
Quantity	6
Function	Future faculty offices
Occupants	1 FTE, 2 visitors
Adjacency	Near student study areas, faculty workroom
Floor	Carpet
Wall	Gypsum board
Ceiling	10' high, suspended acoustic ceiling
Doors	Wood
Windows	Exterior window with roller shades, interior glass partition at 3'-0" above finished floor.
Acoustics	STC 50 at walls, NRC .60 at ceiling
Mechanical	Thermostat w/ range 68-76 degrees
Plumbing	N/A
Electrical I AV I IT	Electrical and IT as needed for equipment Convenience outlets at walls
Lighting	Overhead 30 footcandles with occupancy sensor, task lighting at work surface.
Equipment I Furniture	• office desk • task chair • computer & printer • 2 visitor chairs • glass white board • bookshelves

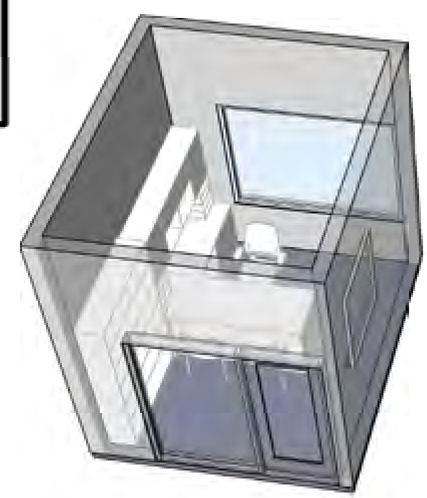




6.12 FACULTY OFFICE - PHYSICS

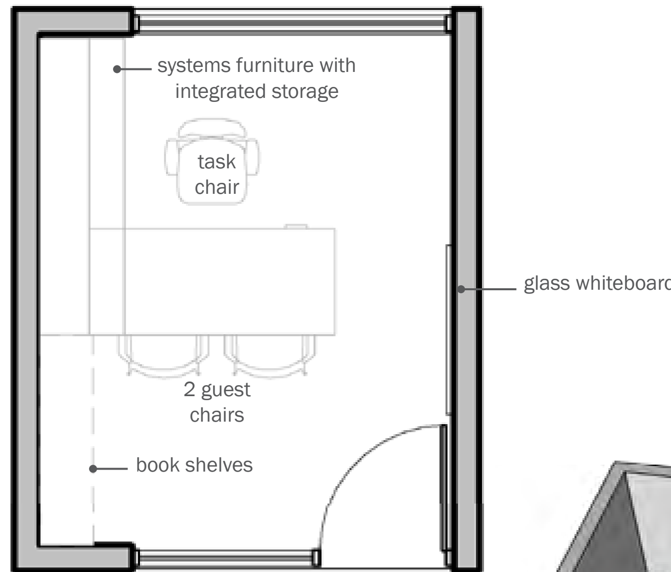
Area	120 SF
Quantity	3
Function	Future faculty offices
Occupants	1 FTE, 2 visitors
Adjacency	Near student study areas, faculty workroom
Floor	Carpet
Wall	Gypsum board
Ceiling	10' high, suspended acoustic ceiling
Doors	Wood
Windows	Exterior window with roller shades, interior glass partition at 3'-0" above finished floor.
Acoustics	STC 50 at walls, NRC .60 at ceiling
Mechanical	Thermostat w/ range 68-76 degrees
Plumbing	N/A
Electrical I AV I IT	Electrical and IT as needed for equipment Convenience outlets at walls
Lighting	Overhead 30 footcandles with occupancy sensor, task lighting at work surface.
Equipment I Furniture	• office desk • task chair • computer & printer • 2 visitor chairs • glass white board • bookshelves

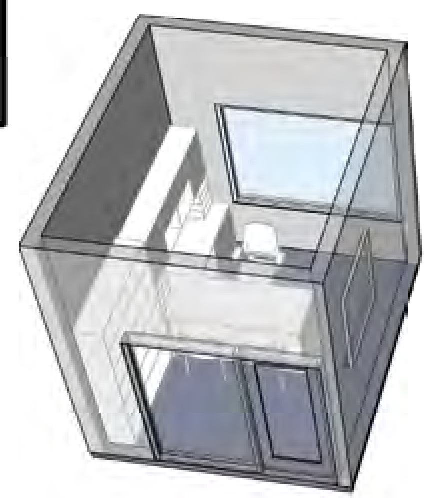




6.13 FACULTY OFFICE - GEOLOGY

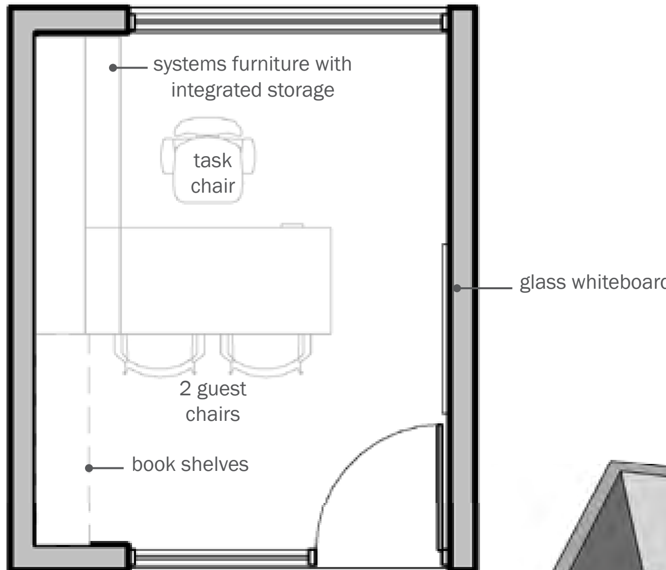
Area	120 SF
Quantity	1
Function	Future faculty offices
Occupants	1 FTE, 2 visitors
Adjacency	Near student study areas, faculty workroom
Floor	Carpet
Wall	Gypsum board
Ceiling	10' high, suspended acoustic ceiling
Doors	Wood
Windows	Exterior window with roller shades, interior glass partition at 3'-0" above finished floor.
Acoustics	STC 50 at walls, NRC .60 at ceiling
Mechanical	Thermostat w/ range 68-76 degrees
Plumbing	N/A
Electrical | AV | IT	Electrical and IT as needed for equipment Convenience outlets at walls
Lighting	Overhead 30 footcandles with occupancy sensor, task lighting at work surface.
Equipment | Furniture	• office desk • task chair • computer & printer • 2 visitor chairs • glass white board • bookshelves

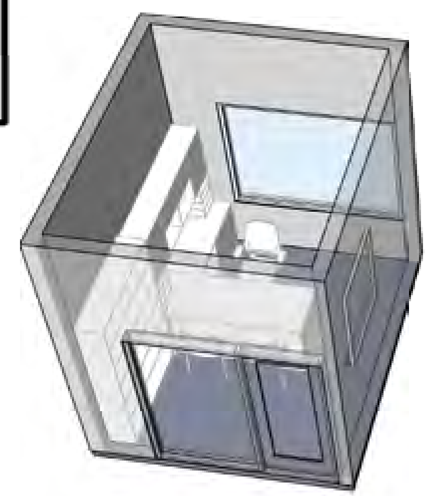




6.14 FACULTY OFFICE - ENGINEERING & COMPUTER SCIENCE

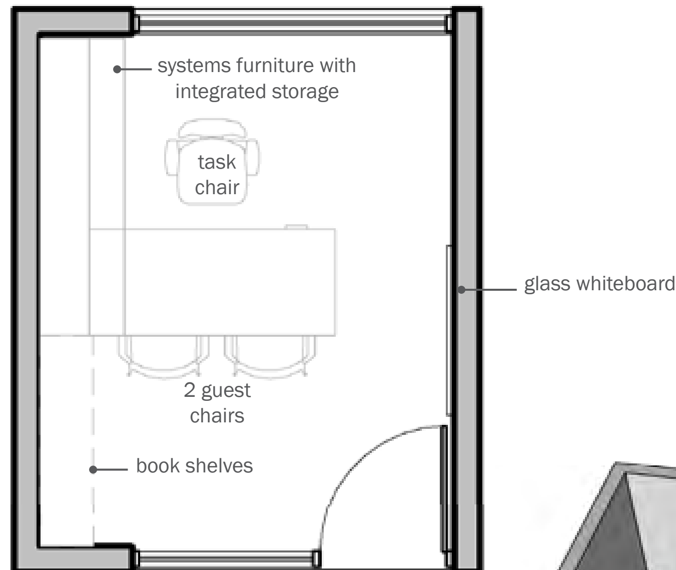
Area	120 SF
Quantity	3
Function	Future faculty offices
Occupants	1 FTE, 2 visitors
Adjacency	Near student study areas, faculty workroom
Floor	Carpet
Wall	Gypsum board
Ceiling	10' high, suspended acoustic ceiling
Doors	Wood
Windows	Exterior window with roller shades, interior glass partition at 3'-0" above finished floor.
Acoustics	STC 50 at walls, NRC .60 at ceiling
Mechanical	Thermostat w/ range 68-76 degrees
Plumbing	N/A
Electrical I AV I IT	Electrical and IT as needed for equipment Convenience outlets at walls
Lighting	Overhead 30 footcandles with occupancy sensor, task lighting at work surface.
Equipment I Furniture	• office desk • task chair • computer & printer • 2 visitor chairs • glass white board • bookshelves

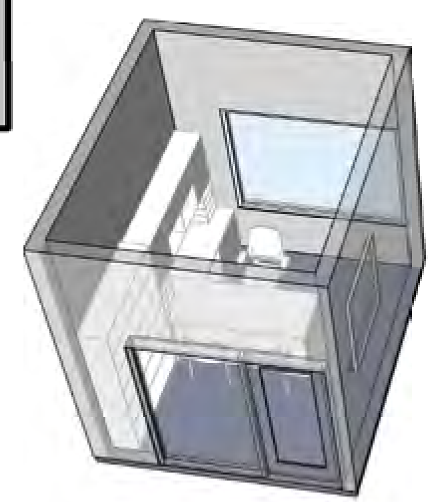




6.15 FACULTY OFFICE - MATH

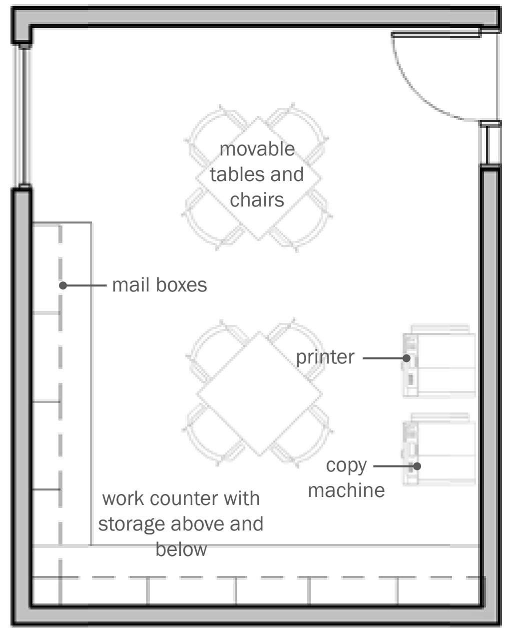
Area	120 SF
Quantity	7
Function	Future faculty offices
Occupants	1 FTE, 2 visitors
Adjacency	Near student study areas, faculty workroom
Floor	Carpet
Wall	Gypsum board
Ceiling	10' high, suspended acoustic ceiling
Doors	Wood
Windows	Exterior window with roller shades, interior glass partition at 3'-0" above finished floor.
Acoustics	STC 50 at walls, NRC .60 at ceiling
Mechanical	Thermostat w/ range 68-76 degrees
Plumbing	N/A
Electrical | AV | IT	Electrical and IT as needed for equipment Convenience outlets at walls
Lighting	Overhead 30 footcandles with occupancy sensor, task lighting at work surface.
Equipment | Furniture	• office desk • task chair • computer & printer • 2 visitor chairs • glass white board • bookshelves

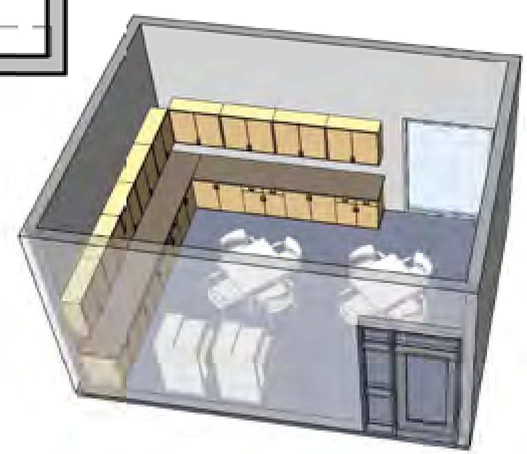




6.16 FACULTY WORK ROOM

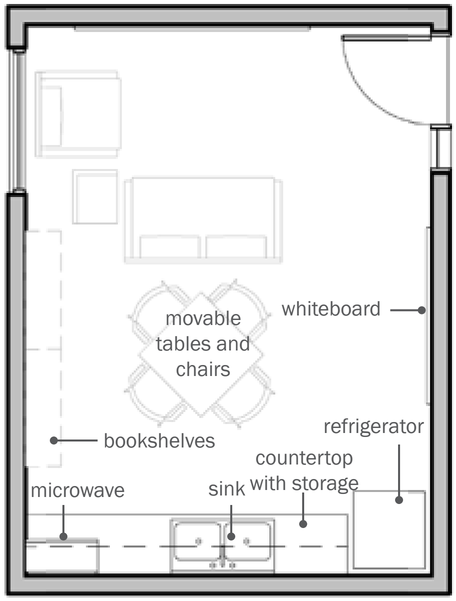
Area	350 SF
Quantity	1
Function	Administrative supply storage and workroom
Occupants	Up to 10 visitors
Adjacency	Department offices
Floor	Resilient Flooring
Wall	Painted gypsum board
Ceiling	10' high, suspended acoustic ceiling
Doors	Wood
Windows	As feasible
Acoustics	STC 45 at walls, NRC .60 at ceiling
Mechanical	Shared thermostat
Plumbing	N/A
Electrical I AV I IT	Electrical and IT as needed for equipment Convenience outlets at walls and floor for work tables
Lighting	Overhead with occupancy sensors, 40 footcandles
Equipment I Furniture	• Storage cabinets • Storage drawers • Copy machine (final location to be determined) • Printers as needed • Takable surface • Faculty mail boxes

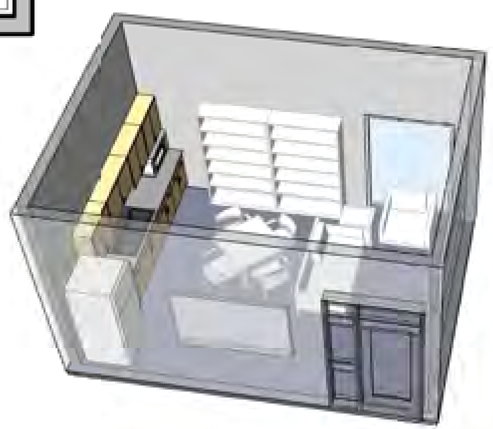




6.17 FACULTY READING ROOM

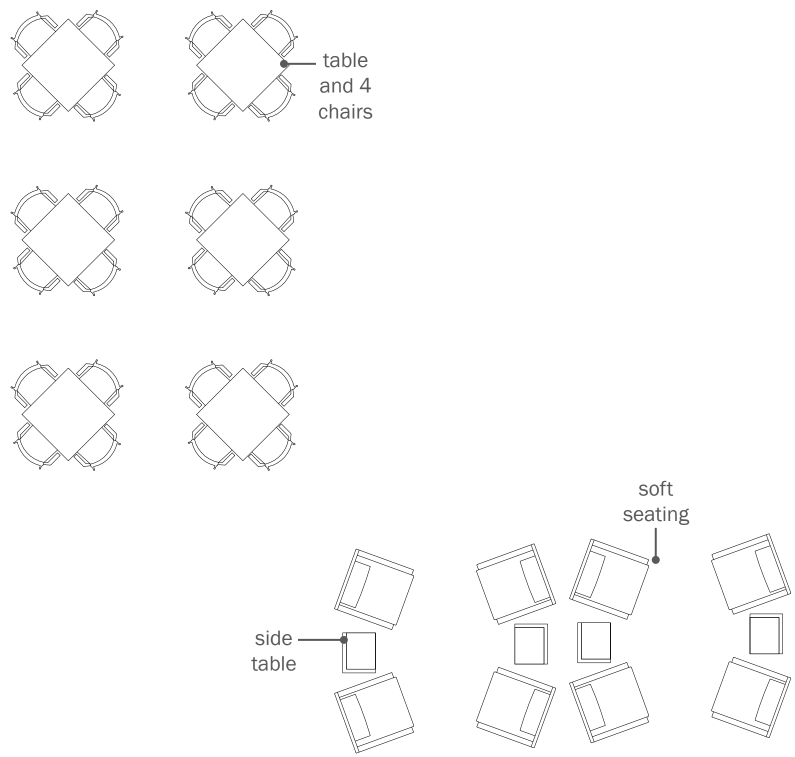
Area	250 sf
Quantity	1
Function	Faculty break, collaboration and reading room.
Occupants	Up to 8 visitors
Adjacency	Department offices and workroom
Floor	Carpet
Wall	Painted gypsum board
Ceiling	10' high, suspended acoustic ceiling
Doors	Wood
Windows	Exterior window with interior roller shades
Acoustics	STC 45 at walls, NRC .60 at ceiling
Mechanical	Shared thermostat
Plumbing	Kitchen sink and garbage disposal
Electrical I AV I IT	Power as needed for convenience and equipment
Lighting	Overhead lighting with occupancy sensors
Equipment I Furniture	• Base cabinets with sink • Refrigerator • Movable tables and chairs • Soft seating • Whiteboard • Bookshelves





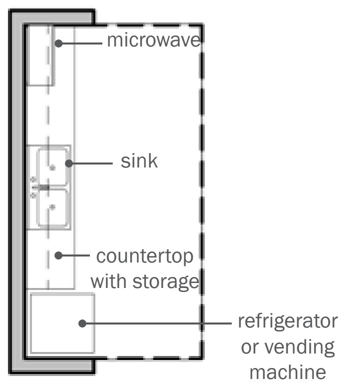
6.20 STUDENT STUDY AREA

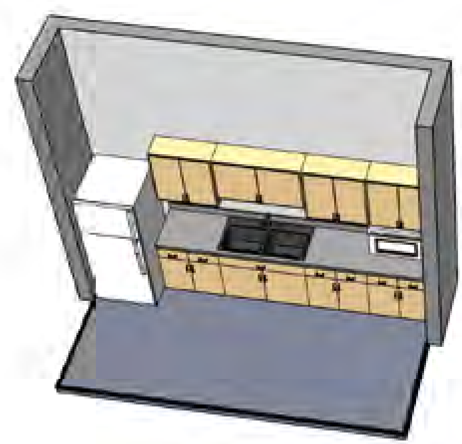
Area	600 sf
Quantity	1
Function	Large, central study and student collaboration area.
Occupants	24-36 students
Adjacency	Near the central circulation area and faculty offices. Convenient to laboratories and classrooms.
Floor	Tile or high quality flooring
Wall	Painted gypsum board and glass wall, as applicable
Ceiling	High ceiling space
Doors	N/A
Windows	Exterior daylight required
Acoustics	N/A
Mechanical	Shared thermal environment
Plumbing	N/a
Electrical I AV I IT	Convenience outlets at walls and in-floor near seating areas. Integrated power and usb ports for device charging at seating and study areas.
Lighting	Overhead lighting with daylight sensors
Equipment I Furniture	• Tables and chairs (charging stations integrated into tables and at perimeter walls) • Soft seating with low collaboration tables • Flat panel digital, informational display



6.21 KITCHENETTE

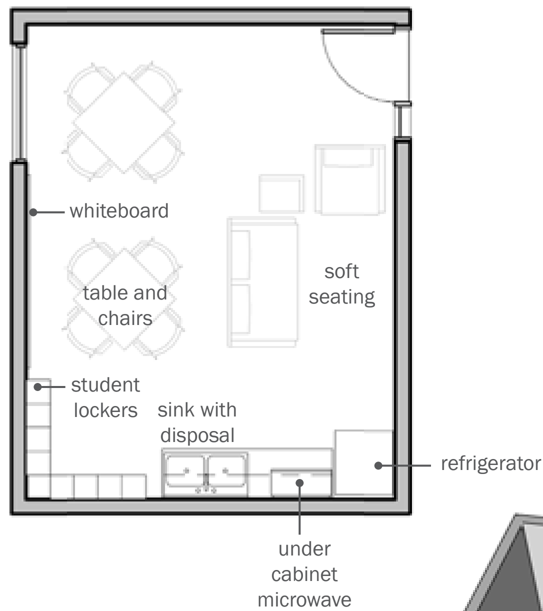
Area	100 sf
Quantity	1
Function	Student food prep and vending area
Occupants	2-4 visitors
Adjacency	Adjacent to student study space and near building lobby
Floor	Tile or high quality flooring
Wall	Painted gypsum board
Ceiling	10'-0" suspended acoustic ceiling tile
Doors	N/A
Windows	N/A
Acoustics	N/A
Mechanical	Shared thermal environment with exhaust fan
Plumbing	Kitchen sink and garbage disposal
Electrical I AV I IT	Power as needed for vending and equipment
Lighting	Overhead lighting with occupancy sensors
Equipment I Furniture	• Base cabinets with sink • Upper cabinets with integrated microwave(s) • Vending machine(s)





6.22 ENGINEERING COMMONS / LOCKERS

Area	300 SF
Quantity	1
Function	Engineering student study room
Occupants	10-16 students
Adjacency	Central circulation area, near faculty offices and student study room
Floor	Carpet
Wall	Gypsum board, glass wall toward corridor or common areas
Ceiling	10' high, suspended acoustic ceiling
Doors	Wood with lite
Windows	Exterior windows with interior roller shades
Acoustics	STC 45 at walls, NRC .60 at ceiling
Mechanical	Thermostat w/ range 68-76 degrees
Plumbing	Double sink with disposal.
Electrical I AV I IT	Electrical, video feed and IT integrated into table for presentations and electronic device charging. Convenience outlets at walls
Lighting	Overhead lighting at 40-45 footcandles with presentation mode and vacancy sensor
Equipment I Furniture	• Meeting tables and chairs • Student lockers • Flat panel display • White board • Upper and lower cabinets and counter top • Under cabinet microwave

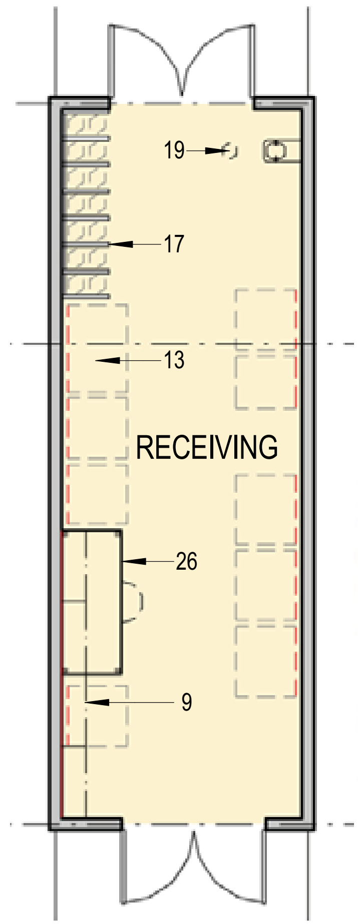


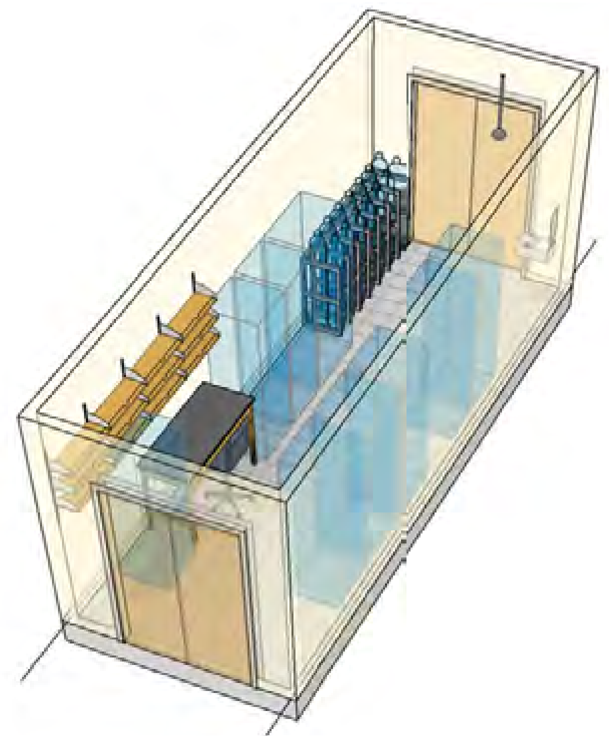
6.30 LOBBY

Area	2,000 SF
Quantity	1
Function	Large open circulation and collaboration space
Occupants	Varies
Adjacency	Building entry, student study areas, and shared classroom(s)
Floor	Tile or high quality flooring
Wall	Gypsum board and glass wall system
Ceiling	High ceiling space, may be open to above
Doors	N/A
Windows	Exterior daylight required
Acoustics	N/A
Mechanical	Shared thermal environment
Plumbing	N/A
Electrical I AV I IT	Convenience outlets at walls and in-floor near seating areas. Integrated power and usb ports for device charging at seating, eating and study areas.
Lighting	Overhead lighting with daylight sensors
Equipment I Furniture	• Tables and chairs (charging stations integrated into tables and at perimeter walls) • Soft seating with low collaboration tables • Flat panel digital, informational display
Notes:	• This should be an open area with access to central stair.

6.31 RECEIVING & CYLINDER STORAGE

Area	315 sf
Quantity	1
Function	Material receiving and cylinder storage room
Occupants	1-4 visitors
Adjacency	Direct access to the exterior, near the field equipment wash off room.
Floor	Resilient flooring
Wall	Epoxy painted gypsum board
Ceiling	10’-0”, suspended acoustic ceiling
Doors	3’-0” Wood with lite and 1’-0” operable leaf
Windows	N/A
Acoustics	STC 45 at walls
Mechanical	Shared thermal environment
Plumbing	As needed for laboratory equipment. See room service summary in the appendix.
Electrical I AV I IT	As needed for laboratory equipment. See room service summary in the appendix.
Lighting	Overhead 50 footcandles at work surface with occupancy sensors
Equipment I Furniture	• See room diagram for furnishings and equipment.





6.32 MECHANICAL / ELECTRICAL

Area	1,500 SF
Quantity	1
Function	Building mechanical equipment room
Occupants	0 FTE, 1-2 visitors
Adjacency	Direct exterior access is preferred
Floor	Sealed concrete
Wall	Painted gypsum board, plywood as needed for equipment
Ceiling	Open to structure above
Doors	Metal
Windows	N/A
Acoustics	N/A
Mechanical	Shared thermal environment
Plumbing	N/A
Electrical I AV I IT	Convenience outlets at walls
Lighting	40 footcandles overhead, integrated occupancy sensor
Equipment I Furniture	• N/A

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APPENDIX A - ROOM SERVICE SUMMARY

			Room Air					Services									Specialty Gasses		Power					
Room Name	Room Index	Room Area (NSF)	Fume Hood Count	100% Exhausted	Recirc Air	AC Rate (Minimum) Occupied	AC Rate (Minimum) Unoccupied	Safety Shower (Tempered) Potable	Eye Wash (Tempered) Potable	Industrial (Non-Potable)	Hot & Cold (H&C) or Cold (C)	Purified Water Unit	Natural Gas (LG)	Lab Vacuum (LV)	Compressed Air (100psi with Regulator) (CA)	Compressed Air (15 - 30 PSI) (LA)	Cylinder Gas (Inert)	Cylinder Gas (Hazardous or Toxic)	120Vac	208Vac, 1 Phase	208Vac, 3 Phase	120Vac Stand-by	208Vac, 1 Phase Stand-by	Notes
Biology																								
Microbiology T-Lab (BSL2)	1.01	1,260	0	•		4	2	•	•	•	H / C	•	•	•			•		•			•		(1) OFOI BSC (A2)
Majors T-Lab & Lecture	1.02	1,260	0	•					at Sink	•	H / C								•					Recirc for Lecture. 8 AC/Hr for Disections
General & Human Biology T-Lab	1.03	1,260	0	•		4	2	•	•	•	H / C	•							•					
Anatomy & Physiology T-lab	1.04	1,575	0	•		4	2	•	•	•	H / C	•		•		•			•					12 / 4 AC/Hr - Cadaver Alcoves
Research Lab (BSL2)	1.05	630	1	•		4	2	•	•	•	H / C	•		•		•	•		•	•		•	•	
Micro Prep Room	1.10	210	1	•		4	2	•	•	•	H / C	•	•	•		•	•		•	•		•		
Micro Autoclave Room	1.11	210	0	•		4	2			•	H / C	Soft			•				•		•			Soft Water for Autoclaves, 480v power
Micro Equipment Room	1.12	210	0	•		4	2										•		•	•	•	•	•	
Herbarium Storage / Work Area	1.13	630	0	•		4	2			•	H / C								•					

Room Name			Room Air					Services									Specialty Gasses		Power					Notes
	Room Index	Room Area (NSF)	Fume Hood Count	100% Exhasted	Recirc Air	AC Rate (Minimum) Occupied	AC Rate (Minimum) Unoccupied	Safety Shower (Tempered) Potable	Eye Wash (Tempered) Potable	Industrial (Non-Potable)	Hot & Cold (H&C) or Cold (C)	Purified Water Unit	Natural Gas (LG)	Lab Vacuum (LV)	Compressed Air (100psi with Regulator) (CA)	Compressed Air (15 - 30 PSI) (LA)	Cylinder Gas (Inert)	Cylinder Gas (Hazardous or Toxic)	120Vac	208Vac, 1 Phase	208Vac, 3 Phase	120Vac Stand-by	208Vac, 1 Phase Stand-by	
Museum Animal Storage	1.14	630	0	•		4	2												•					
Field Equipment Washoff / Storage	1.15	473	0	•		4	2		at Sink	•	H / C	•			•	•			•					
Gen / Human Bio Prep / Storage	1.16	630	1	•		4	2	•	•	•	H / C	•		•		•	•		•			•		
Headhouse for Greenhouse	1.17	1,260	1	•		4	2	•	•	•	H / C								•	•		•		Controls on Standby Power
Tech Office	1.18	105	0		•														•					
Chemistry																								
Gen Chemistry T-Lab (Pair)	2.01	1,260	4	•		4	2	•	•	•	H / C	•	•	•		•			•					Paired Labs = 2,520 NSF
Organic Chemistry T-Lab + Instruments	2.02	1,260	14	•		4	2	•	•	•	H / C	•	•	•		•	•	•	•	•				Specialty Gas 1 to CFHs
Research Lab + Instruments + Library Labs	2.03	798	1	•		4	2	•	•	•	H / C	•	•	•		•	•	•	•	•				

Room Name			Room Air					Services									Specialty Gasses		Power					Notes
	Room Index	Room Area (NSF)	Fume Hood Count	100% Exhasted	Recirc Air	AC Rate (Minimum) Occupied	AC Rate (Minimum) Unoccupied	Safety Shower (Tempered) Potable	Eye Wash (Tempered) Potable	Industrial (Non-Potable)	Hot & Cold (H&C) or Cold (C)	Purified Water Unit	Natural Gas (LG)	Lab Vacuum (LV)	Compressed Air (100psi with Regulator) (CA)	Compressed Air (15 - 30 PSI) (LA)	Cylinder Gas (Inert)	Cylinder Gas (Hazardous or Toxic)	120Vac	208Vac, 1 Phase	208Vac, 3 Phase	120Vac Stand-by	208Vac, 1 Phase Stand-by	
Chemstry Prep / Storage	2.10	630	1	•		4	2	•	•	•	H / C	•	•	•		•	•		•					
Tech Office	2.11	105	0		•														•					
Physics																								
Physics & Engineering T-Lab	3.01	1,260	0	•					at Sink	•	H / C		•		•	•			•	•				Consider Future 100% Exhaust
Physics Storage / Prep	3.10	630	0		•				at Sink	•	H / C		•		•	•			•	•				Consider Future 100% Exhaust
Geology																								
Geology & Natural Resources T-Lab	4.01	1,260	0		•				at Sink	•	H / C								•					Consider Future 100% Exhaust
Geology Sample Storage	4.10	315	0		•				at Sink	•	H / C	•							•	•				
Rock/Sample Prep	4.11	210	0	•		4	2		at Sink	•	H / C				•	•			•	•	•			
Field Equipment Washoff / Storage - Shared with Biology																								See 1.15

Room Name			Room Air					Services										Specialty Gasses		Power					Notes
	Room Index	Room Area (NSF)	Fume Hood Count	100% Exhasted	Recirc Air	AC Rate (Minimum) Occupied	AC Rate (Minimum) Unoccupied	Safety Shower (Tempered) Potable	Eye Wash (Tempered) Potable	Industrial (Non-Potable)	Hot & Cold (H&C) or Cold (C)	Purified Water Unit	Natural Gas (LG)	Lab Vacuum (LV)	Compressed Air (100psi with Regulator) (CA)	Compressed Air (15 - 30 PSI) (LA)	Cylinder Gas (Inert)	Cylinder Gas (Hazardous or Toxic)	120Vac	208Vac, 1 Phase	208Vac, 3 Phase	120Vac Stand-by	208Vac, 1 Phase Stand-by	
Engineering and Computer Science																									
Computer Science T-lab	5.01	1,100	0		•														•						
Engineering Computer T-lab	5.02	1,100	0		•														•						
Equipment + Project Lab	5.10	315	0	•		4	2	•	•	•	H / C		•		•	•			•	•	•			
Shared Spaces																									
Receiving & Cylinder Storage	6.31	315	0		•			•	•								•		•	•				

APPENDIX B - GEOTECHNICAL REPORT

AGEC
Applied GeoTech

GEOTECHNICAL INVESTIGATION

PROPOSED SCIENCE BUILDING
SNOW COLLEGE

100 EAST CENTER STREET

EPHRAIM, UTAH

PREPARED FOR:

DFCM
4130 STATE OFFICE BUILDING
SALT LAKE CITY, UTAH 84114

ATTENTION: KURT BAXTER

PROJECT NO. 1141022 DECEMBER 23, 2014

600 West Sandy Parkway • Sandy, Utah 84070 • (801) 566-6399 • FAX (801) 566-6493

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1. The subsurface soil encountered at the site consists of approximately 4 and 3 feet of fill overlying clay that extends to depths of approximately 26 and 25 feet in Borings B-1 and B-2, respectively. Several silt and sand lenses were encountered in the clay. Gravel was encountered below the clay and extends the full depth investigated, approximately 31 to 31½ feet.

2. No subsurface water was encountered to the maximum depth investigated.

3. The basement portion of the proposed building may be supported on spread footings bearing on the undisturbed natural soil or on compacted structural fill and may be designed for a net allowable bearing pressure of 1,500 pounds per square foot. The non-basement portion of the building may be supported on at least 2 feet of compacted structural fill. Footings bearing on at least 2 and 4½ feet of compacted structural fill may be designed for net allowable bearing pressures of 2,000 and 3,000 pounds per square foot, respectively.

4. The upper soil consists predominantly of clay and will be easily disturbed by construction traffic when the clay is very moist to wet, such as in the winter and spring or at times of prolonged rainfall or irrigation. Placement of 1 to 2 feet of gravel will improve construction equipment access when the subgrade is very moist to wet.

5. Geotechnical information related to foundations, subgrade preparation, pavement design and materials is included in the report.

SCOPE

This report presents the results of a geotechnical investigation for the proposed science building to be located either east or west of the library at Snow College at 100 East Center Street in Ephraim, Utah. The report presents the subsurface conditions encountered, laboratory test results and recommendations for foundations and pavement. The study was conducted in general accordance with our proposal dated November 12, 2014. AMEC performed a geotechnical study for the area and presented their findings and recommendations in a report dated August 7, 2001 under Project No. 1-817-003579

Field exploration was conducted to obtain information on the subsurface conditions and to obtain samples for laboratory testing. Information obtained from the field and laboratory was used to define conditions at the site and to develop recommendations for the proposed foundations and pavement.

This report has been prepared to summarize the data obtained during the study and to present our conclusions and recommendations based on the proposed construction and subsurface conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction are included in the report.

SITE CONDITIONS

At the time of our field study, the two potential locations for the science building consisted of landscaped areas on the east and west sides of the library, which is a two-story, masonry structure with a basement.

The ground surface at the site is relatively level.

Vegetation at the site consists of grass with some bushes and trees around the library and occasional trees throughout the property.

There are additional school buildings to the north, east and west of the site. There are one to two-story, wood-framed houses with basements to the south. Center Street is along the south edge of the property and 100 East Street is to the west.

FIELD STUDY

The field study was conducted on December 9, 2014. Two borings were drilled at the approximate locations indicated on Figure 1. The borings were drilled using 8-inch diameter, hollow-stem auger powered by a truck-mounted drill rig. The borings were logged and soil samples obtained by an engineer from AGEC. Logs of the subsurface conditions encountered in the borings are graphically shown on Figure 2.

SUBSURFACE CONDITIONS

The subsurface soil encountered at the site consists of approximately 4 and 3 feet of fill overlying clay that extends to depths of approximately 26 and 25 feet in Borings B-1 and B-2, respectively. Several silt and sand lenses were encountered in the clay. Gravel was encountered below the clay and extends the full depth investigated, approximately 31 to 31½ feet.

A description of the various materials encountered in the borings follows:

> <u>Fill</u> - The fill consists of sandy lean clay with gravel. It is slightly moist to moist, dark brown to brown and contains roots extending to depths of approximately 3 to 4 inches.
>
> <u>Lean Clay</u> - The clay contains numerous silt and sand layers with occasional gravels. It is medium stiff to stiff, moist to very moist and brown.

Laboratory tests performed on samples of the clay indicate that it has natural moisture contents ranging from 17 to 24 percent and natural dry densities ranging from 101 to 105 pounds per cubic foot (pcf). Results of consolidation tests performed on samples of the clay indicate it will compress a small to moderate amount with the addition of light to moderate loads. Results of the consolidation tests are presented on Figure 3.

Silty Gravel With Sand - The gravel contains possible cobbles. It is very dense, moist and brown.

A summary of the laboratory test results is presented on Table I and included on the logs of the borings.

SUBSURFACE WATER

No subsurface water was encountered to the maximum depth investigated, approximately 31½ feet.

PROPOSED CONSTRUCTION

The building is planned to be a steel-framed structure with a masonry exterior. We understand the science building will have one level extending below grade and three levels above grade. The architect indicates maximum column loads are estimated at 225 kips. We have assumed maximum wall loads of 7 kips per lineal foot.

We anticipate some new paving may be constructed as part of the proposed development. We have assumed traffic to consist predominantly of car traffic with occasional delivery trucks and two garbage trucks per week.

If the proposed construction, building loads or traffic is significantly different from what is described above, we should be notified so that we can reevaluate the recommendations given.

RECOMMENDATIONS

Based on the subsoil conditions encountered, the laboratory test results and the proposed construction, the following recommendations are given:

A. Site Grading

The site grading plan was not provided to us but we assume that changes in site grades will not exceed 3 feet. The site grading fill should be placed well in advance of building construction (at least 3 months) if grades will be raised more than about 3 feet.

1. Subgrade Preparation
   There was approximately 3 to 4 feet of fill in the borings. The existing fill is not suitable for support of the proposed building, pavement or other improvements. Prior to placing site grading fill or base course, the unsuitable fill, organics, debris and other deleterious materials should be removed from areas of the proposed building, pavement and other improvements.

   The upper soil could result in construction access difficulties for rubber-tired construction equipment when the soil is very moist to wet, such as in the winter and spring or at times of prolonged rainfall or irrigation. Care will be required to minimize disturbance of the natural soil during construction. Placement of gravel will generally improve site access for construction equipment in areas where the granular fill is removed. Generally, 1 to 2 feet of gravel will provide limited support for moderately loaded rubber-tired

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construction equipment above very moist to wet clay. A support fabric may be placed between the fill and clay to facilitate construction.

2. Excavation

Excavation at the site can be accomplished with typical excavation equipment. A flat cutting edge should be used to excavate for footings in the clay to reduce disturbance of the foundation soil.

3. Materials

Materials placed as fill to support foundations should be non-expansive granular soil. The clay and fill with a high clay content are not recommended for use as structural fill, but may be used as site grading fill, as fill below pavement areas and as utility trench backfill if the organics, debris, and other deleterious materials are removed, or they may be used in landscaped areas. The moisture of the clay will vary with time and may require wetting or drying to facilitate compaction depending on the moisture condition at the time of construction. Drying of the soil may not be practical during cold or wet periods of the year.

Listed below are the materials recommended for imported fill.

Fill to Support	Recommendations
Footings	Non-expansive granular soil Passing No. 200 Sieve < 35% Liquid Limit < 30% Maximum size 4 inches
Floor Slab (Upper 4 inches)	Sand and/or Gravel Passing No. 200 Sieve < 5% Maximum size 2 inches
Slab Support	Non-expansive granular soil Passing No. 200 Sieve < 50% Liquid Limit < 30% Maximum size 6 inches

4. Compaction

Compaction of materials placed at the site should equal or exceed the minimum densities as indicated below when compared to the maximum dry density as determined by ASTM D 1557.

Fill To Support	Compaction
Foundations	≥ 95 percent
Concrete Slabs and Pavement	≥ 90 percent
Landscaping	≥ 85 percent
Retaining Wall Backfill	85 - 90 percent

Fill and pavement materials placed for the project should be frequently tested for compaction.

To facilitate the compaction process, the fill should be compacted at a moisture content within 2 percent of the optimum moisture content.

The base course placed below pavements should be compacted to at least 95 percent of the maximum dry density as determined by ASTM D 1557.

5. Drainage

The ground surface surrounding the proposed building should be sloped to drain away from the building in all directions. Roof downspouts and drains should discharge well beyond the limits of backfill.

The collection and diversion of drainage away from the pavement surface is important to the satisfactory performance of the pavement section. The pavement should be graded to allow for good surface drainage.

B. Foundations

1. Bearing Material

With the proposed construction and the subsurface conditions encountered, the basement portion of the proposed building may be supported on spread footings bearing the undisturbed natural soil or on compacted structural fill. The non-basement portion of the building may be supported on at least 2 feet of compacted structural fill.

Topsoil, organics, debris, unsuitable fill and other deleterious materials should be removed from below the proposed building.

2. Bearing Pressures

Basement footings bearing on the natural undisturbed soil or on compacted structural fill extending down to the natural undisturbed soil may be designed for a net allowable bearing pressure of 1,500 psf. Footings bearing on at least 2 and 4½ feet of compacted structural fill may be designed for net allowable bearing pressures of 2,000 and 3,000 psf, respectively.

The net allowable bearing pressure is the pressure of the building above the lowest adjacent final grade. The weight of the backfill and concrete below the lowest adjacent final grade may be neglected.

3. Temporary Loading Conditions

The bearing pressure indicated above may be increased by one-half for temporary loading conditions such as for wind and seismic loads.

4. Settlement

We estimate that total and differential settlement will be less than 1 and ¾ inch, respectively, for footings bearing on the undisturbed natural soil or structural fill extending down to the natural undisturbed soil.

5. Minimum Footing Width and Embedment

Spread footings should have a minimum width of 1½ feet and a minimum depth of embedment of 1 foot.

6. Frost Depth

Exterior footings and footings beneath unheated areas should be placed at least 30 inches below grade for frost protection.

7. Foundation Base

The base of footing excavations should be cleared of loose or deleterious material or the footings should be extended to adequate bearing material.

8. Construction Observation

A representative of the geotechnical engineer should observe footing excavations prior to structural fill or concrete placement.

C. Concrete Slab-on-Grade

1. Slab Support

Concrete slabs may be supported on the natural undisturbed soil or on compacted structural fill extending down to the natural undisturbed soil.

2. Underslab Sand and/or Gravel

A 4-inch layer of free draining sand and/or gravel (less than 5 percent passing the No. 200 sieve) should be placed below the concrete slabs.

3. Vapor Barrier

A vapor barrier should be placed under the concrete floor if the floor will receive an impermeable floor covering. The barrier will reduce the amount of water vapor passing from below the slab to the floor covering.

D. Lateral Earth Pressures

1. Lateral Resistance for Footings

Lateral resistance for spread footings placed on the natural soils or on compacted structural fill is controlled by sliding resistance between the footing and the foundation soils. A friction value of 0.35 may be used in the design for ultimate lateral resistance.

2. Subgrade Walls and Retaining Structures

The following lateral earth pressures are given for design of subgrade walls and retaining structures. The active condition is where the wall moves away from the soil. The passive condition is where the wall moves into the soil and the at-rest condition is where the wall does not move. The values listed are equivalent fluid weights and assume a horizontal surface adjacent the wall.

Backfill Type	Active	At-Rest	Passive
Clay/Silt	40 pcf	55 pcf	250 pcf
Sand/Gravel	35 pcf	50 pcf	300 pcf

3. Seismic Conditions

Under seismic conditions, the lateral earth pressure should be increased by 20 pcf for active and 5 pcf for at-rest conditions and decreased by 20 pcf for the passive condition. This assumes a peak ground acceleration of 0.27g for a 2 percent probability of exceedance in a 50-year period (IBC, 2012).

4. Safety Factors

The values recommended above for active and passive pressures assume mobilization of the soil to achieve the assumed soil strength. Conventional safety factors used for structural analysis for such items as overturning and sliding resistance should be used in design.

E. Subsurface Drains

The natural soil consists of clay with silt and sand layers. Subsurface water problems may be encountered during certain times of the year, such as times of snow melt or heavy irrigation. Consideration should be given to providing a subsurface drain for below-grade floor portions of the building. Foundation drains should include at least the following items:

1. The underdrain system should consist of a perforated pipe installed in a gravel filled trench around the perimeter of the subgrade floor portion of the building.

2. The flow line of the pipe should be placed at least 14 inches below the finished floor level and should slope to a sump or outlet where water can be removed by pumping or by gravity flow.

3. If placing the gravel and drain pipe requires excavation below the bearing level of the footing, the excavation for the drain pipe and gravel should have a slope no steeper than 1 horizontal to 1 vertical so as not to disturb the soil below the footing.

4. A filter fabric should be placed between the natural soil and the drain gravel. This will help reduce the potential for fine-grained material filling in the void spaces of the gravel.

5. The subgrade floor slab should have at least 6 inches of free-draining gravel placed below it and the underslab gravel should connect to the perimeter drain.

6. Consideration should be given to installing cleanouts to allow access into the perimeter drain should cleaning of the pipe be required in the future.

F. Seismicity, Faulting and Liquefaction

1. Seismicity

Listed below is a summary of the site parameters for the 2012 International Building Code:

a.	Site Class	D
b.	Short Period Spectral Response Acceleration, S_S	0.62g
c.	One Second Period Spectral Response Acceleration, S_1	0.18g

2. Faulting

There are no active faults extending near or through the site. The closest fault considered to be active is the Gunnison fault located approximately 5 ½ miles west of the site (Black and others, 2003).

3. Liquefaction

The soil conditions encountered in the borings indicate that liquefaction is not a hazard at the site.

G. Water Soluble Sulfates

Previous testing of the soil by AMEC indicates that the soil does not contain significant water soluble sulfates. Based on this information no special cement type is required for concrete placed in contact with the natural soil. Other conditions may dictate the type of cement to be used in the concrete at the site.

H. Pavement

Based on the subsoil conditions encountered, the laboratory test results and the assumed traffic, the following recommendations are given:

1. Subgrade Support

We anticipate that subgrade materials will contain a significant amount of clay. We have assumed a CBR value of 3 percent which assumes a clay subgrade.

2. Pavement Thickness

Based on the subsoil conditions encountered, the anticipated traffic described in the Proposed Construction section of the report, a design life of 20 years for flexible pavement and 30 years for rigid pavement, and methods presented by the Utah Department of Transportation, a pavement section consisting of 3 inches of asphaltic concrete overlying 8 inches of base course is recommended. A rigid pavement section consisting of 5 inches of Portland cement concrete may be used as an alternative.

3. Pavement Materials

a. Flexible Pavement (Asphaltic Concrete)

The pavement materials should meet the material specifications for the applicable jurisdiction. Other materials may be considered for use in the pavement section. The use of other materials may result in other pavement material thicknesses.

b. Rigid Pavement (Portland Cement Concrete)

The design pavement thickness assumes that a concrete shoulder or curb will be placed at the edge of the pavement and that the pavement will have aggregate inter-lock joints.

The pavement materials should meet the material specifications for the applicable jurisdiction. The pavement thickness indicated above assumes that the concrete will have a 28-day compressive strength of 4,000 psi. Concrete should be air entrained with approximately 6 percent air. The maximum allowable slump will depend on the method of placement, but should not exceed 4 inches.

4. Jointing

Joints for concrete pavement should be laid out in a square or rectangular pattern. Joint spacings should not exceed 30-times the slab thickness. The joint spacings indicated should accommodate the contraction of the concrete and under these conditions, steel reinforcing will not be needed. The depth of joints should be approximately one-fourth the slab thickness.

I. Preconstruction Meeting

A preconstruction meeting should be held with representatives of the owner, project architect, geotechnical engineer, civil engineer, general contractor, earthwork contractor and other members of the design team to review construction plans, specifications, methods and schedule.

LIMITATIONS

This report has been prepared in accordance with generally accepted soil and foundation engineering practices in the area for the use of the client for design purposes. The conclusions and recommendations included in the report are based on the information obtained from the borings drilled at the approximate locations indicated on the site plan and the data obtained from laboratory testing. Variations in the subsurface conditions may not become evident until additional exploration or excavation is conducted. If the subsurface soil or groundwater conditions are found to be different from those described in this report, we should be notified to reevaluate the recommendations given.

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

Douglas R. Hawkes, P.E., P.G.

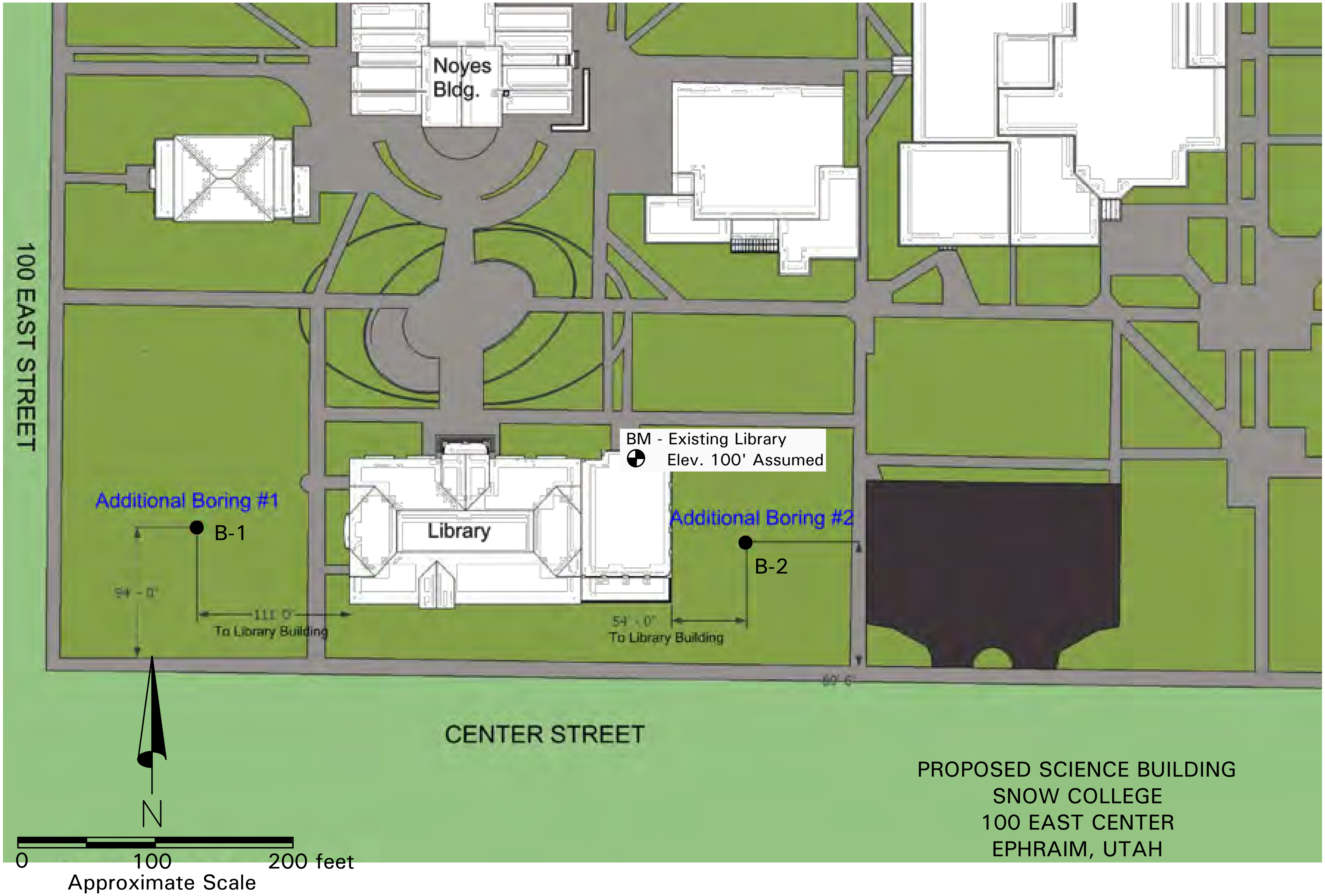
Reviewed by Jay R. McQuivey, P.E.

DRH/rs

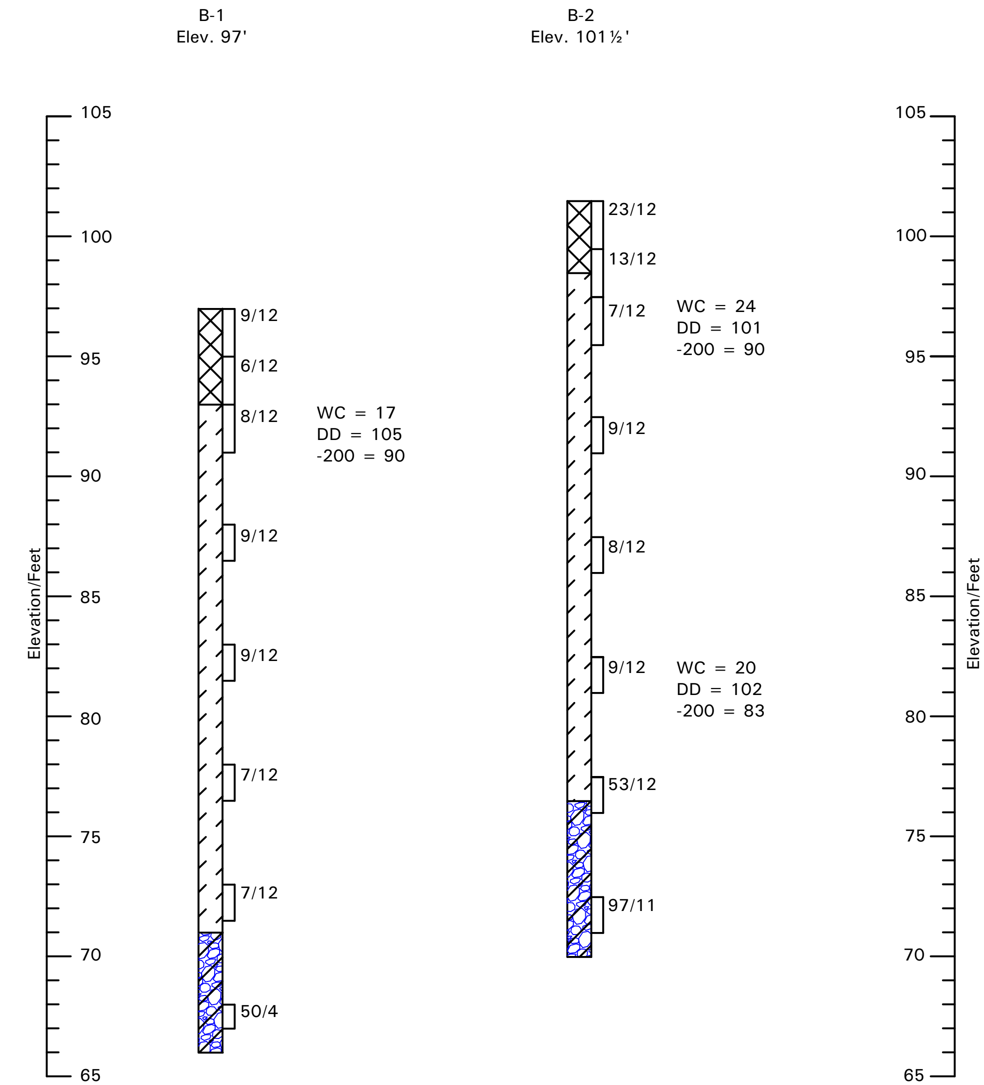
REFERENCES

Black, B.D., Hecker, S., Hylland, M.D., Christenson, G.E., and McDonald, G.N., 2003; Quaternary fault and fold database and map of Utah; Utah Geological Survey Map 193DM.

International Building Code, 2012; International Code Council, Inc. Falls Church, Virginia.



1141022	AGEC	Locations of Exploratory Borings	Figure 1



LEGEND:

Fill; sandy lean clay with gravel, slightly moist to moist, dark brown to brown, roots in upper 3 to 4 inches.

Lean Clay (CL); numerous silt and sand layers, occasional gravels, medium stiff to stiff, moist to very moist, brown.

Silty Gravel with Sand (GM); possible cobbles, very dense, moist, brown.

10/12 California Drive sample taken. The symbol 10/12 indicates that 10 blows from a 140 pound automatic hammer falling 30 inches were required to drive the sampler 12 inches.

NOTES:

1. Borings were drilled on March 9, 2014 with 8-inch diameter hollowstem auger.
2. Locations of borings were measured approximately by pacing from features shown on the site plan provided.
3. Elevations of borings were measured by hand level and refer to the bench mark shown on Figure 1.
4. The boring locations and elevations should be considered accurate only to the degree implied by the method used.
5. The lines between the materials shown on the boring logs represent the approximate boundaries between material types and the transitions may be gradual.
6. No subsurface water was encountered in the borings at the time of drilling.
7. WC = Water Content (%);
   DD = Dry Density (pcf);
   -200 = Percent Passing No. 200 Sieve.

Approximate Vertical Scale 1" = 8'

1141022	AGEC	Logs, Legend and Notes of Exploratory Borings	Figure 2

REFERENCES

Black, B.D., Hecker, S., Hylland, M.D., Christenson, G.E., and McDonald, G.N., 2003; Quaternary fault and fold database and map of Utah; Utah Geological Survey Map 193DM.

International Building Code, 2012; International Code Council, Inc. Falls Church, Virginia.

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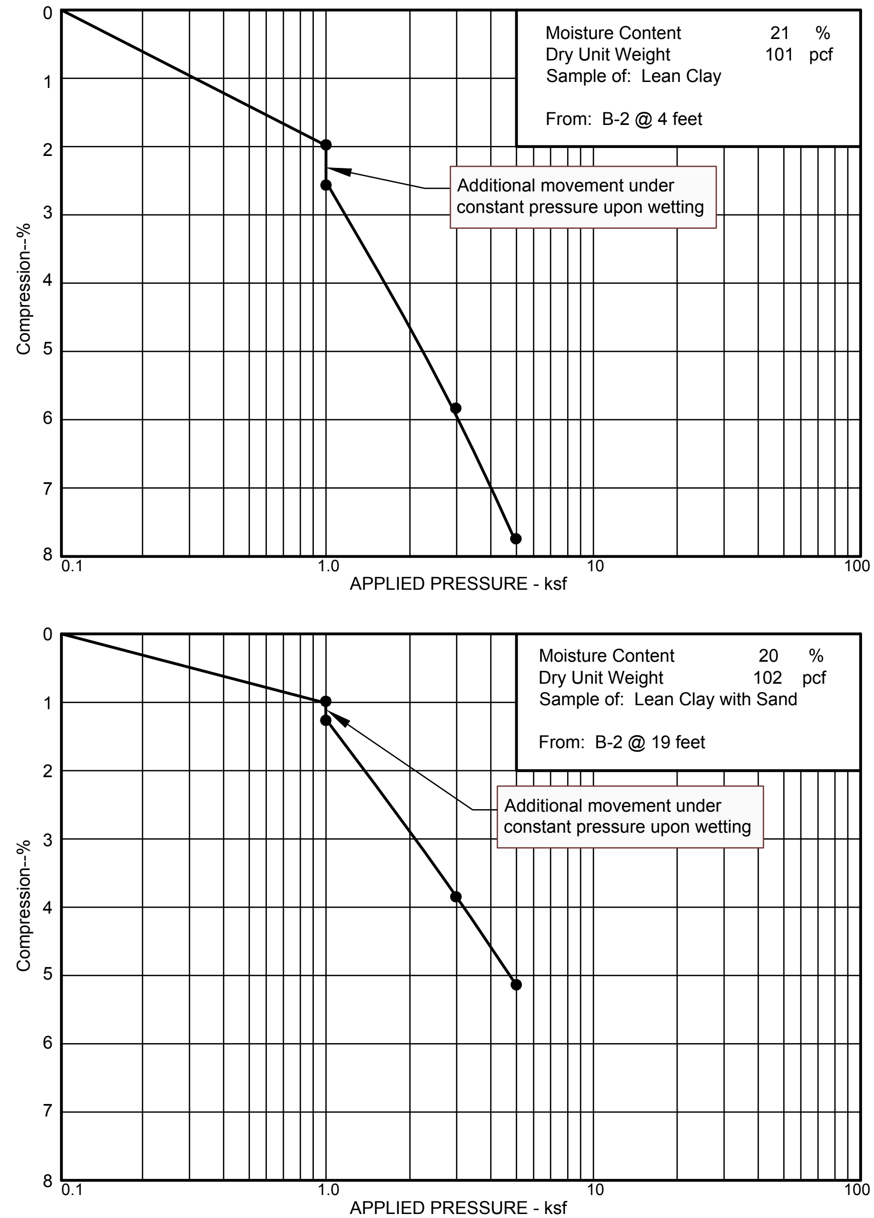

Project No. 1141022 CONSOLIDATION TEST RESULTS Figure 3

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NUMBER 1141022

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)	WATER SOLUBLE SULFATE (%)	SAMPLE CLASSIFICATION
BORING	DEPTH (FEET)			GRAVEL (%)	SAND (%)	SILT/ CLAY (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
B-1	4	17	105			90					Lean Clay
B-2	4	21	101			90					Lean Clay
	19	20	102			83					Lean Clay with Sand

REPORT
GEOTECHNICAL STUDY
PROPOSED PERFORMING ARTS
CENTER/CLASSROOMS BUILDING
NORTHEAST CORNER OF
100 EAST AND CENTER STREET
SNOW COLLEGE CAMPUS
EPHRAIM, UTAH

Submitted To:

State of Utah
Division of Facilities Construction and Management
4110 State Office Building
Salt Lake City, Utah 84114

Submitted By:

AMEC Earth & Environmental, Inc.
Salt Lake City, Utah

August 7, 2001

Job No. 1-817-003579

August 7, 2001
Job No. 1-817-003579

State of Utah
Division of Facilities Construction and Management
4110 State Office Building
Salt Lake City, Utah 84114

Attention: **Mr. David McKay**

Gentlemen:

Re: Report
Geotechnical Study
Proposed Performing Arts Center/Classrooms Building
Northeast Corner of 100 East and Center Street
Snow College Campus
Ephraim, Utah

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical study performed at the site of the proposed performing arts center/classrooms building which is located on the northeast corner of 100 East and Center Street on the Snow College Campus in Ephraim, Utah. The general location of the site with respect to major topographic features and existing facilities, as of 1995, is presented on Figure 1, Vicinity Map. A more detailed layout of the site showing existing and proposed buildings with regard to adjoining streets is presented on Figure 2, Site Plan. The locations of the eight borings drilled in conjunction with this study are also presented on Figure 2.

1.2 OBJECTIVES AND SCOPE

The objectives and scope of our study were planned in discussions between Mr. David McKay from the State of Utah, Division of Facilities Construction and Management, and Mr. Bill Gordon of AMEC Earth & Environmental, Inc. (AMEC).

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In general, the objectives of this study were to:

1. Define and evaluate the subsurface soil and groundwater conditions across the site.

2. Provide appropriate foundation and earthwork recommendations to be utilized in the design and construction of the proposed structure.

In accomplishing these objectives, our scope has included the following:

1. A field program consisting of the drilling, logging, and sampling of eight exploration borings.

2. A laboratory testing program.

3. An office program consisting of the correlation of available data, engineering analyses, and the preparation of this summary report.

1.3 AUTHORIZATION

Authorization was provided by Mr. David McKay of the State of Utah, Division of Facilities Construction and Management.

1.4 PROFESSIONAL STATEMENTS

Supporting data upon which our recommendations are based are presented in subsequent sections of this report. Recommendations presented herein are governed by the physical properties of the soils encountered in the exploration borings, projected groundwater conditions, and the layout and design data discussed in Section 2., Proposed Construction, of this report. If subsurface conditions other than those described in this report are encountered and/or if design and layout changes are implemented, AMEC must be informed so that our recommendations can be reviewed and amended if necessary. This report is only for use in the design of the structure presented in the proposed construction section of this report. Any additional structures, additions, etc. are not covered in this report and AMEC must be contacted to evaluate the situation.

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted engineering principles and practices at this time.

2. PROPOSED CONSTRUCTION

A performing arts center/classrooms building is to be constructed. The overall facility will be roughly rectangular with overall dimensions of approximately 400 by 150 feet, with the longer dimension in the east-west direction. The classroom areas will be one to two-levels, and the

concert hall and auditorium areas will be one extended level with basement, high stage storage areas, and orchestra pits. The structure will be established slab on grade with possible tunnels, elevator, and orchestra pits extending up to five feet below existing grade. It is projected that the structure will be of masonry and metal truss construction with light weight concrete structural floors.

Structural loads will be transmitted down through columns and bearing walls to the supporting foundations. We project that the maximum column and wall loads for the two and one-extended levels of the facility will be on the order of 150 to 200 kips and 6 to 8 kips per lineal foot, respectively. Loads associated with the one-story structure will be light. We project that the floor slab loads will be light (less than 200 pounds per square foot).

Maximum site grading cuts and fills at the site are anticipated to be less than four feet to achieve final grades.

3. SITE INVESTIGATIONS

3.1 FIELD PROGRAM

In order to define and evaluate the subsurface soil and groundwater conditions across the overall site, 8 exploration borings were drilled to depths ranging from 15.0 to 41.5 feet below existing grade. The borings were drilled using a rubber tire-mounted all-terrain-type rotary drilling equipped with hollow-stem augers. Locations of the borings are presented on Figure 2.

The field portion of our study was under the direct control and continual supervision of an experienced member of our geotechnical staff. During the course of the drilling operations, a continuous log of the subsurface conditions encountered was maintained. In addition, relatively undisturbed samples of the typical soils penetrated were obtained for subsequent laboratory testing and examination. The soils were classified in the field based upon visual and textural examination. These classifications were later supplemented by subsequent inspection and testing in our laboratory. Detailed graphical representation of the subsurface conditions encountered is presented on Figures 3A through 3H, Log of Borings. Soils were classified in accordance with the nomenclature described on Figure 4, Unified Soil Classification System.

Following completion of drilling operations, slotted PVC pipe was installed in Boring B-1 in order to provide a means of monitoring the groundwater fluctuations.

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3.2 LABORATORY TESTING

3.2.1 General

In order to provide data necessary for our engineering analyses, a laboratory testing program was initiated. The program included moisture, density, collapse/consolidation, and chemical tests. The following paragraphs describe the tests and summarize the test data.

3.2.2 Moisture and Density Tests

To provide index parameters and to correlate other test data, moisture and density tests were performed on selected undisturbed samples. The results of these tests are presented to the left on the boring logs, Figures 3A through 3H.

3.2.3 Collapse/Consolidation Tests

To provide data necessary for our settlement analyses, a collapse/consolidation test was performed on each of seven representative samples of the finer-grained soils encountered in the exploration borings. The collapse portion of the overall test was performed in accordance with the following procedure:

1. The sample is loaded to a specified axial pressure at in-situ moisture content.
2. The resulting axial deflection is measured and recorded.
3. The sample is saturated.
4. The resulting collapse is measured and recorded.

A tabulation of the results of the collapse portion of the test is presented below.

Boring No.	Depth (feet)	Soil Type	Natural Dry Density (pcf)	Natural Moisture Content (percent)	Axial Load When Saturated (psf)	Collapse (-) or Swell (+) (percent)
B-2	2.5	CL	91	22.8	1,600	-7.4
B-2	20.5	CL/ML	107	21.4	1,600	+1.1
B-4	5.5	CL/ML	85	13.7	1,600	-5.1
B-4	15.5	CL/ML	97	13.8	1,600	-2.3

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Boring No.	Depth (feet)	Soil Type	Natural Dry Density (pcf)	Natural Moisture Content (percent)	Axial Load When Saturated (psf)	Collapse (-) or Swell (+) (percent)
B-4	70.5	CL/ML	97	8.9	1,600	0.4
B-5	8.0	CL/ML	104	24.1	1,600	-0.6
B-6	3.5	CL/ML	91	15.0	1,600	-0.7

Those samples which collapsed less than 1 percent are considered non-collapsible or only slightly collapsible with the majority of the measured collapse being attributed to sample disturbance. Upon completion of the collapse portion of the tests, standard consolidation test load was performed. The results of these tests indicate that the soils which exhibit collapse characteristics (greater than 1 percent) are highly compressible and exhibit low preconsolidation pressures. The consolidation tests performed on the samples that are not collapsible indicate that the soils are moderately to highly over-consolidated and when loaded below the over-consolidated pressure will exhibit relatively low compressibility characteristics. Detailed results of these tests are maintained within our files and can be transmitted to you upon your request.

3.2.4 Chemical Tests

To determine where site soils will react detrimentally with concrete, chemical tests were performed. The results of these tests are tabulated below.

Boring No.	Depth (feet)	Soil Classification	pH	Water Soluble Sulfate (ppm)
B-5	1.5	ML-CL	7.6	<10

These results indicate that the native soils will have negligible corrosive effects on concrete.

4. SITE CONDITIONS

4.1 SURFACE

The site is located on the northeast corner of 100 East Street and Center Street on the campus of Snow College in Ephraim, Utah. The south boundary of the site is Center Street, and the west is

100 East Street and a series of one to two level brick buildings. To the east is an asphalt-paved parking lot and to the north is a water feature and additional brick buildings.

The site is currently occupied by four structures. These structures are one to two levels established near grade, with the north end of the easternmost building having a walk-out basement. The structures are of mainly of brick construction and their foundations appeared to be in good condition. Concrete sidewalks are at various locations across the site. Vegetation consists of short grass with scattered bushes and trees. The site grades downward slightly to the west. There is also an area that is depressed a few feet in the northeast portion of the site.

4.2 SUBSURFACE SOIL

The soil conditions encountered in each of the borings, to the depths penetrated, were somewhat similar. In general the native soils encountered at the site, which underlay up to five feet of non-engineered fills, consist primarily of 23.0 to 27.5 feet of silty clays, silty clays/clayey silts, sequences of alternating up to six-inch layers of fine sandy silt, silty clay, and clayey silt underlain by very dense sands and gravels. Within the upper fine-grained soil zones, significant layers of sands and gravels and sands were encountered.

Pavement consisting of four inches of asphalt underlain by eight inches of road base was encountered at Boring B-1. At the other seven borings, within the upper four inches of the surface soils/fills, major roots (topsoil) were encountered. Topsoil will exhibit poor engineering characteristics. Non-engineered fills were encountered to depths ranging from one and one-half to five feet below existing grade in Borings B-3, B-4, B-6, B-7, and B-8. These fills consist of a mixture of silt and clay with varying amounts of sand with some layers containing gravel, vary in density, are dark brown, moist, and will exhibit variable and in many cases, poor engineering characteristics.

Beneath the surficial fills/pavements and from the surface at Borings B-2 and B-5, variable fine gravel soils were encountered in the deeper borings to the depths ranging from 23.0 to 27.5 feet below existing grade. Some of these layered soils contain a pinhole-type structure which is indicative of a moisture sensitive soil. Moisture sensitivity, in this case, is defined as the characteristic of a soil to exhibit moderately high strength and low compressibility characteristics when dry, but to lose strength, become highly compressible, and collapse when saturated. Laboratory data shows that these layered soils are not or only slightly collapsible. Where non-collapsible, they exhibit relatively high strength and low compressibility characteristics. The non-layered fine grained soils have a more significant pinhole structure and were found to be moderately (2.3 to 5.7 percent) collapsible. The non-collapsible and collapsible soils are variable laterally and vertically in the subsurface sequence.

The underlying sands and gravels are generally dense to very dense, brown, dry to very moist, will exhibit high strength and low compressibility characteristics within the anticipated loading range, and are not collapsible.

The lines designating the interface between soil types on the boring logs generally represent approximate boundaries. In-situ, the transition between soil types may be gradual.

4.3 GROUNDWATER

The day of the drilling and sampling operations, groundwater was not encountered in any of the borings. To facilitate monitoring future groundwater fluctuations, prior to backfilling Boring B-1 slotted PVC pipe was installed.

Seasonal and longer term groundwater fluctuations on the order of two to three feet should be anticipated. The highest seasonal levels will generally occur during the late spring and summer months.

5. DISCUSSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The primary geotechnical aspect of the site that will most influence the design, construction, and long-term performance of the proposed facilities are the collapsible soils found randomly in the upper 23.0 to 27.5 feet of the deep borings. Many of the tested soils have a collapse potential of 2.3 to 5.1 percent under an axial pressure of 1,600 pounds per square foot. These soils could settle under approximately one-quarter to more than one-half of an inch per foot of collapsible soils.

To control the potential settlements, we recommend that the structure be supported upon a drilled pier-grade beam system. Floor slabs should also be structurally supported.

Pavements and outside flatwork may be established upon properly prepared suitable undisturbed natural soils, and/or upon structural fill extending to properly prepared suitable undisturbed natural soils. Pavements and outside flatwork may be established overlying moisture sensitive soils with the understanding that some movements may occur. Movements can be somewhat controlled and delayed by reducing infiltration of water into the subsurface sequence.

Detailed discussions pertaining to earthwork, foundations, floor slabs, lateral resistance, pavements, and the geoseismic setting of the site are discussed in the following sections.

5.2 EARTHWORK

5.2.1 Site Preparation

Preparation of the site will consist of the demolition of the existing structure followed by the removal of all of the non-engineered fill, surface vegetation, topsoil, and other deleterious materials from beneath an area extending at least three feet beyond the perimeter of proposed building areas. Footings and floor slabs associated with the existing building must be totally removed. In flexible pavement and outside flatwork areas, vegetation, topsoil, non-engineered fills, and other deleterious materials must be removed. Existing footings in these areas should be removed to a depth of at least 12 inches below new construction. Prior to the placement of structural fill, outside flatwork, and pavements over natural soils, the subgrade must be proofrolled by passing moderate-weight rubber tire mounted construction equipment over the surface at least twice. If any loose, soft, or disturbed zones are encountered, they must be removed to a maximum depth of two feet and replaced with compacted structural fill.

Surface vegetation and other deleterious materials should generally be removed from the site. Topsoil, although unsuitable for utilization as structural fill, may be stockpiled for subsequent landscaping purposes.

5.2.2 Excavations

Temporary construction excavations not exceeding four feet in depth above or below the water table in cohesive soils may be constructed with near-vertical sideslopes.

Deeper construction excavations up to ten feet in depth in the cohesive soils above or below the water table may be constructed with sideslopes no steeper than one-half horizontal to one vertical. If excessive sloughing occurs, or if extensive layers of clean granular soils are encountered, the sideslopes should be flattened. Additionally, if excavations encounter clean granular soils below the groundwater table, much flatter sideslopes, shoring and bracing, and/or dewatering will be required.

All excavations must be inspected periodically by qualified personnel. If any signs of instability are noted, immediate remedial action must be initiated.

5.2.3 Structural Fill

Structural fill will be required as site grading fill and as backfill over foundations and utilities. All structural fill must be free of sod, rubbish, construction debris, frozen soil, and other deleterious materials. Structural site grading fill is defined as fill placed over fairly large open areas to raise the overall site grade. The maximum particle size within structural site grading fill should generally not exceed four inches, although occasional particles up to six to eight inches may be incorporated

provided that they do not result in honeycombing or preclude the obtainment of the desired degree of compaction. In confined areas, the maximum particle size should generally be restricted to two and one-half inches. So that the compacted fill is essentially impermeable, we recommend that granular soils be well-graded and contain at least 30 percent fines. Maximum plasticity index of the fine-grained soils should not exceed 20 percent.

On-site fine-grained soils may be re-utilized as structural site grading fill if they do not contain significant amounts of deleterious material. These fine-grained soils will require that very close moisture control be maintained during placement and compaction. It may be very difficult, if not impossible, to properly place and compact these fills during wet and cold periods of the year. Only granular soils, such as well-graded mixtures of sands and gravels with at least 25 percent fines, should be used in confined areas.

5.2.4 Fill Placement and Compaction

All other structural fill should be placed in lifts not exceeding eight inches in loose thickness. Fills in excess of 5 feet thick, and beneath all footings and floor slabs, should be compacted to at least 95 percent of the maximum dry density as determined by the AASHTO[1] T-180 (ASTM[2] D-1557) compaction criteria. All other structural fill should be compacted to at least 90 percent of the above criteria.

Prior to the placement of structural site grading fill, the exposed subgrade must be prepared as discussed in Section 5.2.1, Site Preparation, of this report. In confined areas, subgrade preparation must consist of the removal of all loose or disturbed soils.

5.3 DRILLED PIERS

5.3.1 Design Data

To control long-term settlements associated with collapse soils, we recommend that the structure be supported upon a drilled pier-grade beam system. The drilled piers should have a minimum diameter of 2.5 feet and extend to the very dense granular soils encountered at depths of 25.0 to 27.5 feet in the deeper borings.

Since the soils above the dense granular soils are predominantly fine-grained and cohesive, either straight shaft or belled piers can be used. The diameter of the bells should not exceed 2.5 times the diameter of the straight shaft.

---

[1] American Association of State Highway and Transportation Officials
[2] American Society for Testing and Materials

For design, we recommend that an end bearing value of 40,000 pounds per square foot be used for piers with a base diameter not exceeding 48 inches. For a 60-inch base diameter, the bearing pressure should be reduced to 30,000 pounds per square foot. These bearing pressures consider downdrag if collapsible soils were to settle. For seismic loading, the bearing pressure may be increased by 50 percent.

Side friction/adhesive should not be considered. Uplift capacity is essentially the weight of the pier.

5.3.2 Installation

The drilled piers should only be installed by a contractor with a well established record of satisfactory performance in similar conditions.

Since the capacity of each drilled pier is based solely upon end-bearing, it is essential that the base of each pier be totally clean prior to pouring concrete. This can be accomplished by vacuuming the base of the excavation or by hand cleaning. If hand cleaned, the maximum shaft diameter should be at least 36 inches. In addition, full-depth casing, safety harness, air quality equipment, etc. must be provided.

If a pier group is required, we recommend that they have a sidewall or bell edge separation of at least two feet. Excavated piers will most likely have to be cased during drilling of adjacent piers or the first pier poured and allowed to set for at least 48-hours before the adjacent pier is excavated.

Group capacity reduction will not be a factor for pier end bearing on the dense granular soils.

5.3.3 Settlements

Settlement of the piers designed and installed in accordance with the above recommendations, and supporting maximum anticipated loads as discussed in Section 2., Proposed Construction, should not exceed one-half to five-eighths of an inch.

5.4 LATERAL RESISTANCE

Lateral loads imposed upon drilled pier due to wind or seismic forces may be resisted by the development of passive earth pressures against the upper portion of the shafts. Assuming that the soils are collapsible and saturated or near-saturated, an equivalent passive fluid pressure of 450 pounds per cubic foot is recommended. This value should be applied to the actual diameter of the pier but considers that the load will be distributed out into projected area three times the shaft diameter.

5.5 LATERAL PRESSURES

The lateral pressure parameters, as presented within this section, assume that the backfill will consist of silty or clayey granular soil placed and compacted in accordance with the recommendations presented herein. The lateral pressures imposed upon subgrade facilities will, therefore, be basically dependent upon the relative rigidity and movement of the backfilled structure. For moderately rigid basement or tunnel walls that are not more than 10 inches thick and 12 feet or less in height, granular backfill may be considered equivalent to a fluid with a density of 60 pounds per cubic foot. For very rigid non-yielding walls, the backfill should be considered equivalent to a fluid with a density of at least 90 pounds per cubic foot. The above values assume that the surface of the soil slope behind the wall is horizontal, that the granular fill has been placed and lightly compacted, not as a structural fill. If the fill is placed as a structural fill, the values should be increased 80 pounds per cubic foot and 120 pounds per cubic foot, respectively.

The above equivalent fluid pressures are for static loading conditions. All of the equivalent fluid pressures should be increased by 15 pounds per cubic foot for dynamic lateral pressures which would be imposed during a moderately severe seismic event. It should be noted that the lateral pressures, as quoted, assume that the backfill materials will not become saturated.

5.6 FLOOR SLABS

Because of the presence of variable collapsible soil, we recommend that the first level slabs with the buildings be structurally supported by the drilled pier-grade beam foundation system.

Settlement of structurally supported floor slabs should be negligible.

If floor slabs are established directly upon the natural soil sequence, settlements of one to two inches could be experienced if the underlying soil becomes saturated or near-saturated.

5.7 GEOSEISMIC SETTING

5.7.1 General

The site is located within "Seismic Zone 3" as defined by the Seismic Zone Map of the United States in the Uniform Building Code (UBC) 1997 edition. Seismic Zone 3 is expected to experience moderately frequent, potentially damaging earthquakes. In terms of damage potential, Seismic Zone 3 is second only to Zone 4, which includes parts of California, Nevada, Hawaii and Alaska. As a minimum, the criteria for lateral forces stated within the UBC for Seismic Zone 3 should be incorporated into the design of the proposed structure.

State of Utah
Job No. 1-817-003579
Geotechnical Study
August 17, 2001

5.7.2 Faulting

Based upon our review of available literature and data obtained in conjunction with this investigation, no active faults are known to pass through or immediately adjacent to the site.

5.7.3 Liquefaction

Liquefaction is defined as the condition when saturated, loose, fine sand type soils lose their support capabilities because of excessive pore water pressure which develops during a seismic event. Clayey soils, even if saturated, will not liquefy during a major seismic event.

Due to the lack of a shallow water table, the soils encountered at the site have a low probability of liquefaction due to their clay content.

5.7.4 Soil Profile Type

For dynamic structural analyses, the Soil Profile Type "S_D, Stiff Soil Profile" as defined by in Table 16-J of the UBC 1997 may be utilized.

We appreciate the opportunity of providing this service for you. If you have any questions or require additional information, please do not hesitate to contact us.

Respectfully submitted,

AMEC Earth & Environmental, Inc.

Michael S. Huber
Staff Engineer

Reviewed by

William J. Gordon, State of Utah No. 145417
Professional Engineer

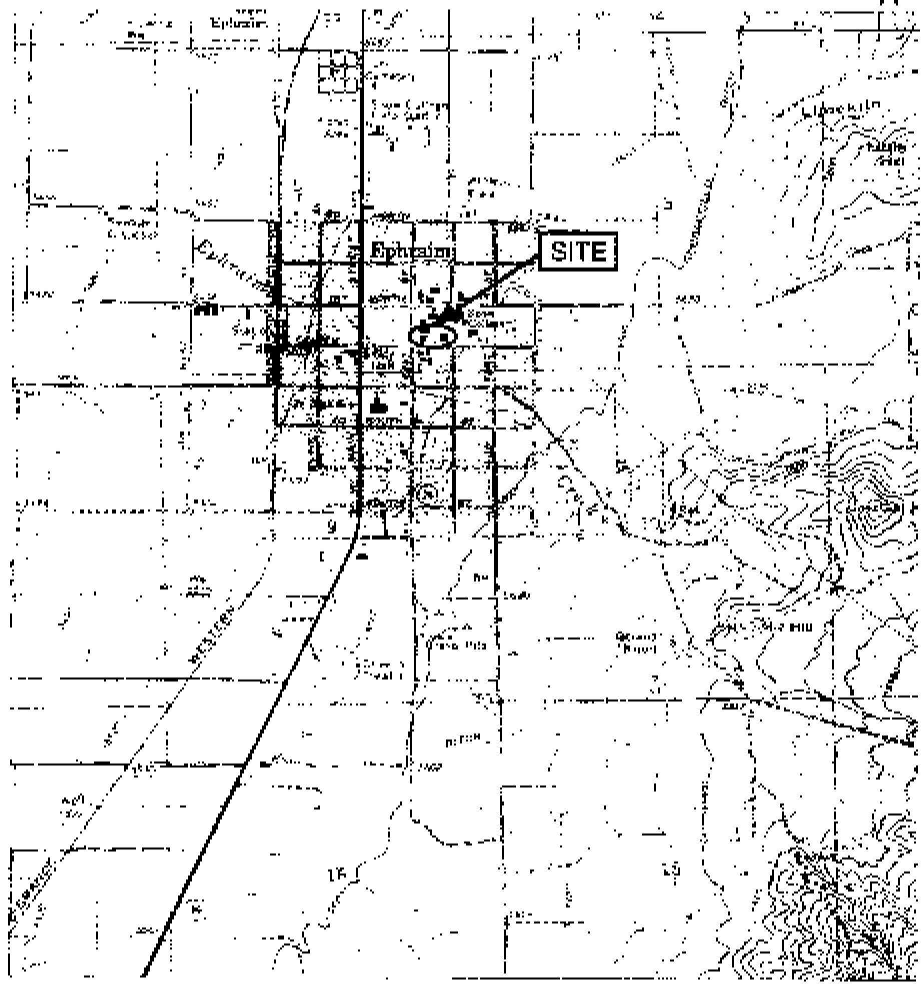
MSH/WJG:sn

Encl: Figure 1, Vicinity Map
Figure 2, Site Plan
Figures 3A through 3H, Log of Borings
Figure 4, Unified Soil Classification System

Addressee (3)

Page 12

STATE OF UTAH - DFCM
JOB NO. 1 817 003579



SCALE IN FEET
1000 0 1000 2000

REFERENCE
USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAP
TITLED "EPHRAIM, UTAH"
DATED 1966

FIGURE 1
VICINITY MAP

PROJECT Performing Arts Center/Classrooms Building
Snow College Campus, Ephraim, Utah
JOB NO. 1-517-003579 DATE 06-21-01

Page 1 of 2

LOG OF TEST BORING NO. B-1

RIG TYPE CME 550
BORING TYPE 3-3/4" ID Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows/foot	Dry Density (pcf)	Moisture Content (%)	Unified Soil Classification	Remarks	Visual Classification
0										4" ASPHALT
								GP/GM FILL		8" ROADBASE; fine to coarse sandy silt and gravel; brown; FILL
				D	11	97	20.3	ML/CL	moist medium stiff to stiff	ALTERNATING LAYERS TO 4" OF CLAYEY SILT, SILTY CLAY, AND FINE SANDY SILT; brown with trace black pockets
5				D	8	99	19.7	CL	moist medium stiff	SILTY CLAY with some fine sand; brown with occasional clayey silt layers to 3", trace fine roots/pinholes
10				D	27					grades without roots/pinholes
								SM/GM	dry medium dense	SILTY FINE TO COARSE SAND AND FINE AND COARSE GRAVEL; brown
15				D	28					grades to alternating layers to 6" of silty fine to coarse sandy fine gravel and silty fine to medium sand
20				D	23				very moist loose	grades with frequent fine silty sand/silty fine sand layers to 4"
								CL/ML	very moist	ALTERNATING LAYERS TO 6" OF SILTY CLAY, CLAYEY SILT,
25										

GROUNDWATER

DEPTH	HOLE	DATE

SAMPLE TYPE
A - Auger cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 3" O.D. thin walled Shelby tube
D - 3 1/4" O.D. 2.42" I.D. tube sample
C - California Split Spoon Sample

FIGURE 3A

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PROJECT Performing Arts Center/Classrooms Building
Snow College Campus, Ephraim, Utah
JOB NO. 1-517-003579 DATE 06-21-01

Page 2 of 2

LOG OF TEST BORING NO. B-1

RIG TYPE CME 550
BORING TYPE 3-3/4" ID Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows/foot	Dry Density (pcf)	Moisture Content (%)	Unified Soil Classification	Remarks	Visual Classification
25				D	10					AND FINE SANDY SILT; brown
								GM	very moist very dense	SILTY AND FINE TO COARSE SANDY FINE AND COARSE GRAVEL; brown
30				D	135					grades with occasional cobble
35				D	139					
40				D	150					

Stopped drilling at 40.0'

Stopped sampling at 41.5'

* Groundwater not encountered

Installed 1 1/4" diameter slotted PVC pipe to 40.0'

The discussion in the text under the section titled SUBSURFACE CONDITIONS, is necessary to a proper understanding of the nature of the subsurface materials.

GROUNDWATER

DEPTH	HOLE	DATE

SAMPLE TYPE
A - Auger cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 3" O.D. thin walled Shelby tube
D - 3 1/4" O.D. 2.42" I.D. tube sample
C - California Split Spoon Sample

FIGURE 3A
(cont'd)

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PROJECT: Performing Arts Center/Classrooms Building, Snow College Campus, Ephraim, Utah

JOB NO: 1-817-003579 DATE: 06-21-01

Page 1 of 2

LOG OF TEST BORING NO. B-2

RIG TYPE: CME 550

BORING TYPE: 3-3/4" ID Hollow-Stem Auger

Depth in Feet	Sample Type	Blows/Foot	Dry Density (pcf)	Moisture Content (%)	Unified Soil Classification	Remarks	Visual Classification
0					ML	moist "loose"/"medium dense"	FINE TO MEDIUM SANDY AND CLAYEY SILT; major roots (topsoil) to 4", dark brown
	D	6	81	22.8	CL	moist medium dense	SILTY CLAY with some fine sand and trace fine gravel; trace pinholes/rootholes; brown
5	D	8			ML	moist medium dense/loose	ALTERNATING LAYERS TO 1" OF CLAYEY SILT AND FINE SANDY SILT; brown
							grades with occasional silty clay layers
10	D	17			SM/SP	slightly moist loose	FINE TO MEDIUM SAND with sandy silt; brown
					GM-SM	"medium dense"	SILTY FINE TO COARSE SAND AND FINE GRAVEL; brown
					CL/ML	moist stiff	ALTERNATING LAYERS TO 6" SILTY CLAY AND CLAYEY SILT with occasional fine sandy silt, silty fine to coarse sand, silty fine and coarse gravel, and silty clay layers to 1"; brown
15	D	19	103	19.5			
20	D	14	107	21.7			grades to alternating layers to 6" of silty clay, clayey silt with some fine sand and fine sandy silt; brown
25							

GROUNDWATER: DEPTH / HOUR / DATE

SAMPLE TYPE

A - Auger cuttings.
S - 2" O.D. 1.38" I.D. tube sample.
U - 3" O.D. 2.42" I.D. tube sample.
T - 3" O.D. thin-walled Shelby tube.
R - 3-1/4" O.D. 2.42" I.D. tube sample.
C - California Split Spoon Sample

FIGURE 3B

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PROJECT: Performing Arts Center/Classrooms Building, Snow College Campus, Ephraim, Utah

JOB NO: 1-817-003579 DATE: 06-21-01

Page 2 of 2

LOG OF TEST BORING NO. B-2

RIG TYPE: CME 550

BORING TYPE: 3-3/4" ID Hollow-Stem Auger

Depth in Feet	Sample Type	Blows/Foot	Dry Density (pcf)	Moisture Content (%)	Unified Soil Classification	Remarks	Visual Classification
25	D	92			GM	very dense	SILTY AND FINE TO COARSE SANDY FINE AND COARSE GRAVEL; brown
30	D	153					
35	D	88					
							Stopped drilling at 36.0'. Stopped sampling at 36.5'. * Groundwater not encountered.
40							
45							The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary to a proper understanding of the nature of the subsurface materials.
50							

GROUNDWATER: DEPTH / HOUR / DATE

SAMPLE TYPE

A - Auger cuttings.
S - 2" O.D. 1.38" I.D. tube sample.
U - 3" O.D. 2.42" I.D. tube sample.
T - 3" O.D. thin-walled Shelby tube.
R - 3-1/4" O.D. 2.42" I.D. tube sample.
C - California Split Spoon Sample

FIGURE 3B (cont.)

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Page 1 of 2

LOG OF TEST BORING NO. B-3

PROJECT: Performing Arts Center/Classrooms Building, Snow College Campus, Ephraim, Utah

JOB NO.: 1-817-003579 DATE: 06-21-01

RIG TYPE: CME 550

BORING TYPE: 3-3/4" ID Hollow-Stem Auger

SURFACE ELEV.:

DATUM:

Columns: Depth in Feet | Continuous Penetration Resistance | Graphical Log | Sample | Sample Type | Blows/foot (140 lb. hammer, 30" free fall drop hammer) | Dry Density (lbs. per cubic foot) | Moisture Content (percent of dry weight) | Unified Soil Classification | REMARKS | VISUAL CLASSIFICATION

Depth (ft)	Sample Type	Blows/ft	Dry Density	Moisture	USC	Remarks	Visual Classification
0 – 4	D	12			CL FILL	dry, medium stiff to stiff	**SILTY CLAY**, major roots (topsoil) to 4"; dark brown; FILL; grades with some fine and coarse gravel
4 – 5					CL/ML	moist to very moist, stiff	**FINE TO MEDIUM SANDY CLAY AND CLAYEY SILT**, major rootholes/pinholes; gray
5 – 12.5	D	2	82	21.0	ML/CL	moist, medium stiff, loose	**ALTERNATING LAYERS TO 6" OF FINE SANDY SILT, SILTY CLAY, AND CLAYEY SILT**
	D	11	101	22.8			
12.5 – 23	D	12			ML/SM	slightly moist to moist, loose	**ALTERNATING LAYERS TO 8" SILTY FINE TO MEDIUM SAND AND FINE SANDY SILT** with occasional silty clay layers to 5"; grades with occasional layers containing some fine gravel
	D	48					
23 – 25	D	152			GM	slightly moist, very dense	**SILTY FINE TO COARSE SANDY FINE AND COARSE GRAVEL**, brown

GROUNDWATER: DEPTH | HOUR | DATE

SAMPLE TYPE:
- A - Auger cuttings.
- S - 2" O.D. 1.38" I.D. tube sample.
- U - 3" O.D. 2.42" I.D. tube sample.
- T - 3" O.D. thin-walled Shelby tube.
- R - 3 1/4" O.D. 2.42" I.D. tube sample.
- C - California Split Spoon Sample

FIGURE 3C

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Page 2 of 2

LOG OF TEST BORING NO. B-3

PROJECT: Performing Arts Center/Classrooms Building, Snow College Campus, Ephraim, Utah

JOB NO.: 1-817-003579 DATE: 06-21-01

RIG TYPE: CME 550

BORING TYPE: 3-3/4" ID Hollow-Stem Auger

SURFACE ELEV.:

DATUM:

Columns: Depth in Feet | Continuous Penetration Resistance | Graphical Log | Sample | Sample Type | Blows/foot (140 lb. hammer, 30" free fall drop hammer) | Dry Density (lbs. per cubic foot) | Moisture Content (percent of dry weight) | Unified Soil Classification | REMARKS | VISUAL CLASSIFICATION

Depth: 25 – 50

Stopped drilling at 24.0'.

Stopped sampling at 25.5'.

* Groundwater not encountered.

The discussion in the text under the section titled SUBSURFACE CONDITIONS, is necessary to a proper understanding of the nature of the subsurface materials.

GROUNDWATER: DEPTH | HOUR | DATE

SAMPLE TYPE:
- A - Auger cuttings.
- S - 2" O.D. 1.38" I.D. tube sample.
- U - 3" O.D. 2.42" I.D. tube sample.
- T - 3" O.D. thin walled Shelby tube.
- R - 3 1/4" O.D. 2.42" I.D. tube sample.
- C - California Split Spoon Sample

FIGURE 3C (cont'd)

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PROJECT Performing Arts Center/Classrooms Building
Snow College Campus, Ephraim, Utah
JOB NO. 1-817-003579 DATE 06-21-01

Page 1 of 2

LOG OF TEST BORING NO. B-4

RIG TYPE CME 550
BORING TYPE 3-3/4" ID Hollow-Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Sample	Blows/ft	Dry Density (pcf)	Moisture Content (%)	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0					ML/CL FILL	dry medium stiff	**FINE TO MEDIUM SANDY CLAY AND SILT**, major roots (topsoil) to 4"; brown; FILL
	D	11			ML/SM/CL	slightly moist medium stiff loose	**ALTERNATING POCKETS AND LAYERS TO 2" OF FINE SANDY SILT, SILTY FINE SAND, CLAYEY SILT, AND SILTY CLAY**; brown to red-brown; FILL
5	D	15	85	12.2	CL ML	dry stiff	**SILTY CLAY/CLAYEY SILT** with some fine sand, trace to some pinholes/rootholes; light brown
10	D	18					
15	D	21	93	13.8		slightly moist	grades with frequent silty clay layers to 5", trace to some rootholes/pinholes
20	D	17	97	8.9			grades with trace pinholes and with frequent fine silty sand and silty fine sand layers to 5"
25					GM/ML	slightly moist medium dense	**ALTERNATING LAYERS TO 12" OF SILTY FINE TO COARSE SAND, FINE AND COARSE GRAVEL, AND FINE TO**

GROUNDWATER: DEPTH / HOUR / DATE

SAMPLE TYPE
A - Auger cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 3" O.D. thin-walled Shelby tube
D - 3 1/4" O.D. 2.42" I.D. tube sample
C - California Split Spoon Sample

FIGURE 3D

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PROJECT Performing Arts Center/Classrooms Building
Snow College Campus, Ephraim, Utah
JOB NO. 1-817-003579 DATE 06-22-01

Page 1 of 1

LOG OF TEST BORING NO. B-5

RIG TYPE CME 550
BORING TYPE 3-3/4" ID Hollow-Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Sample	Blows/ft	Dry Density (pcf)	Moisture Content (%)	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0	D	6			ML/CL	very moist medium dense	**ALTERNATING LAYERS TO 6" OF SILTY CLAY AND CLAYEY SILT** with some fine sand; brown
5	D	7					
	D	5	104	24.1			grades with frequent fine sandy silt layers to 6"; trace pinholes/rootholes
10							
	D	11			CL/ML/SM	slightly moist medium stiff to stiff/loose	**ALTERNATING LAYERS TO 6" OF SILTY CLAY, CLAYEY SILT, SILTY FINE SAND, AND FINE SANDY SILT**, trace fine pinholes/rootholes; brown
15							Stopped drilling at 13.5'. Stopped sampling at 13.5'. * Groundwater not encountered.
20							The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary to a proper understanding of the nature of the subsurface materials.
25							

GROUNDWATER: DEPTH / HOUR / DATE

SAMPLE TYPE
A - Auger cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 3" O.D. thin-walled Shelby tube
D - 3 1/4" O.D. 2.42" I.D. tube sample
C - California Split Spoon Sample

FIGURE 3E

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PROJECT Performing Arts Center/Classrooms Building, Snow College Campus, Ephraim, Utah
JOB NO. 1-817-003579 DATE 06-22-01

Page 1 of 1

LOG OF TEST BORING NO. B-6

RIG TYPE CME 550
BORING TYPE 3-3/4" ID Hollow-Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Sample Type	Blows/foot	Dry Density (lbs. per cubic foot)	Moisture Content (percent of dry weight)	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0	D	9	96	21.5	CL FILL	moist medium stiff	**FINE AND COARSE GRAVELLY CLAY** with some fine to coarse sand; major roots (topsoil) to 4"; brown; FILL grades without gravel
	D	19	92	36.0	CL-ML	slightly moist stiff	**ALTERNATING LAYERS TO 4" OF SILTY CLAY WITH TRACE SAND AND CLAYEY SILT WITH SOME SAND**, trace to some rootholes/pinholes with occasional fine sandy silt layers to 1", brown
5	D pushed						grades with alternating layers of fine sandy silt, silty clay, and clayey silt with trace fine pinholes
10	D	9	99	15.9		medium stiff	grades without pinholes
15	D	9				very moist	

Stopped drilling at 14.0'.

Stopped sampling at 15.5'.

* Groundwater not encountered.

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary to a proper understanding of the nature of the subsurface materials.

GROUNDWATER: DEPTH / HOUR / DATE

SAMPLE TYPE
A - Auger cuttings
S - 2" O.D. 1.38" I.D. tube sample.
U - 3" O.D. 2.42" I.D. tube sample.
T - 3" O.D. thin-walled Shelby tube.
D - 3 1/4" O.D. 2.42" I.D. tube sample.
C - California Split Spoon Sample

FIGURE 2F

amec

PROJECT Performing Arts Center/Classrooms Building, Snow College Campus, Ephraim, Utah
JOB NO. 1-817-003579 DATE 06-22-01

Page 1 of 1

LOG OF TEST BORING NO. B-7

RIG TYPE CME 550
BORING TYPE 3-3/4" ID Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Sample Type	Blows/foot	Dry Density (lbs. per cubic foot)	Moisture Content (percent of dry weight)	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0					CL FILL	moist "soft to "medium stiff"	**SILTY CLAY** with some fine to medium sand; major roots (topsoil) to 4"; brown; FILL
	D	14			CL-ML FILL	moist stiff	**ALTERNATING LAYERS TO 3" OF SILTY CLAY, CLAYEY SILT, AND FINE TO COARSE SANDY SILT** with some fine and coarse gravel; brown; FILL
5	D	13	101	22.3	CL	very moist medium stiff to stiff	**SILTY CLAY** with numerous clayey silt and fine sandy silt layers to 1"; brown
10	D	12					
15	D	14			SM-GC	very moist medium dense	**ALTERNATING LAYERS TO 12" OF SILTY FINE TO MEDIUM SAND AND CLAYEY AND FINE TO COARSE SANDY FINE AND COARSE GRAVEL**, brown

Stopped drilling at 15.0'.

Stopped sampling at 16.5'.

* Groundwater not encountered.

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary to a proper understanding of the nature of the subsurface materials.

GROUNDWATER: DEPTH / HOUR / DATE

SAMPLE TYPE
A - Auger cuttings
S - 2" O.D. 1.38" I.D. tube sample.
U - 3" O.D. 2.42" I.D. tube sample.
T - 3" O.D. thin-walled Shelby tube.
D - 3 1/4" O.D. 2.42" I.D. tube sample.
C - California Split Spoon Sample

FIGURE 2G

amec

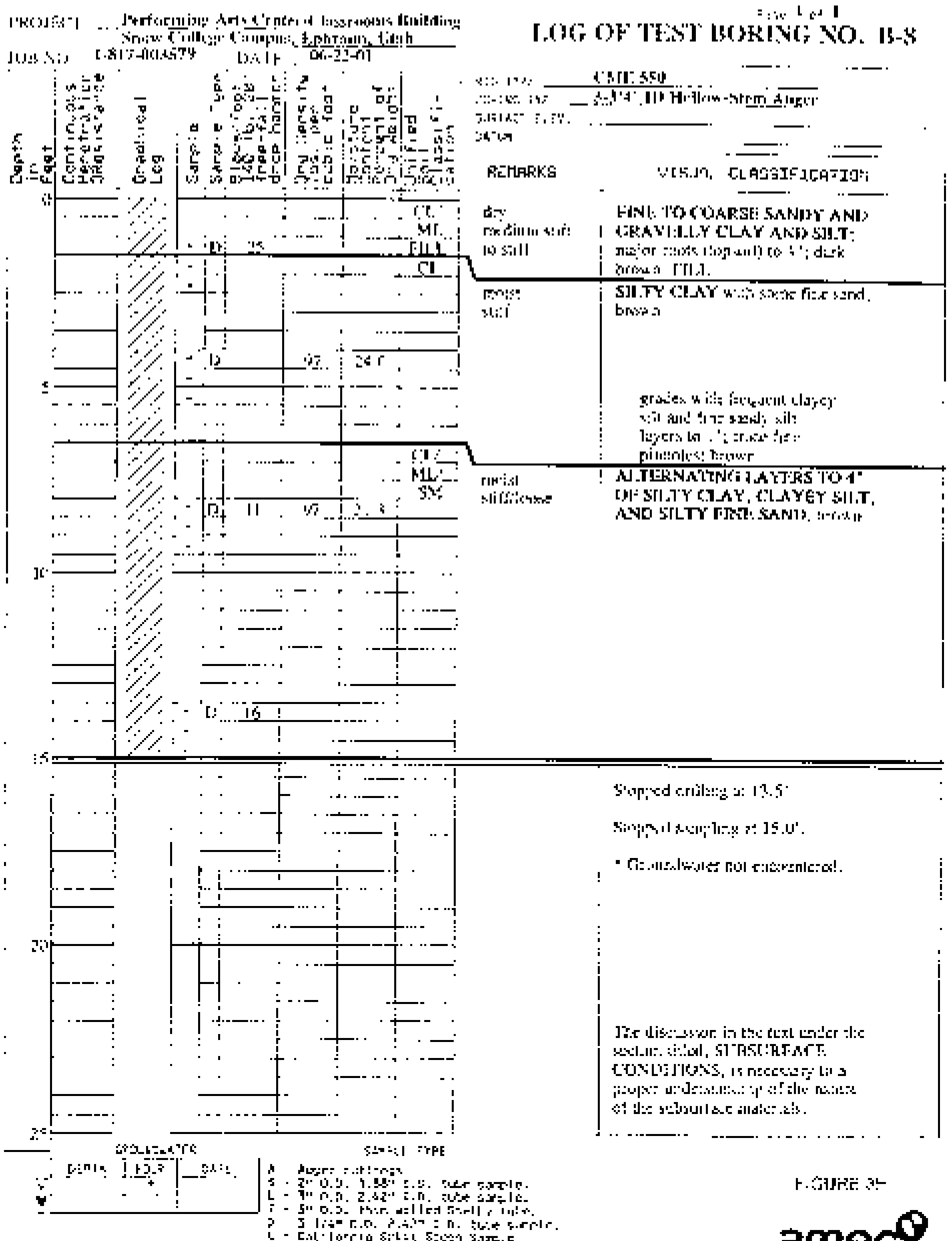


FIGURE 3b

amec

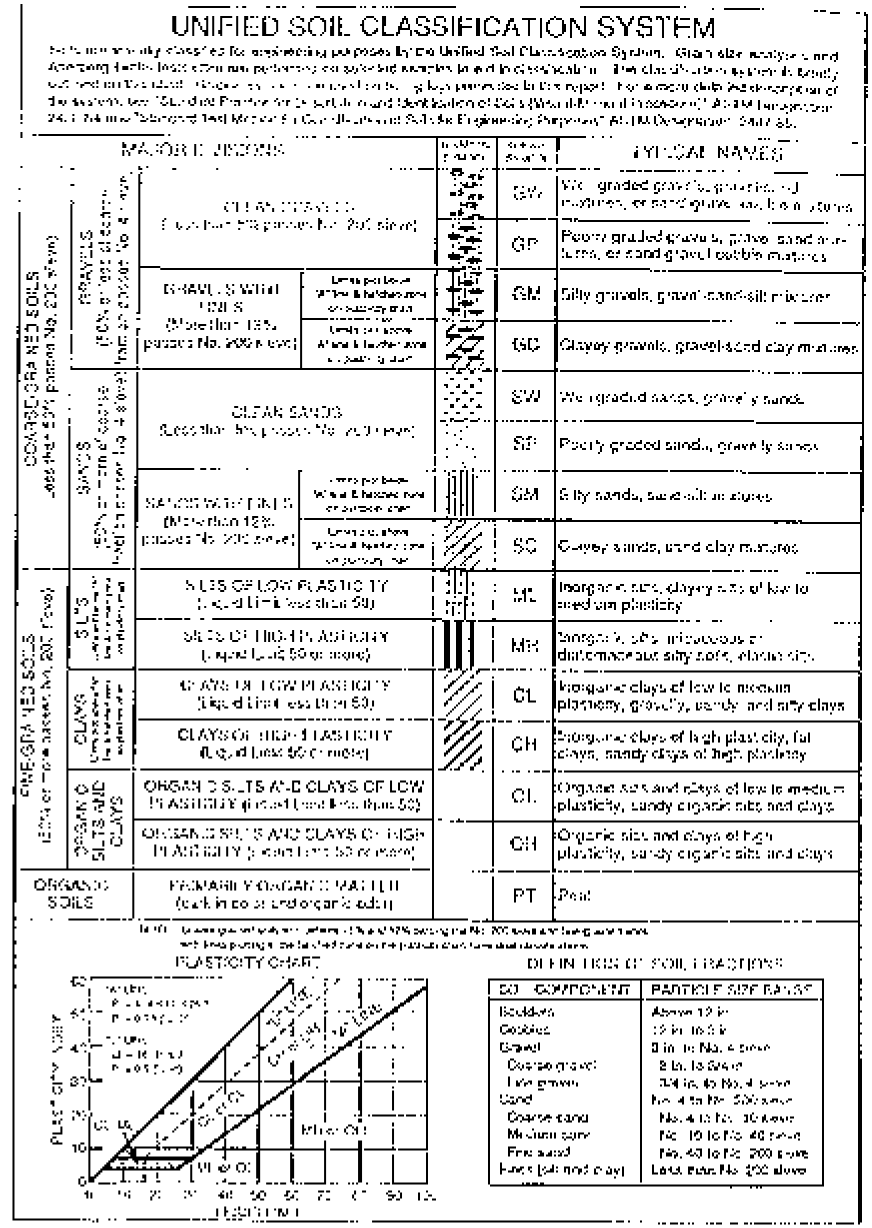


FIGURE 4

amec

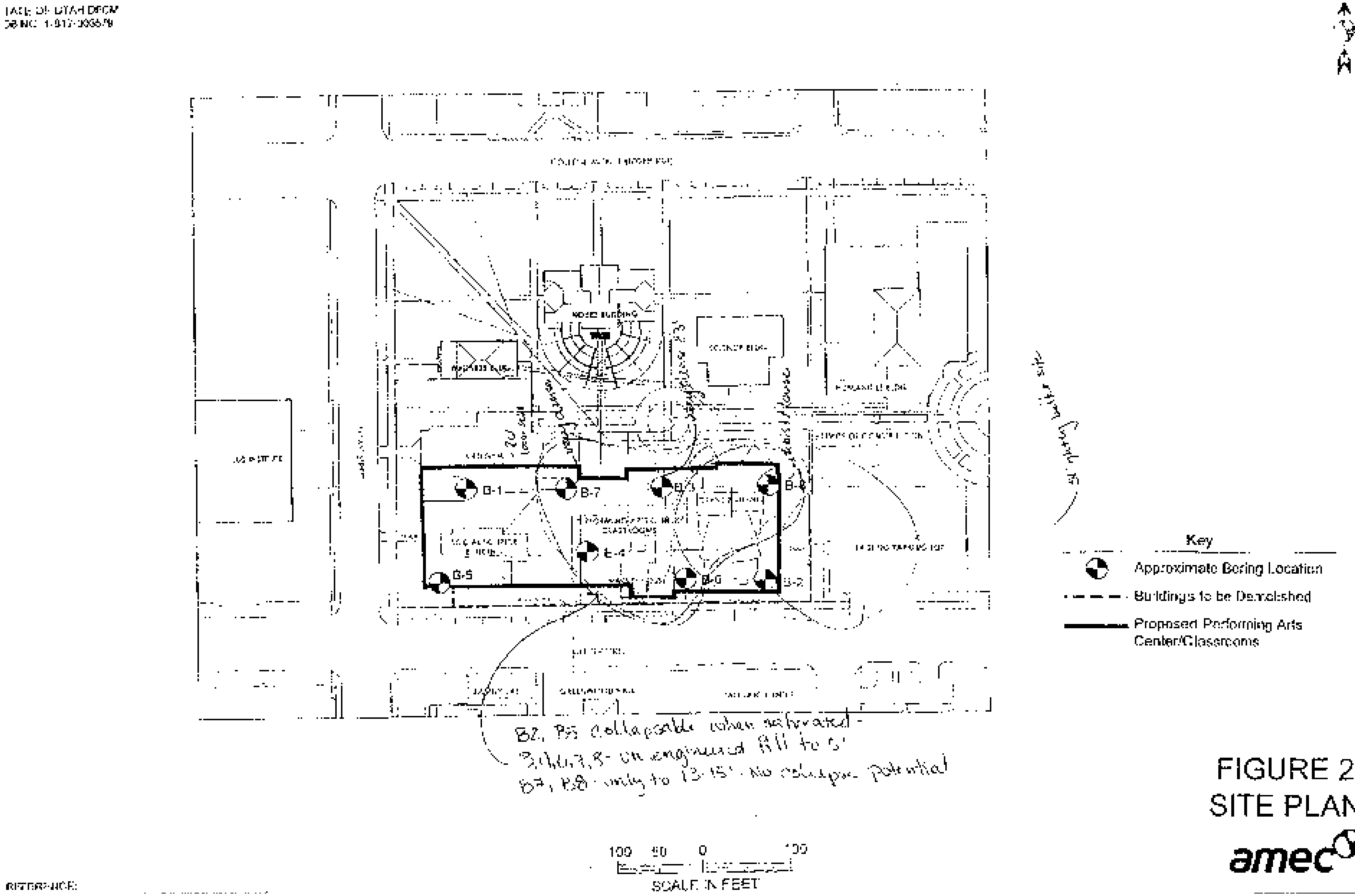


FIGURE 2
SITE PLAN

APPENDIX C - CHEMICAL CONTROL AREAS

There are a number of considerations when designing a laboratory building. One of these is the amount and location of chemical utilization. According to the Whole Building Design Guidelines, “an important consideration in design of a laboratory building are the types and amounts of chemicals and other hazardous materials anticipated to be used and/or stored in the facility. Each floor of a building is typically divided into control areas, with each control area able to house a defined percentage of the maximum allowable quantities of hazardous materials permitted by code.

Table 2: Maximum Allowable Quantity Per Control Area of Hazardous Materials Posing a Physical Hazard - abbreviated version of Table 307.1(1), IBC

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	"b STORAGE"			"b USE-CLOSED SYSTEMS"			"USE-OPEN b SYSTEMS"	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	"Gas (cubic feet at NTP)"	Solid pounds (cubic feet)	Liquid gallons (pounds)	"Gas (cubic feet at NTP)"	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible Liquid	II	H-2 or H-3	N/A	120	N/A	N/A	120	N/A	N/A	30
	IIA	H-2 or H-3		330			330			80
	IIIB	N/A		13200			13200			3300
Cryogenics, Flammable	N/A	H-2	N/A	45	N/A	N/A	45	N/A	N/A	19
Cryogenics, Inert	N/A	N/A	N/A	N/A	NL	N/A	N/A	NL	N/A	N/A
Cryogenics, Oxidizing	N/A	H-3	N/A	45	N/A	N/A	45	N/A	N/A	10
Flammable Gas	Gaseous	H-2	N/A	N/A	1000	N/A	N/A	1000	N/A	N/A
	Liquified			-150	N/A		-150	N/A		
Flammable Liquid	1A	H-2 or H-3	N/A	30	N/A	N/A	30	N/A	N/A	10
	1B & 1C			120			120			30

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	"b STORAGE"			"b USE-CLOSED SYSTEMS"			"USE-OPEN b SYSTEMS"	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	"Gas (cubic feet at NTP)"	Solid pounds (cubic feet)	Liquid gallons (pounds)	"Gas (cubic feet at NTP)"	Solid pounds (cubic feet)	Liquid gallons (pounds)
Flammable Solid	N/A	H-3	125	N/A	N/A	125	N/A	N/A	25	N/A
Organic Peroxide	UD	H-1	1	-1	N/A	0.25	-0.25	N/A	0.25	-0.25
	I	H-2	5	-5	N/A	1	-1	N/A	1	-1
	II	H-3	50	-50	N/A	50	-50	N/A	10	-10
	III	H-3	125	-125	N/A	125	-125	N/A	25	-25
	IV	N/A	NL	NL	N/A	NL	NL	N/A	NL	NL
	V	N/A	NL	NL	N/A	NL	NL	N/A	NL	NL
Oxidizer	4	H-1	1	-1	N/A	0.25	-0.25	N/A	0.25	-0.25
	3	H-2 or H-3	10	-10	N/A	2	-2	N/A	2	-2
	2	H-3	250	-250	N/A	250	-250	N/A	50	-50
	1	N/A	4000	-4000	N/A	4000	-4000	N/A	1000	-1000
Oxidizing Gas	Gaseous	H-3	N/A	N/A	1500	N/A	N/A	1500	N/A	N/A
	Liquified		N/A	-150	N/A	N/A	-150	N/A	N/A	N/A

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	"b STORAGE"			"b USE-CLOSED SYSTEMS"			"USE-OPEN b SYSTEMS"	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	"Gas (cubic feet at NTP)"	Solid pounds (cubic feet)	Liquid gallons (pounds)	"Gas (cubic feet at NTP)"	Solid pounds (cubic feet)	Liquid gallons (pounds)
Unstable (Reactive)	4	H-1	1	-1	10	0.25	-0.25	2	0.25	-0.25
	3	H-1 or H-2	5	-5	50	1	-1	10	1	-1
	2	H-3	50	-50	250	50	-50	250	10	-10
	1	N/A	NL	NL	NL	NL	NL	NL	NL	NL
Water Reactive	3	H-2	5	-5	N/A	5	-5	N/A	1	-1
	2	H-3	50	-50	N/A	50	-50	N/A	10	-10
	1	N/A	NL	NL	N/A	NL	NL	N/A	NL	NL

Note: This table is included only to illustrate certain design issues and has been abbreviated. Other sections of the Code will have to be considered as well, and there are possible exceptions, exemptions, or variations permitted depending upon other factors.

Table 3: Maximum Allowable Quantity Per Control Area of Hazardous Materials Posing a Health Hazard (abbreviated version of Table 307.1(2), IBC 2009*)

Material	Storage			Use, Closed Systems			Use, Open Systems	
	Solid Pounds (Cubic Feet)	Liquid Gallons (Pounds)	Gas (Cubic Feet at NTP)	Solid Pounds (Cubic Feet)	Liquid Gallons (Pounds)	Gas (Cubic Feet at NTP)	Solid Pounds (Cubic Feet)	Liquid Gallons (Pounds)
Corrosive	5000	500	Gaseous 810 Liquefied (150)	5000	500	Gaseous 810 Liquefied (150)	1000	100
Highly Toxic	10	-10	Gaseous 20 Liquefied (4)	10	-10	Gaseous 20 Liquefied (4)	3	-3
Toxic	500	-500	Gaseous 810 Liquefied (150)	500	-500	Gaseous 810 Liquefied (150)	125	-125
Note: This table is included only to illustrate certain design issues and has been abbreviated. Other sections of the Code will have to be considered as well, and there are possibly exceptions, exemptions, or variations permitted depending upon other factors.								

Control areas must be segregated from the rest of the building and each other by fire-resistive construction. Each floor level has a maximum number of control areas allowed. Additionally, each control area on a given floor has a maximum percentage of the allowable material quantity which is allowed to be housed within. Generally, these factors all become increasingly restrictive as the floor level increases to help ensure occupant safety and egress to the floor level at grade. These factors should be carefully considered when blocking and stacking the building in the early design phases to ensure that material quantities can be accommodated on the higher levels of a building."

The number of control areas, as well as the allowable chemical content is also mandated by the building code. The following table represents the allowable control areas and chemical quantities based on distance from ground.

Table 4: Design and Number of Control Areas (abbreviated version of Table 414.2.2, IBC 2009)

Floor Level		Percentage of the Maximum Allowable Quantity Per Control Area	Number of Control Areas Per Floor	Fire-Resistance Rating For Fire Barrier In Hours
Above Grade Plane	Higher Than 9	5	1	2
	7–9	5	2	2
	6	12.5	2	2
	5	12.5	2	2
	4	12.5	2	2
	3	50	2	1
	2	75	3	1
	1	100	4	1
Below Grade Plan	1	75	3	1
	2	50	2	1
	Lower Than 2	Not Allowed	Not Allowed	Not Allowed

Note: This table is included only to illustrate certain design issues and has been abbreviated. Other sections of the Code will have to be considered as well, and there are possible exceptions, exemptions, or variations permitted depending upon other factors.

APPENDIX D - COST ESTIMATE

PROJECT ESTIMATE	CONSTRUCTION CONTROL CORPORATION			2/2/2015

PROJECT NAME.............SNOW COLLEGE SCIENCE BUILDING
LOCATION......................EPHRAIM, UTAH
ARCHITECT......................VCBO Project Size 56,600 SF
STAGE OF DESIGN.........PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
	BUILDING A COST SUMMARY			
02	**SITEWORK & DEMOLITION**		**$ 14.62**	**$ 827,337**
03	**CONCRETE**		**$ 11.59**	**$ 656,251**
04	**MASONRY**		**$ 10.93**	**$ 618,677**
05	**METALS**		**$ 30.30**	**$ 1,715,165**
06	**WOODS & PLASTICS**		**$ 9.20**	**$ 520,720**
07	**THERMAL & MOISTURE PROTECTION**		**$ 10.31**	**$ 583,470**
08	**DOORS & WINDOWS**		**$ 15.68**	**$ 887,412**
09	**FINISHES**		**$ 26.78**	**$ 1,515,922**
10	**SPECIALTIES**		**$ 2.95**	**$ 166,970**
11	**EQUIPMENT**		**$ 8.62**	**$ 487,992**
12	**FURNISHINGS**		**$ 1.20**	**$ 67,795**
13	**SPECIAL CONSTRUCTION**		**$ -**	**$ -**
14	**CONVEYING SYSTEMS**		**$ 3.18**	**$ 180,000**
15	**MECHANICAL**		**$ 68.81**	**$ 3,894,644**
16	**ELECTRICAL**		**$ 36.74**	**$ 2,079,484**
	SUBTOTAL		**$ 250.92**	**14,201,839**
	GENERAL CONDITIONS	**5%**	**$ 12.55**	**710,092**
	OVERHEAD & PROFIT	**3.0%**	**$ 7.53**	**426,055**
	BONDS AND INSURANCE	**1.7%**	**$ 4.27**	**241,431**
	DESIGN CONTINGENCY	**10.0%**	**$ 25.09**	**1,420,184**
	TOTAL CONSTRUCTION COST		**$ 300.35**	**$ 16,999,601**
	ALTERNATE #1 GREENHOUSE	**1260 SF**	**$ 270.00**	**$ 340,200**
	POTENTIAL MARKET LOCATION FACTOR (added to construction cost above)	**12%**		**$ 2,039,952**

PROJECT ESTIMATE	CONSTRUCTION CONTROL CORPORATION			2/2/2015

PROJECT NAME…….…..SNOW COLLEGE SCIENCE BUILDING
LOCATION………….……..EPHRAIM, UTAH
ARCHITECT…..…….…..…VCBO Project Size 56,600 SF
STAGE OF DESIGN………PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
02	**SITEWORK & DEMOLITION**			
	Demolition			
	Site Clearing, Sidewalk Demolition	50000 SF	$ 0.89	$ 44,500
	Subtotal for Demolition			**$ 44,500**
	Earthwork			
	Building Excavation	4193 CY	$ 6.00	$ 25,156
	Backfill and Compaction w/ Imported Fills	3144 CY	$ 19.65	$ 61,788
	Remove Spoil	1048 CY	$ 7.00	$ 7,337
	Geo Piers	1 Allow	$ 150,000.00	$ 150,000
	Building Grading	18867 SF	$ 0.49	$ 9,245
	Gravel Under Slab	749 TNS	$ 24.00	$ 17,978
	Subtotal for Earthwork			**$ 271,503**
	Site Utilities			
	Utility Tunnel	60 LF	$ 2,000	$ 120,000
	Site Utilities	1 LS	$ 50,000.00	$ 50,000
	High Temp Water Line at Site	1 LS	$ 15,000.00	$ 15,000
	Chilled Water at Site	1 LS	$ 15,000.00	$ 15,000
	Subtotal for Site Utilities			**$ 200,000**
	Site Improvements	31133 SF	$ 10.00	**$ 311,333**
	TOTAL SITEWORK & DEMOLITION			**$ 827,337**
03	**CONCRETE**			
	Continuous Footings	359 CY	$ 305.00	$ 109,574
	Spot Footings	359 CY	$ 315.00	$ 113,167
	Foundation Wall/ Grade Beam	8040 SF	$ 24.00	$ 192,960
	Slab on Grade	18867 SF	$ 4.25	$ 80,183
	Topping Slab	37733 SF	$ 4.25	$ 160,367
	TOTAL CONCRETE			**$ 656,251**
04	**MASONRY**			
	CMU at Stair Enclosure	6552 SF	$ 14.68	$ 96,183
	Stone Veneer	7760 SF	$ 30.00	$ 232,794
	Brick Veneer	18106 SF	$ 16.00	$ 289,699
	TOTAL MASONRY			**$ 618,677**
05	**METALS**			
	Miscellaneous Steel	56600 SF	$ 0.38	$ 21,508
	Metal Floor Deck	37733 SF	$ 2.75	$ 103,767
	Metal Roof Deck	20942 SF	$ 1.95	$ 40,837
	Floor Structure (14#/SF)	528267 LB	$ 1.80	$ 950,880
	Metal Roof Truss Framing	18867 SF	$ 12.68	$ 239,229
	Concrete Filled Stair Pans	1396 SF	$ 54.00	$ 75,384
	Free Standing Railing	384 LF	$ 125.00	$ 48,000
	Wall Mounted Handrail	384 LF	$ 65.00	$ 24,960
	Decorative Stair	804 SF	$ 150.00	$ 120,600
	Decorative Stair Railing	400 SF	$ 225.00	$ 90,000
	TOTAL METALS			**$ 1,715,165**
06	**WOOD & PLASTICS**			
	Carpentry:			
	Wood Plates & Blocking	56600 SF	$0.55	$ 31,130
	Subtotal for Carpentry			**$ 31,130**
	Millwork	56600 SF	$8.65	**$ 489,590**
	TOTAL WOOD & PLASTICS			**$ 520,720**
07	**THERMAL & MOISTURE PROTECTION**			
	R-19 Insulation at Exterior Walls	25866 SF	$0.72	$ 18,624
	3" Rigid Insulation at Building Exterior	25866 SF	$2.95	$ 76,305
	Rigid Roof Insulation	20942 SF	$3.15	$ 65,967

PROJECT ESTIMATE	CONSTRUCTION CONTROL CORPORATION			2/2/2015

PROJECT NAME…….…..SNOW COLLEGE SCIENCE BUILDING
LOCATION………….……..EPHRAIM, UTAH
ARCHITECT…..…….…..…VCBO Project Size 56,600 SF
STAGE OF DESIGN………PROGRAMMING

CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
	Sound Batt	98003 SF	$0.48	$ 47,042
	Wall Sheathing	25866 SF	$1.65	$ 42,679
	Weather Barrier	25866 SF	$2.85	$ 73,718
	Composite Shingle Roof	20942 SF	$4.25	$ 89,004
	Metal Flashing	1950 SF	$5.05	$ 9,848
	Soffit/ Fascia	1675 SF	$20.00	$ 33,500
	Building Fireproofing	56600 SF	$1.85	$ 104,710
	Fire Stopping/ Caulking	56600 SF	$0.18	$ 10,188
	Caulking & Sealants	56600 SF	$0.21	$ 11,886
	TOTAL THERMAL & MOISTURE PROTECTION			**$ 583,470**
08	**DOORS & WINDOWS**			
	Interior Single Doors	181 EA	$1,020.00	$ 184,876
	Storefront Exterior Double Door	8 EA	$3,650.00	$ 29,200
	Overhead Door	2 EA	$2,958.00	$ 5,916
	Exterior Glazing (25% of Exterior)	6467 SF	$38.50	$ 248,960
	Curtainwall	4284 SF	$65.00	$ 278,460
	Interior Glazing	3500 SF	$40.00	$ 140,000
	TOTAL DOORS & WINDOWS			**$ 887,412**
09	**FINISHES**			
	Exterior Metal Stud Framing	30150 SF	$3.20	$ 96,480
	Interior Metal Stud Partitions	98003 SF	$1.95	$ 191,106
	Gyp Board Walls	226157 SF	$1.31	$ 296,265
	ACT Ceiing at lab areas	16443 SF	$4.75	$ 78,104
	Lab Flooring	16443 SF	$4.65	$ 76,460
	Non-lab Space Ceiling	40157 SF	$5.65	$ 226,887
	Non Lab Space Flooring	40157 SF	$5.65	$ 226,887
	4" Vinyl Base	15077 LF	$1.45	$ 21,862
	Integral Epoxy Base	195 LF	$3.50	$ 683
	Paint Interior Gyp Board walls	124386 SF	$0.42	$ 52,242
	Epoxy Paint Lab Space	101770 SF	$1.89	$ 192,346
	Wall Coverings	56600 SF	$1.00	$ 56,600
	TOTAL FINISHES			**$ 1,515,922**
10	**SPECIALTIES**			
	Specialties	56600 SF	$2.95	$ 166,970
	TOTAL SPECIALTIES			**$ 166,970**
11	**EQUIPMENT**			
	Fume Hood	24 EA	$12,208.00	$ 292,992
	Biological Safety Cabinet	12 EA	$15,000.00	$ 180,000
	Loading Dock Equipment	1 LS	$15,000.00	$ 15,000
	TOTAL EQUIPMENT			**$ 487,992**
12	**FURNISHINGS**			
	Walk-Off Mats	400 SF	$29.65	$ 11,860
	Blinds	6467 SF	$8.65	$ 55,935
	TOTAL EQUIPMENT			**$ 67,795**
13	**SPECIAL CONSTRUCTION**			
	TOTAL SPECIAL CONSTRUCTION			**$ -**
14	**CONVEYING SYSTEMS**			
	Elevator- 3 Stop	2 EA	$90,000.00	$ 180,000
	TOTAL CONVEYING SYSTEMS			**$ 180,000**
15	**MECHANICAL**			
	HVAC:	40157 SF	$32.00	**$ 1,285,024**
	Lab Area HVAC	16443 SF	$110.00	**$ 1,808,730**

PROJECT ESTIMATE	CONSTRUCTION CONTROL CORPORATION			2/2/2015
PROJECT NAME………..SNOW COLLEGE SCIENCE BUILDING				
LOCATION………………..EPHRAIM, UTAH				
ARCHITECT……………..…VCBO		Project Size	56,600	SF
STAGE OF DESIGN………PROGRAMMING				
CSI #	DESCRIPTION	UNIT QTY	UNIT COST	
	Fire Protection:	56600 SF	$2.85	**$ 161,310**
	Plumbing	56600 SF	$8.65	**$ 489,590**
	Lab Gas, Vacuum System	56600 SF	$2.65	**$ 149,990**
	TOTAL MECHANICAL			**$ 3,894,644**
16	**ELECTRICAL**			
	Service & Distribution (Including Emergency):	56600 SF	$8.34	**$ 472,044**
	Power:	56600 SF	$6.95	**$ 393,370**
	Lighting:	56600 SF	$9.00	**$ 509,400**
	Telecommunication System:	56600 SF	$4.95	**$ 280,170**
	Fire/Smoke System:	56600 SF	$2.25	**$ 127,350**
	Special Systems:	56600 SF	$5.25	**$ 297,150**
	TOTAL ELECTRICAL			**$ 2,079,484**

APPENDIX E - MEETING MINUTES

VCBO

Agenda - Kick Off Meeting

project	Snow College Science Program	project no.	14515
date	2014-08-28	location	Snow College
		meeting re:	Program Kick-Off

In Attendance

Snow College

Dan Black - Division of Natural Sciences and Mathematics Dean, Steve Hood - Vice President for Academic Affairs, Spencer Hill - Vice President of Finance and Administrative Services, Gary Carlston, President.

DFCM

Kurt Baxter - Program Manager

VCBO Architecture

Derek Payne - Principal Programmer, Justin Heppler - Project Manager, Whitney Ward - Programmer

Meeting Goals

To understand the history and goals for the new science building program, provide an overview of the programming process for the steering committee and create a preliminary schedule for early programming workshops.

Discussion Items

Project Overview

Snow College is committed to this new Science Facility. According to President Carlston, the College is at the "20 yard line" working toward confirmed financing from the legislature. This program will provide the necessary information to get the touchdown.

Snow College is paying for the program out of College funds to show their commitment to the Division and the new building.

Steering Committee

There will be approximately 16-17 people on the steering committee. It is important to have a representative from each of the Division's departments that use the building to ensure all groups are represented. Nursing and Natural Sciences will also be included in the program. If someone from the Steering Committee is unable to attend a meeting, a representative from their department would be encouraged to attend the meeting.

Programming Process

VCBO Architecture introduced the programming team, presented an overview of the programming process and discussed deliverables associated with the program and future fund raising materials.

Building tours were discussed as a way to explore what is happening in science education throughout the state. UVU and BYU were discussed as preferred tour locations.

Program Schedule

The Steering Committee will plan to meet every other week for 1 1/2 to 2 hours. This regular meeting will occur between 9 am and 10:30 am every other Wednesday morning.

The first Steering Committee meeting will be held on September 10 at 9:00am.

The first workshop is tentatively scheduled for September 17-18. This will begin with an All College Meeting to inform the faculty and staff of the programming process and discuss goals for the building. There will then be 2 hour interviews with each of the departments to understand their space needs. The workshop will conclude with a Steering Committee meeting to review what was learned from the process.

Tours are anticipated to occur after the first workshop.

Budget

There is a budget defined for this project of approximately 21.5 million for the entire project. This results in a construction budget of approximately 14 to 15.5 million. The current area estimate for the facility is around 53,000 square feet.

It will be important to understand the lab areas required as well as the non-lab areas in order to assess the project's budget.

There is currently approximately 2 million dedicated to furniture, fixtures and equipment for the building. The FF&E budget will also need to be assessed to be able to accurately reflect the realistic costs for the project.

Project Schedule

The program will be completed December 2014. The Legislature will then consider funding. If the design and construction is funded, the design will begin Spring 2015, with construction documents completed November or December 2015 and the project will be bid December 2015 or January 2016. The goal is for construction completion July 2017 in time for fall semester to begin.

Master Plan

The Master Plan Committee will meet after the Science Steering Committee. The Master Plan will be a review of the existing Master Plan and update.

The Master Plan Committee will include a representative from housing, athletics, each of the divisions and administration. A City representative will also be a part of the group.

The College has a fall enrollment of 4,700 students and expects to be at 6,000 students by 2020. Currently access to student housing is a limiting factor for enrollment.

Homework / Next Steps

Please consider your goals and aspirations for the science building. Also, please complete the attached space matrix for each department within the Science Division.

Consider how and where the Division will grow over the next 5 year, 10 year and 20 year futures.

General Discussions	The current instructional model is to have a lecture in a lecture room prior to a laboratory session. Several faculty are open to having a teaching lab where the instruction and experimentation occur in one location. The current class sizes are 48 students with two laboratory sections of 24. There was a recent increase in faculty to 34, and faculty growth is not anticipated in the next 3-4 years. Ideally, all Division faculty offices would be collocated. General discussion occurred around the preference for the building to encourage learning and act as a tool and opportunity for scientific engagement on campus. A number of tours also occur for middle school aged students. The buildings should engage the students and campus community. It should also reflect the historic nature of the campus and quality of Snow College.
10:30 - 12:30 pm	Science Building Tour - The VCBO team was given a tour of the current science building as well as the Natural Resources and Nursing program spaces.

The Programming Team will rely on these minutes as a record of the events of this meeting. If any items are not accurately represented, please contact VCBO Architecture, LLC.

VCBO Architecture, LLC

Whitney Ward

VCBO Architecture

VCBO

Meeting Minutes

project	Snow College Science Program	project no.	14515
date	2014-09-10	location	Snow College
		meeting re:	Steering Committee

In Attendance

Snow College

Dan Black - Division of Natural Sciences and Mathematics Dean, Steve Hood - Vice President for Academic Affairs, Spencer Hill - Vice President of Finance and Administrative Services, Gary Carlston – President, Allan Stevens – Biology, Larry Smith – Physics, Renée Faatz – Geology, Daniel Balls – Mathematics, Phil Allred – I.T., Brian Newbold – Engineering, Dean Brereton – Nursing, Heidi Johnson - Biology

VCBO Architecture

Derek Payne - Principal Programmer, Justin Heppler - Project Manager

COUNTY

Kevin Christensen

Meeting Goals

To understand the history and goals for the new science building program, provide an overview of the programming process for the steering committee and create a preliminary schedule for early programming workshops.

Discussion Items

Programming Overview

What is programming? A road map for the future designer. This is an opportunity to think about not only how you teach now but also how your replacement will be teaching in 40 years in that same space.

The programming team will meet with the departments in a series of workshops, during each workshop there will be breakout meeting where each group will have a 2hr block of time to review their spaces with the programming team. The workshops are spaced apart with time for the spaces to be developed and brought back for additional discussion and refining in the next workshop. A smaller committee should be assigned the task of overseeing the development of the shared spaces and offices.

- Biology expressed a need for more time than the 2hr block due to the amount of spaces that they have.

The first workshop will also feature an all division meeting where the programming team will present information on science trends across the country and have an opportunity for general comments and brainstorming by all attending.

- There was a discussion related to who should be invited to the all division meeting, whether it would be limited to science faculty or a broader invite extended to all the college faculty – it was determined that an invite will be extended to all of the faculty.

- The meeting will be moved from a 9am start to an 8am start so it is more convenient for the most faculty possible.

Building Size and President Carlston's Comments

100,000sqft represents what is currently sketched out as an ideal dream. The executive committee can vet that dream to determine how we "right size" the building. Generally there seems to be a need for 30% expansion in the future.

Kurt Baxter is currently updating the building estimate (CBE). The assessment of total square footage will be vetted after all of the workshop #1 sessions.

Snow College has a goal of raising 3 million. The college currently has 2.2 million budgeted for technology and furnishing of the new building but early estimates are that number is short; one possibility is to put another million in that budget to give more flexibility and ensure the building opens with all of the desired features and equipment. President Carlston will work with DFCM and legislature to push the building size to be as large as practicable. We need to be ready to cut area if we are in a position of being over budget.

The building board thinks building should be a little bigger than the legislature seems to be ready for. It is unlikely that the existing building will be maintained and that would help with the legislature negotiations. President Carlston's instruction is to keep the program as visionary as possible, recognizing that we may have to pare the programmed area if necessary.

Programming Vision

Would like a building that says this is a central Utah hub for science learning. The building and its programs should engage the immediate and larger community. It would be ideal if the community could come to the building for workshops, networking, and possibly a small business owner could "borrow" some lab space to accomplish a specific study or experiment relative to their operations.

- Dan - the building needs to scream science to anyone who comes to town; he described how the current music building missed the mark on this - you don't see music when you walk into that building, you don't see music when you look at the building from the outside.
- Community partnerships – Derek used example of Dixie Health Science and the adjacent Intermountain Hospital.

Other General Items

- I.T
  - recommended $2 a sf for distributed antenna systems to enhance function of mobile devices(is current direction at the U of U).
  - Requested that all departments review how they see technology interfacing with their labs and determine their needs and then involve I.T. for specific needs.
  - Should all students be required to have the same technology device?
    - Would solve some of the I.T. infrastructure coordination issues but execution is a challenge.
    - The future solution will likely be a virtual devise infrastructure - the main brain runs all of the desktop computers / pads / mobile devices.
- Meeting other regulatory requirements such as BSL2 and OSHA requirements - the programming team will bring the expertise to the table.
- Sustainability of the building – high performance building credits and science on display. If this is a priority it should be built into the program, this could also be incorporated into the regional science hub discussion.
- How does projected growth for the college as a whole play into the accommodate growth conversation?
  - This is important to the conversation - how does it interface with the conversation with the legislature? In several years there will be other competing priorities on campuses. The STEM window is currently now, Snow needs to take advantage of that window.
- Problem at Snow is not space utilization as much as it is employee utilization. At Snow this is not as easily solved by adding an adjunct professor.
- Biggest fear by "biology" is that we aren't going to build enough lab space to grow - providing labs should be a higher priority than classrooms, classrooms can be located in other buildings on campus.
  - Could we provide classroom spaces that as they grow can be converted to labs?
  - Would teaching labs that dual purpose as classrooms help solve this problem?
  - Another approach would be to not build classrooms – only new labs; classroom teaching could occur in spaces available elsewhere on campus.
  - What if a movable partition is located between 2 labs that seat 24 so that they could open to a larger space that sits 48.
- Within the science division classrooms are usually 48 and labs are usually 24 students.

Tours

VCBO will coordinate the tours at the different facilities, a request will be made to have faculty available to discuss the buildings. Friday Oct 10 - 9am (@ BYU Life Science Building), let President's office know the schedule so that they can help arrange parking. The following buildings will be included in the tour:

BYU

- New Life Science Building

UVU

- New Science Building

U of U

- Health Sciences Education (student study / classroom)
- Thatcher Chemistry

Westminster

- Meldrum Science Building (optional stop at the end for those who haven't seen it)

Workshop 2

Wednesday October 22nd and Thursday October 23rd - duplicate the scheduled time slots from Workshop 1 for consistency for the faculty, October 14th & 15th is an alternate date window.

Homework / Next Steps	VCBO will schedule the tours and send confirmation to Snow College.
	Dan Black will make discussed adjustments to the schedule and send to VCBO.
	Steering Committee meetings will be scheduled for October 1st and October 15th at 8:00am.

The Programming Team will rely on these minutes as a record of the events of this meeting. If any items are not accurately represented, please contact VCBO Architecture, LLC.

VCBO Architecture, LLC

Justin Heppler

VCBO Architecture

VCBO

Meeting Minutes

project	Snow College Science Program	project no.	14515
date	2014-09-17 and 18	location	Snow College
		meeting re:	Workshop 1

In Attendance	Snow College Varies by session - see attendee lists VCBO Architecture | RFD Derek Payne - Principal Programmer, Justin Heppler - Project Manager, Whitney Ward - programmer, Sean Towne - Principal Laboratory Planner with RFD
Meeting Goals	To understand the space needs and expectations for each department.

Discussion Items

Schedule

Workshop 1 Schedule: September 17, 2014

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	Lunch Break
[illegible]	[illegible]
[illegible]	[illegible]

September 18, 2014

[illegible]	[illegible]
10:00 AM - 12:00 PM	[illegible]
[illegible]	Lunch Break
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Discussions — Please see the notes on the following pages for the spaces requested and discussions held over these two days.

Homework / Next Steps — Steering Committee meetings scheduled for October 1st and October 15th at 8:00am. Building tours will be held on October 10.

The Programming Team will rely on these minutes as a record of the events of this meeting. If any items are not accurately represented, please contact VCBO Architecture, LLC.

VCBO Architecture, LLC

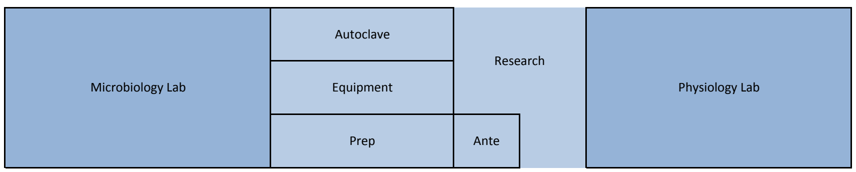
Whitney Ward,

VCBO Architecture

Biology Discussion

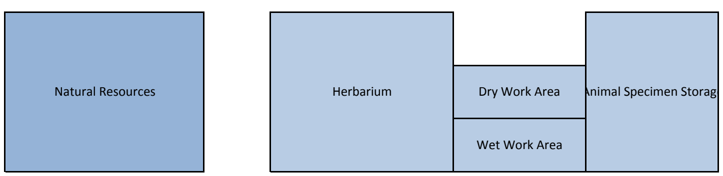
Microbiology | Physiology

Space Type	Space Name	Lab Modules / Size	Capacity	Notes and Equipment
Lab	Microbiology Teaching Lab	4	24 students	BSL2, lockable laptop cart, microscope storage (2 sets), biosafety cabinet, incubators, refrigerators, benchtop equipment
Lab	Physiology Teaching Lab	4	25 students	BSL2, movable stations
Support	Autoclave	200 sf		
Support	Prep	200 sf		
Support	Support - Equipment Room	200 sf		minus 80 freezer, Incubator, Spectrometer, Centrifuge, DNA Sequencer, Fluoroscopy Scope, backup power for equipment, shared between teaching labs
Research	Research Lab	2 or 3	10 students, 2 faculty	BSL2,
Support	Ante Rooms?			May be required for BSL2 entry



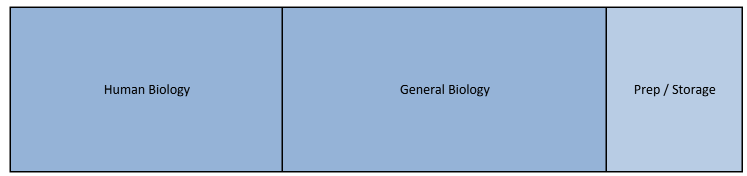
Botany | Animal Biology | Natural Resources

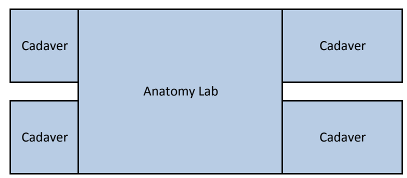
Space Type	Space Name	Lab Modules	Capacity	Notes and Equipment	
Lab	Natural Resources Teaching	4	24 students	Shared between Soil Science, Botany and Animal Science Classes. Need microscope	talk to Chad
Lab	Share Geology Lab		24 students	configure geology and natural resources to share labs. Have two labs with shared support spaces.	
Support	Workroom	2			
Support	Herbarium and Specimen Collection Storage and Workroom	3 or 4		Temperature and humidity control. 2 modules for herbarium including high capacity storage and work space with layout, wet prep and microscopes. 2 modules for animal specimen storage with display, work area and storage.	Consider sharing with geology storage, does not need daylight.
Support	Field Equipment / Workroom	200 sf		Adjacent to exterior with wash off and work	



Human Biology | Anatomy

Space Type	Space Name	Lab Modules	Capacity	Notes and Equipment	
Lab	Human Biology	4	24 students	Models used, no cadavers. Wet bench and storage at perimeter with movable tables in the center. VCBO and RFD to provide design	transparent wall with doors between for shared 48 person lab.
Lab	General Biology Lab	4	24 students	Want nearby access to collections. Wet bench and storage at perimeter with movable tables in the center	
Support	Prep / Storage	2		Adjacent to General Biology, need fume hood	
Lab	Anatomy Lab	5	24 students	Separate dissection areas from the general lab. There would be one cadaver in each zone. Cadavers stay in the room - storage and work area. Plan for 4 cadavers. Storage for models in glass cases. Movable tables.	
Support	Stock Room			May be shared within the building.	





less ventilation requirements, may be more flexible classroom/labs.
These are all models.
currently lower intensive laboratories.

Math

Space Type	Capacity or Area	Quantity	Notes
Classroom (room 140 and 110)	35 Students	8	2 in Noyes, 2 in Science, others around campus, there is a 35 student limit - Writing surface - 1 long wall (for calculus), spilt between chalk and marker; lots of support for digital projection on a larger central screen - like the new smart board in science 127 - prefer teacher is accessing a smart screen that projects on a larger screen - need option for plug in of laptop and a base CPU
Math Lab	35 students	1	Great space, well utilized, too small to accommodate growth
Computer Classroom	35 students	2	Noyes. Limited power, data and flexibility. Laptop cart for half of the students. 35 student limit. New tables in the Noyes rooms would be preferred. There is now integrated power in the classrooms.
Commons Area	10-12 people	1	Great area used by students and faculty to gather. Includes honors library.
Offices	120	20	Located in 7 different locations in 5 buildings. A suite with commons is preferred
Adjunct Offices	500	2	will grow from 10 to 20 adjunct.
Work Room	250	1	mail room, print and copy, supply storage. One black and white and one color copier. Counter space is needed for lab manuals
Break Room	250	1	This could be off the commons area and be a shared conference and break room

Being located across campus is difficult for the department, but is also nice as it encourages cross collaboration.
It would be beneficial to be located in a science building.
Snow has to be open enrollment as a 2 year school. Housing will limit enrollment more than anything
The math department is hoping that developmental math needs will reduce over time. Right now 50% of math classes are developmental
Classrooms are full 8am to 4pm. This may need to expand to include night courses.
There is 1 four year degree on campus. Snow is a 10% Carnegie designation that 10% of graduates could have a 4 year degree.
Long term growth may include a 4 year degree program.
The math faculty has gone from 6 to 12 in the last 15 years, with 10 adjuncts. It may go to 20 faculty and 12-15 adjuncts.
Student spaces that can be adjacent to other science study areas would be ideal.
Math is too big to move the entire program over to the new building. Ideally half would be in Noyes and half in the new building. Having math in 2 buildings is better than 5 buildings.
Furniture that accommodates all student sizes and needs is preferred. Do not use the flip tablet seating in any new classrooms.

Engineering and Computer Science

Space Type	Space Name	Lab Modules	Capacity	Notes and Equipment
lab	Engineering Lab (Bust'em Lab)		24 students	Exterior access, overhead door for equipment. Small scale shop and project space. Prototyping, testing and fabrication space. A teaching wall and movable tables and stools and one or two hoods. Fluid dynamic bay with wind tunnel, sand and water tables.
support	Equipment Storage	1		
lab	Physics Lab / Classroom	shared	shared	Electrical and physics will share a lab.
class	Computer Lab		24 students	Engineering and Computer Science dedicated lab. Programming and robotics class is taught there. Digital Circuits can occur in this lab as well.
future	Electronics Lab		24 students	This would be needed for a future 4 year computer science program.
future	Open Computer Lab		24 students	Open for science division and student use. Ideally this would be adjacent to the other lab, and have direct access between the two.
class	Lecture Room		students	Can lecture occur in the lab?
class	Lecture Room	shared	60-75 students	There are other areas on campus (library and humanities) where this could occur if necessary.

Copy/Print and Mail distribution as well as a faculty lounge are needed.
Student spaces to accommodate students that live in the building.
Some smaller use spaces with access to computers may be considered.

Chemistry

Space Type	Space Name	Quantity	Capacity	Notes and Equipment
Lab	General Chemistry	2	24 students	May be adjacent to one another with operable wall as divider
Lab	Organic Chemistry	1	24 Students	12 hoods preferred, 6 min. One set of 24 shared kits. 4 drawers per desk should be adequate. Consider sharing with microbiology for more efficient utilization. Air, vacuum, RO water, gas and inert gas.
Support	Stock Room			Adjacent to labs, may want to consider pass through hoods between the stock room and labs, even though this adds additional area.
Support	Instrument Room			Includes MMR
Lab	Research Lab	2 or 3	3-4 people working	Could be in one single room. Should include air, vacuum, RO water, gas, inert gas
Classroom	Library - Distance Ed. Lab	1	20-24 students	would host online offerings, would be overseen by a faculty member or TA. Ideally there would also be ample storage in this space.
Classroom	Shared Classroom	2	24 Students	Should be adjacent spaces with operable wall as a divider. Shared classroom.

Physics

Space Type	Space Name	Lab Modules	Capacity	Notes and Equipment
Class	Planetarium		35 students	
Lab	Physics Lab		24 students	shared with engineering, desks need to be sturdy. Uni-strut structure at ceiling
Lab	shared lab			shared with geology and natural resources
Support	Storage			

Classroom space should be flexible and movable seating.
Planetarium could be the once nice lecture hall that could cross function as a planetarium - seating 30-35 students

- flat floor
- fixed or loose seating
- cross functioning as a lecture room
- huge swath of the state that has no access to this kind of stuff - very high on this
- Current inflatable dome is 6 meters
- Ted wants 70 seats if it serves as the auditorium

Observatory

- on the roof
- platform would be OK to block the light from campus

Foucault Pendulum wanted in a visibly prominent location

Shared Spaces

Space Type	Capacity	Quantity	Notes	AV / IT
Entry Lobby		1	Science on display, interactive elements, one for animals and one for plants. Integrate digital information and physical specimens. Consider it a "mini-museum".	Integrated technology - to be determined

Natural history museum for central Utah. A lot of local kids cannot afford to go to the museum. Each Division can have a display. Put the laboratories and sciences on display. Integrate exhibits into alcoves for each department. This is an integrated student project that can be updated. Exploratorium like exploration opportunities Snow College is about the people and the experience. It is an amazing experience. We want engagement, excitement and a living and changing building and experience.

Shared Student Spaces

Space Type	Capacity	Quantity	Notes	AV / IT
Engineering Study	20 students	1		Flat panel displays
Open Student Commons	30-50 students	1		Power available
Group Study	6-8 students	2		Flat panel display, white board paint or wall talker.
Student Kitchen		1	Sink and microwave and vending machines	

Shared Faculty Space

Space Type	Capacity	Quantity	Notes	AV / IT
Faculty Reading Room	12 people	1	Refrigerator, sink, microwave, table and chairs, couch - can the kitchen and reading area be separated.	Bookshelves, books, comfortable seating.
Workroom		1	1 larger space	Print, copy, material storage, mailboxes, counter space.
Print Alcove		3	1 per floor	Print, small storage area.
Faculty Offices	35-50	38		
Lab Manager Office	2	2		

Classrooms

Space Type	Capacity	Quantity	Notes	AV / IT
Seminar Room	20 people	1	This would be well utilized. One per floor.	Distance education enabled
Seminar Room	10 -12 people	1	This would be well utilized.	Distance education enabled
Classroom	48 people	1	Tiered lecture in half circles were preferred. One distance education enabled with science ready teaching station. Divisible into (2) 24 person classrooms	Screens off to the side of the board to allow for both screen and board visibility
Classroom	48 people	1	Flat, flexible furniture, distance capable. Divisible into (2) 24 person classrooms. Quality furniture.	Can these be laboratory ready? Basic infrastructure to convert to laboratory
Classroom	72	1	three 24 student classrooms, with operable partitions for a total capacity of 72.	
Planetarium	35 people	1	There are donors that would like a planetarium.	
Greenhouse			The stand alone greenhouse is working well now. It requires a lot of dedication.	

There is inconsistent power in Eiphraim. The greenhouse needs to be on UPS. Needs two forms of back up heat. It currently has heat from the central plant, but needs backup from April to October as needed. Look for a reliable back up heating system.
Currently the staff have to be in the greenhouse for access.
Could the greenhouse stay in place with a surrounding garden?
The facilities department is also interested in dismantling the greenhouse and using it for campus landscape needs.
A bigger greenhouse is needed. Ideally it would include a student lab area, adjacent to the head house. Up to 10-12 people would need to be accommodated.
Cooling is provided by evaporative cooling, but it is mostly cooled by vents.
The roof is permanently shaded to protect the ferns.
Venting is currently through the side walls.
An easy and clear control system is preferred in the greenhouse.
Polycarbonate is ok, but glass is preferred for the greenhouse. Glass is more than twice as expensive.
A visible glass wall where you can see into the greenhouse from the building would be great. The greenhouse needs to be physically separated from the building due to pesticide use and other chemical use in the greenhouse.
A green roof would be more accessible to students than the greenhouse. Ideally facilities would do the maintenance, and this should be considered with the funding.
Planetarium, weather station and greenhouse may all be located on the roof.
If the roof becomes cost prohibitive, a great installation at the ground would be fine.
If the existing greenhouse remains, it needs to have an integrated landscape and thoughtful re-design.
The current brick wall moderates the temperature of the greenhouse.
Two greenhouses, one for collections and a second for student use.
Integrated campus edible garden would be preferred around the existing greenhouse, where the science building sits.

Student Study Spaces
Biology students primarily study in the lab
Biology and chemistry majors currently tend to congregate.
Engineering wants a dedicated student space, outside of the labs.

Spaces for students to wait outside of the labs and classrooms with a study or work area would be great.
White boards and seating areas with comfortable chairs outside labs should be accommodated
Microwave and refrigerator and sink for student break area is preferred. This can be shared between everyone in an accessible area.
Engineering needs a closed in study area that accommodates 15 to 20 students - tables, chairs, chalk boards.
Engineering faculty need to be near student study and work spaces.
Small group enclosed study rooms are needed to accommodate 6-8 students. These should have white board paint and flat panel displays.

Locate study rooms and student rooms off entry area.

Provide another open
THE STUDENTS ARE THE IMPRESSIVE ELEMENT OF THE BUILDING. THEY ARE ENGAGED AND ACTIVE.
Lobby space should be discussed in more detail. It is a space for gathering, student presentations and showing student work.
Lobby display space is important. 3 story space with atrium, fish tanks, poison arrow frogs, Foucault's pendulum - show science right off the entry.
Living specimens would be really exciting off of the entry. A plant collection in a specific environment with displays about the plants would be interesting.
Westminster has some interesting displays, but not enough.
There is a lot of student poster display in the corridors and around the laboratory spaces.
There is an evolution of plant display that could be integrated into the experience.
Tours bring a grade level at once with 90-100 students. A couple of key areas for students to gather. Typically there are multiple groups a month that visit.
Student ambassadors bring 10 people through the building multiple times a week for recruiting tours.

Geology | Natural Science

Space Type	Space Name	Lab Modules	Capacity	Notes and Equipment	
Lab	Geology Lab / Classroom	4	24 students	Direct access to sample storage. Will be a shared lab space with Natural Resources. Base cabinets on three sides with upper display and map display above.	Natural resources needs expansion space and equipment storage.
Lab	Prep / Workroom			Prep room with benchtop and sediment table. Access for students to work outside of lab. Shared with Natural Resources.	
Support	Field Equipment Storage			Direct exterior access, may be shared with botany.	
Support	Lapidary			May be located in or near storage space	
Support	Sample Storage			Direct access to laboratory	
Support	Mineral display			Visible, accessible and engaging. It is nice to have it by the faculty office for a more engaging experience.	

Lapidary - rock cutting, polishing and gem cutting process and prep
Offices near the classroom was stated as a preference by some of the faculty.

VCBO

Meeting Minutes

project	Snow College Science Program	project no.	14515
date	2014-10-01	location	Snow College
		meeting re:	Steering Committee Meeting

In Attendance

Snow College

Dan Black - Division of Natural Sciences and Mathematics Dean, Steve Hood - Vice President for Academic Affairs, Allan Stevens – Biology, Larry Smith – Physics, Phil Allred – I.T., Brian Newbold – Engineering, Kari Arnoldsen - Mathematics

Brant Hanson - Ephraim City Manager, Kevin Christensen - Sanpete County Economic Development

VCBO Architecture | RFD

Derek Payne - Principal Programmer, Whitney Ward - programmer

Meeting Goals

To review the workshop 1 findings and discuss next steps

Discussion Items

Workshop 1 Findings

The workshop 1 findings were discussed. This presentation began with a word cloud illustrating the vision for the building as discussed at the All Division meeting.

There were a few descriptors that were missing. These were Inspiring, Excitement, Expanding, Research, Family and Friends, Belong and Fun.

After the word cloud was presented, the group discussed the common themes and findings from the envisioning success exercise. These common themes were to create a facility that is welcoming and exciting for students, engaging and interactive and collaborative. Finally, the facility should meet current and future needs.

The space summary from the workshop was also reviewed. The faculty was concerned that there were not sufficient classroom spaces and offices in the building.

After some discussion, it appears that there are really only 4 laboratories that need to be dedicated to a department. These would include 3 biology labs and 1 organic chemistry lab. The rest of the labs could be shared use spaces. Effective support spaces need to be located adjacent to these flexible labs to ensure they are usable.

A mock-up schedule might also be a valuable tool to assess the ability of the proposed spaces to meet the division's needs.

Additionally, the need for future space through an addition or new facility should be a part of the master plan to show how the Division can grow into the future.

Building Tours

Building tours will be held on October 10. The schedule is as follows:

9:00 a.m. – 10:15 a.m. BYU Life Sciences Building

James Porter (james_porter@byu.edu) (801) 422-9160

10:30 a.m. – 12:00 p.m. UVU Science Building

12:00 p.m. – 12:45 p.m. Lunch

12:45 p.m. – 1:30 p.m. In transit to University of Utah

1:30 p.m. – 2:45 p.m. U of U Health Science Education Building

Melissa L. Rethlefsen, melissa.rethlefsen@utah.ed, 801-58(7-9051)

3:00 p.m. – 4:15 p.m. U of U Skaggs Pharmacy Building

Danielle Keddington, danielle.keddington@pharm.utah.edu, (801) 581-7503

4:15 p.m. – 5:15 p.m. Westminster Meldrum Science Center

Richard Brockmyer (r.brockmyer@westminster.edu) (801) 694-9730

Homework / Next Steps

Prepare for Workshop 2 - to be held October 23-24

Workshop 2 agenda will be distributed prior to October 15

The Programming Team will rely on these minutes as a record of the events of this meeting. If any items are not accurately represented, please contact VCBO Architecture, LLC.

VCBO Architecture, LLC

Whitney Ward,

VCBO Architecture

VCBO

Meeting Minutes

project	Snow College Science Program	project no.	14515
date	2014-10-23 and 24	location	Snow College
		meeting re:	Workshop 2

In Attendance

Snow College

Varies by session - see attendee lists

VCBO Architecture | RFD

Derek Payne - Principal Programmer, Justin Heppler - Project Manager, Sean Towne - Principal Laboratory Planner with RFD

Meeting Goals

To further define the space needs and expectations for each department.

Discussion Items

Schedule

Workshop 2 Schedule: October 23, 2014

8:00 AM - 9:00 AM	Steering Committee Meeting
8:00 AM - 9:00 AM	Master Plan (break out)
9:30 AM - 12:30 PM	Chemistry
12:30 PM - 1:00 PM	Lunch Break
1:00 PM - 1:30 PM	Chemistry & Biology
1:30 PM - 5:30 PM	Biology
2:30 PM – 4:00 PM	Classrooms & Mathematics (break out)

October 24, 2014

8:00 AM - 10:00 AM	Offices & Student Study (break out)
8:00 AM – 11:00 AM	Geology/Natural Resources/Plants-Soils Biology
11:00 AM - 12:00 PM	Geology/Natural Resources/Plants-Soils Biology & Engineering
12:00 PM - 12:30 PM	Lunch Break
12:30 PM - 3:00 PM	Engineering/Physics
2:00 PM - 3:00 PM	Crazy Ideas / Art / Visioning (break out)
3:00 PM - 4:00PM	Programming Team Data Analysis
4:00 PM - 5:30 PM	Executive Committee Meeting

Discussions

Please see the notes on the following pages for the spaces requested and discussions held over these two days.

The Programming Team will rely on these minutes as a record of the events of this meeting. If any items are not accurately represented, please contact VCBO Architecture, LLC.

Justin Heppler,

VCBO Architecture, LLC

October 23, 2014

Steering Committee

Attending:
Larry Smith (Physics)
Garth Sorenson (Engineering)
Brian Newbold (Engineering)
Kari Arnoldsen (Math)
Renee Faatz (Geology)
Dan Black (Chemistry)
Allan Stevens (Biology)
Derek Payne (VCBO Architecture)
Justin Heppler (VCBO Architecture)
Sean Towne (RFD)

Discussion Topics:

General

- Concern was expressed that with the baseline program this is essentially a replacement building in that the general sense is that they are basically replacing what they have without gaining any new spaces
- A desire was expressed to re-use the existing building as classroom space and gain more lab space in the new building - but everyone understands that the existing building is slated to be demolished
- Classrooms – a question was brought up regarding the efficiency of the classroom space, they are currently lecturing to 48 students in 720sf spaces
- Dan expressed a desire for an outside voice to emphasize the reasonable need for additional square feet over the baseline program that resulted from workshop #1
- Future growth
  - There was a discussion regarding if we can't grow the program what can we do to accommodate future growth
    - We could plan for certain departments to eventually move into a new building built specifically for them and have those labs/classrooms outfitted for easy conversion to accommodate growth

Tour Feedback

- Dan did not feel that any of the buildings we toured successfully branded the building as a science building on the exterior
  - Renee suggested that we look at the Big Water Visitors center because from above it is shaped like an Ammonite
  - There was discussion regarding whether or not the 1% for the arts could play a role in branding the building on the exterior, we discussed how other facilities have accomplished this with kinetic wind sculptures etc.

- Dan wants a large scale video projection on a glass curtain wall that has a loop of science related videos

- Interactive Exhibits
  - They liked the interactive exhibits at Meldrum but they want double or triple more exhibit opportunities, with multiple sizes of spaces available for these
  - They are having interdepartmental discussions regarding how to manage these, are they student projects, or sponsored and managed by retired faculty
  - They would like the exhibits to be rotated to something new on a yearly basis at a minimum, possibly some could be permanent and some could be rotating
- Flexibility/Modifiability
  - The more general a lecture or lab space is the more flexible it should be
  - An observation was made that BYU's labs were much better at this than UVU's in the furniture that they used to accomplish this because BYU did not use casters
  - A comment was made that all of the writing white-board walls at the Pharmacy building would be a great asset, there was then a discussion regarding how much they would really get used and the verdict was that it would vary by the individual users

October 24, 2014

Master Plan Breakout Session

Attending:
Gary Carlston (President - Snow College)
Spencer Hill (Vice President of Finance and Administrative Services)
Steve Hood (Vice President of Academic Affairs)
Kurt Baxter (DFCM Program Manager)
Derek Payne (VCBO Architecture)

Discussion Topics:

2002 MASTER PLAN GOALS REVIEW

1. **Goals and Objectives of 2014 Master Plan Update:** The goals and objectives of the master plan update were discussed and the list of goals from the 2002 Master Plan were reviewed. It was decided that the description of the Planning Goals section of the plan would include a description that acknowledges that this is a plan for the Ephraim campus only. The Richfield campus master plan will be addressed in a future plan.

The following **Planning Goals** were to be removed from the 2002 goals list:

a. *Understanding Snow College's role in the State educational system, consider the pursuit of a 4-year liberal arts college status.*

b. *Strengthening the physical relationship between the College and the LDS Institute.*

The following **Planning Goals** were to be modified:

c. *Understanding the dynamics of the learning environment as a primarily commuter-oriented campus*. - is changed to: *Understanding the dynamics of the learning environment as a primarily a student-resident campus*.

d. *Recognizing the rural Utah primary market for students* - is changed to: *Recognizing the responsibility of the six-county service area and beyond*.

The following **Planning Goals** were to be added to the plan:

e. Provide an attractive learning environment for students that supports student learning outcomes.

f. Provide facilities to support the Snow College faculty and staff

g. Honor the distinct character of the College and the diverse mix of students that it attracts.

h. Identify an opportunity zone for the development of future College facilities towards the Business building and athletic fields to the south and west of the existing campus core.

2. **Master Planning Goals (Page 7)**: These goals will be eliminated and incorporated into the Planning Goals on Page 6 of the master plan.

3. **The Main Campus**: This illustrative diagram of the campus was discussed extensively. Several modifications to the 2002 Master Plan were identified:
   a. The athletic play fields located east of the Student Center will not be identified as a "Future" building site. The site shall be intended for intramural, college and community events.
   b. The existing Science building shall be identified as a "Future" building site.
   c. The stadium site identified as "Future Multi-Use Center" shall be modified to be noted as an "Football Stadium." The plan shall note that the stadium shall be upgraded with field lights and artificial turf.
   d. The new Library footprint will be shown on the plan. The site to the west of the Library shall be identified as "Future Science."
   e. The site identified as "Family Life" shall be modified to be noted as a "Future Growth Opportunity Zone."

October 23, 2014

Chemistry

Attending:
Adrian Peterson (Chemistry)
Dan Black (Chemistry)
Bryant Jones (Chemistry)
Brandon Burnett (Chemistry)
Sannali Dittli (Chemistry)
Justin Heppler (VCBO Architecture)
Sean Towne (RFD)

Discussion Topics:

General

- Need Gen Chem and Organic Chem to both function as lecture rooms as well as labs
- Prefer 2 Gen Chem labs to have a removable partition wall in-between – 24 seat each
  - Could locate hoods/sinks to one end of the wall
  - Could be oriented so that the teaching wall faces the same direction in both rooms
    - Yes but white boards would have to be placed on the removable wall to create the teaching wall
- Lecture in Organic Chem lab = 24 dedicated chairs
- If these labs are all teaching able – only 1hr of the day chemistry would need an extra classroom of 48 – according to the current schedule
- Pair the library with the research lab

October 23, 2014

Chemistry & Biology

Attending:
Adrian Peterson (Chemistry)
Kevin Sorensen (Biology)
Paul Gardner (Biology)
John Fisher (Biology)
Allan Stevens (Biology)
Dan Black (Chemistry)
Bryant Jones (Chemistry)
Justin Heppler (VCBO Architecture)
Sean Towne (RFD)

Discussion Topics:

General
- Dan is concerned that Biology has to many spaces that are single use spaces – what spaces could be shared use?
- Could the micro lab also be the biology research lab?
- Could physiology be taught in the microlab?
- Chemistry and Biology stock rooms need to be separate (Dan)

October 23, 2014

Biology

Attending:
Adrian Peterson (Chemistry)
Kevin Sorensen (Biology)
Paul Gardner (Biology)
John Fisher (Biology)
Allan Stevens (Biology)
Joseph Papenfuss (Biology)
Justin Heppler (VCBO Architecture)
Sean Towne (RFD)

Discussion Topics:

General
- Physiology lab
    - Would like to use samples of real blood and real urine – BSL2
- Could physiology be taught in the microlab?
- Staff help for set up and take down is a problem because there are no staff to assist with that
- Micro – students need to access the lab multiple times during the week
- Flexibility will vary quite a bit from semester to semester – more flexibility in fall than in spring
- Physiology (Majors Bio) and General Biology are more flexible, and are more flexible in the fall
- Could split micro into 12 rather than 24 and do more sections, (16 is recommended)
- Biggest problem in biology is lack of personnel
- Professors teach both labs and lectures, you end up eating up a classroom for a whole week if you don't have lab availability
- Classroom needs are 1/3 greater in the fall than they are in the spring across the board

MicroBiology Lab
- 2 years ago they were teaching 3 times as much micro, it was cut out of the nursing curriculum; the nursing school is going to add the class back as an entry point generator
    - The last 2 years are the least micro they have ever taught
    - Need sink & pipe services (flame, vacuum) in the middle of the desk
- Secured entry – critical = micro, anatomy, research suite

Anatomy Lab
- When it has been attempted students can't handle a Tuesday/Thursday anatomy class, students need more shorter classes rather than 2 longer classes
- Want natural light
- Need privacy if windows are visible from the outside

- Concerned that the gray tops are showing stains at UVU
  - Sean explained that with proper maintenance techniques the gray tops are very easy to maintain

Herbarium
- Permanent displays vs. rotating displays?
- Interactive display
  - Ipad, video clips
- Would prefer study area is internal
- Glass door to the internal storage
- Shelving to accommodate the wet storage (insulate against breakage), Sean requested a cut sheet to include in the program
- Frustration with animal display as it is now
  - False and mythical statements occur while viewing the animals – want some sort of interactive way to teach about the animals on display and they want to rotate the collection

Physiology Lab (now Biology Majors Flex Lab)
- Physiology can be moved to: anatomy (fall), micro (spring)
  - Would love to teach it in anatomy but is concerned about BSL2 compliance
  - In the 4 room anatomy lab one of the prep bays could be used as BSL2
- Physiology lab tracked now should be a Biology Majors Lab (Flex Lab)
  - 48 person classroom on steroids
  - Would need sinks in both corners
  - Some classical dissection and plant work
  - Laboratory type desks not classroom type
  - Power outlets for microscopes at the desks
  - Fall = classroom, Spring = 24 person lab
  - Ramped up ventilation for dissecting
  - Would free up 2 (24) person classrooms for fall semester for other departments
  - Electrical along edge
  - Would 2 microscope cases either in the classroom or in a support space adjacent

Human Biology / General Biology
- "Light" Lab
- Keep "light" lab air change rates
- 3 sinks is enough
- No fume hood
- 1 or 2 fridge
- Need in class storage space

October 24, 2014

Classroom and Mathematics Breakout Session

Attending:
Kari Arnoldsen (Mathematics)
Allen Stevens (Biology)
Paul Gardner (Biology)
Derek Payne (VCBO Architecture)

Discussion Topics:

TRADITIONAL CLASSROOMS

1. **Paired Classrooms:** A digital model was reviewed with the faculty whereby two 24 person classrooms can be paired to make a 48 person classroom. A moveable wall system would be placed between the two classrooms, it would be pulled back to make the 48 person classroom. This method of pairing classrooms requires additional square footage be programmed. It requires 600 square feet/classroom instead of 500 square feet/classroom if they were not paired. It will be evaluated as to how many of the classrooms will be paired.

2. **Finishes**: Carpet tile will be specified in the classrooms. It is acoustically absorbent and damaged tiles can be easily replaced.

3. **Audio Visual/Information Technology Elements:**
Instructor Lectern: Snow faculty is interested in having a small footprint for the technology lectern. It was discussed that it should be a pull-down unit from a sidewall or be a small table located next to the sidewall at the front of the room. The lectern needs to have have hard wire data connection. The school has had trouble with their wifi connections. There should be both connections for tablets and laptops at the lectern.
Voice Enhancement: Faculty would like to have voice enhancement in the classrooms that are 48 person or larger.
Additional LED screens in Room: The faculty is interested in locating LED screens on the side walls of the class whereby students can break down into groups of 6 or 8 around one of these screens around the room. The system should be configured so that each of these screens can take over the rooms main screen.
Whiteboards: The entire front wall should be a whiteboard. The sidewall should be outfitted with as much whiteboard as is practicable. Whiteboards shall also be placed on the moveable wall system where they occur.
Demonstration Table: There needs to be enough room in the front of the classroom so that a demonstration table can be placed in front of the student tables. There will need to be a minimum of 8' in front of the student desks to the teaching wall.

4. **Lighting**: The faculty does not want the lighting in the classroom to interfere with the visual acuity of the screens of the students tablets or laptops. An indirect/direct light fixture system was described that does a good job of not creating "hot spots" of light on the screens. This lighting technique will be utilized in the classrooms.

5. **Majors Biology Lab:** Allen S. described that this lab could double as a classroom, because it is not fully utilized by Biology in the Fall. It needs moveable tables (laboratory grade furniture) that can be powered up. The room needs a sink somewhere in the room (preferably near the lectern).

6. **Other Classroom Configurations**: Paul asked if the classroom model that Rosemond University utilizes with a class in the round could be used in this building. That model was discussed in the last workshop, and the majority of the people did not like this model for various reasons. The instructor's back is turned to half of the class, and the instruction is highly dependent upon the screens over the instructors head.

7. **Distance Education Classroom**: The faculty would like to make one of the 24 person classrooms a distance education equipped classroom. The following elements need to be incorporated into this room:

   Lighting: The lights in the room need to be directional to light the faces of the students consistently.
   Microphones: Snow College has found that *one* microphone at the front of the class is the best way to pick up the student interaction in the classroom.
   LED Screens: A large LED screen will be at the front of the classroom. There will also be a screen at the back of the room so that the instructor can see themselves and the remote sites on the screen.
   Smart Board: Snow College likes a Smart Board at the front of the room with a control panel at the instructor lectern.
   Wall Color: The color of the walls will need to be carefully selected. A brownish white color looks better on camera than a white wall.
   Facilitator Station: There shall be a facilitator station at the front of the room.
   Cameras: There shall be a camera focused on the instructor. There will also be a camera that records the students in the class.

8. **Seminar Rooms:** There are two of these rooms - one room holds 10 people, the other room holds 20 people. These rooms will be used as conference rooms as well as function as classrooms for smaller classes. The students will sit at a conference table. The audio-visual presentation will be an LED screen on one short end of the room. The other end of the room will have a large whiteboard surface. Exterior windows in these rooms shall have a two-shade system (black-out and a translucent shade). This room shall also be distance education equipped.

October 24, 2014

Office Breakout Session

Attending:
Kari Arnoldsen (Mathematics)
Allen Stevens (Biology)
Dan Black (Chemistry)
Derek Payne (VCBO Architecture)

Discussion Topics:

<u>OFFICE</u>

1. **Office Locations:** The location of the offices was discussed. The faculty would prefer that the offices be located in a suite with all the offices. Offices near the labs was not a preferred option. The office suite is desired to be very near student study space in the building.

2. **Office furniture configuration**: Two layout options were shown to the faculty. The traditional layout of furniture was the preferred option (see attached drawing). Bookshelves on the opposite wall of the desk are desired.

3. **Exterior Windows:** Windows are desired in the offices, as much window as is practicable.

4. **Office Entry**: A solid wood (swing) door with a large sidelight is desired. The glass in the sidelight will be etched so that you can see movement and figures through the glass, but not detail.

5. **Whiteboard**: A whiteboard in the office is desired (see attached drawing). The whiteboard will run under the upper shelving by the desk.

6. A possible diagram of the office wing in relation to the lab wing of the building was discussed. The diagram locates student study adjacent to the offices. The faculty liked the positioning of the elements in this diagram.

October 24, 2014

Geology/Natural Resources/Plants-Soils Biology

Attending:
Renee Faatz (Geology)
Joseph Papenfuss (Biology)
Chad Dewey (Natural Resources)
Justin Heppler (VCBO Architecture)
Sean Towne (RFD)

Discussion Topics:

General

- Field Equipment room should be adjacent to an exterior vehicle access point

Geology / Natural Resources / Plant Taxonomy Lab

- They would like a location against the corridor wall for the display of minerals and gems
  - 2' deep min.
- Support / Prep storage may be highly packed
- Concern between sharing labs between botany and geology because of the mess
  - A site visit was made to look at the Botany lab
  - The Botany lab needs a larger prep/storage space than originally planned

Greenhouse

- Was not included in the baseline program but we have since learned that the current greenhouse will be demolished so it now needs to be included, space will be included equal to the current freestanding greenhouse but omitting the space consumed by the greenhouse attached to the existing science building
- Greenhouse needs to occur on the south side of the site either at grade or on the roof

October 24, 2014

Engineering/Physics

Attending:
Larry Smith (Physics)
Ted Olson (Physics)
Garth Sorenson (Engineering)
Kyle Rowley (Engineering
Brian Newbold (Engineering)
Derek Payne (VCBO Architecture)
Justin Heppler (VCBO Architecture)
Sean Towne (RFD)

Discussion Topics:

General

- Physics - concern was expressed that the dual teaching lab was not included in the baseline program, they had expected that a dual lab with a folding demising wall was being included similar to chemistry's dual lab
- Physics - there was discussion regarding whether or not they want to use the labs for lecture (similar to what chemistry is doing) or use a classroom for teaching; they are having continual interdepartmental discussion regarding whether or not they want to do an integrated lecture/lab format

Planetarium

- With it missing it kills the ability for the building to be a regional science hub
- Would prefer this have fixed seating and have 30 to 35 students
- This will be included as a classroom that has the ability to also be a planetarium

Computer Lab

- Sean did schemes A, B, C & D for this room
- 3D prototyping printers should be planned for and it would be great if they were on display with windows to the corridor

October 24, 2014

Crazy Ideas, Artwork, Interactive Exhibits Breakout Session

Attending:
Kari Arnoldsen (Mathematics)
Allen Stevens (Biology)
Dan Black (Chemistry)
Sannali Ditli (Chemistry)
Brian Newbold (Engineering)
Ted Olsen (Physics)
Derek Payne (VCBO Architecture)

Discussion Topics:

STATE OF UTAH - 1% FOR THE ARTS

1. **Description of the 1% for the Arts Process:** Derek P. described the process that the State of Utah undergoes in selecting artists for the building artwork. A Request for Proposal (RFP) is sent out to artists in Utah and nationwide to respond to a written description of the project. It is important that Snow College define in that Proposal their desires to include a comprehensive description of what they would like the artwork to address. The proposal should also include the statement that it is Snow College's desire is to work with the artist during the design of the project, so that the artwork is developed in such a way that the artist works with the Snow College Faculty to make the artwork become a science learning tool. The group looked at some examples of artwork that has been commissioned in the State of Utah.
The faculty developed a list of items that is important to Snow College. These items should be included in the Artist RFP:
    - Central Utah Heritage
        - Mining Heritage
        - Agricultural Heritage (Turkey and Hay)
        - Birth of the Forest Service
        - Proximity to the mountains
    - Element of Discovery (Students discover something different in the art each time they interact with it.
    - "Science Happens Here"
    - Inspirational

2. **Exhibits in the Building:** The faculty is interested in having interactive exhibits throughout the building. They would like to have at least six (6) exhibits per floor in the building. These exhibits should be simple and easily replaced/refreshed.
Successful exhibits were identified at:
Children's Museum in Phoenix, the Exploratorium in San Francisco, the Museum of Math in New York City.
Some ideas included:
    - Monitors that show cool science videos (time lapse videos, man landing on the moon, miracle of life), Department Announcements and Weather Data.

3. **Branching of the Building:** The group discussed ways in which the building will let people know that 'Science Happens in the Building.'
    - *Transparency* (glass) into the labs lets visitors see science on display.

October 24, 2014

Executive Committee

Attending:
Dan Black (Chemistry)
Gary Carlston (President – Snow College)
Steve Hood (Vice President of Academic Affairs)
Derek Payne (VCBO Architecture)
Justin Heppler (VCBO Architecture)
Sean Towne (RFD)

Discussion Topics:

- After all of the laboratory work sessions for workshop #2, a larger square footage for the building was requested. With the additional square footage, the building will accommodate more potential growth. These additional classrooms will add approximately 6,000 sf to the project for a total of 62,600 gross square feet in the building. This is about 6,000 square feet over the 56,600 square feet that we were at after Workshop #1.

- Steve H. mentioned that there has been some concern expressed by some faculty that with our baseline program the perception is that this will be a replacement building with very little growth potential. It was discussed and it is true that a lot of the additional square footage goes towards making the laboratories right-sized, accessible and modern. However, a good portion of the building square footage will allow growth for the Science Division.

- President Carlston feels that it is worth the effort to interface again with the legislative process to explore whether or not it would be possible to add the 6,000sf into our program square footage limits; there are multiple factors that are considered in the approval of additional square footage including construction costs and long term building maintenance budgets. President Carlston will let the group know if there is a chance of increasing the building footprint.

- In order to analyze the effective utilization of the spaces that we currently have in the program VCBO and RFD will prepare space utilization sheets that Dan B. and his faculty will “test fit” for both the fall and spring semester at an upcoming division meeting. VCBO to send the utilization charts for each of the spaces to Dan B.

- Potential dates for workshop #3 were discussed.

APPENDIX F - FUND-RAISING RENDERINGS

VCBO ARCHITECTURE

STREET VIEW

Science Building | Snow College

VCBO ARCHITECTURE

BIRDS EYE

Science Building | Snow College

BACK VIEW

Science Building | Snow College

VCBO ARCHITECTURE

ENTRY VIEW

Science Building | Snow College

VCBO ARCHITECTURE

ELEVATION

Science Building | Snow College