Project 2020-148
Pierce College, Puyallup STEM Building

Attachment 6:
Puyallup STEM Pre-Design

PIERCE COLLEGE

NEW STEM BUILDING

Pierce College Puyallup

Predesign Report

OFM PROJECT NO. 40000293

DES PROJECT NO. 2020-148

AUGUST 24, 2020

McGRANAHAN architects


GASPARD
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ADM

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TABLE OF CONTENTS

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

As the region grows the demand for STEM jobs and education grows with it. Rapid population growth in the College's service area has exacerbated capacity challenges. The Puget Sound Regional Council predicts a significant population increase by 2040 and identifies Puyallup as a "core city… intended to accommodate a significant share of future growth." Despite a statewide trend of declining CTC numbers Puyallup has seen an increase in enrollment in the past 5 years. As a result, the college can clearly anticipate significant continued enrollment demand.

Pierce College Puyallup lacks adequate and ample space to meet the growing needs of students and community, particularly in Science, Technology, Engineering, and Math (STEM) programs and support services. In the 27 years since the establishment of Pierce College Puyallup's campus, community needs, student demographics, learning needs, instructional strategies, program offerings, and technologies have continued to evolve and expand.

The benefits of this project tie directly to the strategic plan and priorities of Pierce College. Specifically, they address priority areas of a quality educational environment that increase access, provide current technology to enhance job skills, provide enhanced preparation for those students transferring to four-year institutions, particularly in STEM programs, and creates functional and safe facilities for our student population. This project will ensure that these needs continue to be met in accordance with accreditation standards and that the College's facilities increasingly reflect its Mission and Core Themes.

This report builds on prior work of a 2017 Project Request Report for the 2019-21 biennium. PRR was highest scoring PRR submitted and subsequently approved for and received design funding in July 2019. No previous predesigns have been completed for this project. This project remains the number one priority for Pierce College Puyallup.

Three options were analyzed as a solution. A no-action option and two site alternatives for a new building. Each was reviewed against a decision matrix and evaluated based on advantages and disadvantages.

The benefits of the east site (Alternate B) outweighed the benefits of doing nothing (Alternate A) and the benefits offered by the west site (Alternate C). These advantages include community connections, program relationships, constructability, campus presence, master plan compatibility, user accessibility and more.

- The vision for the building is to be a hub of STEM learning with a sense of community in a hands-on collaborative learning environment. The new three-story design will support sustained academic excellence through design strategies with future flexibility. The design will also promote diversity, equity and inclusion through spaces designed to cultivate relationships through increased transparency, informal collaboration spaces, an increased variety of learning settings to meet a diversity of student support needs, and partnerships areas for local industry and community. The project

Enhanced learning environments to prepare students for success will focus on healthy occupant experiences and energy reduction to meet LEED Silver. The college will rely on the design team for finding ways to achieve aspirational goals beyond the minimum requirements. These goals include LEED Gold, 2030 challenge targets for energy use net zero facility and potential pilot credit for diversity, equity and inclusion.

The 54,400 square foot program includes 8 teaching labs, a fabrication lab with supporting design and collaboration spaces, 9 classrooms, a double classroom, 30 faculty offices, informal learning and study space, and numerous support spaces for students and faculty aimed at improving collaboration and safety. It also includes 100 new surface parking stalls. Additional parking will be constructed out of COP funds before or during the completion of this project. Additional studies are underway to solve the campus-wide parking needs.

The College and State have chosen to use the progressive Design-Build method to capitalize on the benefits of merging creativity, effectiveness, and value by working together simultaneously with the designer and builder. This methodology can also assist in lessening the effects of cost escalation given the ability to purchase materials at the most advantageous time and implement segments of work more quickly than other traditional delivery methods.

The design phase will begin in May 2021 pending selection of the Design-Build team, phased construction is anticipated to start in May 2022 and be completed in the Summer of 2023.

Back to Table of Contents

Fabrication equipment and technology prototyping


Learning on display to spark curiosity

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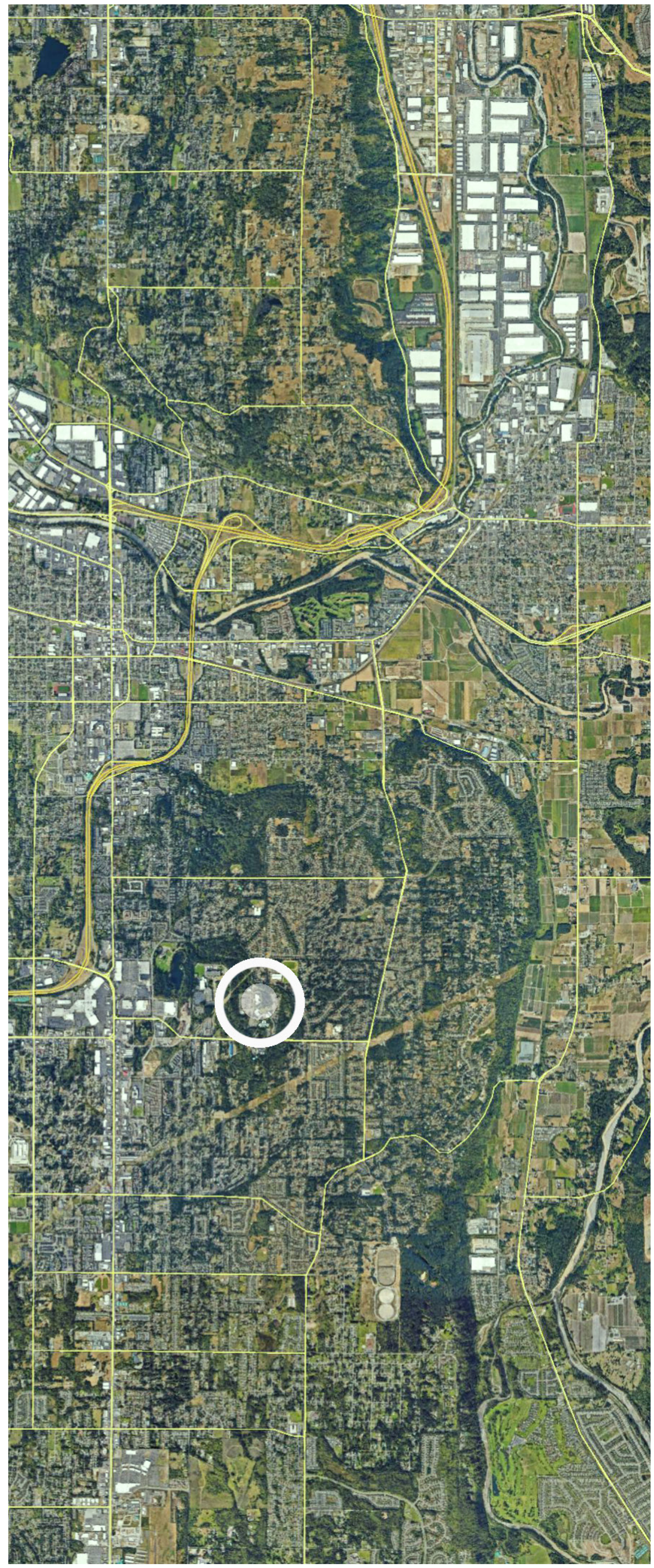
2.0 PROBLEM STATEMENT

Regional Growth

Pierce College Puyallup lacks adequate and ample space to meet the current and growing needs of students and community, particularly in Science, Technology, Engineering, and Math (STEM) programs and support services. In the 27 years since the establishment of Pierce College Puyallup's campus, community needs, student demographics, learning needs, instructional strategies, program offerings, and technologies have continued to evolve and expand.

Rapid population growth in the College's service area has exacerbated our capacity challenges. There are currently 3,500 residences being constructed in Puyallup alone, which is just a fraction of the District. The PSRC 2009 Report for the Central Puget Sound Region predicts a population increase in Pierce County of 393,000 people by 2040 and an employment growth of 212,000 jobs. The report identifies Puyallup as a "core city," which means it is "intended to accommodate a significant share of future growth." Despite a statewide trend of declining CTC numbers Puyallup has seen an increase in enrollment in the past 5 years. As a result, we can clearly anticipate significant continued enrollment demand.



Campus Growth

Pierce College strategically engages in several special initiatives aimed at student recruitment and retention throughout its service district and internationally, as well. As a part of its guided pathways work, the District employs an outreach team that partners with K-12 and other community organizations to build relationships and seamless pathways to higher education that fully and equitably serve our diverse communities. Our International Education program actively recruits international students to provide for additional diversity and global perspective on campus. We are focusing on new efforts to expand participation at Pierce College Puyallup. Further, our Achieving the Dream efforts are proving to be highly successful with annual Fall to Fall student retention rates.

Pierce College Puyallup has had consistent and substantial enrollment growth in Running Start a majority of students choosing to enroll in STEM classes. Running Start FTE in STEM programs has increased 28% in the last five years to a current enrollment of 1,199 (2015 – 2020). Our data reveals trends that suggest Running Start enrollments will continue to grow. The Puyallup School District's growth is currently in the elementary and middle school levels. This new wave of students will begin to reach high school in 2023, less than three years from now, leaving Pierce with a very short turnaround to meet the growing needs of the community. This impact will include both traditional and Running Start enrollments.

A significant part of our enrollment growth has been in STEM programs with Pierce College Puyallup currently serving 3,886 STEM course enrollments. It is important to look at course enrollments in addition to FTE growth because course enrollments drive classroom use, accommodation of student schedules, and overall space utilization needs. This growth in course enrollments requires new and additional classroom space, laboratories, and student support services such as Tutoring, Supplemental Instruction, and Advising. We believe we can be effective with the design of flexible learning space. Specifically, we want to incorporate learning spaces that serve as both classrooms and laboratories, which inspire new instructional pedagogies and take advantage of efficient building design.

Space and facilities are insufficient to meet current demand, particularly in STEM programs and enrollments, and cannot accommodate projected future growth. Six major facilities problems now face Pierce College Puyallup:

- Condition, outdated configuration, and inadequate square footage of our current STEM facilities limit our ability to adequately schedule courses to meet demand, to provide a full complement of STEM courses needed in program pathways, and to fully offer educational programs that meet student and industry needs in STEM fields. For example, we have no Organic Chemistry laboratory nor a Fabrication Space for Physics, Engineering, and industry.
- There is no space to add manufacturing programs (i.e., Computer Aided Design and Additive Manufacturing) in the aerospace, healthcare, automotive and product development industries.
- There is no space to expand the Engineering to meet current demand. These spaces can be designed in a way that maximizes their utilization for both proprietary programmatic needs and for general educational uses (lectures, technology labs, tutoring, etc.)
- Space is inadequate to meet our institutional goals of closing the student achievement gap and increasing student graduation rates because student service and support spaces are inadequate to serve the needs of the current population. Areas that need to be expanded include Enrollment Services, Advising, Tutoring, Writing Center, and Supplemental Instruction. For example, each quarter we have a waitlist for students to be served in tutoring, not because of a lack of tutors, but because of a lack of space to serve them. In addition, we currently do not have a Veterans Resource Center to serve the strong military enrollments at Pierce College. Additional space provided by this project will free up space for expansion of these programs.
- The current building lacks access and visibility to college faculty offices and lacks informal learning spaces and affordances outside each formal teaching space. These cultivate trust and social connections with faculty through impromptu conversations. Studies which have shown a that single trusting relationship positively impacts a student's ability to persevere through difficult situations that negatively impact graduation rates.
- The existing facility lacks variety within the types of learning settings. This limits the ability of the college to meet the diversity of student needs such as study and tutoring rooms, a health/wellness room, dedicated collaboration space for student groups, small group work areas, outdoor learning areas, 2d and 3d areas for multi-cultural display and gender inclusive restrooms.

Project History

PRR

This building was first noted as near term need for Pierce College in their 2006 Masterplan and identified as an academic building which included potential STEM related programs. Campus enrollments were increasing and the need for additional space was noted. Three Project Request Reports were submitted for the project with the most recent submitted in December 2017 for the 2019-2021 biennium. The 19-21 PRR was the highest scoring PRR submitted and subsequently approved for and received design funding in July 2019. No previous predesigns have been completed for this project. This project remains the number one priority for Pierce College Puyallup.

Project Needs

Accreditation standards require the college to create effective learning environments with appropriate programs and services to support learning needs. By adhering to these accreditation standards, Pierce College demonstrates its commitment to creating a learning environment that effectively meets the current and future learning needs of its students. This project will ensure that these needs continue to be met while also reinforcing the College's Mission and Core Themes through the quality of its learning environments and facilities.

- Provide appropriately sized and configured flexible learning spaces to include STEM courses and program offerings in order to meet student and industry needs
- Reduce existing waitlists for many course offerings
- Provide a greatly needed and currently non-existent Organic Chemistry Laboratory
- Provide a multi-purpose Fabrication space to ensure a greatly improved and necessary capability in Physics and Engineering
- Expand the Engineering program
- Develop new programs in Additive Manufacturing/3-D Printing
- Utilize existing space vacated in the Library/Science Building to provide expanded and co-located spaces for Advising, Tutoring, Supplemental Instruction, an expanded Writing Center, and a Veterans Resource Center. This will be a separate project after the completion of a STEM building.
- Meet standards for institutional accreditation
- Support improved ADA accessibility
- Further, integrate energy-efficient building systems into the campus environment
- Provide enhanced surrounding site improvements such as lighting, landscaping, exterior, and signage to continue an emphasis on maintaining a welcoming environment for all students

Advancing our Mission, Vision and Values

This project ties directly to the strategic plan and priorities of Pierce College. Our Institutional Effectiveness Plan and Scorecard is an on-going evaluation of our five core themes that track progress toward mission fulfillment and guides the District's planning efforts, budget allocations, and capital projects. Specifically, this project addresses priority areas of continued development of a quality educational environment that increases access, provides current technology to enhance job skills, provides enhanced preparation for those students transferring to four-year institutions, particularly in STEM programs, and creates functional and safe facilities for our student population.

Currently, the College's ability to adequately support our Core Themes is being significantly impacted by a lack of appropriate classroom and laboratory space, as well as by a shortage of committed space for student study, support resources and services.

Back to Table of Contents

MISSION, VISION, AND VALUES

MISSION

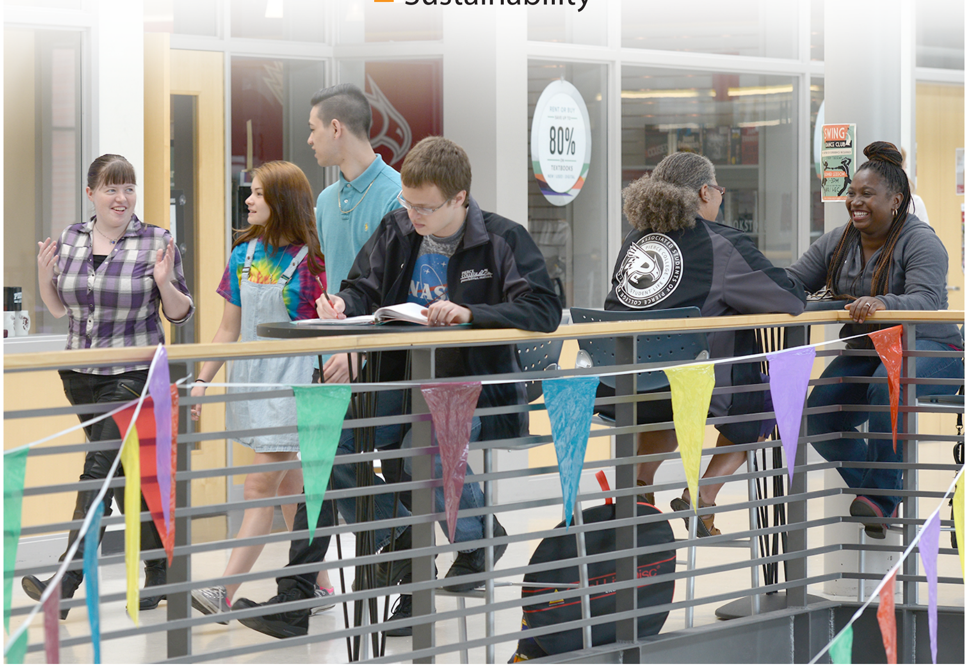
Pierce College creates quality educational opportunities for a diverse community of learners to thrive in an evolving world.

VISION

Possibilities realized: Innovative and engaged learners enriching our local and global communities.

VALUES

- Learning
- Integrity
- Respect
- Accountability
- Sustainability



CORE THEMES AND OBJECTIVES

Access

The community Pierce College serves will have access to comprehensive educational offerings and support services.

1. Learning opportunities will align with students' educational and career goals, and will be consistent with workforce needs.
2. Students will have timely access to the support services they need to accomplish their educational and career goals.
3. We will engage with, and equitably serve, our diverse communities.

Excellence

Pierce College will assure quality and continuous improvement in all endeavors.

1. Departments and programs will meet or exceed their stated outcomes.
2. We will meet the requirements for accreditations, fiscal viability, compliance measures, and other elements necessary to sustain our work.
3. We will provide, and employees will engage in, learning and development opportunities that contribute to mission fulfillment.

Contribution to Community

Pierce College will be a recognized leader in building and sustaining academic, industry, and broad-based community partnerships to advance educational opportunities and align with economic development.

1. We will initiate, lead, and sustain mission-driven partnerships and collaborations within our community.
2. Our community will recognize Pierce College's value and impact.
3. We will foster economic equity and development within our community.

Equity, Diversity, and Inclusion

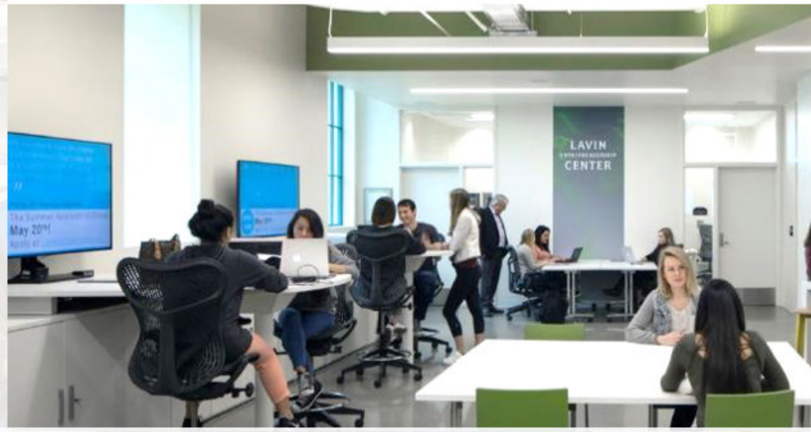
Pierce College will promote an equitable, diverse environment for teaching, learning, and working, with collaborative decision-making and mutual respect.

1. Our infrastructure will foster positive teaching, learning, and working opportunities.
2. Employees and students will be engaged in, and support, shared governance.
3. We will engage students, employees, and community members in ways that respect human dignity and lead to equitable, inclusive experiences.

Student Learning and Success

Students will experience quality, relevant learning that maximizes their potential for success.

1. Students will make timely progress toward their educational and career goals.
2. Students will achieve institutional and programmatic learning outcomes.
3. Students will be successful when they transfer for further education or move directly into the workforce.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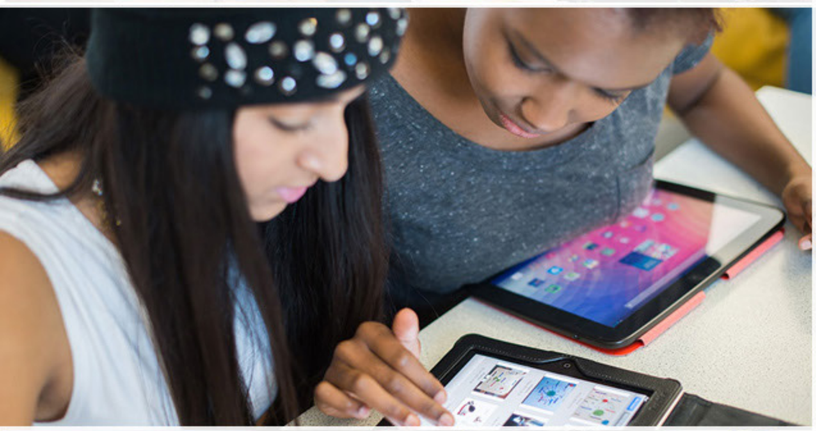

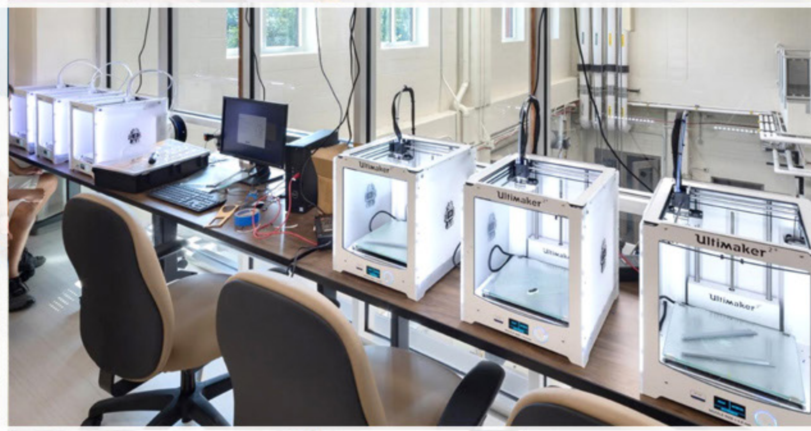
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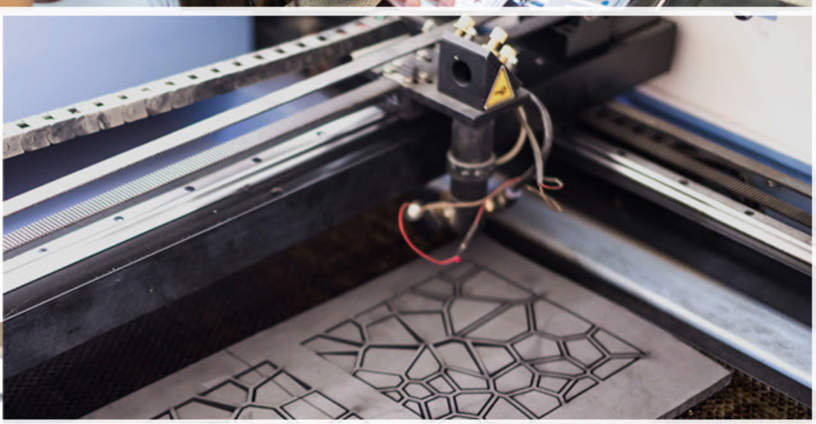
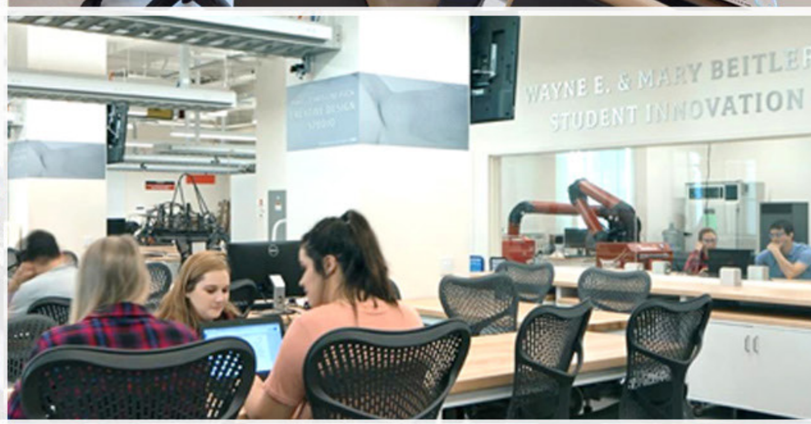
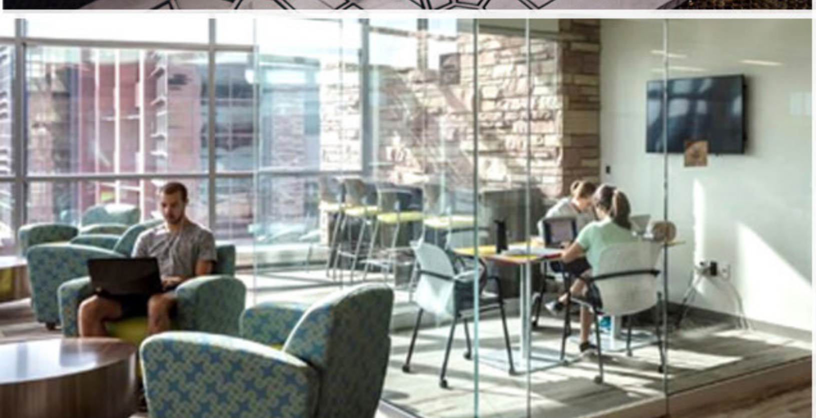
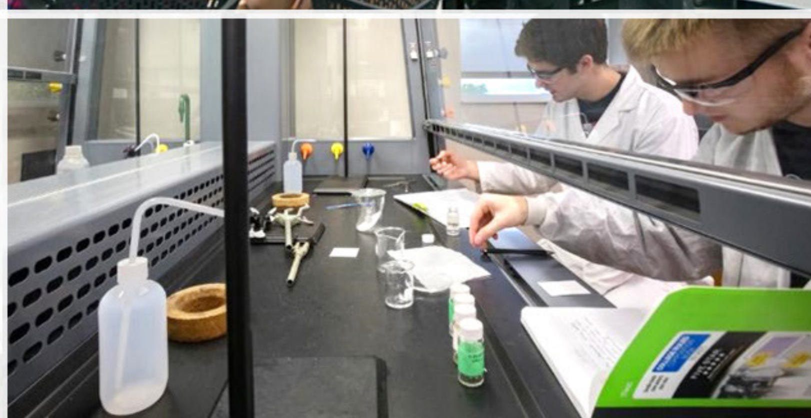



WAYNE E. & MARY BEITLER
STUDENT INNOVATION





Pierce College Puyallup STEM Project Goals

- Grow STEM program enrollment and serve as a community and campus resource
- Provide teaching and learning flexibility for both daily needs and future change
- Serve as an attraction and asset to the greater Puyallup community
- Provoke curiosity with views to hands-on learning, display and demonstration areas
- Create a welcoming learning environment to advance a culture of diversity, equity and inclusion
- Demonstrate commitment and excellence in sustainability
- Honor the beauty and value of the existing trees and surrounding environment
- Highlight the connection between the curriculum the building design and nature
- Cultivate connections between staff and students in a collaborative learning environment

3.0 ANALYSIS OF ALTERNATES

Site Selection

As part of the predesign process, the project stakeholders considered three options for the new Pierce College STEM building on the Puyallup campus. A no-action option and two site alternatives. Each was reviewed against a decision matrix and evaluated based on advantages and disadvantages of each. The following is a brief overview of each option. (See advantages/disadvantages matrix below).

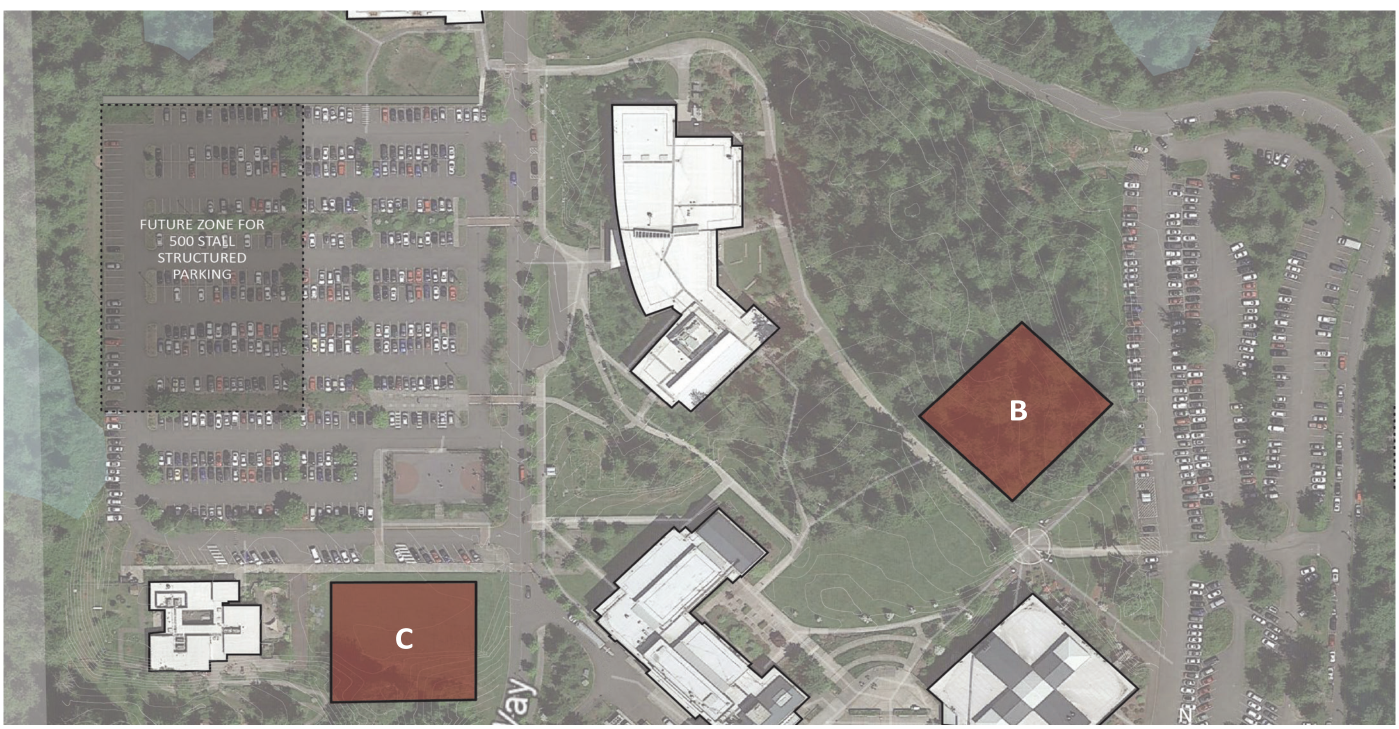
Alternate A: No Action

Advantages

- Cost savings to taxpayers and less operating expense for the college (along with less revenue due to less student enrollment)
- Avoids disruption to campus during construction
- Less impact to the natural environment and a smaller carbon footprint for the campus as a whole

Disadvantages

- Unable to provide sufficient space to support coursework in STEM-related programs to enable successful student program completion, whether for entry into the workforce or 4-year transfer. Existing facilities are under-sized and insufficiently equipped to support these needs. In some cases, Organic Chemistry, for example, has no existing space whatsoever. The college will simply not be able to continue to provide a comprehensive STEM curriculum to meet the needs of its growing service area and will be forced to turn away prospective students.
- As a separate project after the completion of this building, the college will be able to back-fill vacated space in the existing Library/Science Building with expanded and critically needed student support services such as Tutoring and Supplemental Instruction.



PC Puyallup STEM Alternate Sites

Alternate B: East Location

Advantages

This site is on the east edge of the campus in a wooded, slightly sloping site, adjacent to the existing campus lawn.

- The campus master plan intends for this location to be an academic use creating an advantage for campus compatibility.
- This option maximizes community connections due to its direct adjacency and access from the campus commons which is the physical center of campus. It provides more convenient access to the other academic buildings on the commons. Non-STEM students circulating in this area will be more frequently exposed to the STEM activities taking place. The relationship to the Allied Arts and Health building is strong at this location because students can move between buildings without crossing traffic.
- Most utilities are not immediately adjacent to this site so there will be more costs associated with pulling existing power/telecom, gas, and sewer lines from the west and water from the north to service the building, but overall costs associated with site improvements are lower for this option. See alternate C for further cost comparison info.
- ADA access can be accommodated from both the campus commons and the east parking lot.
- The building is far enough away from any adjacent sites, negating setbacks and height restrictions and allowing the campus to maximize the building size and mass within the existing zoning code regulations.

Disadvantages

- Trees will have to be cleared to allow the building to be constructed, reducing the tree canopy on the campus. This is a relatively small sacrifice given the overall canopy that exists, and it affords the pre-design teamsee an opportunity to nestle the building into the woods.
- Parking will have to be reconfigured for ADA stalls and to provide an access route from the adjacent parking lot.

Alternate C: West Location

Advantages

The proposed west site alternate is located east of the existing child development center and west of College Way.

- An existing sewer main is routed within College Way in the proximity to the west site alternate. A 100-foot sewer line is required for connection to the existing main. In contrast, the sewer line at the preferred site is approximately 600 feet away for its connection point.

Disadvantages

- This site in the campus master plan was intended for future student or faculty housing and/or parking.
- It’s located across a main automobile circulation pathway from the heart of the campus. This will increase pedestrian and vehicular interaction and may be a safety concern.
- This location is a farther walk from other programs on campus than Alternate B reducing the strength of connection to other STEM programs on campus. It is easily accessed from the west parking area, but it is a long walk across campus from the east parking lot. Both sites require site improvements to make them accessible to students that use wheelchairs. The west site is not ideal for visually impaired students (crossing the access road). The site is also so small that it will be difficult to screen any service area.
- The childcare facility is a small one-story building immediately adjacent to this option. The close proximity of a new 3-4 story building next to the childcare facility presents an incompatible building bulk and scale relative to the rest of the campus.
- This option is partially located on a steeply sloped site within the setback of an adjacent wetland, increasing jurisdictional requirements to mitigate the construction activities and building layout while also adding expense for site preparations and improvements to prepare for the building.

- The building for this site is situated within an existing grass field. The south portion of the building straddles a steep slope with approximately 9 feet of drop. The grade transition requires fill to be imported to raise the site to building pad elevation. Additionally, the portion of the building that is located over the steep slope will require a cast in place retaining wall or extended footing to bring the southern portion of the building up to finish floor elevation.
- The science building will be placed such that the building's footprint will occupy the entire grass field it is located in. There is not a feasible location for a stormwater detention pond in the surrounding area. Therefore, an underground detention system will be required. The detention system will most likely be placed under the existing parking lot to the north of the proposed building. The underground detention system will be considerably more expensive than an open detention pond. Additionally, the existing asphalt parking lot will require repaving after installation of the underground detention system and stormwater quality treatment for the replaced paving.
- The detention system outfall will tie into the existing storm system along College Way approximately 200 feet north of the northeast corner of the new science building. This will require a storm line to be routed north in the adjacent landscape area prior to connecting to the existing storm system in College Way. The mature landscaping located in the landscape strip east of the basketball court and west of College Way will need to be replaced.

Cost Estimate

The cost estimates between Alternates B and C assume the same program and building footprint. The disadvantages in Alternate C regarding the site result in additional site costs of $754, 598 above the site costs of Alternate B.

Walkway connecting the preferred site with Allied Arts & Health

Life Cycle Cost Model

OFM's Life Cycle Cost model tool was used to compare the life cycle cost between leased space and owned space outlined in the preferred alternative. The LCCM revealed that the best value for the next 20 to 50 years is Ownership. The 50-year net present value between these options is, Lease Option $231,069,062 and Ownership Option $112,324,046. Refer to the LCCM summary document in the appendix. (See Appendix- C.1 Life Cycle Cost Model)

Schedule Estimates

There is no impact difference on the schedule between the two alternate sites.

Conclusion

The analysis of the advantages and disadvantages favored the East site (Alternate B) over the other two options. The advantages included community connections, program relationships, campus presence, master plan compatibility, and user accessibility. In addition to these reasons the cost difference between the two options also favors the East site (Alternate B).

Advantages/Disadvantages

	No Action	Option B East	Option C West
Community Connection Relationship to existing buildings entries, campus pathways and campus communal outdoor spaces			
Program Relationships Beneficial disciplinary and program space type allocation and relationships			
Parking Impact Number of parking stalls demolished			
Constructability Costs associated with earthwork, retaining walls, stormwater and other potential site improvements			
Utility Extention Costs and resources to bring utilities and infrastructure			
Campus Presence Strong sense of welcome through good visibility to the new building's entrypoints			
Master Plan Compatibility Buildings scale and use in alignment with master plan itentions			
Code + Jurisdictional Implications height limit, setbacks, bulk and scale			
Impact to natural setting Trees removed, wetland encroachment			
User Accessibility Length and difficulty of travel from parking and from other buildings on campus			
Service Access Adjacency to road or parking and ability to screen			
Solar Orientation Opportunity for natural daylighting strategies and optimal photovoltaic panel exposure			

- Most Advantageous
- Not a Differentiating Factor
- Disadvantages the Project

Back to Table of Contents

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4.0 DETAILED ANALYSIS

Preferred Alternative

Preferred Site

Setting a Vision

The project was envisioned in a collaborative effort defining and developing goals around learning, sustainability, culture and facility operations. Educators, maintenance, operations, college leadership, architects and professional lab designers teamed up to define how the college's mission, vision and values are embedded in the planning outcomes of the new building. By creating a STEM learning hub in the heart of campus this project will spark curiosity and welcome students to explore a deeper understanding of the opportunities that exist for them and their future in STEM.

Once inside, the project proposes to capitalize on its campus location between a pacific northwest forest and the expansive campus lawn. Bringing nature inside and providing engaging views out will inspire generations of students and serve as a backdrop to the daily activities of hands-on learning. The new design will support academic excellence and promote diversity, equity and inclusion through quality spaces designed to cultivate cross-pollination of ideas. It will invite students and faculty to build relationships with one another as they research, design, make, experiment and demonstrate their learning. The following pages outline the program sizes and quantities along with key relationships for individual programs, the building, the site and the landscape that will bring this vision to fruition.

The project will dramatically improve instructional capabilities by providing more functional, flexible, up-to-date, and well-equipped classrooms and laboratories necessary to address current and cutting-edge instructional methodologies and emerging technologies, meet current and increasing enrollment demand, and meet industry expectation requirements. Waitlists for existing classes will be significantly reduced. The expansion will greatly benefit course scheduling and will ease consistent high current demand for classroom and laboratory space. Pathways for students to pursue and complete their educational goals will be greatly enhanced. New high-technology programs will include Additive Manufacturing/3D Printing. A Fabrication Lab will offer facilities which allow students and community members to explore ideas in material form. This may be as complex as milling a large-scale 3D object using an industrial robot, or as traditional as turning on wood or metal lathes, or as simple as printing 2D images on large format printers. The Fabrication Space will encourage experimentation, allow prototyping and the generation and exploration of ideas, as well as the production of finished objects, in order to prepare students to work in the industry. The Fabrication Lab will support college courses, be open to all students and staff and could serve to outside community members including professionals and businesses.

Flexible Learning Environments

The college currently has no Organic Chemistry Laboratory, prohibiting students from the ability to earn an Associate of Science transfer degree (AS-T), Track 1, with this vital course for Chemistry majors, and this project will provide that much-needed asset. Existing programs in Biology, Chemistry, Physics, Earth Sciences, Mathematics, Engineering, Computer Science, and Computer Network Engineering will benefit by having new, expanded, and much more capable instructional space to meet surging demand in STEM fields.

Informal Learning Environments

Support services for students entering STEM-related programs is a critical factor not only in drawing students into these programs but in providing the best opportunities for students to be retained in these programs and to successfully complete the rigorous curriculum demands required. Comprehensive tutoring and supplemental instruction programs, as well as intensive advising services, are an essential component of a strong STEM curriculum. Although not specifically within the scope of the project itself, this project will enable the use of vacated spaces in the Brouillet Library/Science Building to significantly expand these critical support functions. Strategically locating services to include Tutoring, Supplemental Instruction, Writing Center, Advising, and Veterans Resource Center immediately adjacent to the Library and in close proximity to the new STEM Building, will create one contiguous student support services area. As the largest local provider of higher education classes at Joint Base Lewis-McChord (JBLM), Pierce College continues to experience a significant increase in the number of military veterans enrolling in a wide array of college courses and programs. The addition of a resource center will ensure that we can continue to engage these veterans in such a way as to assure the best possible outcome for the successful accomplishment of their educational goals.

Building Configuration

The project is envisioned as a three-story structure with a mix of labs and general classrooms on each floor to promote exposure of STEM programs for the general student population. The fabrication lab and supporting spaces are on the entry-level to ensure a high level of exposure to the student population from pedestrian pathways. A demonstration courtyard adjacent to and accessible from the fab lab will also generate a visual presence on campus to create curiosity around STEM activities and the promotion of STEM during campus-wide community events.

Occupancy

The program for the STEM Building will be designed to accommodate 36 seats per classroom and 24 workstations per lab.

Program	Current FTE	New FTE
Biology/Nutrition/Health	117	25
Chemistry	162	36
Physics	43	9
Earth Science	58	15
Mathematics	356	93
Engineering	19	5
Total:	**754**	**183**

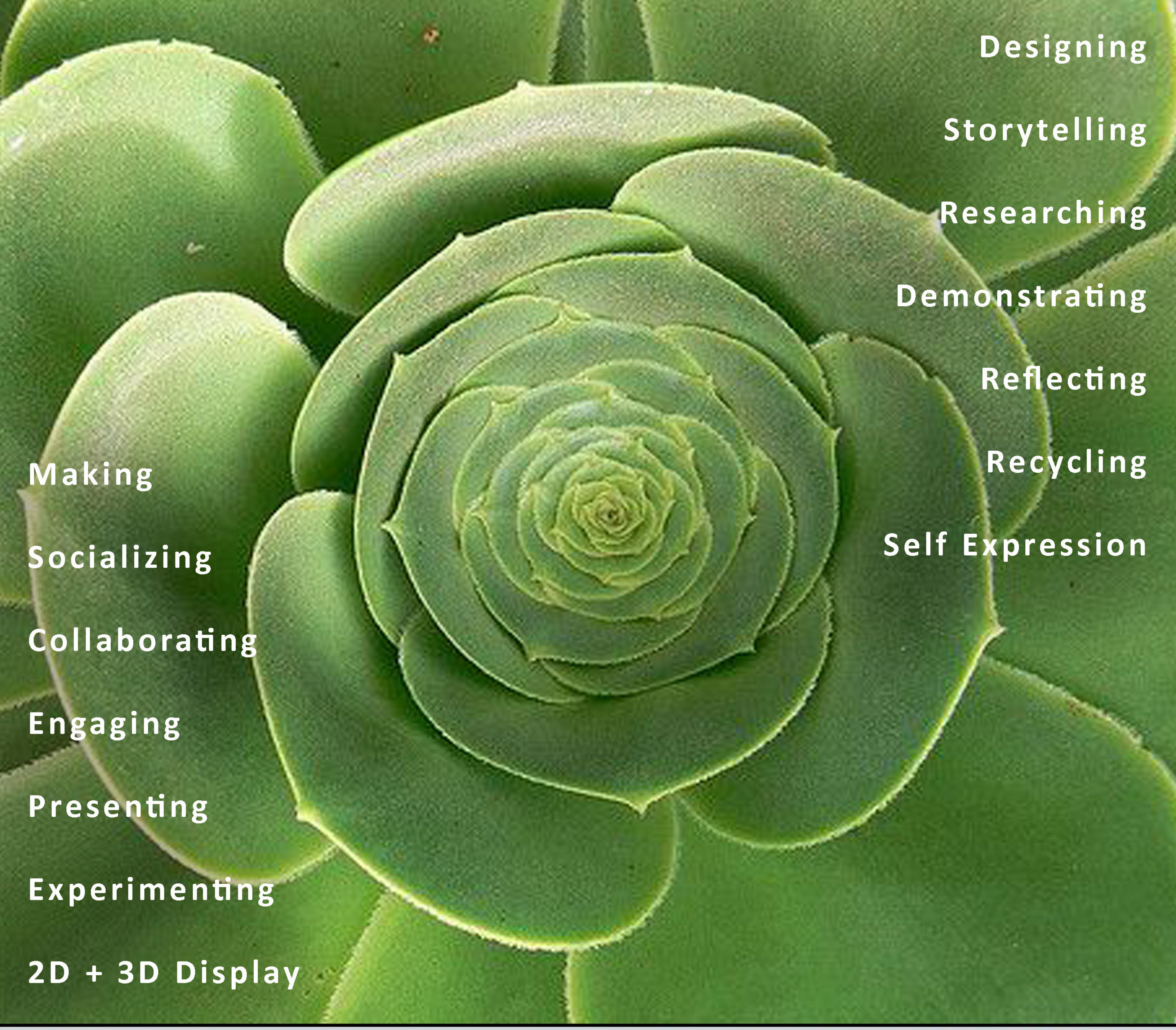
Occupant load for the new building was derived from the area of each space in the program divided by the occupant load factor of the space. Occupant load factors are based on the 2018 IBC.

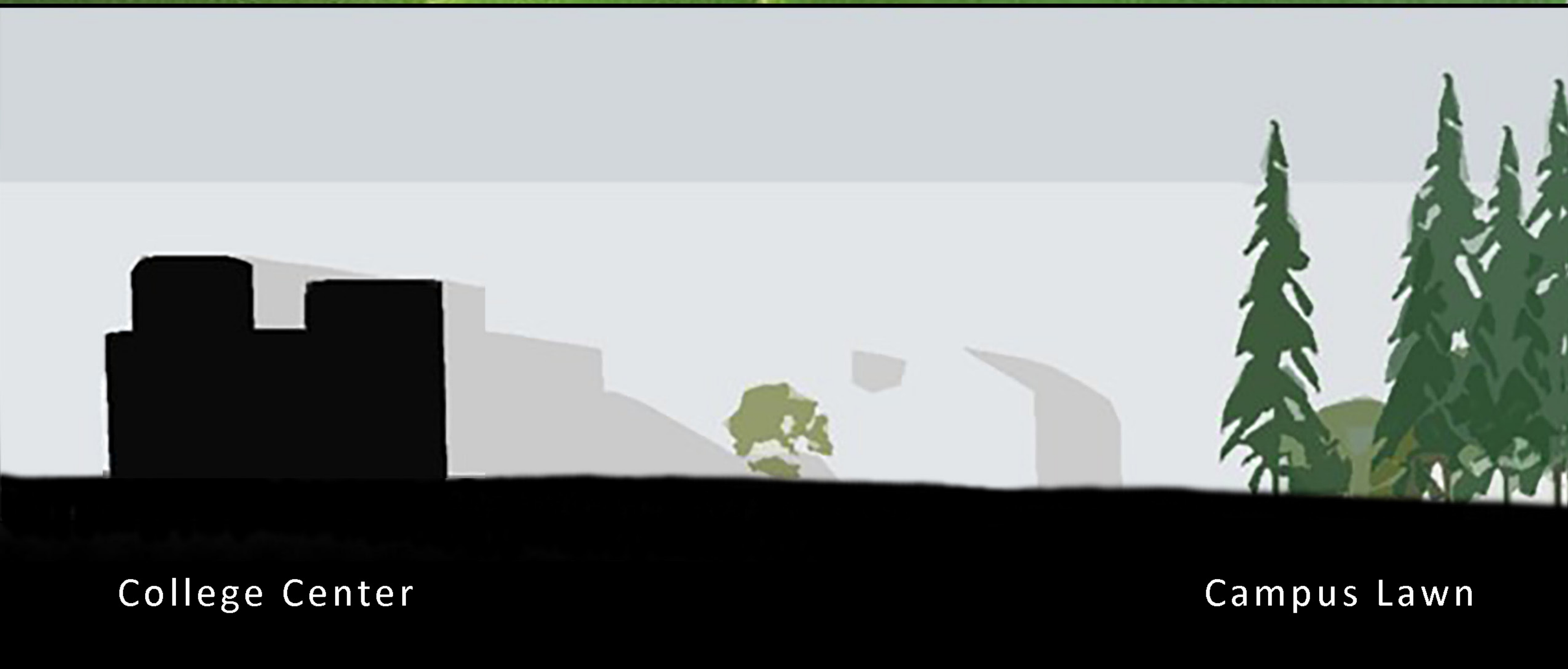
The quantities, areas and supporting information on the following page benefited from the knowledge of a successfully operating STEM building on Pierce College's Steilacoom campus. An additional section of spaces are included as potential elective additions to the program to allow flexibility for maximizing value of the construction budget within the design-build delivery method.

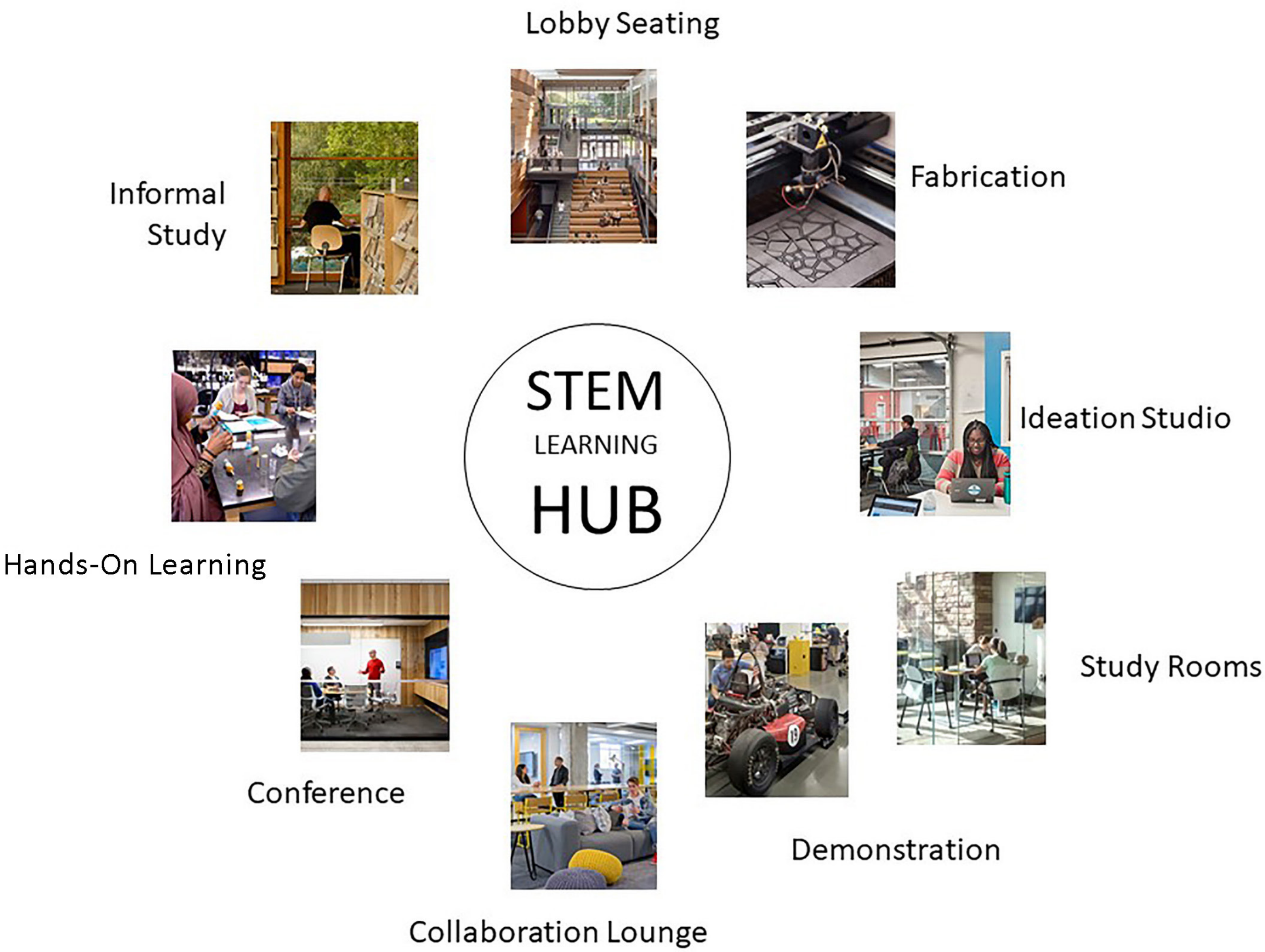
Space Needs

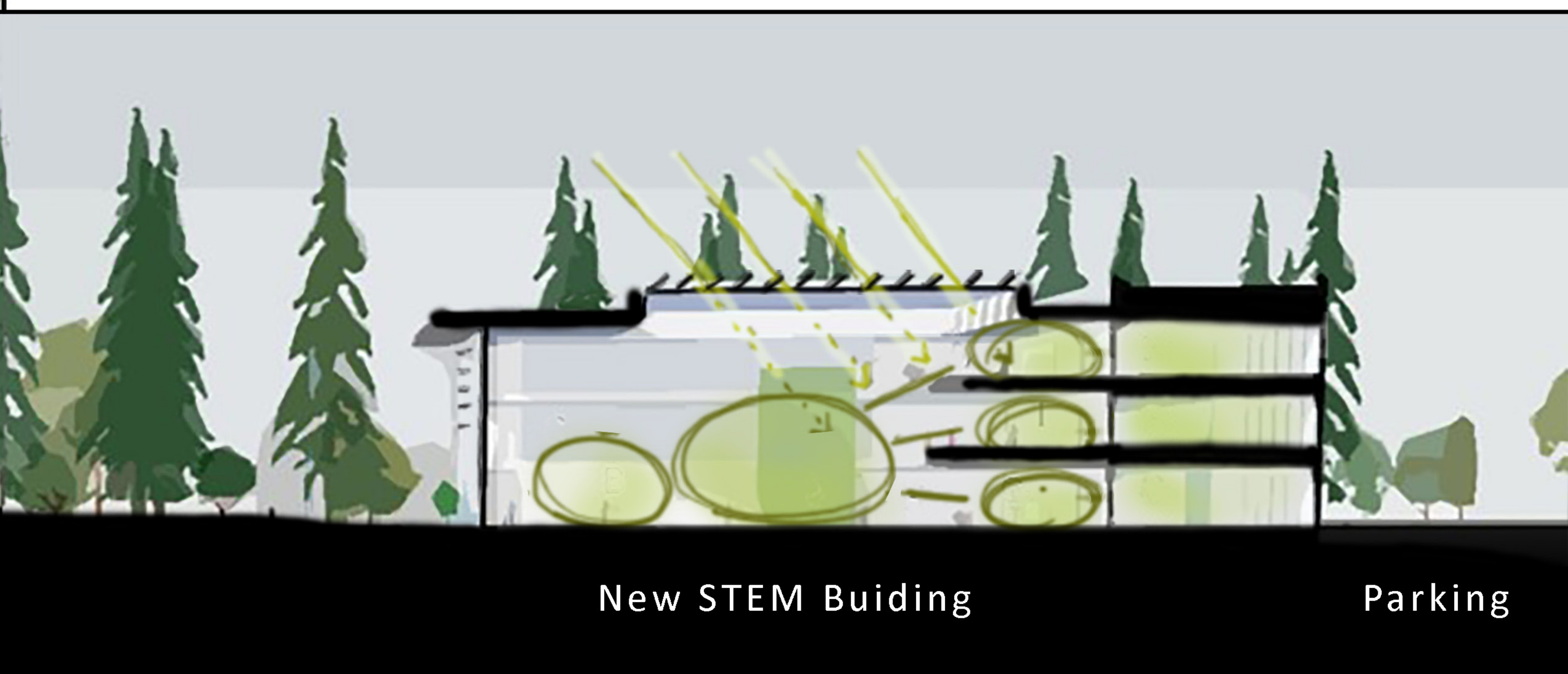
On the following pages are the area program and relationship diagrams for the proposed new STEM building. The State has allocated a finite amount of funding for this project. The purchase value of the funding allocation has been lessened by the influence of construction cost escalation since the legislative approval.

The College is looking forward to the creative process of the design-build delivery method and the potential it holds in finding ways to incorporate value through the cooperative activities of the designer and builder. The basic program area and spaces noted in the space program below fit within the allocated budget given a Predesign level of detail and known marketplace influences at this time. The College is also providing what are called elective spaces that are desired to be included in the ultimate project if possible. The design-build team will be asked to consider how some, or all, of these additional spaces might be included with an understanding that their inclusion may affect other qualitative or quantitative aspects of the project. The design-build team should also refer to the OPR document for direction on expected performance and system qualitative aspects.


Designing
Storytelling
Researching
Demonstrating
Reflecting
Recycling
Self Expression
Making
Socializing
Collaborating
Engaging
Presenting
Experimenting
2D + 3D Display


College Center
Campus Lawn


Lobby Seating
Informal Study
Fabrication
STEM
LEARNING
HUB
Ideation Studio
Hands-On Learning
Study Rooms
Conference
Demonstration
Collaboration Lounge


New STEM Buiding
Parking

Laboratories	Capacity	Area	Qty	Subtotal	Notes
General Biology Laboratory	24	1,260	1	1,260	
Anatomy & Physiology Laboratory	24	1,260	1	1,260	
Microbiology Laboratory	24	1,260	1	1,260	
General Chemistry Laboratory	24	1,575	1	1,575	
Organic Chemistry Laboratory	24	1,575	1	1,575	
Physics Laboratory	36	1,575	1	1,575	
Earth & Space Science Laboratory A	36	1,890	1	1,890	
Earth & Space Science Laboratory B	36	1,575	1	1,575	
Subtotal Laboratories	**228**		**8**	**11,970**	

Laboratory Support	Capacity	Area	Qty	Subtotal	Notes
Biology Prep / Stockroom		945	1	945	
Biology Specimen Storage		160	1	160	
Biology Bulk Storage		160	1	160	
Chemistry Prep / Stockroom		630	1	630	
Chemistry Organic Storage		160	1	160	
Chemistry Inorganic Storage		160	1	160	
Chemistry Bulk Storage		160	1	160	
Chemistry Instrument Room		945	1	945	
Physics Prep / Storage		630	1	630	
Earth Sciences Prep / Storage		630	1	630	
Rock Prep		160	1	160	
Field Equipment Storage / Mud Room		160	1	160	
Subtotal Laboratory Support				**4,900**	

Fab Lab	Capacity	Area	Qty	Subtotal	Notes
Fabrication Lab	36	1,575	1	1,575	Assembly/ Prototyping included
Material Storage		150	1	150	
Office/ Check-in Area		150	1	150	
Subtotal Fab Lab				**1,875**	

Classrooms	Capacity	Area	Qty	Subtotal	Notes
Double Lecture Classroom	48	1,500	1	1,500	
General Classroom	36	945	8	7,560	
Ideation Studio (Eng. Projects Lab)	24	945	1	945	
Subtotal Classrooms			**10**	**10,005**	

Student + Faculty Support	Capacity	Area	Qty	Subtotal	Notes
Collaboration Lounge		800	1	800	
Health/Mother's Room		100	1	100	
Shared Learning Area		800	3	2,400	
Large Group Assembly		1,000	1	1,000	tour group instruction/ waiting
Study Rooms		140	3	420	groups of 6-8
Building Storage		400	1	400	
Faculty Offices	1	100	15	1,500	
Adjunct Faculty Workstations	1	65	15	975	
Lab Tech Office	1	100	3	300	
Small Work Room		100	3	300	
Conference Room		350	1	350	groups of 12-16
Subtotal Student + Faculty Support				**8,545**	

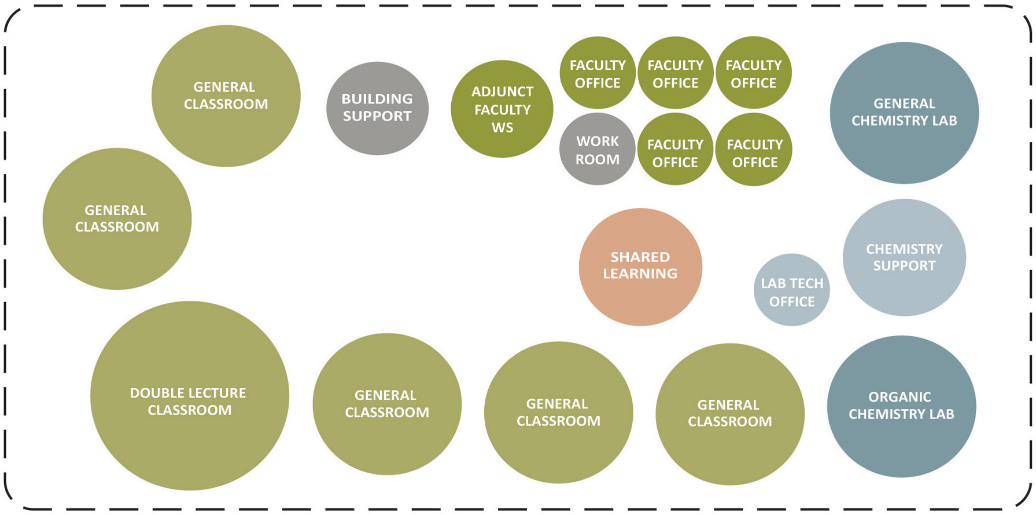
Building Support	Capacity	Area	Qty	Subtotal	Notes
Restrooms		500	3	1,500	Gender inclusive
Mechanical Room		400	1	400	
Electrical Main		500	1	500	
Electrical Sub		80	3	240	
IT		80	3	240	
MDF		150	1	150	
Custodial Closet		80	3	240	
Elevator		70	1	70	
Elevator Machine Room		70	1	70	
Vending/ Recycling Center		40	3	120	
Subtotal Building Support				**3,530**	
Total Net Square Feet				**40,825**	
Allowance for Walls and Circulation			**75%**	**13,608**	
Total Estimated Gross Square Feet				**54,433**	

Elective Program Elements*	Capacity	Area	Qty	Subtotal	Notes
General Biology Laboratory	24	1,260	1	1,260	
Physics Laboratory	36	1,575	1	1,575	
General Classroom	36	945	1	945	
General Classroom	36	945	1	945	
Fab Lab Instructional/ Assembly	24	945	1	945	
Fab Lab Prototyping		300	1	300	
Subtotal Optional Program	**156**			**5,970**	
Total Net Square Feet				**46,795**	
Allowance for Walls and Circulation			**75%**	**15,598**	
Total Estimated Gross Square Feet with Optional Program				**62,393**	

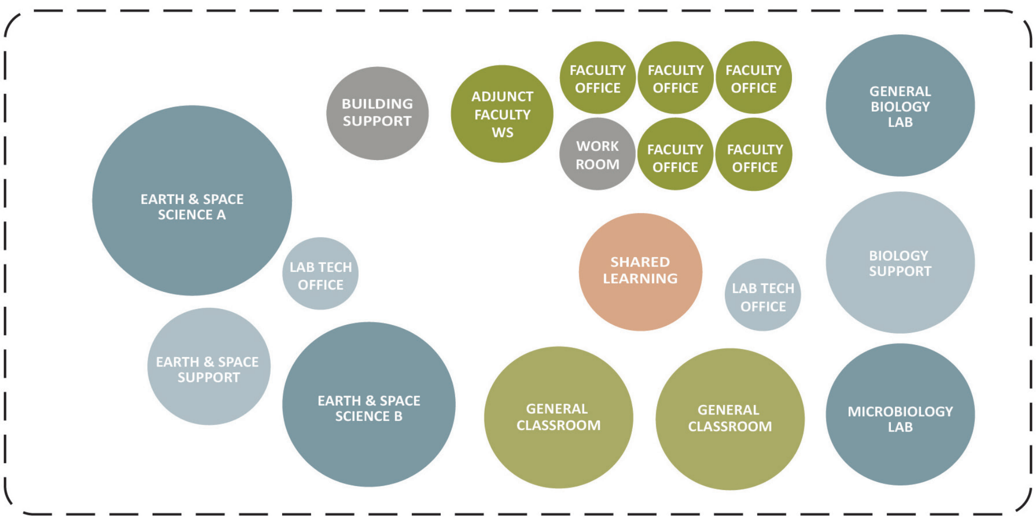
*These spaces are potential elective additions to the program to allow flexibility for maximizing value of the construction budget within the design build delivery method .

Program by Level

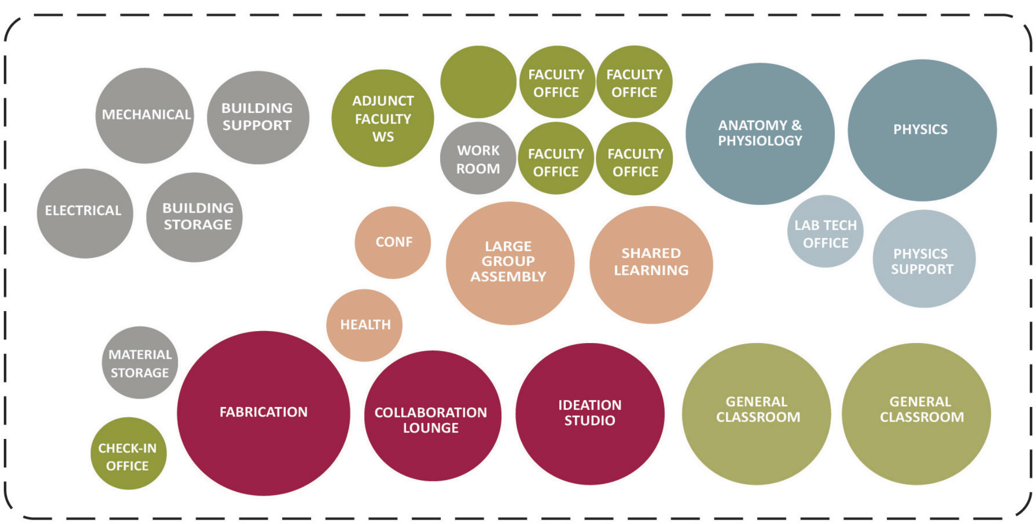
These diagrams represent distribution and overall grouping of program between levels. They do not necessarily represent desired relationships or adjacencies between spaces.



Level 3



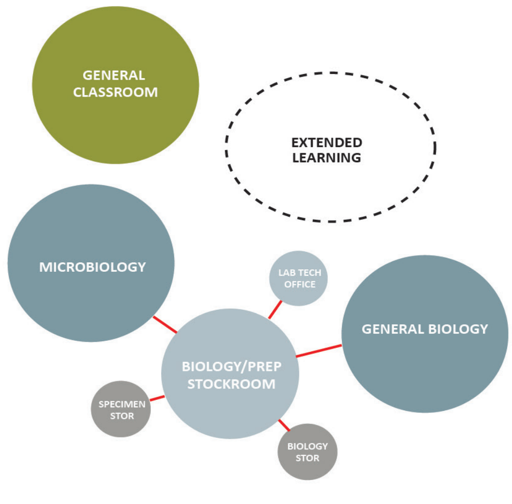
Level 2



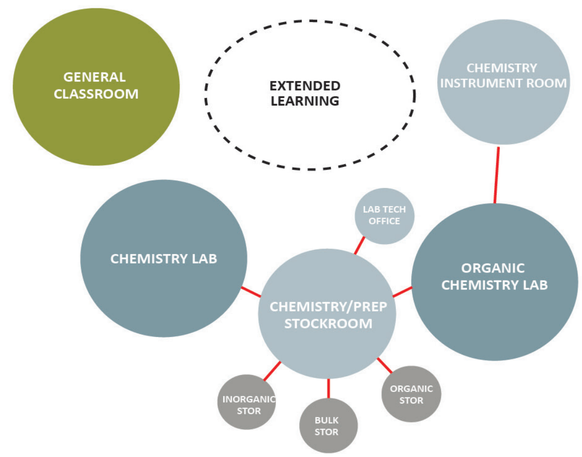
Level 1

Program Adjacency Diagrams

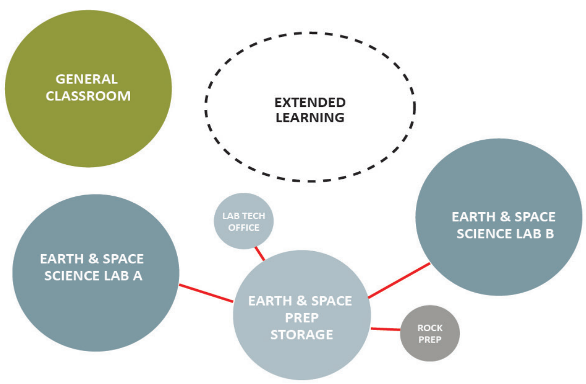
These diagrams represent key relationships between program areas. A line between spaces represents direct access.



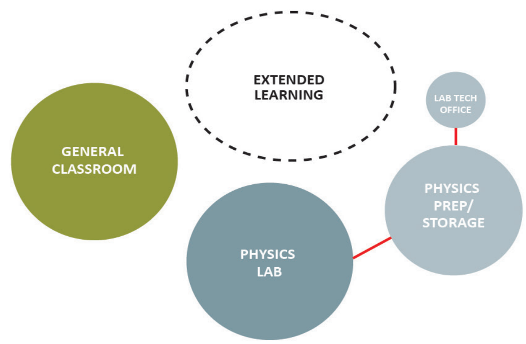
BIOLOGY



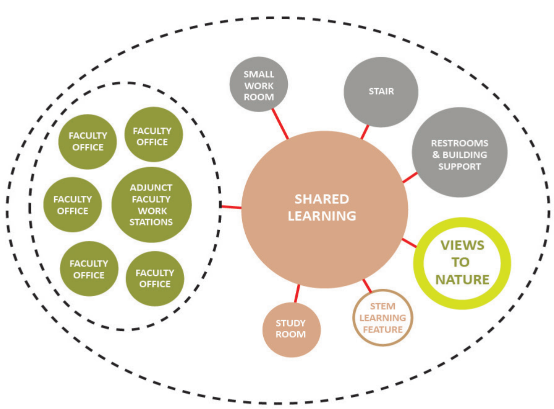
CHEMISTRY



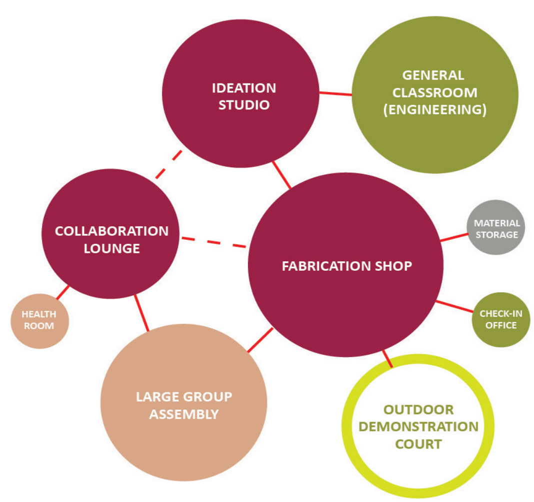
EARTH & SPACE SCIENCES



PHYSICS



EXTENDED LEARNING



FABLAB

Building Relationships

- The new STEM building is intended to attract future students of all ages in the greater Puyallup area. This includes middle and high school students who arrive in large groups throughout the year during field trips intended to provide exposure to STEM learning. The relationship of activities and spaces upon entry should create a welcoming, enticing social hub of learning.
- It should also be evident upon entry that the building itself is a teaching tool. It should demonstrate how energy, technology, nature, and engineering work together for a more sustainable future.
- The main building entry should have a strong visual connection to the campus walkway along the campus quad. An outdoor seating and a demonstration patio should be included as key components of the entry courtyard. Design elements should encourage activities to 'spill out' from the fab lab helping to create a social and active front porch experience.
- At the heart of this social hub of learning is the Fabrication Lab and the alluring excitement of hands-on making and experimentation. The collaboration lounge and ideation studio form a suite of spaces which require visual and physical connections to the fab lab engineering classroom and physics lab.
- To support tours of this building and provide informal study space as an amenity to the entire campus, a large group assembly area for up to 100 students should be located just outside the fab lab. This area should have the ability to view presentations and demonstrations. It should also have adjacent informal study areas, 2d and 3d display, and access to the fab lab suite of spaces.
- Faculty offices and open office workstations for adjunct facility are to be distributed on each floor in a way that avoids intimidating hallways. The intent is to provide approachable friendly access for students in an attempt to strengthen relationships with faculty. These relationships help students persevere through life's difficulties and support them in their academic success. Visibility from these offices to labs, classrooms, and other offices is intended to strengthen interdisciplinary collaborations among faculty.
- Lab storage to be located between labs for equal access.
- Classrooms should be distributed on each floor. By mixing these amongst the labs the non-STEM student population will have more exposure to STEM learning and activities in support of the project goals.
- Informal learning areas, study rooms, and copy rooms to be distributed on each floor and located adjacent to labs, classrooms, and faculty offices to encourage collaboration and provide a place for tutoring and study. A balance between formal and informal learning is key to creating an engaging student learning-centered environment.

Acquisition Needs

The project does not require acquisition of property.

Landscape Design

Program + Goals

- Preserve and enhance the existing forest landscape to the north.
- Forest restoration and the upland conifer ecology provide learning opportunities and potential ties to the curriculum.
- Include ethnobotanical and other cultural interpretations of native plantings.
- Promote biophilic design with interior views out to the forest.
- Integrate stormwater with outdoor classroom to maximize educational opportunities and highlight sustainable features of the landscape.

Plant Materials

- Plant selection and proposed maintenance to support CPTED standards.
- Plant materials to be predominantly native with limited use of well-adapted species.
- Lawn areas should be limited to the existing commons.

Irrigation

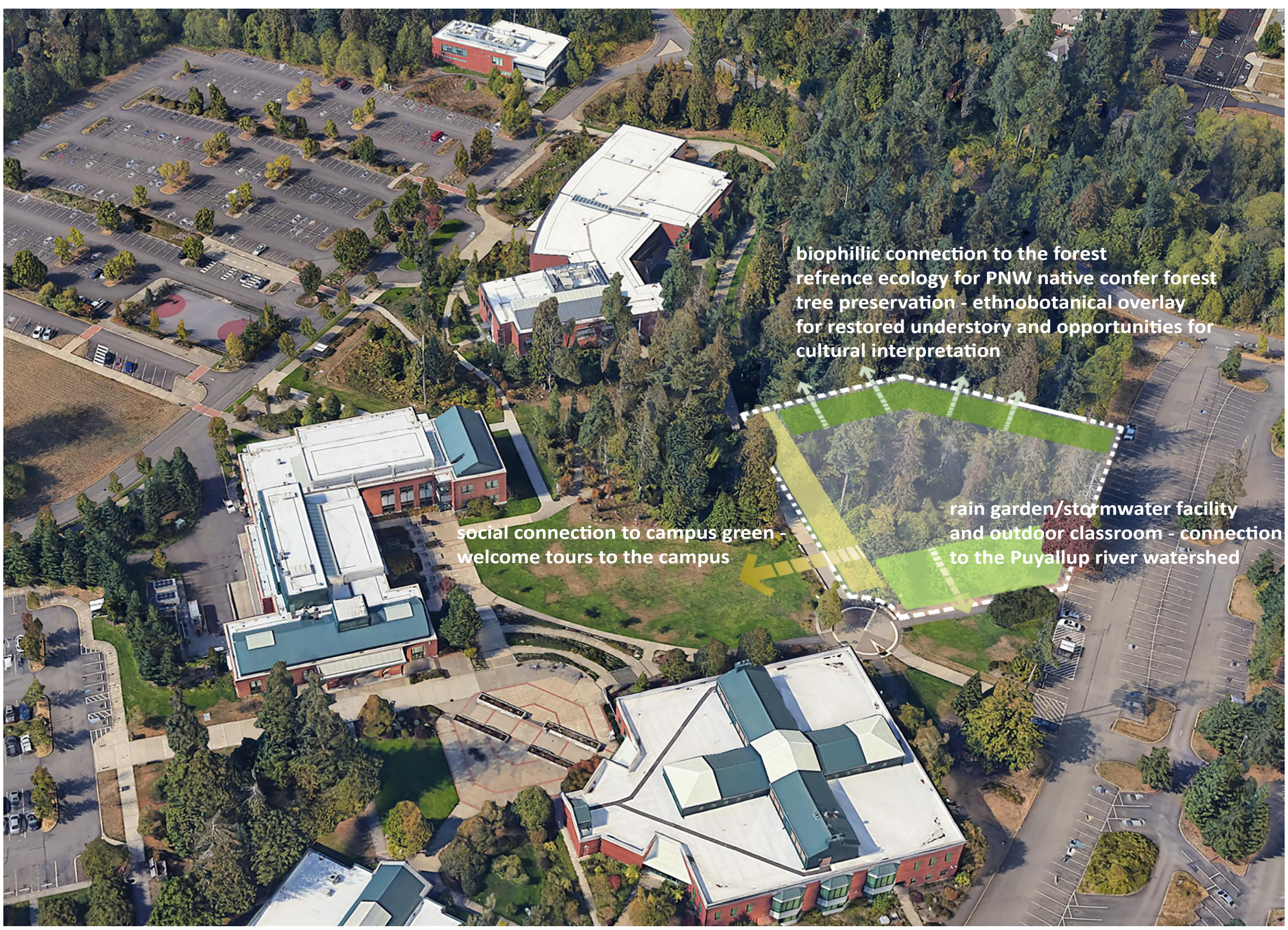
- A new permanent system to be installed for the new building.
- Potentially tie into existing systems along the commons and the existing parking lot.
- If the second LEED point for outdoor water use reduction is pursued, rainwater capture or non-irrigated landscape may be considered.
- Irrigation equipment to be efficient to achieve LEED outdoor water use reduction credit.

Paving

- Cast in place concrete paving and precast concrete pavers complementary to existing paving on campus.

Site Furnishings

- benches, bike racks, and waste/recycling receptacles.



Landscape Diagram

Site Analysis

Studies Completed +Underway

- A traffic analysis was completed in 2015 and found that the existing parking provided was inadequate for the overall campus needs.
- A parking study is currently underway to evaluate the best locations for meeting the overall campus parking deficiency.

Key Relationships

The three key relationships established by the planning team to achieve the project's goals are: spark curiosity, welcome everyone and connect to nature.

Spark Curiosity

Two edges of the new building face existing pedestrian walkways providing opportunity for access at existing circulation nodes. The location is adjacent to and constrained by existing parking on the east. This creates an opportunity to spark curiosity for the general student population. As students walk onto campus from the parking area, they will have visual daily exposure to STEM hands-on learning, specifically activities of the fab lab. Locating outdoor learning areas along this path also reinforces this project goal and highlights the college's core value of sustainability.

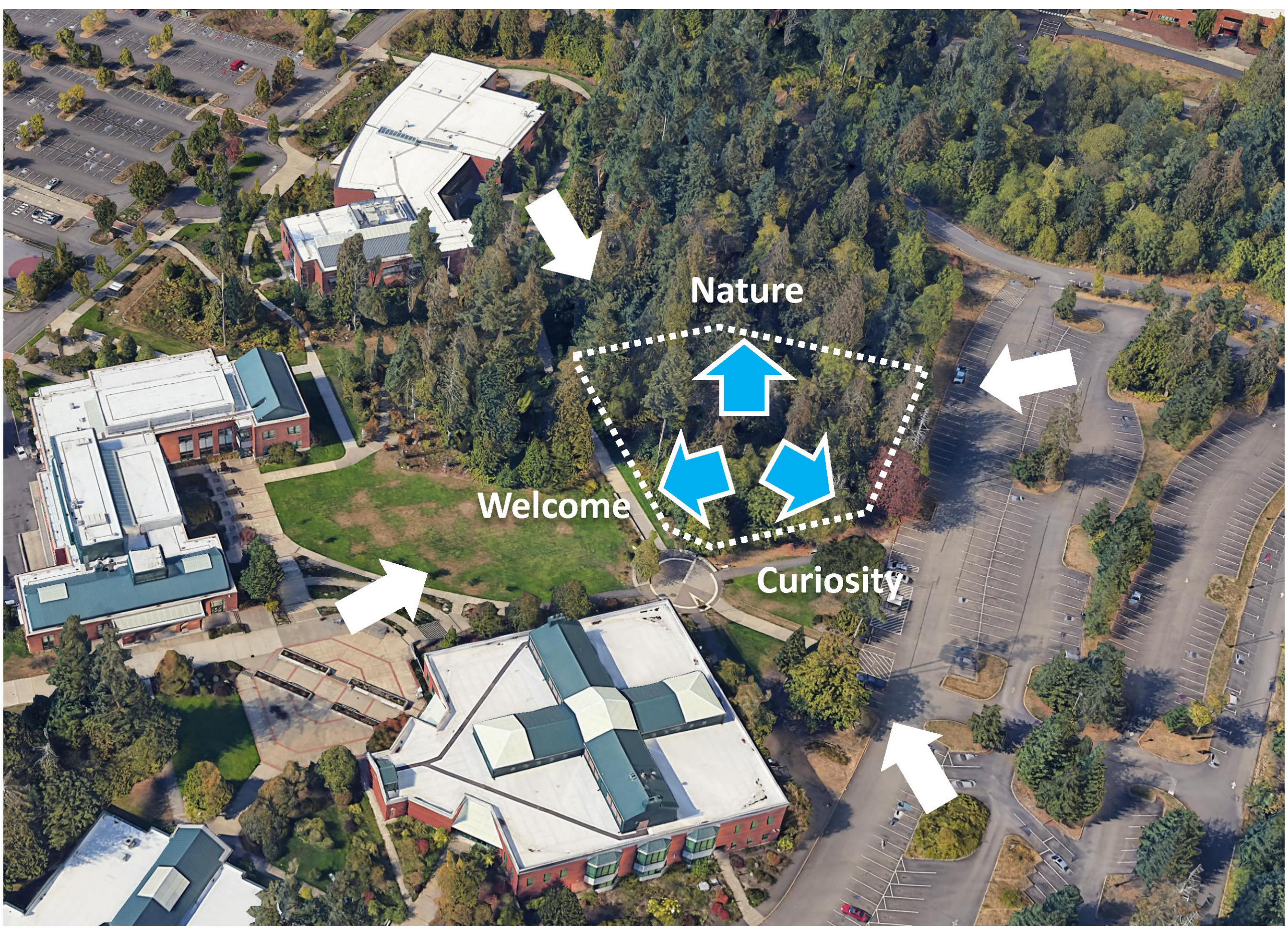
Exsiting Site Analysis

Welcome Everyone

The preferred alternate is on the east edge of the central campus lawn. This location allows the west façade of the new building to complete the sense of enclosure needed for a distinct campus quad. The entry's prominent and welcoming presence within the campus heart will provide a spill out demonstration court with strong visual exposure for STEM programs. This exposure supports the project goal to increase enrollment in STEM for underrepresented student populations. The north façade will work with the Allied Arts and Health building to help shape and activate a future campus commons planned for in the master plan.

Connection to Nature

This location affords an indoor-outdoor connection to the second growth forest on the north and west for hands-on research and experimentation. Not only does this provide a more engaging learning experience but daylight and a connection to nature have also been shown to improve the ability to retain knowledge and improve attendance – both in support of the project goals. The location has adequate solar access to the south but will likely need to rely on skylights/ clerestories and consider exterior screening on the east and west facades. The topography reaches its highest elevation (229) at the northwest corner and its lowest elevation (222) on the east along the parking lot edge.



Key Site Relationships

Verification

The following section includes preliminary and summary statements regarding site systems and jurisdictional requirements that will affect this project. All of these systems, parameters and requirements shall be reviewed and verified during the design process.

Easements and Setback Requirements

No easement or property setbacks have an effect on the planning of this project. Setback buffers are required for existing infrastructure, 20' from sewer lines, and 10' from water and storm drainage lines.

Potential Permit Issues and Code Variances

No unusual permitting requirements or code variances are required for this project. An update to the masterplan is under review by the City of Puyallup approval of which could potentially impact the schedule for this project.

General Site Improvements

The project includes construction of the new building, sidewalks, parking areas, and site utilities. The combined project area is approximately 80,000 square feet (1.84 acres).

Water and Fire Service

The water purveyor for the site is the City of Puyallup Water Department. Water mains on campus are owned and maintained by Pierce College. An existing water main serving a fire hydrant is located southwest of the science building site, looping around the College Center Building. Another existing water main is located north of the site along the north edge of College Way, which turns north and routes offsite towards Wildwood Park Drive. The new science building will be sprinkled. The fire service is anticipated to be 6-inch. A new fire service, fire department connection, double-detector check valve, and other appurtenances will be required from the water main. A new domestic water service will be required. See appendix C.9 for additional information and anticipated design criteria.

Stormwater Drainage

Construction of the new science building will trigger stormwater improvements, including flow control and water quality. The project creates minimal, if any, pollution-generating surfaces so water quality treatment is not anticipated. A preliminary estimate based on 38,000 square feet of new and replaced impervious surfaces would require a detention volume of 21,000 cubic feet. An open pond is the preferred facility for stormwater management due to costs and available land. Additional stormwater management alternatives will be detailed in the list below. The pond will be located to the north of the proposed building and west of the existing parking lot. The detention pond outlet would connect to an existing storm drainpipe located north of the proposed science building along the north drive access lane. In addition, Low Impact Development (LID) facilities will be required to the maximum extent feasible. These may include Bioretention facilities (rain gardens), green roofs, rainwater harvesting, and permeable pavements. To meet flow control requirements, these BMP's require site soils that allow stormwater infiltration. While infiltration is a desirable LID technique, based upon past geotechnical work completed near the site, we anticipate that the site soils are glacial till and not conducive to infiltration of stormwater. Therefore, infiltration is not feasible, and a detention pond is proposed to meet stormwater flow control requirements. The City of Puyallup requires that a geotechnical engineer confirm on-site infiltration is not feasible. A bioretention facility can be provided for educational purposes, however, the facility won't allow the project to obtain additional stormwater LEED points as the facility would only provide water quality and not infiltration.

Construction of the new 100 stall parking lot (see page 43) will trigger stormwater improvements, including flow control and water quality treatment. A preliminary estimate based on 40,000 square feet of new and replaced impervious surfaces would require a detention volume of 22,500 cubic feet. An open detention pond will be required and located immediately to the south of the parking lot, on undeveloped land. The City of Puyallup requires that a geotechnical engineer confirm on-site infiltration is not feasible. The detention pond outlet would discharge to an existing wetland located to the south of the proposed parking lot. A bioretention facility or mechanical system such as a Filterra will be utilized to meet stormwater quality requirements.

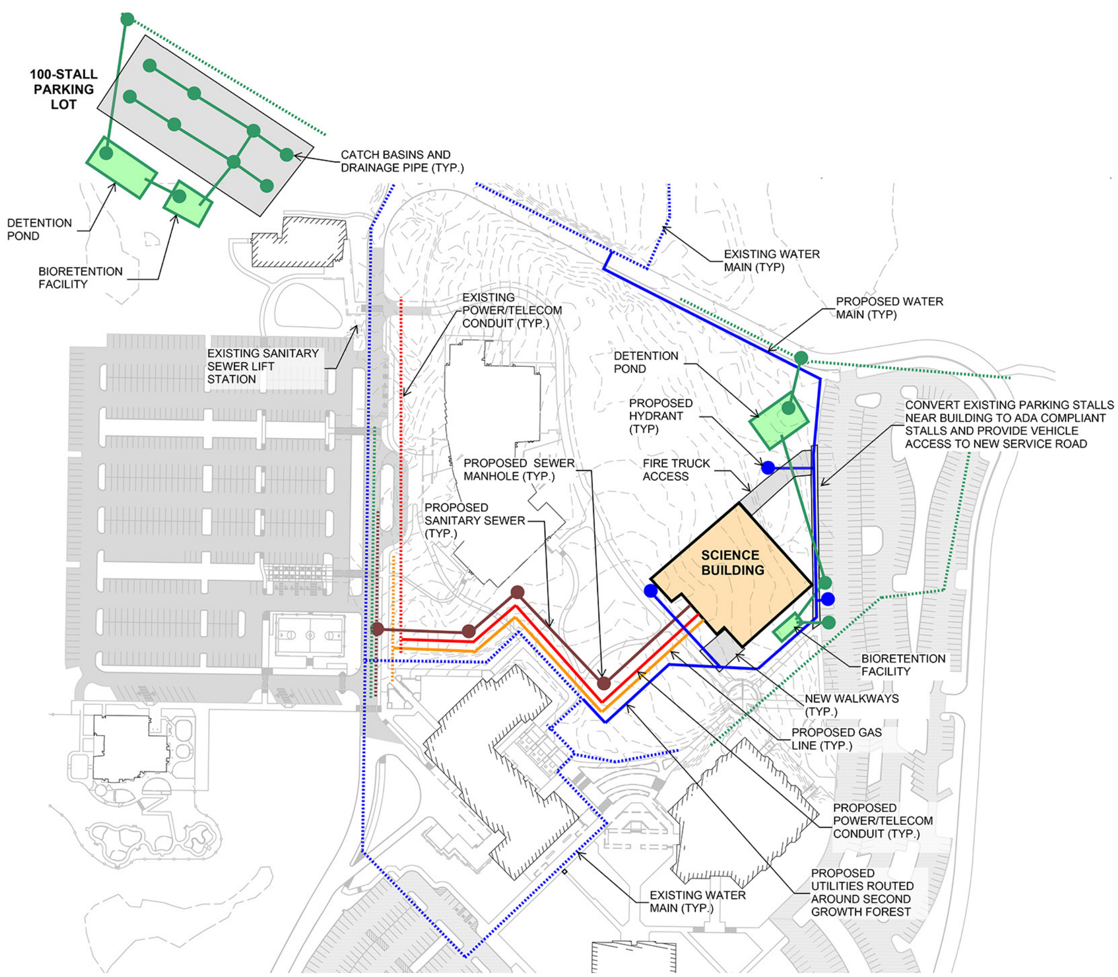
Alternative stormwater management options are available for the STEM building and the 100-stall parking lot. Two alternative options were explored both utilizing underground 6-foot diameter corrugated metal detention pipes with different systems for stormwater quality treatment.

- Stormwater Option 1: Includes underground detention pipe with a bioretention facility upstream.
- Stormwater Option 2: Includes detention pipe with Filterra treatment units upstream. for stormwater quality treatment.

Both alternative options include underground detention pipe which is considerably higher in cost than the above-ground detention pond. However, it allows for an increase in usable land at the campus as the detention system would be underground. The first alternative option of bioretention for stormwater quality treatment serves as a learning tool for students. Additionally, a bioretention facility may be a less costly option for water quality treatment. The second alternative option offers more flexibility for placement of the stormwater quality system due to the decreased footprint required for the Filterra units.

Sub-Drainage Systems

Poorly draining soils in the area and experience designing previous buildings on this campus indicate that a well-designed foundation drain system is a likely necessity. A 6-inch deep capillary break and 4-inch diameter perforated pipes spaced 15-feet on-center surrounded by a 16-inch by 12-inch gravel trench are expected under the slabs of the science building.



Utilities and Civil Plan Diagram

Off-Site Improvements

Off-site improvements are not anticipated.

Potential Environmental Impacts

- Greens space and natural amenities to be preserved
- Site mitigation, possible contamination: There are no known contaminates on the site
- Wetlands delineation: This project site is not immediately adjacent to wetlands or shoreline and will not require wetlands or shoreline mitigation measures.
- No shoreline jurisdiction issues
- State Environmental Policy Act: Based on the new building size a SEPA amendment is required for the project
- Zoning for the site is governed by the City of Puyallup, Municipal Code Chapter 18A. The site is currently zoned (PI) Public / Institutional. All development within the campus zones are governed by the Campus Master Plan, which has been submitted for review by the City of Puyallup.

Parking

Additional parking will be required as a condition of permitting.

In order to preserve the undeveloped tree-vegetated landscape a parking lot can be constructed at the northwest corner of the campus south of the existing access drive lane, and north of the Health Education Center. The proposed parking lot would add a net of 100 new parking spaces.

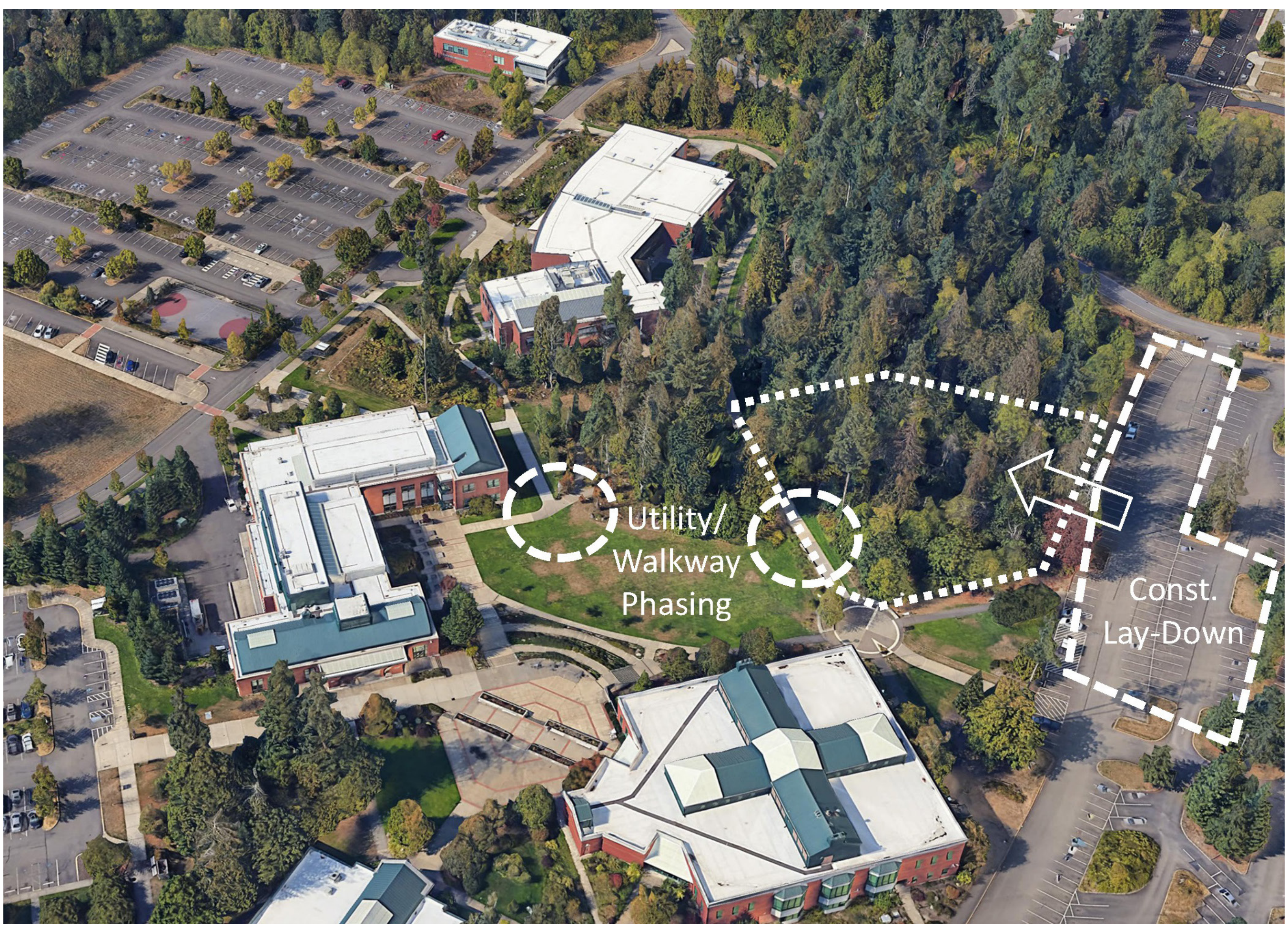
Future commons space and relationship to new STEM facility and future building to the north

The addition of these parking stalls to the campus will require the inclusion of 4 accessible parking stalls. To meet the intent of the Americans with Disabilities Act, the four accessible parking stalls will be located as close as possible to campus buildings. A likely location will be in the parking lot immediately to the east of the new science building.

Existing campus parking is insufficient to meet current parking demands and the additional parking area associated with this project will not be sufficient to meet those demands. A parking structure has been considered as a possible option in the master plan.

Impact from Lay-Down Areas and Construction Phasing

During construction, an area of the existing parking area adjacent to the building site to the east will need to be used as construction lay down and contractor parking. The design team may need to explore the feasibility of other options depending on the parking needs of the college. This may include the central campus lawn which has been noted to have poor drainage during the wet seasons. Utility extensions will potentially disrupt access to Campus walkways. The design team to coordinate pedestrian detours and phased construction to maintain student access.



Potential construction laydown area relative to existing parking and preferred site

Consistency with Long Term Planning

Campus Master Plan

This project ties directly to the Pierce College Puyallup Campus (Facilities) Master Plan, completed in 2002 and updated in 2015 and currently being updated for 2020. The Campus Master Plan identifies six major strategic planning goals:

- Establish a dynamic framework for continued growth and decision-making.
- Reinforce Pierce as a "learning-centered community" with quality comprehensive programs focused on student success.
- Create facilities that enhance interaction with other organizations and strengthen community connections.
- Use architecture and design to express and reinforce district values and mission.
- Maximize operational and maintenance efficiencies.
- Value open spaces and strengthen stewardship of the environment.

The plan also outlines four categories for planning and development:

See Appendix C.3 – Excerpts from Campus Master Plan

- Comprehensive Needs
- Current Campus Development
- Near-Term Development Needs
- Long-Range Development Needs

This project was identified as the next major project in our original campus master plan and continues to be our number one priority for 2019-21 biennium funding. This project will allow us to address four main needs:

- The College simply does not have adequate space or capability to support the tremendous enrollment growth it has seen over the last decade
- Create a facility that provides quality programming focused on student learning and success, particularly in STEM fields
- Enhance our partnerships with local industry and community
- Maximize space utilization and operational efficiencies through flexible design and LEED principles

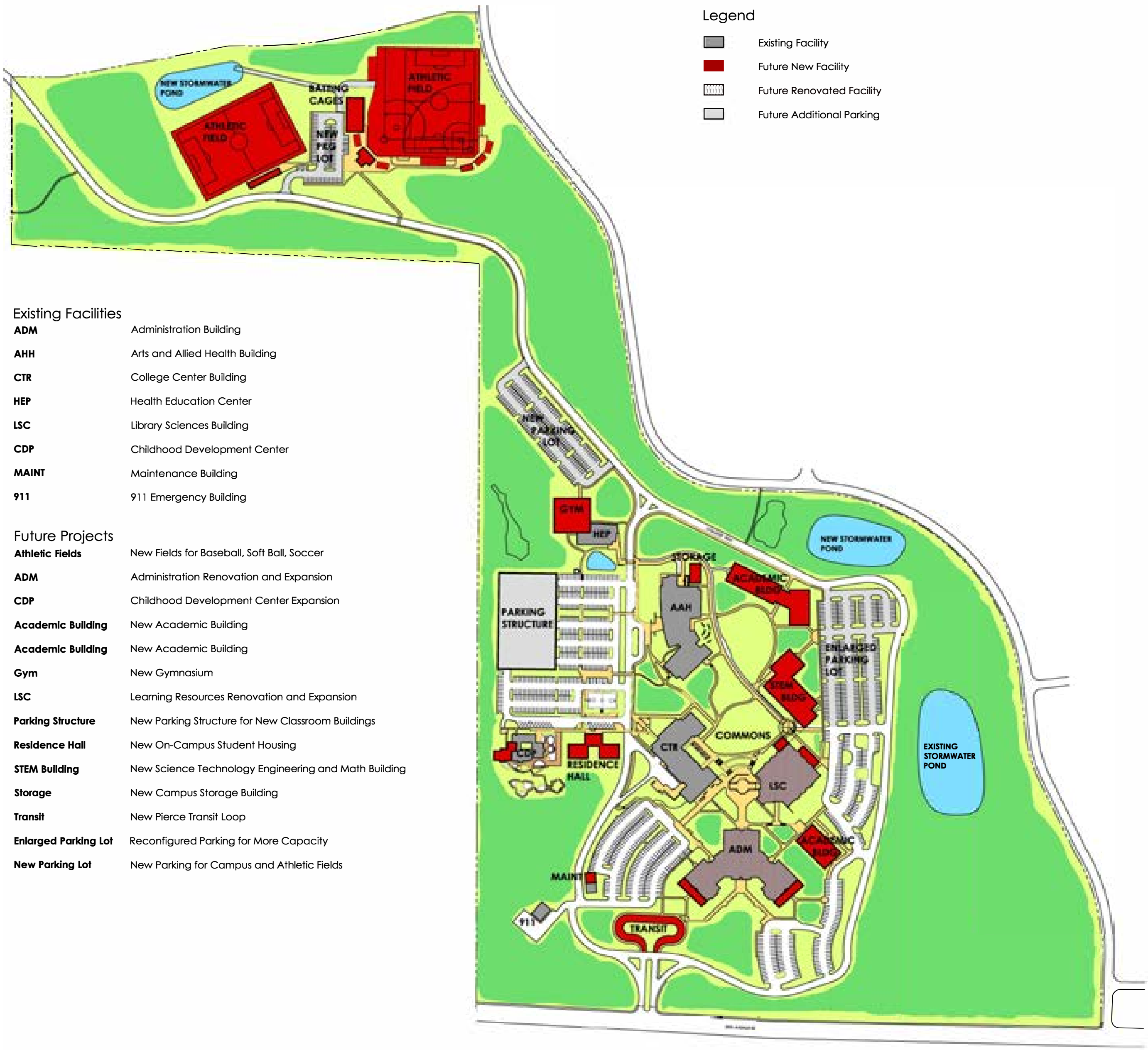
Consistency with Other Regulations

High Performance Building, LEED Silver Standard

On June 18, 2020, the Pierce College team and project consultants spent half a day together for a sustainability workshop lead by O'Brien360. At the meeting, we worked to understand the project's sustainability goals and objectives, develop strategies and metrics to achieve those goals, and identify unique challenges or opportunities for the project in the realm of sustainability. We had a lengthy discussion on values, aspirations, and requirements that would be

Southwest Corner of the Preferred Site

Pierce College Puyallup Campus Master Plan - 2016
Development Plan



Existing Facilities

ADM	Administration Building
AHH	Arts and Allied Health Building
CTR	College Center Building
HEP	Health Education Center
LSC	Library Sciences Building
CDP	Childhood Development Center
MAINT	Maintenance Building
911	911 Emergency Building

Future Projects

Athletic Fields	New Fields for Baseball, Soft Ball, Soccer
ADM	Administration Renovation and Expansion
CDP	Childhood Development Center Expansion
Academic Building	New Academic Building
Academic Building	New Academic Building
Gym	New Gymnasium
LSC	Learning Resources Renovation and Expansion
Parking Structure	New Parking Structure for New Classroom Buildings
Residence Hall	New On-Campus Student Housing
STEM Building	New Science Technology Engineering and Math Building
Storage	New Campus Storage Building
Transit	New Pierce Transit Loop
Enlarged Parking Lot	Reconfigured Parking for More Capacity
New Parking Lot	New Parking for Campus and Athletic Fields

important for the future of Pierce College and this project. We identified aspirational goals for the design team to strive to achieve above the required minimums. We updated the project LEED scorecard. The project has identified 54 yes points and an additional 14 likely points for the project with a commitment to include 5 buffer points for flexibility of unknown changes. Full Eco Charrette summary and LEED Checklist is included in the appendix. (See Appendix-C.4 LEED Checklist)

Aspirational Project Goals for the design-build team to further investigate with the college during design.

- LEED Gold (60 + 5 points)
- Meet the 2030 challenge (EUI of 46.5)
- Net Zero Facility
- Pilot credits in the area of Diversity, Equity and Inclusion

Net Zero Energy Energy Performance

Net Zero Executive Order 18-01 requires state funded projects to be at least zero energy ready. This mandate does not apply to community and technical colleges, but college projects interested in exploring achieving this goal are eligible for support and guidance from the State Efficiency and Environmental Performance office. See appendix C.4 for additional information.

Greenhouse Gas Reduction Strategies

The College has developed a comprehensive list of strategies for reducing greenhouse gas emissions. These strategies have been compiled in conjunction with an extensive energy audit undertaken in 2013. Pierce College acquired an energy grant through the Department of Commerce in 2013 and are currently engaged in the implementation of several of the energy conservation measures outlined in the reduction plan. The Greenhouse Gas Emissions Reduction Plan has been submitted to the Department of Ecology as required. (See Appendix- C.5. Greenhouse Emissions Reduction Plan)

Archaeology and Historic Preservation/ Tribal Reviews

The project description and supporting documentation were submitted to the Department of Archaeology and Historic Preservation (DAHP) as well as the Governor’s Office of Indian Affairs (GOIA) in compliance with Executive Order 05-05 (See Appendix- C.2. DAHP Letter). The DAHP expressed no concerns over historical resources but did note the requirement to contact local tribes for consultation. The GOIA directed toward the Nisqually and Puyallup Tribes. Both tribes have been contacted with submitted documents and have asked the College to conduct a new cultural resources assessment survey at the location of the proposed new structure if the project moves forward. A resource assessment was conducted in the general area of the current project request in 2005, but the survey is deemed to be out of date for the new project proposal. A new survey was completed in the Fall of 2018 and has deemed that no further oversight is required.

Americans with Disability Act Implementation

The ADA prohibits discrimination based on disability in employment, State and local government, public accommodations, commercial facilities, transportation, and telecommunications. ADA Title II requires that State and local governments give people with disabilities an equal opportunity to benefit from all the programs, services, and activities (e.g., public education, employment, transportation, recreation, health care, social services, courts, voting, and town meetings). This project will follow the State requirements for architectural standards under ADA.

ADA Access

The project provides ADA access from an adjacent parking area via existing walkways/ramps along the south side of the proposed building location. These connect to the main campus pedestrian walkway that serves as a service delivery/ fire access lane. This path will be used to provide an ADA accessible pedestrian path to the new STEM building.

Other Codes and Regulations

Zoning for the site is governed by the City of Puyallup. All development within the campus zones are governed by the Campus Master Plan, as adopted by the City of Puyallup.

Further Studies + Other Significant Components

As outlined earlier in this report further study is needed to resolve the overall campus parking deficiency.

Elective program areas, energy-saving systems, and other qualitative features and systems have been included to allow the design team to explore achieving the maximum project scope and value for The College. These are outlined further under delivery method.

Building Commissioning

The STEM Building will be commissioned to ensure that control devices, components, equipment, and systems are calibrated, adjusted, and operate in accordance with the approved plans and specifications. Commissioning will also be performed per the requirements of the WSEC including enhanced commissioning to meet the requirements of LEED 4.1. Functional testing will be performed by a registered professional to demonstrate the correct installation and operation of each component, system, and system to system relationship in accordance with the plans and specifications. This demonstration is to prove operation, function, and maintenance serviceability for each of the commissioned systems. Testing shall include all modes of operation, including:

- All modes as described in the Direct Digital Controls (DDC) sequence of operation.
- Performance of DDC alarms.
- Mode of operation upon a loss of power and restored power.
- The HVAC control system will be tested to ensure that control devices, components, equipment, and systems are calibrated, adjusted, and operate in accordance with the plans and specifications.

Upon completion of the commissioning scope, the Design Builder will submit to the code official a commissioning compliance checklist per the WSEC, signed by the building owner.

Building Envelope Commissioning will also be completed per the WSEC and LEED 4.1. Air barrier testing will be performed to ensure the air leakage rate is below code required values and window water testing completed to verify installation of window systems. Air Barrier testing results will be submitted by the Design Builder to the code official.

Future Phases

This project will not have any future phases. However, the project will result in a need to back-fill of vacated spaces that will be used to expand or develop new programs and services.

Delivery Method

Design-Build

The College and State have chosen to use the progressive Design-Build delivery method for this project. The State is currently exploring this methodology for several higher education projects. Pierce College is interested in using this delivery method to capitalize on the benefits of merging creativity, effectiveness, and value by working together simultaneously with the designer and builder. This methodology can also assist in lessening the effects of cost escalation given the ability to potentially purchase materials the most advantageous time and implement segments of work more quickly than other traditional delivery methods. The Design-Builder is responsible for the project schedule along with the coordination of the design and engineering team.

A space program and cost estimate have been developed for this Predesign phase. The Predesign document includes fundamental project parameters and performance requirements as well as elective features and systems. The elective features are included to explore achieving the maximum project scope and value through the possible inclusion of some of these features within the budget allocated by the legislature. The College believes the design-build delivery method provides the most advantageous opportunity to maximize the program scope, quality, and value.

Agency Management

Pierce College's Steering Committee is responsible for making decisions on overall strategy and design issues. The Colleges Project Manager, with oversight from the Director of Facilities, will be the primary point of contact for owner decisions, direction, and coordination during all phases of the project. The College will work through the Department of Enterprise Services (DES) project manager to provide formal direction to consultants and contractors. The DES project manager is also responsible for the overall project budget, design and construction contracts, and monitoring compliance with project requirements.

The College will utilize current staff including the Director of Facilities and the Pierce College Project Manager to oversee management of the project.

The project will be managed by a Washington State Department of Enterprise Services Project Manager with assistance from the College's Director of Facilities and Project Manager. The Vice President of Administration Services for Pierce College will also assist in overseeing the project.

The Pierce College Director of Facilities and Project Manager will oversee the development and design process to ensure that the facility meets the intended goals of the project in a manner consistent with the Master Plan and Predesign. The Vice President and Facilities Director will regularly review progress and issues with the college President. The Director of Facilities will regularly report to the State Board of Community and Technical Colleges regarding the progress of the project.

Schedule

The project is proposed to be completed under a single Design-Build contract. The project construction will be scheduled to minimize program and campus interruptions although interruptions should be anticipated with the construction of the new building in the center of campus.

The design phase will begin in July 2021 pending selection of the Design-Build team, phased construction is anticipated to start in May 2022 and be completed in the Summer of 2023.

Key Milestones

Item/Phase	Anticipated Start	Completion
Predesign Study	April 2020	August 2020
Predesign Approval	Sept 2020	Sept 2020
Design-Build Team Selection	July 2021	July 2021
Trade Partner Interviews	July 2021	July 2021
Schematic Design	July 2021	Oct 2021
Design Committee Mtgs	July 2021	April 2022
Value Engineering	Oct 2021	Oct 2021
Design Development	Oct 2021	Feb 2022
Construction Documents	January 2022	July 2022
Early Phase Permit Submission	March 2022	June 2022
Building Permit Submission	May 2022	Sept 2022
GMP Established		May 2022
Phased Construction	June 2022	August 2023

Potential Delays

The proposed STEM building is included in the updated College Masterplan that has yet to be submitted to and approved by the City of Puyallup. The updated Masterplan is expected to be submitted in the Summer of 2020 and be reviewed under an Administrative Use Permit.

The STEM Building project includes 100 new parking stalls; however, this only accounts for a portion of the actual expanded parking need on Campus. The Campus is planning to construct the additional required parking under a separate project. If this additional parking is not complete by Summer of 2023 it could delay occupancy of the STEM Building.

The project schedule anticipates construction funding in the 2021-2023 biennium, delay in the construction funding can impact the project in several ways. Project costs could significantly increase due to escalation, and redesign services may be required due to changing programmatic or jurisdictional requirements.

The long-term impacts, if any, of COVID-19 on Construction and Higher Education Facilities are not yet known. If COVID-19 site safety measures extend into 2021 and beyond, the construction costs may increase due to required safety protocols. COVID-19 may also have long term impact on the cost and availability of construction materials which could impact the construction budget. The programmatic areas may also increase if spaces need to be designed for social distancing while maintaining the planned occupancy levels.

Neighborhood Related Issues

The project site is not immediately adjacent to neighboring properties and will not require mitigation measures.

Local Jurisdictions and Community Stakeholder Meetings

Coordination with the City of Puyallup begun in the Predesign phase. No issues or concerns have been raised that would negatively impact the design or schedule.

The design team should review local design standards and meet with the City of Puyallup early in design to confirm.

Back to Table of Contents

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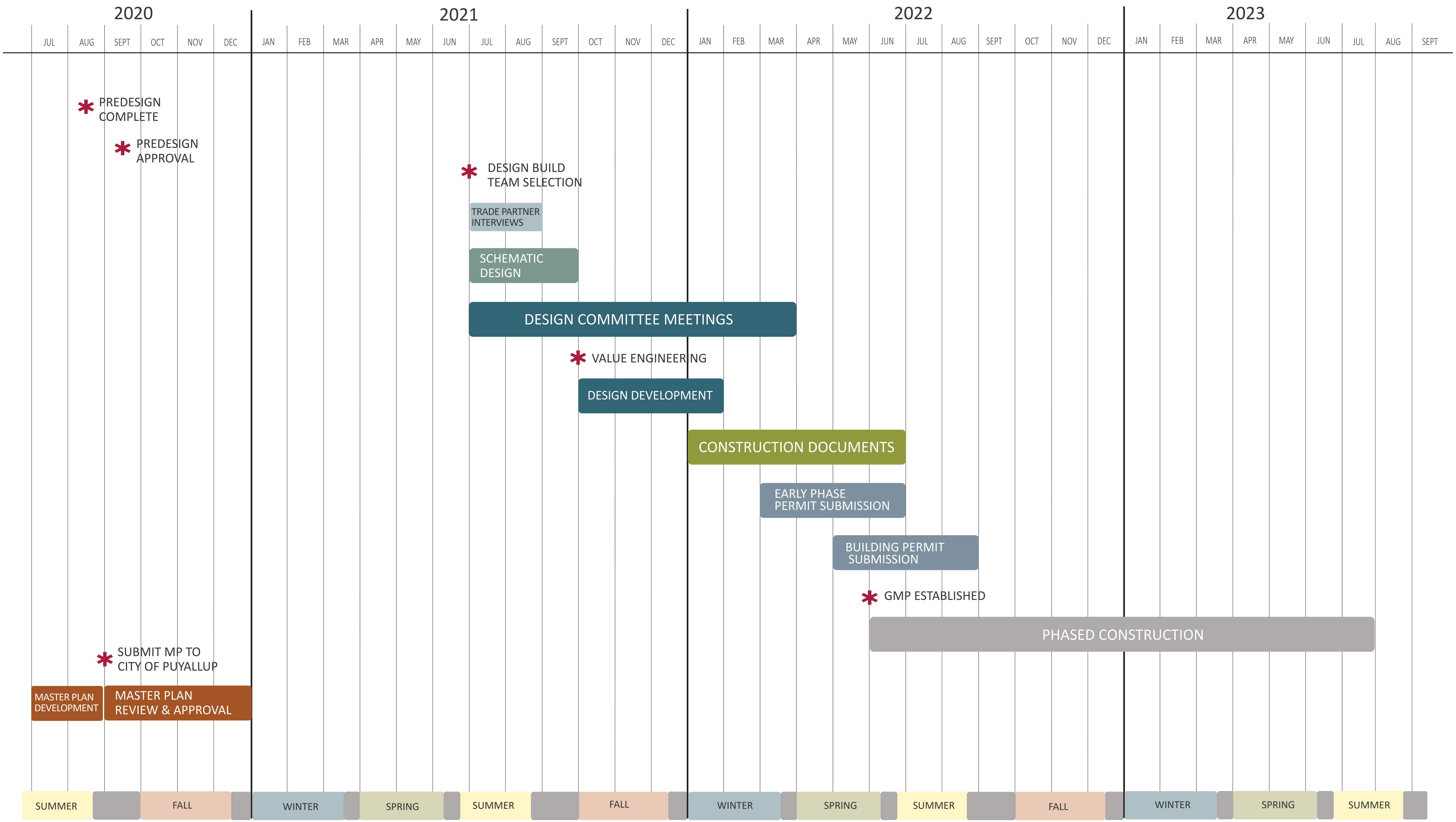
Project Schedule Diagram



5.0 BUDGET ANALYSIS

Cost Estimate

The Predesign cost estimate was prepared in July 2020 based on preliminary project sketches, consultant's narratives, and meetings with the estimator. The estimate anticipates a construction duration of 15 months and a Summer 2022 construction start date. The estimate is based on a progressive design-build project delivery method. See detailed cost estimate in the appendix for other assumptions used in completing the estimate.

C-100 Cost Summary

The table below is a summary of all project costs which include construction contingency, escalation, and sales tax. The complete C-100 Project Cost Summary is included in the appendix.

Project Budget Summary

Item/Phase	Cost	% Budget
Acquisition	$0	0%
Consultant Services	$840,424	2.070%
Construction	$35,032,032	86.288%
Equipment	S2,896,608	7.135%
Artwork	$201,985	0.498%
Project Administration	$265,400	0.654%
Other Costs	$1,362,551	3.356%
Total	$40,599,000	100%
Total Project Cost (rounded)		**$40,599,000**

Proposed Funding

Design phase funding for the project has been allocated through General Obligation Bonds (057) in the 2019-2021 biennium. Construction phase funding is anticipated to be from General Obligation Bonds (057) in the 2021-2023 biennium.

Funding Summary

Funding Category	057
Funding Type	Gen.Obligation
2019-21 Biennium	3,369,000
2021-23 Biennium	37,230,000
Total	**40,599,000**

Summary Table

1) SITE WORK:		
G10) Site Preparation.	$424,300	
G20) Site Improvements.	$529,337	
G30) Site Mechanical Utilities.	$489,627	
G40) Site Electrical Utilities.	$300,000	
G10) Other Site Construction.	$0	
Z10) Contractors GC and Fee	$310,300	
Estimating Contingency	$139,461	
SITE WORK SUBTOTAL:		$2,193,025
3) FACILITY CONSTRUCTION:		
A10) Foundations.	$1,054,291	
A20) Basement Construction.	$0	
B10) Superstructure.	$2,643,500	
B20) Exterior Closure.	$3,081,527	
B30) Roofing.	$711,207	
C10) Interior Construction.	$1,720,698	
C20) Stairs.	$427,650	
C30) Interior Finishes.	$1,232,145	
D10) Conveying.	$148,000	
D20) Plumbing Systems.	$1,224,743	
D30) HVAC.	$3,265,980	
D40) Fire Protection Systems.	$304,825	
D50) Electrical Systems.	$3,429,279	
E10) Equipment Installed by Contractor.	$614,428	
E20) Furnishings Installed by Contractor.	$144,247	
Z10) Contractors GC and Fee	$3,350,531	
Estimating Contingency	$1,000,126	
FACILITY CONSTRUCTION SUBTOTAL:		$24,353,177
MACC TOTAL:		**$26,546,202**

Facility Operations and Maintenance Requirements

ilCollege to provide narrative

Furniture, Fixtures, and Equipment

Furniture, fixtures, and equipment costs are included in both the construction cost estimate and as separate cost items outside of the construction contract. Items included in the construction budget include built-in casework, lab equipment, and other fixed equipment that requires careful coordination with building systems and utilities. All other loose equipment and furniture have been accounted for in the Equipment cost summary tab in the C-100 form.

Back to Table of Contents

Item#	Category	Cost Basis	Anticipated Annual Impact*
5.3.1.	Janitorial Costs		
	Supplies/Materials/Equip.	$0.20	$10,887
	Personnel	$1.04	$56,610
5.3.2.	Utility Costs		
	Electricity/Gas/Water	$2.05	$111,588
	Property Taxes	$0.06	$3,266
	Waste Disposal/Recycling	$0.12	$6,532
	Inspection/Svc. Contracts	$0.18	$9,798
5.3.3.	Technology		
	Infrastructure/Telecom/Equip.	$1.06	$57,699
	Personnel	$2.13	$115,942
5.3.4.	Maintenance/Repair/Furn. & Equip. Repl.		
	General Repair	$0.34	$18,507
	Furn. & Equip. Replacement	$0.11	$5,988
	Personnel	$0.94	$51,167
5.3.5.	Roads/Walks/Grounds		
	Supplies/Materials/Equip.	$0.09	$4,899
	Personnel	$0.43	$23,406
5.3.6.	Security		
	Supplies/Materials/Equip.	$0.08	$4,355
	Personnel	$0.75	$40,825
5.3.7.	Administration		
	Supplies/Materials	$0.01	$544
	Personnel	$0.00	$0.00
	Total Anticipated Budget Impacts	**$9.59**	**$522,013**

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6.0 APPENDIX A - PROGRAM ROOM DATA SHEETS

INTRODUCTORY/GENERAL BIOLOGY LAB

General Information

Activity Description

Hands-on laboratory activities for Biology courses including examination of models, discussion of cases/topics, dissection, lecture, microscopy, wet labs.

Basic Room Parameters

Square Footage 1,260 nsf

Occupants 24 students + 1 instructor

Proximity Requirements

Adjacencies Biology Prep / Stockroom, other Biology Teaching Laboratories, and Faculty Offices.

Casework, Equipment and Furniture

Casework	Casework suitable for a laboratory environment with epoxy resin benchtops
	Tall lockable
	Storage cabinets for microscopes and supplies
	Coat/bookbag storage for student belongings
Technology	Telephone; projector and screen or flat panel monitors to be confirmed during design.
	Wireless access points
Equipment	Refrigerator/freezer
Furnishings	(1) 6’-0” chemical fume hood
	(12) movable laboratory tables at 72” x 30” with epoxy resin benchtops, prewired with (2) duplex receptacles each
	(1) 60” x 30” instructor demonstration bench
	(25) chairs for students and instructor stations

Service Requirements

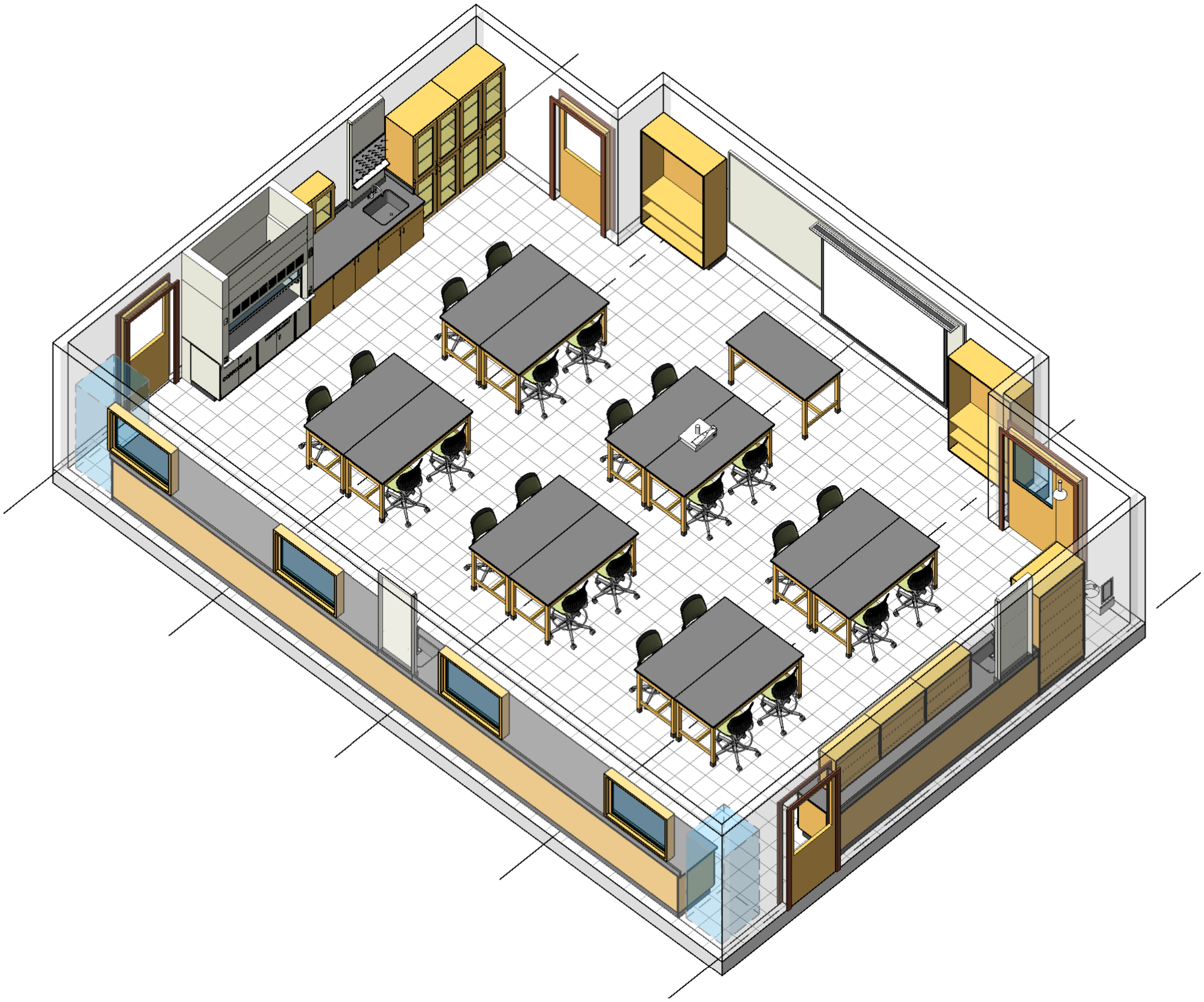
Lighting	Suitable for laboratory activities at the bench level and A/V presentations.
Electrical	Surface metal raceways at perimeter walls with 120v duplex receptacles every 36” on center with dedicated 20 amp circuits provided at laboratory equipment spaces.
	(10) floor boxes with electrical receptacles throughout the middle of the room to support flexible arrangement of movable laboratory tables.
HVAC	100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure.
Plumbing	Hot and cold water
	Laboratory sinks
	Safety shower / eyewash station
	Floor drain
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Natural daylight preferred
Relites	At doors
Doors	36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

Ancillary Space Requirements

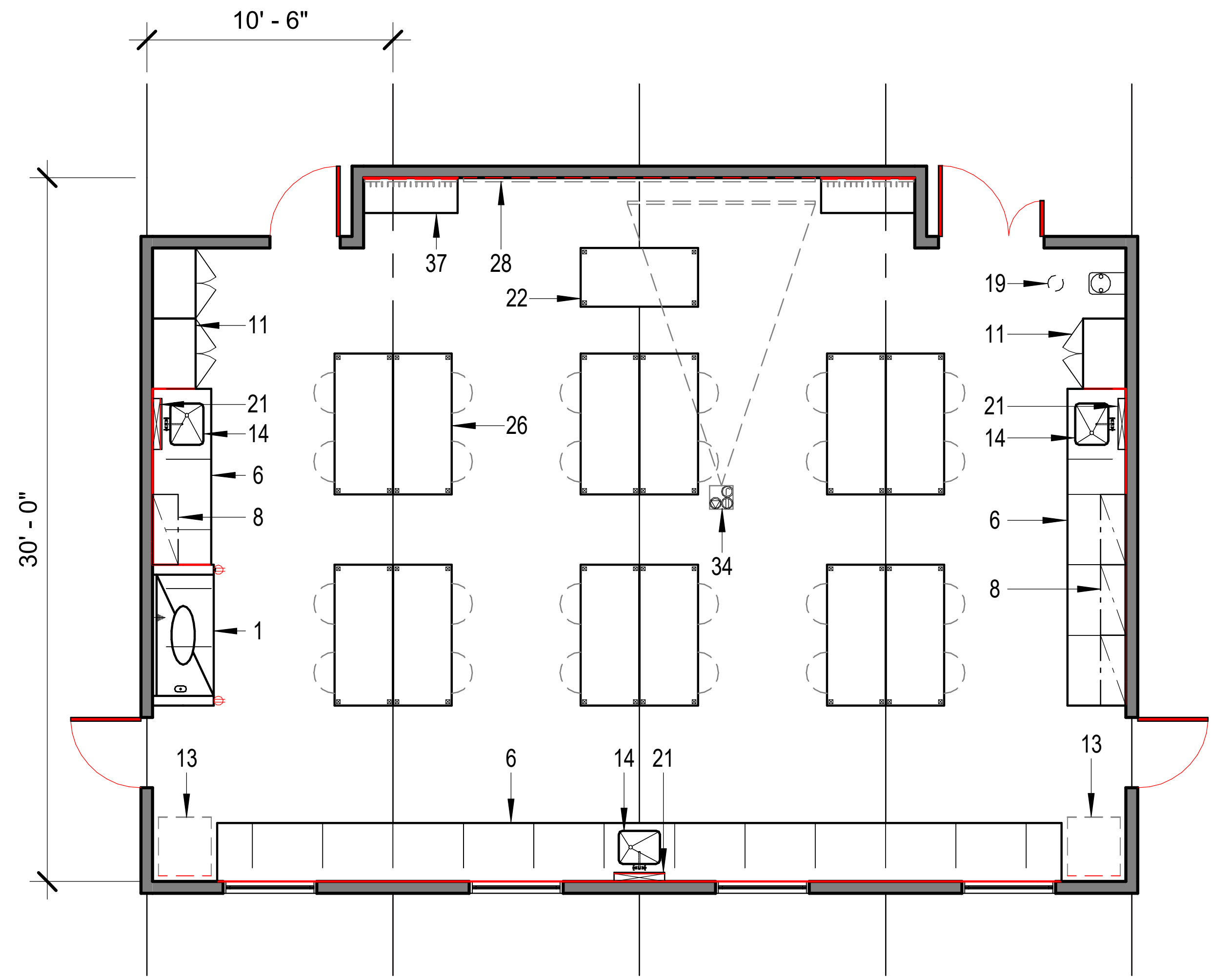
None

Other Requirements

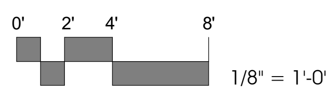
Effective presentation space for instructor.



General Biology Laboratory



General Biology Laboratory



FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Corrosive Cabinet
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. Mobile Teaching Cart
30. Tackboard
31. Mobile Student Desk
32. Balance Table
33. Mobile Bench Workstation
34. A/V Screen
35. Multi-media Projector (Clg. Mtd.)
36. Lattice Rod Assembly
37. Coat/Book Bag Storage Unit
38. Conference Table/ Chairs
39. Mop Sink
40. Mobile Bookshelf
41. Casework
42. Lounge Chairs/ Side Tables
43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

ANATOMY & PHYSIOLOGY LABORATORY

General Information

Activity Description

Hands-on laboratory activities for Biology courses including examination of models, discussion of cases/topics, dissection, lecture, microscopy, and wet labs.

Basic Room Parameters

Square Footage 1,260 nsf

Occupants 24 students + 1 instructor

Proximity Requirements

Adjacencies Biology Prep / Stockroom, Biology Specimen Storage, other Biology Teaching Laboratories, Lab Tech Office, and Shared Learning.

Casework, Equipment and Furniture

Casework	Casework suitable for a laboratory environment with epoxy resin benchtops
	Tall lockable
	Storage cabinets for microscopes and supplies
	Coat/bookbag storage for student belongings
Technology	Telephone; projector and screen or flat panel monitors to be confirmed during design
	Wireless access points
Equipment	Refrigerator/freezer
Furnishings	(12) exhaust snorkels
	(12) movable laboratory tables at 72” x 30” with epoxy resin benchtops, prewired with (2) duplex receptacles each
	(1) 60” x 30” instructor demonstration table
	(25) chairs for students and instructor stations

Service Requirements

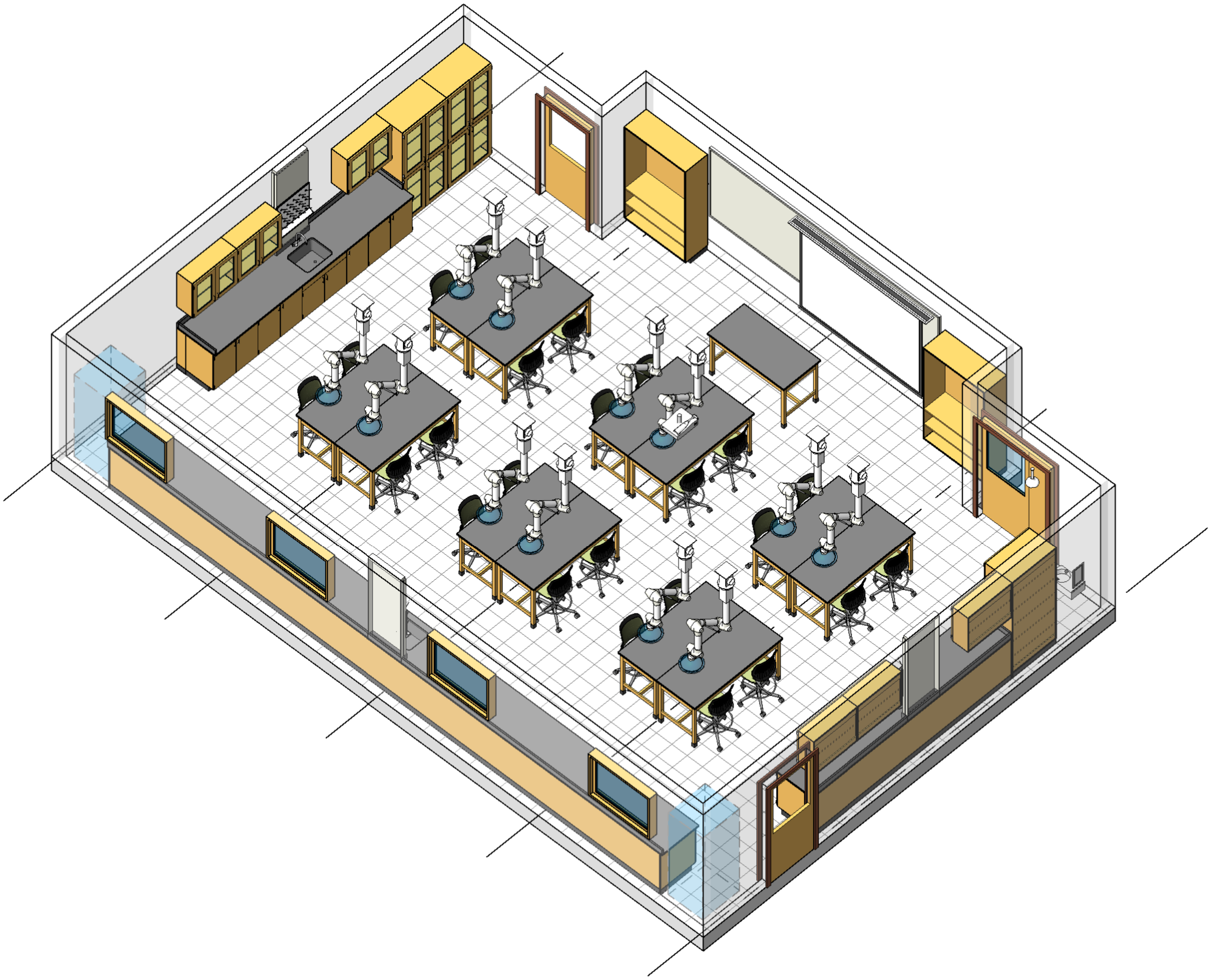
Lighting	Suitable for laboratory activities at the bench level and A/V presentations.
Electrical	Surface metal raceways at perimeter walls with 120v duplex receptacles every 36” on center with dedicated 20 amp circuits provided at laboratory equipment spaces.
	(10) floor boxes with electrical receptacles throughout the center of the room to support flexible arrangement of movable laboratory tables.
HVAC	100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure.
	(12) exhaust snorkels located over student tables activated by instructor-controlled switch.
Plumbing	Hot and cold water
	Laboratory sinks
	Safety shower / eyewash station
	Floor drain
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Natural daylight preferred
Relites	At doors
Doors	36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

Ancillary Space Requirements

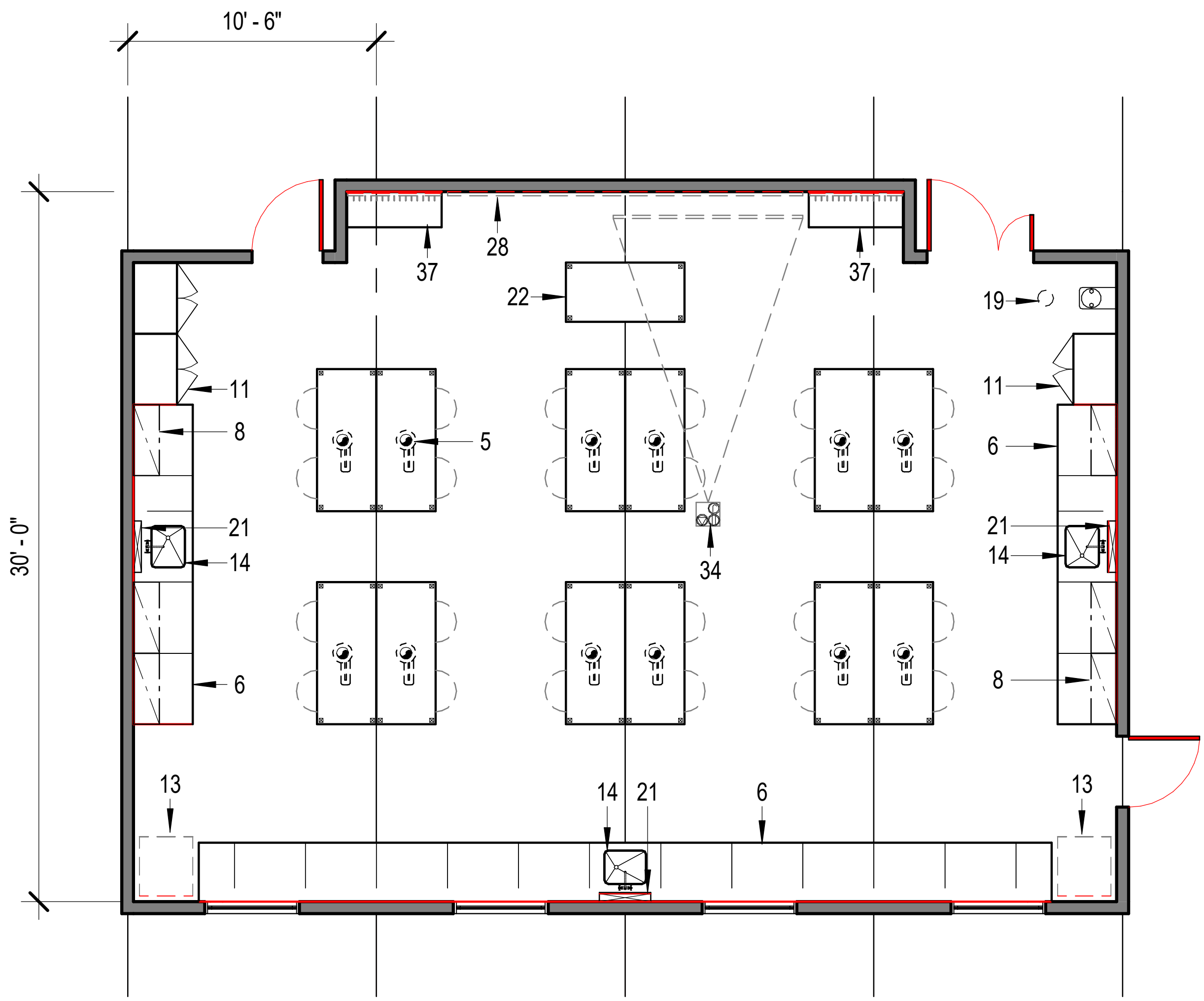
None

Other Requirements

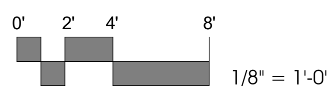
Effective presentation space for instructor.



Anatomy & Physiology Labortaory



Anatomy & Physiology Laboratory



FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Corrosive Cabinet
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. Mobile Teaching Cart
30. Tackboard
31. Mobile Student Desk
32. Balance Table
33. Mobile Bench Workstation
34. A/V Screen
35. Multi-media Projector (Clg. Mtd.)
36. Lattice Rod Assembly
37. Coat/Book Bag Storage Unit
38. Conference Table/ Chairs
39. Mop Sink
40. Mobile Bookshelf
41. Casework
42. Lounge Chairs/ Side Tables
43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

MICROBIOLOGY LABORTORY

General Information

Activity Description

Hands-on laboratory activities for Microbiology courses including isolating, testing, and staining microbes; microscopy; lecture/presentations.

Basic Room Parameters

Square Footage 1,260 nsf

Occupants 24 students + 1 instructor

Proximity Requirements

Adjacencies Biology Prep / Stockroom, other Biology Teaching Laboratories, Lab Tech Office, and Shared Learning.

Casework, Equipment and Furniture

Casework

Casework suitable for a laboratory environment with epoxy resin benchtops

Tall lockable storage cabinets for microscopes and supplies

Coat/bookbag storage for student belongings

Technology

Telephone

Projector and screen or flat panel monitors to be confirmed during design

Wireless access points

Equipment

Two-door deli refrigerator

(1) 6’-0” Class II, Type A2 biological safety cabinet

Furnishings

(1) 60” x 30” instructor demonstration table.

(25) chairs for students and instructor stations

Service Requirements

Lighting	Suitable for laboratory activities at the bench level and A/V presentations.
Electrical	Surface metal raceways at perimeter walls with 120v duplex receptacles every 36" on center with dedicated 20 amp circuits provided at laboratory equipment spaces; standby/ emergency power for refrigerator; benchtop electrical pedestals with duplex receptacle per student at island benches.
HVAC	100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure.
Plumbing	Hot and cold water
	Laboratory sinks at perimeter benches
	Cupsinks at island benches
	Purified water
	Natural gas
	Laboratory vacuum
	Safety shower / eyewash station
	Floor drain
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Natural daylight preferred
Relites	At doors
Doors	36" wide doors including one corridor door paired with 18" fixed leaf for moving equipment

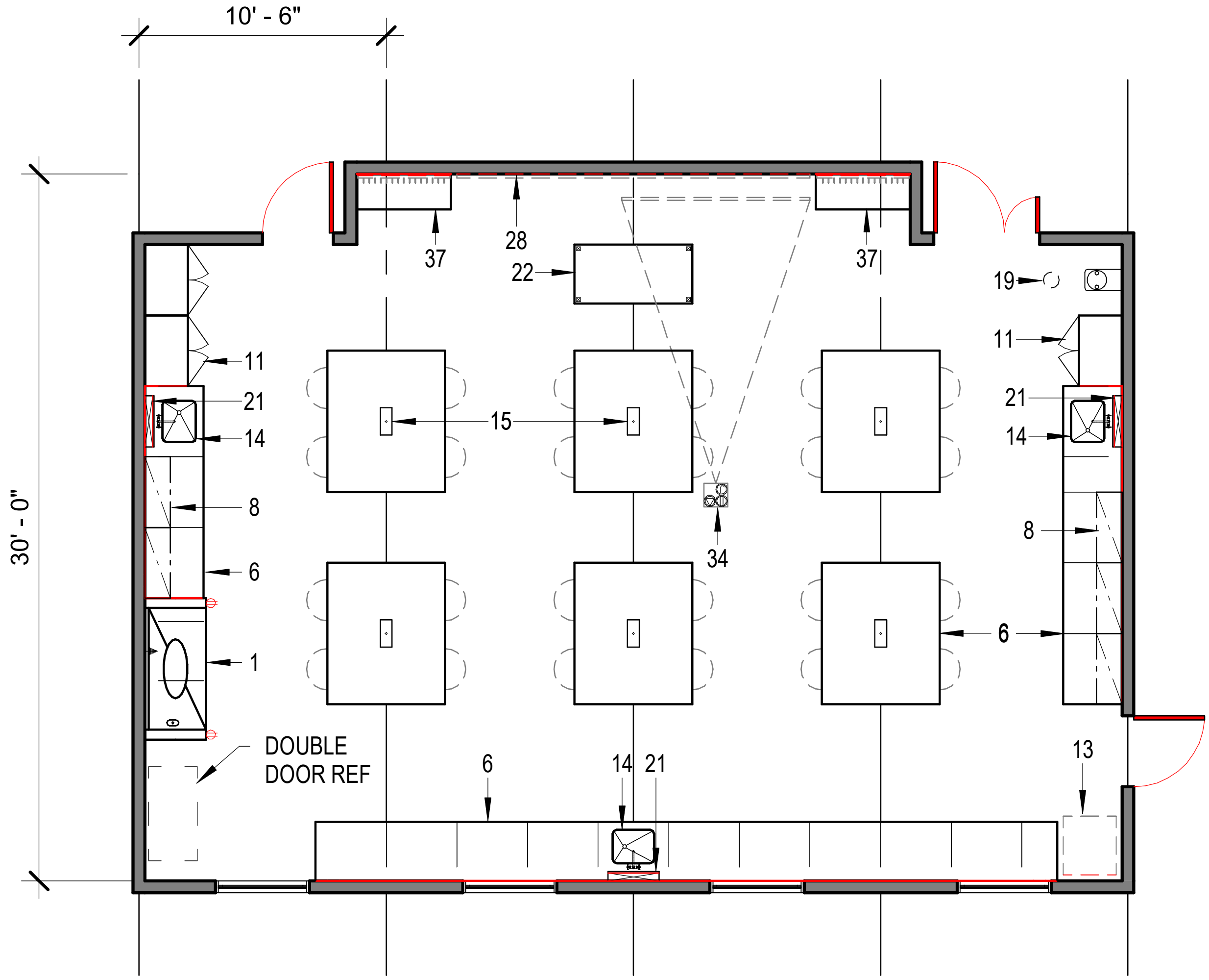
Ancillary Space Requirements

None

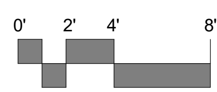
Other Requirements

Effective presentation space for instructor.

Microbiology Laboratory



Microbiology Laboratory



FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
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07. Laboratory Bench, Sitting Height
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40. Mobile Bookshelf
41. Casework
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43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

GENERAL CHEMISTRY LABORATORY

General Information

Activity Description

Hands-on laboratory activities for Introductory and General Chemistry courses to develop skills in observation, use of chemical glassware and equipment, make deductions from observations, analyze results and communicate them in a written laboratory report; lecture/presentations.

Basic Room Parameters

Square Footage 1,575 nsf

Occupants 24 students + 1 instructor

Proximity Requirements

Adjacencies Chemistry Prep / Stockroom, other Chemistry Teaching Laboratories, Lab Tech Office, and Shared Learning.

Casework, Equipment and Furniture

Casework Casework suitable for a laboratory environment with epoxy resin benchtops

Coat/bookbag storage for student belongings

Technology Telephone

Projector and screen or flat panel monitors to be confirmed during design

Wireless access points

Equipment Computers

Furnishings (3) 6’-0” chemical fume hoods

(1) 4’-0” chemical fume hood for dispensing and waste

(25) stools for students and instructor table

Service Requirements

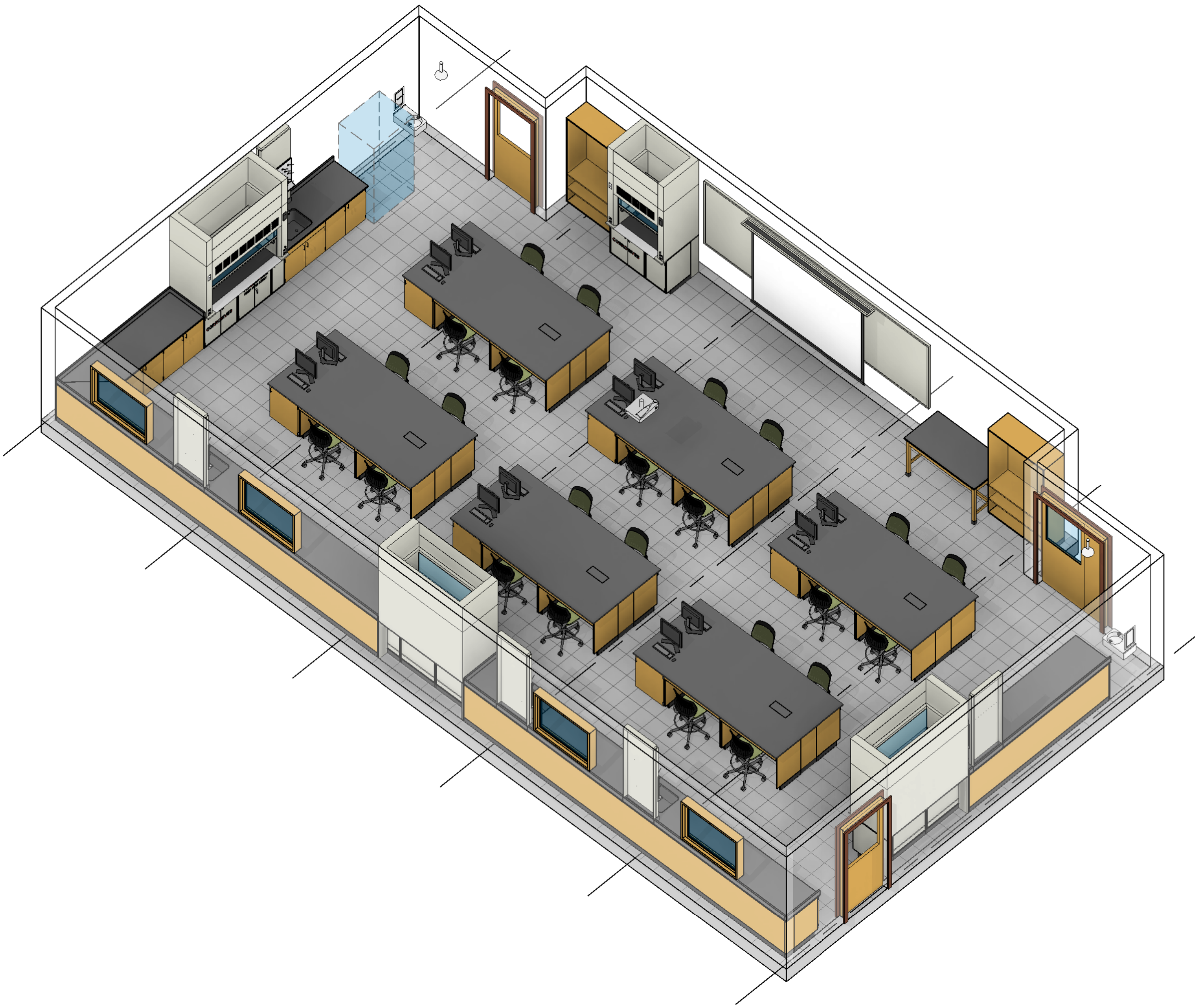
Lighting	Suitable for laboratory activities at the bench level and A/V presentations
Electrical	Surface metal raceways at perimeter walls with 120v duplex receptacles every 36” on center with dedicated 20 amp circuits provided at laboratory equipment spaces
	Benchtop electrical pedestals with duplex receptacle per student at island benches
HVAC	100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure.
Plumbing	Hot and cold water
	Laboratory sinks at perimeter benches
	Cupsinks at island benches
	Purified water
	Natural gas
	Laboratory vacuum
	Safety shower / eyewash station
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Natural daylight preferred
Relites	At doors
Doors	36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

Ancillary Space Requirements

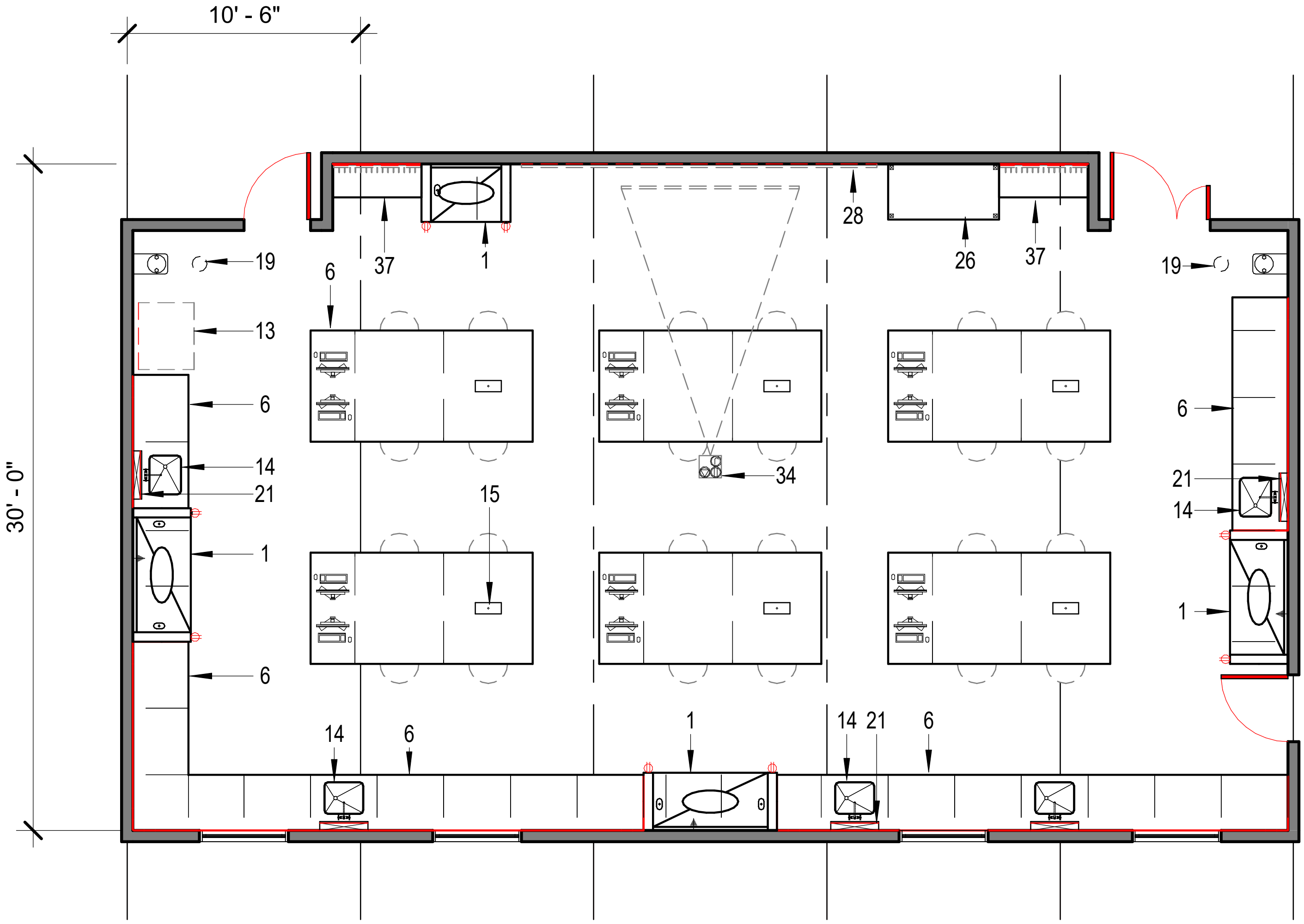
None

Other Requirements

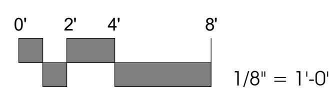
Effective presentation space for instructor.



General Chemistry Laboratory



General Chemistry Laboratory



FURNISHINGS

01. Chemical Fume Hood
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12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Corrosive Cabinet
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. Mobile Teaching Cart
30. Tackboard
31. Mobile Student Desk
32. Balance Table
33. Mobile Bench Workstation
34. A/V Screen
35. Multi-media Projector (Clg. Mtd.)
36. Lattice Rod Assembly
37. Coat/Book Bag Storage Unit
38. Conference Table/ Chairs
39. Mop Sink
40. Mobile Bookshelf
41. Casework
42. Lounge Chairs/ Side Tables
43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

ORGANIC CHEMISTRY LABORATORY

General Information

Activity Description

Hands-on laboratory activities for Organic Chemistry courses to learn structure, nomenclature, physical properties, reactions and synthesis of the main types of organic compounds; lecture/presentations.

Basic Room Parameters

Square Footage 1,575 nsf

Occupants 18 students + 1 instructor

Proximity Requirements

Adjacencies Chemistry Prep / Stockroom, Chemical Storage rooms, Chemistry Instrument Room, General Chemistry Teaching Laboratory, Lab Tech Office, and Shared Learning.

Casework, Equipment and Furniture

Casework Casework suitable for a laboratory environment with epoxy resin benchtops

Coat/bookbag storage for student belongings

Technology Telephone

Projector and screen or flat panel monitors to be confirmed during design

Wireless access points

Equipment Computers

Furnishings (11) 6’-0” chemical fume hoods

(2) 60” x 30” instructor demonstration tables

(20) stools for students and instructor stations

Service Requirements

Lighting Suitable for laboratory activities at the bench level and A/V presentations.

Electrical Surface metal raceways at perimeter walls with 120v duplex receptacles every 36” on center with dedicated 20 amp circuits provided at laboratory equipment spaces

Benchtop electrical pedestals with duplex receptacle per student at island benches.

HVAC 100% exhaust air with a minimum of 6 air changes per hourroom to be kept under negative air pressure.

Plumbing Hot and cold water

Laboratory sinks at island benches

Purified water

Laboratory vacuum

Safety shower / eyewash stations

Finishes

Floor Resilient tile

Walls Conventional painted drywall finish

Ceiling Acoustic ceiling tile (ACT)

Openings

Windows Natural daylight preferred

Relites At doors

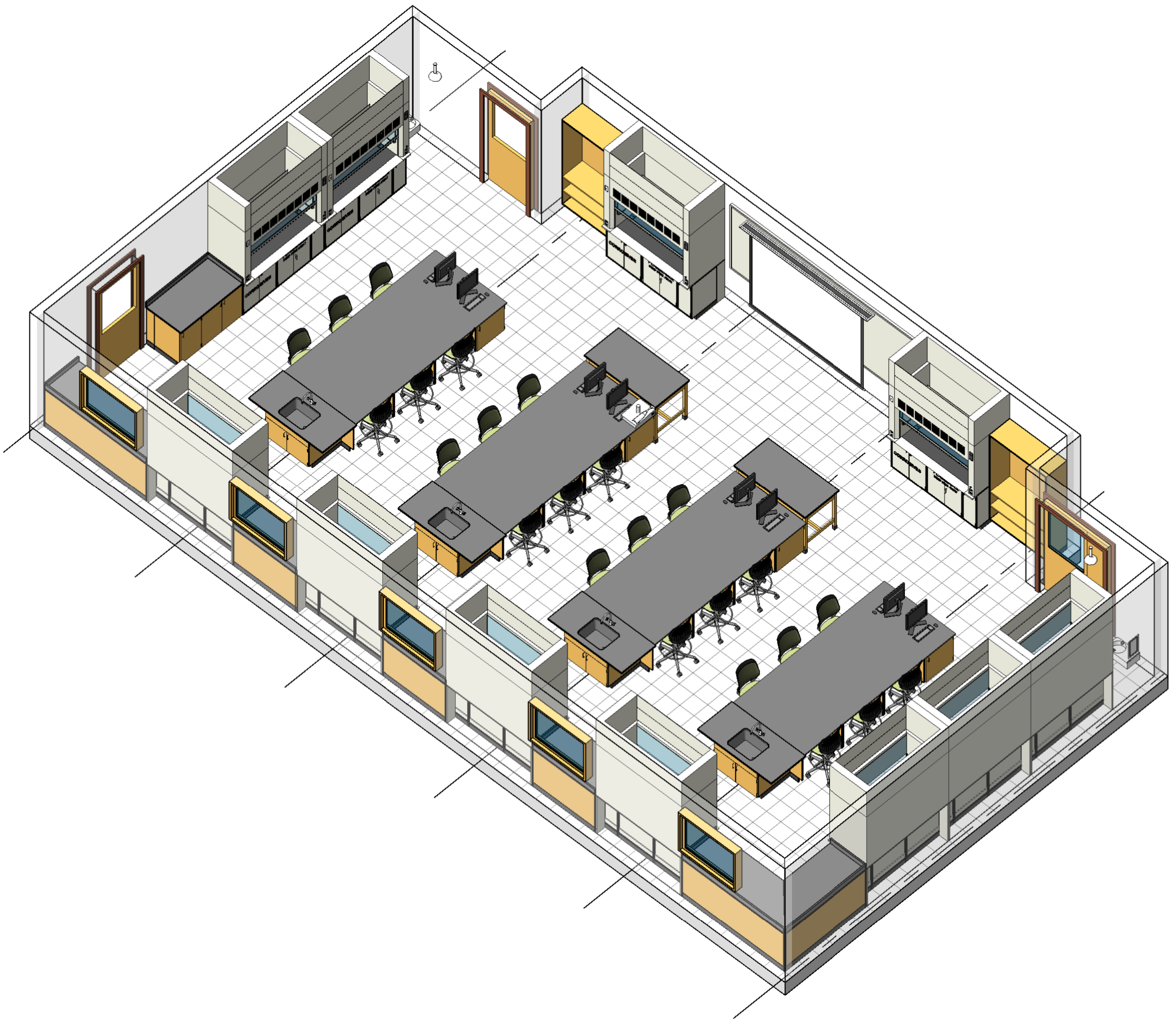
Doors 36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

Ancillary Space Requirements

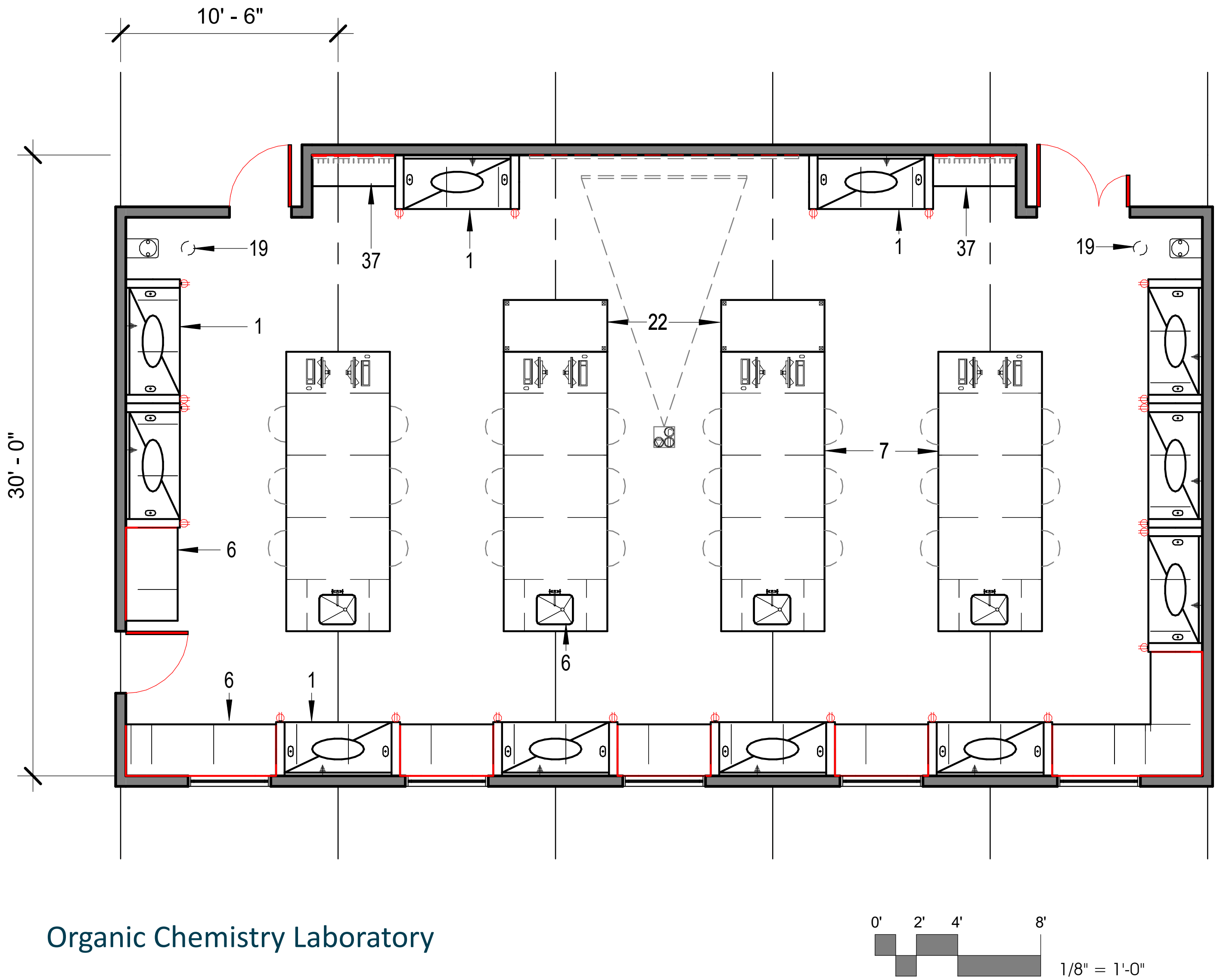
None

Other Requirements

Effective presentation space for instructor.



Organic Chemistry Laboratory



Organic Chemistry Laboratory

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Corrosive Cabinet
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. Mobile Teaching Cart
30. Tackboard
31. Mobile Student Desk
32. Balance Table
33. Mobile Bench Workstation
34. A/V Screen
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43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

PHYSICS LABORATORY

General Information

Activity Description

Hands-on laboratory activities for General Physics courses including the fundamentals of fluid mechanics, thermodynamics, mechanics, kinematics of motion, force, work, energy, momentum, and static equilibrium.

Basic Room Parameters

Square Footage 1,575 nsf

Occupants 24 students + 1 instructor

Proximity Requirements

Adjacencies Physics Prep / Stockroom, other Physics Teaching Laboratory, Lab Tech Office, and Shared Learning.

Casework, Equipment and Furniture

Casework Casework suitable for a laboratory environment with epoxy resin benchtops

Coat/bookbag storage for student belongings

Technology Telephone

Projector and screen or flat panel monitors to be confirmed during design

(12) networked computers available for student/group use during class and particularly positioned for ease of connection to lab equipment (6 minimum)

(1) networked computer for faculty use, connected to projector and document camera

Equipment Gas cooktop with range hood

Furnishings (12) movable laboratory tables at 72” x 30” with epoxy resin benchtops, prewired with (2) duplex receptacles each

(1) 84” x 30” instructor demonstration bench prewired with (3) duplex receptacles

(25) chairs for students and instructor stations

Service Requirements

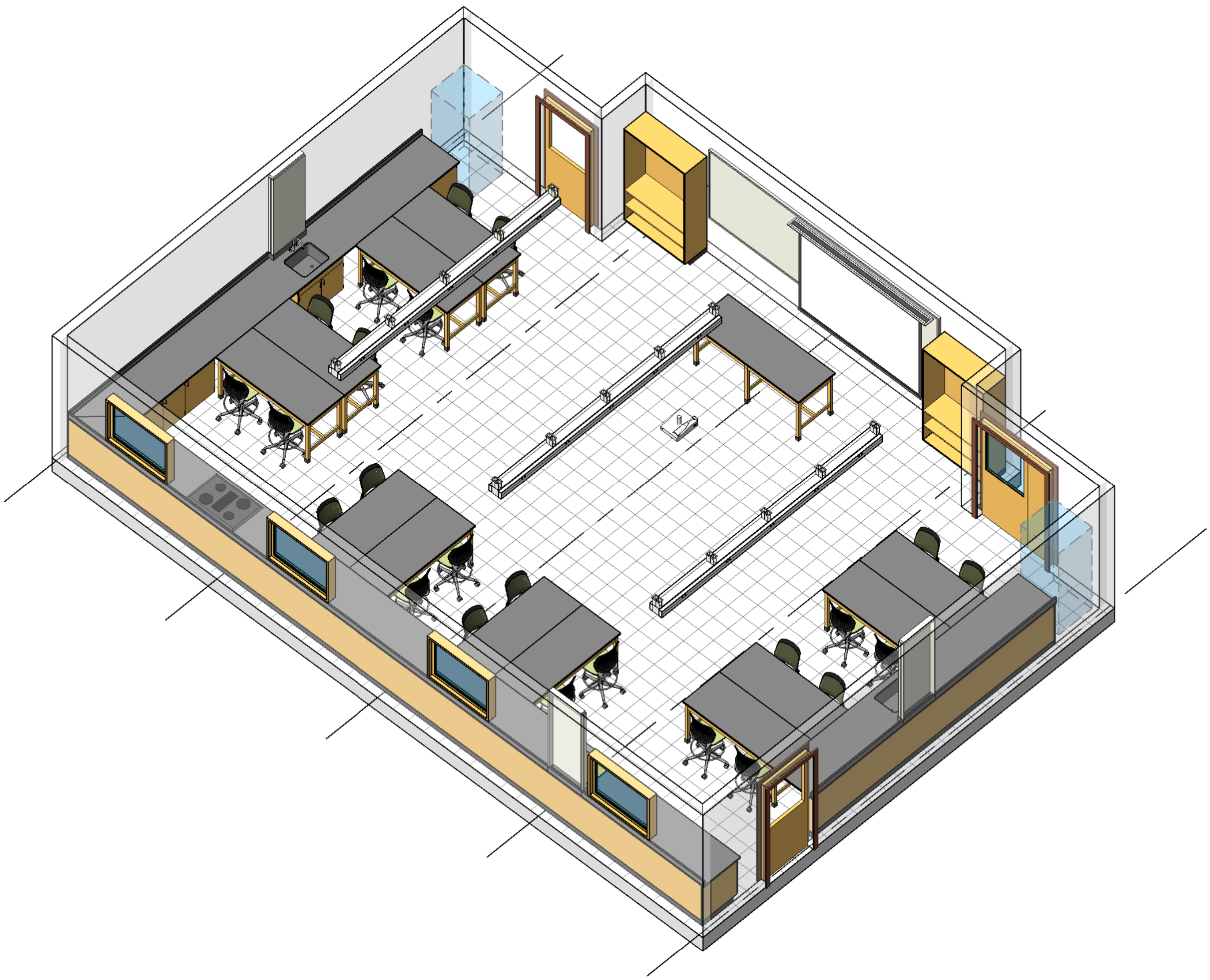
Lighting	Suitable for laboratory activities at the bench level and A/V presentations; dimmable.
Electrical	Surface metal raceways at perimeter walls and overhead service carriers with 120v duplex receptacles every 36” on center.
HVAC	Exhausted range suitable for gas cooktop. 100% exhaust air with a minimum of 4 air changes per hour; room to be kept under negative air pressure.
Plumbing	Hot and cold water
	Laboratory sinks
	Natural gas
	Eyewash station
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic Ceiling tile (ACT)
Openings	
Windows	Natural daylight with blinds to darken the room for labs and demonstrations requiring very little light
Relites	As necessary, with blinds to darken the room for labs and demonstrations requiring very little light
Doors	36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

Ancillary Space Requirements

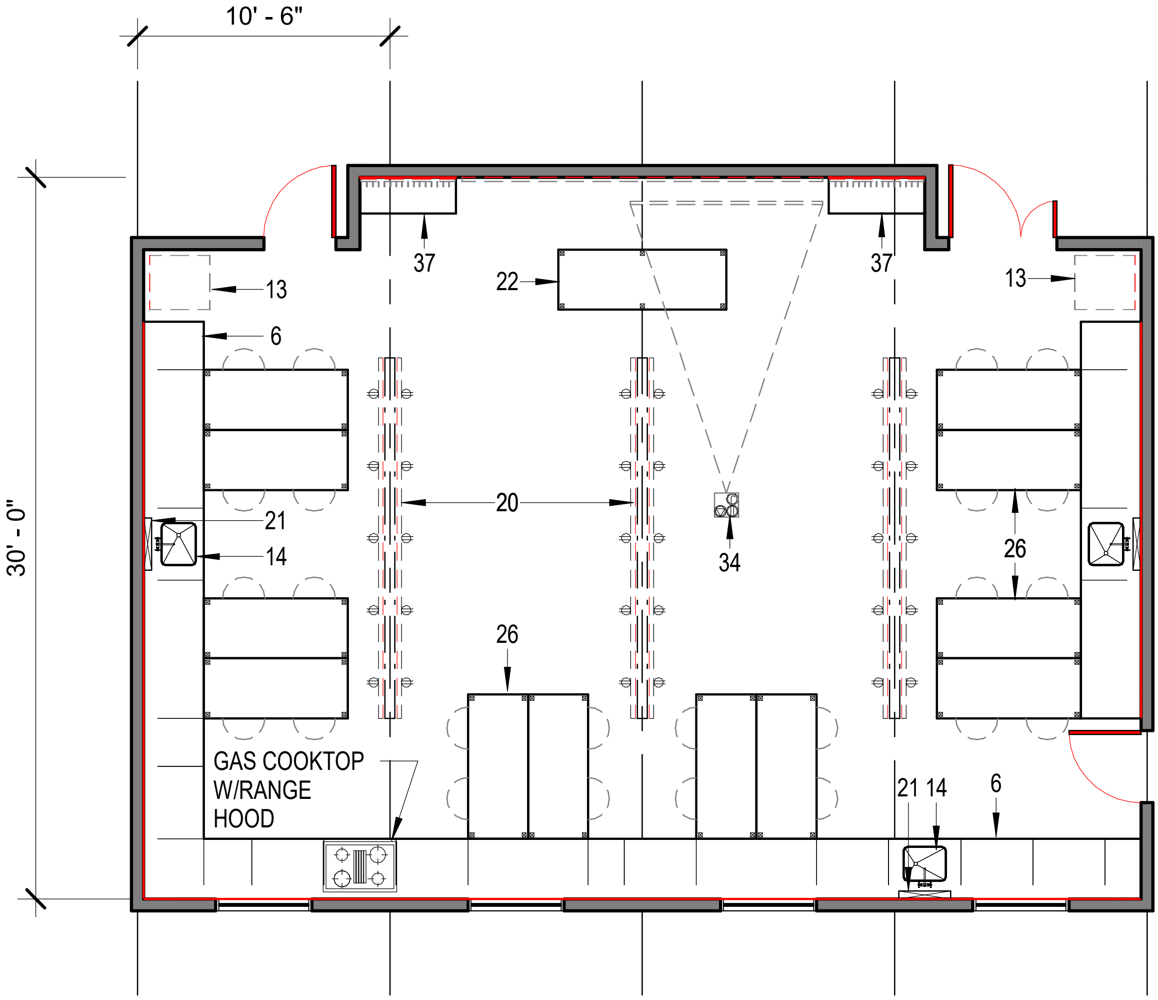
None

Other Requirements

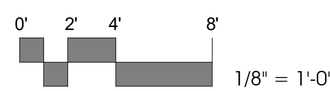
Effective presentation space for instructor.



Physics Laboratory



Physics Laboratory



FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Corrosive Cabinet
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. Mobile Teaching Cart
30. Tackboard
31. Mobile Student Desk
32. Balance Table
33. Mobile Bench Workstation
34. A/V Screen
35. Multi-media Projector (Clg. Mtd.)
36. Lattice Rod Assembly
37. Coat/Book Bag Storage Unit
38. Conference Table/ Chairs
39. Mop Sink
40. Mobile Bookshelf
41. Casework
42. Lounge Chairs/ Side Tables
43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

EARTH & SPACE SCIENCE LABORATORY A

General Information

Activity Description

Hands-on laboratory activities for the geological sciences, astronomy, and oceanography; lecture/presentations.

Basic Room Parameters

Square Footage 1,890 nsf

Occupants 36 students + 1 instructor

Proximity Requirements

Adjacencies Earth Sciences Prep / Storage, other Earth & Space Science Teaching Laboratory and Shared Learning.

Casework, Equipment and Furniture

Casework
- Casework suitable for a laboratory environment with epoxy resin benchtops
- Tall lockable storage cabinets for microscopes and supplies
- Coat/bookbag storage for student belongings

Technology
- Telephone
- Projector and screen or flat panel monitors to be confirmed during design

Equipment
- 3D Sand box
- Erosion tank
- Aquarium
- Water tank
- Seismographs

Furnishings
- (18) laboratory tables / benches at 72” x 30” with epoxy resin benchtops, with (2) duplex receptacles each
- (1) 60” x 30” instructor demonstration table with A/V connections
- (37) chairs for students and instructor stations

Service Requirements

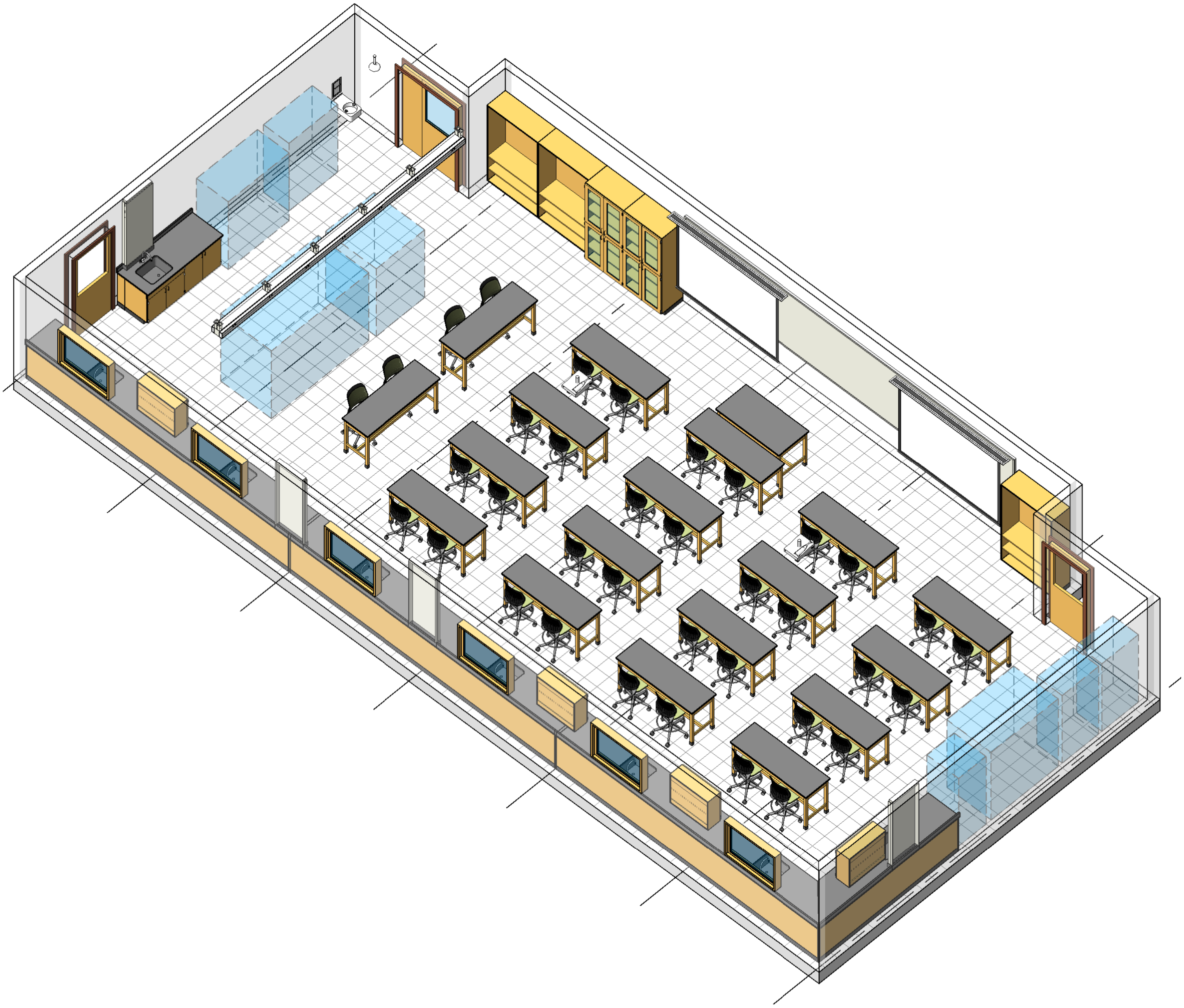
Lighting	Suitable for laboratory activities at the bench level and A/V presentations; dimmable.
Electrical	Surface metal raceways at perimeter walls and overhead service carriers with 120v duplex receptacles every 36” on center
	Electrical connections to the student island table / benches throughout the middle of the room
HVAC	No special requirements
Plumbing	Hot and cold water
	Laboratory sinks with sediment traps
	Eyewash station
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Natural daylight with blinds to darken the room for labs and demonstrations requiring very little light
Relites	As necessary, with blinds to darken the room for labs and demonstrations requiring very little light
Doors	36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

Ancillary Space Requirements

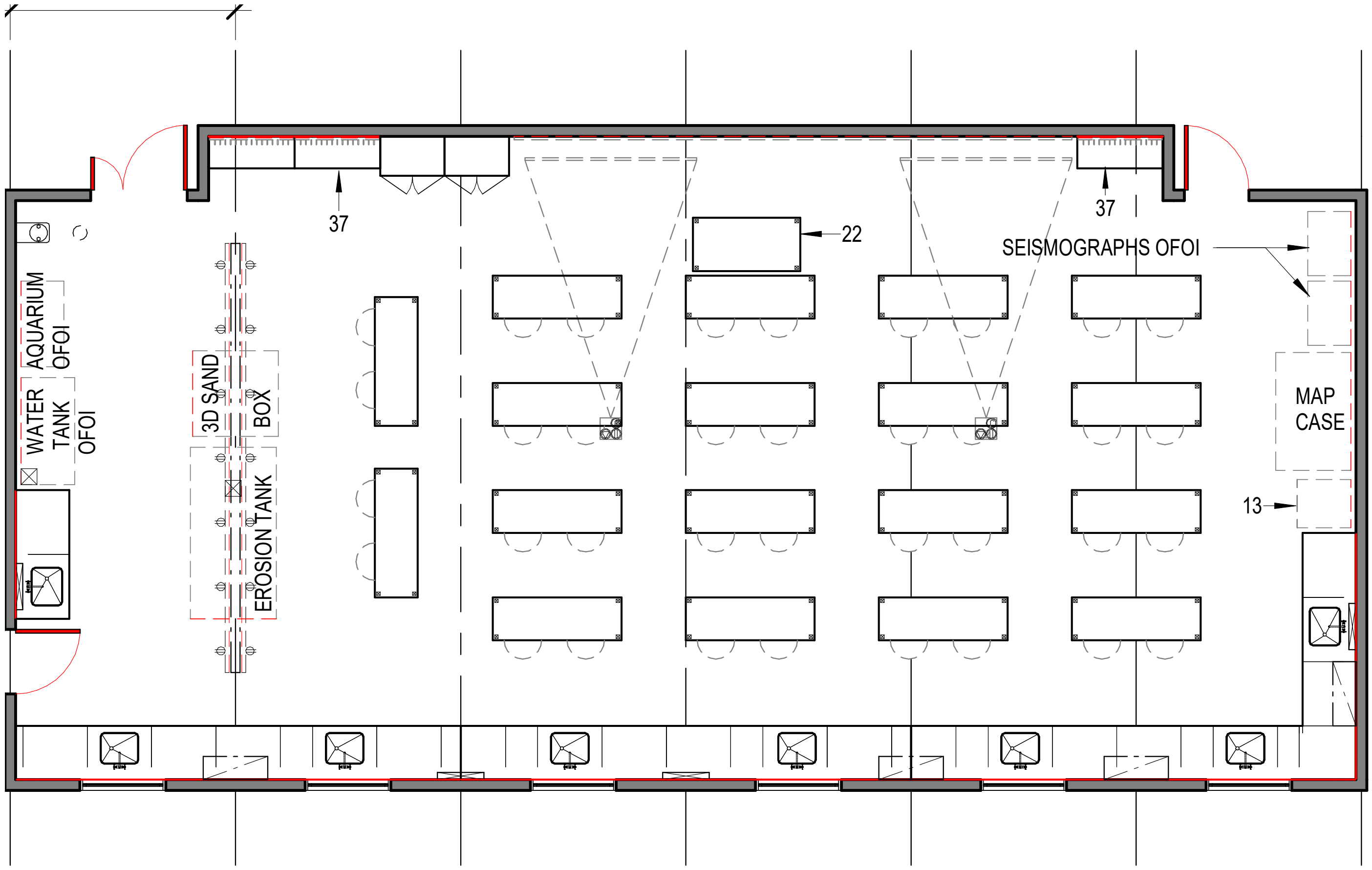
None

Other Requirements

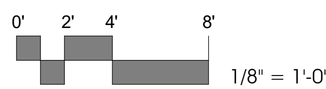
Effective presentation space for instructor.



Earth & Space Science Laboratory A



Earth & Space Science Laboratory A



FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
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32. Balance Table
33. Mobile Bench Workstation
34. A/V Screen
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40. Mobile Bookshelf
41. Casework
42. Lounge Chairs/ Side Tables
43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

EARTH & SPACE SCIENCE LABORATORY B

General Information

Activity Description

Hands-on laboratory activities for the geological sciences, astronomy, and oceanography; lecture/presentations

Basic Room Parameters

Square Footage 1,575 nsf

Occupants 36 students + 1 instructor

Proximity Requirements

Adjacencies Adjacent to Earth Sciences Prep / Storage (3.10).

Casework, Equipment and Furniture

Casework Casework suitable for a laboratory environment with epoxy resin benchtops

Tall lockable storage cabinets for microscopes and supplies

Ccoat/bookbag storage for student belongings

Technology Telephone

Projector and screen or flat panel monitors to be confirmed during design

Equipment No special requirements

Furnishings (18) laboratory tables / benches at 72” x 30” with epoxy resin benchtops, with (2) duplex receptacles each

(1) 60” x 30” instructor demonstration table with A/V connections

(37) chairs for students and instructor stations

Service Requirements

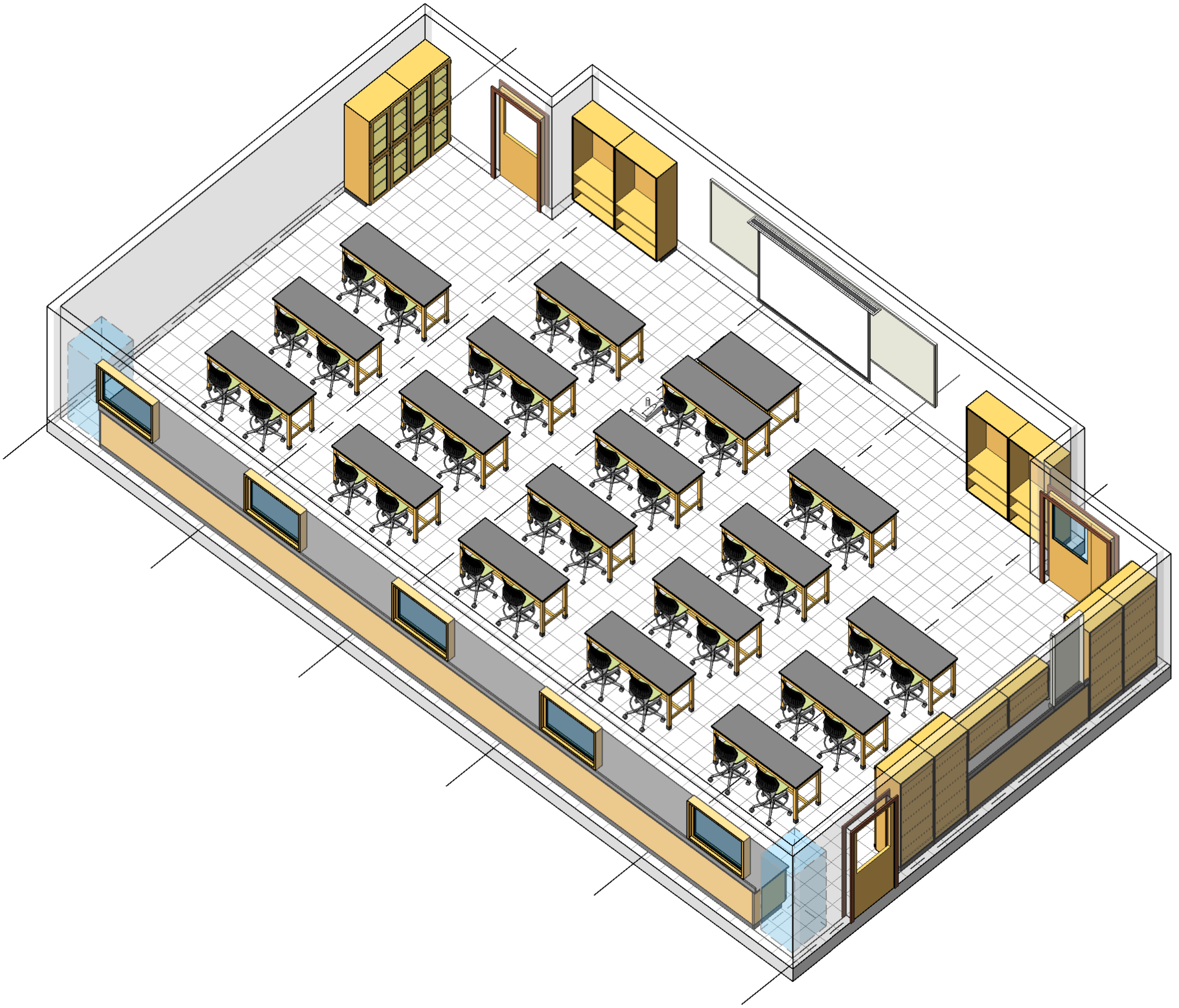
Lighting	Suitable for laboratory activities at the bench level and A/V presentations; dimmable.
Electrical	Surface metal raceways at perimeter walls with 120v duplex receptacles every 36” on center; electrical Connections to the student island tables / benches throughout the middle of the room.
HVAC	No Special Requirements
Plumbing	Hot and cold water
	Laboratory sinks with sediment traps
	Eyewash station
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Natural daylight with blinds to darken the room for labs and demonstrations requiring very little light
Relites	As necessary, with blinds to darken the room for labs and demonstrations requiring very little light
Doors	36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

Ancillary Space Requirements

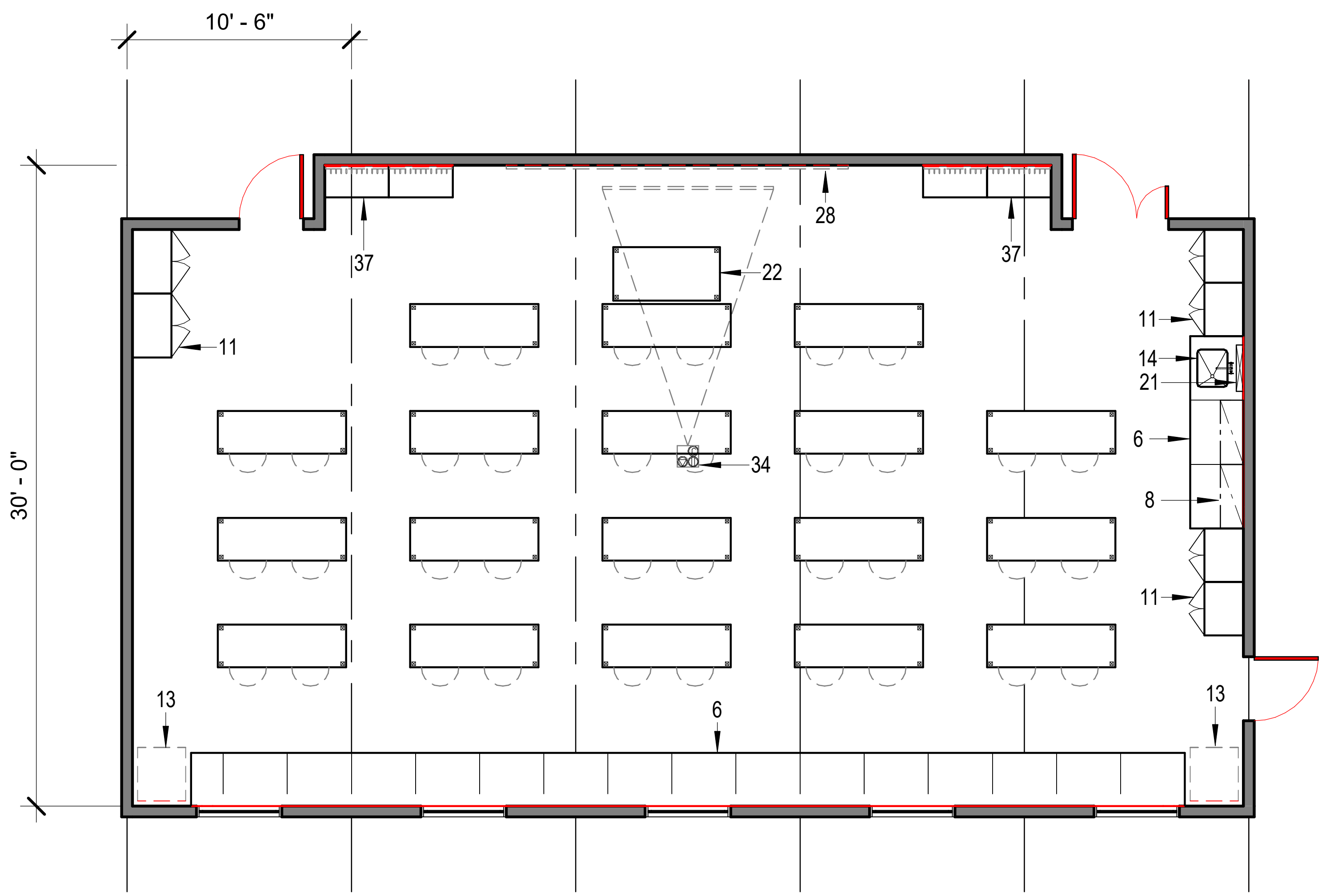
Earth Sciences Prep / Storage, other Earth & Space Science Teaching Laboratories, and Faculty Offices.

Other Requirements

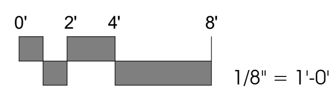
Effective presentation space for instructor.



Earth & Space Science Laboratory B



Earth & Space Science Laboratory B



FURNISHINGS

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02. Biological Safety Cabinet
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04. Vented Workstation
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43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

BIOLOGY PREP / STOCKROOM

General Information

Activity Description

Storage and prep space for biology courses; the main work area for biology staff.

Basic Room Parameters

Square Footage 945 nsf

Occupants 1-2 lab staff + 1-2 student workers.

Proximity Requirements

Adjacencies Introductory / General Biology Laboratory (1.01), Anatomy & Physiology Laboratory (1.02); and Microbiology Laboratory (1.03).

Casework, Equipment and Furniture

Casework Fixed casework suitable for a laboratory environment with epoxy resin benchtops

Wall cabinets and heavy-duty shelving for dry reagents

Glassware and supplies

Technology Telephone

Wireless access points

Equipment Two-door deli refrigerator

Refrigerator/freezer

Furnishings (1) 4’-0” chemical fume hood

(1) 4’-0” Class II, Type A2 biological safety cabinet

(1) small sterilizer/autoclave (16”x16”x26” chamber)

Service Requirements

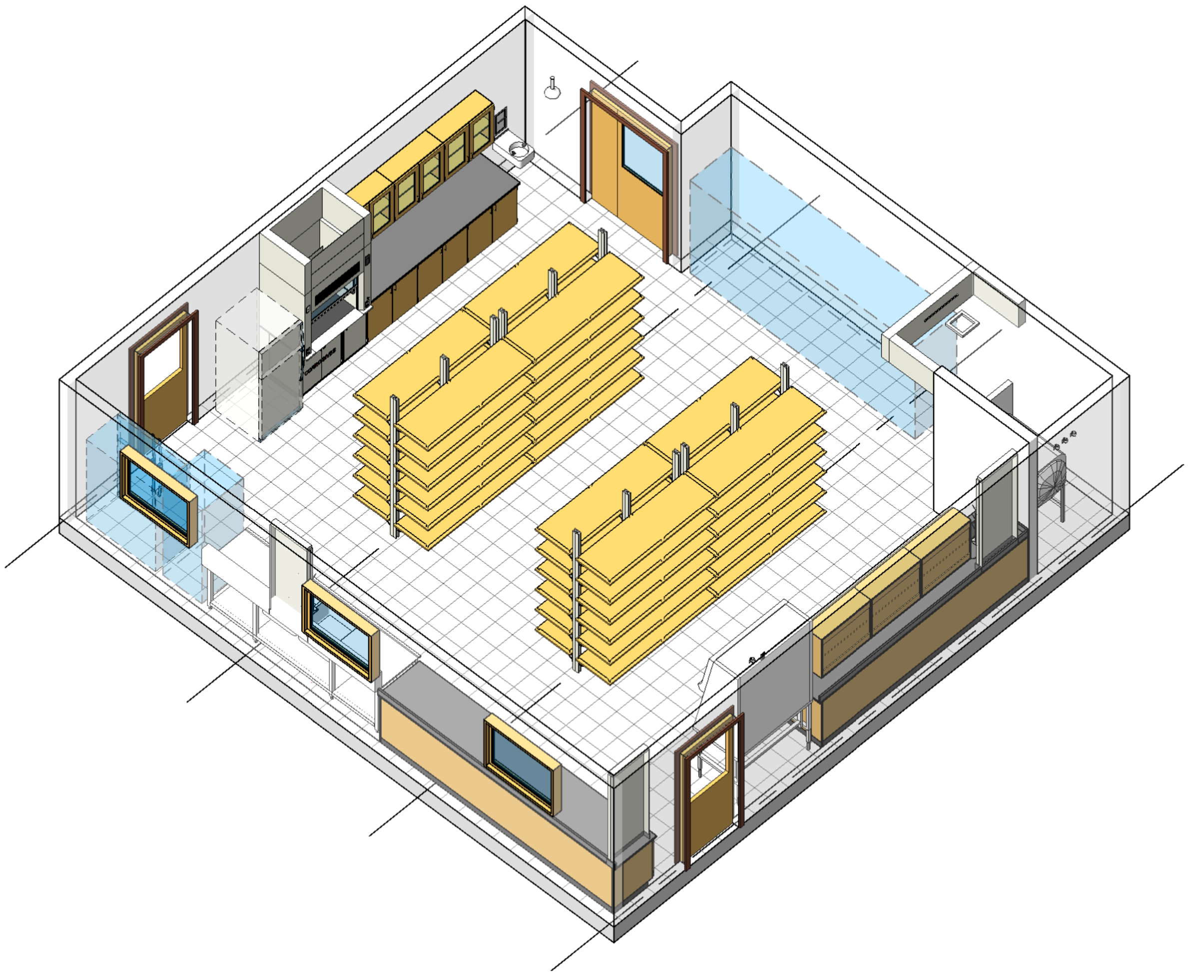
Lighting	No special requirements
Electrical	Surface metal raceways at perimeter walls with 120v duplex receptacles every 36” on center with dedicated 20 amp circuits provided at laboratory equipment spaces
	Standby/emergency power for refrigerators
HVAC	100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure.
Plumbing	Hot and cold water
	Laboratory sinks and dual-bowl scullery sink at perimeter
	Purified water
	Natural gas
	Laboratory vacuum
	Safety shower / eyewash station
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	No Special Requirements
Relites	At doors
Doors	36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

Ancillary Space Requirements

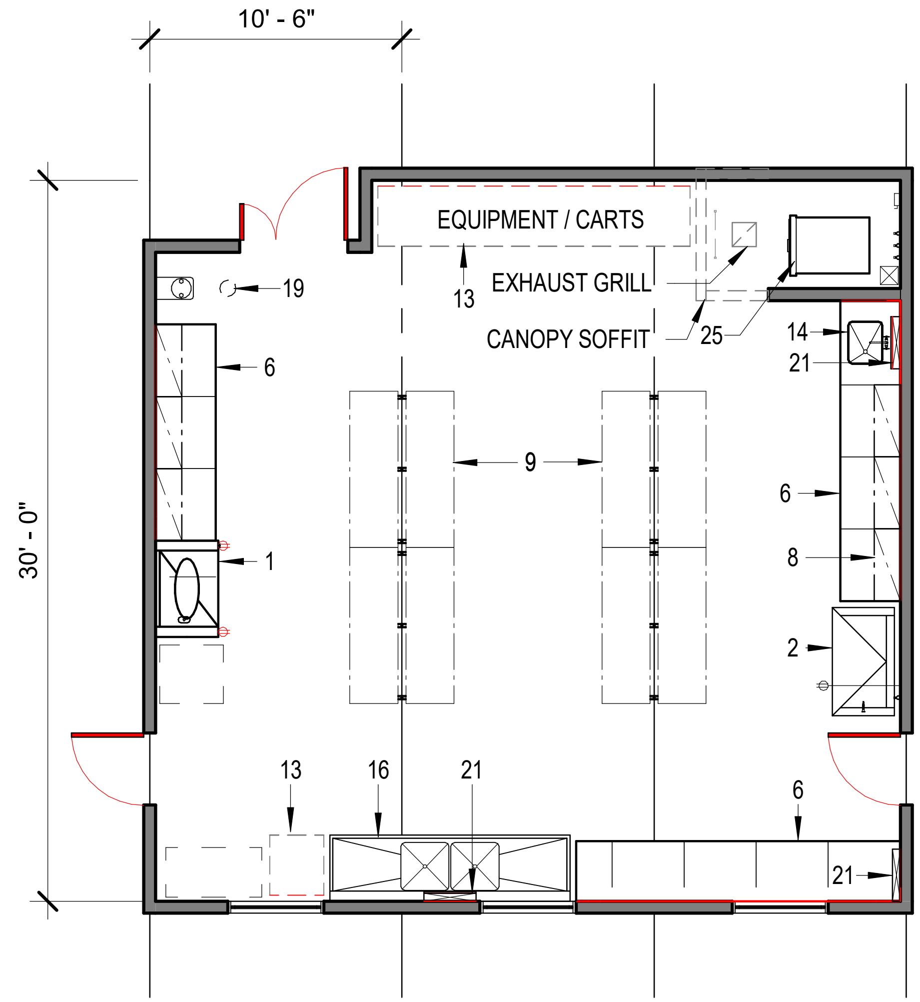
Biology Teaching Laboratories.

Other Requirements

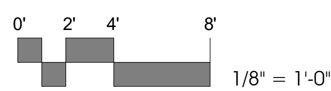
No special Requirements.



Biology Prep/Stockroom



Biology Prep/Stockroom



FURNISHINGS

01. Chemical Fume Hood
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43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

BIOLOGY SPECIMEN STORAGE

General Information

Activity Description

Storage space for preserved specimens.

Basic Room Parameters

Square Footage 158 nsf

Occupants Transitory

Proximity Requirements

Adjacencies Anatomy & Physiology Laboratory (1.02)

Casework, Equipment and Furniture

Casework Heavy-duty shelving for specimen storage

Technology No special requirements

Equipment None

Furnishings None

Service Requirements

Lighting No special requirements

Electrical Convenience receptacles

HVAC 100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure

Plumbing No special requirements

Finishes

Floor Seamless Sheet

Walls Conventional painted drywall finish

Ceiling A coustic ceiling tile (ACT)

Openings

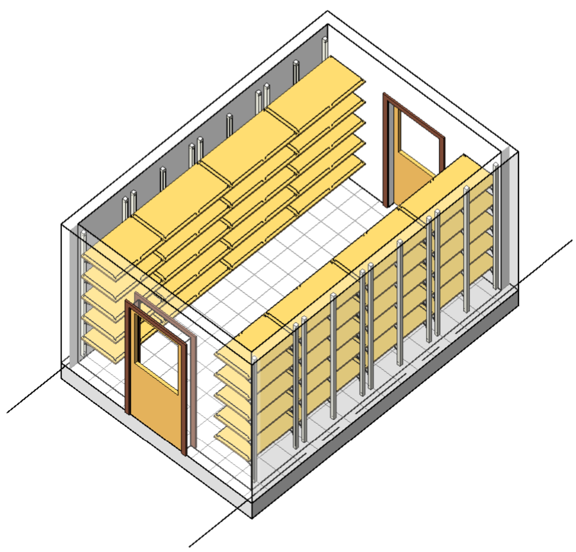
Windows	None
Relites	None
Doors	36” wide doors

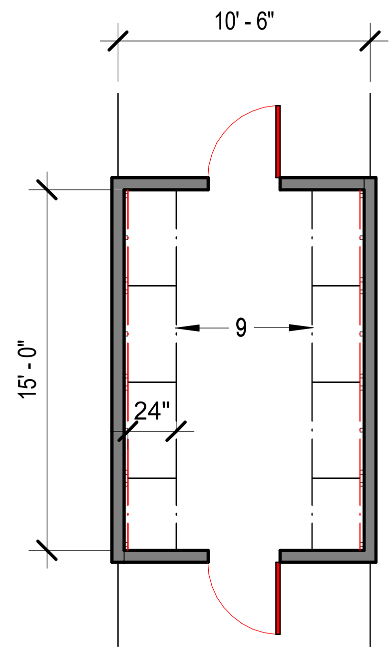
Ancillary Space Requirements

Biology Teaching Laboratories.

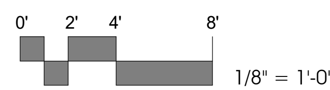
Other Requirements

No Special Requirements.





Biology Specimen Storage



FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
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50. Guest Chair
51. Shelving

Back to Table of Contents

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BIOLOGY BULK STORAGE

General Information

Activity Description

Storage space for biology supplies.

Basic Room Parameters

Square Footage 158 nsf

Occupants Transitory

Proximity Requirements

Adjacencies None

Casework, Equipment and Furniture

Casework Heavy-duty shelving

Technology No special requirements

Equipment None

Furnishings None

Service Requirements

Lighting No special requirements

Electrical Convenience receptacles

HVAC No special requirements

Plumbing No Special Requirements

Finishes

Floor Resilient tile

Walls Conventional painted drywall finish

Ceiling Acoustic ceiling tile (ACT)

Openings

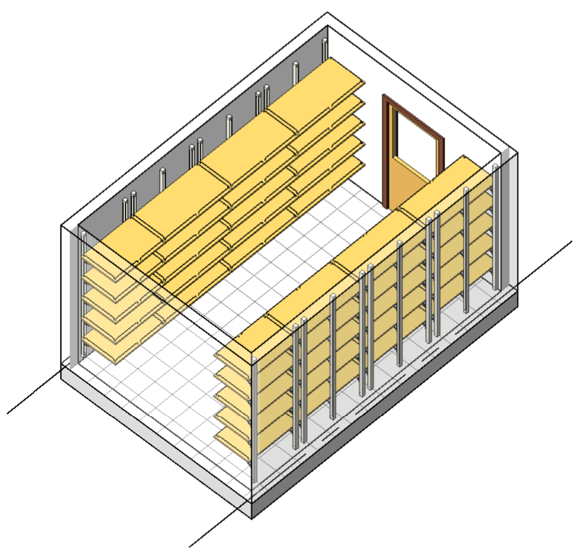
Windows	None
Relites	None
Doors	36” wide doors

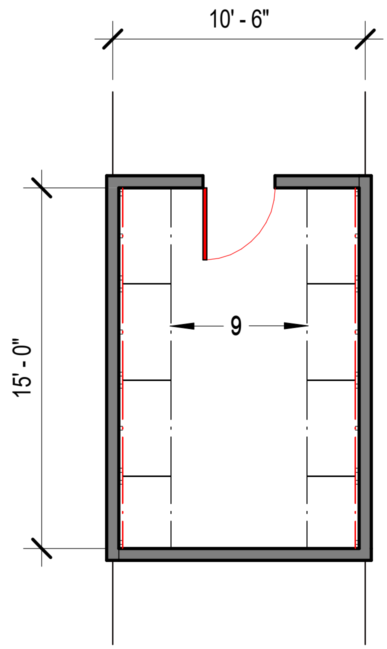
Ancillary Space Requirements

Biology Teaching Laboratories.

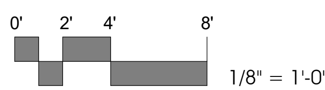
Other Requirements

No Special Requirements.





Biology Bulk Storage



FURNISHINGS

01. Chemical Fume Hood
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28. White Markerboard
29. Mobile Teaching Cart
30. Tackboard
31. Mobile Student Desk
32. Balance Table
33. Mobile Bench Workstation
34. A/V Screen
35. Multi-media Projector (Clg. Mtd.)
36. Lattice Rod Assembly
37. Coat/Book Bag Storage Unit
38. Conference Table/ Chairs
39. Mop Sink
40. Mobile Bookshelf
41. Casework
42. Lounge Chairs/ Side Tables
43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

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CHEMISTRY PREP / STOCKROOM

General Information

Activity Description

Main work area for chemistry staff; Storage and prep space for chemistry lab courses.

Basic Room Parameters

Square Footage 630 nsf

Occupants 1-2 lab staff + 1-2 student workers

Proximity Requirements

Adjacencies General Chemistry Laboratory (1.04) and Organic Chemistry Laboratory (1.05) Chemistry Organic Storage (3.05) and Chemistry Inorganic Storage (3.06).

Casework, Equipment and Furniture

Casework Fixed casework suitable for a laboratory environment with epoxy resin benchtops

Wall cabinets and heavy-duty shelving for dry reagents

Glassware and supplies

Technology Telephone

Wireless access points

Equipment Under-counter glassware washer

Refrigerator/freezer

Analytical balances

Balances

Ultrasonic mixers

Furnishings (1) 4’-0” chemical fume hood

Service Requirements

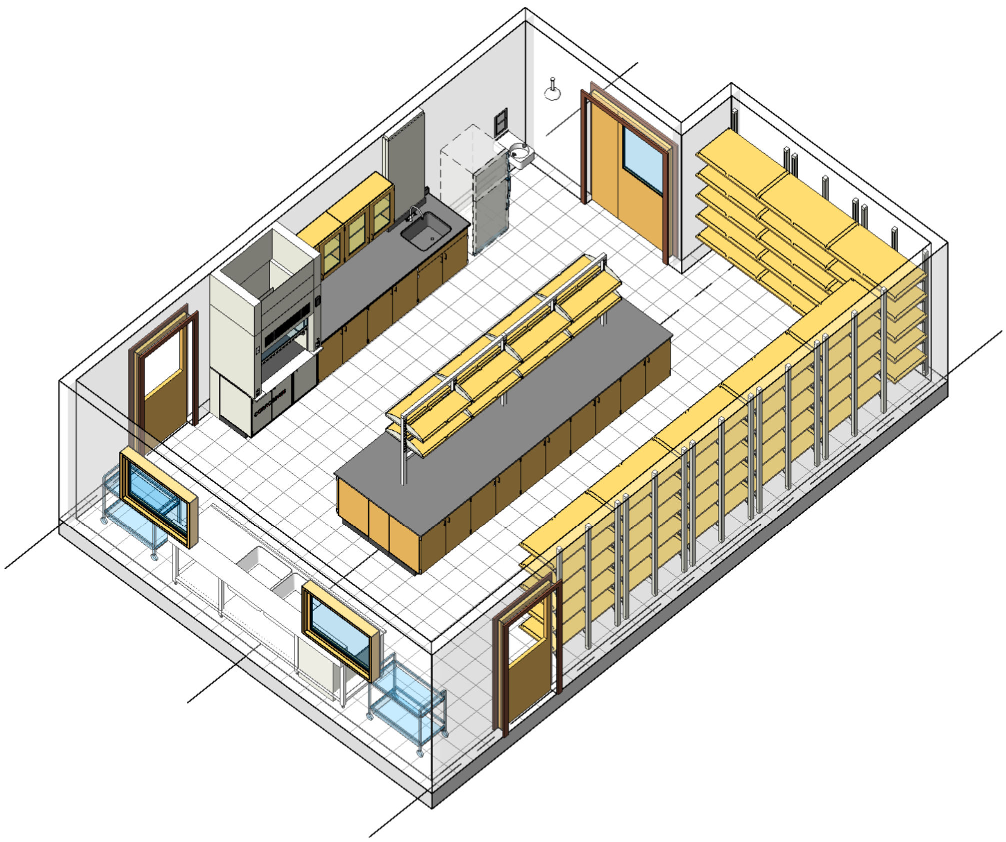
Lighting	Suitable for laboratory activities at the bench level.
Electrical	Surface metal raceways at perimeter walls and at island bench with 120v duplex receptacles every 36” on center with dedicated 20 amp circuits provided at laboratory equipment spaces
	Standby/emergency power for refrigerators.
HVAC	100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure.
Plumbing	Hot and cold water
	Laboratory sinks and dual-bowl scullery at perimeter
	Purified water
	Natural gas
	Laboratory vacuum
	Safety shower / eyewash station
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	No Special Requirements
Relites	At doors
Doors	36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

Ancillary Space Requirements

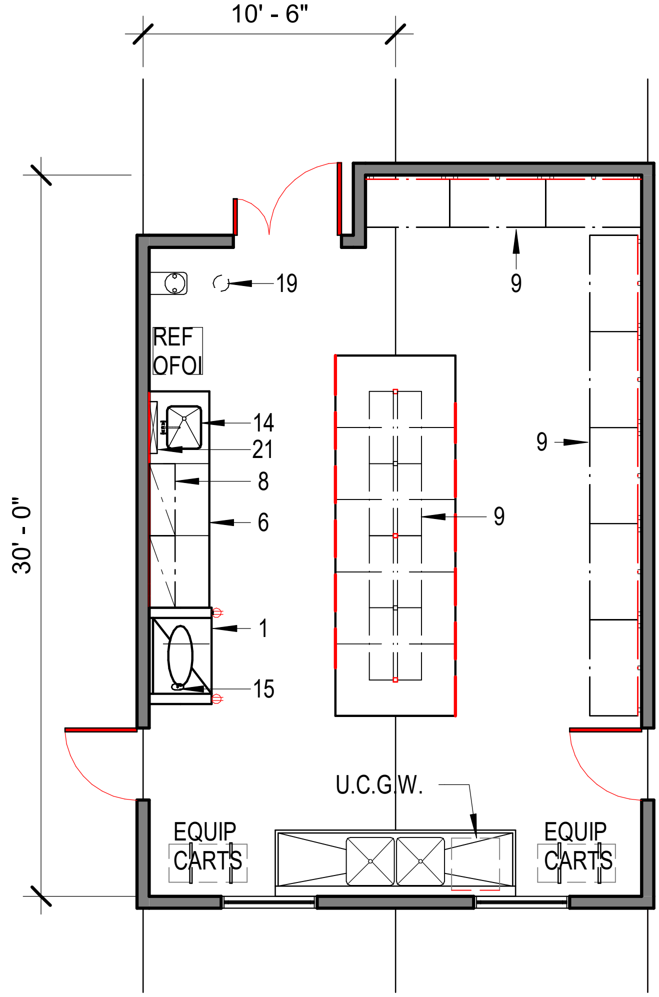
Biology Teaching Laboratories

Other Requirements

No Special Requirements.



Chemistry Prep/Stockroom



Chemistry Prep/Stockroom

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Corrosive Cabinet
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. Mobile Teaching Cart
30. Tackboard
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33. Mobile Bench Workstation
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44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

CHEMISTRY ORGANIC STORAGE

General Information

Activity Description

Storage space for organic chemistry materials and supplies.

Basic Room Parameters

Square Footage 158 nsf

Occupants Transitory

Proximity Requirements

Adjacencies Chemistry Prep / Stockroom (3.04); General Chemistry Laboratory (1.04) and Organic Chemistry Laboratory (1.05).

Casework, Equipment and Furniture

Casework Rated flammable storage cabinet(s)

Heavy-duty chemical resistant shelving

Technology No special requirements

Equipment Explosion-proof refrigerator

Furnishings None

Service Requirements

Lighting No special requirements (will review hazardous requirements in Design phase)

Electrical Convenience receptacles (will review hazardous requirements in Design phase)

HVAC 100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure

Plumbing Safety shower / eyewash station (just outside of room)

Finishes

Floor Resilient tile

Walls Conventional painted drywall finish

Ceiling Acoustic ceiling tile (ACT)

Openings

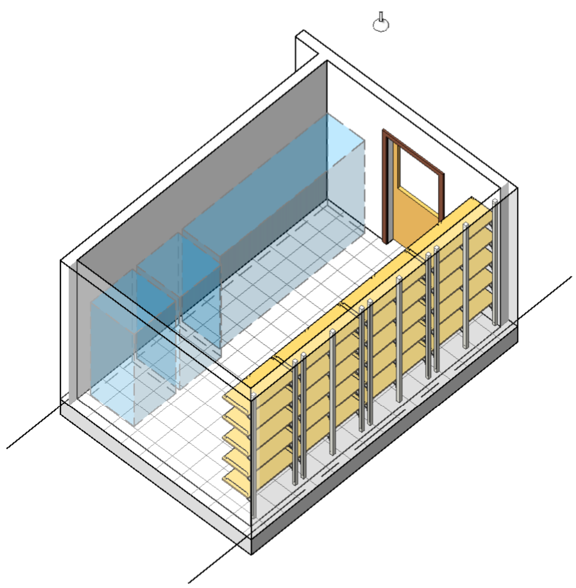
Windows	None
Relites	None
Doors	36” wide doors

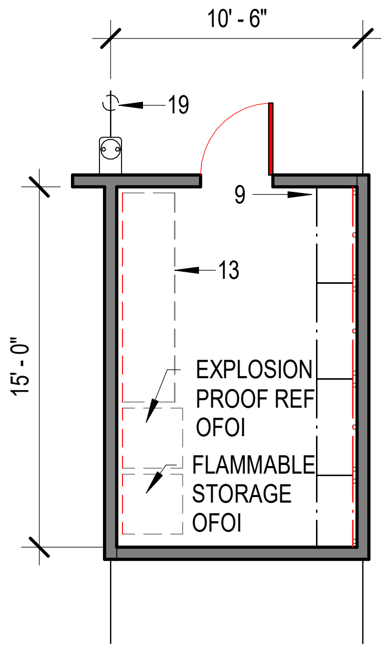
Ancillary Space Requirements

Other chemistry support rooms; Organic Chemistry Laboratory.

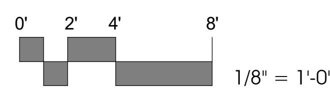
Other Requirements

No Special Requirements.





Chemistry Organic Storage



FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
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09. Adjustable Wall Shelves
10. Island Bench Shelves
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12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Corrosive Cabinet
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. Mobile Teaching Cart
30. Tackboard
31. Mobile Student Desk
32. Balance Table
33. Mobile Bench Workstation
34. A/V Screen
35. Multi-media Projector (Clg. Mtd.)
36. Lattice Rod Assembly
37. Coat/Book Bag Storage Unit
38. Conference Table/ Chairs
39. Mop Sink
40. Mobile Bookshelf
41. Casework
42. Lounge Chairs/ Side Tables
43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

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CHEMISTRY INORGANIC STORAGE

General Information

Activity Description

Storage space for inorganic chemistry materials and supplies.

Basic Room Parameters

Square Footage 158 nsf

Occupants Transitory

Proximity Requirements

Adjacencies Chemistry Prep / Stockroom (3.04); General Chemistry Laboratory (1.04) and Organic Chemistry Laboratory (1.05).

Casework, Equipment and Furniture

Casework Rated flammable storage cabinet(s)

Corrosive storage cabinet(s)

Heavy-duty chemical resistant shelving

Technology No Special Requirements

Equipment Explosion-proof refrigerator

Furnishings None

Service Requirements

Lighting No special requirements (will review hazardous requirements in Design phase).

Electrical Convenience receptacles (will review hazardous requirements in Design phase).

HVAC 100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure

Plumbing Safety shower / eyewash station (just outside of room)

Finishes

Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)

Openings

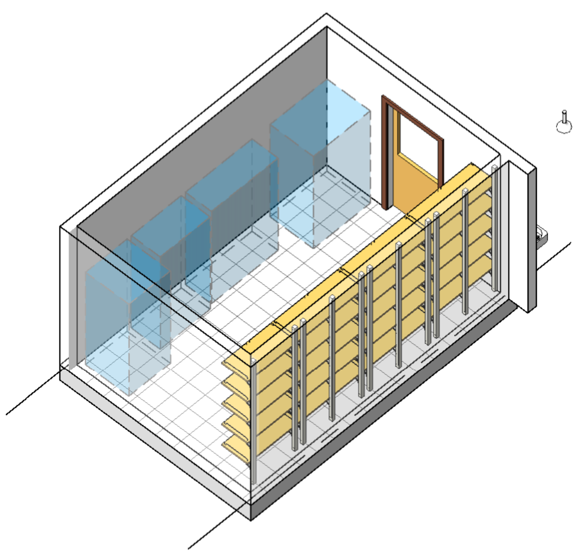
Windows	None
Relites	None
Doors	36” wide doors

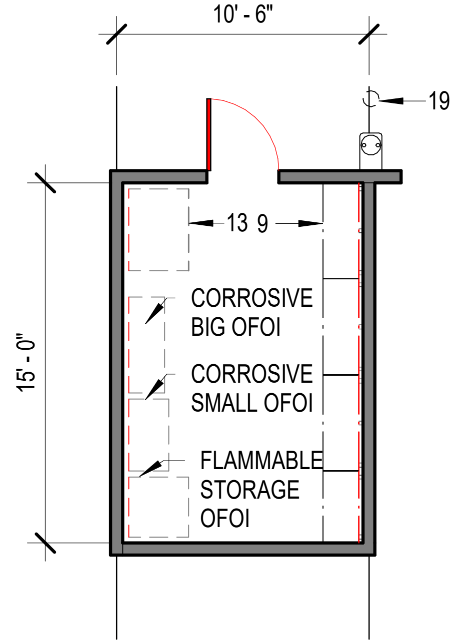
Ancillary Space Requirements

Other chemistry support rooms; Organic Chemistry Laboratory.

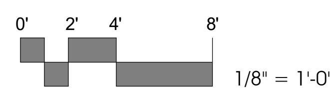
Other Requirements

No Special Requirements.





Chemistry Inorganic Storage



FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
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21. Pipe Drop Enclosure
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32. Balance Table
33. Mobile Bench Workstation
34. A/V Screen
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36. Lattice Rod Assembly
37. Coat/Book Bag Storage Unit
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40. Mobile Bookshelf
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42. Lounge Chairs/ Side Tables
43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

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CHEMISTRY BULK STORAGE

General Information

Activity Description

Storage .space for chemistry supplies.

Basic Room Parameters

Square Footage	158 nsf
Occupants	Transitory

Proximity Requirements

Adjacencies	None

Casework, Equipment and Furniture

Casework	Heavy-duty shelving
Technology	No special requirements
Equipment	None
Furnishings	None

Service Requirements

Lighting	No special requirements
Electrical	Convenience receptacles
HVAC	No special requirements
Plumbing	No Special Requirements
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)

Openings

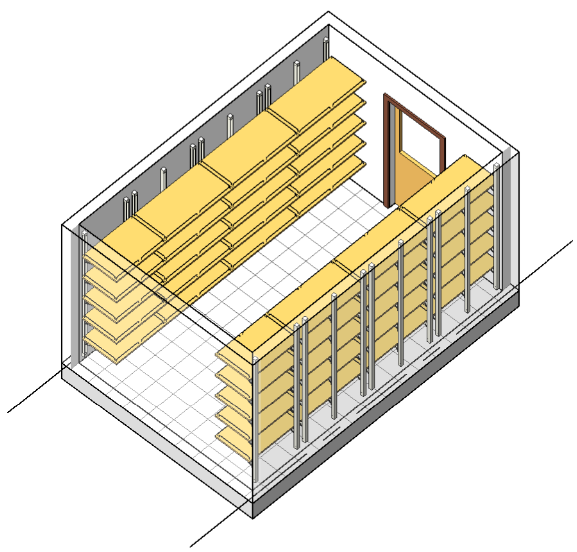
Windows	None
Relites	None
Doors	36” wide doors

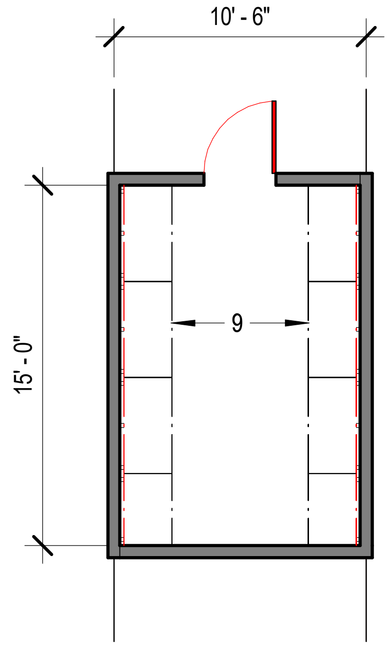
Ancillary Space Requirements

Other chemistry support rooms; Organic Chemistry Laboratory.

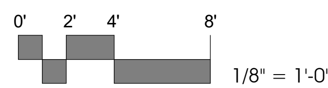
Other Requirements

No Special Requirements.





Chemistry Bulk Storage



FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
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45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

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CHEMISTRY INSTRUMENT ROOM

General Information

Activity Description

Hands-on activities with analytical instrumentation; write-up of observations.

Basic Room Parameters

Square Footage 945 nsf

Occupants 12-24 students + 1 instructor

Proximity Requirements

Adjacencies Proximate with Chemistry Teaching Laboratories

Casework, Equipment and Furniture

Casework Fixed casework suitable for a laboratory environment with epoxy resin benchtops

Technology Telephone

Wireless access points

Equipment Analytical instrumentation (examples: GC, HPLC, Spectrometer; Ion Chromatograph, AA)
Balances

Computers

Vacuum pump(s)

Ice machine

Furnishings (1) 4'-0" chemical fume hood

(3) Exhaust snorkels

(1) High-temperature exhaust snorkel

Service Requirements

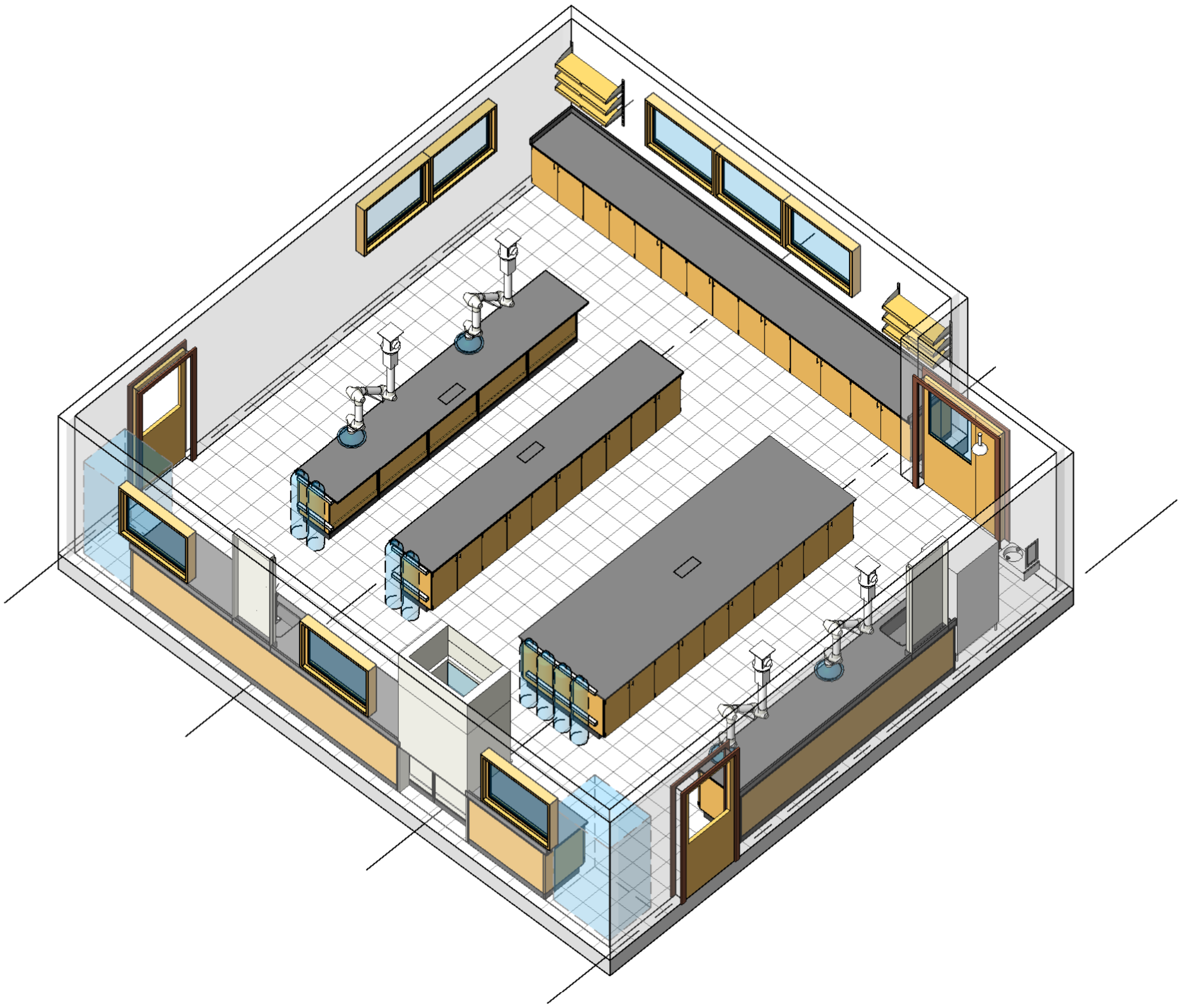
Lighting	Suitable for laboratory activities at the bench level; dimmable
Electrical	Surface metal raceways at perimeter walls and at island benches with 120v duplex receptacles every 36” on center with dedicated 20 amp circuits as required for specialized instruments.
HVAC	100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure
Plumbing	Hot and cold water
	Laboratory sinks at perimeter
	Cupsinks at island benches
	Purified water
	Compressed air
	Safety shower / eyewash station
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	No Special Requirements
Relites	At doors
Doors	36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

Ancillary Space Requirements

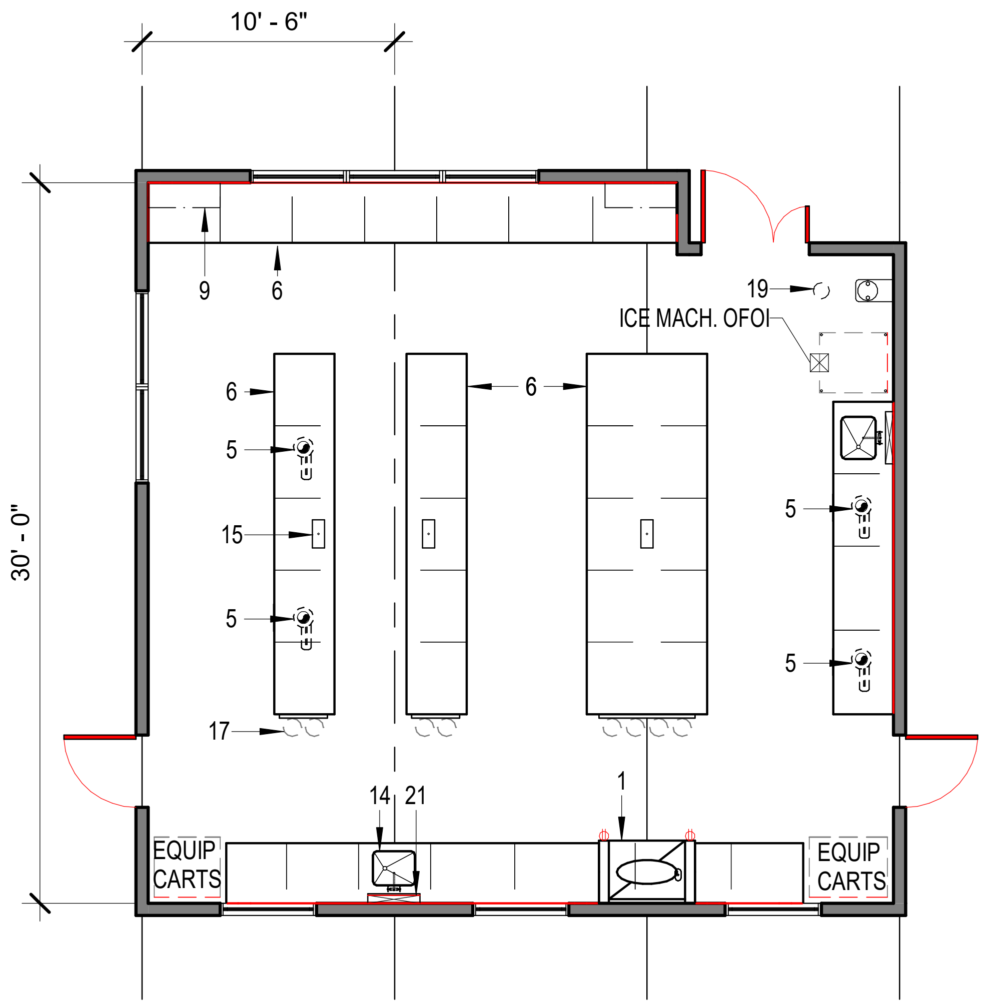
Chemistry Teaching Laboratories.

Other Requirements

Consideration for gas cylinder storage (flammable or toxic gases to be determined).



Chemistry Instrument Room



Chemistry Instrument Room

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
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44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

PHYSICS PREP / STORAGE

General Information

Activity Description

Storage and prep space for physics courses; the main work area for physics staff.

Basic Room Parameters

Square Footage 630 nsf

Occupants 1 lab staff + 1 student worker

Proximity Requirements

Adjacencies Physics Laboratories (1.06)

Casework, Equipment and Furniture

Casework	Fixed casework suitable for a laboratory environment with epoxy resin benchtops
	Heavy-duty shelving for storing equipment
	Apparatus and supplies
Technology	Telephone
	Wireless access points
Equipment	No special requirements
Furnishings	(1) exhaust snorkel for soldering

Service Requirements

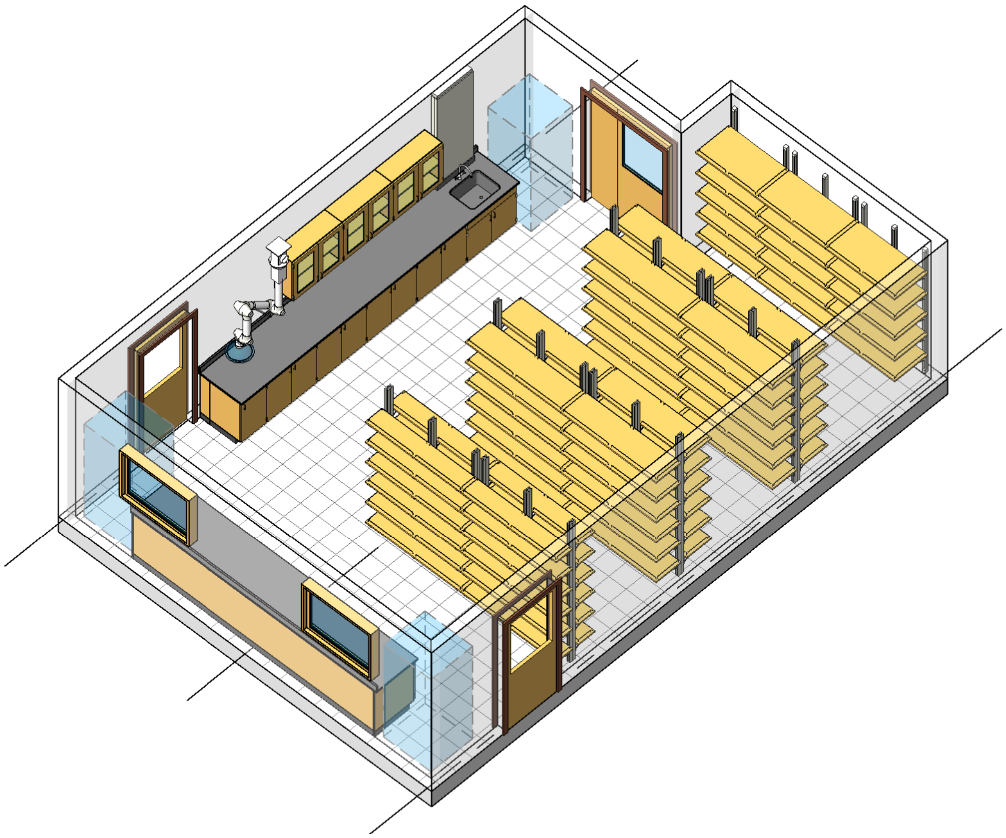
Lighting	No special requirements
Electrical	Surface metal raceways at perimeter walls with 120v duplex receptacles every 36” on center with dedicated 20 amp circuits provided at laboratory equipment spaces
HVAC	100% exhaust air with a minimum of 4 air changes per hour; room to be kept under negative air pressure
Plumbing	Hot and cold water
	Laboratory sink at perimeter
	Natural gas
	Compressed air
	Eyewash station
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	No Special Requirements
Relites	At doors
Doors	36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

Ancillary Space Requirements

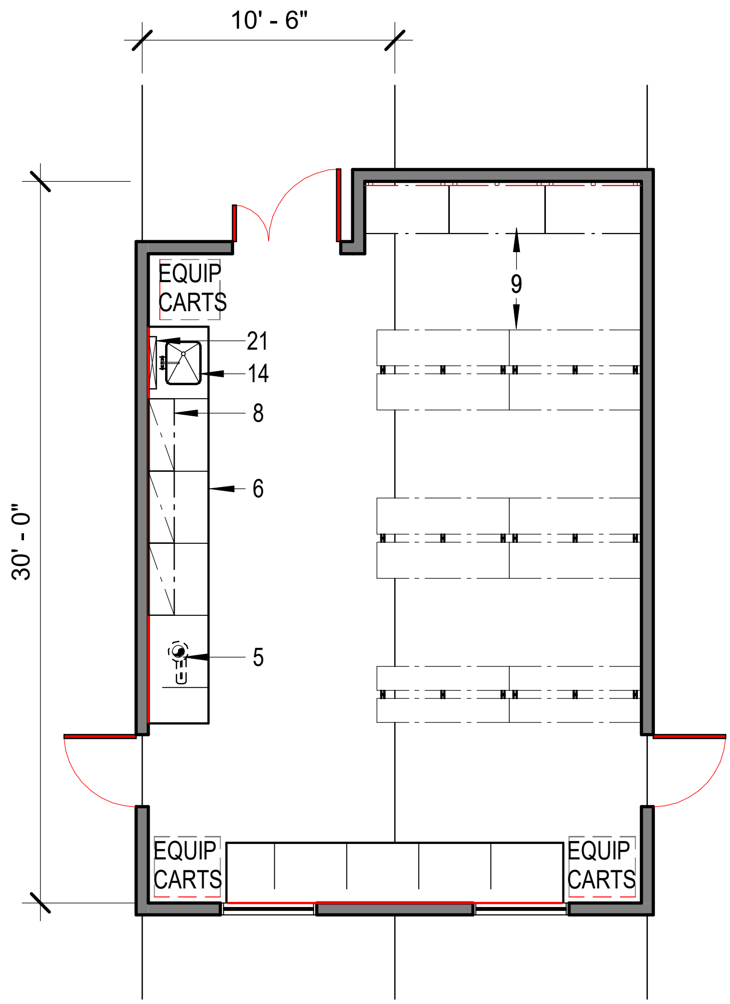
Physics Teaching Laboratories, and Staff Offices.

Other Requirements

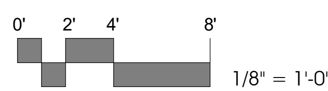
No Special Requirements.



Pyhsics Prep/Storage



Pyhsics Prep/Storage



FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
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45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

EARTH SCIENCES PREP / STORAGE

General Information

Activity Description

Storage and prep space for earth science courses; the main work area for earth sciences staff.

Basic Room Parameters

Square Footage 630 nsf

Occupants 1 lab staff + 1 student worker

Proximity Requirements

Adjacencies Earth & Space Science Laboratory A (1.07) and Earth & Space Science Laboratory B (1.08).

Casework, Equipment and Furniture

Casework Fixed casework suitable for a laboratory environment with epoxy resin benchtops

Heavy-duty shelving for storing equipment

Apparatus and supplies

Technology Telephone

Wireless access points

Equipment Refrigerator/freezer

Washer

Furnishings Specimen storage cabinets (OFOI)

Service Requirements

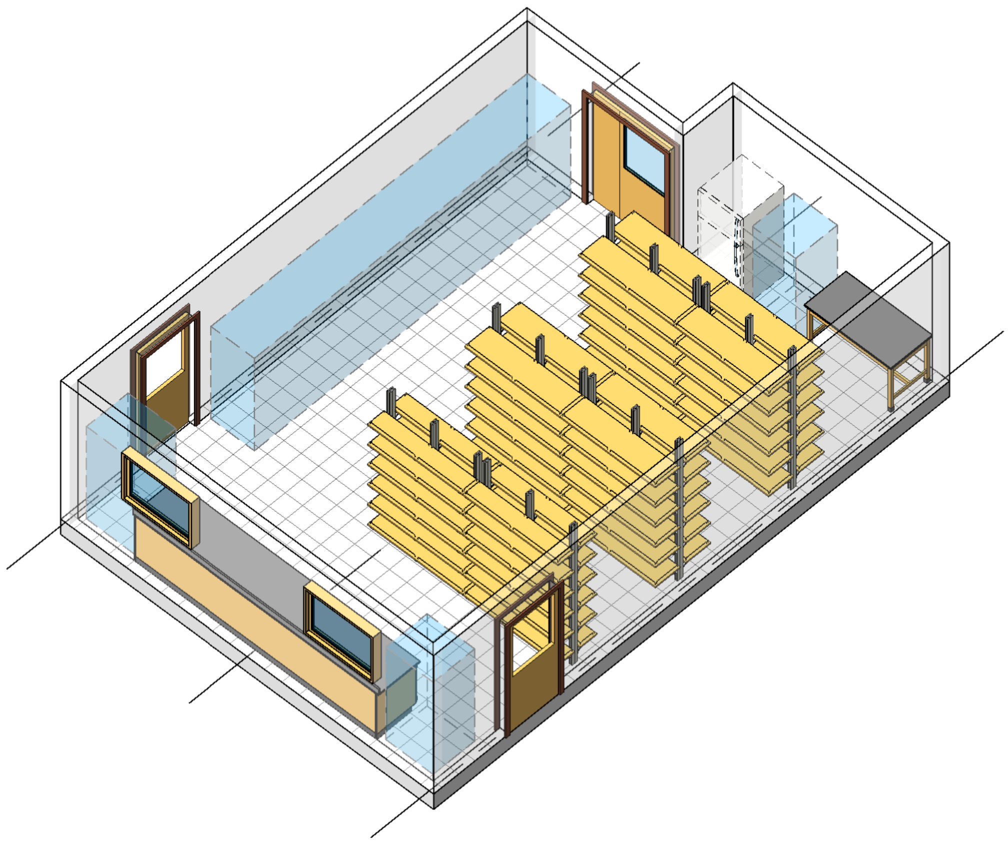
Lighting	No special requirements
Electrical	Surface metal raceways at perimeter walls with 120v duplex receptacles every 36" on center with dedicated 20 amp circuits provided at laboratory equipment spaces
HVAC	100% exhaust air with a minimum of 2 air changes per hour; room to be kept under negative air pressure
Plumbing	Hot and cold water
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	No Special Requirements
Relites	At doors
Doors	36" wide doors including one corridor door paired with 18" fixed leaf for moving equipment

Ancillary Space Requirements

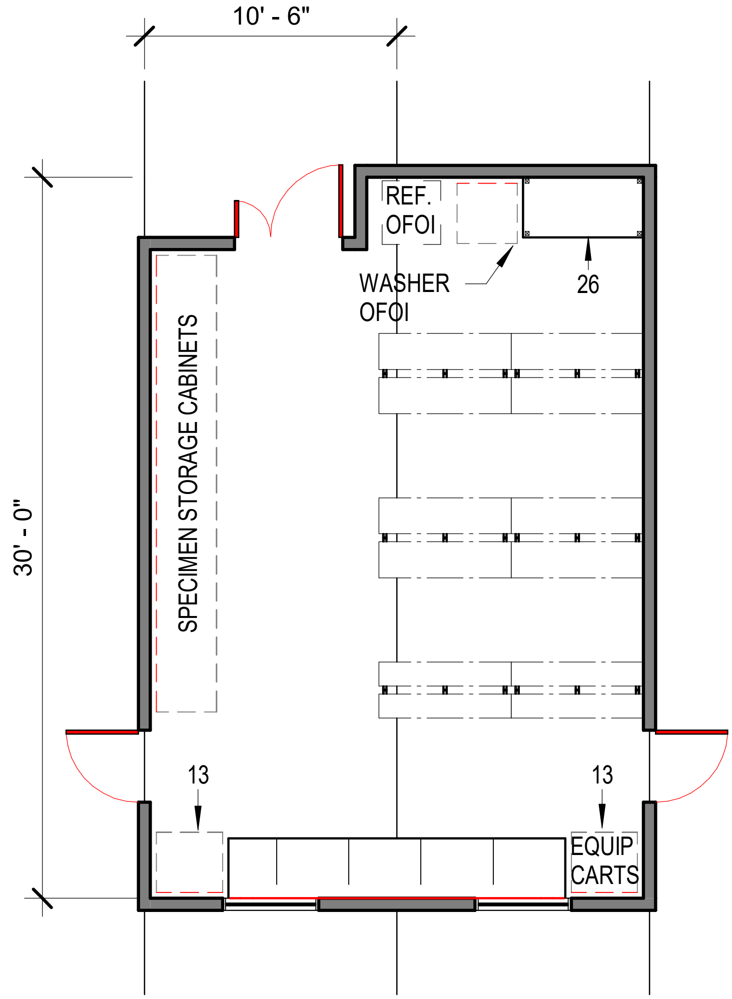
Earth & Space Science Laboratories.

Other Requirements

No Special Requirements.



Earth Science Prep/Storage



Earth Science Prep/Storage

0' 2' 4' 8'
1/8" = 1'-0"

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
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46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

ROCK PREP

General Information

Activity Description

Preparation of geological samples; wet and dirty activities.

Basic Room Parameters

Square Footage 157.5 nsf

Occupants 1-2 lab staff

Proximity Requirements

Adjacencies Proximate to Earth & Space Science Laboratory A (1.07), Earth & Space Science Laboratory B (1.08), and Earth Sciences Prep / Storage (3.10).

Casework, Equipment and Furniture

Casework Fixed casework suitable for a laboratory environment with epoxy resin benchtops

Technology Telephone

Equipment (2) Rock saws

Other miscellaneous OFOI benchtop equipment

Furnishings No special requirements

Service Requirements

Lighting No special requirements

Electrical Surface metal raceways at perimeter walls with 120v duplex receptacles every 36” on center with dedicated 20 amp circuits provided at laboratory equipment spaces.

HVAC 100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure.

Plumbing Hot and cold water

Laboratory sink with sediment trap

Compressed air

Eyewash at sink

Finishes

Floor	Sealed concrete or resinous flooring
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)

Openings

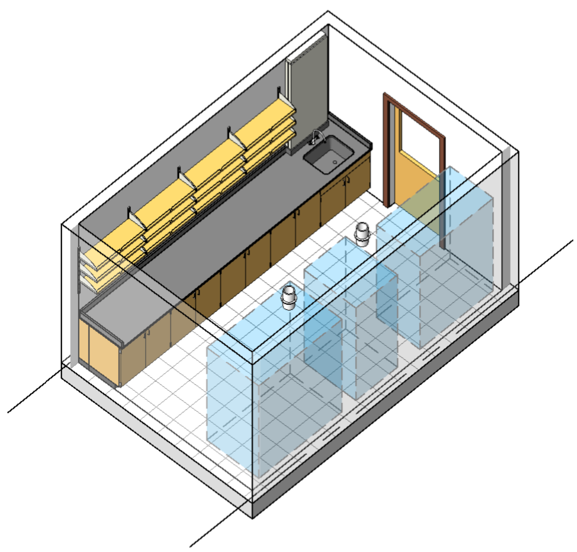
Windows	No Special Requirements
Relites	At door
Doors	42” wide door

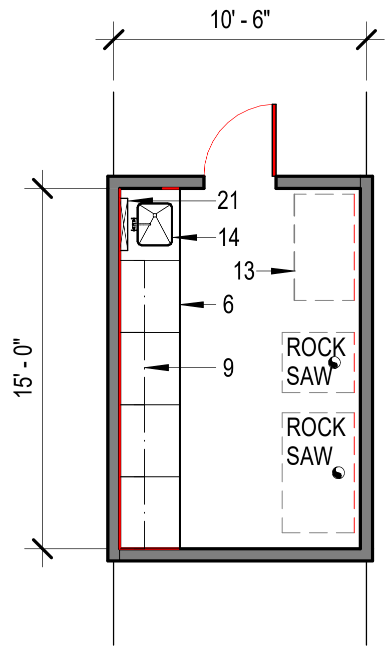
Ancillary Space Requirements

Earth & Space Science Teaching Laboratories, Prep / Storage, and Staff Offices.

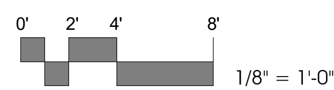
Other Requirements

Consideration for dust control.





Rock Prep



FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Corrosive Cabinet
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. Mobile Teaching Cart
30. Tackboard
31. Mobile Student Desk
32. Balance Table
33. Mobile Bench Workstation
34. A/V Screen
35. Multi-media Projector (Clg. Mtd.)
36. Lattice Rod Assembly
37. Coat/Book Bag Storage Unit
38. Conference Table/ Chairs
39. Mop Sink
40. Mobile Bookshelf
41. Casework
42. Lounge Chairs/ Side Tables
43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

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FIELD EQUIPMENT STORAGE / MUD ROOM

General Information

Activity Description

Storage and cleaning of field equipment.

Basic Room Parameters

Square Footage 157.5 nsf

Occupants Transitory

Proximity Requirements

Adjacencies Proximate to loading dock or outdoor access

Casework, Equipment and Furniture

Casework Heavy-duty shelving

Technology No special requirements

Equipment No special requirements

Furnishings Hooks for hip waders and boots

Service Requirements

Lighting No special requirements

Electrical Convenience receptacles

HVAC 100% exhaust with minimum 4 air changes per hour

Plumbing Hot and cold water

Floor-mounted utility sink with sediment trap

Finishes

Floor Sealed concrete or resinous flooring

Walls Conventional painted drywall finish

Ceiling No special requirements

Openings

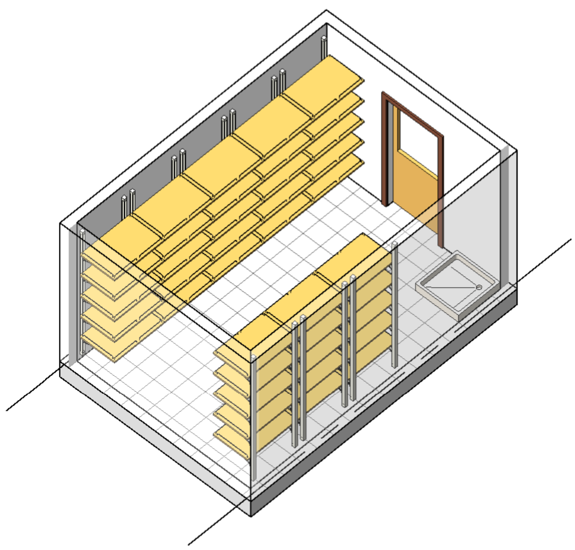
Windows	No special requirements
Relites	Not required
Doors	No special requirements

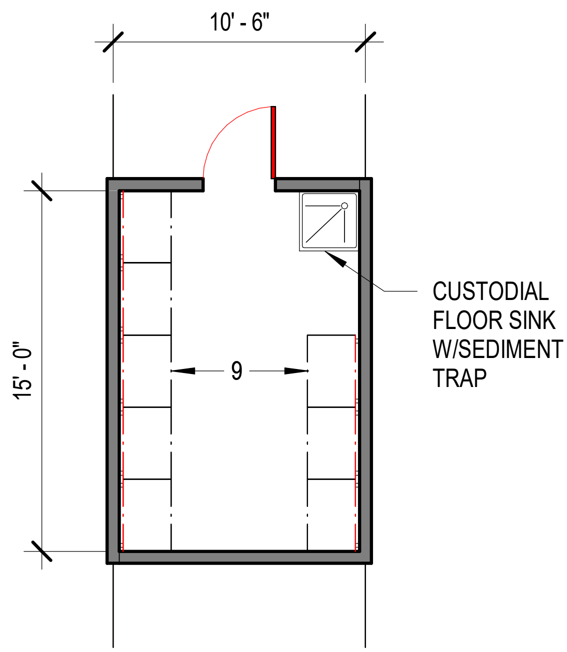
Ancillary Space Requirements

Convenient access to parking lot or loading zone.

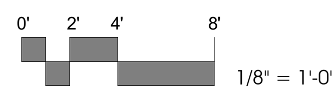
Other Requirements

No special requirements.





Field Equipment Storage/Mud Room



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47. Pedestal Storage
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49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

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FABRICATION LAB

General Information

Activity Description

Student project space for light fabrication, prototyping and assembly of finished products; instruction/ presentations.

Basic Room Parameters

Square Footage 1,575 nsf

Occupants 36 students + 1 instructor/supervisor

Proximity Requirements

Adjacencies Ideation Studio, main building entry/ lobby, large group assembly, collaboration lounge, courtyard for demonstrations and presentations

Casework, Equipment and Furniture

Casework Casework suitable for a shop environment with butcher block tops

Tall lockable storage cabinets for student projects

Tools and supplies

Coat/bookbag storage for student belongings

Heavy-duty shelving

Technology Telephone

Wireless access points

Equipment Various shop equipment for wood and/or metal working (equipment list to be determined by Owner). Examples: drill press, grinder, table saw, sander, lathe, mill, laser cutter, 3D printer, etc.

Furnishings (1) Exhaust snorkel.

(24) to (36) Shop stools.

Service Requirements

Lighting	No special requirements
Electrical	Surface metal raceways at perimeter walls and overhead service carrier with 120v duplex receptacles every 36” on center with dedicated 20 amp circuits provided at laboratory equipment spaces. Some equipment may require 208v circuits.
HVAC	100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure
	(1) snorkel exhaust for soldering station at perimeter of room
Plumbing	Hot and cold water
	Compressed air
	Accessible laboratory sink at perimeter bench
	Eyewash station; tub sink
Finishes	
Floor	Sealed concrete or resinous flooring
Walls	Conventional painted drywall finish
Ceiling	No special requirements
Openings	
Windows	Natural daylight preferred
Relites	At doors
Doors	36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

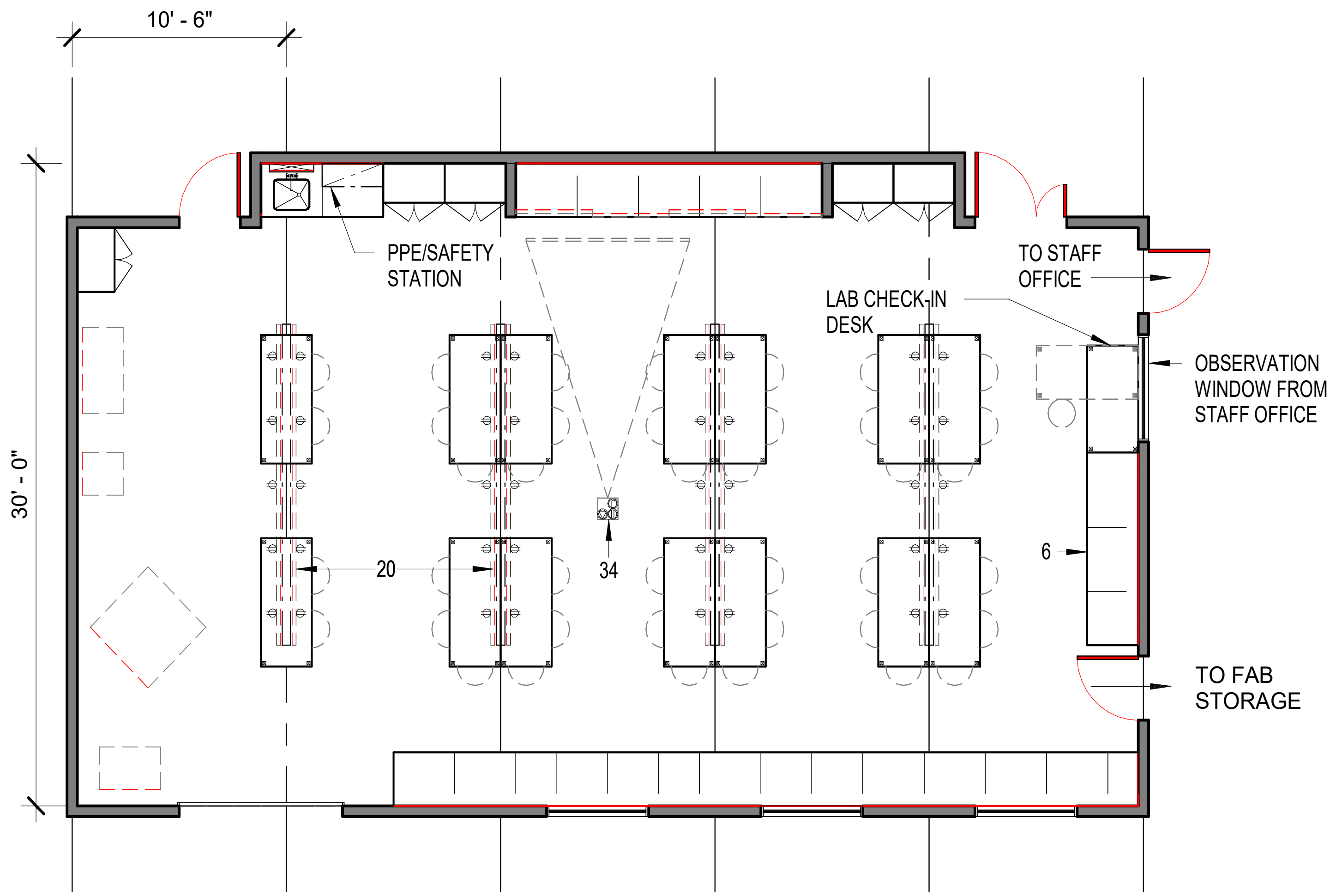
Ancillary Space Requirements

Storage room and office/ check-in are co-located within the space

Other Requirements

No special requirements.

Fabrication Lab



Fabrication Lab

FURNISHINGS

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03. Radioisotope Hood
04. Vented Workstation
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46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

MATERIAL STORAGE

General Information

This material storage space is within the fabrication lab.

Activity Descriptions

Store materials used in the fabrication lab.

Basic Room Parameters

Square Footage	150 sf
Occupants	1-3

Proximity Requirements

Adjacencies	Fabrication lab and outside access for loading

Casework, Equipment and Furniture

Casework	None
Technology	Intercom/clock
	Wireless access points
Equipment	None
Furniture	Open, industrial, steel storage racks in main custodial for storage of bulk material
	Mobile bins for scape material

Service Requirements

Lighting	No special requirements
Electrical	No special requirements
HVAC	Temperature controlled for material stability
Plumbing	None
Finishes	
Floor	Exposed and sealed concrete
Walls	Protective paneling
Ceiling	No special requirements
Openings	
Windows	No other requirements
Relites	No other requirements
Doors	6’ double door

Ancillary Space Requirements

None

Other Requirements

None

Back to Table of Contents

OFFICE CHECK IN AREA

General Information

This office check-in area is within the fabrication lab and serves as a check- in desk for users of the fab lab. It has direct access into an office for administrative work and security needs.

Activity Description

Checking in students, administrative and computer work, and project preparation for tour groups.

Basic Room Parameters

Square Footage 150 sf

Occupants 1-3

Proximity Requirements

Adjacencies Entry to the fabrication lab

Casework, Equipment and Furniture

Casework	None
Technology	Wireless access points
	Intercom/clock
	Telephone
Equipment	(1) Bookshelf
	(1) Small white board
	(1) Tack board
Furniture	(1) File cabinet
	(1) Faculty office desk
	(1) Lateral file cabinets with (4) drawers
	(1) Pedestal storage
	(1) L-shape desk
	(2) Guest chairs

Service Requirements

Lighting	Dimmable lighting
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	None
Finishes	
Floor	Exposed and sealed concrete
Walls	Painted gypsum wall board (GWB)
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Quality exterior views and natural daylight are required. Meeting LEED daylight credit is desired.
	Operable windows to be determined during design.
Relites	Provide visual connections to the fab lab entry and the fab lab for supervision
Doors	36” wide door(s) as required

Ancillary Space Requirements

None

Other Requirements

None

DOUBLE LECTURE CLASSROOM

General Information

Activity Description

A wide range of activities are anticipated to occur in the General Classrooms including; formal lecture, group discussion (large and small), debate, student presentations, watching videos, activities using whiteboards or wall space to express ideas, independent research and writing/typing, peer editing, seminars, work, quiet reading and hands-on projects group projects.

Teachers will change modes of instruction, sometimes within the same class period. The rooms should be as flexible as possible while still satisfying the requirements listed here.

Basic Room Parameters

Square Footage	1,500 sf
Occupants	48

Proximity Requirements

Adjacencies	Shared learning and labs

Casework, Equipment and Furniture

Casework	None
Technology	Sound/Audio system for presentation
	Projector and screen or flat panel monitor to be confirmed during design
	Wireless access points
	Telephone
	Intercom/clock
Equipment	(4) White Markerboards
	(2) Tack boards
Furniture	Student tables and seating for 48
	(1) Desk

Service Requirements

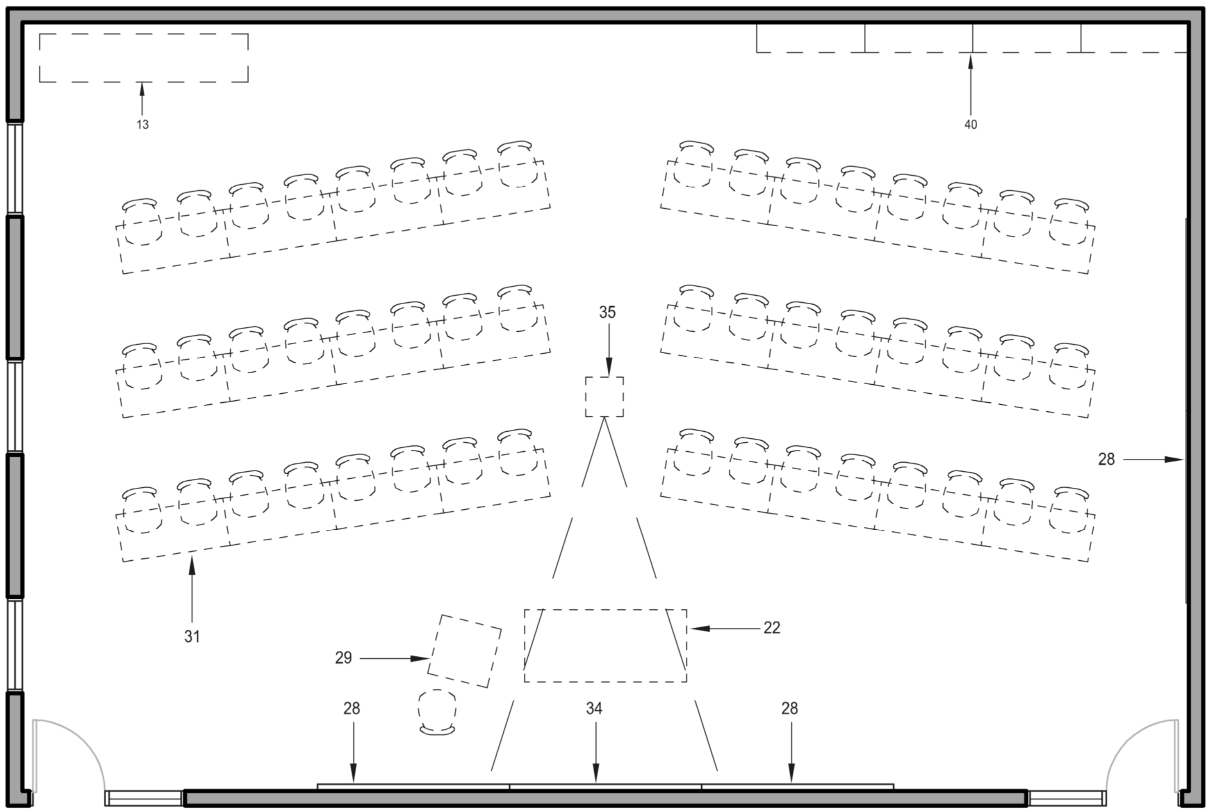
Lighting	Dimmable lighting (by zone) for presentations
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	None
Finishes	
Floor	Carpet
Walls	Painted gypsum wall board (GWB)
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Quality exterior views and natural daylight are required. Meeting LEED daylight credit is desired.
	Operable windows to be determined during design
Relites	Visual connections to the corridor and shared learning area
Doors	36” wide door(s) as required

Ancillary Space Requirements

None

Other Requirements

None



Double Lecture Classroom

0 2 4 8

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
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22. Movable Demonstration Bench
23. Glassware Washer
24. Glassware Dryer
25. Autoclave
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34. A/V Screen
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39. Mop Sink
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43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

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GENERAL CLASSROOM

General Information

Activity Description

A wide range of activities are anticipated to occur in the General Classrooms including; formal lecture, group discussion (large and small), debate, student presentations, watching videos, activities using whiteboards or wall space to express ideas, independent research and writing/typing, peer editing, seminars, work, quiet reading and hands-on projects group projects.

Teachers will change modes of instruction, sometimes within the same class period. The rooms should be as flexible as possible while still satisfying the requirements listed here.

Basic Room Parameters

Square Footage	945 sf
Occupants	36

Proximity Requirements

Adjacencies	Shared learning and labs

Casework, Equipment and Furniture

Casework	None
Technology	Sound/Audio system for presentation
	Projector and screen or flat panel monitor to be confirmed during design
	Wireless access points
	Telephone
	Intercom/clock
Equipment	(3) White markerboards
	(2) Tack boards
Furniture	Student tables and seating for 36
	(1) Desk

Service Requirements

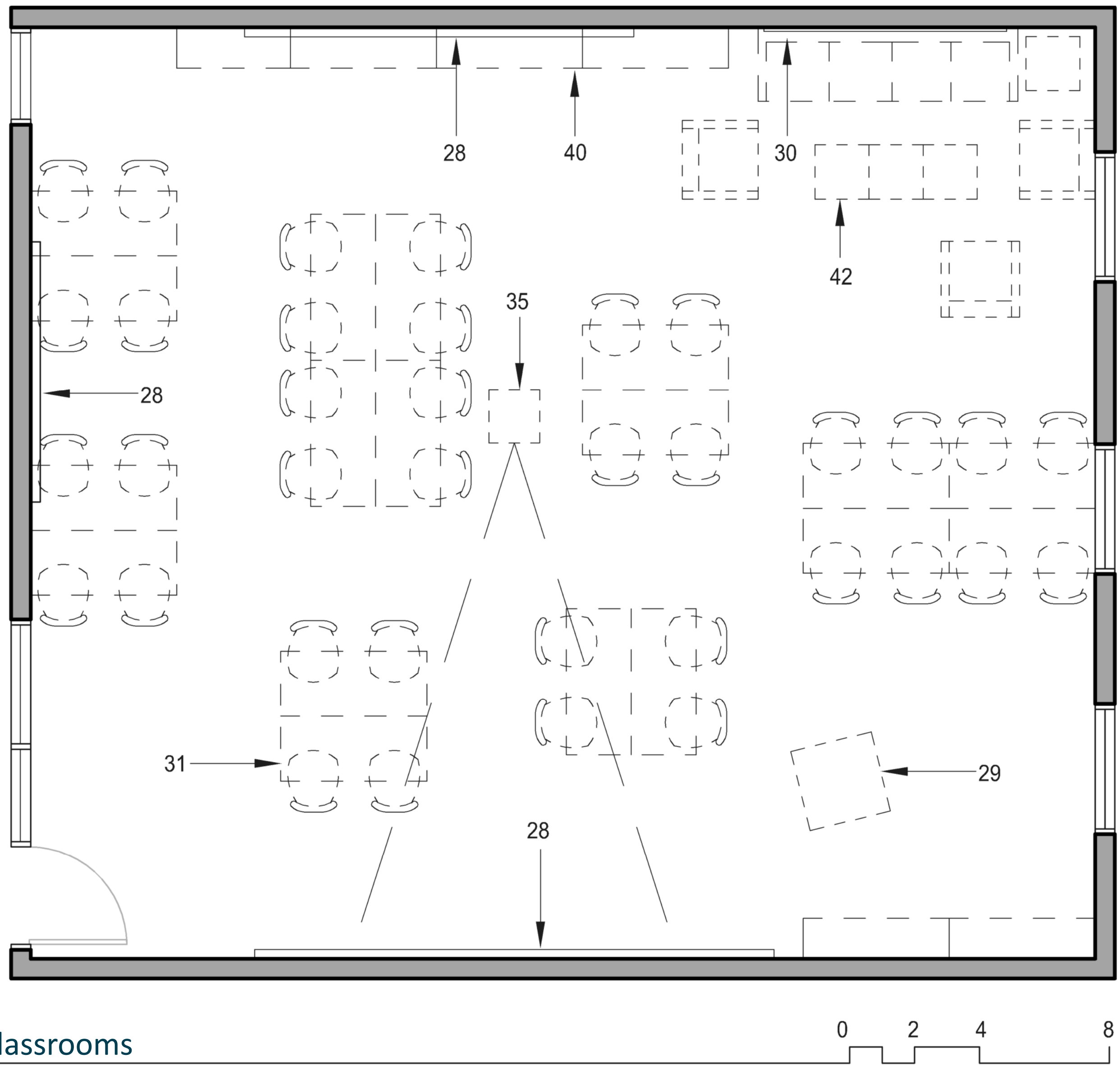
Lighting	Dimmable lighting (by zone) for presentations
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	None
Finishes	
Floor	Carpet
Walls	Painted gypsum wall board (GWB)
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Quality exterior views and natural daylight are required. Meeting LEED daylight credit is desired.
	Operable windows to be determined during design.
Relites	Visual connections to the corridor / shared learning area
Doors	36” wide door(s) as required

Ancillary Space Requirements

None

Other Requirements

None



General Classrooms

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
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42. Lounge Chairs/ Side Tables
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44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

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IDEATION STUDIO

General Information

Activity Description

Circuits Lab sections; independent project space for Engineering courses such as Statics, Dynamics and Mechanics of Materials; Student study and tutoring; Class demonstrations.

Basic Room Parameters

Square Footage 1000 nsf

Occupants 10-24 students

Proximity Requirements

Adjacencies Nearby storage space; Proximate with classrooms, Physics Laboratory, and Fab Lab (if applicable).

Casework, Equipment and Furniture

Casework Casework suitable for a laboratory environment with epoxy resin benchtops

Tall lockable storage cabinets for supplies and student projects

Technology Telephone

Wireless access points

(12) networked computers available for student/group use

Equipment No special requirements

Furnishings (12) movable laboratory tables at 60” x 30” with epoxy resin benchtops, prewired with (2) duplex receptacles each

(24) chairs / stools for students

Service Requirements

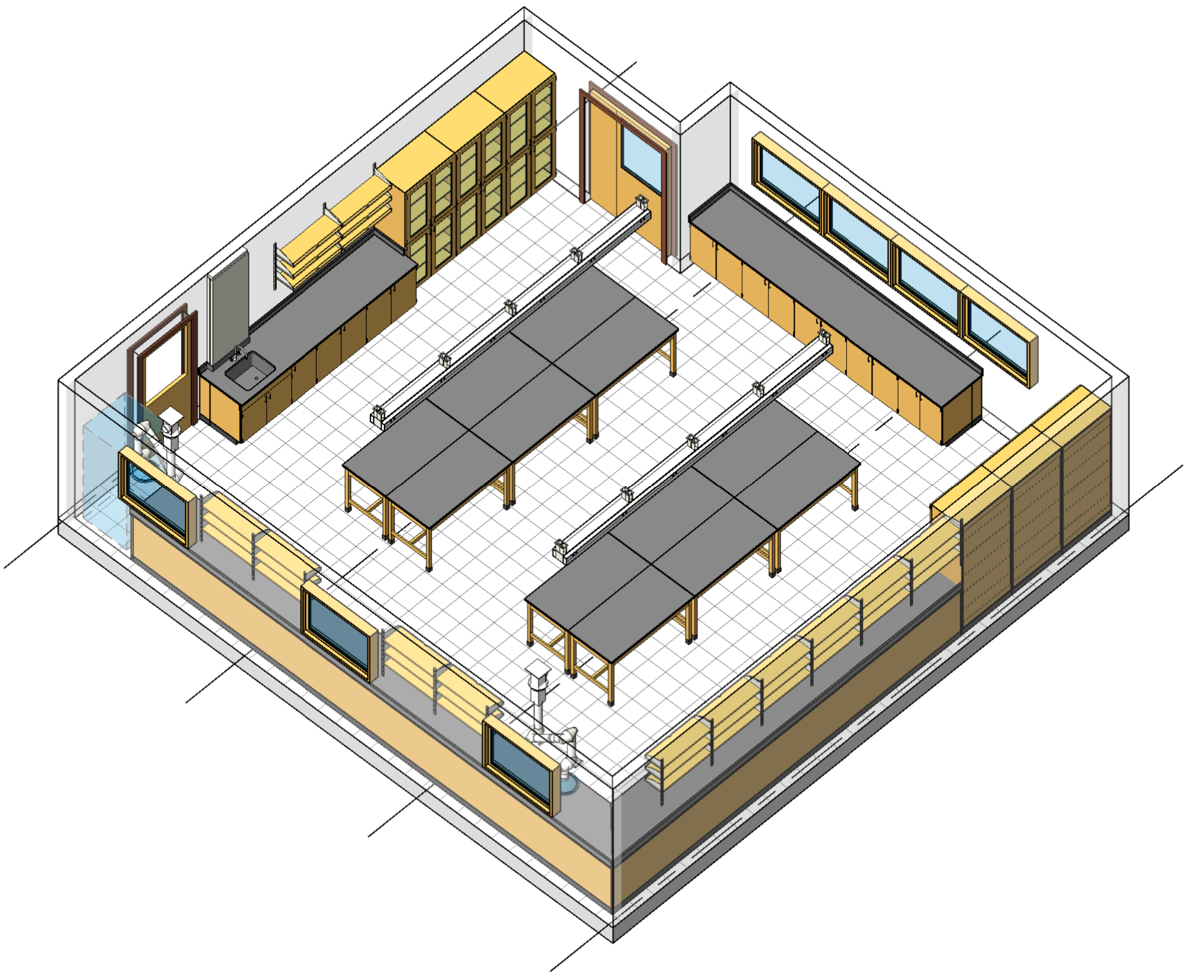
Lighting	Suitable for laboratory activities at the bench level
Electrical	Surface metal raceways at perimeter walls and overhead service carrier with 120v duplex receptacles every 36” on center with dedicated 20 amp circuits provided at laboratory equipment spaces
HVAC	100% exhaust air with a minimum of 6 air changes per hour; room to be kept under negative air pressure
	(2) snorkel exhausts for soldering stations at perimeter of room
Plumbing	Hot and cold water
	Laboratory sinks at perimeter benches
	Eyewash station
Finishes	
Floor	Resilient tile
Walls	Conventional painted drywall finish
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Natural daylight preferred
Relites	At doors
Doors	36” wide doors including one corridor door paired with 18” fixed leaf for moving equipment

Ancillary Space Requirements

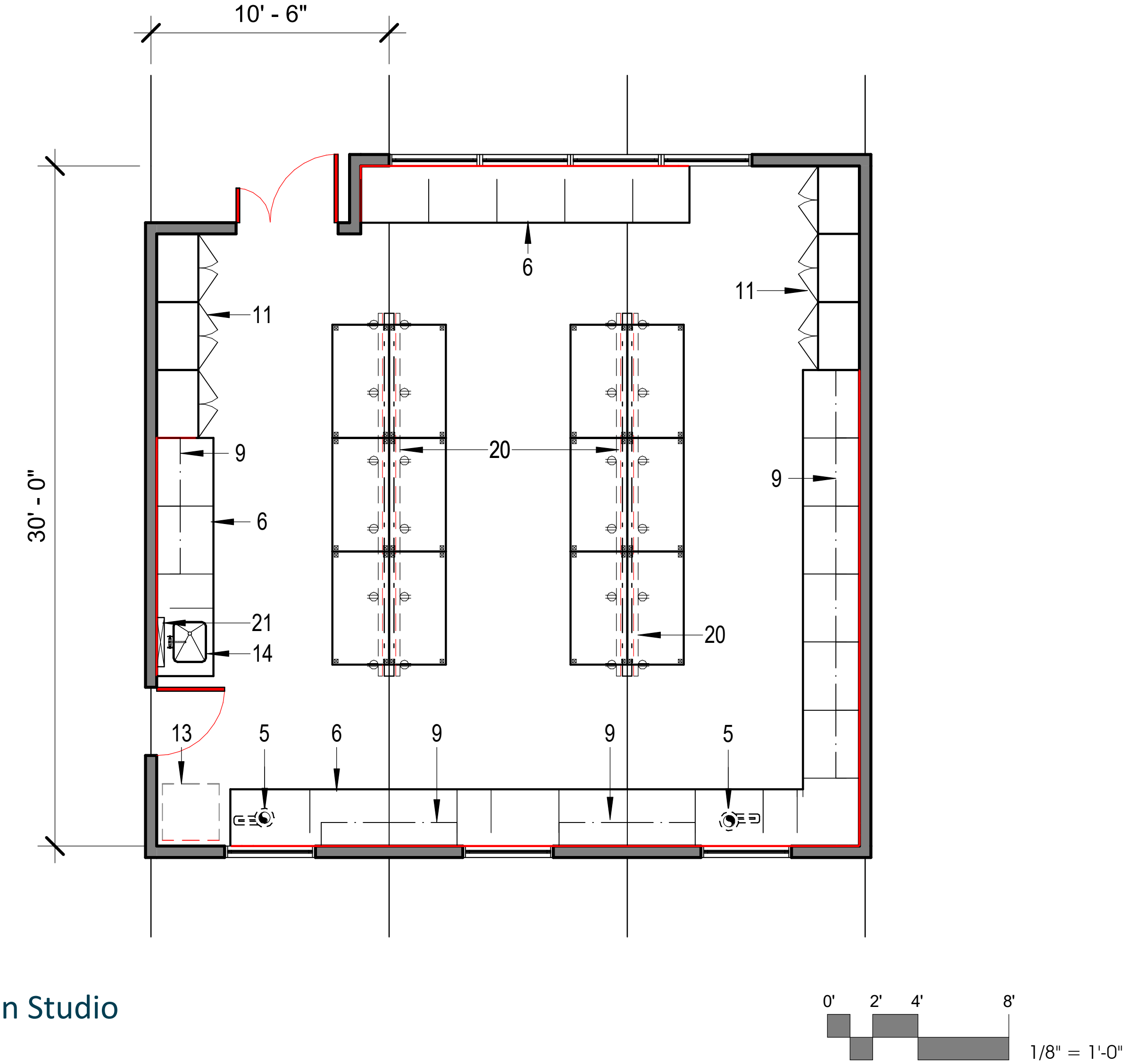
Storage room, general engineering classroom, Fabrication Lab and Physics classroom.

Other Requirements

No special requirements.



Ideation Studio



Ideation Studio

FURNISHINGS

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Back to Table of Contents

COLLABORATION LOUNGE

General Information

Collaboration Activity Description

A shared space used by students for individual research and study, collaborative group work, relaxing, socializing and lunch breaks.

Basic Room Parameters

Square Footage	800 sf
Occupants	10-20

Proximity Requirements

Adjacencies	Main building entry, fabrication lab, ideation studio, and health room

Casework, Equipment and Furniture

Casework	Tall lockable storage
	Personal lockers or cubbies
	Counter and upper cabinets for a coffee maker, microwave and sink
Technology	Sound/Audio system for presentation
	Projector and screen or flat panel monitor to be confirmed during design
	Wireless access points
	Telephone
	Intercom/clock
	TV monitor
Equipment	(1) White board or writable wall surface
	(1) A/V screen
	(1) Tack board or tackable wall surface
	(1) Under counter refrigerator
Furniture	Lounge chairs, ottomans, and side tables
	Bistro tables and chairs
	Conference table and chairs
	Individual study tables and chairs

Service Requirements

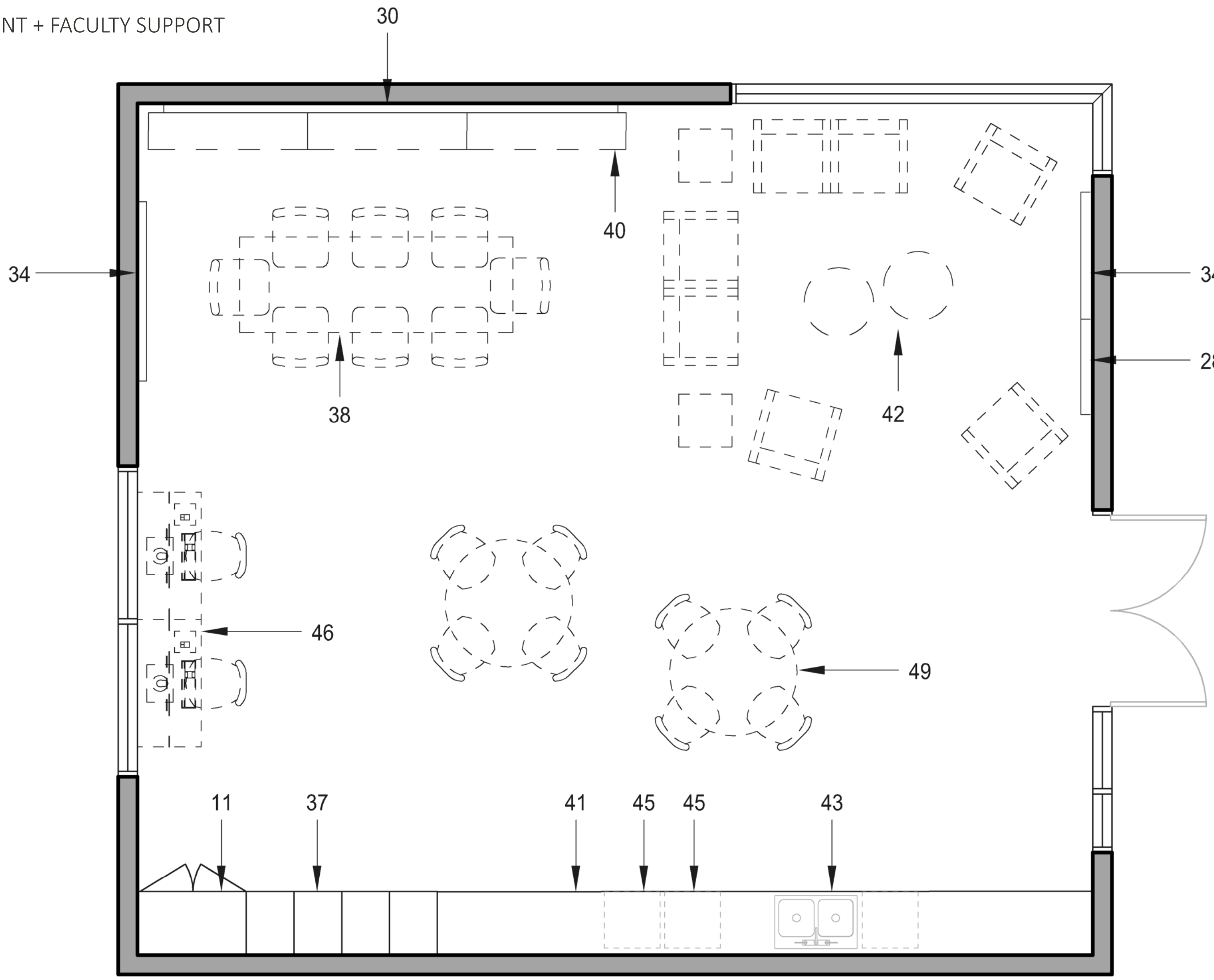
Lighting	Dimmable lighting (by zone) for presentations
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	Sink
Finishes	
Floor	No special requirements
Walls	Painted gypsum wall board (GWB)
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Quality exterior views and natural daylight are required. Meeting LEED daylight credit is desired.
	Operable windows to be determined during design.
Relites	Visual Connections to the corridor / shared spaces
Doors	36” wide door(s) as required

Ancillary Space Requirements

None

Other Requirements

None



Colloboration Lounge

FURNISHINGS

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02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
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Back to Table of Contents

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HEALTH/MOTHER'S ROOM

General Information

Activity Descriptions

This room is a private space where individuals can attend to personal health and wellness needs found in a diversity of cultures. It's particularly beneficial to new mothers who need a private space to breastfeed. Other activities include private phone calls, naps, prayer and meditation.

Basic Room Parameters

Square Footage 100 sf

Occupants 1

Proximity Requirements

Adjacencies Collaboration lounge, conference room, and large group assembly

Casework, Equipment and Furniture

Casework	(6) linear feet of counter with upper and lower casework
	Tall lockable storage
Technology	Wireless access points
	Telephone
	Intercom/clock
Equipment	Baby Changing Station
	Under-counter refrigerator
	Disaster packs
	White Markerboards
	Tack boards
Furniture	Side Table
	Lounge Chair

Service Requirements

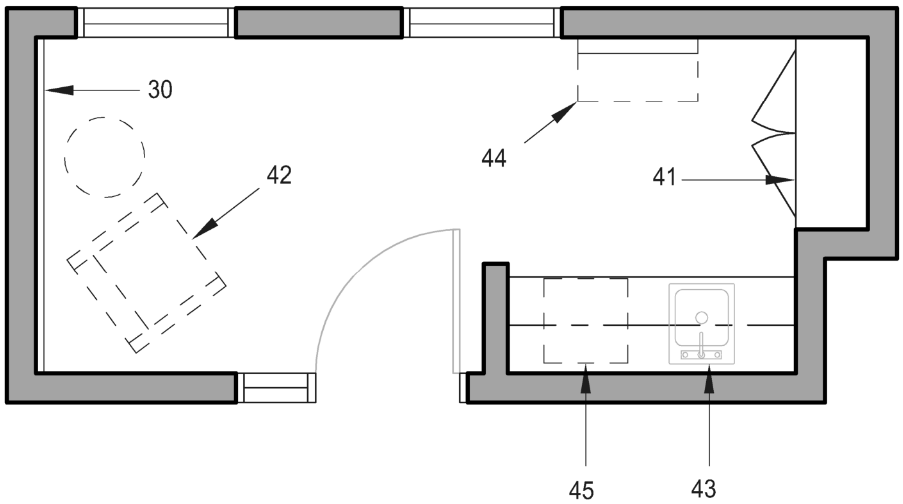
Lighting	Warm, soft, with the ability to adjust the lighting levels. Access to natural light is desirable.
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	Sink
Finishes	
Floor	Resilient sheet flooring
Walls	Painted gypsum wall board (GWB)
Ceiling	Acoustical ceiling tile (ACT)
Openings	
Windows	Exterior views and natural light desired, but student privacy is important
Relites	Small relite adjacent to the door with shades
Doors	36” wide door(s) as required

Ancillary Space Requirements

None

Other Requirements

None



Health/Mother's Room

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Radioisotope Hood
04. Vented Workstation
05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Corrosive Cabinet
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. Mobile Teaching Cart
30. Tackboard
31. Mobile Student Desk
32. Balance Table
33. Mobile Bench Workstation
34. A/V Screen
35. Multi-media Projector (Clg. Mtd.)
36. Lattice Rod Assembly
37. Coat/Book Bag Storage Unit
38. Conference Table/ Chairs
39. Mop Sink
40. Mobile Bookshelf
41. Casework
42. Lounge Chairs/ Side Tables
43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

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SHARED LEARNING AREA

General Information

Activity Description

An open informal area for individual study, collaborative small group work, socializing, tutoring and informal meetings where acoustic separation is not required.

Basic Room Parameters

Square Footage	800 sf
Occupants	10-20

Proximity Requirements

Adjacencies	Labs, classrooms, offices, restrooms, and stairs

Casework, Equipment and Furniture

Casework	None
Technology	Wireless access points
	Intercom/clock
Equipment	Whiteboard or writable wall surface
	Tack Board or tackable wall surface
Furniture	Lounge chairs, ottomans, and side tables
	Bistro tables and chairs
	Individual study tables and chairs
	Mobile bookshelves

Service Requirements

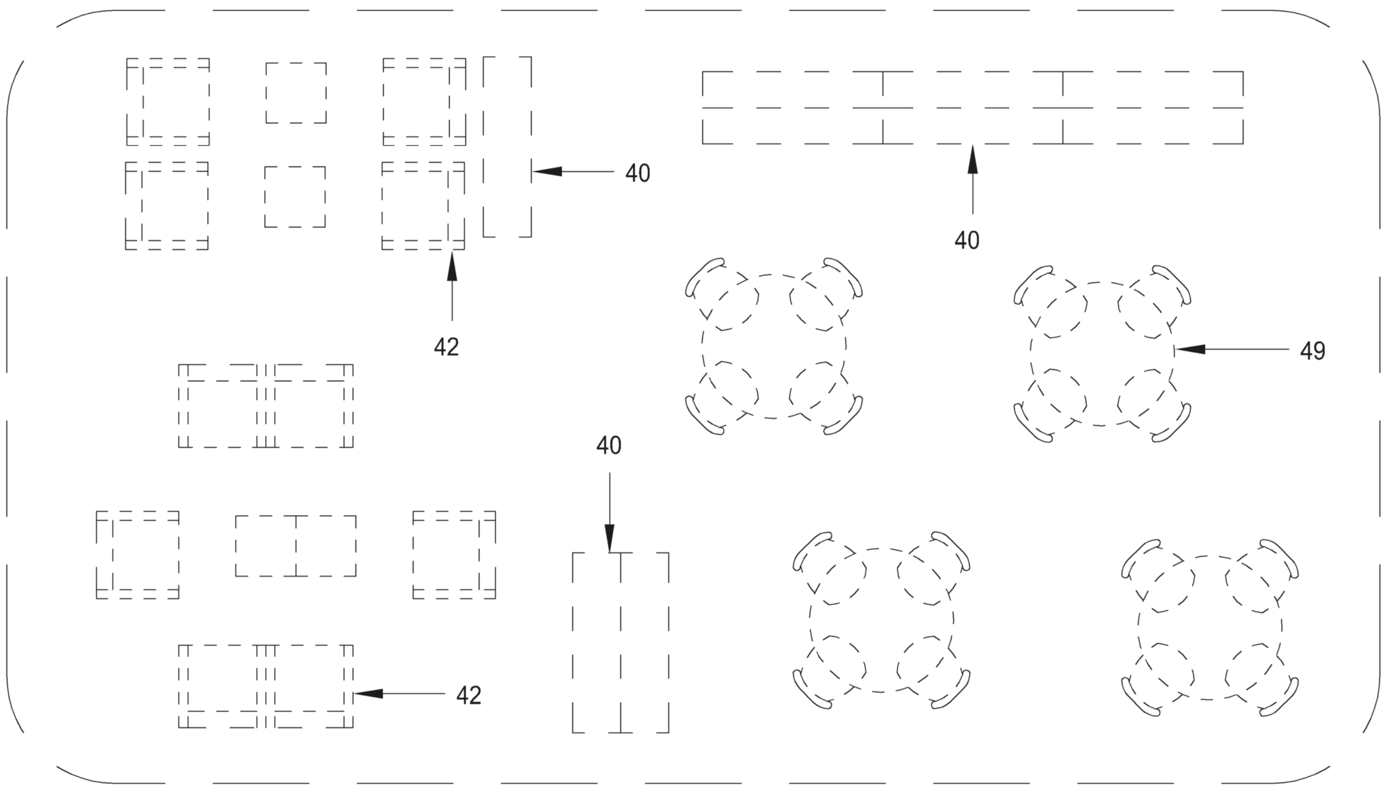
Lighting	Dimmable lighting
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	Drinking fountain/bottle filler
Finishes	
Floor	No special requirements
Walls	Painted gypsum wall board (GWB)
Ceiling	No special requirements
Openings	
Windows	Natural daylight
Relites	n/a
Doors	No special requirement

Ancillary Space Requirements

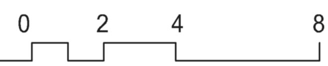
None

Other Requirements

None



Shared Learning Area



FURNISHINGS

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Back to Table of Contents

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LARGE GROUP ASSEMBLY

General Information

This space supports orientation and instruction for tours of the building for up to 100 students. When not used by large groups it provides informal study space as an amenity to the entire campus and is a central feature for creating a welcoming collaborative atmosphere.

Activity Description

Lecture, presentations, student demonstrations, independent study, groups discussion and eating lunch.

Basic Room Parameters

Square Footage	1,000 sf
Occupants	80-100

Proximity Requirements

Adjacencies	Main entry, fabrication lab, demonstration floor area, display areas, collaboration lounge, ideation studio, and health/mother's room.

Casework, Equipment and Furniture

Casework	None
Technology	Sound/Audio system for presentation
	Wireless access points
	Intercom/clock
Equipment	Projector and screen
	Tackable wall surfaces
	White Markerboards
	Digital display monitors
	Display shelving
	(1) teacher podium (smart desk)
Furniture	None

Service Requirements

Lighting	Dimmable lighting (by zone) for presentations
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	None
Finishes	
Floor	No special requirements
Walls	n/a
Ceiling	No special requirements
Openings	
Windows	Exterior views and natural daylight
Relites	n/a
Doors	n/a

Ancillary Space Requirements

None

Other Requirements

None

STUDY ROOMS

General Information

Activity Description

Individual or small group study sessions, tutoring, and faculty meetings.

Basic Room Parameters

Square Footage 140 sf

Occupants 2-8

Proximity Requirements

Adjacencies Labs, classrooms, offices, restrooms, and stairs.

Casework, Equipment and Furniture

Casework	None
Technology	TV monitor
	Sound/Audio system for presentation
	Projector and screen or flat panel monitor to be confirmed during design
	Wireless access points
	Telephone
	Intercom/clock
Equipment	White Markerboards or writable wall surface
	Tack Board or tackable wall surface
Furniture	Conference table
	(8) Chairs

Service Requirements

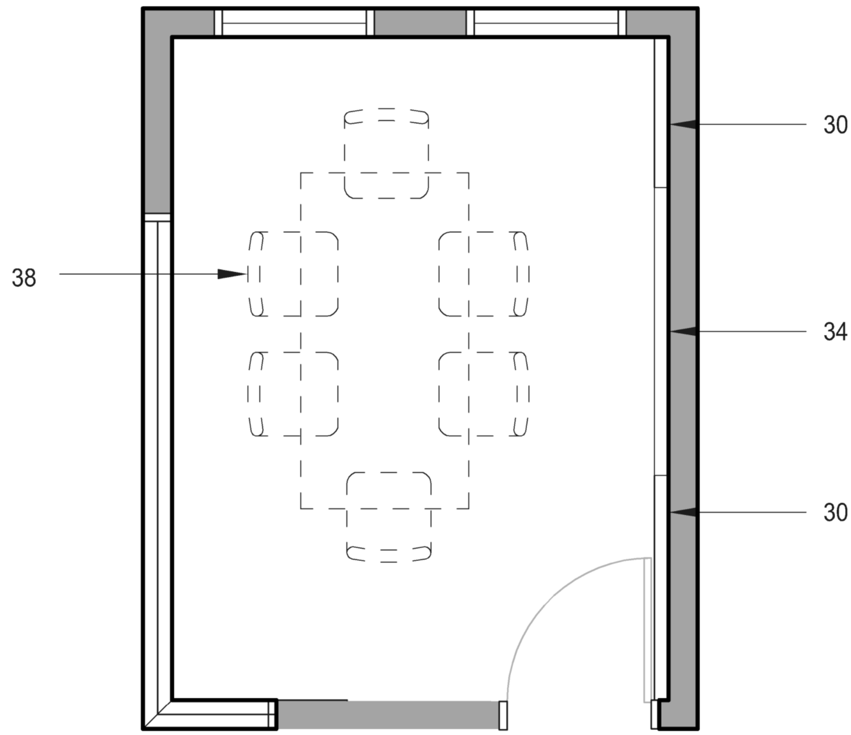
Lighting	Dimmable lighting (by zone) for presentations
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	None
Finishes	
Floor	Carpet
Walls	Painted gypsum wall board (GWB)
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Quality exterior views and natural daylight are required. Meeting LEED daylight credit is desired.
	Operable windows to be determined during design.
Relites	Abundant transparency is needed for passive supervision
Doors	36” wide door(s) as required

Ancillary Space Requirements

None

Other Requirements

None



Study Rooms

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Back to Table of Contents

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BUILDING STORAGE

General Information

The Custodial support spaces in the building are comprised of a central space for working and storage, and custodial closets distributed on each level.

Activity Descriptions

Store equipment and materials used in the daily process of cleaning and maintaining the building in addition to any misc. storage needs in the daily use of the facility. Also supports administrative tasks for the custodial staff.

Basic Room Parameters

Square Footage 400 sf

Occupants 1-4

Proximity Requirements

Adjacencies Field equipment storage, mechanical, electrical, outside access, and fabrication lab

Casework, Equipment and Furniture

Casework None

Technology Wireless access points

Intercom/clock

Equipment Floor scrubbing machines

Vacuums, mops and misc. cleaning equipment

White Markerboards

Tack board

Open, industrial, steel storage racks in main custodial for storage of bulk material

Furniture Desk

File cabinet

Service Requirements

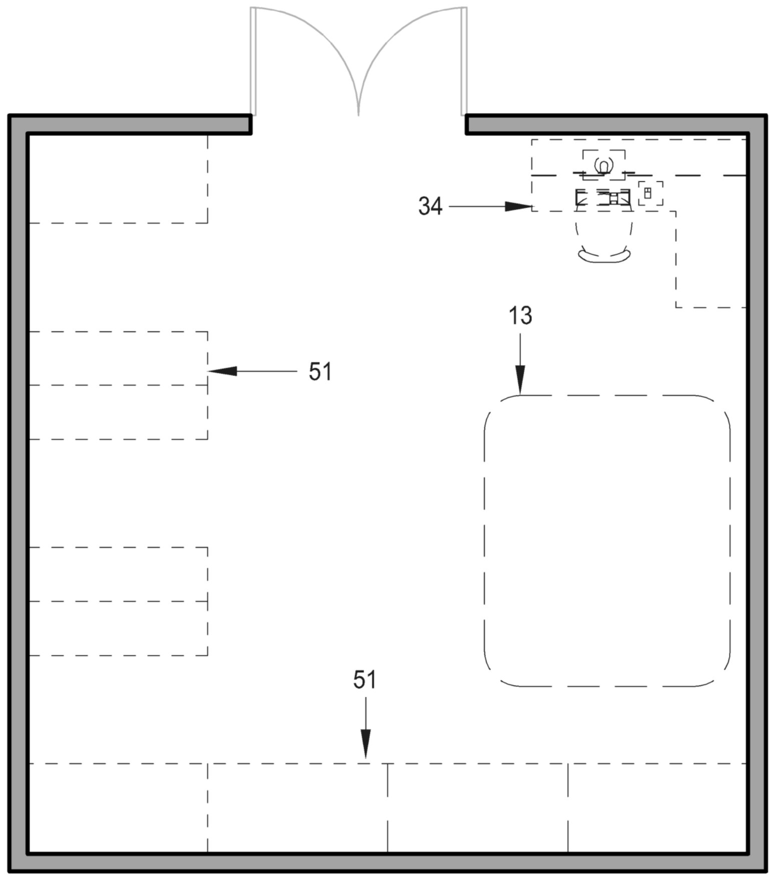
Lighting	No special requirements
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	Mop Sink
Finishes	
Floor	Exposed, sealed concrete
Walls	Washable surfaces
Ceiling	No other requirements
Openings	
Windows	No requirements
Relites	No requirements
Doors	6’ double door should accommodate movement of standard cleaning equipment
	Custodial Closets should swing out of the space to maximize usable floor area for storage of custodial carts

Ancillary Space Requirements

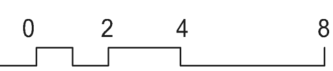
None

Other Requirements

None



Building Storage



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Back to Table of Contents

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FACULTY OFFICES

General Information

Activity Description

The office is used for administrative work by faculty.

Basic Room Parameters

Square Footage 100 sf

Occupants 1-3

Proximity Requirements

Adjacencies Adjunct faculty workstations, shared learning, study rooms, and copy room.

Casework, Equipment and Furniture

Casework None

Technology Sound/Audio system for presentation

Projector and screen or flat panel monitor to be confirmed during design

Wireless access points

Telephone

Intercom/clock

Speakers

Equipment Wireless network access

Intercom/clock

(1) Bookshelf

(1) Small white board

(1) Tack board

Furniture (1) File cabinet

(1) Faculty office desk

(1) Lateral file cabinets with (4) drawers

(1) Pedestal storage

(1) L-shape desk

(2) Guest chairs

Service Requirements

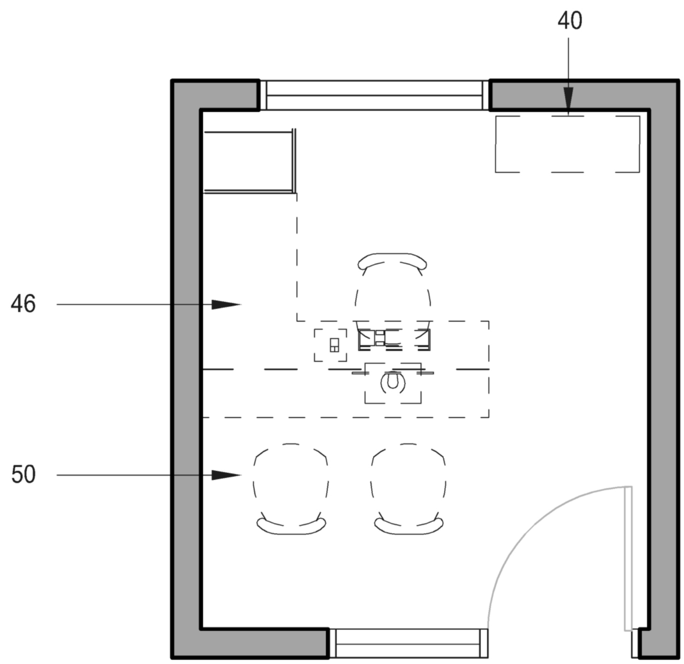
Lighting	Dimmable lighting
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	None
Finishes	
Floor	Carpet
Walls	Painted gypsum wall board (GWB)
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Quality exterior views and natural daylight are required. Meeting LEED daylight credit is desired.
	Operable windows to be determined during design.
Relites	Visual connections to the corridor/ shared learning area
Doors	36” wide door(s) as required

Ancillary Space Requirements

None

Other Requirements

None



Faculty Offices

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51. Shelving

Back to Table of Contents

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ADJUNCT FACULTY WORKSTATIONS

General Information

Activity Description

The workstations are used for administrative work by adjunct faculty.

Basic Room Parameters

Square Footage	65 sf per workstation
Occupants	1-2

Proximity Requirements

Adjacencies	Faculty offices, shared learning, study rooms, and work room.

Casework, Equipment and Furniture

Casework	Bookshelf
Technology	Wireless access points
	Telephone
	Intercom/clock
	Speakers
Equipment	Video projector and screen in main area
	White Markerboard
	Tack boards
Furniture	Lateral file cabinet
	Faculty office desk
	Pedestal storage

Service Requirements

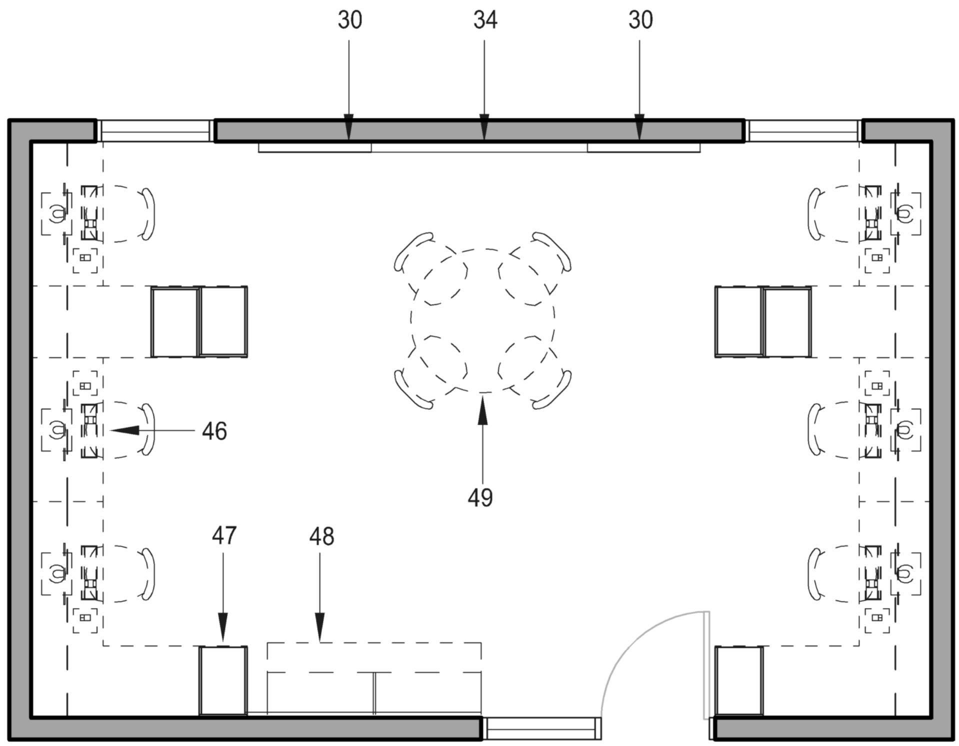
Lighting	Dimmable lighting
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	Drinking fountain/bubbler
Finishes	
Floor	Carpet
Walls	Painted gypsum wall board (GWB)
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Quality exterior views and natural daylight are required. Meeting LEED daylight credit is desired.
	Operable windows to be determined during design.
Relites	Visual connections to the corridor/ shared learning area
Doors	36” wide door(s) as required

Ancillary Space Requirements

None

Other Requirements

None



Adjunct Faculty Workstations

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FURNISHINGS

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Back to Table of Contents

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LAB TECH OFFICE

General Information

Activity Description

The office is used for administrative activities by the lab technician.

Basic Room Parameters

Square Footage 100 sf

Occupants 1

Proximity Requirements

Adjacencies Labs, lab support, and shared learning

Casework, Equipment and Furniture

Casework	None
Technology	Sound/Audio system for presentation
	Projector and screen or flat panel monitor to be confirmed during design
	Wireless access points
	Telephone
	Intercom/clock
	Speakers
Equipment	(1) bookshelf
	(1) small white markerboard
	(1) tack board
Furniture	(1) file cabinet
	(1) Faculty office desk
	(1) lateral file cabinets with (4) drawers
	(1) pedestal storage
	(1) L-shape desk
	(2) guest chairs

Service Requirements

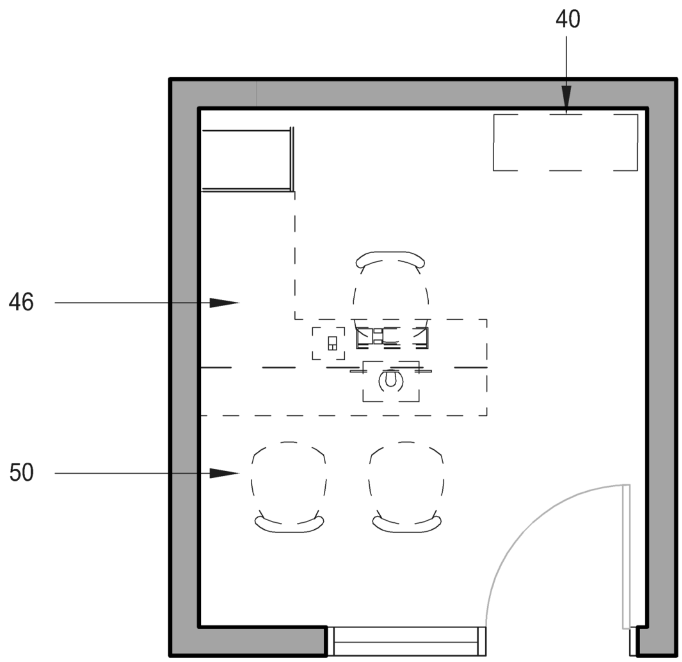
Lighting	Dimmable lighting
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	None
Finishes	
Floor	Carpet
Walls	Painted gypsum wall board (GWB)
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Quality exterior views and natural daylight are required. Meeting LEED daylight credit is desired.
	Operable windows to be determined during design.
Relites	Visual connections to the corridor/ shared learning area
Doors	36” wide door(s) as required

Ancillary Space Requirements

None

Other Requirements

None



Lab Tech Office

FURNISHINGS

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04. Vented Workstation
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Back to Table of Contents

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SMALL WORK ROOM

General Information

Activity Description

The space is used for administers and faculty for making copies.

Basic Room Parameters

Square Footage	100 sf
Occupants	1-3

Proximity Requirements

Adjacencies	Faculty offices and adjunct faculty workstations

Casework, Equipment and Furniture

Casework	(6) linear feet of counter with upper and lower casework
Technology	Wireless access points
	Telephone
	Intercom/clock
	Speakers
Equipment	(1) white markerboard
	(1) tack board
	(1) copy machine
Furniture	None

Service Requirements

Lighting	Dimmable lighting
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	None

Finishes

Floor	Resilient flooring
Walls	Painted gypsum wall board (GWB)
Ceiling	Acoustic ceiling tile (ACT)

Openings

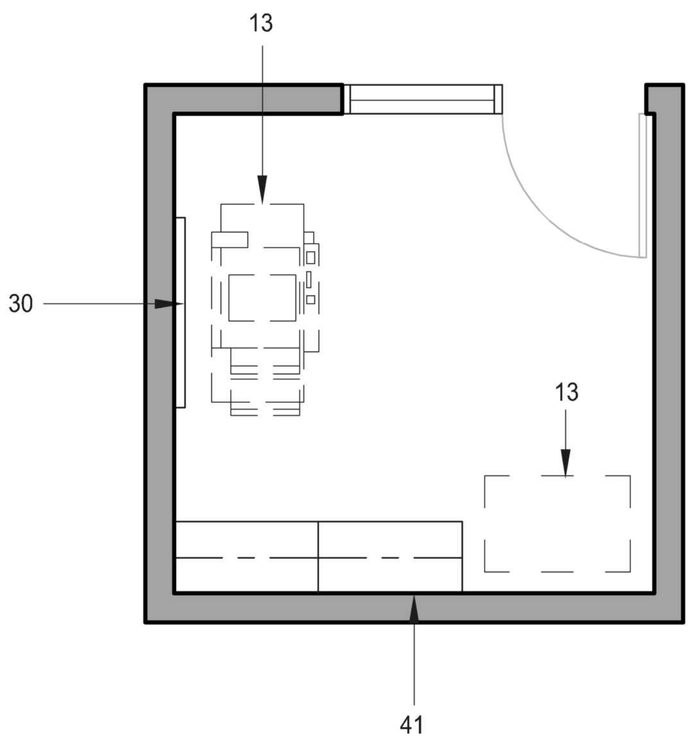
Windows	No special requirements
Relites	No special requirements
Doors	No special requirements

Ancillary Space Requirements

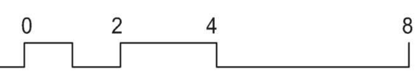
None

Other Requirements

None



Small Workroom



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Back to Table of Contents

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CONFERENCE ROOM

General Information

Activity Description

Formal meeting and prestation's for faculty, deans, community groups and student groups. Tutoring session and spontaneous individual or small group study sessions, and tutoring.

Basic Room Parameters

Square Footage 350 sf

Occupants 12-16

Proximity Requirements

Adjacencies Faculty offices, open workstations and copy room.

Casework, Equipment and Furniture

Casework	(1) Tall storage cabinet
	(6) linear feet of counter with upper and lower casework
Technology	Sound/Audio system for presentation
	Projector and screen or flat panel monitor to be confirmed during design
	Wireless access points
	Telephone
	Intercom/clock
	Speakers
Equipment	Video projector and screen in main area
	TV monitor
	(2) White markerboards
	(1) tack board
Furniture	(1) Conference table
	(16) Chairs
	Service Requirements
Lighting	Dimmable lighting (by zone) for presentations

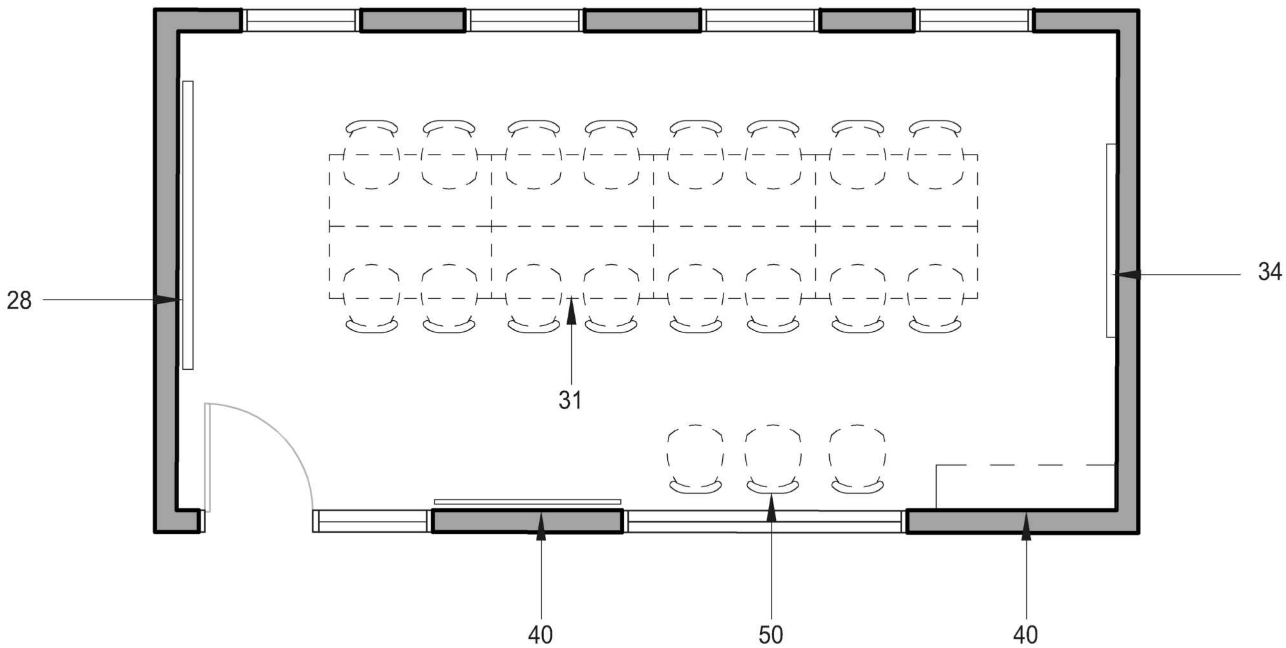
Electrical	Convenience outlets
	Power and data for equipment
HVAC	No special requirements
Plumbing	None
Finishes	
Floor	Carpet
Walls	Painted gypsum wall board (GWB)
Ceiling	Acoustic ceiling tile (ACT)
Openings	
Windows	Quality exterior views and natural daylight are required. Meeting LEED daylight credit is desired.
	Operable windows to be determined during design.
Relites	Visual connections to the corridor/ shared learning area
Doors	36” wide door(s) as required

Ancillary Space Requirements

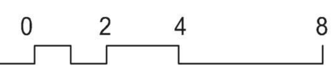
None

Other Requirements

None



Confrence Room



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05. Snorkel Exhaust
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable Storage Cabinet
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Corrosive Cabinet
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. Mobile Teaching Cart
30. Tackboard
31. Mobile Student Desk
32. Balance Table
33. Mobile Bench Workstation
34. A/V Screen
35. Multi-media Projector (Clg. Mtd.)
36. Lattice Rod Assembly
37. Coat/Book Bag Storage Unit
38. Conference Table/ Chairs
39. Mop Sink
40. Mobile Bookshelf
41. Casework
42. Lounge Chairs/ Side Tables
43. Lavatory
44. Baby Changing Station
45. Undercounter Refrigerator
46. Workstation Desk
47. Pedestal Storage
48. Lateral File Cabinet
49. Small Group Table/ Chairs
50. Guest Chair
51. Shelving

Back to Table of Contents

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6.0 APPENDIX B - OPR

Owner Project Requirements – STEM Building

Pierce College Puyallup - STEM Building

August 24, 2020

Table of Contents

INTRODUCTION

The Owner Project Requirements (OPR) document is a tool to be used throughout the project, from predesign through occupancy and operations. It provides a documented description of the criteria that are most important to the Owner to meet their needs as it relates to the new building or systems. It is also used by the Commissioning Authority to evaluate the building during the commissioning process.

The OPR is organized into the seven sections that are required by LEED V4. Additional systems and sections may be added by the Owner as appropriate.

The Basis of Design (BOD) is the documentation of the assumptions used in the design, such as occupancy and use, building code basis, indoor and outdoor design conditions, building envelope materials, heating and cooling loads, noise and vibration criteria, energy use and efficiency goals. The OPR may contain BOD information as a subset. The BOD shall be developed by the design team by the end of design development.

This document is not intended to include every design aspect that is important to the Owner, but as a guide to the thought process to documenting them. The Owner and design team are encouraged to include additional information on equipment or system requirements as appropriate.

The intent of the OPR along with the Predesign document, is to detail the functional requirements of the proposed capital improvement project and the expectations for the building's use and operation. The OPR is considered a "living" document during the design phase of the project, and as such is subject to change as the design progresses. By establishing the project performance goals, the OPR becomes a record by which the Owner, and other parties involved in the project, can judge the degree of success in meeting the Owner's defined objectives and criteria. The Owner's Project Requirements form the basis from which all design, construction, acceptance, and operational decisions are made. The OPR is a document that evolves through each project phase.

This Owner's Project Requirements (OPR) document outlines functional requirements of the project and expectations of how the facility and its systems will be used and operated.
This project will add an approximately 54,400 sf STEM building including all support spaces. There will also be surrounding infrastructure work such as storm drainage, road and parking alterations, and sustainable landscaping.

The Owner will develop and update the OPR through program verification and schematic design, or until the Cx consultant is selected. The Cx consultant will then assume responsibility for refining and augmenting the OPR throughout programming, design, construction, and post-occupancy period of one year following Substantial Completion of construction. As decisions are made during the life of the project, this document shall be updated to reflect the current requirements of the College for the STEM facility. At a minimum this new facility shall conform to the systems and performance of similar buildings and infrastructure on campus.

Owner and User Requirements

Project Information

Owner:	Pierce College Puyallup
Name of Building:	STEM Building
DES Contact:	Chris Gizzi
Owner Contact:	Jeff Schneider, Pierce College Facilities
Pre-Design Architect:	McGranahan Architects
Pre-Design Civil Engineer	AHBL
Pre-Design Landscape	Berger Partnership
Architect	McGranahan Architects
Pre-Design ME:	Notkin Engineers
Pre-Design EE:	Hargis Engineers
Pre-Design SE:	PCS Structural Solutions
Acoustical Engineer:	TBD
LEED Consultant:	O'Brien 360
Commissioning Authority:	Welsh Commissioning Group, Inc.
Other Key Team Members:	Research Facilities Design, Laboratory Planning Services

General Description of Project/Facility

This project will construct a new STEM Building for Pierce College Puyallup, located in Puyallup Washington. This project includes space for instructional laboratories, fabrication spaces, laboratory prep spaces, classrooms, and offices. The project is planned to be delivered via the Progressive Design-Build process.

The building is anticipated to be approximately 54,400 sf per, 3 stories and constructed as a type IIB structure per the 2018 IBC. Project budget and program are outlined in detail in the predesign document.

Project Incentives or Grants

PSE's whole-building rebate program offers incentives at \$5/therm and \$0.3/kWh of first year energy savings. The Owner and Design Team should further explore this program early in the design phase.

Occupancy

Requirements
This project is intended to be an integrative process and delivered via the progressive design-build methodology. During the first stage of the design build process the D/B shall conduct a simple box energy model and water budget to inform design decisions to meet the requirements of the LEED Integrative Process credit.

Operating Hours & Activity
For each unique space type, list the space use or occupant type, the number of occupants (Occ), the hours per day of use (H), Days per week (D), Months per year (M) and Season (S) if applicable.

No.	Space	Space Use Occupant Type	Occ	H	D	M	S

Commissioning

The commissioning scope will include Fundamental Commissioning and Verification, Enhanced Commissioning Option 1, Path2 and Enhanced Commissioning Option 2. The systems to be commissioned include the following:

- Building Envelope Systems
- Plumbing Systems
- HVAC&R Systems
- Electrical Systems
- Metering Systems
- Renewable Energy Systems

Environmental and Sustainability Goals

Indicate environmental and sustainability goals for the project.

The project has the minimum State requirements of achieving LEED v4 Silver Certification. Additional goals to be evaluated include: Net-Zero ready, meet AIA 2030 Building Challenge and LEED Gold.

See Appendix C.4 for preliminary LEED scorecard in the predesign document.

Energy Efficiency Goals

What are the overall energy efficiency goals for the facility? (Amount below code, compared to other owner facilities, obtain LEED points, etc.)

Achieve an EUI of 46.5 Btu/Ft2/Year to meet AIA 2030 Challenge.

Indoor Environmental Quality Requirements

IEQ - Air Quality and Comfort

Identify the specific industry standards or codes that are to be met:

For office areas and normally occupied spaces, ASHRAE 62.1 Ventilation. ASHRAE 55-2004, "Thermal Environmental Conditions for Human Occupancy". 2018 Washington State Energy Code Commercial Provisions. For labs ANSI/AIHA Z9.5, Laboratory Ventilation.

Achieve Improved IAQ point, exceed min by 30%.

Provide a general description of expected air distribution and circulation for heating and for cooling. Ducted or plenum return? Method of inducing outside air? Natural ventilation?

Ducted air distribution including supply, return, outside and exhaust. No natural ventilation. Outside air to be delivered at 100% for lab spaces.

Identify any filtration requirements. (Filter ratings, pre-filtering)

MERV 8 prefilters and MERV 13 post filters. Installed filter assembly to be tested for particulate transmission after construction.

Provide any indoor temperature and humidity requirements. (Space heating set point, Space cooling set points, preferred humidity range)

Identify any areas that will use CO_2 demand ventilation control. Will a minimum damper position or air flow be specified to ensure some level of ventilation even if the CO_2 does not demand it? (Often used where odors may build up).

None for lab areas as they are 100% outside air. As needed for classroom areas to meet code.

Identify specific indoor or outdoor pollutant sources and identify proposed method for managing.

Laboratory activities. 100% outside air to spaces and fume hoods at localized points of activity.

Identify method of managing environmental tobacco smoke:

No smoking allowed in facility.

Other Design Considerations
Identify any other factors or design decisions that would contribute to the indoor air quality and comfort of the building:

Install permanent entryway systems at least 10 feet (3 meters) long in the primary direction of travel to capture dirt and particulates entering the building at regularly used exterior entrances.

Sufficiently exhaust each space where hazardous gases or chemicals may be present or used such as laboratories, prep rooms, the fab lab, and janitorial closets using the exhaust rates determined in LEED EQ Prerequisite Minimum Indoor Air Quality Performance or a minimum of 0.50 cfm per square foot (2.54 l/s per square meter), to create negative pressure with respect to adjacent spaces when the doors to the room are closed. For each of these spaces, provide self-closing doors and deck-to-deck partitions or a hard-lid ceiling.

Low-emitting products: Vet all paints and coatings, insulation, composite wood, flooring, and ceiling products for 100% compliance with LEED VOC content requirements and LEED VOC emissions testing such that at least the minimum threshold for each category (75% - 100%) is achieved.

IEQ - Lighting

Identify the specific industry standards or codes that are to be met:

Illumination Engineering Society of North America, 2018 Washington State Energy Code Commercial Provisions and WAC 246-366-120.

Provide a general description of the lighting system, special lighting needs, anti-glare requirements, use of day lighting.

Lighting will be LED with indirect lighting to be used for ambient lighting within spaces when possible to help reduce glare on computer monitors. Direct lighting to be used to get the higher light levels needed to perform small tasks within labs and office spaces. Any user space that does not have direct sunlight shall consider the use of tunable lighting that has LED boards with a minimum of three colors, so the light quality stays close to the black body curve of natural light. Tunable lighting fixtures shall be compatible with the building network lighting control system.

Lighting control throughout the building to have occupant controlled dimming capability.

Indicate if the exterior lights have to meet reduction in light pollution and how this requirement will be met.

Yes. Design team to determine how requirement will be met.

Other Design Considerations

Identify any other factors or design decisions that would contribute to the indoor lighting quality and comfort of the building:

For at least 90% of individual occupant spaces, provide individual lighting controls that enable occupants to adjust the lighting to suit their individual tasks and preferences, with at least three lighting levels or scenes (on, off, midlevel). Midlevel is 30% to 70% of the maximum illumination level (not including daylight contributions). For all shared multi-occupant spaces, meet all of the following requirements.

- Have in place multizone control systems that enable occupants to adjust the lighting to meet group needs and preferences, with at least three lighting levels or scenes (on, off, midlevel).
- Lighting for any presentation or projection wall must be separately controlled.
- Switches or manual controls must be located in the same space as the controlled luminaires. A person operating the controls must have a direct line of sight to the controlled luminaires.

IEQ - Acoustical

Identify the specific industry standards or codes that are to be met:

NC 45 for lab classroom. 35 NC for classrooms. General concepts to reduce noise transmission between classrooms. 36" in front of hoods NC 50.

Identify specific indoor or outdoor noise sources and identify proposed method for managing.

Primary sources of noise are mechanical equipment and Fabrication LAB.

Separate noisy areas from classroom areas. Construct walls from deck to deck. Insulate classroom walls. Specify NC 35/45 diffusers. Include inertia bases to minimize mechanical noise. Sound insulated duct where needed. Include other measures as necessary and as recommended by the project acoustical engineer.

Project should seek LEED credit for acoustics.

Other Design Considerations

Identify any other factors or design decisions that would contribute to the indoor acoustical quality and comfort of the building:

Do not exceed HVAC Background Noise maximums in the LEED Acoustic Performance credit.

Also meet minimum thresholds for STC or reverberation (choose one) listed in the LEED credit for all applicable room types.

Materials, Systems and Equipment

Expectations

General

Specify products that are environmentally responsible in addition to their primary function. Select products to achieve as many points as possible in the LEED Building Product Disclosure and Optimization credits Environmental product declaration, Sourcing of raw materials, Material ingredients.

Division 03 Concrete

Concrete mixes shall be developed by the contractor and be 3000 psi minimum for footings and 4000 psi minimum for all other concrete. Coarse and fine aggregate shall conform to ASTM C33, cement shall conform to ASTM C150, Type II, aggregate grading 57 or 67. Reinforcing steel shall be ASTM A615 Grade 60 typical. Welded wire reinforcement shall be ASTM A185. Non-shrink grout shall conform to CRF-C621 and ASTM C1107.

Division 04 Masonry

Hollow concrete masonry units (CMU) shall conform to ASTM C90 and shall be grouted solid with 2500 psi grout. Mortar shall be Type S with minimum 1800 psi compressive strength. Reinforcing steel shall be ASTM A615 Grade 60. Brick masonry veneer shall conform to ASTM C652 and shall be anchored to metal stud backing with anchor ties spaced at 16” o.c. each way.

Division 05 Metals

Structural steel frame shall be constructed with wide flange shapes conforming to ASTM A992 (Fy=50 ksi), hollow structural sections conforming to ASTM A500 Grade C (Fy =50 ksi), and other shapes conforming to ASTM A36 (Fy=36 ksi). Bolted connections shall be made with high-strength bolts (ASTM A325). Welded connections shall be made in accordance with “Structural Welding Code” AWS D1.1. Open-web steel joists shall conform to SJI requirements and shall be bidder designed to support loads shown on the drawings. Metal deck for roof and floors shall be formed from steel sheets conforming to ASTM A653. Buckling restrained braces (BRB) shall be designed by the manufacturer to meet stiffness, yield strength and elongation requirements.

AESS shall be designated for exposed to view structural steel members in public areas of the buildings, use the appropriate AESS level based on member type and viewing distance.

Division 06 Wood, Plastic, Comp – not used

See Building Envelope Requirements and Interior Finishes and System Requirements Sections.

Division 07 Thermal & Moisture Protection – not used

See Building Envelope Requirements section below.

Division 08 Openings – not used

See Building Envelope Requirements section below.

Division 09 Finishes – not used

See Building Envelope Requirements and Interior Finishes and System Requirements Sections.

Division 10 Specialties – not used

See Building Envelope Requirements and Interior Finishes and System Requirements Sections.

Division 11 and 12 Equipment and Furnishings

All loose furnishings will be owner provided.

Contractor furnished and installed equipment types (including but not limited to):

- Fume Hoods
- Laboratory and prep room casework and shelving. This includes moveable casework and shelving.
- Storage room shelving and counters.
- Storage systems and shelving
- DI water and gas systems
- Network electronics and MDF/IDF closet equipment
- Whiteboards, tackboards, display cases, toilet partitions, signage, fire extinguishers, bathroom accessories, premanufactured features such as access stairs, rail systems, etc.
- Casework, shelving and countertops
- Window coverings, blinds
- Elevator and associated systems
- Exterior and interior signage to meet the campus signage standards

Owner Furnished, Contractor Installed equipment types. (including but not limited to):

To be determined during design

Owner Furnished, Owner Installed equipment types. (including but not limited to):

- Computers and Office machines
- Telephone handsets
- Moveable furniture (stools, chairs, free standing tables, desks, file cabinets)
- Staff workstations
- Loose laboratory equipment

Division 13 Special Construction – not used

See Building Envelope Requirements and Interior Finishes and System Requirements Sections.

Division 14 Conveying Equipment

Elevators

General
Elevator shall have a service sized cab to accommodate a 7’ long piece of equipment. Verify equipment sizes with Owner early in design phase.

Identify the specific industry standards or codes that are to be met:

ICC/ANSI A117.1-2009
ASME A17.1-2004; A17.1a-2005

Indicate the basic design considerations:

Elevator shall have a service sized cab to accommodate a 7’ long piece of equipment. Review size requirements further with the College during the design phase.

Indicate any requirements for redundant equipment:

Elevator to be on emergency power.

Identify other systems to be integrated with and how integration will be accomplished:

None.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

None.

Other Design Considerations
Identify any other factors or design decisions that would contribute to the system’s capability to meet the Owner’s Project Requirements.

Division 21 Fire Suppression

Fire Sprinkler System

General

Identify the specific industry standards or codes that are to be met:

> 2018 IFC with amendments.

Indicate the basic design considerations:

> The building must be 100% fully sprinkler protected. Dry sprinklers provided at exterior overhangs.

Indicate any requirements for redundant equipment:

> None.

Identify other systems to be integrated with and how integration will be accomplished:

> None.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

> None.

Other Design Considerations

Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

> None.

Division 22 Plumbing

Plumbing Systems

General

Reclaimed water for non-potable lab use, collection of Reverse Osmosis water for reuse, and rainwater harvesting for flushing should be further evaluated.

Identify the specific industry standards or codes that are to be met:

UMC, UPC and ASPE design standards. 2018 Washington State Energy Code Commercial Provisions.

Use low flow fixtures as required to meeting water reduction goals. Review all low flow fixtures with College facilities and maintenance team.

Indicate the utility provider for heating the domestic water:

Puget Sound Energy.

Indicate the basic design considerations:

Hot Water:
Generate hot water at 140°F and distribute through mixing valve and circulator.

Fixtures:
Line volt power automatic fixtures with battery backup or on E power

Piping: Piping shall be copper.

Indicate any requirements for redundant equipment and emergency power operation:

None.

Identify systems the plumbing systems will be integrated with and how integration will be accomplished:

BAS control of DHW circulator.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

None.

Other Design Considerations
Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

Provide as many shutoff valves as feasible to facilitate isolation of zones for maintenance. Particularly at floor changes.

Low or ultra-low flow fixtures will be installed such that at least a 35% reduction in water use from the LEED baseline is achieved.

Division 23 HVAC

HVAC

General

Identify the specific industry standards or codes that are to be met:

IBC, IMC, UPC, ASHRAE, USGBC LEED, 2018 Washington State Energy Code Commercial Provisions. For labs ANSI/AIHA Z9.5, Laboratory Ventilation.

Indicate the type of energy source and utility provider:

Puget Sound Energy for electric. HVAC to be all-electric.

Indicate the basic design considerations beyond the information provided under the section on Indoor Environment Quality:

An all-electric path for a potential net-zero ready building. Ceiling diffuser velocities are to be limited to a ratio of hood face velocity. Hoods to be tested per ASHRAE Standard 110. Fume hood exhaust to have a stack height of 10' per ASHRAE and IMC. Systems shall be designed such that they require limited user input (student/faculty). Provide separate HVAC systems for laboratories, standard teaching and a separate system for the makers space. System to comply with energy code which suggests a decoupled DOAS and FCU system, or a High Performance VAV. Follow ASHRAE 36 control standards. For energy code, have chosen C406: Improved lighting efficiency and improved envelope.

Indicate how the occupants will interface with the systems, adjustability:

None.

Indicate any requirements for redundant equipment and emergency power operation:

Lab safety systems to have redundancy to include fume hoods, chemical storage cabinets, etc. Provide AHUs with fan array and associated backdraft dampers.

Identify systems the HVAC systems will be integrated with and how integration will be accomplished:

BAS controlled. Fire alarm interlock via auxiliary relay.

Identify water and air balance tolerances and balancing standards to be used (NEBB or AABC):

NEBB only +/-10%.

Identify standard equipment safety and protection strategies, freeze protection, glycol use, heat tape, equipment shutdown, high pressure shutdown:

> Glycol system if required by manufacturer, otherwise avoid.
> High duct static pressure shutdown.
> Manual reset freeze stats.
> Heat tape as needed.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

> 5-year for compressors.

Other Design Considerations

Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

> Provide as many shutoff valves as feasible to facilitate isolation of zones for maintenance. Particularly at floor changes.

Division 25 Integrated Automation

Building Automation System

General

Identify the specific industry standards or codes that are to be met

> NEC. 2018 Washington State Energy Code Commercial Provisions. BacNet.

Indicate the design considerations for the control system, protocols (BacNet, Lon Works), compatibility with existing systems, alarm reporting, local access, remote access, printing:

> Initial intent is to continue with JCI, but with their latest system (MUI). Review options for open protocol (BACnet protocol, JACE etc.) with College facilities team for further discussion.

Indicate how the occupants will interface with the systems, adjustability:

> None.

Identify the individuals that will require access to the system including security levels definitions:

> Facilities staff. Commissioning authority.

Identify the requirements for the graphical interface to the BAS, floor plans with room numbers, equipment representation, summary screens, linking, alarm reporting, animation, etc.

> Currently with JCI V5, going to V10 MUI. Match existing general layouts. Design builder can present options for the College to consider alternatives to JCI.

Identify systems the building automation system will be integrated with and how integration will be accomplished:

> Control all HVAC, domestic circulator, supervisory control over lab exhaust valves (Phoenix valves), monitor and trend meters. Trend capacity and functionality to meet energy code and LEED Advanced Energy Metering requirements (3 years data, 15-minute intervals, etc.). Monitor Generator: low fuel, battery alarms and other available points via BacNet or binary inputs.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

> None.

Additional BAS Information:

Indicate in Tables 1 what BAS points are typically not required for executing the sequence of operations but are useful for analysis and are desired by the Owner. Indicate in Table 2 the general alarming strategies for the BAS system.

Other Design Considerations

Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.
Consider metering domestic hot water separately for improved energy management and LEED water metering credit.

Table 1 – BAS Optional Control Point Monitoring

Point	Yes	Applies To:
Electric Power Monitoring	Y	
Phase Monitoring	Y	
Gas Monitoring	Y	
Domestic Water Monitoring	Y	
Irrigation Water Monitoring	Y	
Make-Up Water Monitoring	Y	
Steam Condensate Monitoring		
Other Utility Monitoring		
LEED M&V System	Y	
Supply Air temperature	Y	
Mixed Air temperature	Y	
Return Air temperature	Y	
Enthalpy		
Fan Status	Y	
Valve Position Feedback		
Damper Position Feedback		
Filter Differential Pressure	Y	Analog reading with threshold set point
Furnace Firing Rate Feedback		
Compressor Status	Y	
Chiller Feedback – Status, Alarm, Load		
Boiler Feedback – Status,	Y	

Alarm, Fire Rate		
VSD Feedback – Speed, Hz, Amps, Alarm	Y	
Pump Status	Y	
Loop Temperature	Y	
Humidity		
Elevator sump	Y	
HX EAT and LAT	Y	

Table 2 – BAS Alarm Requirements

Point	Yes	Applies To:
Zone Temperature High or Low	N	
Supply Air temperature High or Low	N	
Mixed Air temperature Low	N	
Fan Failure	Y	
Dirty Filter	Y	
VFD Fault	Y	
Pump Failure	Y	
Boiler Failure	Y	
Chiller Failure		
Loop Temperature High or Low	Y	
Duct Static Pressure High or Low	N	
Building Static Pressure Differentials High or Low	N	
CO2 Level High	N	
CO Level High	N	
Freezer/Cooler Temp		
Sump, sewer, well high/low		

Division 26 Electrical

Electrical – Service and Distribution

General
Identify the specific industry standards or codes that are to be met:

NEC. 2018 Washington State Energy Code Commercial Provisions

Indicate the basic design considerations for power distribution to outlets, building equipment, fixed equipment, lighting and all served devices. Include listing of overall voltage, phase, frequency and power conditioning needs:

Plug control in all classrooms via the lighting control system. A/V system to be shutoff during fire alarm to allow fire alarm to be heard over presentation.

The electrical service shall include capacity and space for future EV charging stations as required by state code. EV stations to be planned for Lot C.

Minimum of 30 watts per SF for overall service.
Open offices – 4 workstations to a circuit.
Enclosed offices – 2 offices per circuit.
Classrooms and Labs –circuits for specific lab and A/V equipment within each room plus a minimum of 3 general purpose receptacles circuits within each room. Spare capacity – 25% spare circuit breakers AND spare capacity within each electrical panel or switchboard.

Indicate any requirements for redundant equipment:

None.

Identify specific electrical system testing that will be required and if an independent testing company will be required on some systems; insulation, panelboards, transformers, grounding, etc.:

None.

Identify systems the power distribution systems will be integrated with and how integration will be accomplished:

Networked lighting controls will control receptacles via network relay modules and utilize time of day functions for normal operating hours and follow emergency lighting operations for after hours.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

None.

Other Design Considerations
Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

Emergency Power

General

Identify the specific industry standards or codes that are to be met:

NEC.

Indicate the basic design considerations:

Generator sized to carry the full design load without using load shedding. Generator shall power the NEC 700, NEC 701, and NEC 702 loads required within the building including but not limited to: Egress lighting, lab fume hoods and makeup are, heating equipment to support makeup air system, BMS system, refrigerators and freezers within lab spaces.

Indicate any metering strategies:

All generator loads are to be metered to meet the system load type required by the 2018 WSEC using branch circuit metering as needed.

Indicate any requirements for redundant equipment:

None

Identify other systems to be integrated with and how integration will be accomplished:

Monitored by BAS.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

Other Design Considerations

Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

Electrical - Lighting and Lighting Control

General

Identify the specific industry standards or codes that are to be met:

Illumination Engineering Society of North America, 2018 Washington State Energy Code Commercial Provisions

Indicate the basic design considerations for lighting, day lighting and lighting control including interior vs. exterior control strategies:

Networked lighting control for the building except offices that don't require daylighting control which will be local OS/VS sensors only. Time clock control. After hours override by occupancy sensors within corridors, hallways, classrooms and labs. Manual controls in electrical and mechanical rooms only.

Network lighting control system to be remotely accessible via the internet to include user a friendly interface to allow schedule changes, overrides, sensor parameter changes, etc.

Indicate occupancy sensor type, technology and delay by space type:

Space Type	Type OS/VS	Technology PIR/DT	Timeout (5-30 min)	Comment
Office	VS	DT	15	Standalone sensor
Restrooms	OS	DT	15	
Storage	OS	PIR	5	DT not needed small space
Classrooms	VS	DT	15	
Labs	VS	DT	15	Time clock override

Occ. Sensor (OS) = Auto-On/Auto-Off, Vacancy Sensor (VS) = Manual-On/Auto-Off
PIR = Passive Infrared, DT = Dual Technology (PIR + Ultrasonic)

Indicate any requirements for redundant equipment and emergency power operation:

Emergency lighting on generator or battery backup within the emergency electrical room. All egress lighting on the floor shall remain on whenever a network occupancy sensor is active.

Indicate how the occupants will interface with the systems, interfaces, graphical interfaces, adjustability:

Wall switches for on/off and dimming control of various zones. Daylight diming will be automatic with no user override beyond what daylight sensor allows.

Identify systems the lighting systems will be integrated with and how integration will be accomplished:

None.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

None.

Other Design Considerations
Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

None.

Renewable Energy Systems (PV Array, Solar Heat, etc.)

General

Identify the specific industry standards or codes that are to be met:

NEC. 2018 Washington State Energy Code Commercial Provisions.

Indicate the basic design considerations for renewable energy systems:

Provide design options for the purposes of meeting Net Zero.

Indicate any requirements for redundant equipment and emergency power operation:

None.

Indicate how the occupants will interface with the systems, interfaces, graphical interfaces, adjustability:

May be made available for educational purposes.

Identify any metering strategies:

Production meter.

Identify systems the renewable energy systems will be integrated with and how integration will be accomplished:

Metering. Education kiosk.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

None.

Other Design Considerations
Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

Utility and Energy Metering

Energy Metering (2015 WSECCP, C409)
Section C409 of the Washington State Energy Code Commercial Provisions, Energy Metering and Energy Consumption Management, delineates the requirements for energy end-use metering to include the following:

Energy sources:
- C409.2.1 Electrical energy
- C409.2.2 Gas and liquid fuel supply energy
- C409.2.3 District energy (steam, chilled water, hot water, etc.)
- C409.2.4 Site-generated renewable energy.

Energy end uses:
- C409.3.1 HVAC system energy use
- C409.3.2 Water heating energy use

Measurement devices, data acquisition system and energy display:

C409.4.1 Meters. Meters and other measurement devices required by this section shall have local displays or be configured to automatically communicate energy data to a data acquisition system. Source meters may be any digital-type meters. Current sensors or flow meters are allowed for end use metering, provided that they have an accuracy of .+/- 5%. All required metering systems and equipment shall provide at least hourly data that is fully integrated into the data acquisition and display system per the requirements of Section C409.

C409.4.2 Data acquisition system. The data acquisition system shall store the data from the required meters and other sensing devices for a minimum of 36 months. For each energy supply and end use category required by C409.2 and C409.3, it shall provide real-time energy consumption data and logged data for any hour, day, month or year.

C409.4.3 Energy display. For each building subject to Section C409.2 and C409.3, either a readily accessible and visible display, or a web page or other electronic document accessible to building management or to a third-party energy data analysis service shall be provided in the building accessible by building operation and management personnel. The display shall graphically provide the current energy consumption rate for each whole building energy source, plus each end use category, as well as the average and peak values for any day, week or year.

Owner Project Requirements – STEM Building

Indicate what systems will be metered and what system will be used to record the measured data (BAS, stand-alone loggers)

End Use	Meter?	Data Acquisition System	Comment
Building gas			
Building electric			
HVAC gas			Not applicable for All-Electric Building*
Boiler gas			Not applicable for All-Electric Building*
Chiller electric			
HVAC electric			
Domestic HW gas			Not applicable for All-Electric Building*
Domestic HW electric			
On-site generation electric			

* D/B team to review and confirm energy use options with College and impacts on sustainable building goals.

Energy Metering (LEED 4.0 - Building-Level Energy Metering Prerequisite)

For the LEED Building-Level Energy Metering Prerequisite, the following energy uses must be metered at the building level at a minimum:

Energy Sources:

- Electrical
- Natural gas
- Chilled water
- Steam
- Fuel oil
- Propane
- Biomass
- Others

Meters provided by the local utility provider may be sufficient to meet these requirements.

Energy consumption must be tracked at one-month intervals at a minimum.

Identify project-specific metering below:

Energy Source	Utility Meter Provided (Y or N)	Utility Meter Adequate (Y or N)	Comment
Building Electrical			
Building Natural Gas			
Chilled Water			
Steam			
Fuel Oil			
Propane			
Biomass			
Others			

Energy Metering
(LEED 4.0 - Advanced Energy Metering Credit and 2018 WSECCP)

Provide energy metering to meet the requirements for LEED 4.0 - Advanced Energy Metering Credit and 2018 WSECCP.

For the LEED Advanced Energy Metering Credit, meters must be installed for the following:

Energy Sources:
- All whole-building energy sources, including the following:
    - Electrical
    - Natural gas
    - Chilled water
    - Steam
    - Fuel oil
    - Propane
    - Biomass
    - Renewable on-site generation (e.g. photovoltaic panels, solar thermal panels, geothermal)
    - Non-renewable on-site generation (e.g. fuel-burning generators)
    - Both inputs and outputs for non-renewable sources shall be metered (e.g. fuel input and electricity output)
- Any individual energy end uses that represent 10% or more of the total annual consumption of the building.

Meter Requirements:
- Meters must be permanently installed
- Meters must record at intervals of one hour or less
- Meters must transmit data to a remote location
- Electricity meters must record both consumption and demand
- Whole-building electricity meters must record power factor, if appropriate
- Data collection system must use a local area network, building automation system, wireless network, or comparable communication infrastructure
- System must be capable of storing all meter data for at least 36 months
- Data must be remotely accessible
- All meters in system must be capable of reporting hourly, daily, monthly, and annual energy use

Minimum building level metering requirements:
- Whole Building Electricity
- Photovoltaic Generation

Minimum end-use metering requirements:
- Plug Load Electricity
- Lighting Electricity
- HVAC Electricity
- Domestic Hot Water Electricity

Identify project-specific metering below:

Energy Source	Source Applies	Data Collection System (type)	Comment
Building Electrical	X		
Building Natural Gas			
Chilled Water			
Steam			
Fuel Oil			
Propane			
Biomass			
Photovoltaic	X		
Solar Thermal			
Geothermal			
Engine Generators			
Others			

Identify project-specific end-uses below:

End Use	Source Applies	Data Collection System (type)	Comment
Plug Load Electrical	X		Lab load assumed to fall under plug load and not process load
Lighting Electrical	X		
HVAC Electrical	X		
HVAC Natural Gas			
Domestic Hot Water Electric	X		
Domestic Hot Water Natural Gas			
Engine Generator Fuel Oil			
Others			

Monitoring-Based Commissioning (LEED 4.0 Credit)

Monitoring-Based Commissioning (MBCx) is the integration of three components: permanent energy monitoring systems, real-time energy analysis, and ongoing commissioning. Ongoing Cx is a component of MBCx but should not be confused with it. When executed independently or without MBCx capabilities, ongoing Cx is a process of discrete functional performance testing and reporting over the lifetime of a building. In comparison, MBCx is an ongoing performance analysis of an operational building that provides real-time equipment performance information to the building operators. In other words, MBCx allows the user to track energy consumption, detect faulty equipment operations, and identify unusual energy or power consumption patterns as they occur.

MBCx can be accomplished via systems submetering, operational points trending, and real-time analyses (such as fault detection and sequence verification). The real-time analyses can be performed by either a service provider or an on-site energy manager who uses software to monitor data from building meters and the building automation system.

Monitoring-Based Commissioning is characterized as using facility data as the primary indicator of building operation. The key elements of MBCx are 1) collection of building data, typically for energy-metering and energy-consuming systems, 2) data analysis through automated Fault Detection and Diagnostics (FDD) with follow-up review, and 3) energy performance tracking using meter data and/or Energy Management Information Systems (EMIS) to identify issues and opportunities.

The EMIS is defined as broad family of tools and services to manage commercial building energy use, also called energy analytics tools. These technologies include, for example, the energy information system, equipment-specific fault detection and diagnostic systems, benchmarking and utility tracking tools, automated system optimization tools, and the building management systems.

Details on specific metering requirements should be consolidated into the OPR section on Energy Metering. Details on specific Building Automation System data trending requirements should be consolidated into the OPR section on Building Automation System.

Indicate if MBCx will be pursued:

Yes.

Indicate if a third-party EMIS or data analytics tool will be used (Examples: Copper Tree (Kaizen), Iconics, SkySpark):

The college intends to pursue MBCx compatible with the existing Johnson Controls BacNet system. Further research and investigation will be performed.

Campus is currently working with JCI on a new EMIS. Deployment was scheduled for spring 2020 but has been delayed. New EMIS should be in place by project completion.

Indicate who is responsible for developing the MBCx plan:

Welsh Commissioning Group, Inc.

Indicate who will be responsible for monitoring the system and taking action to correct any noted issues:

Pierce College Facilities staff.

Division 27 Communications

Telephone and Data

General

See Electrical Design Narrative, under Telecommunications System

Other Design Considerations
Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

Sound Reinforcement

General

See Electrical Design Narrative, under Clock System/ Mass Notification

Division 28 Electric Safety & Security

Fire Alarm

General

Identify the specific industry standards or codes that are to be met:

2018 IFC with amendments.

Indicate the basic design considerations, zoning considerations, type of alarm system, annunciators, devices, monitoring types, local printer, network protocols:

Audio/Visual notification as required by code and connect to campus Notifier network.

Indicate any requirements for redundant equipment:

Fire alarm to be on emergency power.

Identify other systems to be integrated with and how integration will be accomplished:

HVAC as required by code.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

None.

Other Design Considerations
Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

None.

Security and Access Control

General

See Electrical Design Narrative, under Intrusion Detection, Access Control and Security Video Systems

Division 31 Earthwork

Erosion Control

General

Identify the specific industry standards or codes that are to be met:

City of Puyallup City Standards for Public Works Engineering and Construction including Standard Details and Department of Ecology Stormwater Management Manual for Western Washington, latest edition.

Indicate the basic design considerations:

Erosion control measures will include best management practices as part of the design; including silt fences, catch basin protection, sediment traps, and other measures. Existing paved driveways will be utilized for construction access to the site. Construction entrances will be utilized on the site.

Indicate any requirements for redundant equipment:

Inlet sediment protection inserts in catch basins, silt fence, and a temporary sediment pond for removal of sediment from stormwater during construction.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

None.

Other Design Considerations
Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements. If soils are found to be highly silty, fine material may be difficult to remove from sediments and Baker Tank may be necessary.

None.

Earth Moving

General

Identify the specific industry standards or codes that are to be met:

> Puyallup Municipal Code, City of Puyallup City Standards for Public Works Engineering and Construction including Standard Details, and King County Surface Water Design Manual, Chapter 21.14.

Indicate the basic design considerations:

> The design will seek to balance earthwork quantities to the maximum extent feasible. The building finish floor elevation will be set in such a matter to balance earthwork as closely as possible while still providing accessibility. Clean topsoil material will either be reused as part of the project or placed within a designated location on the campus.

Identify other systems to be integrated with and how integration will be accomplished:

> Earth moving excavation will be integrated into the stormwater system for construction of the detention pond.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

> None.

Other Design Considerations
Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

> Existing site soils shall be reused to the maximum extent feasible. The geotechnical investigation and report will determine if existing site soils are suitable for reuse.

Division 32 Exterior Improvements

Asphalt Paving

General

Identify the specific industry standards or codes that are to be met:

> City of Puyallup Municipal Code. Standard Specifications for Road, Bridge, and Municipal Construction, Washington State Department of Transportation and American Public Works Association, Washington State Chapter, latest edition, unless superseded or amended by the City of Puyallup City Standards for Public Works Engineering and Construction.

Indicate the basic design considerations:

> The design will utilize standard WSDOT asphalt mixes for all asphalt paving.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

None.

Other Design Considerations

Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

None

Concrete Paving, Curbs, and Walks

General

Identify the specific industry standards or codes that are to be met:

City of Puyallup Municipal Code. Standard Specifications for Road, Bridge, and Municipal Construction, Washington State Department of Transportation and American Public Works Association, Washington State Chapter, latest edition, unless superseded or amended by the City of Puyallup City Standards for Public Works Engineering and Construction.

Indicate the basic design considerations:

The design shall utilize 4,000 psi concrete for all concrete paving. Sidewalks shall be constructed of cement concrete. The emergency and service vehicle lane shall be constructed of concrete.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

None.

Other Design Considerations

Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

None

Irrigation

General

Identify the specific industry standards or codes that are to be met:

> Reduce the project's landscape water requirement by at least 30% from the calculated baseline for the site's peak watering month. Reductions must be achieved through plant species selection and irrigation system efficiency, as calculated by the Environmental Protection Agency (EPA) WaterSense Water Budget Tool.
>
> All code required landscaping shall have a permanent or temporary irrigation system per industry standards for plant establishment. If temporary irrigation is decided upon, LEED requirements will still be met, and the temporary system will be abandoned after plant establishment.

Indicate the basic design considerations:

> Combined rotor, spray, bubbler and drip zones as appropriate to planting areas.

Indicate any metering strategies:

> Deduct meter for the building system will be used if connected to a domestic supply.

Indicate any requirements for redundant equipment:

> If captured rainwater is used, redundancy for the pump is recommended to extend pump life and improve efficiency

Identify other systems to be integrated with and how integration will be accomplished:

> New irrigation may be fully or partially tied into existing irrigation systems on campus.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

> N/A

Other Design Considerations

Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

Planting

General

Identify the specific industry standards or codes that are to be met:

- All planting design and materials will comply with the City of Puyallup Municipal Code (PMC) Chapter 20.58 and the City of Puyallup Vegetation Management Standards (VMS).
- Between 5%-10% of all paved areas shall be landscaped per PMC 20.58.005.
- Internal parking lot landscaping shall conform to Type IV landscaping standards per VMS.

Indicate the basic design considerations:

- New plantings will be chosen carefully to meet CPTED standards.
- Recommend the use of native and adapted plant material to meet LEED requirements and provide for enhanced ecological value. A minimum of 25% of shrubs and groundcover used will be native to the Puget Sound region per PMC and VMS.
- Recommend plant materials that are easy to maintain and coincide with the College's maintenance standards and Landscape Masterplan.

Indicate any requirements for redundant equipment:

N/A

Identify other systems to be integrated with and how integration will be accomplished:

Planting will be incorporated into any required stormwater facilities as feasible.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

N/A

Other Design Considerations

Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

Division 33 Utilities

Water Distribution

General

Identify the specific industry standards or codes that are to be met:

City of Puyallup Municipal Code. Standard Specifications for Road, Bridge, and Municipal Construction, Washington State Department of Transportation and American Public Works Association, Washington State Chapter, latest edition, unless superseded or amended by the City of Puyallup City Standards for Public Works Engineering and Construction. Washington Department of Health.

Indicate the basic design considerations:

The design will include providing domestic and fire services to the new science building. Two existing water mains are located onsite. In order to provide adequate fire hydrant coverage, a 12-inch water main is proposed to connect to the existing water mains. This new water loop will also provide water and fire protection to an area of undeveloped land north of the site identified in campus master planning documents as a future building site. The project proposes to add four new fire hydrants as part of the water main construction to provide adequate coverage to the new building. New water and fire services will be provided to the building. The fire service will include a post indicator valve, fire department connection, and double detector check valve assembly.

Indicate any metering strategies:

The new science building will have a water meter for the domestic water service line. A fire service meter will be provided if required by the City of Puyallup.

Indicate any requirements for redundant equipment:

None.

Identify other systems to be integrated with and how integration will be accomplished:

None.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

None.

Other Design Considerations

Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

None

Sanitary Sewerage

General

Identify the specific industry standards or codes that are to be met:

Department of Ecology Stormwater Management Manual for Western Washington, latest edition. State of Washington, Department of Ecology manual, Criteria for Sewage Works Design, revised August 2008, as thereafter; and the Standard Specifications for Road, Bridge, and Municipal Construction, Washington State Department of Transportation and American Public Works Association, Washington State Chapter, latest edition, unless superseded or amended by the City of Puyallup City Standards for Public Works Engineering and Construction including Standard Details.

Indicate the basic design considerations:

An existing 8-inch sanitary sewer main is located in the roadway west of the College Center and Arts & Allied Health Buildings within College Way. A new 8-inch sanitary sewer will be provided between the new science building and the existing sanitary sewer. The City of Puyallup requires confirmation that the pump station has adequate capacity for the new building's sewage.

Indicate any metering strategies:

None.

Indicate any requirements for redundant equipment:

None.

Identify other systems to be integrated with and how integration will be accomplished:

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

Other Design Considerations

Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

None.

Storm Utility Drainage Piping

General

Identify the specific industry standards or codes that are to be met:

City of Puyallup Municipal Code. Standard Specifications for Road, Bridge, and Municipal Construction, Washington State Department of Transportation and American Public Works Association, Washington State Chapter, latest edition, unless superseded or amended by the City of Puyallup City Standards for Public Works Engineering and Construction. Department of Ecology Stormwater Management Manual for Western Washington, latest edition.

Indicate the basic design considerations:

Construction of the new science building and parking lot will trigger stormwater improvements, including flow control and water quality. Poor soils are expected onsite and therefore infiltration is not feasible. A detention open pond is the preferred facility for stormwater management due to costs and available land. The City of Puyallup require that a geotechnical engineer confirm on-site infiltration is not feasible. At the new building, a bioretention facility can be provided for educational purposes and water quality in conjunction with an underground detention system. However, the facility won't allow the project to obtain additional stormwater LEED points as the facility would only provide water quality and not infiltration. A bioretention facility will provide stormwater quality treatment for the new parking lot.

Indicate any metering strategies:

None.

Indicate any requirements for redundant equipment:

None.

Identify other systems to be integrated with and how integration will be accomplished:

None.

Identify any special warranty requirements over and beyond the standard one (1) year materials and labor warranty.

None.

Other Design Considerations

Identify any other factors or design decisions that would contribute to the system's capability to meet the Owner's Project Requirements.

An alternative for the new building's stormwater management system for flow control and water quality includes an underground detention facility with a bioretention facility above grade for educational opportunities.

Division 34 Transportation – not used

Building Occupant Operations and Maintenance Personnel Requirements

O&M General Considerations

For each system listed, provide the listed information. Use Key Notes below the table to describe items that will not fit in the table.

1. Indicate the organization or entity that will be responsible for the maintenance and operation of the facility by individual system. This is to include subcontracted work.
2. Indicate any Computerized Maintenance Management Systems (CMMS) utilized by the organization to track and manage maintenance each system
3. Identify standardized equipment identification and labeling conventions for each system, <u>attach detailed list by equipment type as appropriate</u>. Standardized identification assists with in-field identification, maintenance and record keeping.
4. Identify preferred or standardized products, suppliers or services. Standardization is desirable to minimize resources required to maintain systems.
5. Identify any special quality control or testing requirements. There is a trade-off of cost to quality assurance. The more tests, the higher the cost. Example: A backup generator set is sometimes required to be load bank tested on site at 100% design load (added cost) or it could just be tested against the building load (lower cost).
6. Identify any special needs for accessing equipment for maintenance. For example: access doors, no equipment above ceiling tiles, all equipment to be indoors, dedicated rooms for certain equipment, etc.

Maintenance and Operations Information

System	1. Who Maintains	2. CMMS	3. Labeling	4. Standard Products
Building Envelope	(1)	(2)		
Fire Suppression	(1)	(2)	Per code	
Plumbing	(1)	(2)	(5)	
Domestic Hot Water	(1)	(2)	(3) (5)	
HVAC	(1)	(2)	(3) (5) (6)	Phoenix valves
Building Automation	(1)	(2)	(3) (4) (7)	JCI, open to others
Electrical Service & Dist.	(1)	(2)	(3) (4) (6)	
Emergency Power	(1)	(2)	(3) (4)	
Lighting and Control	(1)	(2)	(3) (4)	
Renewable Energy	(1)	(2)		
Metering System	(1)	(2)		
Communications (Structured Cabling)	(1)		(3) (4) (6)	Leviton
Sound Reinforcement	(1)	(2)		Valcom
Fire Alarm	(1)	(2)	(3) (4)	Notifier
Security and Access Cont.	(1)	(2)	(3) (4)	Continental Access (access control), Bosch (intrusion detection)
Irrigation	(1)	(2)		

Key Notes:
(1) PC building maintenance staff with support by contracted services
(2) Direct Line.
(3) For equipment, black plastic with white letters, use same designation as on plans (as may be modified by asset number)
(4) Label panels, machine label control wires at each end
(5) Label pipes, tag valves per district standards.
(6) Mark ceiling tiles with clear labels and black letters.
(7) Final as-built BAS drawings to be laminated in plastic and mounted in BAS panels.

Maintenance and Operations Information (continued)

System	5. Quality Control/Testing	6. Maintenance Access
Plumbing	(1)	(2) (3)
Domestic Hot Water	(1)	(2) (3)
HVAC	(1)	(2) (3)
Building Automation	(1)	(2) (3)
Electrical Service & Dist.	(1)	(2) (3)
Emergency Power	Load bank 4 hours. NFPA 110	(2) (3)
Lighting and Control	(1)	(2) (3)
Renewable Energy	(1)	(2) (3)
Metering System	(1)	(2) (3)

Key Notes:
(1) None beyond typical commissioning.
(2) Meet manufacturer recommendations. Include hatches when equipment above hard ceiling. Pay particular attention to access coordination for fan powered VAV boxes and other equipment requiring regular PM that is located above ceiling tiles.
(3) Equipment and control panels to be located inside mechanical/electrical equipment rooms to the extent feasible.

O&M Training

For each system listed, provide the listed information regarding training. Use Key Notes below the table to describe items that will not fit in the table.

1. Intended Audience – list who the training is intended for.
2. Minimum Training Duration (hours) – minimum expected time for training and if it should be broken up into more than one session.
3. Required Credentials of trainer
4. Off-Site Training – list any factory or other off-site training expected.
5. Video Recording of Training – will videotaping be required, what format
6. Special Production Requirements – interactive DVD, etc.
7. Training Topics – list expected topics to be covered

Training Requirements

System	1. Audience	2. Duration	3. Credentials	4. Off-Site	5. Video	6. Special
Building Envelope	PC Maintenance	2 Hrs	Installing Contractor		Y	
Fire Suppression	PC Maintenance	2 Hrs	Installing Contractor		N	
Plumbing	PC Maintenance	2 Hrs	Installing Contractor		Y	
Domestic Hot Water	PC Maintenance	2 Hrs	Factory Rep		Y	
Lab Systems	PC Maintenance	4 Hrs	Installing Contractor		Y	
HVAC	PC Maintenance	4 Hrs	(2)		Y	
Building Automation	PC Maintenance	4 Hrs	Installing Contractor		Y	
Electrical Service & Dist.	PC Maintenance	4 Hrs	Installing Contractor		Y	
Emergency Power	PC Maintenance	2 Hrs	Factory Rep		Y	
Lighting and Control	PC Maintenance	8 Hrs(1) 4 Hrs	(4) Installing contractor		Y	
Renewable Energy	PC Maintenance	2 Hrs	Factory Rep		Y	
Metering System	PC Maintenance	2 Hrs	Factory Rep		Y	
Communications	PC Maintenance	2 Hrs	Installing Contractor		Y	
Sound Reinforcement						
Fire Alarm	PC Maintenance	2 Hrs	Installing Contractor		Y	
Security and Access Cont.	PC Maintenance	2 Hrs	Installing Contractor		Y	
Irrigation	PC Maintenance	2 Hrs	Installing Contractor		Y	

Key Notes: (1) Sessions to be a maximum of 4 hours.
(2) Installing contractor for basic installations. Factory trained representative for boilers, chillers and air handlers.
(3) Web based also acceptable.
(4) Electrical contractor, factory rep AND lighting control programmer.

Training Requirements (Continued)

System	7. Topics
Building Envelope	Safety considerations including fall protection, slipping, pinch points and broken glass. Location, identification, operation theory, adjustment method and maintenance of all equipment and envelope systems. Provide information specific to the roof membrane type regarding maintenance procedures, safety and foot traffic considerations. Provide information specific to the exterior wall types regarding maintenance, graffiti removal and sealing/coating. Review O&M documentation, special warranties and location of spare materials.
Fire Suppression	Safety considerations including pressurized fluids/gasses, shock hazards and fall protection. Location, identification, operation theory, and maintenance of system components. Explain all features and functions, arming/disarming, sensor types and zoning. Review O&M documentation, special warranties and location of spare materials.
Plumbing	Safety considerations including hot water, pressurized fluids/gasses and flammable gases. Fixture care and use. Faucet cartridge replacement. Emergency shutoffs. Review O&M documentation, special warranties and location of spare materials.
Domestic Hot Water	Safety considerations including hot water, pressurized fluids/gasses and flammable gases. Hot water generator operation, circulation pump operation, hot water tank operation, mixing valve operation, maintenance procedures, set point adjustment. Review O&M documentation, special warranties and location of spare materials.
HVAC	Safety considerations including fall protection, pinch points, rotating machinery, steam, hot water, pressurized fluids/gasses and flammable gases. System overview and equipment-specific operation and maintenance. Operation, energy source, electric source, gas source, safeties, start-up and shut-down, maintenance and emergency operating procedures for all equipment. Review O&M documentation, special warranties and location of spare materials.
Building Automation System	Operation of all features and functions, graphics editing, set point adjustment, schedule changes, override features, trending, maintenance. Operation of metering system. Emergency or shelter-in-place features. System integration features. Occupant interface features. Review O&M documentation, special warranties and location of spare materials.
Electrical Service & Distribution	Safety considerations including shock hazards, arc flash and GFI operation. Location, identification, operation theory, adjustment method and maintenance of all equipment. Emergency vs. regular power sources. Maximum load capabilities. Resetting circuits and GFIs. Review O&M documentation, special warranties and location of spare materials.
Emergency Power	Safety considerations including shock hazards, arc flash and fall protection. Location, identification, operation theory, adjustment method and maintenance of all equipment. Explain general features and what building systems the generator serves. Review O&M documentation, special warranties and location of spare materials.
Lighting & Controls	Safety considerations including shock hazards and tube breakage. Location, identification, operation theory, adjustment method and maintenance of all lights. Emergency vs. regular power operation. Egress lighting. Astrological clock and/or photocell settings for exterior lights. Occupant interface capabilities. Review difference between occupancy and vacancy sensors (auto-on vs. manual-on). Explain the purpose of daylight control and what to expect regarding fixture dimming or switching.
Renewable Energy Systems	Safety considerations including shock hazards, arc flash and fall protection. Location, identification, operation theory, adjustment method and maintenance of all equipment. Explain general features and what building systems the renewable energy serves. Review O&M documentation, special warranties and location of spare materials.
Metering	Safety considerations including shock hazards, arc flash and fall protection. Location, identification, operation theory, calibration, maintenance and areas metered. Review O&M documentation, special warranties and location of spare materials.
Intercom/Clock	Safety considerations including shock hazards and fall protection. Location, identification, operation theory, and maintenance of

	system components. Explain all features and functions, bell schedule programming, clock synchronization and intercom zoning. Review O&M documentation, special warranties and location of spare materials.
Sound Reinforcement	Safety considerations including shock hazards and fall protection. Location, identification, operation theory, and maintenance of system components. Explain all features and functions and what areas are served. Review O&M documentation, special warranties and location of spare materials.
Security & Fire Alarm	Safety considerations including shock hazards and fall protection. Location, identification, operation theory, and maintenance of system components. Explain all features and functions, arming/disarming, sensor types and zoning. Review O&M documentation, special warranties and location of spare materials.
CCTV	Safety considerations including shock hazards and fall protection. Location, identification, operation theory, and maintenance of system components. Explain all features and functions, recording systems, channel selection, remote operation and zoning. Review O&M documentation, special warranties and location of spare materials.
Access Control	Safety considerations including shock hazards and fall protection. Location, identification, operation theory, and maintenance of system components. Explain all features and functions, user access programming, interface operation and zoning. Review O&M documentation, special warranties and location of spare materials.
Irrigation	Safety considerations including pressurized fluids and shock hazard. Location, identification, operation theory, adjustment methods and maintenance of all equipment and heads. Explain general features, zone identification, schedule programming, flow meter, rain gauge and other auxiliary sensors. Review O&M documentation, special warranties and location of spare materials.

Key Notes:

Building Occupant Training Requirements

Training to be provided by PC Maintenance staff as needed.

Occupant Training Requirements

System	Topics
Building Envelope	General safety including pinch points and broken glass. Review operation of windows, locks and operators. Explain relationship between opening windows/doors and the HVAC efficiency and effectiveness.
Fire Suppression	None.
Plumbing	Fixture care and use. Emergency shutoff (custodians)
Domestic Hot Water	None
HVAC	Basic orientation on system type and expectations.
Building Automation System	Review HVAC systems serving occupant spaces and how occupant behavior impacts system operation and efficiencies. Review concept of unoccupied, occupied and manual override. Show how to operate occupant interfaces to system such as thermostat functions/adjustment, wall switches and bypass timers. Emergency or shelter-in-place features.
Electrical Service & Distribution	General safety including shock hazards and GFI operation. Emergency vs. regular power sources. Maximum load capabilities. Resetting circuits and GFIs. Switched receptacles.
Emergency Power	User items on backup power.
Lighting & Controls	Review lighting control operation and how occupant behavior impacts system operation and efficiencies. How to operate occupant interfaces to system such as wall switches, dimmers and timers. Review difference between occupancy and vacancy sensors (auto-on vs. manual-on). Explain the purpose of daylight control and what to expect regarding fixture dimming or switching.
Renewable Energy Systems	Kiosk interface if applicable.
Metering	Kiosk interface if applicable.
Intercom/Clock	Operation and use of all user features and functions.
Sound Reinforcement	Operation and use of all user features and functions.
Security & Fire Alarm	Operation and use of all user features and functions.
CCTV	Operation and use of all user features and functions.
Access Control	Operation and use of all user features and functions.
Irrigation	None.

Systems Manual Components

The Systems Manual is a document that provides the information needed to understand, operate, and maintain the systems and assemblies within a building. It expands the scope of the traditional operating and maintenance documentation and is compiled of multiple documents developed during the commissioning process, such as the Owner's Project Requirements, operation and maintenance manuals, and sequences of operation. In addition to the table below the following items are required by the LEED Fundamental Commissioning prerequisite in a CFR and O+M Plan.

- a sequence of operations for the building;
- the building occupancy schedule;
- equipment run-time schedules;
- setpoints for all HVAC equipment;
- set lighting levels throughout the building;
- minimum outside air requirements;
- any changes in schedules or setpoints for different seasons, days of the week, and times of day;
- a systems narrative describing the mechanical and electrical systems and equipment;
- a preventive maintenance plan for building equipment described in the systems narrative; and;
- a commissioning program that includes periodic commissioning requirements, ongoing commissioning tasks, and continuous tasks for critical facilities.

Owner Project Requirements – STEM Building

The table below lists items that are typically to be included in the Systems Manual as well as optional items that may or may not be included based on Owner preference. Confirm recommended items and identify optional items to be included in the manual. Note that some of the optional items are Owner provided.

Systems Manual Components:

Suggested Content Per ASHRAE & LEED	Recommended or Optional	Required by Owner
Executive Summary	R	
System Narratives	R	
HVAC Zoning Diagram	R	
Building Controls As-built Drawings	R	
Building and Equipment Operating Schedules and Set points	R	
Lighting Controls Zoning Diagram	R	
Lighting Controls Programming	R	
Envelope System Diagrams	R	
Troubleshooting Guide	R	
Maintenance Procedures and Schedules	R	
Recommended Schedule for Sensor Recalibration	R	
Ongoing Optimization Guide (Re-Commissioning Guide)	R	
Owner's Project Requirements	R	
Basis of Design	R	
Testing and Balancing Report	R	
Original Training Records	R	
Project Team Contact Information	R	
Construction Record Documents	O	
Construction Record Specifications	O	
Approved Submittals	O	
Operations and Maintenance Manuals	O	
Warranties	O	
Facility Operating Procedures (e.g. normal, abnormal, emergency) (provided by Owner)	O	
Recommended Operational Record Keeping Procedures (provided by Owner)	O	
Commissioning Report	O	
Janitorial and Cleaning Plans and Procedures	O	
Utility Measurement and Reporting Procedures (provided by Owner)	O	

Equipment and System Expectations

Sustainable Materials
Specify products that are environmentally responsible in addition to their primary function and achieve as many points as possible in the following LEED Building Product Disclosure and Optimization credits:

- Environmental product declaration
- Sourcing of raw materials
- Material ingredients

Building Envelope Requirements

Building Envelope

General

The building envelope shall be designed to endure for at least 50 years. The design and construction shall provide an appropriate level of quality to ensure continued use of the facility over that time period with the application of reasonable preventative maintenance and repairs that would be industry standard.

Specify products that are environmentally responsible in addition to their primary function. Select products to achieve as many points as possible in the LEED Building Product Disclosure and Optimization credits Environmental product declaration, Sourcing of raw materials, Material ingredients.

Please refer to other envelope requirements found in other locations of the OPR.

Goals
The building envelope is crucial to ensuring an energy efficient building. The building envelope or facility's shell includes exterior walls, roof, foundation, doors, windows, dampers, penetrations and other openings. The objectives for the building shell are:

The exterior walls should be compatible with the existing campus buildings in quality, durability, maintainability and appearance. General system expectations include metal stud framing or concrete with cladding on a thermally isolated rainscreen system, cementitious or exterior gyp-sheathing with fluid or self-adhered sheet applied air barrier and high performing continuous exterior insulation. Claddings shall include brick, heavy gauge metal panel systems or equivalent. GWB on the interior sides of exterior walls shall contain no paper facings.

Glazing should be installed to maximize daylight and views to the outdoor environment while being an effective component of an energy efficient envelope and building. The exterior shell of the building should meet or exceed the energy code, meeting or exceeding current codes on infiltration and reduced conductive energy transfer. The envelope will be a critical element in achieving the sustainability goals noted elsewhere in the Predesign and OPR documents.

Roofs are assumed to be low slope with minimum R38 insulation and single ply roofing products that match other buildings on campus. Flashings, fascias and copings shall be a minimum of 20 - gauge prefinished sheet metal. All roofs shall have fall protection where required.

Primary exterior windows and entries shall be anodized aluminum curtainwall or storefront with thermal-break system, 1" insulated glass with high performing shading coefficient equivalent to Solarban 60 typical and Solarban 70 where additional solar control is necessary. Consider the use of a hard coat Low-E coating on the interior of the glass to further enhance the performance of the glazing assemblies.

Exterior utility doors may be painted insulated hollow metal assemblies with thermal breaks. Hardware, card access and keying shall match campus standards.

Exterior Enclosure Thermal Performance Criteria

Identify the specific industry standards or codes that are to be met:

2018 IBC, USGBC LEED 4.0/1, 2018 Washington State Energy Code Commercial Provisions

Envelope UA criteria

Project goal is to exceed code baseline by 15% to maximize energy savings and meet EUI goal See 2018 WSEC section 406.10

Exterior Enclosure Structural Criteria

No special structural design criteria

Roofing Criteria (New)

Identify the specific industry standards or codes that are to be met:

NRCA Roofing and Waterproofing Manual, SMACNA Architectural Sheet Metal Manual

Anticipated Rooftop Traffic – Discuss anticipated amount of traffic (note – if there is any traffic other than maintenance, the surface may be considered a plaza deck, the membrane may be considered waterproofing and any roofing warranty could be voided):

If design proposes an occupied roof deck, roof shall be designed as a plaza deck. The College discourages the use of roof gardens based on prior history.

Chemical Reactions – Identify any exhaust on or near roof except normal building exhaust (note – grease from kitchen exhaust hoods can damage built-up roofs and EPDM roofs):

Ensure roofs are protected from chemical exhaust.

Visibility – Is the roof visible from above by nearby tenants?

Roof is not anticipated to be visible from adjacent buildings. If the roof is visible from adjacent buildings, design roof to be visually appealing and avoid glare and reflections to viewers.

Fire Rating – Identify the fire rating of the roof/ceiling assembly and the flame spread classification of the roof system. Also identify requirements for fire proofing:

No fire ratings anticipated. Fireproofing anticipated around elevator structure.

Expansion Joints and Roof Dividers – Identify joints required in the roof system including building expansion joints and roof area dividers:

None anticipated. Any expansion joints required shall be compatible with the roofing system.

Drain Sizing – Identify building code and industry standard criteria for sizing of drains, gutters, overflows and scuppers:

Meet code requirements of the local jurisdiction.

Exterior Wall Systems (New)

Identify the specific industry standards or codes that are to be met:

PCI Precast Concrete Institute, SMACNA Architectural Sheet Metal Manual.
AAMA (American Architectural Manufacturers Association)
Masonry Institute of Washington, National Masonry Systems Guide, Northwest Edition

Owner's Standards - Identify if Owner has any standard or preference type:

None

Required Reliability – Identify required reliability. Must wall remain intact after a seismic event? Are walls subject to damage or abuse from pedestrians or vehicles? Are walls subject to graffiti?

No special requirements. Masonry or concreter surfaces shall be treated with an anti-graffiti coating.

Air Leakage Criteria – Identify air leakage criteria with the Mechanical Engineer:

Per 2018 Washington State Energy code for allowable air leakage through the building envelope. Mechanical requirements are separate.

Water Leakage Criteria – Identify Owner's tolerance to leaks in relationship to cost. For example, most Owners of warehouses will tolerate a small amount of leaks in exchange for cost savings from single-thickness masonry walls; museums will not tolerate any leaks. Note that no tolerance for leaks increases cost:

No leakage allowed. Balance cost and reliability.

Fire Resistance – Identify required fire rating of exterior walls:

None by owner. Meet code requirements.

Acoustical Performance – Identify requirements for exterior walls to control the passage of sound, either from exterior in or from interior out. Note that building and zoning codes may have requirements for control of sound:

Meet local codes and ordinances.

Exterior Windows, Curtainwall and Storefront Systems

Identify the specific industry standards or codes that are to be met:

AAMA American Architectural Manufacturers Association, SMACNA Architectural Sheet Metal Manual, GANA Glass Association of North America, IGMA Insulating Glass Manufacturers Alliance

Owner's Standards - Identify if Owner has any standard or preference type:

None

Required Reliability – Identify required reliability. Must wall remain intact after a seismic event? Are walls subject to damage or abuse from pedestrians or vehicles? Are walls subject to graffiti?

No special requirements - meet code.

Air Leakage Criteria – Maximum 0.06 CFM/square foot at [1.57] psf as measured by ASTM E283 under laboratory conditions. For most projects select 6.24 or 10 psf. For buildings up to 15 stories 12 psf will be adequate. Coordinate air leakage criteria with the Mechanical Engineer:

Meet energy code requirements

Water Leakage Criteria – No leaks at a static pressure of [6.24] psf as measured by ASTM E331 test under laboratory conditions. No leaks under dynamic loading under AAMA 501.1 or ASTM E1105 Require window water test for at least one curtain wall and one storefront, testing per ASTM E 1105, pressure at 4.18 psf.

Slabs-on-Grade

Flatness - Identify criteria for flatness of slabs-on-grade as required for intended use:

Meet requirements for specified flooring. At ground concrete slabs, FF= 50 and FL= 25

Waterproofing - Determine if waterproofing is required based on geotechnical survey. Coordinate requirements for waterproofing with the Structural Engineer:

Required at elevator pit. Install per geotechnical engineer recommendations
Underslab drainage will likely be require, follow recommendations of geotechnical engineer.

Required Reliability – Identify required reliability. Will below slab systems be covered by functions making future access difficult? What is the slab finish, function of the enclosed space and the value of the contents?

No special requirements.

Water Leakage Criteria – Identify Owners tolerance to leaks in relationship to cost:

No special requirements. Building Envelope shall not leak.

Vapor Control – Identify criteria for need of control of vapor based on interior function and finish. Typically, a vapor retarder below slabs on grade is good practice unless no finish is required or foreseeable:

> Provide standard under slab vapor retarder or other vapor control layers as recommended by the geotechnical engineer

Interior Finishes and System Requirements

General

Interior finishes should be selected with aesthetics and quality in mind while still meeting campus standards and requirements for lab related spaces. Specify products that are environmentally responsible in addition to their primary function. Select products to achieve as many points as possible in the LEED Building Product Disclosure and Optimization credits Environmental product declaration, Sourcing of raw materials, Material ingredients.

Floors – Wet Lab floors should be welded seam resilient sheet flooring with a self-cove base. Dry labs shall be sealed concrete or other resilient sheet flooring. Office/Conference/collaborative areas to have commercial grade carpet tiles. Carpet adhesives to be non-toxic, low odor and low VOC. At non wet lab room conditions wall base shall be rubber or other easily maintainable resilient material. Public and circulation areas shall be resilient accent base or rubber base. Restroom floors to be non - slip porcelain ceramic floor tile on thin-set mortar and tile base.

Walls – All occupied room walls to typically be 5/8" Type "X" GWB with level 4 finish if exposed to view or level 5 finish if dark paint is used or at feature walls lit by natural daylight. Public spaces shall be a combination of GWB and accent material(s). Restroom walls to be tile finish to minimum of 7' high. Provide proper backing on tile walls. Walls shall meet or exceed the acoustical requirements of similar room types and spaces on campus. Interior door systems shall be aluminum or painted 1" wide hollow metal assemblies. Doors shall be solid core wood veneer doors, fire rated and labeled where required. All interior glass shall be safety or tempered glass.

Ceilings – All occupied room ceilings to include acoustical material, GWB, exposed structure or other combination to meet the acoustical and finish requirements. Wet Lab and prep spaces and restrooms shall have additional moisture control and cleanability requirements. Restroom ceilings to be 5/8" GWB. Storage and utility areas ceilings may be left open to structure as long as room walls are sealed to underside of roof or floor deck above.

Appendix 1 – Project Design Criteria

The project will be designed to Local, State, Federal codes that apply. These codes include but are not limited to:

City of Puyallup latest codes and local amendments
State of Washington codes and amendments, as adopted by the Washington State Legislature.
Federal Codes including ADA & OSHA, National Fire Protection Association (NFPA) Codes, Standards and Recommended Practices,
American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc (ASHRAE) standards, handbook series, and recommendations and
All applicable IBC codes and amendments.

Appendix 2 – LEED Scorecard

See Appendix C.4 in the Predesign document.

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6.0 APPENDIX C - PREDESIGN CHECKLIST AND OUTLINE

1. LIFE CYCLE COST MODEL
2. DAHP LETTER AND TRIBAL REVIEW LETTER
3. CAMPUS MASTER PLAN
4. SUSTAINABILITY NARRATIVE AND LEED CHECKLIST
5. GREENHOUSE REDUCTION PLAN
6. COST ESTIMATE
7. C-100 COST ESTIMATE
8. LANDSCAPE NARRATIVE
9. CIVIL NARRATIVE
10. STRUCTURAL NARRATIVE
11. MECHANICAL NARRATIVE
12. ELECTRICAL AND TELECOMMUNICATIONS NARRATIVE
13. FABLAB PROGRAMMING HOMEWORK

1. life cycle cost model

Project and Existing Facility Information Sheet

*	***Requires a user input***	*Green Cell*	*= Value can be entered by user.*	*Yellow Cell*	*= Calculated value.*

*	**Agency**	Pierce College Puyallup
*	**Project Title**	STEM Building

*	**Date of Analysis:**	**7/10/2020**

	Analysis Period	
*	Years of Analysis (If not 30 or 50)	**20**

Existing Facility Description	Project is a new building

	Existing Lease Information	**Lease 1**	**Lease 2**	**Lease 3**	**Lease 4**	**Lease 5**	**Lease 6**	**Total**
	Existing Square Feet							-
	Lease Start Date / Last Lease Increase							
	Lease End Date							
	Lease Rate per Month							$ -
	Lease Rate per SF per Year at End Date							
	Additional Operating Costs per Month	$ -						$ -
	Total Lease Costs per Month							$ -
*	Persons Relocating							-
	SF per Person Calculated							
	Estimated Lease Renewal Rate - 5 Year							$ -

Lease Option 1 Information Sheet

*	***Requires a user input***	*Green Cell*	*= Value can be entered by user.*	*Yellow Cell* *= Calculated value.*

*	**New Lease Option 1 Description**	Move STEM Related Programs to an off site leased space suitable for programatic requirements.

	New Lease Information		
*	Lease Location	Puyallup	Market Area: Pierce County
*	Lease Square Feet Type	Gross	
*	New Facility Square Feet	54,400	
*	New Lease Start Date	9/1/2023	
	SF per Person Calculated		

	New Lease Costs	**Years of Term**	**Rate / SF / Year**	**Rate / Month**	**Adjusted to FS Rate**	**Total FS Rate / Month**	**Estimated FSG Market Rate**	**Estimated FSG Rate / Month**	**Real Estate Transaction Fees for Term**
*	Years 1 - 5	5				$ 210,808	$ 46.50	$ 210,808	$ 294,662
	Years 6 - 10	5				$ 245,811	$ 54.22	$ 245,811	$ 173,583
	Years 11 - 15	5				$ 286,626	$ 63.23	$ 286,626	$ 204,195
	Years 16 - 20	5				$ 334,218	$ 73.72	$ 334,218	$ 239,889
	Years								
	Total Length of Lease	20							$ 912,330
	Transaction Fee for first 5 Years	2.50%	*of total rent for first 5 years of term*						
	Transaction Fee for Additional Years	1.25%	*of total rent for term beyond 5 years*						

Note: Real estate transaction fees calculated on base lease - not full service rate including added services and utilities.

Added Services	New Lease Operating Costs (Starting in current year)	Known Cost / SF / Year	Estimated Cost / SF / Year in 2023 - Gross	Total Cost / Year	Cost / Month	*Escalated to lease start date*
☑	Energy (Electricity, Natural Gas)	$ -	$ 1.24	$ 67,374	$ 5,615	
☑	Janitorial Services	$ -	$ 1.56	$ 85,035	$ 7,086	
☑	Utilities (Water, Sewer, & Garbage)	$ -	$ 0.67	$ 36,631	$ 3,053	
☑	Grounds	$ -	$ 0.07	$ 3,925	$ 327	
☑	Pest Control	$ -	$ 0.13	$ 7,195	$ 600	
☑	Security	$ -	$ 0.10	$ 5,233	$ 436	
☐	Maintenance and Repair	$ -	$0.00	$ -	$ -	
☐	Management	$ -	$0.00	$ -	$ -	
☐	Road Clearance	$ -	$0.00	$ -	$ -	
☐	Telecom	$ -	$0.00	$ -	$ -	
	Additional Parking	$ -	$ -	$ -	$ -	
	Other	$ -	$ -	$ -	$ -	
	Total Operating Costs	**$ -**	**$ 3.78**	**$ 205,393**	**$ 17,116**	

	New Lease One Time Costs	Current Estimate	Calculated (for reference)	
*	Real Estate Transaction Fees	$ 912,330	$ 912,330	*Per Std %*
*	Tenant Improvements	$ 9,500,000	$ 816,000	*$174.63 per SF*
*	IT Infrastructure	$ 850,000	$ -	
*	Furniture Costs	$ 1,500,000	$ -	
*	Building Security and Access Systems			
*	Moving Vendor and Supplies	$ 200,000	$ -	
	Other / Incentive			
	Total	$ 12,962,330	$ 1,728,330	

Biennium Budget Impacts for New Lease	Biennium Time Period Start	Finish	Existing Lease Option	New Lease Option 1	Biennium Impact:
21-23 Biennium Lease Expenditure	7/1/2021	6/30/2023	$ -	$ -	$ -
23-25 Biennium Lease Expenditure	7/1/2023	6/30/2025	$ -	$ 17,600,102	$ 17,600,102
25-27 Biennium Lease Expenditure	7/1/2025	6/30/2027	$ -	$ 5,059,387	$ 5,059,387
27-29 Biennium Lease Expenditure	7/1/2027	6/30/2029	$ -	$ 5,409,419	$ 5,409,419
29-31 Biennium Lease Expenditure	7/1/2029	6/30/2031	$ -	$ 5,899,463	$ 5,899,463

Ownership Option 1 Information Sheet

*	***Requires a user input***	*Green Cell*	*= Value can be entered by user.*	*Yellow Cell*	*= Calculated value.*

*	**Project Description**	Construct new STEM Building on the Puyallup Campus
*	**Construction or Purchase/Remodel**	Construction
*	**Project Location**	Puyallup — Market Area = Pierce County

	Statistics	
*	Gross Sq Ft	54,400
*	Usable Sq Ft	40,825
	Space Efficiency	75%
	Estimated Acres Needed	3.00
	MACC Cost per Sq Ft	$562.24
	Estimated Total Project Costs per Sq Ft	$746.31
	Escalated MACC Cost per Sq Ft	$616.52
	Escalated Total Project Costs per Sq Ft	$818.36

*	**Move In Date**	9/1/2023

Interim Lease Information	**Start Date**
Lease Start Date	
Length of Lease (in months)	
Square Feet (holdover/temp lease)	
Lease Rate- Full Serviced ($/SF/Year)	
One Time Costs (if double move)	

	Construction Cost Estimates (See Capital Budget System For Detail)			
		Known Costs	Estimated Costs	Cost to Use
	Acquisition Costs Total	$ 0	$ 750,000	$ 0
A & E	**Consultant Services**			
A & E	A & E Fee Percentage (if services not specified)	6.84%	6.55% Std	6.84%
A & E	Pre-Schematic Design services	$ 296,929		
A & E	Construction Documents			
A & E	Extra Services	$ 290,332		
A & E	Other Services	$ 212,320		
A & E	Design Services Contingency	$ 40,843		
A & E	**Consultant Services Total**	$ 840,424	$ 3,823,204	$ 840,424
	Construction Contracts			
MACC	Site Work	$ 2,289,738		
MACC	Related Project Costs	$ 4,811,010		
MACC	Facility Construction	$ 23,484,882		
	MACC SubTotal	$ 30,585,630	$ 16,320,000	$ 30,585,630
	Construction Contingency (5% default)	$ 1,290,650	$ 1,529,282	$ 1,290,650
	Non Taxable Items			$ -
	Sales Tax	$ 3,155,752	$ 2,875,049	$ 3,155,752
	Construction Additional Items Total	$ 4,446,402	$ 4,404,331	$ 4,446,402
	Equipment			
	Equipment	$ 2,635,676		
	Non Taxable Items			
	Sales Tax	$ 260,932		
	Equipment Total	$ 2,896,608		$ 2,896,608
	Art Work Total	$ 201,985	$ 152,928	$ 201,985
	Other Costs			
	Other Construction services, LEED, Testing, CX etc	$ 422,861		
	Parking Mitigation	$ 939,690		
	Other Costs Total	$ 1,362,551		$ 1,362,551
	Project Management Total	$ 265,400		$ 265,400
	Grand Total Project Cost	**$ 40,599,000**	**$ 25,450,463**	**$ 40,599,000**

Construction One Time Project Costs			
One Time Costs	**Estimate**	**Calculated**	
Moving Vendor and Supplies		$ -	*$205 / Person in FY09*
Other (not covered in construction)			
Total	$ -	$ -	

Added Services	Ongoing Building Costs				
	New Building Operating Costs	Known Cost /GSF/ 2023	Estimated Cost /GSF/ 2023	Total Cost / Year	Cost / Month
☑	Energy (Electricity. Natural Gas)	$ -	$ 1.24	$ 67,374	$ 5,615
☑	Janitorial Services	$ -	$ 1.56	$ 85,035	$ 7,086
☑	Utilities (Water, Sewer, & Garbage)	$ -	$ 0.67	$ 36,631	$ 3,053
☑	Grounds	$ -	$ 0.07	$ 3,925	$ 327
☐	Pest Control	$ -	$0.00	$ -	$ -
☑	Security	$ -	$ 0.10	$ 5,233	$ 436
☑	Maintenance and Repair	$ -	$ 6.48	$ 352,570	$ 29,381
☑	Management	$ -	$ 0.57	$ 30,744	$ 2,562
☐	Road Clearance	$ -	$0.00	$ -	$ -
☐	Telecom	$ -	$0.00	$ -	$ -
	Additional Parking	$ -	$ -	$ -	$ -
	Other	$ -	$ -	$ -	$ -
	Total Operating Costs	**$ -**	**$ 10.69**	**$ 581,511**	**$ 48,459**

Life Cycle Cost Analysis - Project Summary

Agency	Pierce College Puyallup
Project Title	STEM Building

Existing Description	Project is a new building

Lease Option 1 Description	Move STEM Related Programs to an off site leased space suitable for programatic requirements.

Lease Option 2 Description	

Ownership Option 1 Description	Construct new STEM Building on the Puyallup Campus

Ownership Option 2 Description	

Ownership Option 3 Description	

Lease Options Information	**Existing Lease**	**Lease Option 1**	**Lease Option 2**
Total Rentable Square Feet	-	54,400	-
Annual Lease Cost (Initial Term of Lease)	$ -	$ 2,529,694	$ -
Full Service Cost/SF (Initial Term of Lease)	$ -	$ 46.50	$ -
Occupancy Date	n/a	9/1/2023	
Project Initial Costs	n/a	$ 12,962,330	$ -
Persons Relocating	-	-	-
RSF/Person Calculated			

Ownership Information	**Ownership 1**	**Ownership 2**	**Ownership 3**
Total Gross Square Feet	54,400	-	-
Total Rentable Square Feet	40,825	-	-
Occupancy Date	9/1/2023		
Initial Project Costs	$ -	$ -	$ -
Est Construction TPC ($/GSF)	$ 818	$ -	$ -
RSF/Person Calculated	-	-	-

Financial Analysis of Options

	Display Option?	No	Yes	No	Yes	No	No	No	No	No	No	No	No	No	No	No
	Financial Comparisons	**Existing Lease**	**Lease 1**	**Lease 2**	**Ownership 1**				**Ownership 2**				**Ownership 3**			
Years	**Financing Means**	**Current**	**Current**	**Current**	**GO Bond**	**COP**	**COP Deferred ***	**63-20**	**GO Bond**	**COP**	**COP Deferred**	**63-20**	**GO Bond**	**COP**	**COP Deferred**	**63-20**
20	20 Year Cumulative Cash		$ 69,588,880		$ 62,547,642											
	20 Year Net Present Value		$ 66,034,628		$ 59,157,774											
	Lowest Cost Option (Analysis Period)		**2**		**1**											

The best NPV result for the 20 year analysis period is the Ownership 1 option using GO Bond financing. This option becomes the best financial alternative in 2023.

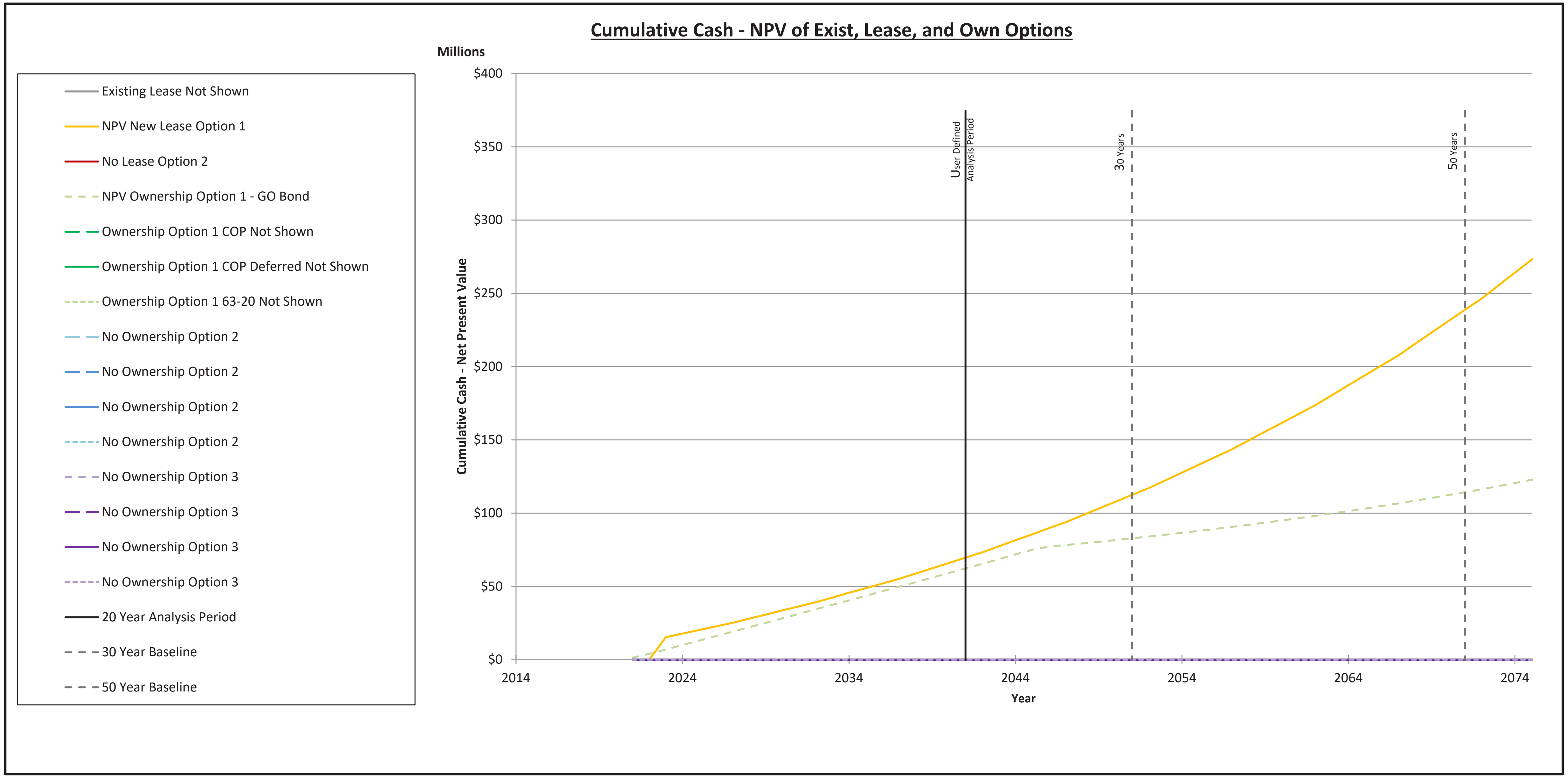
	Financial Comparisons	**Existing Lease**	**Lease 1**	**Lease 2**	**Ownership 1**				**Ownership 2**				**Ownership 3**			
Years	**Financing Means**	**Current**	**Current**	**Current**	**GO Bond**	**COP**	**COP Deferred ***	**63-20**	**GO Bond**	**COP**	**COP Deferred**	**63-20**	**GO Bond**	**COP**	**COP Deferred**	**63-20**
30	30 Year Cumulative Cash		$ 117,352,084		$ 88,050,778											
	30 Year Net Present Value		$ 107,801,657		$ 81,618,394											
	Lowest Cost Option (30 Years)		**2**		**1**											

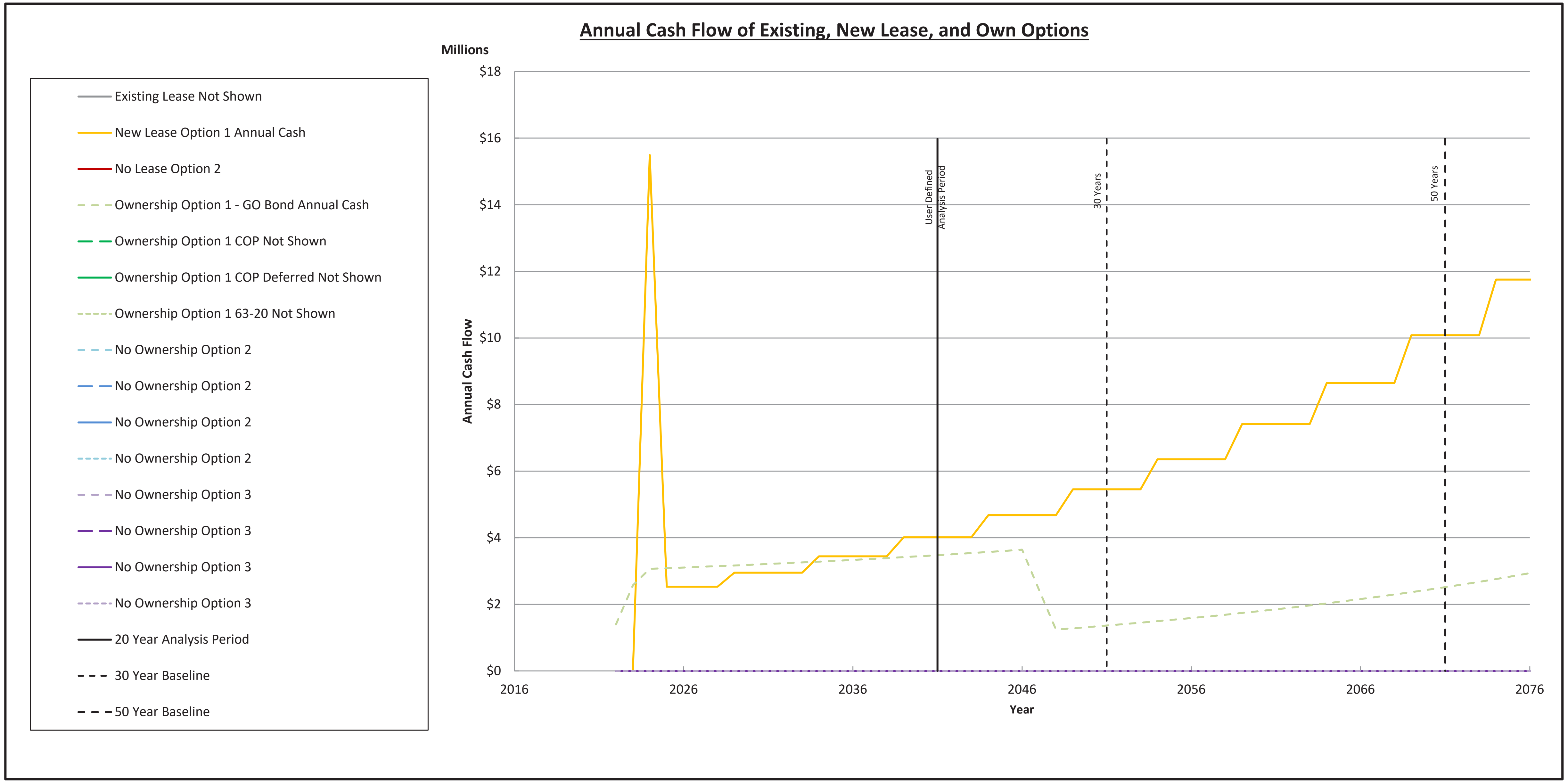
The best NPV result for the 30 year analysis period is the Ownership 1 option using GO Bond financing. This option becomes the best financial alternative in 2023.

	Financial Comparisons	**Existing Lease**	**Lease 1**	**Lease 2**	**Ownership 1**				**Ownership 2**				**Ownership 3**			
Years	**Financing Means**	**Current**	**Current**	**Current**	**GO Bond**	**COP**	**COP Deferred ***	**63-20**	**GO Bond**	**COP**	**COP Deferred**	**63-20**	**GO Bond**	**COP**	**COP Deferred**	**63-20**
50	50 Year Cumulative Cash		$ 270,591,746		$ 126,217,202											
	50 Year Net Present Value		$ 231,069,062		$ 112,324,046											
	Lowest Cost Option (50 Years)		**2**		**1**											

The best NPV result for the 50 year analysis period is the Ownership 1 option using GO Bond financing. This option becomes the best financial alternative in 2023.

** - Defers payment on principle for 2 years while the building is being constructed. See instructions on Capitalized Interest.*


Cumulative Cash - NPV of Exist, Lease, and Own Options
Millions
Existing Lease Not Shown
NPV New Lease Option 1
No Lease Option 2
NPV Ownership Option 1 - GO Bond
Ownership Option 1 COP Not Shown
Ownership Option 1 COP Deferred Not Shown
Ownership Option 1 63-20 Not Shown
No Ownership Option 2
No Ownership Option 2
No Ownership Option 2
No Ownership Option 2
No Ownership Option 3
No Ownership Option 3
No Ownership Option 3
No Ownership Option 3
20 Year Analysis Period
30 Year Baseline
50 Year Baseline
$400
$350
$300
$250
$200
$150
$100
$50
$0
Cumulative Cash - Net Present Value
User Defined Analysis Period
30 Years
50 Years
2014
2024
2034
2044
2054
2064
2074
Year


Annual Cash Flow of Existing, New Lease, and Own Options
Existing Lease Not Shown
New Lease Option 1 Annual Cash
No Lease Option 2
Ownership Option 1 - GO Bond Annual Cash
Ownership Option 1 COP Not Shown
Ownership Option 1 COP Deferred Not Shown
Ownership Option 1 63-20 Not Shown
No Ownership Option 2
No Ownership Option 2
No Ownership Option 2
No Ownership Option 2
No Ownership Option 3
No Ownership Option 3
No Ownership Option 3
No Ownership Option 3
20 Year Analysis Period
30 Year Baseline
50 Year Baseline
Millions
$18
$16
$14
$12
$10
$8
$6
$4
$2
$0
Annual Cash Flow
User Defined Analysis Period
30 Years
50 Years
2016
2026
2036
2046
2056
2066
2076
Year

Financial Assumptions

Date of Life Cycle Cost Analysis:	7/10/2020
Analysis Period Start Date	9/1/2021
User Input Years of Analysis	20

All assumptions subject to change to reflect updated costs and conditions.

	Lease Options			Ownership Option 1			Ownership Option 2			Ownership Option 3		
	Existing Lease	**Lease Option 1**	**Lease Option 2**	**GO Bond**	**COP**	**63-20**	**GO Bond**	**COP**	**63-20**	**GO Bond**	**COP**	**63-20**
Inflation / Interest Rate	3.120%	3.120%	3.120%	3.540%	3.670%	3.670%	3.540%	3.720%	3.720%	3.540%	3.720%	3.720%
Discount Rate	0.533%	0.533%	0.533%	0.533%	0.533%	0.533%	0.533%	0.533%	0.533%	0.533%	0.533%	0.533%
Length of Financing	N/A	N/A	N/A	25	25	25	25	25	25	25	25	25

See Financial Assumptions tab for more detailed information

COP Deferred and 63-20 Financing defer the payment on principle until construction completion.

New Lease Assumptions

Real Estate Transaction fees are 2.5% of the lease for the first 5 years and 1.25% for each year thereafter in the initial term of the lease.

Tenant Improvements are estimated at $174.63 per rentable square foot.

IT infrastructure is typically estimated at $350 per person.

Furniture costs are typically estimated at $500 per person and do not include new workstations.

Moving Vendor and Supplies are typically estimated at $205 per person.

Default Ownership Options Assumptions

Assumes a 2 month lease to move-in overlap period for outfitting building and relocation.

Assumes surface parking.

The floor plate of the construction option office building is 25,000 gross square feet.

The estimated total project cost for construction is $420.00 per square foot.

See the Capital Construction Defaults tab for more construction assumptions.

Back to Table of Contents

2. DAHP letter and tribal review letter

November 21, 2013

Mr. Jim Taylor
Pierce College
9401 Farwest Drive SW
Lakewood, Washington 98498

Re: Pierce College New Building Project
Log No: 112113-04-OSPI

Dear Mr. Taylor:

Thank you for contacting our department pursuant to Executive Order 05-05. We have reviewed the materials you provided for the proposed Pierce College New Building Project on the Puyallup Campus, Pierce County, Washington.

We concur with the determination of no cultural resource impacts.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of Executive Order 05-05

In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and the concerned tribes and this department notified.

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 586-3080
email: *rob.whitlam@dahp.wa.gov*

Nisqually Indian Tribe
4820 She-Nah-Num Dr. S.E.
Olympia, WA 98513
(360) 456-5221

January 15, 2014

Mr. Jim Taylor
Pierce College
9401 Farwest Dr. S.W.
Lakewood, WA 98498

Dear Mr. Taylor,

Thank you for the opportunity to comment on:

Pierce College New Building Project Log No.: 112113-04-OSPI

The Nisqually Tribe has concerns because of the close proximity to waterways. The site is near Bradley Lake, a seasonal stream, and two features identified as wetlands. Because of these factors, we would like to see an archaeological survey done prior to any land disturbances.

We also would like in place an inadvertent discovery plan for archaeological resources and human remains.

The Nisqually Indian Tribe wishes to be notified of any cultural resources are found.

Thank you,

Jackie Wall
THPO
(360)456-5221 Ext. 2180
wall.jackie@nisqually-nsn.gov

From: Brandon Reynon
To: Jim Taylor
Subject: RE: Cultural Resource Assessments - Pierce College
Date: Monday, January 27, 2014 10:24:56 AM
Attachments: image001.jpg

Mr. Taylor,

Yes, your understanding is correct. While we appreciate the work that NWAA (who is now called SWCA), conducted back in 2005 and 2006, surveys are only considered relevant for 5 years. With that said, those assessments will yield important information moving forward. The new assessments will give us a look into how disturbed the soil is in the location of your new projects, and determine just how much archaeological material potentially is going to be disturbed. The new assessments, from the Puyallup Tribe's perspective, only need to occur in the projects in Puyallup. The renovation project at Fort Steilacoom will only need to be conducted if the optional building addition is put into place and the utilities need to be trenched, etc. If the renovation purely stays within the existing structure, the Puyallup Tribe has no concerns or comments on that renovation.

Thank you,

Brandon Reynon
Tribal Archaeologist/Cultural Regulatory Specialist
Puyallup Tribe of Indians
253.573.7986

Everything I am is because of my Ancestors

From: Jim Taylor [mailto:JTaylor@pierce.ctc.edu]
Sent: Monday, January 27, 2014 10:10 AM
To: Brandon Reynon
Subject: RE: Cultural Resource Assessments - Pierce College

Thank you for the quick response. I would propose to bring Northwest Archaeological Associates in for these assessments. Would it be of any value to review the cultural resource assessments conducted in 2005 and 2006? These would be more relevant to the proposed renovation and new building construction projects. The athletic fields project is in a more removed location. My understanding is that, in any case, the Tribe would want to see an updated assessment conducted at each project location and we will proceed on that basis.

Thanks again and let us know if there is anything else we can do to ensure we are appropriately supporting the interests of the Puyallup Tribe in this matter.

Best regards,

Jim Taylor
Director of Facilities
Pierce College District

(253) 964-6588

From: Brandon Reynon [mailto:brandon.reynon@puyalluptribe.com]
Sent: Monday, January 27, 2014 9:50 AM
To: Jim Taylor
Subject: RE: Cultural Resource Assessments - Pierce College

Mr. Taylor,

Thank you for contacting the Puyallup Tribe regarding the Pierce College future projects. We greatly appreciate the opportunity to comment on the proposed projects.

Fort Steilacoom Cascade Renovation: Upon review of the information provided, the Puyallup Tribe has no concerns with the project moving forward as presently planned. If however, the optional expansion that would require ground disturbance is exercised into action, ground disturbance in that area would require an archaeological assessment.

Puyallup Science & Tech and Athletic Field: After reviewing the information provided for these two projects, an archaeological assessment will need to be conducted. The area around the Puyallup campus is an area that has historically been heavily used by the Puyallup Tribe. This area is significant to our Tribal history. The potential for encountering archaeological material is high. Please keep the Puyallup Tribe informed as this project moves forward.

Thank you again for the opportunity to comment on the proposed projects.

Sincerely,

Brandon Reynon
Tribal Archaeologist/Cultural Regulatory Specialist
Puyallup Tribe of Indians
253.573.7986

Everything I am is because of my Ancestors

From: Jim Taylor [mailto:JTaylor@pierce.ctc.edu]
Sent: Monday, January 27, 2014 8:24 AM
To: Brandon Reynon
Subject: Cultural Resource Assessments - Pierce College

Brandon,
Pierce College is in the process of developing a series of future capital projects. In compliance with Governor's Executive Order 05-05, we have contacted the Department of Archaeology and Historic Preservation. Attached is the information provided to DAHP on our projects and responses from that office. We have also been in contact with Mystique Hurtado at the Governor's Office of Indian Affairs and have been referred to the Puyallup and Nisqually Tribes for further consultation.

The Pierce College District is part of the state community and technical college system and is comprised of two colleges: Pierce College Puyallup and Pierce College Fort Steilacoom located in the City of Lakewood. We are currently in planning stages for the next phases of capital expansion at each college.

At Pierce College Fort Steilacoom, we are planning a renovation project in one of our major buildings. This may include construction of a small adjacent structure. At Pierce College Puyallup, we have plans for a new academic building and a new athletic fields complex.

We have previously contracted Northwest Archaeological Associates to conduct a cultural resources assessment for specific projects at each of the colleges (2006 for Puyallup and 2005 for Fort Steilacoom). No items of cultural significance were documented during these previous assessments at the specific sites designated for construction.

We look forward to collaborating with the Puyallup Tribe in this matter and please let me know if I can provide any further information or whether correspondence should be directed to anyone else.

Jim Taylor
Director of Facilities
Pierce College District
(253) 964-6588

PROJECT REVIEW SHEET – EZ1
HISTORIC & CULTURAL RESOURCES REVIEW

PROPERTY / CLIENT NAME: Pierce College **FUNDING AGENCY:** 699

Project Applicant:	Pierce College
Contact Person:	Jim Taylor
Address:	9401 Farwest Dr SW
City, State:	Lakewood, WA **Zip:** 98498 **County:** Pierce
Phone/ FAX:	(253) 964-6588 / (253) 964-7339
E-Mail:	jtaylor@pierce.ctc.edu

Funding Agency:

Organization:	State Board for Community and Technical Colleges
Address:	1300 Quince St. SE
City, State:	Olympia, WA Zip: 98504
Phone:	(360) 704-4400

PLEASE DESCRIBE THE TYPE OF WORK TO BE COMPLETED
(Be as detailed as possible to avoid having to provide additional information)

☒ **Provide a detailed description of the proposed project:**

This project is to construct a new major structure on the Pierce College Puyallup campus. The project will represent the fifth major building to be constructed on the site and will consist of an approximate 70,000 square foot science and technology building consisting of two to three floors. The building footprint will cover approximately 25,000-35,000 square feet depending on number of floors constructed.The project site is located immediately adjacent to other previously constructed buildings.

☒ **Describe the existing project site conditions:**

The project is located on a historically forested site in the Puyallup South Hill area that has been previously logged and consists of second and third generation tree growth. The property contains a small number of wetlands. The site is largely level and sits at an elevation of approximately 550'. The site is not located near stream beds or open bodies of water. The nearest body of water is Bradley Lake located well to the west of the project site

☒ **Describe the proposed ground disturbing activities:**

The project will require excavation and export of soil as well as import of new soil necessary to achieve appropriate compaction. Infrastructure requirements will involve trenching for electrical, water, sewer and for storm water management. The soil conditions are typically very wet and under-drainage infrastructure and connection to detention ponds will be somewhat extensive. The building will be constructed as concrete slab on grade. It is anticipated that additional parking will be required in conjunction with this project and will probably be constructed as a parking structure on top of existing paved parking areas.

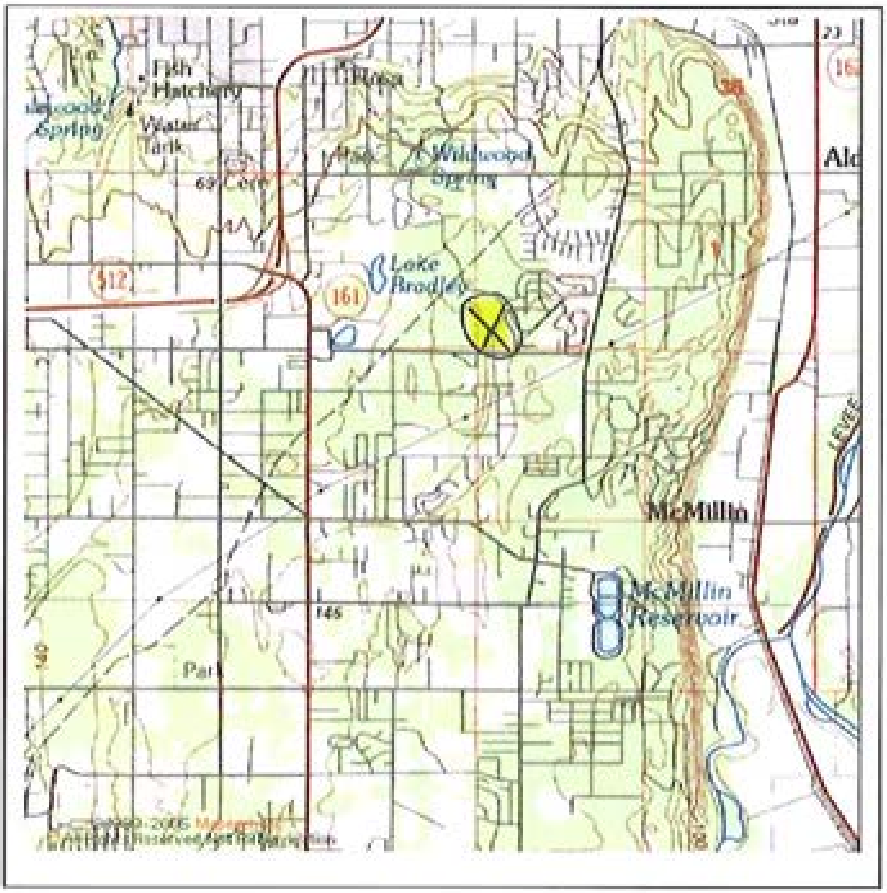
☐ **Check if building(s) will be altered or demolished. If so please complete a DAHP Determination of Eligibility "EZ2 form" using our on-line Historic Property Inventory Database for each building, 45 years or older, effected by the proposed project.**

N/A

PLEASE ATTACH A COPY OF THE RELEVANT PORTION OF A 7.5 SERIES USGS QUAD MAP AND OUTLINE THE PROJECT INPACT AREA.
USGS Quad maps are available on-line at http://maptech.mytopo.com/onlinemaps/index.cfm

Project Location

Township: 19 North **Range:** 4 East **Section:** 3
Address: 1601 39th Ave. SE **City:** Puyallup **County:** Pierce



Mail this form to:

Department of Archaeology and Historic Preservation or E-mail to:
1063 S. Capitol Way, Suite 106
P.O. Box 48343
Olympia, WA 98504-8343

Robert Whitlam, Ph.D.
State Archaeologist, DAHP
(360) 586-3080
rob.whitlam@dahp.wa.gov

(Within 30 days DAHP will mail their opinion back to you.)

Please be aware that this form may only initiate consultation. For some projects, DAHP may require additional information to complete our review such as plans, specifications, and photographs. An historic property inventory form may need to be completed by a qualified preservation professional.

Back to Table of Contents

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3. campus master plan

Pierce College Puyallup Master Plan
2015 Update

3. Program, Learning, and Student Success Needs: Campus Master Plan

Strategic Outcomes

The Campus Master Plan for Pierce College Puyallup establishes the foundation for continuity in physical planning by creating a vision that will allow the College to develop a cohesive campus aesthetic, meet required space needs for future growth, plan for facility upgrades, and improve site conditions in a coherent and unified way. This will ensure that each future project fits appropriately within the larger intended character and limits of the campus. The Campus Master Plan presents a physical expression of the current and future development of the campus, the outcome of which is to ensure that planned growth is consistent with the college's vision, mission, and values.

Current Campus Development

The Pierce College Puyallup campus sits on approximately 123 acres of land located within the city limits of Puyallup. Constructed buildings total 243,792 square feet -- five main buildings accounting for 231,733 gross square feet and three smaller buildings totaling 12,059 square feet.

Gaspard Administration Building

This is the original campus building. It supports instructional classrooms as well as administrative offices and student services functions.

Brouillet Library/Science Building

This building was constructed in 1997 and is the second of the campuses' major buildings. The building is 55,000 square feet in size and houses the college's library as well as science labs and classrooms, general classrooms, and offices for faculty and staff.

College Center Building

This building is the third major facility constructed on the campus and is a hub of student activity. The facility supports a wide array of instructional spaces and services, as well as offices for faculty and staff.

Garnero Child Development Center

This facility provides learning space for toddlers and pre-school children of student parents. There is some capacity for children of employees and community, as well.

Major functions and programs: Learning facilitated through a childcare-like environment

Health Education Center

The facility provides instructional and exercise areas.

Arts and Allied Health Building

This is the newest building at the Puyallup campus and it supports an array of programs.

Maintenance facility

Maintenance and grounds support

Portable building

The college has been utilizing a 2,688 square foot portable building to house staff offices since 1999. This facility is listed as a near-term need for replacement.

City of Puyallup Communication Center

This facility was formerly utilized as the 911 communications center for the City of Puyallup but is no longer used for this purpose. However, the City continues to lease this space. Future disposition of this facility is uncertain although the college has notified the City of Puyallup that it would like the space back as soon as the City finds more suitable space.

Comprehensive Ongoing Needs

General space and program needs and efficiencies

The college faces ongoing needs for space improvements as instructional methodologies, student-learning styles, and service support requirements change. Existing space needs periodic updating and renovation to remain current.

Expected Outcomes:

- General classrooms are sufficient in number and have sufficient technology to support instructional needs
- Computer labs are sufficient in number and are technologically current
- Sufficient office space is provided for full- and part-time faculty and staff (currently inadequate)
- Relocation of faculty offices are undertaken as needed
- Social and informal learning spaces are expanded
- Central “commons” spaces are provided to promote shared participation and responsibility
- Student Life space is expanded
- The Food Services facility is remodeled and upgraded
- Marketing and Communications offices have been relocated and upgraded
- District administrative and support offices are sufficient to support the District’s mission, values and goals and are appropriately located

Technology and equipment

Technology and equipment needs continuously change. The college strives to offer technology and equipment that is representative of the same technology and equipment students will see either in the workplace or at universities upon transfer.

Expected Outcomes:

- All general classrooms are equipped with adequate technology to support current instruction
- Computer labs are equipped with current equipment and software technology
- eLearning has access to and is utilizing sufficient technology to support its mission fully
- Instructional equipment is replaced and upgraded on a scheduled basis

Infrastructure improvements

In conjunction with more recently added capital inventory, we continue to support older facilities. Building infrastructure systems need to be upgraded and replaced at intervals throughout the life-cycles of our campus structures.

Expected Outcomes:

- Roofs and other building envelope systems are sufficient in quality and installation to protect structures from weather related damage
- Building mechanical systems are sufficient to maintain adequate temperatures and environmental conditions to support the learning environment
- Building electrical systems are updated and in good repair
- Parking lots and driveways are in good repair and are maintained on a planned schedule
- Elevators have been upgraded and are fully code compliant

Minor improvements

The college is continually in the process of identifying and responding to the changing needs of the institution. This includes space modifications that better address current programmatic need, the continued development of interior wayfinding signage, and the refinement of design standards for colors, materials, furnishings and equipment.

Expected Outcomes:

- Interior spaces are configured in a way that best meets the needs of the college and its programs and services
- Space improvements are planned strategically and are implemented on a scheduled basis that allows adequate time for completion and within reasonable cost
- Interior signage is improved and standardized
- Wayfinding signage is adequately located and provides sufficient information to adequately direct first-time visitors to their destination
- Standards have been developed for colors and materials used throughout the college environment
- Furnishings in offices, classrooms and common areas are in good repair and are replaced on as as-needed basis
- Carpeting is in good repair and is replaced on a planned schedule
- Interior surfaces are in good repair and painted on a planned schedule

Safety and Security

Pierce College is committed to providing a safe and secure environment for our students, employees, guests, and visitors. Interior and exterior improvements are designed and implemented in such a way as to promote a safe personal and learning environment for each of our students, a comfortable and secure environment for our employees and a welcoming environment for guests and visitors. The physical environment reflects and honors this commitment. Emergency preparedness measures also impact our master planning efforts. Infrastructure improvements that may enable us to better withstand or recover from various emergency situations need to be factored into our master planning. The college may also be placed in the position of providing sheltering or staging for outside groups or agencies during area-wide emergencies and this will have an impact on infrastructure needs.

Expected Outcomes:

- Access control systems for buildings and interior spaces are expanded
- Emergency notification and egress systems are sufficient to ensure the immediate and safe evacuation of personnel from buildings and the campus in the event of an emergency
- Infrastructure systems are capable of supporting continued operations of key facilities for extended periods during and following emergencies
- Emergency communication infrastructure systems and devices, including call boxes (including call boxes for the Deaf and Hard of Hearing community), are improved and expanded

<u>Maintenance efficiencies and sustainability</u>

The management of long-term operational costs of buildings and systems continues to be a major focus of the college's efforts. This includes the development of improved processes and the refinement of design standards for building systems and components to achieve better consistency of maintenance and function. Sustainable systems and practices are included in all design and implementation projects.

Expected Outcomes:

- Energy conservation measures are implemented and existing measures improved to include metering of energy consumption in all buildings
- Design standards have been developed for all building systems and components
- Serviceability of systems and equipment is sufficient to enable ease of servicing, repair and replacement
- Sustainable practices have been implemented and are in use in maintenance, grounds and custodial operations
- Maintenance practices are streamlined and can be supported with existing personnel resources
- Maintenance, grounds and custodial personnel are receiving regular skills development training

<u>Vehicular and pedestrian circulation</u>

There is a need to provide accessibility to all facilities and weave together a clear pathway system that unifies the campus, strengthens the pedestrian environment, and reinforces the campus open spaces. A series of entry points around the perimeter of the campus lead pedestrians both to the central open spaces and to building entries. Paths are organized to create simple and clear access to building entries and through the buildings to connect one building to the next. The term "accessibility" also refers specifically to the development of a physical environment which is conducive to the concept of universal design and in which students, employees and visitors experience no physical barriers to their access to and use of the college's physical environment.

The vehicular plan includes roadways that enable the passage of motorized vehicles through the campus and ready access to parking areas. Parking areas are situated to allow reasonable access to buildings and to campus entry and exit points. The master plan recognizes the need to provide efficient access and circulation for public transit as well as the promotion of alternative means of transportation.

Expected Outcomes:

- Persons with disabilities do not encounter physical barriers that impede access to buildings or services
- The pedestrian environment is sufficiently developed to allow convenient and easy access to and through the campus
- Motor vehicle circulation and access is clear and promotes safe and convenient entry and exits to the campus and its buildings
- Alternative modes of transportation are encouraged and provided for
- Parking is sufficient in quantity to meet demand

Exterior lighting and signage

Closely aligned with creating and maintaining a safe and secure environment, exterior lighting is a critical component of our overall master planning process. A comprehensive lighting plan is essential for the well-being of our campus community and is also a major factor in the overall appearance and appeal of the college to our community. Exterior lighting improvements, in many cases, represent a significant financial expense and must be undertaken over time as funding and opportunities present themselves.

Clear wayfinding and informational signage is critical to the welcoming and supportive environment that Pierce College Puyallup strives to support. To this end, the college has developed an exterior signage master plan in conjunction with two architectural firms, as well as a signage design consultant. This plan is intended to employ a methodical approach to guiding people to and through the campus. The plan is partially implemented and is being progressively developed in phases.
Expected Outcomes:

- Sufficient exterior signage is in place to clearly guide vehicular and pedestrian traffic into and through the campus
- Exterior lighting has been expanded and improved and provides a safe, well-lit environment for parking, driveways and pedestrian pathways

Site management

Jurisdictional requirements for management of storm water runoff are becoming increasingly stringent. Having good management practices in place will be a requirement for the permitting of future campus development. The college will continue to work with the City of Puyallup and other agencies to ensure compliance with current or anticipated ordinances and regulations.

The campus master plan recognizes the need for well-developed strategies for the management of the college's land from border-to-border in order to comply with the college's goal of strong environmental stewardship. This includes a landscaping plan for those areas that are highly maintained on a regular basis and those that are less intensely managed but contribute to the overall campus environment. This also includes preservation of natural habitat and native vegetation.

Expected Outcomes:

- The college has developed a comprehensive landscaping and land management plan that recognizes the desire for an attractive and safe campus and also recognizes our commitment to environmental stewardship
- The College has developed a comprehensive storm water management plan that complies with jurisdictional mandates and supports environmental stewardship
- The College collaborates with the City of Puyallup on land protection and preservation issues

Near-Term Development Needs (5-10 Years)

Through the process already described, the college identifies near-term and long-term development needs. This is augmented by environmental scans, and external and internal community surveys. The projects listed in this section were prioritized based on the following criteria:

- Perceived community/industry need (e.g., addressing a national need for Science, Technology, Engineering, and Mathematics majors on a local level)
- A need identified in the District Learning and Student Success Strategic Plan
- Funding opportunities
- Current enrollment information and future enrollment projections
- Rationale
- Potential for capital funding
- Demonstrated need for the future

<u>Science, Technology, Engineering, Mathematics (STEM) Building</u>

Pierce College Puyallup's existing facilities do not meet current need in emerging engineering and technology fields or in a comprehensive science curriculum. There has been steady growth in the need for such programs over the past several years and this is expected to continue to experience large growth into the future. A new facility would replace older instructional environments with much more robust capabilities, allow the college to expand existing programs, add robotics and additive manufacturing, allow the college to offer the full complement of transfer STEM-related courses, and ensure program viability for the next generation of students.

<u>Brouillet Library/Science Building renovation and expansion</u>

The existing Library is too small and insufficiently configured to meet the needs of the college and to adequately support student learning. Space is required to support teaching and learning methodology (e.g., rooms for students to work together on projects; rooms for students to practice presentations) and to support new technology applications. Associated student support services such as Tutoring, Supplemental Instruction, the Writing Center, a veteran's support center, and Assistive Technology have no space in which to incorporate appropriate adjacencies to the Library proper. Additional general classrooms are also needed to accommodate instructional scheduling demands. Subsequent to construction of the STEM Building, the Library will be renovated and expanded to provide greatly improved services to students and faculty.

Residence Facility

Demand for residence facilities to, primarily, support International Education has increased exponentially in recent years. Pierce College is committed to ensuring the continued success of its international programs, which are growing, and, in recognizing this demand, is seeking opportunities to develop such facilities.

Parking expansion

Future construction will require additional parking expansion. A parking lot footprint is reflected in the campus plan. The next major expansion phase will occur in conjunction with the construction of the STEM Building and may also be required with additional future building expansion. Ground level parking surfaces will require encroachment outside currently developed areas, recognizing there are limitations due to natural terrain and wetlands. Expansion could include construction of a vertical parking structure. However, construction cost may be prohibitive and difficult to fund. Under the section Alternatives Considered it is noted that an adjacent facility may be an option for building expansion. If this option were to become available, additional parking may be made available, as well.

Athletic field development

The District's current intent is to primarily support athletic field sports at Pierce College Puyallup and to maintain court sports at Pierce College Fort Steilacoom. A feasibility study has been conducted for the development of a multi-sport complex with fields and associated support structures on the campus. However, funding sources have not yet been identified and the project is not eligible for traditional capital funds.

Gaspard Administration Building Remodel

The Administration Building is inadequately configured to support the college's current needs. Over the next several years, the college will be conducting a series of space modifications in this building to better support student services and administrative functions.

Storage facility

The college has insufficient storage space to support both instructional program needs and needs for furnishings and equipment to support college and community events. This is of particular concern in the Arts and Allied Health Building where, as a result of rapidly escalating construction costs being experienced during late design, and project bid and subsequent impact on the project's final scope, approximately 8,000 square feet of storage and related spaces were removed prior to bidding and construction. It was decided to keep the academic programs intact as much as possible. In order to do this, there was a reduction in storage space, maintenance areas, and other non-instructional space.

Maintenance shop expansion

The existing maintenance shop is inadequately sized or configured to support the existing needs of the college for maintenance and grounds services. It may be possible to expand rather than replace the existing structure but this requires further investigation.

Reconfigure main entrance drive and transit loop

The primary campus entrance does not provide easy access and routing for drop-offs and for public transit. The entrance is also configured in such a way that the campus is largely hidden from the main public right-of-way. Reconfiguration of the entry drive to enable a shorter turn around for transit and to open up the entrance more visually will greatly enhance campus appearance and access. This may also make it easier for Pierce Transit to expand routes as the reconfiguration would be more accessible.

Remove portable

The existing portable housing the Marketing and Communications department has been utilized since 1999. It is awkwardly positioned and is not suitable for future reconfiguration or expanded use. It is also not supported with maintenance and operations funding from the state. The college is seeking near-term opportunities to eliminate the need for this facility and to house programs located there to other space.

Communication Center acquisition

The City of Puyallup no longer utilizes the small structure on campus as the 911 Communications Center as they needed to expand and have relocated into a new facility. Although the City cannot use the old structure for other purposes without the college's permission, they do use the space for an extension of their current Communications Center by housing several servers in the building. In addition, they use the space for storage. The college has met with the City to express an interest in acquiring the facility and converting it for other needed purposes should it become available in the future.

Gender Neutral Restrooms

There has been increasing need for additional gender neutral restrooms on campus. Currently there are two restrooms on campus (i.e., one each in the Arts and Allied Health building and the College Center building), and two restrooms in the Health Education Center that are individual-use restrooms that will have the signage replaced to identify them as gender neutral restroom. If additional gender neutral restrooms are needed, the college will either need to add them when new buildings come on line, or it needs to identify one or more restrooms for a remodel. Facilities is currently exploring the need and the options.

Long-term Development Needs (11-15 Years)

Future Academic Buildings

Our long-range plans include two additional academic buildings. We anticipate that we will continue to identify needs of the college over the next 10 or more years that will require additional building space. We will continue to assess facility needs over the next several years and are leaving options open for the placement of new facilities on the campus to support future program growth.

Health Education Center expansion

The Health Education Center was designed to allow for the future addition of a gymnasium. This expansion remains a longer-term goal. The college will continue to assess the potential need for this addition and this will have to include funding strategies. State capital funds are unlikely to be available for this project. This project may also not be needed if we commit to the athletic fields at Pierce College Puyallup and formally designate Pierce College Puyallup for field sports and Pierce College Fort Steilacoom for court sports.

Garnero Child Development Center expansion

The Child Development Center (CDC) was constructed with the intention of adding a future wing to the structure to increase capacity. If funds are available earlier, there is a desire to move this into a short-term development need.

Parking expansion

Although parking expansion will be required to meet some of the college's near- term capital goals, additional expansion may be required in the future to meet longer-term goals. This will be determined by future enrollment demand and jurisdictional permitting requirements.

Pierce College Puyallup Campus Master Plan - 2016

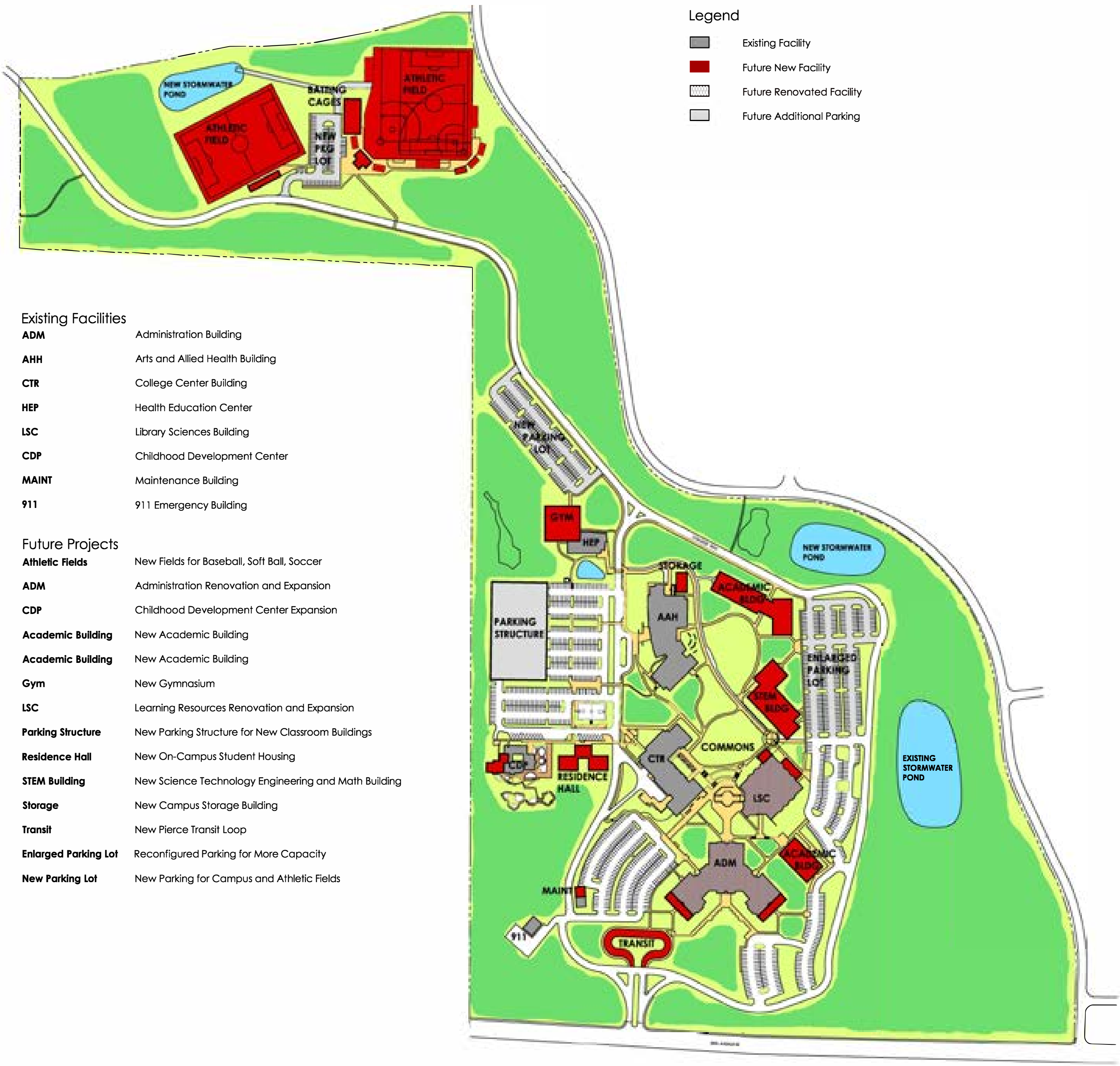
Existing Development Plan

Existing Facilities

ADM	Administration Building
AHH	Arts and Allied Health Building
CTR	College Center Building
HEP	Health Education Center
LSC	Library Sciences Building
CDP	Childhood Development Center
MAINT	Maintenance Building
911	911 Emergency Building

Pierce College Puyallup Campus Master Plan - 2016

Development Plan



Existing Facilities

ADM	Administration Building
AHH	Arts and Allied Health Building
CTR	College Center Building
HEP	Health Education Center
LSC	Library Sciences Building
CDP	Childhood Development Center
MAINT	Maintenance Building
911	911 Emergency Building

Future Projects

Athletic Fields	New Fields for Baseball, Soft Ball, Soccer
ADM	Administration Renovation and Expansion
CDP	Childhood Development Center Expansion
Academic Building	New Academic Building
Academic Building	New Academic Building
Gym	New Gymnasium
LSC	Learning Resources Renovation and Expansion
Parking Structure	New Parking Structure for New Classroom Buildings
Residence Hall	New On-Campus Student Housing
STEM Building	New Science Technology Engineering and Math Building
Storage	New Campus Storage Building
Transit	New Pierce Transit Loop
Enlarged Parking Lot	Reconfigured Parking for More Capacity
New Parking Lot	New Parking for Campus and Athletic Fields

Back to Table of Contents

4. sustainability narrative and LEED checklist

PIERCE COLLEGE STEM BUILDING
LEED PREDESIGN NARRATIVE

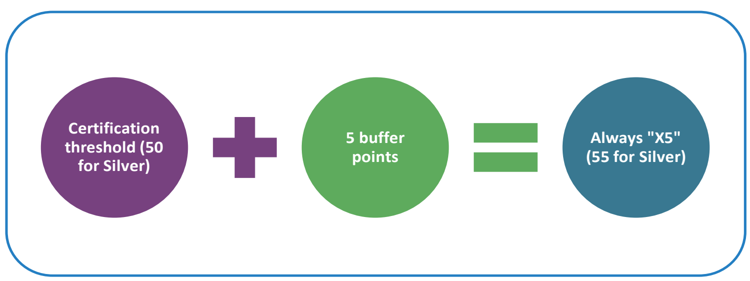
FINAL : 7/10/2020

Background

This project is a new 3-story, 54,000 square foot science, technology, engineering, and mathematics (STEM) building for Pierce College in Puyallup, Washington. The building will contain 11 STEM classrooms, eight teaching labs, and a fabrication lab (shop) as well as 30 new offices for STEM staff. Moving STEM staff to the new building will free up room in existing buildings for other staff.

Approach to LEED

O'Brien360 conducted a sustainability workshop with the project team on June 18, 2020 to understand the project's sustainability goals and objectives, develop strategies and metrics to achieve those goals, and identify unique challenges or opportunities for the project in the realm of sustainability. This information was translated into an approach that could earn LEED Silver certification, the minimum requirement from Washington State for state funded projects. The College has expressed a desire to achieve at least LEED Gold and explore options for achieving net-zero energy or net-zero carbon as well.



In the workshop, O'Brien360 introduced the strategy of "Always 55" which is a method to track and obtain LEED Silver certification by maintaining through out the project a scorecard with enough points for Silver (50) plus 5 buffer points. Whenever something changes in the project that makes points available or unavailable, the project team must adjust by adding or removing other points. At no point during the project should a clear path to certification not be included in the current design or construction practice. If LEED Gold is the goal, the approach is "Always 65" instead.

Rating System Versions

There are currently two versions of LEED available to the project; LEED v4, and LEED v4.1 Beta. Currently, projects can register for LEED v4 and use only v4 credits, register for LEED v4 and substitute any credit with the equivalent LEED v4.1 credit, as it suits the project, or participate in the beta of v4.1. O'Brien360 recommends registering early under version 4 and using v4.1 credits strategically to have the most flexibility going forward. The LEED scorecard provided with this report notes for which credits we recommend using the v4.1 option and for which it is better to stay with the original version 4 criteria.

Current Score

In developing the pre-design LEED scorecard for the Pierce College STEM building, the pre-design team identified 54 points to comprise the path to LEED Silver certification. These points are from credits that are inherent in the current design approach or easily achievable but not yet detailed in the design. The team also confirmed that there are no elements in the current design direction that preclude earning these 54 'Yes' points.

Pre-design LEED score summary for the Pierce College STEM building

Category	Yes (Silver)	Likely (Gold)	Unlikely	No
Integrative Process	1			
Location and Transportation	2	1	2	11
Sustainable Sites	5	2	1	2
Water Efficiency	5		6	
Energy and Atmosphere	17	6	3	7
Materials and Resources	5	2	4	2
Indoor Environmental Quality	10	3	2	1
Innovation in Design	6			
Regional Priority	3		1	
Total	**54**	**14**	**19**	**23**

Beyond the minimum requirement of LEED Silver, the College has expressed a desire to achieve at least LEED Gold and explore options for achieving net-zero energy or net-zero carbon as well. In the pre-design scorecard, there are 14 points that the team has identified as likely but not specifically included in the predesign, such as adding electric vehicle charging. This is a strategy the College can choose to add to the project to earn points toward Gold. Following an "Always 65" strategy for LEED Gold means 11 of the 14 points should be selected to go forward into the next phase of design.

Additional Certification Options

Executive Order 18-01 requires state funded projects to be at least zero energy ready. This mandate does not apply to community and technical colleges, but college projects interested in exploring achieving this goal are eligible for support and guidance from the State Efficiency and Environmental Performance office. The College may also want to consider a net-zero certification in addition to achieving LEED Silver or Gold certification. There are a number of certifications available now including Net Zero Carbon or Net Zero Energy Certification from the International Living Future Institute and LEED Zero Carbon or LEED Zero Energy which are additional endorsements LEED projects can earn beyond their base certification. The systems have a mix of criteria such as whether they are performance or design based, whether they allow combustion, how much off-site renewable energy is allowed, vs. on-site production, and whether they address the energy in building materials or the impact of transportation to the building. As the College explores a zero energy building going forward, these systems can provide useful criteria for crafting a plan.

LEED Status by Category

Integrative Process

This credit requires performing both a simple box model to explore how to reduce loads on the building, and water budgeting to evaluate options for reducing potable water use prior to 30% design and then incorporating what was learned in the OPR and BOD. This process is a natural fit for the progressive design build model of procurement that will be used on this project. Include the specifics of the LEED requirement in the RFP and design builders' contract to assure the LEED point is earned.

Location and Transportation

This category primarily scores a selected site by attributes inherent to location, such as proximity to diverse amenities or high-volume mass transit. The Pierce College location does not meet many of the criteria. Therefore the project will have to focus on earning most of the points from other categories like Energy and Atmosphere in order to meet certification goals.

There is strong interest in supporting bicycle commuting however. The current amount of bike commuters are small, but the College wants to support alternative modes of transportation as much as possible. The project will include short-term and long-term bike parking to meet LEED requirements and showers for commuting staff. Assuming no more than 100 FTE faculty and staff and about 500 student/visitors at peak occupancy, this means about 15 short term bicycle parking spaces and 5 long term spaces. Include infrastructure for electric bike charging in the future.

The College would also like to explore electric vehicle charging. If the project includes adding 6-8 chargers in the adjacent lot and those are signed as dedicated to the STEM building, the project can earn another point towards LEED Gold certification.

Sustainable Sites

There are significant opportunities in site development to provide views, open space, protect or restore habitat, and reduce heat island effect and light pollution. The preferred site and building form provide for public open space in a revitalized quad and outdoor learning rain garden and for protecting some trees while restoring other areas. The LEED project boundary should be drawn and the site plan developed to optimize for earning these credits as they are integral to the project goals. Site lighting design and fixtures, and hardscape and roofing materials will be selected to achieve Heat Island and Light Pollution Reduction credits as well. Stormwater will be treated and detained on site via the rain garden and other green stormwater infrastructure, but the requirements for retention and infiltration from LEED are unlikely to be met.

Water Efficiency

This category addresses both indoor and outdoor water use. Outdoor water use should be limited as to less than 50% of the baseline in the EPA's WaterSense tool. For indoor water use, low or ultra-low flow fixtures will be install such that atleast a 35% reduction in water use from the LEED baseline is achieved. Various forms of water collection and reuse were discussed during predesign without detailed investigation. Reclaimed water uses and opportunities for rainwater harvesting should be further evaluated. Install metering for all major water uses.

Energy and Atmosphere

The predesign mechanical basis of design is expected to deliver 20%-30% better performance than the ASHRAE baseline used in LEED. Higher levels of saving are dependant on high-performance envelope and possible on-site PV production, and are also necessary considerations for net-zero energy or net-zero carbon. With a focus on high performance systems and envelope, a LEED Gold, zero-energy ready building is reasonably achievable without an on-site PV installation, which could be added later to contribute to ultimately achieving net-zero energy.

Advanced Energy Metering should be met by following WSEC requirements. The design build team should verify this during design and add meters as necessary to achieve the point. It is assumed that Enhanced Refrigerant Management can be achieved as none of the proposed systems include variable refrigerant flow. This also needs verification considering any refrigeration needs in labs.

Welsh Commissioning is already on board with the project and has created the project OPR. Enhanced Commissioning and Monitoring-based commissioning criteria will be met. It is recommended but not yet confirmed that the project will also do building envelope commissioning. Adding this commissioning option will contribute to earning LEED Gold.

Materials and Resources

The Materials and Resources category scoring is based on several years of experience with LEEDv4 materials credits which are significantly different from previous versions. When version 4.1 was introduced, it addressed some problems with how the new credits were structured and now at least half the points are achievable on a regular basis in the Pacific Northwest. During design, the team will screen materials for contribution to Environmental Product Declarations, Sourcing of Raw Materials, and Materials Ingredients Disclosures credits to confirm that there is adequate numbers of those products to earn the points. During construction, the team will track those credits closely to make sure the thresholds are met.

Indoor Environmental Quality

The prerequisite for Minimum IAQ Performance is generally met by Washington State Energy Code ventilation requirements which are equal or stricter than the LEED reference standard of ASHRAE 62.1. The design/build team should confirm this early in design. The Environmental Tobacco Smoke Control prerequisite also parallels current statute. Use version 4.1 of this credit to provide flexibility in signage requirements. For Enhanced Indoor Air Quality Strategies, the current mechanical basis of design provides for direct exhaust, negative pressurization, and MERV 13 or greater filtration as needed for the first point. The design will need to include an entryway system for the large opening into the demonstration court to secure this point however. It is also likely and desirable to the college that the increased levels of fresh air supply in the LEED credit can be provided. CO2 monitoring as prescribed by LEED will not be implemented. Given the many open work areas in laboratories, providing individual control of the thermal environment is not a priority. During predesign, the team did discuss ceiling fans as a method of thermal control to extend the comfort band and in naturally cooled areas of the building.

Specifications will require the design builder to prepare and implement an Indoor Air Quality Management plan that also addresses moisture control and to either flush-out the building after move-in but before occupancy to the levels required by LEED, or to conduct air-quality testing for carbon monoxide, particulates, and ozone. A second point is available towards LEED Gold if the testing is expanded to include formaldehyde and 11 other volatile organic compounds (VOCs). The design build team will also vet all paints and coatings, insulation, composite wood, flooring, and ceiling products for 100% compliance with LEED VOC content requirements and LEED VOC emissions testing such that at least the minimum threshold for each category (75% -100%) is achieved.. This is a more stringent requirement than previous versions of LEED and requires careful attention by the design team but is readily achievable. The specifications then need to include fully compliant materials or performance criteria for VOC emissions testing where specific products are not named.

Views to the surrounding natural environment are a priority for this project. The current design with all labs and classrooms on an exterior wall and the large open atrium with skylight provide well for achieving the Quality Views credit. Daylight maybe more challenging as the atrium light may not meet the criteria and must be modeled. Also the 30' depth of the classroom/lab modules requires daylight penetration high in each wall near the ceiling to provide daylight to the back wall. For good quality lighting and to reduce glare, this should be balanced with relights near the ceiling to bring in light from the atrium. The current LEED plans assumes the team will use daylight modeling to assure the design achieves at least one point on the Daylight credit.

The acoustic requirements, as defined by the laboratory design criteria, are generally more stringent than the LEED Acoustic Performance credit requirements so this point is a 'Yes.' However, the two requirements should be cross checked as design is developed. For example, LEED sound transmission criteria for conference rooms is higher than what is recommended for lab buildings.

Innovation

Pierce College priorities for this project include a focus on equity, diversity, and inclusion. There are a number of opportunities to earn points in the innovation category through college initiatives and activities around equity, diversity, and inclusion for the STEM building. These are detailed in a memo provided as an appendix: *Promoting Equity, Diversity, and Inclusion – LEED Innovation.* The College and project team are tasked with selecting at least one pilot credit from this list and two additional innovation credits. The plan for innovation credits also includes Green Building Education using signage and a case study, and green operations plans for housekeeping and integrated pest management.

Regional Priority

Up to four bonus points can be earned by LEED projects for implementing regular credits that are deemed environmental priorities for the area. The current LEED plan has the project achieving 3 of these for Environmental Product Declarations, Renewable Energy, and Sourcing of Raw Materials.

Appendices

1. Appendix 1: LEEDv4 NC Scorecard
2. Appendix 2: *Promoting Equity, Diversity, and Inclusion – LEED Innovation* memo

Appendix 1

O'Brien360

LEEDv4 New Construction Scorecard

Project: Pierce College STEM
Date: 7/10/2020

campus \ group
design \ construction

Certified 40-49 points Silver 50-59 points Gold 60-79 points Platinum 80 points and above

Y	L	U	N		Possible Points
54	14	19	23	**Total Project Score**	110

Integrative Process

Y	L	U	N			Integrative Process	Possible Points:	1
1				d	c1	Integrative Process		1

Location and Transportation

Y	L	U	N			Location and Transportation	Possible Points:	16
2	1	2						
			16	d	c1	LEED ND Location		16
1				d	c2	Sensitive Land Protection		1
			2	d	c3	High Priority Site		2
			5	d	c4	Surrounding Density & Diverse Use		5
		1	4	d	c5	Access to Quality Transit (v4.1)	72/30 trips	5
1				d	c6	Bicycle Facilities (v4.1)	ST=2.5% + LT=5% (1 per 100)	1
		1		d	c7	Reduced Parking Footprint (v4.1)	30% reduction	1
	1			d	c8	Electric Vehicles (v4.1)	2% of spaces (min. 2)	1

Sustainable Sites

Y	L	U	N			Sustainable Sites	Possible Points:	10
5	2	1	2					
Y				C	p1	Const. Activity Pollution Preventio		required
1				d	c1	Site Assessment		1
	2			d	c2	Protect or Restore Habitat (v4.1)	Restore 25%	2
1				d	c3	Open Space (v4.1)	30% of total area (25% veg)	1
		1	2	d	c4	Rainwater Management (v4.1)	90th %	3
2				d	c5	Heat Island Reduction		2
1				d	c6	Light Pollution Reduction		1

Water Efficiency

Y	L	U	N			Water Efficiency	Possible Points:	11
5		6						
Y				d	p1	Outdoor Water Use Reduction		required
Y				d	p2	Indoor Water Use Reduction (v4.1)	20% Reduction	required
Y				d	p3	Building-Level Water Metering		required
1		1		d	c1	Outdoor Water Use Reduction	50% reduction	2
3		3		d	c2	Indoor Water Use Reduction (v4.1)	35% reduction	6
		2		d	c3	Cooling Tower Water Use		2
1				d	c4	Water Metering		1

Energy & Atmosphere

Y	L	U	N			Energy & Atmosphere	Possible Points:	33
17	6	3	7					
Y				C	p1	Fundamental Cx & Verification		required
Y				d	p2	Minimum Energy Performance		required
Y				d	p3	Building-Level Energy Metering		required
Y				d	p4	Fundamental Refrigerant Mgmt		required
4	2			C	c1	Enhanced Commissioning		6
8	4		6	d	c2	Optimize Energy Performance	29% reduction	18
1				d	c3	Advanced Energy Metering		1
		1	1	C	c4	Demand Response		2
3		2		d	c5	Renewable Energy (v4.1)		5
1				d	c6	Enhanced Refrigerant Mgmt		1
				C	c7	--		

Materials & Resources

Y	L	U	N			Materials & Resources	Possible Points:	13
5	2	4	2					
Y				d	p1	Storage/Collection of Recyclables		required
Y				C	p2	C&D Waste Mgmt Planning		required
	2	1	2	d	c1	Bldg Life-Cycle Impact Reduction (	5% reduction	5
1		1		C	c2	Environmental Product Declaratior	20 products, 5 mfr.	2
1		1		C	c3	Sourcing of Raw Materials (v4.1)	20% tot. product value	2
1		1		C	c4	Material Ingredients (v4.1)	10% by cost or 10 from 3	2
2				C	c5	C&D Waste Mgmt (v4.1)		2

Indoor Environmental Quality

Y	L	U	N			Indoor Environmental Quality	Possible Points:	16
10	3	2	1					
Y				d	p1	Minimum IAQ Performance		required
Y				d	p2	Env. Tobacco Smoke Control (v4.1)		required
1	1			d	c1	Enhanced IAQ Strategies		2
3				C	c2	Low-Emitting Materials (v4.1)	3 Categories	3
1				C	c3	Construction IAQ Mgmt Plan		1
1		1		C	c4	IAQ Assessment		2
		1		d	c5	Thermal Comfort	50% ind. + 90% multi-occ.	1
1	1			d	c6	Interior Lighting		2
1	1		1	d	c7	Daylight (v4.1)		3
1				d	c8	Quality Views	Min. 75% occ. spaces	1
1				d	c9	Acoustic Performance (v4.1)		1

Innovation in Design

Y	L	U	N			Innovation in Design	Possible Points:	6
6								
1				d	c1	ID: Green Building Education		1
1				d	c2	ID: LEED O&M Starter Kit		1
1				d	c3	ID: TBD Pilot Credit		1
1				d	c4	ID: TBD Innovation Credit		1
1				d	c5	ID: TBD Exem Perf		1
1				C	c6	LEED™ Accredited Professional		1

Regional Priority Credits

Y	L	U	N			Regional Priority Credits	Possible Points:	4
3		1						
1				C	RPC 1	Environmental Product Declarations		1
		1		d	RPC 2	Indoor Water Use Reduction (v4.1)		1
		1		d	RPC 3	Demand Response		1
1				d	RPC 4	Renewable Energy (v4.1)		1
			1	d	RPC 5	Rainwater Management (v4.1)		1
1				C	RPC 6	Sourcing of Raw Materials (v4.1)		1

Appendix 2

O'Brien360

PROMOTING EQUITY, DIVERSITY, AND INCLUSION – LEED INNOVATION

PIERCE COLLEGE STEM BUILDING 7/6/2020

Recommended frameworks for the project that promote equity, diversity, and inclusion are listed below. These credits can be applied to the project to earn points, or to be used as a framework to act towards promoting equity, diversity, and inclusion values. Underlined titles include a link to additional details. Note that in order to achieve all 5 Innovation in Design credits, USGBC requires that the project pursue at least 1 Pilot Credit and 1 Innovation Credit.

LEED Innovation in Design Credit Sources

- Innovation catalog
- Pilot credits
- Credits from other rating systems (other LEED systems, WELL, etc.)

Innovation Catalog

These innovative ideas are already approved by GBCI and have guidance available on how to comply in the LEED Innovation Catalog. Options listed below have been broken into those for owner review and those for design team review.

For Owner:

Community Outreach and Involvement- 1 point

This innovation credit encourages responsiveness to community needs by involving the people who live or work in the community in project design and planning and in decision about how it should be improved or how it should change over time. This credit reinforces the notion of shared governance as a framework for partnership, equity, accountability, and ownership.

For Design Team:

Design for Flexibility- 1 point

Conserve resources associated with the construction and management of buildings by designing for flexibility and ease of future adaptation and for the service life of components and assemblies. The ideals of equity, diversity, and inclusion require our community's ability to evolve as we engage in discussion both in the classroom and out of the classroom. The benefits of flexible architecture include our ability to keep the built environment relevant and useful as our ideas and needs shift, and the building ages.

Additional pre-approved innovation credits are found in the Innovation Credit Catalog in the LEED Credit Library

Pilot Credits

Pilot credits are those which the USGBC is testing for future versions of the rating system. Many of them are robust and involved that need to be committed to early in a project. Those listed for owner review that are not directly within owner control require a commitment from the owner to include these attributes within the project RFP and/or project specifications.

For Owner Review:

Social equity within the project team- 1 point

Pilot credit aiming to promote social equity by integrating strategies that address relevant social and economic needs among those working on the project.

Includes fair and equitable wages and benefits, skill development, and financial and health stability for project workers. This can be accomplished on a project level by paying prevailing wages and providing workforce development training. Alternatively, the project can pursue this on a company level, by achieving industry certifications (such as the ILFI JUST certification) or by developing a social responsibility report meeting industry guidelines.

Informing Design Using Triple Bottom Line Analysis-1 point

The purpose of a triple bottom line analysis is to demonstrate the economic, social, and environmental value of LEED design strategies using empirical evidence to inform the design process. This analysis can be utilized for at least 6 LEED credits in aggregate (required analysis for indoor water use reduction, outdoor water use reduction, optimize energy performance, plus 3 additional credits)

Informing Design by Major Credit Category Using Triple Bottom Line Analysis-1 point

Similar to informing design using triple bottom line analysis this credit asks us to conduct a triple bottom line analysis but for up to two credits in two of the following categories:

- Location and Transportation
- Sustainable Sites
- Water Efficiency

- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality

For Design Team Review:

Inclusive Design- 1 point

This pilot credit encourages the design of spaces that "empower a diverse population by improving human performance, health and wellness, and social participation. With this approach we can prioritize the experience and participation of students, faculty, and staff while evaluating for ability, age, gender, language, cultural understanding, and other characteristics of diversity.

Assessment and Planning for Resilience- 1 point

Given all the other priorities and everyday constraints faced by community colleges, it is not uncommon to minimize possible danger, catastrophe, or extreme public health situations like global pandemics. This credit encourages designers, planners and building owners/operators to proactively plan before design commences for the potential impacts of natural disasters or disturbances as well as address issues that impact long-term building performance such as climate changing conditions. This assessment would need to happen immediately upon beginning the design/build contract or separately prior to contracting.

Social Equity within the Supply Chain- 1 Point

A marker of success in the college environment is to think globally, this credit encourages all members of the project team to promote and further social equity by integrating strategies that address identified social and community issues, needs and disparities among those affect by the project by promoting fair trade, respect for human rights, and other equity practices among communities. This credit asks us to perform supplier assessments addressing elements such as child labor, health and safety procedures and training, right of freedom of association, non-discrimination, discipline and grievance procedures, fair working hours and compensation, anti-corruption and bribery.

Additional pilot credits are found in the Pilot Credits list in the LEED Credit Library

Other Rating Systems

Living Building Challenge: Equity Petal- 0 points

This petal elevates equity as a project goal by fostering a just and inclusive community, enabling all people to participate, prosper, and reach their full potential.

Requirements:

- Demonstrate Universal Design
- 2 project team organizations are JUST certified
- 5 project teams complete JUST Self-Assessment

WELL Rating System- 0 points

The WELL rating system has a series of policy, and design related credits that contribute to promoting diversity, equity, and inclusion. While there is an innovation credit within the LEED rating system for some WELL credits, not all WELL credits are accepted for innovation points. These WELL Concepts contribute to project goals:

- Mind- The WELL Mind concept promotes mental health through policy, program and design strategies that seek to address the diverse factors that influence cognitive and emotional wellbeing.
- Community- The WELL Community concept aims to support access to healthcare, workplace health promotion and accommodations for new parents while establishing an inclusive, integrated community through social equity, civic engagement and accessible design.

5. greenhouse reduction plan

Appendix – Best Practices to Reduce Greenhouse Gas Emissions
Pierce College Puyallup
Science, Technology, Engineering, Mathematics (STEM) Building

System / Best Practices	**Included in Project?**
Mechanical	
Solar water heating	
Above code HVAC system efficiency	Yes
Use natural gas instead of electricity for heating	Yes
Geothermal heat pump	
Post occupancy commissioning	Yes
NEW Interconnectivity of room scheduling in 25Live and HVAC controls	Yes
Electrical	
Photovoltaic energy systems	
Time of day and occupancy programming of lighting	Yes
Efficient lighting	Yes
Envelope	
Minimize building surface area for necessary floor area	Yes
Roofing materials with high solar reflectance and reliability	Yes
Green roofs to absorb heat and act as insulators for ceilings	
Site	
Orient building for natural light and reduced heating and cooling loads	Yes
Trees and vegetation planted to directly shade building	Yes
Paving materials with high solar reflectance, enhanced water evaporation, or otherwise designed to remain cooler ore require less lighting than conventional pavements	Yes
Increase transportation choices – drive, walk, bike, or public transit	Yes
Total number of these best practices included in project:	12

Pierce College District

Strategy for Reducing Greenhouse Gas Emissions

February 19, 2014

1. Background and Intent

The Pierce College District encompasses Pierce College Fort Steilacoom and Pierce College Puyallup and represents two of the thirty-four community and technical colleges in the State of Washington. Pierce District has developed preliminary estimates of the targets for greenhouse gas reductions required by legislation under the State Agency Climate Leadership Act. We understand that we are required to incrementally reduce emissions based on 2005 levels. We have experienced very significant capital expansion since 2005. In order to meet the 2005 baseline requirement, we would be required to achieve a 60% reduction from the reported 2009 emissions summary by 2020, 70% by 2035 and 80% by 2050. This is a far different scenario than the 15%, 36.5% and 57.5% reduction requirements referenced in the legislation.

We do not see that we can realistically achieve a 60% reduction level by 2020 and certainly not without significant expense. We propose to undertake a methodical approach to emissions reductions that can be realistically undertaken and that will result in measurably improved reduction levels over time.

Emissions reduction efforts will need to be a broad-based organizational undertaking. Strategies noted in this report are based on an extensive energy audit undertaken in 2013. We have been methodical in development of reduction strategies and have focused on strategies that appear to be reasonably achievable. In the event that specific strategies will not result in meaningful energy reduction outcomes, we will continue to refine them over the next several years.

We will not be able to engage in a full range of strategies without cost and, probably, substantial cost in many cases. We may well have to retrofit even relatively newer buildings over the next several years with improved technologies to include mechanical and mechanical controls systems. The probability that funds to support these strategies will be available, to any great degree, is uncertain.

Realistically, the strategies we should be developing would focus on means by which we can reduce long-term building operating costs whether that be through emissions reductions, technological improvements, improvements in maintenance and care, retrofitting of older building systems, use of longer lasting and more cost efficient components, improvements in design that contribute to better protected building envelopes and development of improved and more efficient business practices.

In summary, we are committed to implementing emissions reduction strategies in alignment with legislative intent to the greatest degree possible and to undertake efforts representing goals that we believe can most realistically be achieved.

1a. Sustainability Policy

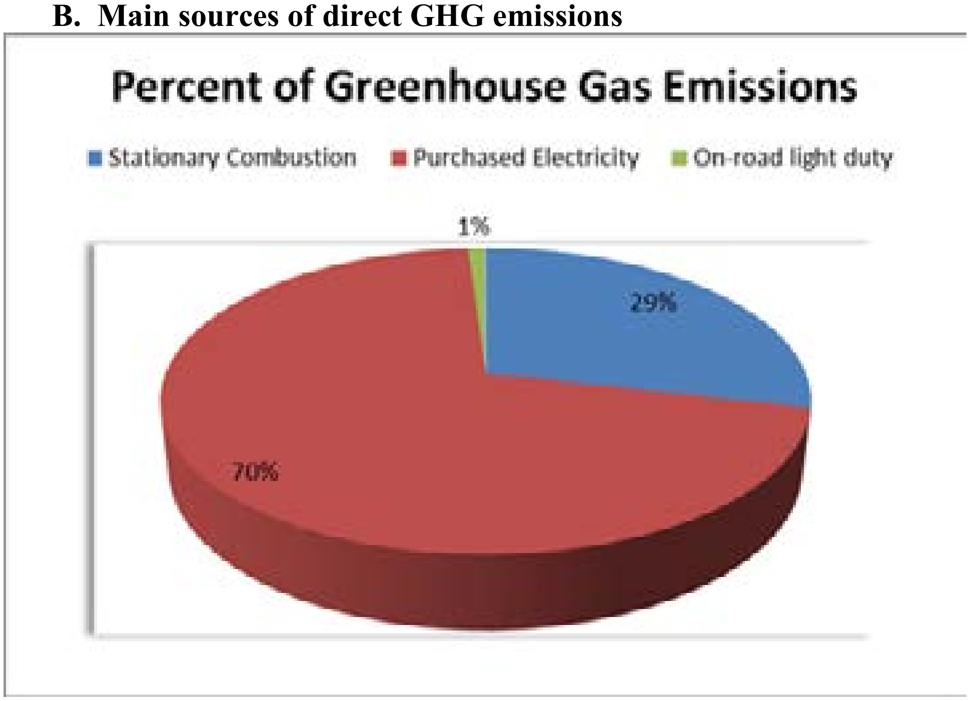
Pierce College has an established Sustainability Committee. The mission of this group is to provide leadership for the transition of the District into an environmentally sustainable college community by encouraging and coordinating sustainability initiatives, assisting with the development of the initiatives when needed and keeping the community informed about the district's progress towards sustainability. This committee will frame a district emphasis on sustainability to include but not be excluded to: existing curriculum; current institutional and student practices; new courses or programs; and the need to engage and communicate what is happening. Greenhouse gas reduction strategies that have been developed support the stated goals of the Sustainability Committee. This committee will play a strong role in communicating the value of reduction strategies to the college community and to help foster changes in culture and practice that will ensure the long-term success of these strategies.

2. Greenhouse Gas Emissions from District Operations

A. Direct sources of GHG emissions from building and fleet energy use

Year	**Greenhouse Gas Emissions** (metric tons carbon dioxide equivalent, $MTCO_2e$)
2005	4,474.40
2009 (or most recent year)	6103.60
2020 (projected)	6969.30
2035 (projected)	8085.70

B. Main sources of direct GHG emissions



C. Greenhouse Gas Reduction Targets

Year	GHG Reduction Target (MTCO$_2$e)
2020 (15% below 2005)	**3,803.24**
2035 (36% below 2005)	**2,863.62**
2050 (57.5% below 2005)	**1,901.62**

D. Level of GHG Reduction Needed to Meet Targets

Year	Amount of GHG Reduction Needed to meet Targets (MTCO$_2$e)
2020	**3166.06**
2035	**5222.08**

3. Overarching Strategies

The Pierce College District identified several broadly based strategies to help in reducing GHG emissions:

- Develop improved tracking methods and capabilities for monitoring GHG emissions.
- Conduct an investment grade energy audit.
- Establish a process for periodic measurement and verification of strategies implemented.
- Expand monitoring and controls systems for managing energy consumption.
- Develop an action plan that ensures strategies are viable over the long-term.
- Inform and engage the college community regarding reduction strategies and results.
- Work with District leadership in implementing sustainable organizational practices.
- Review and revise strategies, as necessary.

4. Greenhouse Gas Reduction Strategies for Direct Emission Sources (Building and Fleet Energy Use)

A. Strategies and Actions with Low to No Cost

Strategies and Actions	GHG Reduction Estimate Annual ($MTCO_2e$)	Upfront Cost Estimate ($)	Payback Period Estimate (Years)	Date to Imple-ment Estimate
Building Energy Use				
Implement policies for lighting conservation. Program lighting based on ambient light conditions and space occupancy without jeopardizing public safety.	undetermined	undetermined	undetermined	2014
Set building temperature parameters to conserve energy and maintain reasonable comfort levels.	undetermined	undetermined	undetermined	2014
Set building control systems to minimize operation of mechanical systems during non-occupancy periods.	undetermined	undetermined	undetermined	2013
Consolidate activities into fewer buildings where possible, particularly during evenings and weekends	undetermined	undetermined	undetermined	2014
Conduct a public information campaign to support reduction of energy use	undetermined	undetermined	undetermined	2014
Fleet Energy Use				
TOTALS:			N/A	N/A

B. Strategies and Actions with Payback within 7-10 years.

Strategies and Actions	GHG Reduction Estimate ($MTCO_2e$)	Upfront Cost Estimate ($)	Payback Period Estimate (Years)	Date to Imple-ment Estimate
Building Energy Use				
District Wide Selected Buildings - Controls Upgrade (Expansion): This measure will upgrade and expand the DDC energy management system for optimized HVAC control including: - Demand Controlled Ventilation using CO2 monitoring to regulate outside air in areas of sporadic occupancy - Occupancy sensing to setback and turn off HVAC equipment when the space is unoccupied - Incorporate Schedules for zones. - Convert all remaining pneumatic controls to DDC. - Full commissioning of HVAC systems to optimize performance.	1084.971	$1,027,525	7.61	2013-14
District Wide Remaining Buildings - Controls Upgrade (Expansion): This measure will upgrade and expand the DDC energy management system for optimized HVAC control including: - Demand Controlled Ventilation using CO2 monitoring to regulate outside air in areas of sporadic occupancy - Occupancy sensing to setback and turn off HVAC equipment when the space is unoccupied	Undetermined	Undetermined	Undetermined	Undetermined
District Wide Remaining Buildings - Retro Commissioning: This measure will retro-commission the functioning mechanical systems by calibrating sensors, optimizing control sequences, confirming mechanical systems are optimized to meet the current needs and verifying that outside airflows meet current codes.	Undetermined	Undetermined	Undetermined	Undetermined

District Wide - PC power management: This measure will install PC power management software to turn off computers when not in use.	125.063	$43,302	1.38	Undetermined
Fort Steilacoom Campus - Fixture Retrofit: This measure will install water conservation devices (.5 GPM aerators on lavs, 1.5 GPM aerators on remaining sinks, new 1.28 GPF water closets, new 1 pint urinals) to save water and energy for water heating. See plumbing spreadsheets for details.	17.841	$66,807	2.78	undetermined
Fort Steilacoom Olympic South Building - Water Heater: use heat exchanger and hot supply water from boiler to heat domestic hot water. Use electric heating element as backup.	12.326	$5,250	7.5	2014
Fort Steilacoom Health Education Center - Retro Commissioning: This measure will retro-commission the functioning mechanical systems by calibrating sensors, optimizing control sequences, confirming mechanical systems are optimized to meet the current needs and verifying that outside airflows meet current codes.	49.556	$17,010	2.66	2014
Puyallup Campus - Fixture Retrofit: This measure will install water conservation devices (.5 GPM aerators on lavs, 1.5 GPM aerators on remaining sinks, new 1.28 GPF water closets, new 1 pint urinals) to save water and energy for water heating.	3.23	$133,653	8.7	Undetermined
Fleet Energy Use				
TOTALS:	1,292.99	$1,293,547.00		
			N/A	N/A

C. Strategies and Actions with High Cost and Payback of more than 12 years.

Strategies and Actions	GHG Reduction Estimate ($MTCO_2e$)	Upfront Cost Estimate ($)	Payback Period Estimate (Years)	Date to Imple-ment Estimate
Building Energy Use				
District Wide - Submetering: This measure will install district wide (18 bldgs) sub metering for Gas, Electricity, and Water by building.	Undetermined	$189,000	Undetermined	2014
District Wide - Lighting Retrofit (interior): This measure will retrofit or replace interior lighting. - Retrofit/replace incandescent and fluorescent exit signs with LED technology - Daylighting sensor(s) - Occupancy/Unoccupancy sensor(s) with programmed start ballast fixtures	Undetermined	Undetermined	Undetermined	Undetermined
Fort Steilacoom Campus - Lighting Retrofit (exterior and parking): This measure will retrofit or replace exterior HID fixtures with LED This also includes adding 14 additional LED parking lot poles.	42.466	$304,424	58.93	2013-14
Fort Steilacoom Campus – Remaining Exterior Lighting: Lighting Retrofit (exterior and parking): This measure will retrofit or replace exterior and parking HID lighting with LED per lighting spreadsheet. - Separate exterior lighting circuits with additional relays and within Metasys to allow customizable Scheduling. Convert to NEX Light controls.	110.623	$413,119	23.71	Undetermined
Fort Steilacoom Health Education Center and Rainier Building - Disaggregate radiant heating and fan coil heating. This will allow condensing boilers to operate at lower return water temperature and achieve higher efficiency for radiant floor heating.	4.044	$15,750	32.35	2014
Fort Steilacoom Olympic South Building - Zone Dampers: Install zone isolation dampers on H-1, H-2, F-1.	Undetermined	Undetermined	Undetermined	2014
Fort Steilacoom Health Education Center - Add return air for gym tunnel. This will allow optimized morning warm-up, and allow night setback. Revise control sequencing.	Undetermined	Undetermined	Undetermined	Undetermined

Fort Steilacoom Cascade and Rainier Buildings - Boiler Sequencing: optimize boiler sequencing for energy efficiency	Undetermined	Undetermined	Undetermined	2014
Fort Steilacoom Rainier Building - Boiler to condensing model: This measure will replace the existing cast iron condensing boilers with new stainless steel high efficiency condensing models.	Undetermined	Undetermined	Undetermined	Undetermined
Fort Steilacoom Cascade Building - Boiler to condensing model: This measure will replace the existing boilers with new high efficiency condensing models. Includes boiler sequencing controls and hot water temperature reset.	69.601	$519,000	49.76	2014
Fort Steilacoom Cascade Building - Bookstore Electric Heater to Heat Pumps: This measure will replace the existing unit with heat pump technology.	1.967	$63,000	147.38	Undetermined
Fort Steilacoom Olympic North Building - Lab dedicated heat pump: install dedicated heat pump in lab to allow better HVAC system optimization.	Undetermined	Undetermined	Undetermined	Undetermined
Fort Steilacoom Cascade Building - Pump Centralization (Chilled Water): Replace multiple small pumps with one larger pump with variable speed control. Reconfigure chiller piping to allow one dedicated pump.	Undetermined	Undetermined	Undetermined	Undetermined
Fort Steilacoom Olympic South Building - Water heater to condensing model: This measure will replace the existing water heater with a new high efficiency condensing model.	Undetermined	Undetermined	Undetermined	Undetermined
Fort Steilacoom Rainier Building - Install ADA door openers to avoid the need to prop open doors all winter. This will improve air balancing.	Undetermined	$18,375	Undetermined	2013-14
Fort Steilacoom Olympic South Building - Controls: replace H-1 and H-2 3-way valves with 2-way valves (F-unit). Install dedicated boiler pump for Olympic South.	3.847	$8,400	24.35	2014
Fort Steilacoom Rainier Building - Water side economizing: This measure will install a heat exchanger in the mechanical room to allow waterside economizing when chiller operation is not required.	Undetermined	Undetermined	Undetermined	Undetermined
Puyallup College Center Building - Chiller - replace with heat pump chiller: This measure will replace the chiller with a new	Undetermined	Undetermined	Undetermined	Undetermined

heat pump chiller capable of providing heating and cooling.				
Puyallup Library/Science Building - Boiler to condensing model: This measure will replace the existing boilers with new high efficiency condensing models. Utilize condensing boiler for DHW via heat exchanger. Remove excess boiler circulation pumps.	23.805	$286,650	85.46	Undetermined
Puyallup Administration Building - Water heater to condensing model: This measure will replace the existing water heater with a new high efficiency condensing model. Investigate on-demand DHW.	Undetermined	Undetermined	Undetermined	Undetermined
Puyallup Library/Science Building - Water heater to condensing model: This measure will replace the existing water heater with a new high efficiency condensing model or combined heat and power.	4.581	$26,250	35.96	Undetermined
Puyallup Arts & Allied Health Building – Water side economizing. This measure will install a heat exchanger in the mechanical room to allow waterside economizing when chiller operation is not required.				
Puyallup College Center Building - Boiler to condensing model: This measure will replace the existing boilers with new high efficiency condensing models. Remove extra boiler circulation pumps.	4.327	$135,000	229.03	Undetermined
Fleet Energy Use				
TOTALS:	265.26	$1,978,968	N/A	N/A

5. Greenhouse Gas Reduction Strategies for Other Emission Sources (Employee Business Travel and Commuting)

The College has data on greenhouse gas emissions from employee commuting and business travel from 2009 and is still in the process of developing a stronger program for tracking these emissions. In compliance with Washington's Commute Trip Reduction Law (RCW 70.94.521-551), Pierce College is committed to commute trip reduction, with a program to identify and establish commute alternatives and policies that will reduce single occupant vehicle use, and vehicle miles traveled to and from work.

Source of GHG Emissions	**GHG Emissions, 2009 (or most recent year)** ($MTCO_2e$)
Business Travel	110.7
Employee Commuting	3322.0

Strategies and Actions	**GHG Reduction Estimate ($MTCO_2e$)**	**Upfront Cost Estimate ($)**	**Payback Period Estimate (Years)**	**Date to Imple-ment Estimate**
Employee Business Travel				
In process				
Employee Commuting				
Continued support of Commute Trip Reduction program				2008
Development of bicycle shelters				2014-16
TOTALS:			N/A	N/A

6. Additional Sustainability Strategies and Actions (if applicable)

Strategies and Actions	Co-benefits for GHG Reduction	Implementation Date Estimate
District Wide - Hand Dryers: Convert world dryers and paper towel systems to Xlerator Air dryer with low decibel nozzle. This includes 75 new hand dryers.	Reduction in paper towel use	Undetermined
District Wide - Green Cleaning practices implemented at both campuses	Reduction in chemical use. Use of environmentally friendly products.	2010
District Wide - Recycling Compactors: compactor currently installed at Fort Steilacoom. Installation at Puyallup dependent on funding availability	Reduction in waste stream	2011 Fort Steilacoom. TDB Puyallup
Fort Steilacoom Campus - Irrigation Control System: This measure will commission or add an automated irrigation control system to optimize water usage.	Reduction in water use	Undetermined

7. Next Steps and Recommendations

Next Steps:
Pierce College will continue to develop and revise specific strategies, as necessary. This will include working with an energy services firm, in this case Ameresco, to implement energy conservation measures. We successfully applied for an energy grant through the Department of Commerce in 2013 and will look for further grant opportunities in the future. Additionally, we are incorporating, wherever possible, energy conservation measures into repair and minor improvement projects. This allows us to repair or replace older mechanical, lighting and controls systems with newer more energy efficient devices.

The college continues to promote commuter reduction strategies and collaborates with Pierce Transit to promote use of mass transit. This includes the use of incentives to include trips and prizes.

We have implemented a very detailed method of tracking consumption of resources. This enables us to monitor progress in energy reduction strategies and to more accurately forecast future projected operational and energy costs. This also supports the development of data for reporting to Portfolio Manager.

Recommendations:
Continued regional support for the use of mass transit such as the ORCA card program and for the SAFE-Ride program would further encourage commuter trip reduction.
Programs that would enable public transit to extend operational hours to support agencies such as ours that conduct extensive evening programs would encourage further use of alternative transportation means.
Provide financial or other incentives to local municipalities to plan for and implement strategies that promote safer bike friendly routes into and through their communities.
Greater financial incentives for agencies to provide infrastructure to support alternatively fueled vehicles such as electric charging stations.

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6. cost estimate

RC
COST GROUP

Pierce College
STEM Building
Puyallup, WA

Pre-Design Estimate

Estimate Issue Date: **July 13, 2020**
Estimate Revision: **2**

For: Marc Gleason
McGranahan Architects
2111 Pacific Avenue, Suite 100
Tacoma, WA 98402

Pierce College
STEM Building
Puyallup, WA
Pre-Design Estimate

RC COST GROUP

Date: **July 13, 2020**

Exclusions from Construction Cost:

Design fees
Owners administration costs
Building and land acquisition fees
Legal and accounting fees
Removal of unforeseen underground obstructions
Owner’s furniture, furnishings and equipment
Owners supplied materials
Moving owners equipment and furniture
Compression of schedule, premium or shift work
Assessments, finance, legal and development charges
Builder's risk, project wrap-up and other owner provided insurance program
Washington State Sales Tax
AV Equipment

Assumption used in establishing the estimate:

Open and competitive bidding among all proportions of the work
Escalation has been included to the Start of Construction

Items that may affect the cost estimate:

Modifications to the scope of work included in this estimate.
Special phasing requirements other than mentioned above.
Restrictive technical specifications or excessive contract conditions.
Any non-competitive bid situations.
Bids delayed beyond the projected schedule.

Assumptions used in establishing the estimate:

A10: Foundations:

Scope of work continuous, brace frame footings and spread footings, perimeter drainage, reinforced concrete slab on grade, elevator pit.

B10: Superstructure:

Vertical and horizontal steel structure including BRB brace frames, metal deck and reinforced concrete topping slab at floor structure and housekeeping pads.

B20: Exterior enclosure:

Scope of work includes laid up brick and metal panel and metal panel soffits. The extent of brick would be 70% and 30% metal panels at opaque walls. Glazing scope includes curtain wall and storefront glazing. The extent of the glazing would be at approximately 30% to the gross wall area. Other scope would include louvers. Exterior door scope would include glazed aluminum doors at vestibules and hollow metal doors at other locations.

B30: Roofing:

Roof scope of work includes a PVC roofing system with R-38 insulation, sheet metal flashings, rough carpentry. Scope includes roof ladders, roof hatch, skylights.

C10: Interior Construction:

Interior partitions consist of metal stud framing, batt insulation and gypsum board, interior glazing, railings at open to below areas, operable partitions and interior doors. Fittings and specialties will include toilet partitions, signage, miscellaneous, restroom accessories fire extinguishers and cabinets.

C20: Stairs

Scope includes exit stairs and architectual stairs.

C30: Interior Finishes

Wall finishes include paint to gypsum board, porcelain tile at restroom wet walls, specialty wall finishes. Floor finishes include porcelain tile at restrooms, carpet tile, resilient flooring, polished concrete, walk off mats and sealed concrete at MEP rooms. Ceiling finishes include ACT and grid, gypsum board painted, specialty wall finishes.

D10: Conveying systems

One passenger elevator

D20: Plumbing

Plumbing include sanitary fixtures, sanitary waste, vent and service piping, water treatment, storage and circulation, surface water drainage, gas piping, fittings and specialties.

D30: Heating, Ventilation and Air Conditioning (HVAC)

Heat generation and chilling, thermal storage and circulation pumps, piping, fittings, valves and insulation, radiant systems, air handling equipment, air distribution and return, diffusers and return air grilles, controls, instrumentation and balancing.

D40: Fire Protection Systems

Wet pipe sprinkler system, standpipe systems to stairs.

D50: Electrical

Electrical scope includes main service and distribution, emergency or uniterrupted power, grounding systems, machine and equipment power, user convenience power, testing and seismic restraints. Other scope includes lighting and branch wiring, communications and security systems, alarm and access control and CCTV system rough-in only.

E10: Equipment

Equipment includes lab casework, equipment and accessories and residential appliances.

E20: Fixed Furnishing

Fixed furnishings include casework and interior and exterior window treatments.

Pierce College
STEM Building
Puyallup, WA
Pre-Design Estimate

RC COST GROUP

Date: **July 13, 2020**

OVERALL SUMMARY CONSTRUCTION COST *Prepared By:* AC

	GFA	$/SF	$
Preferred Option			
STEM Building	54,433 SF	483.17	26,300,587
Sitework			2,368,391
TOTAL CONSTRUCTION COST			**28,668,977**
Alternative Option			
STEM Building	54,433 SF	483.17	26,300,587
Sitework			3,122,989
TOTAL CONSTRUCTION COST			**29,423,575**

Pierce College		
STEM Building		
Puyallup, WA		RC COST GROUP
Pre-Design Estimate		
Building - Preferred Site	**BUILDING DATA**	**Date: July 13, 2020**

Building Area		
Level 1	21,605 SF	
Level 2	16,414 SF	
Level 3	16,414 SF	
Total Gross Floor Area		**54,433 SF**
Program		
Laboratories	11,970 SF	
Laboratory Support	4,900 SF	
Fab Lab	1,875 SF	
Classrooms	10,000 SF	
Student + Faculty Support	8,550 SF	
Building Support	3,530 SF	
Walls and Circulation	13,608 SF	
Total Gross Floor Area		**54,433 SF**

		Quantity	**Unit**	**Ratio to Gross Area**
Number of stories (x1,000)		3	EA	0.055
Gross Area		54,433	SF	1.000
Footprint Area		21,605	SF	0.397
Suspended Slab		32,828	SF	0.603
Gross Wall Area		34,340	SF	0.631
Retaining Wall Area (Excludes Stem Walls)		-	SF	
Opaque Finished Wall Area		24,038	SF	0.442
Windows or Glazing Area	30.00%	10,302	SF	0.189
Roof Area		22,253	SF	0.409
Roof Glazing Area		1,000	SF	0.018
Interior Partition Length		4,640	LF	0.085
Interior Doors Per Leaf		126	EA	0.002
Interior Glazing		2,150	SF	0.039
Finished Area		54,433	SF	1.000
Elevators (x10,000)		1	EA	0.018

Pierce College
STEM Building
Puyallup, WA
Pre-Design Estimate — **Gross Floor Area: 54,433 SF**
Building - Preferred Site — **Summary of Estimate** — **Date: July 13, 2020**

No.	Element Description		Element Totals	Group Totals	Cost Per SF	
A10	FOUNDATIONS			1,054,291		19.37
A1010	Standard Foundation		832,723		15.30	
A1020	Special Foundation				-	
A1030	Slab on grade		221,569		4.07	
A20	BASEMENT WALL CONSTRUCTION					-
A2010	Basement Excavation				-	
A2020	Basement Wall Construction				-	
B10	SUPERSTRUCTURE			2,643,500		48.56
B1010	Floor & Roof Construction		2,643,500		48.56	
B20	EXTERIOR ENCLOSURE			3,081,527		56.61
B2010	Exterior Walls		2,041,139		37.50	
B2020	Exterior Windows		968,388		17.79	
B2030	Exterior Doors		72,000		1.32	
B30	ROOFING			711,207		13.07
B3010	Roofing		711,207		13.07	
C10	INTERIOR CONSTRUCTION			1,720,698		31.61
C1010	Partitions		1,132,980		20.81	
C1020	Interior Doors		357,600		6.57	
C1030	Fittings		230,118		4.23	
C20	STAIRS			427,650		7.86
C2010	Stair Construction		427,650		7.86	
C30	INTERIOR FINISHES			1,232,145		22.64
C3010	Wall Finishes		369,382		6.79	
C3020	Floor Finishes		440,907		8.10	
C3030	Ceiling Finishes		421,856		7.75	
D10	CONVEYING			148,000		2.72
D1010	Elevators & Lifts		148,000		2.72	
D20	PLUMBING			1,224,743		22.50
D2010	Plumbing		1,224,743		22.50	
D30	HVAC			3,265,980		60.00
D3010	HVAC		3,265,980		60.00	
D40	FIRE PROTECTION			304,825		5.60
D4010	Sprinkler System		304,825		5.60	

Pierce College STEM Building Puyallup, WA Pre-Design Estimate Building - Preferred Site	Summary of Estimate		Gross Floor Area: Date:	54,433 SF July 13, 2020	
No.	**Element Description**		**Element Totals**	**Group Totals**	**Cost Per SF**
D50	ELECTRICAL			3,429,279	63.00
D5000	Electrical		3,429,279		63.00
E10	EQUIPMENT			614,428	11.29
E1010	Equipment		614,428		11.29
E20	FURNISHINGS			144,247	2.65
E2010	Fixed Furnishings		144,247		2.65
F10	SPECIAL CONSTRUCTION			-	-
F1010	Special Structure				
F1020	Special Construction				
	Sub-Total			**20,002,520**	**367.47**
	Estimating / Design Contingency	5.00%		1,000,126	18.37
	General Conditions / General Requirements	9.70%		2,037,257	37.43
	Sub-Total			**23,039,903**	**423.27**
	GC Fee	5.70%		1,313,274	24.13
	July 2020 Construction Cost			**24,353,177**	**447.40**
	Escalation - April 2022	8.00%		1,947,410	35.78
	TOTAL CONSTRUCTION COST			**$26,300,587**	**483.17**

Pierce College STEM Building Puyallup, WA Pre-Design Estimate Building - Preferred Site				
	Gross Floor Area:	**54,433**	**SF**	
	Date:	**July 13, 2020**		

	Item Description	Quantity	Unit	Unit Cost	Totals
A10	**FOUNDATIONS**				
A1010	**Standard Foundation**				
	A1011 Foundations				
	Reinforced concrete continuous footings	90	CY	885.00	79,650
	Reinforced concrete brace frame footings	660	CY	920.00	607,200
	A1012 Column foundations				
	Reinforced concrete spread footings	40	CY	870.00	34,800
	A1013 Perimeter drainage and insulation				
	Perimeter drain pipe and rock	690	LF	23.00	15,870
	Perimeter insulation	1,898	SF	4.33	8,216
	Miscellaneous				
	Concrete curbs	1	LS	10,500.00	10,500
	Reinforced concrete stem walls including waterproofing	45	CY	1,310.00	58,950
	Elevator pit, sump pit including slabs, walls and waterproofing	1	EA	17,536.50	17,537
	Total For Standard Foundations				**832,723**
A1020	**Special Foundation**				
	No work anticipated				N/A
	Total For Special Foundations				
A1030	**Slab on Grade**				
	A1031 Standard slab on grade				
	Reinforced concrete slab on grade, 4"	21,605	SF	9.70	209,569
	A1034 Trenches, pits and bases				
	Reinforced concrete pads / slab thickening	1	LS	12,000.00	12,000
	Total For Slab on Grade				**221,569**
A20	**BASEMENT CONSTRUCTION**				
A2010	**Basement Excavation**				
	No work anticipated				N/A
	Total For Basement Excavation				
A2010	**Basement Walls**				
	No work anticipated				N/A
	Total For Basement Walls				

Pierce College STEM Building Puyallup, WA Pre-Design Estimate Building - Preferred Site	*Gross Floor Area:* 54,433 SF *Date:* July 13, 2020			
Item Description	Quantity	Unit	Unit Cost	Totals
B1010 Floor & Roof Construction				
B1012 Upper floors construction				
Steel structure, vertical	40,050	LB	2.45	98,123
Steel structure, horizontal	339,770	LB	2.45	832,436
Channel steel and angle steel	22,000	LB	2.55	56,100
Lateral and moment connections	1	LS	55,000.00	55,000
Metal deck, 3"	32,828	SF	3.70	121,464
Reinforced concrete topping slab	32,828	SF	9.85	323,356
Equipment pads and curbs	1	LS	8,500.00	8,500
Brace frames including columns, beams and bracing	165,000	LB	3.10	511,500
Roof framing				
Steel structure, vertical	27,149	LB	2.45	66,515
Steel structure, horizontal	183,588	LB	2.45	449,792
Channel steel and angle steel	10,000	LB	2.55	25,500
Lateral and moment connections	1	LS	20,000.00	20,000
Metal deck	22,253	SF	3.38	75,216
Total For Floor & Roof Construction				**2,643,500**
B20 EXTERIOR CLOSURE				
B2010 Exterior Walls				
B2011 Exterior wall construction				
Opaque walls combination of brick veneer and metal panel wall systems	24,038	SF	40.00	961,520
Metal stud framing, batt and rigid insulation, WRB, sheathing, air/vapor barrier and GWB to interior side, painted	24,038	SF	32.00	769,216
Anti-grafitti coatings	1	LS	12,500.00	12,500
B2013 Exterior louvers, screens and fencing				
Louvers	1	LS	6,500.00	6,500
Mechanical screens including support framing	1	LS	134,000.00	134,000
B2014 Exterior sun control devices				
Sunscreens	610	LF	145.00	88,450
B2016 Exterior soffits				
Exterior soffits, gypsum board, painted	648	SF	35.00	22,685
Caulking, sealants and firestopping				
Caulking, sealants and firestopping	54,433	GFA	0.85	46,268
Total For Exterior Walls				**2,041,139**

Pierce College STEM Building Puyallup, WA Pre-Design Estimate Building - Preferred Site		*Gross Floor Area:* *Date:*	54,433 SF July 13, 2020		RC COST GROUP
	Item Description	Quantity	Unit	Unit Cost	Totals
B2020	**Exterior Windows**				
	B2022 Curtain walls				
	Curtain wall, 40% of glazed area	4,121	SF	112.00	461,530
	B2023 Storefronts				
	Storefront, 60% of glazed area	6,181	SF	82.00	506,858
	Total For Exterior Windows				**968,388**
B2030	**Exterior Doors**				
	B 2030 Exterior Doors				
	Exterior doors and entrance doors	1	LS	72,000.00	72,000
	Total For Exterior Doors				**72,000**
	ROOFING				
B3010	**Roof Covering**				
	B3011 Roof finishes				
	PVC roofing system with 1/2" cover board, R38 Rigid insulation, vapor retarder and gypsum base board, 1/2" thick	22,253	SF	22.80	507,372
	B3014 Flashings and trim				
	Sheet metal flashings and trim	1	LS	44,635.06	44,635
	B3021 Glazed roof openings				
	Skylights	1,000	SF	105.00	105,000
	B3022 Roof hatches				
	Roof access hatch, allow	1	EA	3,700.00	3,700
	Miscellaneous				
	Rough carpentry	1	LS	20,000.00	20,000
	Roof ladders and other accessories	1	LS	7,500.00	7,500
	Fall restraint anchors, allowance	1	LS	23,000.00	23,000
	Total For Roofing				**711,207**
C10	**INTERIOR CONSTRUCTION**				
C1010	**Partitions**				
	C1011 Fixed partitions				
	Interior partitions	4,640	LF	172.00	798,080
	C1013 Operable and folding panel partitions				
	Operable partitions, not required				N/A
	C1016 Interior balustrades and screens				
	Railings at open to below / stair extentions	410	LF	365.00	149,650

Pierce College STEM Building Puyallup, WA Pre-Design Estimate Building - Preferred Site		*Gross Floor Area:* 54,433 SF *Date:* July 13, 2020		
Item Description	**Quantity**	**Unit**	**Unit Cost**	**Totals**
C1017 Interior windows and storefronts				
Interior glazing / rated glazing	2,150	SF	75.00	161,250
Miscellaneous				
Bulkheads / interior soffits	1	LS	10,000.00	10,000
Blocking and backing	1	LS	14,000.00	14,000
Total For Interior Partitions				**1,132,980**
C1020 Interior Doors				
C1021 Interior doors				
Interior doors	126	EA	2,600.00	327,600
Specialty hardware	1	LS	30,000.00	30,000
Total For Interior Doors				**357,600**
C1030 Specialties				
C1032 Fabricated compartments and cubicles				
Toilet partitions and urinal screens	54,433	GFA	0.40	21,773
C1033 Storage shelving and lockers				
Janitors mop rack and shelf	3	EA	675.00	2,025
C1035 Identifying devices				
Code signage	54,433	SF	0.20	10,887
Wayfinding and room identification signage	54,433	SF	0.50	27,217
Exterior building signage	1	EA	25,000.00	25,000
C1037 General fittings and misc. metals				
Miscellaneous metals, allow 0.3#/SF	16,330	LB	3.00	48,990
Fire extinguisher cabinets	15	EA	340.00	5,100
Restroom accessories	1	LS	17,000.00	17,000
Elevator pit ladder	1	EA	1,363.95	1,364
Markerboards and whiteboards	54,433	GFA	1.00	54,433
Miscellaneous specialties	54,433	GFA	0.30	16,330
Total For Fittings and Specialty Items				**230,118**
C20 STAIRS				
C2010 Stair Construction				
C 2010 Stair Construction including railings and finish				
Stairs	1	LS	427,650.00	427,650
Total For Stair Construction				**427,650**
INTERIOR FINISHES				
C3010 Wall Finishes				

		Item Description	Quantity	Unit	Unit Cost	Totals
		C3012 Wall finishes to interior walls				
		Interior painting	54,433	GFA	3.10	168,742
		Miscellaneous wall finishes	54,433	GFA	2.40	130,639
		Sustainable feature	1	LS	70,000.00	70,000
		Total For Wall Finishes				**369,382**
	C3020	**Floor Finishes**				
		C3024 Flooring				
		Floor finishes and base	54,433	GFA	8.10	440,907
		Total For Floor Finishes				**440,907**
	C3030	**Ceiling Finishes**				
		C3031 Ceiling finishes				
		Ceiling finishes	54,433	GFA	7.75	421,856
		Total For Ceiling Finishes				**421,856**
D10						
	D1010	**Elevator & Lift**				
		D 1010 Elevators and Lifts				
		Passenger elevator, 3 stop 5,000 Capacity including cab finish	1	EA	148,000.00	148,000
		Total For Elevator & Lifts				**148,000**
D20		**PLUMBING**				
	D2010	**Plumbing**				
		Plumbing systems, complete	54,433	GFA	22.50	1,224,743
		Total For Plumbing				**1,224,743**
D30		**HVAC**				
	D3010	**HVAC**				
		HVAC systems	54,433	GFA	60.00	3,265,980
		Total For HVAC				**3,265,980**
D40		**FIRE PROTECTION**				
	D4010	**Fire Protection**				
		Fire protection				
		Fire suppression	54,433	GFA	5.60	304,825
		Total For Fire Sprinkler System				**304,825**

Pierce College
STEM Building
Puyallup, WA
Pre-Design Estimate
Building - Preferred Site

Gross Floor Area: **54,433 SF**
Date: **July 13, 2020**

		Item Description	Quantity	Unit	Unit Cost	Totals
D50		**ELECTRICAL**				
	D5000	**Electrical**				
		Electrical systems, complete	54,433	GFA	63.00	3,429,279
		Total For Electrical				**3,429,279**
E10		**EQUIPMENT**				
	E1010	**Equipment**				
		E1025 Audio-visual equipment				
		Projection screens, assumed FF&E				N/A
		E1027 Laboratory equipment				
		Lab equipment including BSC, CFH and autoclave	54,433	GFA	6.55	356,536.15
		Laboratory casework and countertops	54,433	GFA	2.72	148,057.76
		Lab mobile tables including frame and epoxy countertop	54,433	GFA	1.03	56,065.99
		Lab accessories	54,433	GFA	0.85	46,268.05
		E1094 Residential equipment				
		Residential appliances	1	LS	7,500.00	7,500.00
		Total For Equipment				**614,428**
E20		**FURNISHINGS**				
	E2010	**Fixed Furnishing**				
		E2012 Fixed casework				
		Casework at non-lab areas	54,433	GFA	1.80	97,979
		E2013 Blinds and other window treatments				
		Window treatments	54,433	GFA	0.85	46,268
		Total For Furniture				**144,247**
	F10	**SPECIAL STRUCTURES**				
	F1010	**Special Structure**				
		No work anticipated				N/A
		Total For Special Structure				
	F1020	**Special Construction**				
		No work anticipated				N/A
		Total For Special Construction				

Pierce College
STEM Building
Puyallup, WA
Pre-Design Estimate
Sitework - Preferred Option

Summary of Estimate

Date: **July 13, 2020**
Prepared By: AC

No.	Element Description		Element Totals	Group Totals	
G	BUILDING SITEWORK			1,743,264	
G10	Site Preparation		424,300		
G20	Site Improvement		529,337		
G30	Site Mechanical Utilities		489,627		
G40	Site Electrical Utilities		300,000		
	Sub-Total			**1,743,264**	
	Estimating / Design Contingency	8.00%		139,461	
	General Conditions / General Requirements	10.20%		192,038	
	Sub-Total			**2,074,763**	
	GC Fee	5.70%		118,262	
	July 2020 Construction Cost			**2,193,025**	
	Escalation - April 2022	8.00%		175,366	
	TOTAL CONSTRUCTION COST			**$2,368,391**	

Pierce College STEM Building Puyallup, WA Pre-Design Estimate Sitework - Preferred Option			*Date:* July 13, 2020 *Prepared By:* AC	RC COST GROUP
Item Description	**Quantity**	**Unit**	**Unit Cost**	**Totals**
G				
G10 Site Preparation				
G 1020 Site Demolition, Relocations, Site Clearance				
Hardscape and softscape	56,000	SF	0.80	44,800
Utilities and appurtances	1	LS	8,000.00	8,000
Protection to utilities	1	LS	6,500.00	6,500
Miscellaneous site demolition and site clearance	1	LS	65,000.00	65,000
G 1030 Site Earthwork				
Earthwork, allowance	1	LS	220,000.00	220,000
G1037 Erosion control				
Erosion control, allowance	1	LS	80,000.00	80,000
Total For Site Preparation				**424,300**
G20 Site Improvements				
G 2020 Parking Lots				
AC paving and base, 4" over 9"	40,000	SF	5.90	236,000
Concrete curbs	1,350	LF	28.00	37,800
Vehicle stall striping	100	EA	46.70	4,670
Wheelstops	100	EA	85.00	8,500
ADA markings and signage	3	EA	370.00	1,110
Pedestrian warning markings	1	LS	850.00	850
Emergency service vehicle lane	1	LS	30,000.00	30,000
G 2030 Pedestrian Paving				
Cast in place concrete paving at remaining areas	8,000	SF	8.00	64,000
Patch to paving at utility scope of work, allow	1	LS	10,000.00	10,000
G2041 Fences and gates				
Fences and gates	800	LF	35.00	28,000
G2042 Retaining walls				
No work anticipated				N/A
G2045 Site furnishings				
Site furnishings, allow	1	LS	10,000.00	10,000
G 2050 Landscaping				
G2051 Fine grading and soil preparation				
Fine grading and soil preparation	8,000	SF	0.15	1,200
G2053 Top soil and planting beds				
Topsoil	148	CY	50.00	7,407
G2055 Planting				
Softscape planting	8,000	SF	5.50	44,000
Trees	18	EA	500.00	9,000
Bio retention including grading, preparation, soil and planting	1,600	SF	13.00	20,800

Pierce College STEM Building Puyallup, WA Pre-Design Estimate Sitework - Preferred Option		Date: July 13, 2020 Prepared By: AC		RC COST GROUP
Item Description	**Quantity**	**Unit**	**Unit Cost**	**Totals**
G2057 Irrigation system				
Irrigation system, complete, shrub spray	8,000	SF	2.00	16,000
Total For Site Improvement				**529,337**
G30 Site Mechanical Utilities				
G 3010 Water Supply				
Water and fire utilities and connections	1	LS	108,000.00	108,000
G 3020 Sanitary Sewer				
Sanitary sewer utilities and connections	1	LS	41,250.00	41,250
G 3030 Storm Sewer				
Storm detention requirements and connections	1	LS	108,000.00	108,000
Detention pond	1	LS	120,000.00	120,000
Underslab drainage system	21,605	SF	3.35	72,377
G 3090 Other Site Mechanical Utilities				
Gas service and connections	1	LS	40,000.00	40,000
Total For Site Mechanical Utilities				**489,627**
G40 Site Electrical Utilities & Site Lighting				
Site electrical and lighting	1	LS	300,000.00	300,000
Total For Site Electrical Utilities				**300,000**

Pierce College
STEM Building
Puyallup, WA
Pre-Design Estimate
Sitework - Alternate Option

Summary of Estimate

Date: **July 13, 2020**
Prepared By: AC

No.	Element Description		Element Totals	Group Totals	
G	BUILDING SITEWORK			2,298,689	
G10	Site Preparation		504,300		
G20	Site Improvement		515,337		
G30	Site Mechanical Utilities		979,052		
G40	Site Electrical Utilities		300,000		
	Sub-Total			**2,298,689**	
	Estimating / Design Contingency	8.00%		183,895	
	General Conditions / General Requirements	10.20%		253,224	
	Sub-Total			**2,735,808**	
	GC Fee	5.70%		155,941	
	July 2020 Construction Cost			**2,891,749**	
	Escalation - April 2022	8.00%		231,240	
	TOTAL CONSTRUCTION COST			**$3,122,989**	

Pierce College
STEM Building
Puyallup, WA
Pre-Design Estimate
Sitework - Alternate Option

Date: July 13, 2020
Prepared By: AC

Item Description	Quantity	Unit	Unit Cost	Totals
G				
G10 Site Preparation				
G 1020 Site Demolition, Relocations, Site Clearance				
Hardscape and softscape	56,000	SF	0.80	44,800
Utilities and appurtances	1	LS	8,000.00	8,000
Protection to utilities	1	LS	6,500.00	6,500
Miscellaneous site demolition and site clearance	1	LS	20,000.00	20,000
G 1030 Site Earthwork				
Earthwork, allowance	1	LS	345,000.00	345,000
G1037 Erosion control				
Erosion control, allowance	1	LS	80,000.00	80,000
Total For Site Preparation				**504,300**
G20 Site Improvements				
G 2020 Parking Lots				
AC paving and base, 4" over 9"	40,000	SF	5.90	236,000
Concrete curbs	1,350	LF	28.00	37,800
Vehicle stall striping	100	EA	46.70	4,670
Wheelstops	100	EA	85.00	8,500
ADA markings and signage	3	EA	370.00	1,110
Pedestrian warning markings	1	LS	850.00	850
Emergency service vehicle lane	1	LS	30,000.00	30,000
G 2030 Pedestrian Paving				
Cast in place concrete paving at remaining areas	8,000	SF	8.00	64,000
Patch to paving at utility scope of work, allow	1	LS	10,000.00	10,000
G2041 Fences and gates				
Fences and gates	400	LF	35.00	14,000
G2042 Retaining walls				
No work anticipated				N/A
G2045 Site furnishings				
Site furnishings, allow	1	LS	10,000.00	10,000
G 2050 Landscaping				
G2051 Fine grading and soil preparation				
Fine grading and soil preparation	8,000	SF	0.15	1,200
G2053 Top soil and planting beds				
Topsoil	148	CY	50.00	7,407
G2055 Planting				
Softscape planting	8,000	SF	5.50	44,000
Trees	18	EA	500.00	9,000
Bio retention including grading, preparation, soil and planting	1,600	SF	13.00	20,800

Pierce College
STEM Building
Puyallup, WA
Pre-Design Estimate
Sitework - Alternate Option

Date: **July 13, 2020**
Prepared By: **AC**

Item Description	Quantity	Unit	Unit Cost	Totals
G2057 Irrigation system				
Irrigation system, complete, shrub spray	8,000	SF	2.00	16,000
Total For Site Improvement				**515,337**
G30 Site Mechanical Utilities				
G 3010 Water Supply				
Water and fire utilities and connections	1	LS	91,800.00	91,800
G 3020 Sanitary Sewer				
Sanitary sewer utilities and connections	1	LS	18,750.00	18,750
G 3030 Storm Sewer				
Storm detention requirements and connections	1	LS	108,000.00	108,000
Detention tanks	43,500	CF	13.75	598,125
Detention pond	1	LS	60,000.00	60,000
Underslab drainage system	21,605	SF	3.35	72,377
G 3090 Other Site Mechanical Utilities				
Gas service and connections	1	LS	30,000.00	30,000
Total For Site Mechanical Utilities				**979,052**
G40 Site Electrical Utilities & Site Lighting				
Site electrical and lighting	1	LS	300,000.00	300,000
Total For Site Electrical Utilities				**300,000**

Back to Table of Contents

7. c-100 cost estimate

State of Washington
AGENCY / INSTITUTION PROJECT COST SUMMARY
Updated June 2020

Agency	Pierce College - Puyallup
Project Name	Science, Technololgy, Engineering, Mathematics (STEM) Building
OFM Project Number	40000293 Building and Infrastructure

Contact Information

Name	Wayne Doty
Phone Number	360-704-4382
Email	wdoty@sbctc.edu

Statistics

Gross Square Feet	54,400	MACC per Square Foot	$447
Usable Square Feet	40,825	Escalated MACC per Square Foot	$474
Space Efficiency	75.0%	A/E Fee Class	B
Construction Type	Science labs (teaching)	A/E Fee Percentage	6.97%
Remodel	No	Projected Life of Asset (Years)	50

Additional Project Details

Alternative Public Works Project	Yes	Art Requirement Applies	Yes
Inflation Rate	2.38%	Higher Ed Institution	Yes
Sales Tax Rate %	9.90%	Location Used for Tax Rate	1601 39th Ave SE, Puyallup WA 98374
Contingency Rate	5%		
Base Month	June-20	OFM UFI# (from FPMT, if available)	new construction
Project Administered By	DES		

Schedule

Predesign Start	April-20	Predesign End	July-20
Design Start	July-21	Design End	June-22
Construction Start	April-22	Construction End	September-23
Construction Duration	17 Months		

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Project Cost Estimate

Total Project	**$38,332,454**	Total Project Escalated	**$40,599,000**
		Rounded Escalated Total	**$40,599,000**

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY
Updated June 2020

Agency	Pierce College - Puyallup	
Project Name	Science, Technololgy, Engineering, Mathematics (STEM) Building	
OFM Project Number	40000293 Building and Infrastructure	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$289,461		
A/E Basic Design Services	$0		
Extra Services	$280,000		
Other Services	$200,000		
Design Services Contingency	$38,473		
Consultant Services Subtotal	**$807,934**	**Consultant Services Subtotal Escalated**	**$840,424**

Construction			
GC/CM Risk Contingency	$1,061,848		
GC/CM or D/B Costs	$3,470,000		
Construction Contingencies	$1,215,759	Construction Contingencies Escalated	$1,290,650
Maximum Allowable Construction Cost (MACC)	$24,315,182	Maximum Allowable Construction Cost (MACC) Escalated	$25,774,620
Sales Tax	$2,976,216	Sales Tax Escalated	$3,155,752
Construction Subtotal	**$33,039,005**	**Construction Subtotal Escalated**	**$35,032,032**

Equipment			
Equipment	$2,482,739		
Sales Tax	$245,791		
Non-Taxable Items	$0		
Equipment Subtotal	**$2,728,530**	**Equipment Subtotal Escalated**	**$2,896,608**

Artwork			
Artwork Subtotal	**$201,985**	**Artwork Subtotal Escalated**	**$201,985**

Agency Project Administration			
Agency Project Administration Subtotal	$0		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$250,000**	**Project Administation Subtotal Escalated**	**$265,400**

Other Costs			
Other Costs Subtotal	**$1,305,000**	**Other Costs Subtotal Escalated**	**$1,362,551**

Project Cost Estimate			
Total Project	**$38,332,454**	Total Project Escalated	**$40,599,000**
		Rounded Escalated Total	**$40,599,000**

Cost Estimate Details

Acquisition Costs					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Purchase/Lease					
Appraisal and Closing					
Right of Way					
Demolition					
Pre-Site Development					
Other					
Insert Row Here					
ACQUISITION TOTAL	**$0**		**NA**	**$0**	

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Cost Estimate Details

Consultant Services					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services					
Programming/Site Analysis					
Environmental Analysis					
Predesign Study	$289,461				
Insert Row Here					
Sub TOTAL	**$289,461**		**1.0258**	**$296,929**	Escalated to Design Start
2) Construction Documents					
A/E Basic Design Services	$1,227,860				69% of A/E Basic Services
Zero-out Basic Services	-$1,227,860				Basic Services part of Design-Build contract
Insert Row Here					
Sub TOTAL	**$0**		**1.0369**	**$0**	Escalated to Mid-Design
3) Extra Services					
Civil Design (Above Basic Svcs)					
Geotechnical Investigation	$70,000				
Commissioning	$60,000				
Site Survey					
Testing					
LEED Services					
Voice/Data Consultant					
Value Engineering	$45,000				
Constructability Review					
Environmental Mitigation (EIS)	$40,000				
Landscape Consultant					
Design Build Selection	$10,000				
Traffic Analysis	$35,000				
Honorarium	$20,000				
Sub TOTAL	**$280,000**		**1.0369**	**$290,332**	Escalated to Mid-Design

4) Other Services				
Bid/Construction/Closeout	$551,647			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Commissioning & Training	$100,000			
Construction Materials Testing	$100,000			
Zero-out Basic Services	-$551,647			Basic Services part of Design-Build contract
Insert Row Here				
Sub TOTAL	**$200,000**	**1.0616**	**$212,320**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$38,473			
Insert Row Here				
Sub TOTAL	**$38,473**	**1.0616**	**$40,843**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$807,934**		**$840,424**	

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Cost Estimate Details

Construction Contracts					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work					
G10 - Site Preparation	$424,300				
G20 - Site Improvements	$529,337				
G30 - Site Mechanical Utilities	$489,627				
G40 - Site Electrical Utilities	$300,000				
G60 - Other Site Construction					
Z10 - Contractors General Requiremens	$310,300				General Conditions + DB Fee
Estimating Contingency	$139,461				
Sub TOTAL	**$2,193,025**		**1.0441**	**$2,289,738**	
2) Related Project Costs					
Offsite Improvements					
City Utilities Relocation					
Parking Mitigation					
Stormwater Retention/Detention					
Other					
Insert Row Here					
Sub TOTAL	**$0**		**1.0441**	**$0**	
3) Facility Construction					
A10 - Foundations	$1,054,291				
A20 - Basement Construction	$0				
B10 - Superstructure	$2,643,500				
B20 - Exterior Closure	$3,081,527				
B30 - Roofing	$711,207				
C10 - Interior Construction	$1,720,698				
C20 - Stairs	$427,650				
C30 - Interior Finishes	$1,232,145				
D10 - Conveying	$148,000				
D20 - Plumbing Systems	$1,224,743				
D30 - HVAC Systems	$3,265,980				
D40 - Fire Protection Systems	$304,825				
D50 - Electrical Systems	$3,429,279				
F10 - Special Construction					
F20 - Selective Demolition					
General Conditions					
E10 Equipment Installed by Contractor	$614,428				
E20 - Furnishings Installed by Contractor	$144,247				
Z10 - Contractors General Requiremens	$3,350,531				General Conditions + DB Fee
Contingency	$1,000,126				
Efficiency savings from DB process	-$2,231,020				
Insert Row Here					

Sub TOTAL	**$22,122,157**	**1.0616**	**$23,484,882**
4) Maximum Allowable Construction Cost			
MACC Sub TOTAL	**$24,315,182**		**$25,774,620**

5) GCCM Risk Contingency				
GCCM Risk Contingency				
DB Risk Contingency	$1,061,848			Risk calculated at 4% before efficiency savings
Insert Row Here				
Sub TOTAL	**$1,061,848**	**1.0616**	**$1,127,258**	
6) GCCM or Design Build Costs				
GCCM Fee				
Bid General Conditions				
GCCM Preconstruction Services	$225,000			
A/E Basic and Extra Design Services	$3,245,000			
Insert Row Here				
Sub TOTAL	**$3,470,000**	**1.0616**	**$3,683,752**	
7) Construction Contingency				
Allowance for Change Orders	$1,215,759			
Other				
Insert Row Here				
Sub TOTAL	**$1,215,759**	**1.0616**	**$1,290,650**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.0616**	**$0**	
Sales Tax				
Sub TOTAL	**$2,976,216**		**$3,155,752**	
CONSTRUCTION CONTRACTS TOTAL	**$33,039,005**		**$35,032,032**	

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Cost Estimate Details

Equipment					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
E10 - Equipment	$863,561				
E20 - Furnishings	$755,617				
F10 - Special Construction					
A/V Equipment, Telcom/Cabling	$863,561				
Insert Row Here					
Sub TOTAL	**$2,482,739**		**1.0616**	**$2,635,676**	
1) Non Taxable Items					
Other					
Insert Row Here					
Sub TOTAL	**$0**		**1.0616**	**$0**	
Sales Tax					
Sub TOTAL	**$245,791**			**$260,932**	
EQUIPMENT TOTAL	**$2,728,530**			**$2,896,608**	

Green cells must be filled in by user

Cost Estimate Details

Artwork						
Item	Base Amount		Escalation Factor	Escalated Cost	Notes
Project Artwork	$0				0.5% of total project cost for new construction
Higher Ed Artwork	$201,985				0.5% of total project cost for new and renewal construction
Other					
Insert Row Here					
ARTWORK TOTAL	**$201,985**		**NA**	**$201,985**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$0				
Additional Services					
PC Project Management	$250,000				
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$250,000**		**1.0616**	**$265,400**	

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Cost Estimate Details

Other Costs					
Item	Base Amount		Escalation Factor	Escalated Cost	Notes
Mitigation Costs					
Hazardous Material Remediation/Removal					
Historic and Archeological Mitigation					
Permit and Plan Review Fees	$250,000				$261,025
LEED Registration/Certification Fee	$5,000				$5,221
Landuse and Development Fee	$150,000				$156,615
Parking Mitigation Cost	$900,000				$939,690
OTHER COSTS TOTAL	**$1,305,000**		**1.0441**	**$1,362,551**	

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C-100(2020)
Additional Notes

Tab A. Acquisition
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Tab B. Consultant Services
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Tab C. Construction Contracts
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Tab D. Equipment
Insert Row Here

Tab E. Artwork
Insert Row Here

Tab F. Project Management
Insert Row Here

Tab G. Other Costs
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Back to Table of Contents

8. landscape narrative

Landscape Narrative

STEM Building
Pierce College, Puyallup

Site Program

- Connect to the campus commons and the pedestrian network.
- Provide additional ADA connection to the existing parking lot.
- Preserve and enhance the existing forest landscape to the north.
- Forest restoration and upland conifer reference ecology provide learning opportunities and potential ties to the curriculum.
- Include ethnobotanical and other cultural interpretation of native plantings.
- Promote biophilic design with interior views out to the forest.
- Integrate stormwater with outdoor classroom to maximize educational opportunities and highlight sustainable features of the landscape.

Plant Materials

- Planting design and proposed maintenance to support CPTED standards.
- Plant materials to be predominantly native with limited use of well-adapted species.
- Lawn areas should be limited to connection to the existing commons.

Irrigation

- A new permanent system to be installed for the new building.
- Potentially tie into existing systems along the commons and the existing parking lot.
- If the second LEED point for outdoor water use reduction is pursued, rainwater capture or non-irrigated landscape may be considered.
- Irrigation equipment to be efficient to achieve LEED outdoor water use reduction credit.

Paving

- Cast in place concrete paving and precast concrete pavers complimentary to existing paving on campus.

Site Furnishings

- benches, bike racks, and waste/recycling receptacles

Berger Partnership PS
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Back to Table of Contents

9. civil narrative

PROJECT MEMO

Science Building

Pierce College, Puyallup

CIVIL NARRATIVE

Pierce College is evaluating the feasibility of building a new science, technology, engineering, and mathematics (STEM) building and an additional parking lot at its Puyallup campus. The new science building would be two or three stories and be constructed in a tree-vegetated, undeveloped portion of the campus east of the Arts and Allied Health Building and north of the Brouillet Library/Science Building and west of an existing parking lot. A parking lot would be constructed at the northwest corner of the campus south of the existing access drive lane, and north of the Health Education Center. The proposed parking lot would add a net 100 new parking spaces. The combined project area is approximately 80,000 square feet (1.84 acres).

The project includes construction of the new building, sidewalks, parking areas, and site utilities. A fire and service lane is proposed northeast of the building. The existing parking lot east of the proposed building will be constructed to provide at minimum the code required ADA accessible parking stalls. Existing paved roadways will be used for fire access on the east, south, and west sides of the building.

DEMOLITION AND CLEARING

Work will include demolition of pavement, clearing and grubbing, and stripping topsoil. Designated areas will be cleared of vegetation, debris and topsoil. Demolished materials will be disposed off site at permitted locations. Clean topsoil material will either be reused as part of the project or placed within a designated location on the campus.

EROSION CONTROL AND SITE GRADING

During the initial phase of sitework, temporary erosion control facilities will be installed. Erosion control measures will include best management practices including silt fences, catch basin protection, sediment traps, and other measures. Existing paved driveways will be utilized for construction access.

The topography across the science building site drops from the west to the east. Based on the campus mapping, the elevations along the west corner of the building are about 528 feet; the elevations along the east corners of the building are about 522 feet; the building finish floor is estimated to be near elevation 525. The elevation at the parking lot is about 519 feet. The main entrance located to the west of the parking lot should provide distance to accommodate ADA accessible walkways of less than 5.0-percent between the parking lot and the main building entrance.

WATER AND FIRE SERVICE

The water purveyor for the site is the City of Puyallup Water Department. Water mains on campus are owned and maintained by Pierce College. An existing water main serving a fire hydrant is located southwest of the science building site, looping around the College Center Building. Another existing water main is located north of the site along the north edge of College Way, which turns north and routes offsite towards Wildwood Park Drive. In order to provide adequate fire hydrant coverage, a 12-inch water main is proposed to connect these two existing water mains, running along the south and east edge of the site. This new water loop will also provide water and fire protection to an area of undeveloped land north of the site identified in campus master planning documents as a future building site. The project proposes to add four new fire hydrants as part of the water main construction to provide adequate coverage to the new building.

The new science building will be sprinkled. The fire service is anticipated to be 6-inch. A new fire service, fire department connection, double-detector check valve, and other appurtenances will be required from the water main. Fire flow testing will need to be completed to confirm that available fire flow and pressure is adequate.

The science building site is served by a parking lot drive aisle east of the site and a walkway designed to serve as a fire lane west of the science building site, between College Way and the east parking lot, providing adequate existing fire department access

A new domestic water service will be required. The domestic service is anticipated to be 4-inch. The proposed water main will minimize the distance between the water main and the building.

SANITARY SEWER SERVICE

An existing 8-inch sanitary sewer main is located in the roadway west of the College Center and Arts & Allied Health Buildings within College Way. The invert in the nearest upstream and downstream manholes are 522 feet and 510 feet, making connection to this sanitary sewer feasible for a gravity system. The existing sanitary sewer system outfalls to an existing pump station located adjacent to the HEC Building. A new 8-inch sanitary sewer will be provided between the new science building and the existing sanitary sewer. The new sanitary sewer line will be routed around the existing second growth forest located west of the proposed science building. The second growth forest will not be impacted by the installation of the proposed sewer line. The City of Puyallup requires confirmation that the pump station has adequate capacity for the building’s sewage.

STORMWATER DRAINAGE

Construction of the new science building will trigger stormwater improvements, including flow control and water quality. The project creates minimal, if any, pollution-generating surfaces so water quality treatment is not anticipated. A preliminary estimate based on 38,000 square feet of new and replaced impervious surfaces would require a detention volume of 21,000 cubic feet. An open pond is the preferred facility for stormwater management due to costs and available land. Additional stormwater management alternatives will be detailed in the list below. The pond will be located to the north of the proposed building and west of the existing parking lot. The detention pond outlet would connect to an existing storm drain pipe located north of the proposed science building along the north drive access lane. In addition, Low Impact Development (LID) facilities will be required to the maximum extent feasible. These may

CIVIL NARRATIVE

include bioretention facilities (rain gardens), green roofs, rainwater harvesting, and permeable pavements. To meet flow control requirements, these BMP's require site soils that are allow stormwater infiltration. While infiltration is a desirable LID technique, based upon past geotechnical work completed at the site, we anticipate that the site soils are glacial till and not conducive to infiltration of stormwater. Therefore, infiltration is not feasible and a detention pond is proposed to meet stormwater flow control requirements. The City of Puyallup require that a geotechnical engineer confirm on-site infiltration is not feasible. A bioretention facility can be provided for educational purposes, however the facility won't allow the project to obtain additional stormwater LEED points as the facility would only provide water quality and not infiltration.

Construction of the new 100 stall parking lot will trigger stormwater improvements, including flow control and water quality treatment. A preliminary estimate based on 40,000 square feet of new and replaced impervious surfaces would require a detention volume of 22,500 cubic feet. An open detention pond will be required and located immediately to the south of the parking lot, on undeveloped land. The City of Puyallup require that a geotechnical engineer confirm on-site infiltration is not feasible. The detention pond outlet would discharge to an existing wetland located to the south of the proposed parking lot. A bioretention facility or mechanical system such as a Filterra will be utilized to meet stormwater quality requirements.

Alternative stormwater management options are available for the science building and the 100-stall parking lot. Two alternative options were explored both utilizing underground 6-foot diameter corrugated metal detention pipes with different systems for stormwater quality treatment.

- Alternative Option 1: Includes underground detention pipe with a bioretention facility upstream.
- Alternative Option 2: Includes detention pipe with Filterra treatment units upstream. for stormwater quality treatment.

Both alternative options include underground detention pipe which is considerably higher in cost than the above ground detention pond. However, it allows for an increased in usable land at the campus as the detention system would be underground. The first alternative option of bioretention for stormwater quality treatment serves as a learning tool for students. Additionally, a bioretention facility is a cheaper option for water quality treatment. The second alternative option offers more flexibility for placement of the stormwater quality system due to the decreased footprint required for the Filterra units.

SUB-DRAINAGE SYSTEMS

Poorly draining soils in the area and experience designing previous buildings on this campus indicate that a well-designed foundation drain system is a likely necessity. A 6-inch deep capillary break and 4-inch diameter perforated pipes spaced 15-feet on-center surrounded by a 16-inch by 12-inch gravel trench are expected under the slabs of the science building.

CIVIL NARRATIVE

SURFACING SYSTEMS

Sidewalks shall be constructed of cement concrete. The emergency and service vehicle lane northeast of the building will be constructed of concrete. Both the improved parking lot east of the building and new 100 stall parking lot at the northwest corner of the site will be constructed with asphalt concrete pavement.

ACCESSIBLE PARKING STALLS

The addition of a total of 100 parking stalls to the campus will require the inclusion of 4 accessible parking stalls. In order to meet the intent of the Americans with Disabilities Act, the four accessible parking stalls will be located as close as possible to campus buildings. A likely location will be in the parking lot immediately to the east of the new science building.

GAS SERVICE

An existing gas main is located adjacent to College Way west of the College Center and Arts & Allied Health Buildings. A new gas service will be provided between the new science building and the existing gas line.

POWER AND TELECOM SERVICE

An existing power and telecommunications duct bank is located adjacent to College Way west of the College Center and Arts & Allied Health Buildings. A new power and telecommunications service will be provided between the new science building and the existing duct bank. The new power and telecommunications services will be routed around the existing second growth forest located west of the proposed science building. The second growth forest will not be impacted by the installation of the proposed utilities. The electrical engineer will analyze the proposed loads and data needs to determine if additional improvements are required.

OFF-SITE IMPROVEMENTS

Off-site improvements are not contemplated.

ALTERNATIVE WEST SITE - SCIENCE BUILDING

Advantages:

- The proposed west site alternate is located east of the existing child development center and west of College Way. An existing sewer main is routed within College Way in the near proximity to the west site alternate. A 100-foot sewer line is required for connection to the existing main. In contrast the sewer line at the preferred site is approximately 600 feet away for its connection point.

CIVIL NARRATIVE

Disadvantages:

- The proposed building is situated within an existing grass field. The south portion of the building straddles a steep slope with approximately 9 feet of drop. The grade transition requires fill to be imported to raise the site to building pad elevation. Additionally, the portion of the building that is located over the steep slope will require a cast in place retaining wall or extended footing to bring the southern portion of the building up to finish floor elevation.
- The science building will be placed such that the building's footprint will occupy the entire grass field it is located in. There is not a feasible location for a stormwater detention pond in the surrounding area. Therefore, an underground detention system will be required. The detention system will most likely be placed under the existing parking lot to the north of the proposed building. The underground detention system will be considerably more expensive than an open detention pond. Additionally, the existing asphalt parking lot will require repaving after installation of the underground detention system and stormwater quality treatment for the replaced paving.

- The detention system outfall will tie into the existing storm system along College Way approximately 200 feet north of the northeast corner of the new science building. This will require a storm line to be routed north in the adjacent landscape area prior connecting to the existing storm system in College Way. The mature landscaping located in the landscape strip east of the basketball court and west of College Way will need to be replaced.

Back to Table of Contents

10. structural narrative

July 13, 2020

STRUCTURAL NARRATIVE
PIERCE COLLEGE PUYALLUP
STEM BUILDING

Design Criteria

All methods, materials, and workmanship shall conform to the *2018 International Building Code.* Design loads shall be determined from *ASCE 7-16 Minimum Design Loads for Buildings and Other Structures.* Loads are as follows:

- Floor Live Load: 100 psf at classrooms, offices and floor corridors.
- Roof Snow Load: 25 psf.
- Wind Loads: Three-second peak gust: 115 mph. Exposure B.
- Seismic Loads: As determined by the USGS hazard data. Site class D, with Short Period Spectral Response Acceleration, Ss, equal to 125.30 percent g, and One-Second Spectral Response Acceleration, S1, equal to 43.20 percent g. The Response Modification Coefficient R is 8.

Foundation

A preliminary geotechnical report is to be prepared for this site. Adjoining buildings are supported on shallow foundations, therefore if permitted at the new site the foundations will be conventional concrete foundations. Foundations will consist of perimeter footing with stem wall to support exterior walls, interior spread footings below columns, and grade beams below braced frames. Foundations will bear at frost depth, assumed to be 18 in. below finish grade as a minimum. Foundations should be designed for bearing pressure, seismic sliding and overturning forces, and to minimize overall settlement and differential settlement.

The ground floor of the building will be concrete slab on grade throughout the building. The slab will be 4-in. minimum thickness with fibrous concrete reinforcement, welded wire reinforcement or reinforcing bar. Control joints will be provided throughout the slab to reduce random cracking.

Wall Framing

Exterior walls and non-bearing interior walls will be cold-formed steel metal studs at 16” o.c. Exterior metal studs will be designed to support finish materials and resist out-of-plane wind loads. Typical exterior studs will be 6” or 8” x 43 mil studs at 16” o.c. The wall framing at the exterior will be designed as non-bearing wall elements.

Masonry veneers have been used on multiple buildings on the campus and if used they are non-structural but will be anchored to the metal studs with adjustable veneer ties spaced at 16” o.c. each direction. Precast concrete elements, if used, are non-structural, but will be anchored to the metal studs or the floor framing directly.

Supplemental structural steel will be used at some walls where there are large openings, parapets, screen walls, or discontinuities.

Retaining walls or basement walls that retain soil would be reinforced concrete walls.

Floor Framing – Steel

Structured floors will be constructed with structural steel and concrete. The floor surface will be concrete topping reinforced with welded wire reinforcing. The topping will be placed over 2”, Type W2 Formlock, corrugated metal decking. The concrete will be reinforced with welded wire reinforcement and the thickness will be 5-1/2 in.

Steel wide-flange beams will support the floor and will be anchored to the concrete topping with headed studs for composite beam behavior. The floor framing will be designed to resist the live loads for the spaces depending on the use of the spaces.

Serviceability of the floor including deflections and vibrations are to be considered in the design of the spaces. Floor framing will be evaluated based on the American Institute of Steel Construction publication *Floor Vibrations Due to Human Activity.* Expected building uses include laboratory spaces, classrooms and faculty offices so the vibration criteria for different parts of the building may vary and may be designed to meet criteria for sensitive equipment as recommended by the design team.

The steel beams and girders will be supported by HSS steel columns.

Roof Framing – Steel

Roof framing will be constructed with structural steel or steel joists. The roof will have 1½“ Type B or 3” Type N metal deck supported by joists or wide flange beams. Girders are expected to be wide flange members. Roof areas supporting mechanical equipment will be constructed with concrete topping, similar to floor framing.

Roof screens will be constructed with structural steel elements.

Lateral Resisting System

Lateral forces will be transmitted by diaphragm action of the metal deck roof diaphragm and the concrete floor diaphragms to the lateral force resisting elements. Common lateral force resisting elements for this type of building are classified in the IBC as Steel Buckling-Restrained Braced Frames (BRBs). The BRBs will be constructed with wide flange columns, wide flange horizontals, and manufacturer-designed braces. Ideally the BRB frames would extend uninterrupted from the foundation to the roof and would be uniformly distributed to minimize code requirements for magnifying the design loads.

Loads will be transferred to the foundation by the BRBs where ultimate displacement is resisted by passive pressure. Overturning is resisted by the dead load of the structure, and by the use of grade beams.

Collectors will be provided throughout the roof and floor diaphragms to drag lateral forces to the BRBs. It is expected that collectors would be constructed with steel reinforcement within the concrete floor slabs, and by steel beams.

There are alternatives to the BRB bracing system for the building. Other common approaches include Special Concentrically Braced Frames (SCBF) and concrete shear walls. SCBFs are similar in configuration and layout to the BRB framing, but currently are an added cost to the structural cost. Concrete shear walls are an economical option when there are layouts that can accommodate multiple full height concrete walls and when the walls are left exposed as feature walls.

Alternative Framing

There should be alternatives considered for the structural framing. A concrete frame building that uses concrete shear walls, concrete floors and concrete roofs are an option that could be economical and result in lower floor-to-floor heights. Post-tensioned slabs could be considered for the floors, but this tends to limit future building flexibility.

Wood elements, such as heavy timber elements at the roof framing are potential options that could be cost effective and provide an attractive aesthetic. The potential savings with this method would be realized by exposing these elements to view. It is also possible to employ mass timber construction, such as CLT, for floor or roof elements. CLT has sustainability benefits but is currently a more expensive option in most cases.

As mentioned in the Lateral Resisting System section, there are multiple lateral force resisting systems that can be considered for the building depending on layout.

Sustainability

Any of the following that function as part of a structural system or structural assembly: concrete including cast in place, shotcrete and precast; unit masonry; metal of any type; wood of any type, but not limited to, wood composites and wood laminated products shall, where feasible, have an Environmental Product Declaration that meets one of the following requirements:

1. Facility-specific Environmental Product Declaration, Type III (i.e., conforms to ISO 14025 and has at least a cradle to gate scope).
2. A publicly available, critically reviewed life-cycle assessment conforming to ISO 14025 (i.e., has at least a cradle to gate scope).

Back to Table of Contents

11. mechanical narrative

Pierce College STEM Predesign

Basis of Design

notkin
a P2S INC company

www.p2sinc.com

July 6, 2020
Notkin-P2S Project No. P30161

TABLE OF CONTENTS

1.0 PROJECT BACKGROUND

1.1 General

The Pierce College Puyallup campus currently has no space in which to host a Science, Technology, Engineering, and Math (STEM) program. A new 3-story, 54,000 square foot building is proposed that will contain 11 STEM classrooms, eight teaching labs, and a Fabrication lab (shop) as well as 30 new offices for STEM staff. Moving STEM staff to the new building will free up room in existing buildings for other staff. The new building will be designed with the intent of LEED Silver Certification as well as Net Zero or Net Zero capable status.

Pierce College envisions that the mechanical system for the building will be energy-efficient and still maintain comfort actively. The system will possibly include chilled beams, fan coil units, and high-efficiency VAV systems. For teaching buildings, Pierce college prefers to avoid passive systems that require significant user manipulation such as radiant floors and ceilings, which have had limited success in campus use.

1.2 Codes and Standards

The following codes and standards apply to this project:

- International Building Code (IBC)—2018
- International Mechanical Code (IMC)—2018
- Uniform Plumbing Code (UPC)—2018
- Washington State Energy Code (IECC)(WAC 51-11C)—2018
- International Fuel and Gas Code (IFGC)—2018
- National Fire Protection Association (NFPA 58)—2011
- National Fire Protection Association (NFPA 54)—2012
- International Fire Code (IFC)—2015
- ADA Standards for Accessible Design (ADA)—2010
- ANSI/AIHA Z9.5, *Laboratory Ventilation* (AIHA)—2012
- ANSI Z358.1, *American National Standard for Emergency Eyewash and Shower Equipment* (ANSI) —2009
- ANSI/ASHRAE Standard 110, *Method of Testing Performance of Laboratory Fume Hoods* (ASHRAE) —1995
- ANSI/ASHRAE Standard 55, *Thermal Environmental Conditions for Human Occupancy* (ASHRAE) —2013
- ANSI/ASHRAE Standard 62.1, *Ventilation for Acceptable Indoor Air Quality* (ASHRAE)—2013
- ANSI/ASHRAE 90.1, *Standard for Energy Conservation in New Building Design* (AHSRAE)—2013
- ASHRAE Handbook, HVAC Applications, Chapter 16, *Laboratories* (ASHRAE)—2011
- *Biosafety in Microbiological and Biomedical Laboratories* (5th Edition) (CDC/NIH)—2009
- *Primary Containment for Biohazards. Selection, Installation and use of Biological Safety Cabinets* (CDC/NIH)—2009
- *Guidelines for Laboratory Design* (DiBerardinis et al.)—2013
- Operations Manual for Laboratories. SHEMP (Safety, Health and Environmental Management Program) (EPA)—1998

- NFPA 30, *Flammable and Combustible Liquids Code* (NFPA)—2015
- NFPA 45, *Fire Protection for Laboratories Using Chemicals* (NFPA)—2015
- NFPA 101, *Life Safety Code* (NFPA)—2015
- NFPA 13, *Fire Sprinkler Systems*—2013
- NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials* (NFPA)—2014
- NSF/ANSI 49, *Biosafety Cabinetry: Design, Construction, Performance, and Field Certification* (NSF/ANSI)—2008
- SEFA 1-2010, *Laboratory Fume Hoods, Recommended Practices* (SEFA)—2010
- SEFA 2-2010, *Installation of Scientific Furniture and Equipment, Recommended Practices* (SEFA)—2007
- *Industrial Ventilation, A Manual of Recommended Practices*, 24th Edition (ACGIH)—2001

2.0 MECHANICAL DESIGN

2.1 General

Mechanical work on this project involves providing three major separate systems to provide heating/cooling and outside air ventilation to three distinct building uses:

- Classrooms and offices.
- Teaching laboratories.
- Fabrication Lab.

Other rooms and zones such as the elevator room and IT closets will be on separate, smaller systems to allow for 24/7 cooling without running the larger systems.

2.2 Design Conditions

The following design conditions are based on ASHRAE outdoor design conditions:

Outdoor Spaces

- Summer (cooling): 0.4% frequency of occurrence for dry-bulb temperature and mean coincident wet-bulb temperature. 86 degrees F DB and 65 degrees F MCWB.
- Winter (heating): 99.6% frequency for mean coincident dry-bulb temperature. 19 degrees F.

Indoor Spaces

- Laboratory and laboratory support: 72 degrees F, 50% relative humidity (RH) cooling and 68°F, 30%RH heating. Maintained 24 hours a day, 365 days a year.
- Offices, conference rooms, and lounges: 74 degrees F, 50% RH cooling and 68°F, 30% RH heating.
- Equipment rooms: 75 degrees F, 50% RH cooling and 68 degrees F, 30% RH heating.
- Mechanical spaces: 80 degrees F cooling and 65 degrees F heating.

Note: relative humidity (RH) is noted above for criteria; there is no planned humidity control.

2.3 Proposed Systems

Three heating, ventilation, and air-conditioning (HVAC) systems will be designed for the three types of zones based on the appropriate HVAC code requirements. Energy recovery from exhaust air streams will be considered.

The primary source of heating and cooling to serve all three zones of the building will be a hydronic all-electric heat recovery heat pump system that will provide chilled water and heating water simultaneously. A backup electric boiler is anticipated for the coldest times of the year to supplement heating when the air source heat pump system is defrosting. The anticipated size of the heat pump system is 175 to 200 tons.

2.3.1 Classrooms and Offices

The classrooms and offices will be served by a dedicated outdoor air system (DOAS) with fan coils and heat pump. A variable air volume (VAV) system will be provided for the DOAS with occupancy sensors connected to the direct digital control (DDC) system that will shut off or turn down the system when rooms are unoccupied.

2.3.2 Teaching Labs

An airside, variable air volume (VAV) system with 100 percent outside air will be used for the teaching labs. Occupancy sensors connected to the DDC system will turn down the system when rooms are unoccupied.

Exhaust/fume hoods for the lab spaces will be designed for an average face velocity of 100 feet per minute (FPM) ±10 percent. To aid in energy savings, the design sash position will be at 60 percent maximum hood opening. Vertical sash stops will be provided at the design sash position and its location will be marked with labels. A label will also indicate the correct operating position. This design will prohibit the velocities dropping below 60 fpm. Measuring devices will also be provided that can be monitored and will trigger audible and visual alarms when airflows become unsafe. The laboratories will be equipped with a dedicated laboratory room control system such as a Phoenix controls that will maintain pressures and minimum flow rates. Laboratory exhaust fans will be 100 percent redundant to allow for greater safety and the ability to connect fume hoods on a common system without fire smoke dampers.

Biological safety cabinets with high efficiency HEPA filters will be used in laboratories working with microbiological hazards.

Other exhaust hoods and cabinets will be provided for various other exhausting needs, e.g., gas cylinder cabinets, vented cabinets for hazardous substances, and canopy hoods over work areas to capture heat or steam.

Room pressurization will be designed to meet or exceed code requirements for ventilation and secondary containment. The labs will be maintained at a minimum of 6 air changes per hour during occupied hours. Laboratory spaces will be ventilated 24 hours a day and will be exhausted directly outdoors. The system for laboratory spaces will reduce airflow during unoccupied hours to 2 to 3 air changes per hour and will maintain the space at negative pressure with respect to adjacent occupied areas.

2.3.3 Fabrication Lab

The Fabrication Lab is a fabrication shop area and will be served by a heating and ventilation system without cooling. Offices in the Fabrication Lab will receive heating and cooling from the classroom and offices system. The Fabrication Lab will be provided with a dust collection system for saws, grinders, and other source capture equipment necessary to meet the program.

2.4 Control System

The current control system used by Pierce College is Metasys by Johnson Controls. This control system is obsolete and the new STEM Building will require a new system. The new system should be BACnet, Java Application Control Engine (JACE) by Tridium/Honeywell, or another control system by Johnson Controls.

A separate lab control system will be used for the fume hoods.

3.0 PLUMBING DESIGN

Three separate water supply systems will be designed for the new STEM building:

- Potable hot and cold water.
- Non-potable hot and cold water.
- Purified water.

All piping systems will have dedicated shutoff valves as well as point-of-connection shutoff valves.

3.1 Potable Water

The potable water supply will enter the building at ~65.5 psi. A reduced pressure principal backflow device will be installed at the point of entry. Potable water will be distributed through each floor of the building to restrooms, laboratories (for drench hoses and emergency shower/eye wash stations), and water bottle fillers. This distribution will have its own water heater and hot water recirculation at 120 degrees F. Storing 140 degree water in a tank to limit Legionella growth will be explored. A thermostatic mixing valve will reduce water temperature as required by code for public fixtures.

A domestic water pressure booster system may be required to provide the minimum 35 psi water pressure at flush valves on the third level of the building.

3.2 Non-Potable Water

Non-potable water will require a separate piping system, water heater, and backflow prevention. Non-potable water will be supplied to the laboratories for use in cup sinks, fume hoods, washing and sterilizing equipment, hose stations, laboratory ice machines, and laboratory equipment. All non-potable water fixtures will be labeled "NON-POTABLE WATER, DO NOT DRINK."

3.3 Purified Water

A central purified water system (reverse osmosis) will be on a separate plenum rated polymer piping system and will be distributed to the laboratories. This system will supply water for lab experiments and equipment cleaning. Individual small water polishers will be provided as required to provide small quantities of ultra-high purity water for lab uses.

3.4 Other Systems

3.4.1 Compressed Air

An oil-free and dried instrument-grade compressed air (CA) system will be supplied to each floor at 100 psig. Pressure reducing valves will be provided downstream of the laboratory point of connection to deliver laboratory compressed air (LA) at 15–30 psig.

3.4.2 Centralized Vacuum

A centralized dry vacuum system will be distributed the laboratories with 19 to 23 inch Hg negative pressure. Vacuum pumps will be used for deeper vacuum needs.

3.4.3 Natural Gas

Natural gas will be provided at low pressure of 4 to 7 inches of water to the laboratories. Each floor and laboratory will have an isolation valve that is quickly accessible for emergency shutoff. Additional shutoff valves will be provided downstream of the point of connection for controlling usage of natural gas in teaching laboratories.

3.4.4 Waste and Vent

Two separate waste and vent systems will be used: a sanitary waste (SW) system and a laboratory waste (LW) system. The SW system will be cast iron piping and will connect to the city's SW system. The LW system will be comprised of chemical-resistant material, will have an acid neutralizing tank, and will connect to the city's SW system outside the building. A sampling pit could be used at a designated location prior to discharging to the city's SW system to monitor concentration levels of chemicals.

3.5 Energy Savings

For water savings, the use of low flow fixtures, hands-free faucets, and water bottle filler stations will be used. Solutions such as rain water collection and grey water filtering for use in water closet flushing will also be explored.

4.0 FIRE PROTECTION DESIGN

Fire-smoke dampers will be utilized in duct shafts throughout the building per code requirements.

The sprinkler system will primarily be a light hazard wet sprinkler system. Small areas of the building such as storage areas will require systems of greater hazard classification but will not significantly impact the overall sprinkler coverage. Dry sprinklers will be provided for exterior areas of the building such as overhangs and covered loading to provide complete protection. The Makers space will be provided with wet pipe sprinkler systems.

The water pressure of 65 psi will result in 19 psi at the top of the Level 5 penthouse (assuming a 4-story building is constructed). The need for a fire pump is not anticipated.

5.0 MECHANICAL LEED CONTRIBUTIONS

Refer to the LEED® scorecard for mechanical and plumbing LEED® points. It is anticipated the Mechanical system and high performance building envelope in conjunction with onsite PV solar generation can achieve a 29 percent improvement of energy compared to ASHRAE 90.1-2016.

Back to Table of Contents

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12. electrical and telecommunications narrativ

July 10, 2020

PROJECT Pierce College – STEM Building

PHASE Predesign

SITE UTILITIES

Power – Campus Primary Distribution: The existing Pierce College (PC) campus electrical service is primary metered and served from Puget Sound Energy (PSE) at 12.47kV, 3 phase, 3 wire. There are three 200A rated medium voltage switches on campus that are a radial feed from the PSE service disconnect.

Power –Addition for STEM Building/Programs: We are evaluating, in conjunction with PC, two options for powering the proposed building addition:

- Alternative E1: Continue the medium voltage feeder from the back side of the Arts and Allied Health Building. There is a spare protected way within the existing gear that can be used to feed the new building. This is the only spare way on campus and would limit future flexibility for expansion on the North end of campus. Alternative E1 is more cost effective since it has approximately 550’ of trenching that would extend through dirt/soil.
- Alternative E2: (Preferred) Provide a new 15kV switch for new service entrance near Library Science Building, back feed the existing equipment and extend new medium voltage feeders to the building location. Alternative E2 is more appropriate to support future campus growth and allow for expansion. The existing service size does not appear to be large enough to support the master plan so a new 600A 5 ways switch with a fused/protected primary way, one unprotected way to back feed the primary campus switch and three additional 200A protected ways, one to be used to feed the new buliding.

Telecommunications: The campus telecommunications distribution system will connect to the existing MDF room in the Admin Building but extend from a vault on the south west side of Arts and Allied Health Building with three (3) 4”C.

- A 100-pair UTP copper cable will be provided to the new building from the existing MDF room in the Admin building.
- A 24-strand OS2 singlemode optical fiber backbone cable will be provided to the new building from the existing campus MDF room in the Admin building.

BUILDING POWER DISTRIBUTION

General: Distribution topology segregated by load type (e.g. lighting, mechanical, plug loads). Large electrical loads and motors sized at 1/2 HP and larger served at 480 Volts, 3 phase; lighting at 277 Volts and plug loads at 120 Volts. Minimum 25% spare capacity and spare overcurrent protective devices. Fully rated for available fault current. Designed to integrate with the architecture, while providing flexibility for the future.

Load Calculation:

- Existing campus feeders: The existing campus feeder has a 200A disconnect with a 12.47kV primary feed from PSE which allows a total of 4,320kVA.

  Utility metering data for the campus shows a 12-month peak electrical demand of 988 kW with a 0.85 Power Factor = 1,162.4 kVA total.

  Spare capacity: 4320 kVA – 1162.4 kVA * 1.25 = 2867.5 kVA

  The system is operating at approximately 33% of capacity.

- Building: The building will be approximately 54,000 to 56,000 square feet (sf). Depending on mechanical system type and plug load programming, the associated building power distribution system will require an anticipated capacity range of:

  56,000 sf * 24 VA/sf = 1,344 kVA (low end)

  56,000 sf * 35 VA/sf = 1,960 kVA (recommended)

Main Building Power Distribution Equipment: Indoor switchboard construction, configuration with insulated case main and feeder circuit breakers. 480Y/277 Volts, 3 phase, 4 wire. Surge protection. Electronic metering. Copper bus.

Distribution Equipment: Panelboards with bolt-on circuit breakers, door-in-door construction, copper bus. Panelboards located in proximity to loads served, on same floor; laboratory spaces will have dedicated panelboards immediately outside the space service 2-4 labs per panel. Transformers energy efficient dry-type, copper windings.

Wiring Methods: Copper conductors, #12 AWG minimum in raceway. Branch circuit wiring overhead. Equipment ground conductors required. MC Cable allowed within rooms with direct termination to outlets.

Power Monitoring: Electronic metering devices and networking for building main, feeders and designated branch circuits to meet energy code and LEED requirements. Integrate with building management system.

Surge Protective Devices: Provide at main switchboard, panelboards serving emergency power, telecommunications equipment, labs and sensitive equipment.

Receptacle Controls: Automatic receptacle controls per energy code requirements for classrooms and offices. Integrated with lighting control system based on time of day and occupancy.

BUILDING EMERGENCY POWER SYSTEM

General: An emergency power system is anticipated to serve the following loads:

- Emergency lighting and fire alarm
- Optional standby equipment including lab exhaust, makeup air, BMS Controls, telecommunications equipment in MDF and IDF rooms.

Emergency Generator: Packaged diesel engine generator. Fuel oil tank with storage adequate for a minimum 48 hours of runtime at full load. Generator may be installed indoors, or outdoors within a weatherproof acoustical enclosure.

Automatic Transfer Switch (ATS): Open-transition, contactor style with maintenance bypass. Install in dedicated, fire rated room. Separate ATS's for emergency and optional standby loads.

Provisions for portable load bank connection, and portable generator interface as required by code to support generator maintenance.

LIGHTING SYSTEMS

General: The lighting system shall address specific "visibility" requirements for the project and each individual space. "Visibility" includes issues such as light quality, occupant comfort, as well as aesthetics. It is critical that the visibility issues be addressed for each space to provide maximum occupant comfort, ultimately resulting in reduced Owner costs. A quality lighting system shall not only add visual interest to a space, but may also increase employee productivity and student performance, reduce sick time and improve morale. Once the visibility issues have been identified and addressed, the lighting system can be designed to provide maximum energy efficiency.

Light Fixtures: Lighting fixtures LED, rated life of 50,000 hours. 80 CRI minimum. Color temperature 4000K. Tunable lighting requirements are to be discussed with the College. Tunable lighting if used should follow the black body curve.

Exterior Lighting: In accordance with campus standards. Full cutoff meeting energy code and LEED requirements.

LIGHTING CONTROL SYSTEMS

General: Standalone, networked digital lighting control system for interior and exterior lighting systems, meeting programmatic, energy code, and LEED requirements. System inputs include integral timeclock, manual switches, occupancy sensors, photosensors, photocell.

Occupancy Sensors: Classrooms, labs, offices and multi-purpose rooms. Common areas for egress lighting after hours.

Automatic Daylighting Controls: Controlled separate from other areas; 0-10v dimming.

Manual Dimming: Classrooms, labs, offices and multi-purpose rooms. Preset scene selection buttons in rooms with AV equipment. All rooms with AV will have manual control of the front lights separate from the rear lights

FIRE ALARM SYSTEM

General: Intelligent, software-controlled addressable fire alarm, detection, with horn/strobe notification in accordance with AHJ requirements, and PC campus standards, integrated with existing Notifier campus fire alarm system.

Notification Devices: ADA compliant audible and audible/visual devices in accordance with NFPA 72 and the Fire Code. Audible notification utilizing horns and public mode communication. AV system to turn off on fire alarm signal.

Wiring: Install within raceways in exposed area, open cabling above ceilings.

EMERGENCY COMMUNICATIONS SYSTEMS

Rescue Assistant Signal System: The system will include call stations at floor in the elevator landing with base station on the ground floor in a typically occupied area. When a call is initiated by a call station it will ring to the local base station, if the call is not answered it will be directed to campus police/ security.

Emergency Responder Radio System: The system is to support first responder radios for communications into and out of the building during an emergency. Donor antenna on the roof will send/ receive the radio communications. The radio signals are amplified and distributed throughout the building via distribution antennas. The radio signals per code shall meet specific signal strength within certain areas for incoming and outgoing communications; the system will be in accordance with AHJ requirements.

TELECOMMUNICATIONS SYSTEM

General: Structured cabling system to support Wide Area Network (WAN) and Local Area Network (LAN) transport of voice (analog and Voice-Over-IP), data, wireless and streaming video applications. The structured cabling system shall enable the transport of data, telephony, audio visual, security, building automation, and other Internet Protocol (IP) applications to be converged onto a common cabling and network infrastructure. The system shall be warrantied by the manufacturer for 25 years.

- Networking equipment such as servers, Ethernet switches, routers, network software, computers, UPS systems and phones will be provided by the Owner.

Telecommunication Rooms and Spaces: Telecommuting Room (TR) shall be a dedicated space designed for the termination of horizontal station cabling and backbone cabling. Space will support infrastructure for the installation, configuration and administration of mission critical telecommunications and systems equipment. Secured spaces with a dedicated environmental control system with dedicated thermostat to monitor and maintain acceptable temperature and humidity levels on a 24 hours-per-day, 365 days-per-year basis.

- Main Distribution Frame (MDF): Located on the First Floor. Facilitate the terminating hardware for campus backbone cabling, intrabuilding & Interbuilding connectivity, and equipment.
- Intermediate Distribution Frame (IDF): Cross-connect between the horizontal cabling serving a given area of the building and the backbone infrastructure connecting the MDF. Stacked rooms located on each floor.
- Equipment: 19-inch wide equipment racks, plywood backboards, patch panels and cable management. Racks equipped with vertical and horizontal cable management panels

and shelves and a Power Distribution Unit (PDU) for distributing power to rack mounted equipment. Includes overhead cable tray around the room to support horizontal and backbone cabling, bonding and grounding.

Structured Cabling Infrastructure: Hierarchical star topology with optical fiber backbone cabling installed between the IDF and the MDF and horizontal cabling from the workstation devices to an IDF.

- Intrabuilding and Interbuilding Optical Fiber Backbone Cabling: OS2 singlemode riser rated loose-tight cabling, terminated with SC connectors. The optical cabling shall support optical fiber Ethernet applications, current 10GB Ethernet and future 40GB and 100GB applications. A 24-strand OS2 singlemode cable shall be provided to each IDF room from the new building MDF room.
- Intrabuilding and Interbuilding 100-ohm Backbone Cabling: Multi-pair riser rated with armored jacket cabling, terminated on wall mount 110 blocks. The copper cabling shall support phones and other voice applications. A 100-pair cable shall be provided to each IDF room from the new building MDF room.
- Horizontal Cabling: 100 ohm, 4-pair, Category 5e unshielded twisted pair (UTP) and Category 6 shielded twisted pair (FTP) plenum rated cabling as defined in ANSI/TIA – 568-C Standard. Route directly to a same floor Telecommunications Room, maintaining a maximum length no greater than 90 meters between terminations and service loops. Splicing and transition points are prohibited.

Telecommunications Outlets: Category 5e, 8-position 8-conductor modular jack.

- One (1) port/cable to each video projector/ display
- Three (3) ports/cables to each workstation
- Classroom: Three (3) ports for instructors' lectern, none for student use
- Lab: Port quantity to (3) ports/cables for each lab station and additional for equipment as determined by final lab planning and layout.

Wireless Access Point (WAP): Three (3) Category 6 shielded (FTP) horizontal cabling to WAP locations throughout the building to support wireless LAN applications. The WAP requirements are as follows:

- One (1) WAP per room within classrooms, labs, conference rooms, etc.
- Two (2) WAP's minimum within larger common spaces such as multipurpose rooms, lecture halls, break out spaces, etc. This quantity will need to be confirmed on a space by space need based upon use.
- WAP's within office areas will be provided to meet the quantity of users.

Pathways: The primary pathways for routing cabling to telecommunications rooms shall consist of cable trays. Open cabling support system consisting of cable saddles and j-hooks mounted on threaded rod supports acceptable above accessible ceilings.

TELEPHONE SYSTEM (OWNER)

Telephone System: The Owner-provided VoIP phones shall be connected to the structured cabling system with a cross connect to the Ethernet switches. Owner shall provide equipment and phones.

AUDIO VISUAL SYSTEM (ROOM-BASED)

General: Includes rough-in for distribution of audio and video signaling within each classroom, lab and conference room in accordance with Pierce College standards. The system shall consist of AV input plate(s), ceiling mounted speakers, amplifier/video switcher, control panel, mounting hardware and cabling. Audio visual systems will be Owner-provided.

CLOCK SYSTEM/MASS NOTIFICIATION

General: IP clocks/displays to connect to the existing campus system. Intercom speakers included in hallways/ corridors and other commons spaces.

- Classrooms, conference rooms, hallways, open office area and labs shall be equipped with a clock/mass notification system.

DIGITAL SIGNAGE

General: Displays/monitors supported by an Owner-provided content system with displays/monitors located in common spaces, multipurpose rooms and open office areas.

INTRUSION DETECTION SYSTEM
General: The system monitors and alerts campus security of unauthorized entry. Keypad located at the main entry and receiving man door. Door contacts located at exterior doors and internal zoning doors (where applicable). Motion detection devices located in areas with ground floor access and upper hallways and other larger areas. System will tie into overall campus intrusion detection system.

ACCESS CONTROL SYSTEM
General: The system manages and permits entry into the building or secures spaces for authorized personnel. System controls electronic access control doors either by time clock or using a web-based/ thick client to allow entry during scheduled and non-scheduled times. Access control panels will be wall mounted and located in the MDF/IDF rooms. The intelligent building controller will be connected to the network and existing enterprise server. The access controlled doors are as follows in accordance with Pierce College standards:

- Exterior doors
- Doors between student and staff areas
- Lab doors and other sensitive spaces
- Telecommunications (MDF, IDF), electrical & mechanical rooms

SECURITY VIDEO SYSTEM
General: Cabling and rough-in provided under the telecommunications system for future Owner provided security cameras.

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Back to Table of Contents

13. fabLab programming homework

FabLab Programming Homework

Pierce College STEM pre-design

May 22, 2020

FabLab Programming Homework

KEY PROGRAMS	ACTIVITIES	PRIORITY

X	MATERIALS + SYSTEMS	EQUIPMENT / RESOURCES	PRIORITY
	Wood		
	Metal		
	Plastics		
	Glass		
	Ceramics		
	Automotive		
	Gaming Design		
	Robotics		
	Circuit Boards		

FabLab Programming Homework

Pierce College STEM pre-design
May 22, 2020

<u>Flex/Open Space</u>
Fabrication tables
Large format workspace
Garage door access
Class and Demo
Soldering station
Manual Embroidery Machine
Sewing Machine and tools
Laminator

<u>Metal Shop</u>
Drill presses
Metal Bandsaw
Horizontal bandsaw
Hand tools
Bench grinder
Angle grinder
Shear
Button press

<u>Rapid Prototyping Lab</u>
Laser Cutter
3D scanner
3D printers
CNC Router
Vinyl cutter
Carvey CNC machines

<u>Woodshop</u>
TABLE SAW (SAW STOP)
COMPOUND MITER SAW (DEWALT)
BANDSAW (17" GRIZZLY)
WOOD LATHE (JET)
ROUTER TABLE
DRILL PRESSES
JIG SAW
SANDING AND SHAPING
VARIOUS HAND TOOLS
AIR COMPRESSOR
SANDBLASTING CABINET
SANDING STATION
VICE

<u>Design Lab</u>
Computer work stations with design software

https://facilitymade.com/

FabLab Programming Homework
Pierce College STEM pre-design
May 22, 2020

KEY PROGRAMS	ACTIVITIES	PRIORITY
engineering	demonstrate and experiment with design, fabrication, material properties, and invention	1
digital design	demonstrate and create different methods of fabrication, product design, real-world applications, and invention.	1
art	enable the creation of innovative art using cutting-edge technology, create increased accessibility to the creation of art for people with physical disabilities, create 2d and 3d references for 2d and 3d art, create structural components and maquettes for design and prototyping.	3
physics	Relate to, explore, and experiment with physical forces and material properties in the natural and built environment	1
mathematics	Hands-on demonstration of the application of mathematic principles, including the applications of algebra in CNC machining, practical use and meaning of measurements, applications of formulas such as calculating shrinking rates in materials subjected to heat, and other approaches than make theoretical principles immediate and relatable for students	1
biology	creation of learning models such as skeletons for comparative anatomy, 3d printing fossils and other specimens from museum collections, fabricating containers and watering devices for demonstrations and experiments with plants, supplement lab materials such as dissections for further study	1
nursing/medical assistant	creating study materials such as 3d depictions of bodily structures, copies of medical devices for hand-on demonstration, create assistive devices and casts/prosthetics to contribute to greater understanding of medical technology and the needs of disabled and chronically ill people	3
vet tech	create replicas of different animal structures for comparative study, create assistive devices/prosthetics for animal populations, create and design training and enrichment activities to encourage healing and growth in animals, replicate assorted medical devices for hands-on experimentation and demonstration.	3
theater	create innovative props, costume elements, and technical assistance devices for lighting, recording, etc.	4
business	explore design, innovation, product development, prototyping, and manufacturing/marketing workflows for products and services	2
computer science	demonstrate the physical applications of coding through use of CNC devices, experiment with code-based generative design and machine output.	3
service learning/ sociology/anthropology	recreate museum holdings from world courses, explore ethics of creation, intellectual property, and cultural object repatriation, design and create interventions to assist problems of equity, community, and society, such as supporting community projects with designed systems and supportive devices (could design and build an irrigation system for a community garden, create assistive devices for volunteers with habitat for humanity to use tools more easily, etc). Use craft and invention to connect to personal histories of technology and creation in diverse cultures.	2
community and continuing education	creating community access to new technology, develop career skills, create access to opportunities in design, art, and manufacturing for disabled and elderly people,	2
k-8 outreach	create a space to demonstrate technology, design, and invention to youth to support their sense of achievability of higher education, potential for personal contribution to society, and to see hands-on real-world applications of STEAM principles	2

9-12 grade youth outreach	create a hands-on, project-based learning environment for youth to connect, solve real world-problems, build career skills, learn social/emotional communication skills, and develop connection to their community and personal history and culture.	2
Student leadership	host clubs and student-led initiatives in community outreach and research, allow space and resources for socializing and networking around shared interests and projects, share skills, build confidence and communication skills, and create investment in self-defined community.	

X	MATERIALS + SYSTEMS	EQUIPMENT / RESOURCES	PRIORITY
x	Wood	CNC router, table saw, bandsaw, drill press, bench sander, lathe, hand tools (drills, hammers, chisels, hand saws, clamps), work benches	1
x	Metal	combination mig/tig welder, all-steel work table, CNC plasma cutter, gas forge, anvil, assorted hammers, files, and steel brushes, bench grinder, oxypropane “microtorch” for small metals, jewelry bench, horizontal bandsaw, chopsaw, frame and delft sand for sand casting, assorted siz crucibles and pouring rig, tongs. lathe.	2
x	Plastics	injection molder, vacuum former, convection oven and heatplate, hotknife for forming	1
x	Glass	kiln, glass knives, tile saw, soldering irons, plaster slump molds	3
x	Ceramics	kiln, throwing wheel(s), wedging table, turntables, work trays, drying shelves, hand tools, slab roller, clay storage, plaster molds, clay-catch drain on sink, glaze and brushes.	2
	Automotive		
x	Gaming Design	see multipurpose, assorted gaming systems and vr rigs for game testing (not my area of expertise)	3
x	Robotics	see multi-purpose equipment (not my area of expertise)	2
x	Circuit Boards	prototyping boards such as raspberry pi and arduinos. breadboards. assorted components. PCP circuit board mill or etcher (not my area of expertise)	2
X	Printing	large-format plotter/printer. Large format CNC die cutter. small CNC die-cutter. heat press for assorted items. Sublimation printer. Binding equipment such as a heavy duty stapler or spiral binding machine.	1
X	Fibers/costuming	multicolor digital embroidery machine. Foam knives. sewing machine. assorted materials for fiber circuitry. dress forms. serger sewing machine. heavy/leather sewing machine.	3
X	Multi-purpose equipment	3d printers have applications in plastics, robotics, circuits, ceramics, metals, costuming,and game design. KIln has applications in ceramics, jewelry, and metals. Laser cutter has applications in every category. Water jet would have applications similar to laser cutter, plasma cutter, and CNC router. 3 axis CNC mill would have applications in wood, metal, robotics, plastics, and circuit boards. Soldering stations would have applications in metals, circuit boards, robotics, gaming design, and glass. ventilation is necessary for nearly every category, would recommend a universal exhaust with adjustable ventilation outlets (flexible metal tubes that can be positioned according to the work area in use).	1

Back to Table of Contents

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