OLYMPIC COLLEGE

INNOVATION & TECHNOLOGY LEARNING CENTER
NEW AREA PROJECT

OLYMPIC COLLEGE

Project Request Report 2019-2021
Washington State Board for Community and Technical Colleges

OLYMPIC COLLEGE

PROJECT STEERING COMMITTEE

Kay Ash, Vice President for Administrative Services
Daniel Whittier, Interim Director Facilities Service Department
Candace Alvarez, Space Analyst

PRIMARY CONTACT

Kay Ash, Vice President for Administrative Services
Olympic College
1600 Chester Avenue
Bremerton, WA 98337-1699
360-475-7501
kash@olympic.edu

STATE OF WASHINGTON, DEPARTMENT OF ENTERPRISE SERVICES

Dennis Flynn, Project Manager

CONSULTANT TEAM

SCHACHT ASLANI ARCHITECTS

Eric Aman, AIA, Principal
Walter Schacht, FAIA, Principal
Shazi Tharian, AIA, Associate

PCS, Structural Engineer
PAE Engineers, Mechanical Engineer
PAE Engineers, Electrical Engineers and IT
Coughlin Porter Lundeen, Civil Engineer
C&N Consulting, Cost Estimator

Table of Contents

1. Executive Summary 1
2. Problem Statement, Opportunity, Program Requirement 4
3. Analysis of Alternatives 12
4. Project Planning of Preferred Alternative 16
5. Project Budget Analysis of Preferred Alternative 19

Attachments

Project Budget (Form C-100) - New Area Project 23
Project Budget (Form C-100) - Alternate 25
Project Parameters Form 27
Minimum & Overarching Criteria 29
LEED Checklist 31
Construction Cost Estimate 33

Diagrams & Sketches

Updated Campus Plan 56
Site Plan 58
Building Plans 591

Appendix

Design Team Basis of Design (Engineer's Reports) 65
Design Team - Alternative (Engineer's Reports) 89
Best Practices to Reduce Greenhouse Gas Emissions 111

Attached Support Files

Space Utilization Calculations (see attached excel file.)
C-100 Preferred / New Area (see attached excel file.)
C-100 Alternative (see attached excel file.)

1. EXECUTIVE SUMMARY

1.1 PROBLEM STATEMENT / TYPE OF PROJECT REQUEST

CRITICAL NEEDS

Demand for skilled workers in STEM (science, technology, engineering, and math) related fields represents an opportunity for residents of Kitsap and Mason Counties where the military, defense contractors, manufacturers, health care, and public agencies drive the local economy. The Puget Sound Naval Shipyard is the second largest industrial employer in Washington State, immediately following Boeing. There is a shortage of qualified employees to fill jobs in these industries. Employers need college educated workers with cross-disciplinary skills such as communications, critical thinking, and teamwork as well as discipline-specific knowledge.

Olympic College is the sole institution of higher education in Kitsap and north Mason Counties. It plays a critical role in providing access to higher education for its region. The college offers a range of academic and professional-technical programs to a place-bound population that otherwise might not be able to obtain a postsecondary education. Its certificate, associate and baccalaureate programs focus on student achievement. The college has strong partnerships with K-12, universities, and industry. As a result, enrollment is projected to grow.

Olympic College has the programs, faculty and partners to help students and industry bridge the education/skills gap but it does not have adequate space to serve the specific needs of under-served populations, meet enrollment demand or provide the learning environments students need to succeed.

Underserved Populations

Less than 50% of the high school graduates in Kitsap and Mason Counties pursue a post-secondary education after high school. Veterans make up 19% of Kitsap County's and 17% of Mason County's adult population. Many are returning to civilian life and are in need of job training. 42% of the veterans enrolled at Olympic College have only a high school degree or equivalent. 28% have some post-secondary education but do not have a degree. The college does not have adequate facilities to recruit these students or provide the support services – tutoring, academic and career counselling – that these students need to succeed.

Enrollment Demand

Olympic College's enrollment is growing. The state board forecasts an enrollment increase of 4.7% in new FTES by 2026, bringing the college's total enrollment to 5,522 FTES. Existing campus facilities do not have the capacity or infrastructure to support growth in the 21st century STEM-related fields. Olympic College has historically had one of the lowest space to student ratios in the state. In ten years, the ratio will be reduced to 104 gross square feet per student, 14% lower than the system-wide average.

Industry demand for skilled workers and enrollment growth at the college will continue. Kitsap County Comprehensive Plan 2035 reports 32% growth for Kitsap

County over the next twenty years. Mason County Comprehensive Plan 2036 states that the county's population will grow 34% over the same period.

Learning Environments

Existing learning environments at the college do not support the development of students with process-oriented skills such as communications, critical thinking and collaboration. There is only one active learning classroom on campus. There are no digital fabrication labs or makerspaces that foster the creativity and innovation required for success in high-tech fields or engineering.

The college does not have space or technology required to teach data informatics, computer information systems and computer information systems security. It lacks a cyber range to support the articulated pathway in cybersecurity. There is not enough space to meet enrollment demand for Department of Defense information assurance workers. The college needs simulated network environments to teach data informatics. There are no virtual reality training environments to train students for jobs at the Puget Sound Naval Shipyard.

High-tech programs are isolated in separate buildings on campus which limits the potential for interdisciplinary collaboration. The location and configuration of learning environments constrains the opportunities for K-12, university and industry partnerships.

TYPE OF REQUEST

The Innovation and Technology Learning Center is a new area project.

1.2 PROPOSED SOLUTION

The Innovation and Technology Learning Center is an innovative concept that will serve enrollment growth and industry demand. It will respond to campus-wide needs for contemporary learning environments, promote interdisciplinary collaboration and prepare students for success in high demand occupations. The center will support recruitment, achievement and retention of under-served populations.

The new 40,940 square foot building is organized around four program components.

- An Active Learning Center will contain four active learning classrooms that support project-based learning and development of cross-disciplinary skills for all STEM programs. They will serve un-met needs for discipline-specific learning in high-tech programs.
- An Innovation Center will contain five hands-on labs with tools and technology to help students develop entrepreneurial, innovation and technology skills. Two of these labs will accommodate a cyber range and a mock data-center. The remaining three provide digital fabrication tools, serve as makerspaces, allow for joint projects with industry partners, showcase student work and provide K-12 students with an understanding of career pathways.

- A Study Zone provides spaces that promote group work and peer-to-peer engagement. It includes student study space, team rooms, meeting and conference rooms.
- A Student Services Zone will include a learning center that provides tutoring for K-12, veterans and military service members. It will provide space for counseling and workforce development services to facilitate recruitment of K-12 students and contains an expanded veterans and military service center. Located adjacent to instructional space these services will enhance student integration, achievement, and coursework completion. The workforce development center will strengthen alignments with local employers.

Together these components make the building a hub for STEM pathways and increase partnership opportunities with K-12, industry and universities.

1.3 PROGRAMS ADDRESSED BY PROJECT

The Innovation and Technology Center will provide shared-use active learning classroom and hands-on labs that will be used by a wide range of the college's STEM programs including cybersecurity, data informatics, digital humanities and virtual reality training. They will provide space and technology for teaching cross-disciplinary, life-long skills, and promoting creativity and innovation. The project will contain space to serve the specific needs of under-served K-12, veterans and military service personnel.

1.4 PROBABLE COST SUMMARY AND COMPARISON TO BENCHMARK

Category	Cost
Construction Contracts	$17,990,337
Other Costs	$5,987,663
Total (rounded to $1,000)	**$23,978,000**

Total project cost is less than 100% of the expected cost for the facility type.

1.5 PROJECT SCHEDULE

Phase	Start	Complete
Predesign	Sep-2018	Mar-2019
Design	Jul-2019	Jun-2021
Construction	Jul-2021	Apr-2023

1.6 FUNDING

The project will be funded through general obligation bonds allocated through the state's capital budget.

2. PROBLEM STATEMENT, OPPORTUNITY, PROGRAM REQUIREMENT

2.1 DESCRIPTION OF THE PROJECT AND ITS BENEFITS

PROJECT DESCRIPTION

The Innovation and Technology Learning Center will colocate shared-use active learning classrooms, hand-on labs, student study space that will provide contemporary, high tech learning environments for a wide range of the college's STEM programs with tutoring and support services for K-12, veterans and military service students. The 40,940 square foot building will be located in the center of campus. It will enable the college to improve recruitment and outcomes for under-served populations. The new building will improve collaboration and program delivery with the college's K-12, local businesses and university partners.

The center supports the "cradle to career" chain described in Governor Inslee's 2015 STEM Education Innovation Alliance Report which recommends strategies for increasing post-secondary education attainment.

- Improve school readiness and transition to college. Work with K-12 students for career and college ready coursework, particularly in science, math, engineering and English. Boost capacity to grant STEM degrees.
- Invest in and retain at-risk students by providing guidance and advising alongside instruction.
- Engage in career coaching and employer outreach.

BENEFITS

Guided Pathways

The new building will support a guided pathways approach for K-12 students, veterans and military personnel. It will include a workforce development center, career and advising support center, and veterans and military service center to help students from these under-served populations develop structured, educationally coherent program maps that align with their goals for careers and further education. Incoming students will be able to explore careers opportunities, choose a program of study and develop an academic plan based on program maps created by faculty and advisors. This approach simplifies student decision-making and allows colleges to provide predictable schedules and frequent feedback so students can complete programs more efficiently.

Improved Program Access

The center will improve program access for under-served populations, K-12 students, veterans and military personnel. Student support services will be directly adjacent to classrooms and labs that provide training for high demand occupations increasing awareness of career pathways. The learning center will provide them with the tutoring support they need to succeed. Colocation of instructional and support services will enhance faculty awareness of individual student needs.

Learning Environments

Preparing Students for the Workplace

Learning environments in the new building will facilitate development of the skills required for success in the workplace. Industry requires employees to have cross-disciplinary as well as discipline-specific skills. Active learning classrooms, hands-on labs and informal student study spaces will be designed to teach students how to communicate, think critically, be creative and collaborate. These are essential, life-long competencies that enable students to change career pathways in response to economic trends long after they graduate from college.

The assembly of active learning classrooms, labs and informal study space increases opportunities for collaboration and peer-to-peer engagement. Students will work in teams in the instructional spaces and utilize the informal space to extend the collaborative process, studying together before or after class and working in small groups on team assignments. Labs will have open hours that allow students to work on projects.

Adaptability, Flexibility and Utilization

Typical academic facilities are dedicated to specific disciplines and have limited capacity to accommodate other programs. Classrooms and labs in the Innovation and Technology Center will be designed to be shared by multiple disciplines increasing their adaptability, flexibility and utilization.

Shared Resources and Interdisciplinary Collaboration

Shared classrooms, labs and student study areas will provide space, equipment and technology that are essential to preparing students for careers in high-tech and engineering occupations. The center's resources will include virtual reality training environments, a cyber range, robotics, 3-D printing and shop equipment which are not available in Kitsap and north Mason County despite their relevancy to preparing for high demand occupations.

The resources will be shared by the college's STEM programs reducing initial cost, maintenance and operations, and increasing utilization. Adjacency of programs that require student competency in software technology increases opportunities for interdisciplinary collaboration.

Partnerships with K-12, Local Businesses and Universities

K-12 Partners (Outreach and Recruitment)

The project will allow the college to expand its K-12 partnerships with local schools. It will serve as a recruitment center for K-12 students. The career and advising center and the workforce development center will open their eyes to job opportunities and career pathways, addressing a critical need for increasing student interest in STEM-related fields at an early age. Active learning classrooms and hands-on labs will provide space for the college's Running Start program, demonstration classes and summer camps.

Industry Partners

Active learning classrooms and labs in the new center will support apprenticeship training for the trades, engineering and design. They will allow the college to offer virtual reality training that prepares Puget Sound Naval Shipyard personnel for applications in design, industrial engineering, maintenance and fabrication. Space and technology in the new building will allow local businesses to donate equipment that supports workforce training.

University Partners

Active learning environments in the new facility will support articulated career pathways for programs with the college's partnerships with Washington State University (mechanical and electrical engineering), Western Washington University (computer information systems security, business, environmental science and environmental studies) and Old Dominion University (industrial technology, cybersecurity and computer engineering.) They will also support the college's partnership with Brandman University which provides seamless transition for military personnel and working students toward degrees in information technologies, organizational communications, business, entrepreneurship, and organizational leadership.

2.2 FACILITIES MASTER PLAN, INSTITUTIONAL & STRATEGIC PLANS

1. FACILITIES MASTER PLAN

The new building aligns with the college's Facilities Master Plan and is identified as their first capital priority for a major project. (see page 56 in the Appendix)

2. STRATEGIC PLAN AND INSTITUTIONAL GOALS

Olympic College invests in initiatives for student success through training and resources that support evidence-based solutions, institutional and academic assessment, best practices and ongoing review and evaluation to determine effectiveness.

The project aligns with the college's strategic plan and institutional goals which are articulated in the core themes of its Strategic Initiatives. (see page 113 in the Appendix).

CORE THEME 1: STUDENT LEARNING AND QUALITY TEACHING	
Objective 1: Curriculum and programs facilitate student success and support the development of core abilities. *Objective 2: Faculty are effective educators- allow for advancement of teaching research and creative endeavors leading to innovative and contemporary techniques for learning.*	The new building accommodates colocation of disciplines to support meta-majors or career pathways, competency based education, creative use of technology, flipped classrooms, and adaptive learning technologies. The building will address the college goals to provide relevant experiential and applied learning (REAL) activities into the curriculum with flexible lab space that mimics industry, fabrication, engineering and IT environments. REAL activities supported by the building are academically anchored and center on four themes: career, create, discover and serve. STEM education stimulates core skill development including self-confidence, communication skills, cultural awareness and sensitivity leading to academic achievement. Staff benefit from exploratory, adaptable space that provides academic freedom which leads to evolving pedagogy.
Objective 3: Students learn- preparing students for advanced degrees or job-place training through effective contributions to their knowledge, skills and personal development.	Creating new growth space for open collaboration and dialogue into a multi-disciplinary learning center will make programs and career pathways visible to students, promoting student achievement and retention. Team rooms, project labs and demonstration areas allow faculty to implement research, prototype development and testing. Informal study and gathering spaces will promote student-to-faculty and peer-to-peer engagement. Learning environments will be configured and equipped for project based learning to teach students communications and collaboration skills required by employers.

CORE THEME 2: STUDENT ACCESS AND SUPPORT	
Objective 1: Maintain or exceed enrollment levels and ensure equal access to education, including under-served population groups in service area. *Objective 2: Retain and complete educational goals.* *Objective 3: Student services facilitate student success- provide advising service that foster success.*	The building fosters interdisciplinary collaboration between students and faculty of varying disciplines opening the doors to new economic opportunities. Display and presentation rooms work in conjunction with makerspace and project labs to showcase student learning, problem-based solutions and product outcomes. Visibility of program spaces facilitates successful outreach to K-12, military personnel and those seeking new vocational training and career shifts. Colocation of tutoring, advising and veteran's service center boost oversight methodologies and guidance toward success.

CORE THEME 3: COLLEGE ENVIRONMENT	
Objective 1: Foster a healthy work environment - professional development of staff that fosters intellectual honesty in their syllabus and teachings. *Objective 2: Appreciate diversity and respect differences.* *Objective 3: Stewardship of Resources – utilize college funding allocations to support mission and values towards academic achievement, operational goals and OC's core themes.*	The center will increase social equity by removing barriers to access and bringing learners from multiple programs, and under-served populations together as a community. Designed to meet LEED certification requirements, the building will meet the college's long term commitment to environmental stewardship conserving energy, water and other material resources.

CORE THEME 4: COMMUNITY ENRICHMENT	
Objective 1: Provide relevant educational and training offerings to serve community needs. *Objective 2: Ensure strong partnerships with community.* *Objective 3: Serve as a cultural resource.*	The building is a community asset, bridging between Olympic College area businesses and community organizations, allowing for program offerings that cater to public needs. The building is an instructional community center, combining technology, equipment and training not readily available in Kitsap and north Mason Counties but in demand to serve growing business and community needs.

2.3 RELATIONSHIP TO SBCTC SYSTEM DIRECTION GOALS

The project relates to SBCTC's goals for educational attainment, opening more doors to college education The college utilizes assessment of student and learning outcomes to increase student retention and academic success. The project will support Olympic College's ongoing planning and research to implement streamlined pathways that result in increased access, on-board assistance, completion and transfer rates in support of SBCTC goals.

SBCTC System Direction Goal	Innovation and Technology Learning Center
PROMOTE STUDENT ACHIEVEMENT AND SUCCESS	
Improve math achievement	The project improves math achievement by providing appropriate learning environments for the preparatory classes that enable under-prepared students to take college level math and excel. It then puts these skills to use in project-based practices in lab environments where students apply their knowledge to solutions and products.
Increase access to wrap-around student services to raise post-secondary attainment for underrepresented, adults, veterans, and first-generation students and increase the percent of basic skills students that move beyond basic skills.	The project increases wrap-around access to student services by collocating the college's workforce development center, a learning center for tutoring and advising as well as a veterans and military service center.
Close skill gaps within the workforce to ensure workforce training capacity is sufficient for demand and increase awards in high-demand professional-technical programs.	The project provides learning environments needed to attract and prepare students to succeed in the local and regional economy. It fills a gap for STEM learning spaces to address job placement needs in STEM, manufacturing fields. Students will learn needed soft skills as well as the technical skills required to succeed.

INCREASE ACCESS TO POST-SECONDARY EDUCATION	
Provide incentives to increase the number of people in Basic Education for Adults programs and programs that combine basic skills, English language, academic, and jobs skills training.	To align programs and curricula with labor market needs, the project will respond to demands, skills gaps and projections for occupations across the service district (Kitsap and Mason counties) and commuting region (Puget Sound Region – King, Pierce, Thurston and Snohomish counties). The college further achieves program and curriculum currency by working with employers and industry-based advisory groups to ensure curriculum updates that meet changing demands. Workforce development staff and faculty participate in relevant community or workforce-based committees to ensure continuous input from employers. Advisory committees, provide continuous input. Faculty participate in professional development and work-based experiences to maintain currency.
Enroll more underrepresented, first-generation and adult students, active military, veterans and their dependents and develop means to attract former students needing credits for degrees, certificates, or credentials.	Maker space, innovation labs and presentation rooms at the heart of the building will be designed to host community groups, local employers, and K-12 STEM camps. Advising and career counseling services immediately adjacent to lab space provide helpful guidance that removes entry barriers and provides assessment of student needs to streamline their personal educational path.

BUILD ON THE SYSTEM'S STRENGTH AND SUCCESSES	
Increase communication and partnerships within the system, including faculty, students and staff, and with business, labor, K-12, four-year institutions and other stakeholders.	Active learning classrooms and labs in the new center will support apprenticeship training for the trades, engineering and design. They will allow the college to offer virtual reality training to Puget Sound Naval Shipyard personnel. The project will expand K-12 partnerships. The career and advising center and the workforce development center will make K-12 students aware of job opportunities and educational pathways to employment. Active learning classrooms and hands-on labs will provide space for the college's Running Start program, demonstration classes and summer camps. Active learning environments in the new facility will support articulated career pathways for programs with the college's partnerships with Washington State University and Western Washington University and Brandman University.

2.4 PROGRAM AND RELATED SPACE TABLE

Program		ASF	GSF	New Workstations
CLASSROOMS				
ACTIVE LEARNING CENTER		11,780	18,124	
Active Learning Classrooms (4)	3,600			120
Classroom Program Storage	400			
STUDENT STUDY ZONE				
Informal Student Study	800			
Student/Faculty Interaction	200			
Open Breakout	600			
Meeting/Conference	600			
Team Rooms	480			
STUDENT SUPPORT CENTERS				
Learning Support Center	1,800			44
Veterans & Military Service Center	1,200			
Workforce Development Center	1,050			
Career Advising and Support Center	1,050			
LABS		12,900	19,847	
INNOVATION CENTER				
Cyber Range Lab	3,000			30
Mock-up Data Center Lab	3,000			30
Small Projects Lab	900			9
Entrepreneurial/Makerspace	3,000			30
Engineering Lab	3,000			30
OFFICES		1,930	2,969	
Faculty Offices and Support Spaces	1,930			
	Total	**26,610**	**40,940**	**293**
	Efficiency Ratio		65%	

There will be a total of 293 new student workstations including 129 lab stations and 164 classroom stations. Future utilization is calculated based on adding these new workstations.

	Contact Hours	Work Stations	Future Utilization (hours per week)
Classes	25,446.10	1,270	19.66
Labs	18,176.78	998	17.00
Campus	43,622.88	2,268	18.39

2.5 INCREASED TYPE 1 AND TYPE 2 FTES ACCOMMODATED BY THIS PROJECT

Demand for education in the college's service district is growing. The state's Capital Analysis Model (CAM) projects that by fall 2026 enrollment will increase by 129 Type 1 FTES and 169 Type 2 FTES.

2.6 TABLE OF AFFECTED EXISTING BUILDINGS

No existing buildings will be affected.

3. ANALYSIS OF ALTERNATIVES

3.1 DEFINITION OF CAPITAL PROBLEM

New area is required to serve the state's board estimated enrollment growth.

3.2 OBVIOUS AND CRITICAL NEEDS

1. NEW SPACE FOR ENROLLMENT DEMAND

   Olympic College serves a place-bound population in a region with large employers. Increasing enrollment is related to population growth and industry demand in the college's service district. The state board forecasts enrollment growth of 249 new FTES over the next 10 years, reducing space allocation to 104 gross square feet (gsf) per student by 2026. That is 17.5% less the SBCTC system average of 121 gsf per student.

   Enrollment growth in Kitsap and Mason counties will continue. Both counties project population growth of more than 30% over the next twenty years. The military and defense industries will continue to grow and provide opportunities for skilled workers.

   Special Initiatives Beyond Participation Rates

   Olympic College tracks enrollment on a quarterly basis to identify students who have stopped participating and assist them in getting back to school. Prior to fall quarter 2017, college staff reached out to over 400 students who fell into this category. They were able to help 25% of them to re-enroll in classes and resume their education.

   The college's retention rate of some of the least academically prepared students is 5% higher than the national average. 90% of its students complete their vocational programs and are placed in area jobs.

2. NEW AREA

   Creating a Technology Center

   Existing learning environments on campus do not support the development of students with cross-disciplinary, life-long skills that employers are seeking. Students must be able to communicate, think critically, be creative and collaborate as well as develop discipline-specific knowledge. There is only one active learning classroom for project-based learning on campus.

The college does not have adequate space or technology required to teach its growing demand for cybersecurity, data informatics, computer information systems and computer information systems security. Most Washington community colleges have modern technology buildings, but Olympic College lags behind in this area, even though it is situated in the heart of a military community where there is growing demand for military personnel and civil service employees to get hands-on information technology training. Specifically, there is demand for cybersecurity programs. A state of the art technology space is needed that includes a small-scale cyber range for ethical hacking and multi-purpose labs with adjoining clean room environments for forensics and data recovery. These spaces would allow the college to train associate level cybersecurity students as well as prepare students to transfer to the WWU cybersecurity bachelor's degree program. There is not enough space to meet enrollment demand for Department of Defense information assurance workers. The college needs simulated network environments to teach data informatics. There are no virtual reality training environments which are required to train students for jobs at the Puget Sound Naval Shipyard.

Many of the college's programs need access to digital fabrication and related instructional equipment. It needs labs and makerspaces that support experimental prototyping, technology simulation, engineering and fabrication, encouraging creativity and innovation.

The college needs a centralized location for equipment such as large-format graphics printing, laser cutters, 3D printers, robotics and computer workstations containing design and fabrication software for fabrication machinery to support student learning in design ideation, prototyping, project assembly and testing.

The college needs places to display student projects that demonstrate innovation and entrepreneurship, promote student pride, open career pathways and showcase programs with local partnerships.

I-BEST

Interdisciplinary collaboration space in the new building will allow the college to expand its I-BEST program and increase academic I-BEST course offerings, bringing together workforce training, and basic skills in English, reading and math to provide opportunity for students to learn literacy and workplace skills at the same time.

Interdisciplinary and Partner Collaboration

Technology programs are isolated in separate buildings on campus limiting the potential for interdisciplinary collaboration. The location and configuration of learning environments limits the opportunities for K-12, university and industry partnerships. The college needs a central location that brings disciplines together for teamwork and allows them to share resources.

Meeting the Needs of Under-served Populations

Learning Center

The college needs space for a learning center that will provide comprehensive tutoring to serve the specific needs of K-12, veterans and military personnel. It would enable these students to develop the academic competencies that are required to succeed in their educational programs and in the workplace.

Student Support Services

The college needs to expand its veterans and military service center to provide adequate support for it students. Incorporating the veterans services into a larger center would improve the college's ability to provide assistance in transitioning from a military to a college environment, assessments that support an action plan based on identified needs and access to staff who understand the obstacles veterans face when enrolling in or returning to higher education. It would prepare students to deal with college level expectations. An expanded center would enhance staff's ability to help students apply for veteran education benefits and financial aid, decide on a career and identify an effective college pathway to prepare for it.

The college needs a workforce development and career advising centers to support recruitment and service for K-12 students. Locating the new centers in a facility that also contains classrooms and labs for STEM education stimulates student interest attending college and identifying career pathways.

3 ACCREDITATION NEEDS

The Innovation and Technology Learning Center will address the college's core themes for providing advanced learning environments and support the development of student's core competencies while simultaneously addressing community needs and local partnerships. The project addresses the recommendations by providing spaces for collaboration to reinforce faculty research and exploration, in turn supporting a variety of evidence-based teaching methodologies. Active learning classrooms, project labs, team rooms and informal study areas will support students' ability to communicate effectively, think critically and engage in teamwork. See page 115 in the Appendix.

3.3 ALTERNATIVES CONSIDERED

1 PROGRAMMATIC & FACILITY-RELATED

Alternative 01 - Renovation and Addition to Existing Building

The college considered renovation and addition to its Engineering Building as an alternative to the project. The Engineering Building currently houses partnership programs for Western Washington University and Old Dominion University, along with general faculty offices. It also houses a veterans lounge, classroom and lecture room.

A substantial addition would be required to house the proposed program for the new building. Approximately 33,500 square feet of new construction would be added to

the Engineering Building to accommodate the new area. The existing large lecture room on the north end of the building would be demolished and the portico enclosed to house four new classrooms. The existing veterans lounge would be re-purposed to house a new veterans and military services center.

The substantial alternation would trigger code requirements for comprehensive improvements to the original structure. The entire building would need to be brought up to current building and energy codes. Renovation of the building would require upgrades to meet the intent of ADA.

Construction work would impact operations of the programs currently housed in the Engineering Building. These programs would need to be temporarily relocated by either moving off campus into leased space or housed in portable buildings, neither of which is optimum for the programs to operate effectively.

2. CONSEQUENCES OF DOING NOTHING

There will be significant negative consequences if nothing is done. The college will not meet the needs of its projected future enrollment and provide the necessary balance of classrooms and labs. The college will not be able to meet the demands for increased STEM education, missing the chance to align itself with high demand technology, engineering and science sector job openings. As the only college in North Mason and Kitsap counties it will not meet the higher education needs of an already under-served population. Services to military veterans and their families will be significantly compromised.

3. COST ESTIMATE FOR EACH ALTERNATE

The cost of the renovation/addition alternative is more than the preferred new area alternative.

Category	Cost
Construction Contracts	$18,021,226
Other Costs	$6,493,774
Total (rounded to $1,000)	$24,515,000

(see Alternate C-100, page 25 in the Appendix.)

The renovation/addition alternate is not cost effective and does not align with the college's facilities master plan.

- It is more than 80% of the replacement cost which exceeds state guidelines for the project type. It exceeds the cost for the preferred new area option by $537,000 (or 2.24% higher) due to the number of seismic, energy, envelope and space configuration deficiencies in the existing building.
- It does not meet the goals of the facilities master plan which calls for the Engineering Building to be demolished and campus open space to be expanded.

4. PROJECT PLANNING OF PREFERRED ALTERNATIVE

4.1 HISTORY OF BUILDING AND ORIGINAL FUNDING SOURCE

Olympic College opened in 1946. Its facilities have been funded by the state of Washington.

4.2 USEFUL LIFE OF PROPOSED FACILITY

The new building is planned and budgeted to be a flexible durable facility that will serve Olympic College for 50 years. Classrooms and labs are sized to accommodate evolving pedagogies.

4.3 SUSTAINABILITY

The building is planned and budgeted to maximize building system performance and reduce the total cost of ownership. The building is targeted for LEEDv4 Silver certification, which places significant emphasis on energy efficiency and material selection (see page 31 in the Appendix). Twelve of the state's required Best Practices to Reduce Greenhouse Gas Emissions have been identified as achievable for this project (see page 111 in the Appendix).

4.4 IMPACT ON DEFERRED MAINTENANCE AND REPAIR BACKLOG

The growth project provides new area. There is no impact to deferred maintenance.

4.5 ACQUISITION NEEDS

The construction site is on the Olympic College's main campus. No site acquisition is required.

4.6 MITIGATION AND NEIGHBORHOOD RELATED ISSUES

There are no neighborhood or mitigation issues.

4.7 PARKING EXPANSION DIRECTLY RELATED TO THE PROJECT

No expansion of parking facilities is required for or provided by the project.

4.8 PERMIT ISSUES, VARIANCES REQUIRED

Zoning for the site is governed by the City of Bremerton Municipal Code, Title 20 Land Use. No variances are expected for this project.

The height of the proposed two-story building is expected to be under the maximum building height of 85 feet with upper level setbacks as applicable for this zone. All required setbacks and lot coverage will be met. The proposed site is not adjacent to any existing residential or commercial zones therefore no screening and site lighting requirements as stated in Section 20.98.090 of the municipal code shall apply.

The 2018 edition of the International Building Code (IBC) with Washington State amendments is assumed to regulate the design of this facility.

The following highlights provide a summary of the primary applicable regulations.

- The building is a mixed-occupancy building with non-separated uses. It includes B, F-1 and S-1 occupancies.
- Type IIA Construction Type is anticipated.
- An automatic sprinkler system will be required for the building.

4.9 UTILITY AND OTHER INFRASTRUCTURE NEEDS

Campus services including gas, sanitary sewer, domestic water and power serve the project site. Minor improvements and branch connections to main lines will serve the new building. New domestic water connections will be required for the fire sprinkler service. A fire hydrant will be added to supplement existing fire protection on campus.

4.10 STORM WATER AND OTHER ENVIRONMENTAL ISSUES

Stormwater quantity management will not be required. On campus stormwater is discharged to the Port of Washington Narrows through the city's storm system. Due to the limited scope of development, code requirements for stormwater quality management are not anticipated. In keeping with the facilities master plan and achieve LEED certification it is likely that low-impact development strategies such as bio-retention planters, rain gardens and porous paving will be implemented.

There are no other environmental issues associated with the project.

4.11 ROADS AND TRAFFIC SIGNALS

Off campus roads and traffic signals will not be affected by this project.

4.12 DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION AND TRIBAL REVIEWS

No historic or archaeological content is expected to be encountered. The site was previously disturbed for construction of a theater that is being demolished as part of another project. Review by the Department of Archaeology and Historic preservation is not applicable to this project.

4.13 FALL 2016 UTILIZATION OF CLASSROOMS, LABORATORIES AND ALL INSTRUCTIONAL AREAS ON CAMPUS.

Space utilization yields the following recent data for classrooms and labs (See attached space utilization calculations.)

Quarter	Program Space	Utilization (hours per week)
Fall Quarter 2016	Classrooms	20.04
	Labs	18.21
	Campus	19.23

4.14 NEW PROGRAMS, CHANGING MIX OF PROGRAMS

The center creates a new mix of programs, bringing the college's existing academic and professional-technical programs together to simulate real-world industry collaborations, teaching students to be entrepreneurs and innovators. The programs will share multi-use classrooms and labs that provide access to technological resources such as hands-on fabrication labs and virtual training environments that are required for instruction but not currently available on campus. The center will support training for high demand occupations in cybersecurity, data informatics, and engineering. It will have the capacity to serve a much larger group of programs.

The center also creates a new program mix by colocating student support services for under-served populations together with instructional programs. It will contain the college's learning center which provides tutoring. It will provide space for academic and career counselling that serves K-12 students, veterans and military service people. The integration will enhance student success, introducing them to a wide range of career pathways.

4.15 NEW SPACE AND WHAT HAPPENS TO VACATED SPACE

The project provides 40,940 square feet of new area. The veterans and military service center will vacate 1,200 square feet in the Engineering Building when it relocates to the new building. The space will be re-purposed to serve existing programs in the Engineering Building.

4.16 COMPARISON OF EXISTING AND NEW SPACES TO THE CAM

The most recent CAM shows a shortage of 34,873 assignable square feet (ASF) in basic skills, science, and computer labs. The project provides 19,847 new ASF in labs that serve technology programs. It provides 11,780 ASF of classrooms and learning support that support under-served populations that need basic skills.

4.17 NEED AND AVAILABILITY OF SURGE SPACE

No surge space will be required. The project provides new area. No program space will be impacted for building construction.

4.18 FLEXIBILITY AND ADAPTABILITY OF PROPOSED SPACE

The building program provides multi-purpose instructional spaces that will be shared by a wide range of STEM programs, ensuring the flexibility and adaptability of proposed space over the life of the building. Classrooms, labs and open offices are sized in modules that allow them to be re-purposed without requiring systematic changes to the facility. The simple, rectilinear volume of the two-story structure and double-loaded corridor maximizes efficiency and long term capacity for the building to serve the college's evolving programmatic needs.

5. PROJECT BUDGET ANALYSIS OF PREFERRED ALTERNATIVE

5.1 PREDICTION OF OVERALL PROJECT COST

PROJECT BUDGET

Category	Cost
Acquisition	$0
Consultant Services	$3,710,136
Construction Contracts	$17,990,337
Equipment	1,680,449
Artwork	$78,592
Project Administration	$170,040
Other Costs	$347,995
Total (Rounded to $1,000)	**$23,978,000**

EXPECTED COST CALCULATION

Facility Type	Expected $/SF	GSF	Expected Cost
Classrooms	$586	18,124	$10,618,852
Labs	$610	19,847	$12,099,029
Offices	$431	2,969	$1,279,802
Total		40,940	$23,997,683

5.2 COMPARISON OF $/FTE TO SIMILAR SBCTC PROJECTS

PROJECT BUDGET / NET NEW FTES COMPARISON

Current SBCTC Projects	GSF	Project Cost	New FTES	$/Net New FTES
Edmonds Community College Science Engineering Technology Building	69,910	$47,378,000	583	$81,266
Cascadia College Center for Science & Technology	66,100	$41,147,000	254	$161,996
Olympic College Innovation and Technology Learning Center	40,940	$23,978,000	249	$96,297

* The above comparison projects are from the SBCTC 2018 Major Project List. The 2026 FTES are the total net FTE growth of each college in 2026.

5.3 ANTICIPATED ANNUAL IMPACT ON THE COLLEGE'S O&M BUDGET

Item	Notes	Annual Cost
Janitorial	Two additional staff, goods, services	$93,858
Utility	Offset by ESCO projects	$0
Technology	Negligible impact	$0
Capital Maintenance & General Repair, Furniture/Equipment Replacement	No impact for minimum three biennia	$70,701
Roads, Walks, Landscaping & Grounds Maintenance	One additional staff	$42,000
Security	Negligible impact	$0
Administration	Two instructional staff	$110,400
Total		**$316,959**

5.4 JUSTIFICATION FOR DESIRED METHOD OF CONSTRUCTION

The college evaluated three options for project delivery, general contractor construction manager (GCCM), design-build and design-bid-build. Design-bid-build was selected because it aligns with the college's priorities. It enables the college to involve its stakeholders during the planning, design and construction phases of the project and typically results in the lowest cost at bid.

The college has successfully delivered major projects of comparable scope and cost with design-bid-build. Responsibility criteria will be included in the contract documents to ensure that a qualified contractor is awarded the project. Adequate design and construction contingencies to manage the project are included in budget.

ATTACHMENTS

PROJECT BUDGET (FORM C-100) - NEW AREA PROJECT

C-100 Preferred / New Area Option (see attached excel file.)

STATE OF WASHINGTON AGENCY / INSTITUTION PROJECT COST SUMMARY		
Agency	Olympic College	
Project Name	Innovation and Technology Learning Center (New Area)	
OFM Project Number		

Contact Information		
Name	Kay Ash	
Phone Number	360-475-7501	
Email	kash@olympic.edu	

Statistics			
Gross Square Feet	40,940	MACC per Square Foot	$339
Usable Square Feet	0	Escalated MACC per Square Foot	$384
Space Efficiency	0.0%	A/E Fee Class	B
Construction Type	College classroom facilit	A/E Fee Percentage	7.62%
Remodel	No	Projected Life of Asset (Years)	50
Additional Project Details			
Alternative Public Works Project	No	Art Requirement Applies	Yes
Inflation Rate	2.80%	Higher Ed Institution	Yes
Sales Tax Rate %	9.00%	Location Used for Tax Rate	Bremerton, WA
Contingency Rate	5%		
Base Month	November-17		
Project Administered By	DES		

Schedule			
Predesign Start	September-18	Predesign End	March-19
Design Start	July-19	Design End	June-21
Construction Start	July-21	Construction End	April-23
Construction Duration	21 Months		

Green cells must be filled in by user

Project Cost Estimate			
Total Project	**$21,294,950**	Total Project Escalated	**$23,977,549**
		Rounded Escalated Total	**$23,978,000**

STATE OF WASHINGTON AGENCY / INSTITUTION PROJECT COST SUMMARY		
Agency	Olympic College	
Project Name	Innovation and Technology Learning Center (New Area)	
OFM Project Number		

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$200,000		
A/E Basic Design Services	$766,050		
Extra Services	$1,176,324		
Other Services	$1,084,667		
Design Services Contingency	$161,352		
Consultant Services Subtotal	**$3,388,394**	**Consultant Services Subtotal Escalated**	**$3,710,136**

Construction			
Construction Contingencies	$693,799	Construction Contingencies Escalated	$786,491
Maximum Allowable Construction Cost (MACC)	$13,875,985	Maximum Allowable Construction Cost (MACC) Escalated	$15,718,405
Sales Tax	$1,311,281	Sales Tax Escalated	$1,485,441
Construction Subtotal	**$15,881,065**	**Construction Subtotal Escalated**	**$17,990,337**

Equipment			
Equipment	$1,360,000		
Sales Tax	$122,400		
Non-Taxable Items	$0		
Equipment Subtotal	**$1,482,400**	**Equipment Subtotal Escalated**	**$1,680,449**

Artwork			
Artwork Subtotal	**$78,592**	**Artwork Subtotal Escalated**	**$78,592**

Agency Project Administration			
Agency Project Administration Subtotal	$0		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$150,000**	**Project Administation Subtotal Escalated**	**$170,040**

Other Costs			
Other Costs Subtotal	**$314,500**	**Other Costs Subtotal Escalated**	**$347,995**

Project Cost Estimate			
Total Project	**$21,294,950**	Total Project Escalated	**$23,977,549**
		Rounded Escalated Total	**$23,978,000**

PROJECT BUDGET (FORM C-100) - ALTERNATE

C-100 Alternative (see attached excel file.)

STATE OF WASHINGTON AGENCY / INSTITUTION PROJECT COST SUMMARY		
Agency	Olympic College	
Project Name	Innov. & Tech Learning Center- Alt. Renovation and Addition	
OFM Project Number		

Contact Information		
Name	Kay Ash	
Phone Number	360-475-7501	
Email	kash@olympic.edu	

Statistics			
Gross Square Feet	40,940	MACC per Square Foot	$340
Usable Square Feet	0	Escalated MACC per Square Foot	$385
Space Efficiency	0.0%	A/E Fee Class	B
Construction Type	College classroom facilit	A/E Fee Percentage	10.62%
Remodel	Yes	Projected Life of Asset (Years)	50
Additional Project Details			
Alternative Public Works Project	No	Art Requirement Applies	Yes
Inflation Rate	2.80%	Higher Ed Institution	Yes
Sales Tax Rate %	9.00%	Location Used for Tax Rate	Bremerton, WA
Contingency Rate	5%		
Base Month	November-17		
Project Administered By	DES		

Schedule			
Predesign Start	September-18	Predesign End	March-19
Design Start	July-19	Design End	June-21
Construction Start	July-21	Construction End	April-23
Construction Duration	21 Months		

Green cells must be filled in by user

Project Cost Estimate			
Total Project	**$21,791,184**	Total Project Escalated	**$24,514,967**
		Rounded Escalated Total	**$24,515,000**

STATE OF WASHINGTON AGENCY / INSTITUTION PROJECT COST SUMMARY		
Agency	Olympic College	
Project Name	Innov. & Tech Learning Center- Alt. Renovation and Addition	
OFM Project Number		

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$200,000		
A/E Basic Design Services	$1,069,911		
Extra Services	$1,176,324		
Other Services	$1,221,184		
Design Services Contingency	$183,371		
Consultant Services Subtotal	**$3,850,790**	**Consultant Services Subtotal Escalated**	**$4,216,532**

Construction			
Construction Contingencies	$695,272	Construction Contingencies Escalated	$788,160
Maximum Allowable Construction Cost (MACC)	$13,905,434	Maximum Allowable Construction Cost (MACC) Escalated	$15,745,074
Sales Tax	$1,314,064	Sales Tax Escalated	$1,487,992
Construction Subtotal	**$15,914,769**	**Construction Subtotal Escalated**	**$18,021,226**

Equipment			
Equipment	$1,360,000		
Sales Tax	$122,400		
Non-Taxable Items	$0		
Equipment Subtotal	**$1,482,400**	**Equipment Subtotal Escalated**	**$1,680,449**

Artwork			
Artwork Subtotal	**$78,725**	**Artwork Subtotal Escalated**	**$78,725**

Agency Project Administration			
Agency Project Administration Subtotal	$0		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$150,000**	**Project Administation Subtotal Escalated**	**$170,040**

Other Costs			
Other Costs Subtotal	**$314,500**	**Other Costs Subtotal Escalated**	**$347,995**

Project Cost Estimate			
Total Project	**$21,791,184**	Total Project Escalated	**$24,514,967**
		Rounded Escalated Total	**$24,515,000**

PROJECT PARAMETERS FORM

Project Parameters

Type of Space	Square Footage		Percent
Renovation of Existing	(S1)	0	
New Space	(S2)	40,940	
Exterior Circulation of Existing. See Appendix H.	(S6)	0	
Demolished Area	(S3)	0	
Total Affected Area	**(S4)**	**40,940**	100%
Net Area Change = New – Demo – Circulation	S5	**40,940**	

Costs	Dollars		Percent
Acquisition		$0	0%
Consultant Services		$3,710,136	15.47%
Construction Contracts (w/o eligible Infrastructure)	Ca	$17,990,337	75.03%
Eligible Infrastructure Contracts (from C100)	Cb	N/A	0%
Equipment		$1,680,449	7.01%
Artwork		$78,592	.33%
Other Costs		$3347,995	1%
Project Management		$170,040	0%
Total Project Cost (C1)		**$40,855,000**	100%

Funding	Dollars		Percent
State Appropriation		**$23,978,000**	**100%**
Financed – backed by State Appropriation		N/A	
Local Funds – Cash (see list of qualifying funds)		N/A	
Financed – backed by Local Funds		N/A	
Total Project Funding	**(F1)**	**$23,978,000**	**100%**
Matching			
Variance = Cost – Funding			

Project Weighting	Equivalent Area		Percent
Matching			
Infrastructure			
Renovation			
Replacement			
New		40,940	100%
Total	**S4**	**40,940**	**100%**

MINIMUM & OVERARCHING CRITERIA

2019-21 Minimum and Overarching Criteria Points

Evaluation Criteria	**Scoring Standard**	
College Response	Affected buildings are at a single site.	**Yes / No**
College Response	Project does not include improvements to temporary or portable facilities.	**Yes / No**
College Response	Project is not a gymnasium or recreational facility.	**Yes / No**
College Response	Project is not an exclusive enterprise function such as a bookstore, dormitory or contract food service.	**Yes / No**
College Response	Project is not dependent on another project in the current request.	**Yes / No**
College Response	Project meets LEED Silver Standard requirements.	**Yes / No**
College Response	College has a Greenhouse Gas Emission Reduction plan.	**Yes / No**
College Response	The facility is state-owned or a condominium interest is held (state capital funds cannot be spent on leased space).	**Yes / No**
College Response	Project will take more than one biennium. And, project costs at least $5,000,000 and does not exceed 70,000 gsf without WACTC Capital Budget Committee approval.	**Yes / No**
College Response	If project includes renovation or replacement, then affected buildings have been owned by the college for 20 years at the time of the request.	**Yes / No**
College Response	If project includes renovation, then the project extends the useful life of the affected building at least 20 years.	**Yes / No**
College Response	If project includes renovation, then the cost does not exceed 80% of the current replacement cost.	**Yes / No** N/A
Effective use of existing facilities See Appendix C for guidelines on determining existing utilization.	Fall 2016 space utilization relative to standards and other proposals. Standards are: Classroom seats used 22 hours per week. Laboratory seats used 16 hours per week.	**Up to 9 points**
Ability to enhance state and institution's achievement of goals	*Add up points from each category: (Max 14)* Directly tied to facilities master plan Directly tied to objectives in strategic plan Include clear and succinct description of the relationship between the project and its impact on partnerships with K-12, 4 yrs, business, etc. This may be supported by letters from partners describing how the project will benefit the partnership. Project includes at least seven of the best practices identified in Appendix A to reduce greenhouse gas emissions.	 **4** **4** **4** **2**
	Overarching Subtotal (O1)	
	Overarching Weighting (O2)	
	Overarching Weighted Subtotal (O3 = O1 x O2)	
	Overarching Portion of Project (O4)	
	Overarching Points (O5 = O3 x O4)	

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name: Olympic College Innovation Technology Center
Date: November 2017

Y	?	N			
1			Credit	Integrative Process	1

7	5	19		Location and Transportation	16
		16	Credit	LEED for Neighborhood Development Location	16
		1	Credit	Sensitive Land Protection	1
		1	Credit	High Priority Site	2
1	4		Credit	Surrounding Density and Diverse Uses	5
5			Credit	Access to Quality Transit	5
1			Credit	Bicycle Facilities	1
	1		Credit	Reduced Parking Footprint	1
		1	Credit	Green Vehicles	1

2	2	4		Sustainable Sites	10
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit	Site Assessment	1
	1	1	Credit	Site Development - Protect or Restore Habitat	2
		1	Credit	Open Space	1
		1	Credit	Rainwater Management	3
1	1		Credit	Heat Island Reduction	2
		1	Credit	Light Pollution Reduction	1

9	1	0		Water Efficiency	11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
2			Credit	Outdoor Water Use Reduction	2
6			Credit	Indoor Water Use Reduction	6
	1		Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

10	7	16		Energy and Atmosphere	33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
4	1	1	Credit	Enhanced Commissioning	6
6	3	9	Credit	Optimize Energy Performance	18
	1		Credit	Advanced Energy Metering	1
		2	Credit	Demand Response	2
		3	Credit	Renewable Energy Production	3
		1	Credit	Enhanced Refrigerant Management	1
	2		Credit	Green Power and Carbon Offsets	2

5	2	6		Materials and Resources	13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
3	2		Credit	Building Life-Cycle Impact Reduction	5
		2	Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
		2	Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
		2	Credit	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit	Construction and Demolition Waste Management	2

16	0	0		Indoor Environmental Quality	16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2			Credit	Enhanced Indoor Air Quality Strategies	2
3			Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
2			Credit	Indoor Air Quality Assessment	2
1			Credit	Thermal Comfort	1
2			Credit	Interior Lighting	2
3			Credit	Daylight	3
1			Credit	Quality Views	1
1			Credit	Acoustic Performance	1

2	1	3		Innovation	6
1	1	3	Credit	Innovation	5
1			Credit	LEED Accredited Professional	1

2	0	2		Regional Priority	4
1			Credit	Regional Priority: Specific Credit	1
1			Credit	Regional Priority: Specific Credit	1
		1	Credit	Regional Priority: Specific Credit	1
		1	Credit	Regional Priority: Specific Credit	1

54	18	50	TOTALS	Possible Points:	110

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

CONSTRUCTION COST ESTIMATE

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate

C & N Consultants, Inc.
Construction Cost Consultants

Date: **December 15, 2017**
Prepared By: AC

OVERALL SUMMARY CONSTRUCTION COST

	Gross Area	$/SF	$
Building - New	40,940 SF	328.65	13,454,861
Sitework			421,123
TOTAL CONSTRUCTION COST			**13,875,984**
Alternate Building New 32,670 SF, Renovation 8,270 SF	40,940 SF	323.31	13,236,512
Sitework			668,922
TOTAL CONSTRUCTION COST			**13,905,434**

Note: Washington State Sales Tax is assumed to be included in Soft Costs.

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
New Building

C & N Consultants, Inc.
Construction Cost Consultants

Date: **December 15, 2017**
Prepared By: AC

BUILDING DATA

Building Area

Level 1	19,034 SF	
Level 2	21,906 SF	
Total Gross Floor Area		**40,940 SF**

		Quantity	Unit	Ratio to Gross Area
Number of stories (x1,000)		2	EA	0.049
Gross Area		40,940	SF	1.000
Footprint Area		19,034	SF	0.465
Volume		593,630	CF	14.500
Gross Wall Area		19,807	SF	0.484
Retaining Wall Area		-	SF	
Finished Wall Area		19,807	SF	0.484
Windows or Glazing Area	30.00%	5,942	SF	0.145
Roof Area - Flat		21,906	SF	0.535
Roof Area - Sloping		-	SF	
Roof Area - Total		21,906	SF	0.535
Roof Glazing Area		450	SF	0.011
Interior Partition Length		2,830	LF	0.069
Interior Doors Per Leaf		80	EA	0.002
Interior Glazing		2,240	SF	0.055
Finished Area		40,940	SF	1.000
Elevators (x10,000)		1	EA	0.024

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
New Building

C & N Consultants, Inc.
Construction Cost Consultants

Gross Floor Area: **40,940 SF**
Date: **December 15, 2017**
Prepared By: AC

Summary of Estimate

No.	Element Description		Element Totals	Group Totals	Cost Per SF
A10	FOUNDATIONS			554,300	13.54
A1010	Standard Foundation		196,460		4.80
A1020	Special Foundation		190,340		4.65
A1030	Slab on grade		167,499		4.09
A20	BASEMENT WALL CONSTRUCTION				-
A2010	Basement Excavation				-
A2020	Basement Wall Construction				-
B10	SUPERSTRUCTURE			1,589,094	38.82
B1010	Floor Construction		1,031,148		25.19
B1020	Roof Construction		557,946		13.63
B20	EXTERIOR ENCLOSURE			1,523,803	37.22
B2010	Exterior Walls		955,861		23.35
B2020	Exterior Windows		525,876		12.85
B2030	Exterior Doors		42,066		1.03
B30	ROOFING			501,601	12.25
B3010	Roof Covering		501,601		12.25
C10	INTERIOR CONSTRUCTION			1,159,394	28.32
C1010	Partitions		814,719		19.90
C1020	Interior Doors		171,600		4.19
C1030	Fittings		173,075		4.23
C20	STAIRS			72,000	1.76
C2010	Stair Construction		72,000		1.76
C30	INTERIOR FINISHES			671,918	16.41
C3010	Wall Finishes		174,985		4.27
C3020	Floor Finishes		294,661		7.20
C3030	Ceiling Finishes		202,272		4.94
D10	CONVEYING			115,000	2.81
D1010	Elevators & Lifts		115,000		2.81
D20	PLUMBING			548,596	13.40
D2010	Plumbing		548,596		13.40
D30	HVAC			2,169,820	53.00
D3010	HVAC		2,169,820		53.00
D40	FIRE PROTECTION			225,170	5.50
D4010	Sprinkler System		225,170		5.50
D50	ELECTRICAL			2,159,585	52.75
D5000	Electrical		2,159,585		52.75

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
New Building

C & N Consultants, Inc.
Construction Cost Consultants

Gross Floor Area: **40,940 SF**
Date: **December 15, 2017**
Prepared By: AC

Summary of Estimate

No.	Element Description		Element Totals	Group Totals	Cost Per SF
E10	EQUIPMENT			220,500	5.39
E1010	Equipment		220,500		5.39
E20	FURNISHINGS			245,324	5.99
E2010	Fixed Furnishings		245,324		5.99
F10	SPECIAL CONSTRUCTION			-	-
F1010	Special Structure				
F1020	Special Construction				
F20	SELECTIVE BUILDING DEMOLITION			-	
F2010	Building Demolition				-
	Sub-Total			**11,756,104**	**287.15**
	General Conditions / General Requirements	9.00%		1,058,049	25.84
	Sub-Total			**12,814,153**	**313.00**
	GC Fee	5.00%		640,708	15.65
	December 2017 Construction Cost			**13,454,861**	**328.65**
	Escalation, excluded (Included in C100 Forms)				-
	TOTAL CONSTRUCTION COST			**$13,454,861**	**328.65**

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
New Building

C & N Consultants, Inc.

Gross Floor Area: **40,940 SF**
Date: **December 15, 2017**
Prepared By: AC

DETAIL OF ESTIMATE

	Item Description	Quantity	Unit	Unit Cost	Totals
A10	**FOUNDATIONS**				
A1010	**Standard Foundation**				
	A1011 Wall foundations				
	Reinforced concrete continuous footings and spread footings	230	CY	725.00	166,750
	Miscellaneous				
	Elevator pits including slabs, walls and waterproofing	1	EA	11,150.00	11,150
	Sump pit including metal grating	1	EA	2,050.00	2,050
	Perimeter drain pipe and rock	607	LF	22.00	13,354
	Rigid insulation at slab perimeter	607	LF	5.20	3,156
	Total For Standard Foundations				**196,460**
A1020	**Special Foundation**				
	Allow for piling and pile caps	1	LS	190,340.00	190,340
	Total For Special Foundations				**190,340**
A1030	**Slab on Grade**				
	A1031 Standard slab on grade				
	Structural slab	19,034	SF	8.80	167,499
	Total For Slab on Grade				**167,499**
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				
B1010	**Floor Construction**				
	B1012 Upper floors construction				
	Steel columns, allow 1.05#/SF	23,001	LB	2.40	55,203
	Steel beams, allow 9#/SF	197,154	LB	2.40	473,170
	Metal deck	21,906	SF	3.90	85,433
	Reinforced concrete topping slab	21,906	SF	7.00	153,342
	Brace frames				
	Steel columns, beams and bracing	110,000	LB	2.40	264,000
	Total For Floor Construction				**1,031,148**

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
New Building

C & N Consultants, Inc.

Gross Floor Area: **40,940 SF**
Date: **December 15, 2017**
Prepared By: AC

DETAIL OF ESTIMATE

	Item Description	Quantity	Unit	Unit Cost	Totals
B1020	**Roof Construction**				
	B 1020 Roof Construction				
	Steel columns, allow 1.05#/SF	23,001	LB	2.40	55,203
	Steel beams, allow 8#/SF	175,248	LB	2.40	420,595
	Metal deck	21,906	SF	3.75	82,148
	Total For Roof Construction				**557,946**
B20	**EXTERIOR CLOSURE**				
B2010	**Exterior Walls**				
	B2011 Exterior wall construction				
	Cladding systems	13,865	SF	35.00	485,272
	Metal stud framing	13,865	SF	7.00	97,054
	Batt insulation, R19	13,865	SF	1.25	17,331
	Rigid insulation	13,865	SF	3.25	45,061
	Gypsum sheathing, 5/8" thick	13,865	SF	3.00	41,595
	Air / Vapor barrier, building paper and wrap	13,865	SF	4.20	58,233
	Gypsum board, 5/8" at interior finish side	13,865	SF	2.80	38,822
	B2013 Exterior louvers, screens and fencing				
	Louvers and sun control devices	1	LS	28,000.00	28,000
	B2016 Exterior soffits				
	Exterior gypsum soffits including WAB and metal framing	1,922	SF	20.00	38,440
	Caulking, sealants and firestopping				
	Caulking, sealants and firestopping	1	LS	45,034.00	45,034
	Miscellaneous				
	Finish to backside of parapet walls	1,334	SF	12.50	16,675
	Sheet metal coping	667	LF	35.00	23,345
	Canopies	200	SF	105.00	21,000
	Total For Exterior Walls				**955,861**
B2020	**Exterior Windows**				
	B2021 Windows / Storefronts				
	Windows / Storefronts	4,159	SF	75.00	311,960
	Curtain wall				
	Curtain wall glazing system	1,783	SF	120.00	213,916
	Total For Exterior Windows				**525,876**

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
New Building

C & N Consultants, Inc.

Gross Floor Area: **40,940 SF**
Date: **December 15, 2017**
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DETAIL OF ESTIMATE

	Item Description	Quantity	Unit	Unit Cost	Totals
B2030	**Exterior Doors**				
	B 2030 Exterior Doors, frames and hardware				
	Glazed aluminum entrance doors, double	4	EA	6,200.00	24,800
	HM / Solid core wood door and HM frame, per leaf	5	EA	2,225.00	11,125
	Specialty hardware	1	LS	6,141.00	6,141
	Total For Exterior Doors				**42,066**
B30	**ROOFING**				
B3010	**Roof Covering**				
	B3011 Roof finishes				
	Roofing system with 1/2" cover board, R30 Rigid insulation, vapor retarder and gypsum base board, 1/2" thick	21,906	SF	18.50	405,261
	B3012 Traffic toppings and paving membranes				
	TPO walkway	2,191	SF	8.50	18,620
	B3014 Flashings and trim				
	Sheet metal flashings	1	LS	20,470.00	20,470
	B3021 Glazed roof openings				
	Skylights	450	SF	75.00	33,750
	Miscellaneous				
	Rough carpentry	1	LS	11,000.00	11,000
	Fall anchors including cable	1	LS	12,500.00	12,500
	Total For Roofing				**501,601**
C10	**INTERIOR CONSTRUCTION**				
C1010	**Partitions**				
	C1011 Fixed partitions				
	Metal studs	39,620	SF	4.55	180,271
	Batt insulation	39,620	SF	1.00	39,620
	Gypsum board, 5/8"	79,240	SF	2.80	221,872
	Gypsum board underlayment / multiple layers	48,500	SF	2.60	126,100
	Sound absorptive panels	1	LS	30,000.00	30,000
	C1013 Operable and folding panel partitions				
	Operable partitions, not required				
	C1016 Interior balustrades and screens				
	Interior railings	176	LF	280.00	49,280
	C1017 Interior windows and storefronts				
	Interior glazing including transoms and sidelights	2,240	SF	67.50	151,200
	Miscellaneous				
	Bulkheads and soffits	1	LS	10,235.00	10,235
	Blocking and backing	1	LS	6,141.00	6,141

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
New Building

C & N Consultants, Inc.

Gross Floor Area: **40,940 SF**
Date: **December 15, 2017**
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DETAIL OF ESTIMATE

Item Description	Quantity	Unit	Unit Cost	Totals
Total For Interior Partitions				**814,719**
C1020 Interior Doors				
C1021 Interior doors				
Interior doors, frames and hardware				
Solid core wood / wood glazed doors and HM frame				
Per leaf	80	EA	2,020.00	161,600
Specialty hardware / rated doors / power actuators / acoustics	1	LS	10,000.00	10,000
Total For Interior Doors				**171,600**
C1030 Specialties				
C1032 Fabricated compartments and cubicles				
Toilet partitions				
ADA toilet partition	5	EA	1,610.00	8,050
STD toilet partition	10	EA	1,415.00	14,150
Urinal screens	4	EA	555.00	2,220
C1033 Storage shelving and lockers				
Janitors mop rack and shelving	2	EA	450.00	900
C1035 Identifying devices				
Code signage	40,940	SF	0.16	6,550
Wayfinding and room identification signage	40,940	SF	0.38	15,557
Exterior building signage	1	LS	8,000.00	8,000
C1037 General fittings and misc. metals				
Miscellaneous metals, allow 0.4#/SF	16,376	LB	3.25	53,222
Elevator pit ladders	2	EA	800.00	1,600
Fire extinguisher cabinets	10	EA	230.00	2,216
Corner guards	40,940	SF	0.16	6,550
Grab bars at restrooms	5	EA	240.00	1,200
Mirrors at restrooms	5	EA	165.00	825
Restroom accessories	1	LS	7,000.00	7,000
Fixed markerboards and whiteboards	1	LS	45,034.00	45,034
Total For Fittings and Specialty Items				**173,075**
C20 STAIRS				
C2010 Stair Construction				
C 2010 Stair Construction including railings and finish				
Stairs	3	FLT	24,000.00	72,000
Total For Stair Construction				**72,000**
C30 INTERIOR FINISHES				
C3010 Wall Finishes				
C3011 Wall finishes to inside exterior walls				

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
New Building

C & N Consultants, Inc.

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DETAIL OF ESTIMATE

	Item Description	Quantity	Unit	Unit Cost	Totals
	Paint to interior side of exterior walls	13,865	SF	1.00	13,865
	C3012 Wall finishes to interior walls				
	Paint to walls	79,240	SF	1.00	79,240
	Miscellaneous wall finishes / acoustical treatments	1	LS	81,880.00	81,880
	Total For Wall Finishes				**174,985**
C3020	**Floor Finishes**				
	C3024 Flooring including base				
	Level 1	19,034	SF	8.00	152,272
	Level 2	21,906	SF	6.50	142,389
	Total For Floor Finishes				**294,661**
C3030	**Ceiling Finishes**				
	C3031 Ceiling finishes				
	Level 1	6,990	SF	7.00	48,930
	Level 2	21,906	SF	7.00	153,342
	Total For Ceiling Finishes				**202,272**
D10	**CONVEYING**				
D1010	**Elevator & Lift**				
	D1011 Passenger elevators				
	Passenger elevator, 2 stop including cab finish	1	EA	115,000.00	115,000
	Total For Elevator & Lifts				**115,000**
D20	**PLUMBING**				
D2010	**Plumbing**				
	Plumbing	40,940	SF	13.40	548,596
	Total For Plumbing				**548,596**
D30	**HVAC**				
D3010	**HVAC**				
	HVAC	40,940	SF	53.00	2,169,820
	Total For HVAC				**2,169,820**
D40					
D4010	**Fire Protection**				
	Fire protection	40,940	SF	5.50	225,170

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
New Building

C & N Consultants, Inc.

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DETAIL OF ESTIMATE

		Item Description	Quantity	Unit	Unit Cost	Totals
		Total For Fire Sprinkler System				**225,170**
D50		**ELECTRICAL**				
	D5000	**Electrical**				
		Electrical	40,940	SF	52.75	2,159,585
		Total For Electrical				**2,159,585**
E10	**E1010**	**EQUIPMENT**				
		E1027 Laboratory equipment				
		Lab equipment	1	LS	215,000.00	215,000
		E1094 Residential equipment				
		Break room appliances	1	LS	5,500.00	5,500
		Total For Equipment				**220,500**
E20		**FURNISHINGS**				
	E2010	**Fixed Furnishing**				
		E2012 Fixed casework				
		Casework	1	LS	188,324.00	188,324
		E2013 Blinds and other window treatments				
		Window treatments	1	LS	45,000.00	45,000
		E2014 Fixed floor grilles and mats				
		Entrance mats and frames	1	LS	12,000.00	12,000
		Total For Furniture				**245,324**
	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				
	F20	**SELECTIVE BUILDING DEMOLITION**				
	F2010	**Building Element Demolition**				
		No work anticipated				N/A
		Total For Selected Demolition				

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
Sitework - New Building

C & N Consultants, Inc.
Construction Cost Consultants

Date: **December 15, 2017**
Prepared By: AC

Sitework Summary

No.	Element Description		Element Totals	Group Totals	
G	BUILDING SITEWORK			367,954	
G10	Site Preparation		99,750		
G20	Site Improvement		144,704		
G30	Site Mechanical Utilities		88,500		
G40	Site Electrical Utilities		35,000		
	Sub-Total			**367,954**	
	General Conditions / General Requirements	9.00%		33,116	
	Sub-Total MACC			**401,070**	
	GC Fee	5.00%		20,053	
	December 2017 Construction Cost			**421,123**	
	Escalation, excluded (Included in C100 Forms)				
	TOTAL CONSTRUCTION COST			**$421,123**	

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
Sitework - New Building

C & N Consultants, Inc.
Construction Cost Consultants

Date: **December 15, 2017**
Prepared By: AC

DETAIL OF ESTIMATE

Item Description	Quantity	Unit	Unit Cost	Totals
G10 Site Preparation				
G 1020 Site Demolition and Relocations				
Site clearance and demolition	35,000	SF	0.80	28,000
G 1030 Site Earthwork				
Earthwork	1	LS	45,500.00	45,500
G1037 Erosion control				
Erosion control	1	LS	26,250.00	26,250
Total For Site Preparation				**99,750**
G20 Site Improvements				
G 2030 Pedestrian Paving				
Pedestrian paving	10,000	SF	7.00	70,000
G2045 Site furnishings				
Site furnishings	1	LS	6,500.00	6,500
G2049 Miscellaneous structures				
Miscellaneous structures	1	LS	35,000.00	35,000
G2051 Fine grading and soil preparation				
Fine grading and soil preparation	5,000	SF	0.40	2,000
G2053 Top soil and planting beds				
Topsoil	93	CY	40.00	3,704
G2055 Planting				
Shrubs and groundcover plantings	5,000	SF	3.00	15,000
Trees	10	EA	450.00	4,500
G2057 Irrigation system				
Irrigation system, modify and extend	5,000	SF	1.60	8,000
Total For Site Improvement				**144,704**
G30 Site Mechanical Utilities				
Mechanical utilities				
Water system	1	LS	18,000.00	18,000
Sanitary sewer	1	LS	14,500.00	14,500
Storm drainage	1	LS	45,000.00	45,000
Natural gas	1	LS	11,000.00	11,000
Total For Site Mechanical Utilities				**88,500**
G40 Site Electrical Utilities & Site Lighting				
Site electrical				
Site Electrical Utilities & Site Lighting	1	LS	35,000.00	35,000
Total For Site Electrical Utilities				**35,000**

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
Alternate Building New 32,670 SF, Renovation 8,270 SF Summary of Estimate

C & N Consultants, Inc.
Construction Cost Consultants

Gross Floor Area: **40,940 SF**
Date: **December 15, 2017**
Prepared By: AC

No.	Element Description		Element Totals	Group Totals	Cost Per SF
A10	FOUNDATIONS			481,659	11.77
A1010	Standard Foundation		174,561		4.26
A1020	Special Foundation		163,350		3.99
A1030	Slab on grade		143,748		3.51
A20	BASEMENT WALL CONSTRUCTION				-
A2010	Basement Excavation				-
A2020	Basement Wall Construction				-
B10	SUPERSTRUCTURE			1,294,608	31.62
B1010	Floor Construction		824,502		20.14
B1020	Roof Construction		470,106		11.48
B20	EXTERIOR ENCLOSURE			1,466,047	35.81
B2010	Exterior Walls		917,686		22.42
B2020	Exterior Windows		506,295		12.37
B2030	Exterior Doors		42,066		1.03
B30	ROOFING			388,832	9.50
B3010	Roof Covering		388,832		9.50
C10	INTERIOR CONSTRUCTION			1,159,394	28.32
C1010	Partitions		814,719		19.90
C1020	Interior Doors		171,600		4.19
C1030	Fittings		173,075		4.23
C20	STAIRS			96,000	2.34
C2010	Stair Construction		96,000		2.34
C30	INTERIOR FINISHES			671,404	16.40
C3010	Wall Finishes		174,471		4.26
C3020	Floor Finishes		294,661		7.20
C3030	Ceiling Finishes		202,272		4.94
D10	CONVEYING			230,000	5.62
D1010	Elevators & Lifts		230,000		5.62
D20	PLUMBING			548,596	13.40
D2010	Plumbing		548,596		13.40
D30	HVAC			2,169,820	53.00
D3010	HVAC		2,169,820		53.00
D40	FIRE PROTECTION			225,170	5.50
D4010	Sprinkler System		225,170		5.50
D50	ELECTRICAL			2,159,585	52.75
D5000	Electrical		2,159,585		52.75

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
Alternate Building New 32,670 SF, Renovation 8,270 SF Summary of Estimate

C & N Consultants, Inc.
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Gross Floor Area: **40,940 SF**
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No.	Element Description		Element Totals	Group Totals	Cost Per SF
E10	EQUIPMENT			220,500	5.39
E1010	Equipment		220,500		5.39
E20	FURNISHINGS			245,324	5.99
E2010	Fixed Furnishings		245,324		5.99
F10	SPECIAL CONSTRUCTION			-	-
F1010	Special Structure				
F1020	Special Construction				
F20	SELECTIVE BUILDING DEMOLITION			-	
F2010	Building Demolition				-
	Sub-Total			**11,356,939**	**277.40**
	General Conditions / General Requirements	11.00%		1,249,263	30.51
	Sub-Total			**12,606,202**	**307.92**
	GC Fee	5.00%		630,310	15.40
	December 2017 Construction Cost			**13,236,512**	**323.31**
	Escalation, excluded (Included in C100 Forms)				-
	TOTAL CONSTRUCTION COST			**$13,236,512**	**323.31**

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
Alternate Building New 32,670 SF, Renovation 8,270 SF

C & N Consultants, Inc.

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DETAIL OF ESTIMATE

	Item Description	Quantity	Unit	Unit Cost	Totals
A10	**FOUNDATIONS**				
A1010	**Standard Foundation**				
	A1011 Wall foundations				
	Reinforced concrete continuous footings and spread footings	182	CY	725.00	131,950
	Miscellaneous				
	Elevator pits including slabs, walls and waterproofing	2	EA	11,150.00	22,300
	Sump pit including metal grating	2	EA	2,050.00	4,100
	Perimeter drain pipe and rock	596	LF	22.00	13,112
	Rigid insulation at slab perimeter	596	LF	5.20	3,099
	Total For Standard Foundations				**174,561**
A1020	**Special Foundation**				
	Allow for piling and pile caps	1	LS	163,350.00	163,350
	Total For Special Foundations				**163,350**
A1030	**Slab on Grade**				
	A1031 Standard slab on grade				
	Structural slab	16,335	SF	8.80	143,748
	Total For Slab on Grade				**143,748**
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				
B1010	**Floor Construction**				
	B1012 Upper floors construction				
	Steel columns, allow 1.05#/SF	17,152	LB	2.40	41,164
	Steel beams, allow 9#/SF	147,015	LB	2.40	352,836
	Metal deck	16,335	SF	3.90	63,707
	Reinforced concrete topping slab	16,335	SF	7.00	114,345
	Expansion joint and cover plate	270	LF	135.00	36,450
	Brace frames				
	Steel columns, beams and bracing	90,000	LB	2.40	216,000

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
Alternate Building New 32,670 SF, Renovation 8,270 SF

C & N Consultants, Inc.

Gross Floor Area: **40,940 SF**
Date: **December 15, 2017**
Prepared By: AC

DETAIL OF ESTIMATE

	Item Description	Quantity	Unit	Unit Cost	Totals
	Total For Floor Construction				**824,502**
B1020	**Roof Construction**				
	B 1020 Roof Construction				
	Steel columns, allow 1.05#/SF	17,152	LB	2.40	41,164
	Steel beams, allow 8#/SF	147,015	LB	2.40	352,836
	Metal deck	16,335	SF	3.75	61,256
	Expansion joint and cover plate	110	LF	135.00	14,850
	Total For Roof Construction				**470,106**
B20	**EXTERIOR CLOSURE**				
B2010	**Exterior Walls**				
	B2011 Exterior wall construction				
	Cladding systems	13,351	SF	35.00	467,285
	Metal stud framing	13,351	SF	7.00	93,457
	Batt insulation, R19	13,351	SF	1.25	16,689
	Rigid insulation	13,351	SF	3.25	43,391
	Gypsum sheathing, 5/8" thick	13,351	SF	3.00	40,053
	Air / Vapor barrier, building paper and wrap	13,351	SF	4.20	56,074
	Gypsum board, 5/8" at interior finish side	13,351	SF	2.80	37,383
	B2013 Exterior louvers, screens and fencing				
	Louvers and sun control devices	1	LS	24,000.00	24,000
	B2016 Exterior soffits				
	Exterior gypsum soffits including WAB and metal framing	1,860	SF	20.00	37,200
	Caulking, sealants and firestopping				
	Caulking, sealants and firestopping	1	LS	45,034.00	45,034
	Miscellaneous				
	Finish to backside of parapet walls	1,204	SF	12.50	15,050
	Sheet metal coping	602	LF	35.00	21,070
	Canopies	200	SF	105.00	21,000
	Total For Exterior Walls				**917,686**
B2020	**Exterior Windows**				
	B2021 Windows / Storefronts				
	Windows / Storefronts	4,005	SF	75.00	300,375
	Curtain wall				
	Curtain wall glazing system	1,716	SF	120.00	205,920
	Total For Exterior Windows				**506,295**
B2030	**Exterior Doors**				

Olympic College
Innovation Center
Bremerton, WA
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Alternate Building New 32,670 SF, Renovation 8,270 SF

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Prepared By: AC

DETAIL OF ESTIMATE

	Item Description	Quantity	Unit	Unit Cost	Totals
	B 2030 Exterior Doors, frames and hardware				
	Glazed aluminum entrance doors, double	4	EA	6,200.00	24,800
	HM / Solid core wood door and HM frame, per leaf	5	EA	2,225.00	11,125
	Specialty hardware	1	LS	6,141.00	6,141
	Total For Exterior Doors				**42,066**
B30	**ROOFING**				
B3010	**Roof Covering**				
	B3011 Roof finishes				
	Roofing system with 1/2" cover board, R30 Rigid insulation, vapor retarder and gypsum base board, 1/2" thick	16,335	SF	18.50	302,198
	B3012 Traffic toppings and paving membranes				
	TPO walkway	1,634	SF	8.50	13,885
	B3014 Flashings and trim				
	Sheet metal flashings	1	LS	18,000.00	18,000
	B3021 Glazed roof openings				
	Skylights	450	SF	75.00	33,750
	Miscellaneous				
	Rough carpentry	1	LS	10,000.00	10,000
	Fall anchors including cable	1	LS	11,000.00	11,000
	Total For Roofing				**388,832**
C10	**INTERIOR CONSTRUCTION**				
C1010	**Partitions**				
	C1011 Fixed partitions				
	Metal studs	39,620	SF	4.55	180,271
	Batt insulation	39,620	SF	1.00	39,620
	Gypsum board, 5/8"	79,240	SF	2.80	221,872
	Gypsum board underlayment / multiple layers	48,500	SF	2.60	126,100
	Sound absorptive panels	1	LS	30,000.00	30,000
	C1013 Operable and folding panel partitions				
	Operable partitions, not required				
	C1016 Interior balustrades and screens				
	Interior railings	176	LF	280.00	49,280
	C1017 Interior windows and storefronts				
	Interior glazing including transoms and sidelights	2,240	SF	67.50	151,200
	Miscellaneous				
	Bulkheads and soffits	1	LS	10,235.00	10,235
	Blocking and backing	1	LS	6,141.00	6,141
	Total For Interior Partitions				**814,719**

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
Alternate Building New 32,670 SF, Renovation 8,270 SF

C & N Consultants, Inc.

Gross Floor Area: **40,940 SF**
Date: **December 15, 2017**
Prepared By: AC

DETAIL OF ESTIMATE

Item Description	Quantity	Unit	Unit Cost	Totals
C1020 Interior Doors				
C1021 Interior doors				
Interior doors, frames and hardware				
Solid core wood / wood glazed doors and HM frame				
Per leaf	80	EA	2,020.00	161,600
Specialty hardware / rated doors / power actuators / acoustics	1	LS	10,000.00	10,000
Total For Interior Doors				**171,600**
C1030 Specialties				
C1032 Fabricated compartments and cubicles				
Toilet partitions				
ADA toilet partition	5	EA	1,610.00	8,050
STD toilet partition	10	EA	1,415.00	14,150
Urinal screens	4	EA	555.00	2,220
C1033 Storage shelving and lockers				
Janitors mop rack and shelving	2	EA	450.00	900
C1035 Identifying devices				
Code signage	40,940	SF	0.16	6,550
Wayfinding and room identification signage	40,940	SF	0.38	15,557
Exterior building signage	1	LS	8,000.00	8,000
C1037 General fittings and misc. metals				
Miscellaneous metals, allow 0.4#/SF	16,376	LB	3.25	53,222
Elevator pit ladders	2	EA	800.00	1,600
Fire extinguisher cabinets	10	EA	230.00	2,216
Corner guards	40,940	SF	0.16	6,550
Grab bars at restrooms	5	EA	240.00	1,200
Mirrors at restrooms	5	EA	165.00	825
Restroom accessories	1	LS	7,000.00	7,000
Fixed markerboards and whiteboards	1	LS	45,034.00	45,034
Total For Fittings and Specialty Items				**173,075**
C20 STAIRS				
C2010 Stair Construction				
C 2010 Stair Construction including railings and finish				
Stairs	4	FLT	24,000.00	96,000
Total For Stair Construction				**96,000**
C30 INTERIOR FINISHES				
C3010 Wall Finishes				
C3011 Wall finishes to inside exterior walls				
Paint to interior side of exterior walls	13,351	SF	1.00	13,351

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
Alternate Building New 32,670 SF, Renovation 8,270 SF

C & N Consultants, Inc.

Gross Floor Area: **40,940 SF**
Date: **December 15, 2017**
Prepared By: AC

DETAIL OF ESTIMATE

	Item Description	Quantity	Unit	Unit Cost	Totals
	C3012 Wall finishes to interior walls				
	Paint to walls	79,240	SF	1.00	79,240
	Miscellaneous wall finishes / acoustical treatments	1	LS	81,880.00	81,880
	Total For Wall Finishes				**174,471**
C3020	**Floor Finishes**				
	C3024 Flooring including base				
	Level 1	19,034	SF	8.00	152,272
	Level 2	21,906	SF	6.50	142,389
	Total For Floor Finishes				**294,661**
C3030	**Ceiling Finishes**				
	C3031 Ceiling finishes				
	Level 1	6,990	SF	7.00	48,930
	Level 2	21,906	SF	7.00	153,342
	Total For Ceiling Finishes				**202,272**
D10	**CONVEYING**				
D1010	**Elevator & Lift**				
	D1011 Passenger elevators				
	Passenger elevator, 2 stop including cab finish	2	EA	115,000.00	230,000
	Total For Elevator & Lifts				**230,000**
D20	**PLUMBING**				
D2010	**Plumbing**				
	Plumbing	40,940	SF	13.40	548,596
	Total For Plumbing				**548,596**
D30	**HVAC**				
D3010	**HVAC**				
	HVAC	40,940	SF	53.00	2,169,820
	Total For HVAC				**2,169,820**
D40					
D4010	**Fire Protection**				
	Fire protection	40,940	SF	5.50	225,170

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
Alternate Building New 32,670 SF, Renovation 8,270 SF

C & N Consultants, Inc.

Gross Floor Area: **40,940 SF**
Date: **December 15, 2017**
Prepared By: AC

DETAIL OF ESTIMATE

		Item Description	Quantity	Unit	Unit Cost	Totals
		Total For Fire Sprinkler System				**225,170**
D50		**ELECTRICAL**				
	D5000	**Electrical**				
		Electrical	40,940	SF	52.75	2,159,585
		Total For Electrical				**2,159,585**
E10	**E1010**	**EQUIPMENT**				
		E1027 Laboratory equipment				
		Lab equipment	1	LS	215,000.00	215,000
		E1094 Residential equipment				
		Break room appliances	1	LS	5,500.00	5,500
		Total For Equipment				**220,500**
E20		**FURNISHINGS**				
	E2010	**Fixed Furnishing**				
		E2012 Fixed casework				
		Casework	1	LS	188,324.00	188,324
		E2013 Blinds and other window treatments				
		Window treatments	1	LS	45,000.00	45,000
		E2014 Fixed floor grilles and mats				
		Entrance mats and frames	1	LS	12,000.00	12,000
		Total For Furniture				**245,324**
	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				
	F20	**SELECTIVE BUILDING DEMOLITION**				
	F2010	**Building Element Demolition**				
		No work anticipated				N/A
		Total For Selected Demolition				

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
Sitework - Alternate Building

C & N Consultants, Inc.
Construction Cost Consultants

Date: **December 15, 2017**
Prepared By: AC

Sitework Summary

No.	Element Description		Element Totals	Group Totals	
G	BUILDING SITEWORK			584,467	
G10	Site Preparation		122,550		
G20	Site Improvement		233,917		
G30	Site Mechanical Utilities		176,000		
G40	Site Electrical Utilities		52,000		
	Sub-Total			**584,467**	
	General Conditions / General Requirements	9.00%		52,602	
	Sub-Total MACC			**637,069**	
	GC Fee	5.00%		31,853	
	December 2017 Construction Cost			**668,922**	
	Escalation, excluded (Included in C100 Forms)				
	TOTAL CONSTRUCTION COST			**$668,922**	

Olympic College
Innovation Center
Bremerton, WA
PRR Estimate
Sitework - Alternate Building

C & N Consultants, Inc.
Construction Cost Consultants

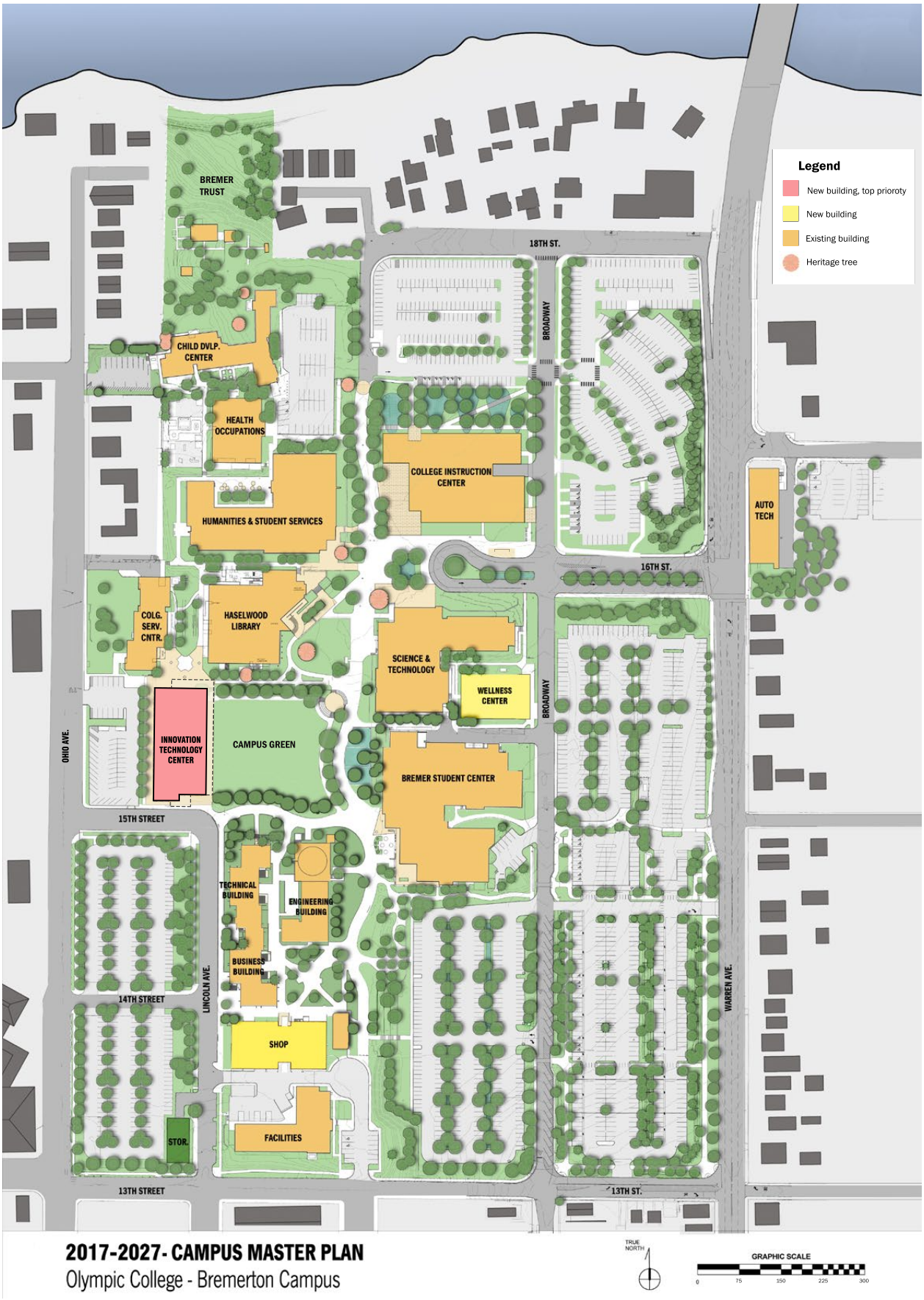
Date: **December 15, 2017**
Prepared By: AC

DETAIL OF ESTIMATE

Item Description	Quantity	Unit	Unit Cost	Totals
G10 Site Preparation				
G 1020 Site Demolition and Relocations				
Site clearance and demolition	43,000	SF	0.80	34,400
G 1030 Site Earthwork				
Earthwork	1	LS	55,900.00	55,900
G1037 Erosion control				
Erosion control	1	LS	32,250.00	32,250
Total For Site Preparation				**122,550**
G20 Site Improvements				
G 2030 Pedestrian Paving				
Pedestrian paving	18,000	SF	7.00	126,000
G2045 Site furnishings				
Site furnishings	1	LS	6,500.00	6,500
G2049 Miscellaneous structures				
Miscellaneous structures	1	LS	43,000.00	43,000
G2051 Fine grading and soil preparation				
Fine grading and soil preparation	9,000	SF	0.40	3,600
G2053 Top soil and planting beds				
Topsoil	167	CY	40.00	6,667
G2055 Planting				
Shrubs and groundcover plantings	9,000	SF	3.00	27,000
Trees	15	EA	450.00	6,750
G2057 Irrigation system				
Irrigation system, modify and extend	9,000	SF	1.60	14,400
Total For Site Improvement				**233,917**
G30 Site Mechanical Utilities				
Mechanical utilities				
Water system	1	LS	26,000.00	26,000
Sanitary sewer	1	LS	42,000.00	42,000
Storm drainage	1	LS	80,000.00	80,000
Natural gas	1	LS	28,000.00	28,000
Total For Site Mechanical Utilities				**176,000**
G40 Site Electrical Utilities & Site Lighting				
Site electrical				
Site Electrical Utilities & Site Lighting	1	LS	52,000.00	52,000
Total For Site Electrical Utilities				**52,000**

DIAGRAMS & SKETCHES

UPDATED CAMPUS PLAN



2017-2027 CAMPUS MASTER PLAN

The Innovation and Technology Learning Center is identified as Olympic College's highest priority and next project in its updated 10 year campus master plan.

FACILITIES MASTER PLAN - CAPITAL PROJECT LIST:

1. Shop Renovation and Expansion

Project Type: Renovation Renovate 18,500 sf shop building and add 4,000 sf to provide space for welding, drafting and baking programs	Design	2017-2019
	Construction	2019-2021

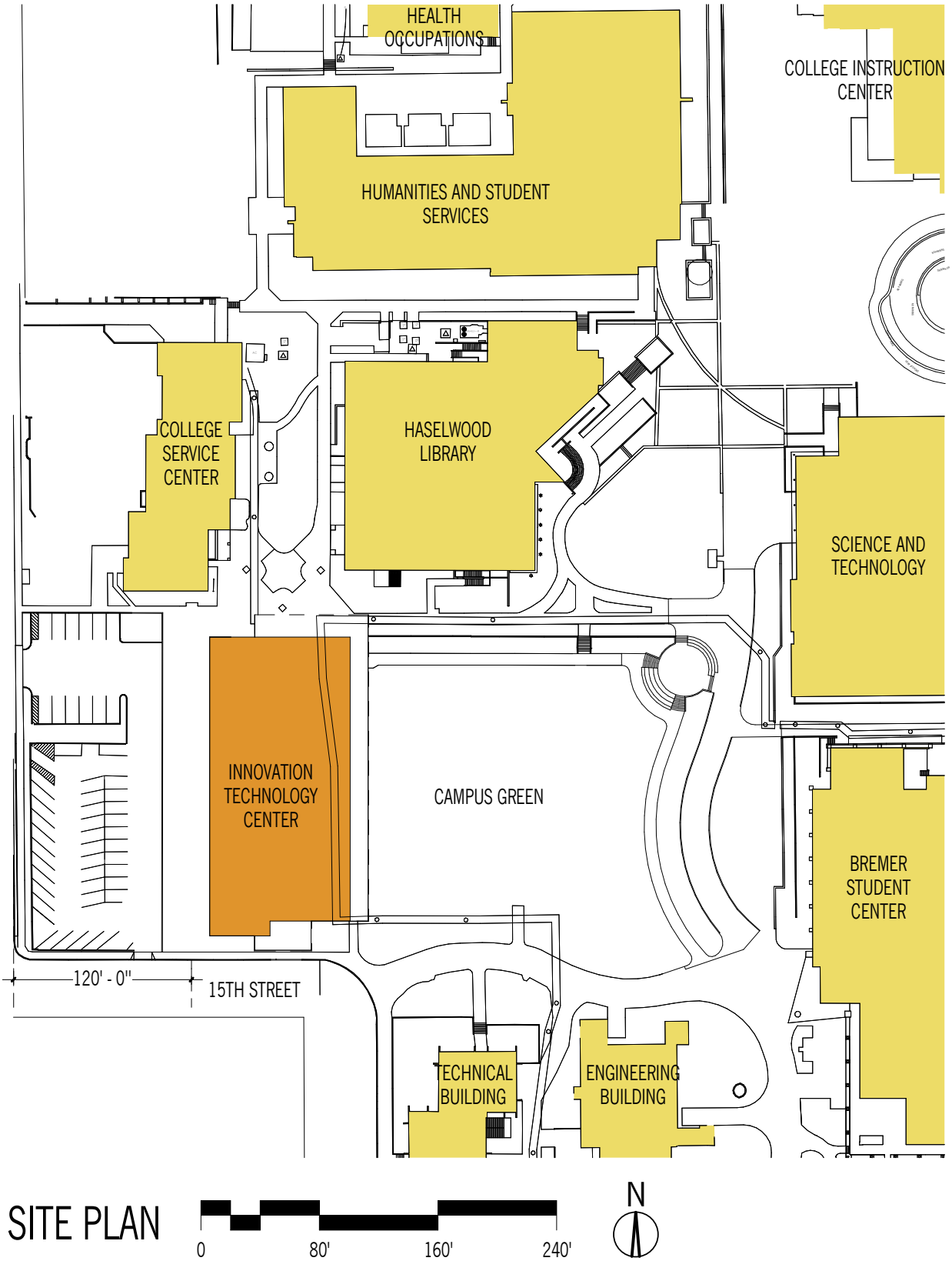
2. Innovation and Technology Learning Center

Project Type: New Net Area A new 41,000 sf building to provide space for active learning and labs that support STEM disciplines, and cybersecurity..	Design	2019-2021
	Construction	2021-2023

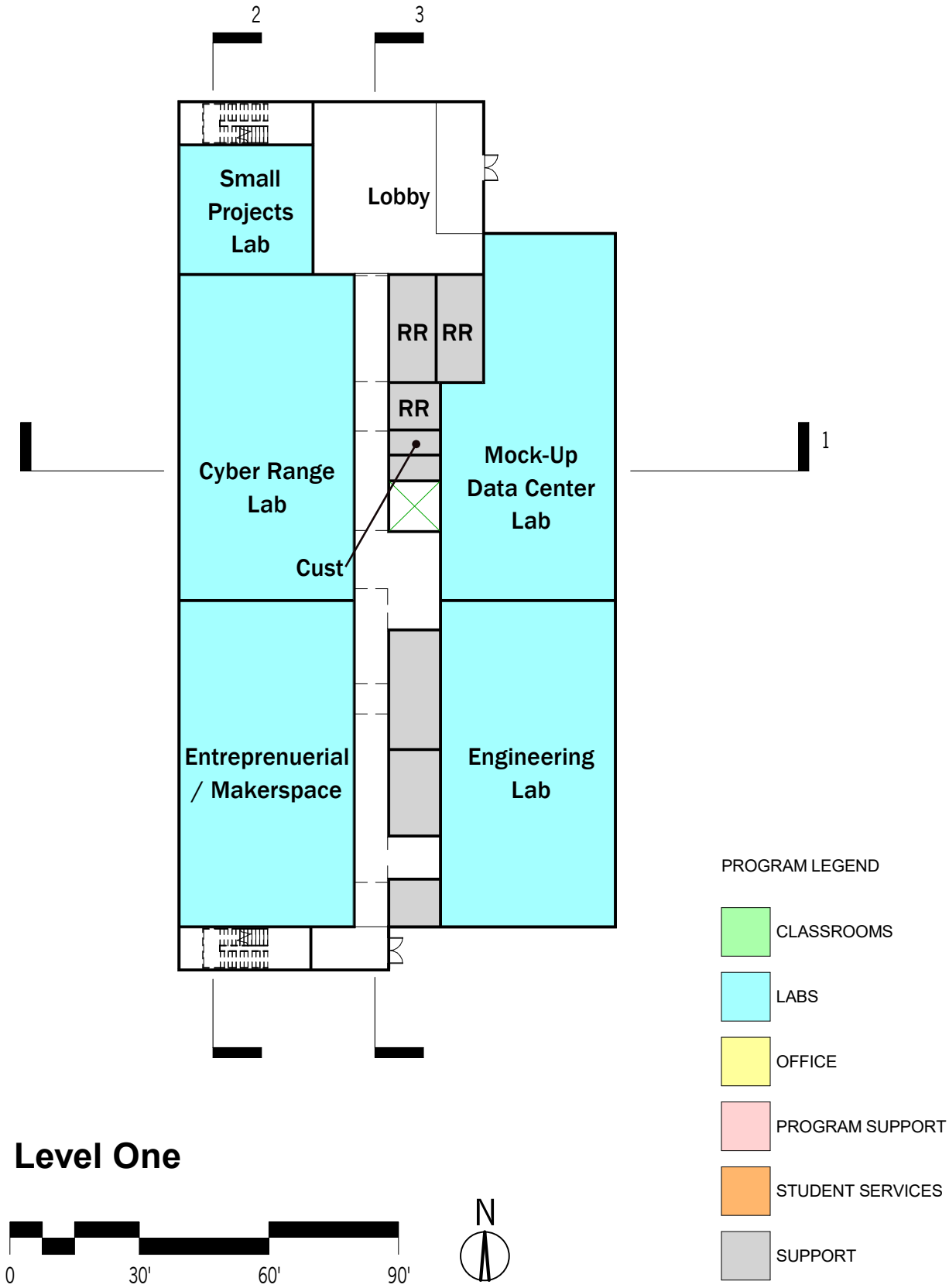
3. Wellness Center

Project Type: COP A new 40,000 sf building to provide space for fitness and athletic programs. Demolish existing PE Building.	Design	2023-2025
	Construction	2025-2027

SITE PLAN

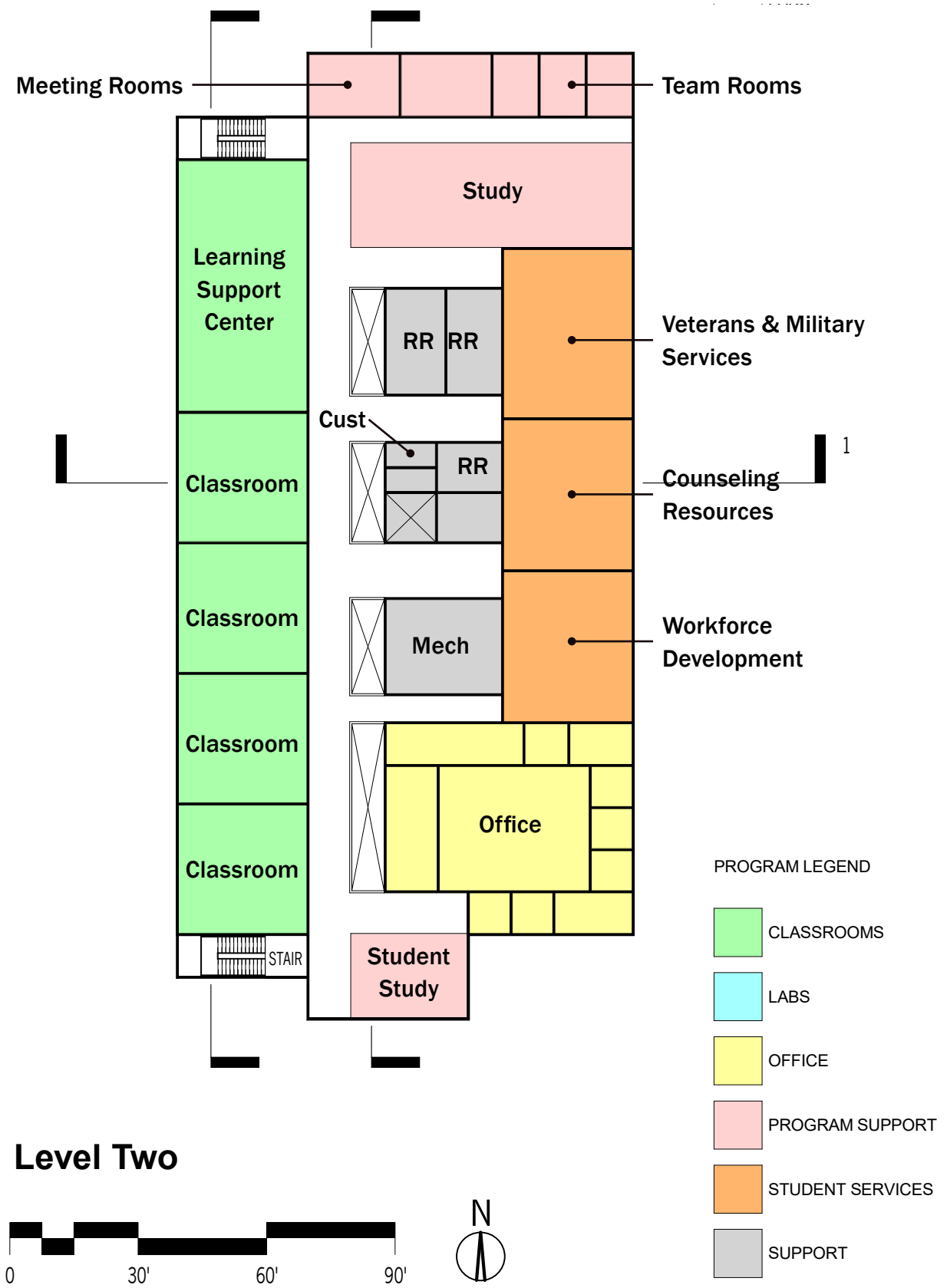

HEALTH OCCUPATIONS
COLLEGE INSTRUCTION CENTER
HUMANITIES AND STUDENT SERVICES
COLLEGE SERVICE CENTER
HASELWOOD LIBRARY
SCIENCE AND TECHNOLOGY
INNOVATION TECHNOLOGY CENTER
CAMPUS GREEN
BREMER STUDENT CENTER
120' - 0"
15TH STREET
TECHNICAL BUILDING
ENGINEERING BUILDING
SITE PLAN
0
80'
160'
240'
N

BUILDING PLANS



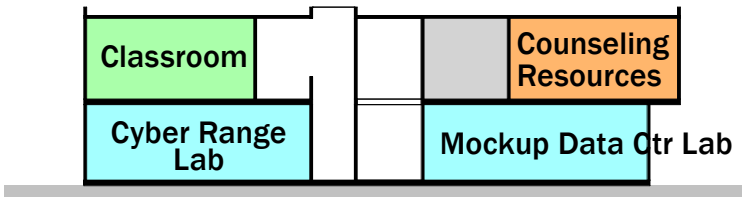
Level One

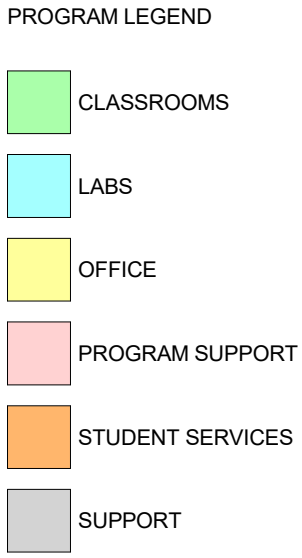
BUILDING PLANS



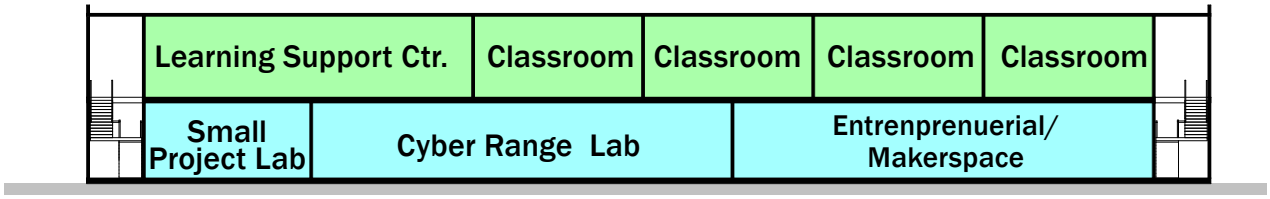
Level Two

BUILDING PLANS

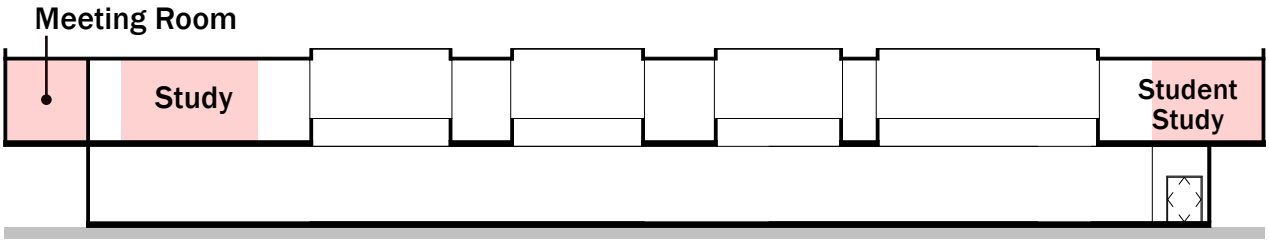




Section One



Section Two



Section Three

APPENDIX

DESIGN TEAM BASIS OF DESIGN (ENGINEER'S REPORTS)

STRUCTURAL ENGINEERING

Olympic College Innovation & Technology Center

B.3 STRUCTURAL NARRATIVE

Authors: PCS
Page Count: 2

3.A CONCEPT STRUCTURAL DESIGN NARRATIVE

ii. Design Loads:
  1 Dead Loads
    a. Roof
      i. 15 psf typical, plus 10 psf of collateral load
      ii. 30 psf additional capacity provided at designated area of roof, to account for Photo Voltaic panels and ballast (for future installation)
    b. Elevated Floor
      i. 60 psf typical (self-weight of beams and slab), plus 10 psf of collateral load.
  2 Live Loads
    a. Roof
      i. 25 psf snow load, plus drifting where applicable
      ii. 20 psf minimum live load
    b. Elevated Floor
      i. Offices and Classrooms: 65 psf uniform, plus 15 psf partition load
      ii. Mechanical Rooms: 125 psf uniform, 2000# concentrated; or, mechanical unit weight plus 50 psf uniform, 2000# concentrated
      iii. Assembly: 100 psf
      iv. Corridors: 80 psf
      v. Stairs: 100 psf, 300# concentrated at treads
    c. At Grade Floor
      i. Laboratories: 150 psf uniform, 3000# concentrated
      ii. All other areas : 125 psf, to allow for flexibility
  3 Lateral Loads:
    a. Seismic
      i. Site Class "D"
      ii. Risk Category III, I=1.25
      iii. Seismic Coefficients: S_S=1.530g, S_1=0.540g
    b. Wind
      i. 115 MPH, Exposure B
iii. Proposed Foundation systems
  1 The foundations will be constructed with augercast piles interconnected with pile caps and grade beams.
    a. Pile caps to penetrate about 10 to 15 feet in the bearing layer and have a capacity of 45 tons for a 16" Diameter pile.
    b. Mat Footings supporting the Lateral Frame: Varying width and thickness, dependent on lateral forces induced into the supported frame above
iv. Proposed Roof and Floor Framing Systems.
  1 Roof System
    a. 1.5", 18 and 20 GA Type "B" metal roof deck, acoustical where exposed to occupied spaces.
    b. Wide-Flange steel joists, spaced at approximately 8 feet on center, supported by wide flange steel beams and steel columns
  2 Elevated Floor System

        a. 3", 20 GA Type "W3" metal floor deck with concrete topping. Total Thickness of 5.5 inches
        b. Wide flange beams and girders, with headed studs to achieve composite action. Beams and girders supported by steel columns.
    3 At Grade Floor System
        a. Slab on Grade concrete. 5" thick slabs supported on 2' thick layer of structural fill are provided at all laboratories and at commons, classrooms and offices. A secondary topping slab is provided to account for a radiant heated slab where occurs.
v. Proposed structural systems, including lateral systems, and material properties.
    1 Lateral System
        a. Special Steel Concentrically Braced Frames, supported by concrete mat footings.
    2 Non-structural Partition Walls
        a. Exterior
            i. Cold-formed steel framing, 43 mil minimum
        b. Interior
            i. Cold-formed steel framing, 18 mil minimum
    3 Concrete
        a. Mildly reinforced footings and slabs
        b. Strength: 3000 typical at footings, 4000 psi typical elsewhere
    4 Steel
        A. Wide Flange Shapes: Hollow Structural Steel Sections, Square, Rectangular, and Round; Misc Sections and Plates

CIVIL ENGINEERING

Civil Site Selection Narrative

Olympic College Innovation and Technology Building

Coughlin Porter Lundeen, Inc.

Project No. C170624-04
December 1, 2017

Introduction

Olympic College is proposing to develop a new Innovation and Technology Building located in its main campus in Bremerton, WA. The new facility would provide the campus with 41,000 square feet of building space on two stories which will include labs, classrooms, offices, and student service spaces. The current site under consideration for locating this campus facility east of the parking lot off Ohio Avenue and 15th Street.

In addition to the new Innovation and Technology building, the project is proposing to redevelop the existing campus pedestrian spine which runs north and south through the center of the campus. The redevelopment will offer a better pedestrian experience traversing the campus and will also allow emergency vehicle through access, which is currently not provided.

Following is a summary of the development requirements for utilities and earthwork necessary for the proposed site.

Earthwork Demolition and Paving

Innovation and Technology Building

The project is proposing to match into adjacent walkways to the north, east, and south of the new building and into the existing parking lot to the west. The existing asphalt parking lot and sidewalks as well as any vegetated surfaces would be removed. Paving is expected to include new concrete sidewalk connections to adjacent walkways.

Earthwork is limited to leveling the site for the ground floor slab and structural foundations. Existing fill soils have been determined to consist of a fill material extending down to approximately 25-feet in places. Existing fill soils are understood to be not suitable for structural support or structural fill, as such all fill for structural support will be imported. Building foundations will likely implement augercast piles designed to penetrate the fill soils into the bearing layer below. The building slab on grade would either be supported by pile foundations and be designed as a structural slab, or would be required to bear on a minimum of 2-feet of well compacted imported structural fill, in addition to 4" of capillary break material.

Pedestrian Spine Site Alternative

The proposed pedestrian spine redevelopment is replacing the existing stairway connecting the pedestrian paths with a more gradual sloping walk. In order to accomplish the intended design the grades will need to be raised at the existing bottom of stair locations and substantial earthwork will be required. The redevelopment of the pedestrian spine will install approximately 10,000 square feet of concrete paving designed to support traffic loading from emergency vehibles.

Water Distribution

Innovation and Technology Building

The public water system is provided by the City of Bremerton. Supply to the site includes an existing 12" public water main located in 15th Street approximately 25 feet south of the project site, and is available to be utilized for water services.

The installation of domestic water service is required for the proposed project and will connect to the existing water main mentioned above. As required as part of the domestic service a water meter sized to meet the building will be included in the project. An exterior reduced pressure backflow assembly (RPBA) is required for

the domestic service. An independent irrigation meter is not expected and existing irrigation services are proposed to be reconfigured to meet the needs of the project.

Fire service will be required for the project and include backflow prevention, fire department connection, post-indicator valve, and the service line connected to the existing water main mentioned above. In additional to the building service, a fire hydrant will be required to supplement existing fire protection on campus. The hydrant will be installed to the south of the project and connected to the water main mentioned above.

The building fire service could potentially require a booster pump to augment the available water pressure depending on the height, construction type, and fire sprinkler requirements. We recommend a fire flow test be conducted during the design process to better understand the available water pressure.

Storm Water Runoff

Innovation and Technology Building

Storm water runoff control (detention) will not be required. The storm water runoff is directly discharged to the Port of Washington Narrows through a storm system in Ohio Avenue confirmed to have sufficient capacity; direct discharge and capacity are the two requirements needed to not implement runoff control (detention).

Installation of Low Impact Design (LID) systems will be required to the maximum extent feasible. Potential LID systems may include rain gardens and bioretention planters. Porous paving is another potential option dependent on site programming. Existing site fill soils are not conducive to full onsite infiltration, however will be pursued on a limited basis.

Water quality treatment will be required for pavements greater than 5,000 square feet subject to vehicular access. Based on our understanding of the building and site design the project is not proposing the addition of any substantial parking areas. As such, water quality requirements are not anticipated for this project. However, to achieve LEED goals for the project water quality elements may be implemented to treat the runoff from the development area.

A perimeter footing drain system will be installed around the proposed building. An underdrain system is not anticipated for the project.

Pedestrian Spine Site Alternative

The redevelopment of the pedestrian spine does not require stormwater runoff control, LID systems, or water quality treatement. However, due to the major elevation changes a new drainage design is required and multiple catch basin inlets will be installed and connected to the adjacent existing storm system to ensure adequate drainage of the area.

Sanitary Sewer

Innovation and Technology Building

A side sewer will need to be extended from the proposed building to the existing 12 " sewer main located approximately 25 feet to the south of the proposed project in Lincoln Avenue and 15th Street. Sewer waste from any food preparation or chemical lab areas will discharge through a grease interceptor and acid neutralization vault prior to discharging to the sewer main. Similarly, any dumpster areas will need to be routed through a sand filter prior to discharging to the sewer system.

Gas Service

Innovation and Technology Building

If required for building systems, gas service will need to be extended approximately 25 feet to the project site from the gas main located to the north of the proposed building.

Utility Corridor

Innovation and Technology Building

An existing utility corridor is located below the proposed building running north/south. The building design proposes to circumvent the existing utility corridor and protect in-place. The structural system would be designed such that no foundations will bear on the existing utility corridor to remain below the building. It is unknown what utilities if any utilize the existing cooridor, however it is a desireable amenity to keep in place for future planning.

Electrical Services

Innovation and Technology Building

The installation of electrical services for the site will require coordination with the service provider (PSE). A primary service line currenly runs north/south below the proposed building location. With approval from PSE the preferred option is to relocate the primary service into the existing utility corridor discussed above. Alternatively, the primary service can be rerouted around the proposed building. The project requires a transformer to reduce the primary power to secondary power.

The proposed project will be required to relocate disrupted site lighting conduit in order to maintain power to existing site lights to remain.

Pedestrian Spine Site Alternative

The proposed redevelopment of the pedestrian spine will require the installation of new site lighting and associated infrastruction such as handholes and conduits.

Summary Table

The following table shows the approximate length of utility extensions required for the site. These connections are shown without knowledge of where the mechanical rooms will be, so modifications and adjustments should be anticipated as the design is developed.

APPROX. LENGTH OF WATER (FT)	APPROX. LENGTH OF SEWER (FT)	APPROX. LENGTH OF STORM (FT)	APPROX. LENGTH OF GAS (FT)	APRROX. SITE AREA (AC)	APPROX. DETENTION VOLUME (CF)
100	25	75	25	0.75	Not Required

TABLE 1 - Approximate utility extension and site requirements for the Innovation and Technology Building.

1.0 Project Description

The project is a 40,940 square foot building on the Olympic College campus in Bremerton Washington. The program consists of classrooms, labs, maker spaces, office space, conference room, and study areas. The building program is intended to support workforce development and military members looking to enter the workforce.

1.1 Sustainability Goals

The building will be designed to meet the requirements for a USGBC LEED Silver certification.

2.0 Mechanical

2.1 Design Conditions

Outdoor Conditions	Summer	Winter
Washing State Energy Codes	86°F DB/ 65°F WB1	24°F

Table 1: Outdoor Conditions

Indoor Conditions	Summer	Winter
Labs	75°F ±2°F	70°F ±2°F
Student Services	75°F ±2°F	70°F ±2°F
Program Support Spaces	75°F ±2°F	70°F ±2°F
Offices	75°F ±2°F	70°F ±2°F
Support	80°F ±2°F	70°F ±2°F
Relative Humidity	<50% ±5%RH	No control

Table 2: Indoor Conditions

Medium-Pressure Ductwork	
Static Pressure Loss	Maximum 0.2 inches WC per 100 feet
Main Velocity	Maximum 2,400 feet per minute
Branch Velocity	Maximum 1,600 fpm
Low-Pressure Ductwork	
Static Pressure Loss	Maximum 0.1 inches WC per 100 feet
Main Velocity	Maximum 1,400 feet per minute
Main Velocity in Theater	Maximum 600-800 feet per minute
Branch Velocity	Maximum 1,500 fpm
Branch Velocity in Theater	Maximum 400feet per minute
Flexible Ducts	Maximum length 6 feet, maximum of two 90° bends
Hydronic Piping	
Static Pressure Loss	Maximum 4 feet WC per 100 feet
Main Velocity	Maximum 8 feet per second

Table 3: Duct Design Criteria

2.2 Heating Systems

Heating Source – Air to Water Heat Pump

A multi-module (minimum three modules) air to water heat pump roof will provide heating water for the building.

The system will be piped in a variable primary pumping arrangement. The heating water system will be a 20% glycol solution. Secondary loops with control valves for temperature control will serve space heating devices.

Heating Delivery

Heating will be provided to the main building spaces with an in slab radiant floor, radiant ceiling panels, finned tube radiator, four pipe fan coil units, or active chilled beams.

Cabinet unit heaters will be provided in all building vestibules, exit stairs with exterior walls, and other spaces requiring heating but not cooling.

Unit heaters will be provided in mechanical rooms and back of house spaces for freeze protection.

2.3 Cooling Systems

Cooling Source – Air to Water Heat Pump

A multi-module air to water heat pump located on the roof will provide cooling water for the building.

The system will be piped in a variable primary pumping arrangement. The chilled water system will be a 20% glycol solution. Secondary loops with control valves for temperature control will space cooling devices.

Cooling Delivery

Cooling will be provided to the main building spaces with an in slab radiant floor, radiant ceiling panels, finned tube radiator, four pipe fan coil units, or active chilled beams.

Cooling for telecom, electric, and transformer rooms will be provided by split system heat pumps. The condensing units will be located on grade or the roof.

2.4 Air Handling Systems

The building will be served by a dedicated outside air systems (DOAS) providing outside air to all occupied spaces.

2.5 Air Distribution and Ductwork

Air will distributed through medium pressure round or flat oval ductwork to a network of pressure independent air terminal units.

The remainder of the air distribution will be supplied in low pressure rectangular ductwork directly from the air handling systems to the air diffusers.

Return/exhaust air will be ducted for all systems.

CO2 control shall be provided for all densely occupied spaces.

2.6 Special Systems & Program

General: Experimental labs, technology simulation labs, small projects labs, maker spaces and energy labs may contain 3D printers, laser cutters, wood working equipment, metal working equipment, soldering rooms, and other specialized equipment requiring independent exhaust.

Maker Space

Provide independent exhaust for maker spaces and room where other specialized equipment require independent exhaust.

2.7 Building Control System

The temperature control system will consist of a Honeywell direct digital control (DDC) system that will tie into the Olympic College Campus DDC system. The system will be networked within the building and have a central computer as the operator interface point. That computer will have a connection to permit remote monitoring of the system by facility maintenance.

The temperature control system will consist of a stand-alone direct digital control (DDC) system. Electric actuators will be used for all valve and damper control. The system will be networked within the building and have a central computer as the operator interface point. That computer will have internet conductivity to permit remote monitoring of the system by facility maintenance.

2.8 Measurement and Verification

Controls will be provided to allow for a measurement and verification system to provide continuous metering of equipment for the following systems:

- Lighting systems and controls
- Cooling loads
- Heating loads
- HVAC fans and pumps
- Plug loads
- Elevators

3.0 Plumbing

3.1 Design Criteria

Domestic cold water shall be sized with velocities not exceed 8ft/sec and the domestic hot water system shall be sized with velocities not to exceed 5ft/sec.

3.2 Plumbing Fixtures

Plumbing fixture will be commercial quality and will be water conserving type.

3.3 Domestic Cold Water System

New water services will be provided from the city water main for the building. A new meter and a backflow preventer assembly will be provided for the domestic water system. Additional reduced pressure backflow preventers will be provided for:

- Industrial Cold Water
- HVAC Makeup
- Irrigation
- Other potential contamination sources

3.4 Industrial Cold Water System

Provide industrial cold water to labs where needed to support programmatic needs.

3.5 Domestic Hot Water System

A high efficiency air to water heat pump and a water storage tank will provide domestic hot water to the building. The water heater will produce 140°F. A master mixing valve assembly will be utilized to temper the hot water for plumbing fixture use to deliver 120°F hot water. An expansion tank will be provided on domestic hot water systems. Temperature maintenance will be provided by a recirculating hot water loop and hot water circulation pump or heat trace installed on hot water piping.

3.6 Storm Drain System

An internal roof and overflow drain system will be provided as required by code.

3.7 Sanitary Sewer System

A Sanitary waste pipe will stub out of the West end of the building for connection to site sanitary system designed by the civil engineer. A Grease interceptor will be installed to collect waste from the Café area. The interceptor will be located at outside the building on the West end and will discharge into the sanitary system.

3.8 Natural Gas System

A new gas service will be provided to the building and coordinated with the civil engineer to serve gas fired equipment.

3.9 Irrigation

Irrigation piping and valves will be shown on the civil or landscape drawings.

3.12 Special Systems & Program

General: Experimental labs, technology simulation labs, small projects labs, maker spaces and energy labs may contain 3D printers, laser cutters, wood working equipment, metal working equipment, soldering rooms, and other specialized equipment requiring compressed air, vacuum systems, industrial cold water.

Wood Shop

Wood shop areas will be served by a central compressed air system.

Laser Cutter

No special plumbing systems anticipated.

Metal Shop

Metal shop areas will be served by a central compressed air system.

Soldering Station

No special plumbing systems anticipated.

Maker Space

Maker spaces shall be served by a central compressed air system.

4.0 Fire Protection

4.1 Wet Pipe Sprinkler System

The entire building will be totally sprinkled in accordance with NFPA 13. In general, system to consist of connection to new water service, including detector double check assembly, main flow alarm station, zone control valves and flow indicators, alarm bell, wet and combination standpipe, standpipe hose valves, fire department connection, roof outlets, wall and/or post type control valves for roof outlets, and sprinkler piping and heads. All required system isolation valves shall be provided with tamper switches.

Class 1 standpipes with required hose connections will be provided within stairways in accordance with NFPA 14. The sprinkler system/combination standpipe system shall provide a fire protection system designed and installed in strict accordance with NFPA, OFC, and local Fire Marshal requirements.

Sprinkler heads to be chrome plated semi-recessed pendant type or sidewall type with polished chrome escutcheons in finished areas and upright rough brass finish type heads in unfinished areas. High temperature heads will be provided in the classrooms where required by classroom use (hot work). Horizontal dry sidewall sprinkler heads will be provided for overhangs, and other perimeter areas subject to freezing. Quick-Response heads will be provided in all light hazard areas.

5.0 Electrical

5.1 Code References

- 2017 National Electric Code (NEC)
- 2015 Washington State Energy Code (WSEC)

5.2 Design Criteria

The following table indicates allowances that will be used to calculate the service size and distribution service for the OC CIC Innovation Center. Lighting allowances are in conjunction with the current Washington State Energy Code (WSEC); power allowances are based on past experience with buildings of similar use. Power as noted for labs includes an allowance for equipment loads such as 3D printers, laser cutters, soldering stations, etc. that are expected to be installed in those spaces.

Load Density (VA/SF) & Equipment Loads (kVA)

	Area (SF)	**Lighting (VA/SF)**	**Power (VA/SF)**	**Equipment (kVA)**	**Sub-Total (kVA)**
Classrooms	5,400	1.0	3.5	-	24
Labs	12,900	1.5	15.0	-	212
Student Services	3,300	1.0	4.0	-	16
Program Support Spaces	3,080	1.0	3.5	-	14
Office Space	1,930	0.9	4.5	-	10
Support	14,330	0.8	1.5	-	32
Roof	-	-	-	2.0	2
HVAC	-	-	-	250.0	250
Elevator	-	-	-	10.0	10
Network Loads	-	-	-	20.0	20
Total Connected Load					592 kVA
+Design Contingency (15%)					680 kVA
Total Amps (@208V, 3-phase)					1890 A
Recommended Service Size (@208V, 3-phase)					2000 A

Table 4: Load Density and Equipment Loads

5.3 Service

The building will be served via a campus pad-mount transformer located at the exterior of the building. The primary feed is expected to be via existing conduits running through the site and currently feeding the theater building that is to be demolished. The secondary feeder will then be routed from the transformer underground to the main electrical room of the building. See figure below for approximate locations.

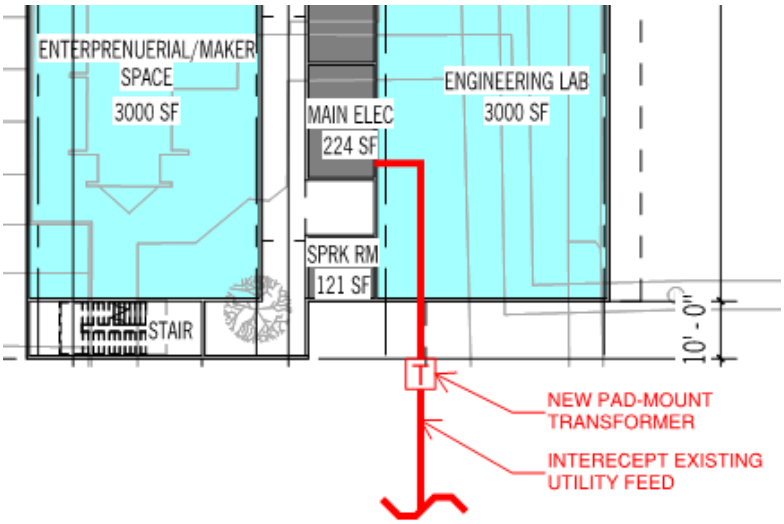


Figure 1: Electrical Service Sketch

5.4 Distribution

A Main Distribution Panel (MDP) will be located in the main electrical room at the ground floor of the building. The preliminary size of the MDP is 2000A, 208/120V, 3-phase, 4-wire. This equipment will be free standing and floor mounted. It will be braced to exceed available fault current at the main lugs of the switchboard.

In addition to the MDP, the main electrical room will contain wall mounted electrical panelboards, fire alarm control panel, and lighting control equipment. Panelboards dedicated to lab equipment will be located immediately adjacent to those spaces.

Electrical feeders from the MDP to subsequent distribution panelboards will be copper conductors routed in conduit.

The MDP, and branch panels serving sensitive loads, will each be provided with an integral surge protective device (SPD).

Refer to the figure below for a rough schematic of the distribution system.

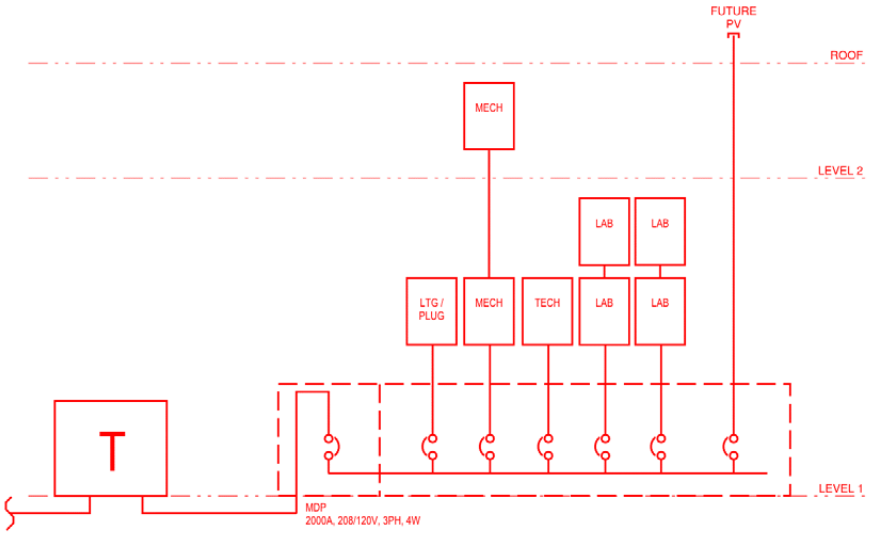


Figure 2: Preliminary Single-line Diagram

5.5 Metering, Measurement, and Verification Systems

Metering for the building will be in conjunction with standards set forth by Olympic College. It is understood that the campus power loop utilizes a master meter. The master meter shall meter the new building, assuming capacity of the master meter is adequate. Verification with the College will be required to ensure capacity.

Because the building is less than 50,000 square feet, metering provisions per WSEC C409 do not apply.

5.6 Grounding System

Two grounding criteria will be addressed: safety and performance. A safe grounded power system will be provided in compliance with the National Electric Code (NEC). This ground system consists of the building service grounding and bonding (multiple ground rods, UFER ground, and bonding to the water service and structural steel). A building main ground bus bar will be provided in the main electrical room. The safe grounding system will be extended throughout all electrical systems in the building. All branch circuits and feeders will carry a grounding conductor. All metallic systems will be grounded to the building grid.

Performance grounding includes a system of grounding conductors and busses to be used for the telecommunication rooms throughout the building. The performance ground system will tie into the code required safety grounding system at the building main ground bus bar.

5.7 Branch Circuits

Branch circuit wiring shall be copper and will be routed in conduit from the panel to a junction box in the accessible ceiling space in area served, then extended to devices utilizing cable in conduit.

Branch circuits sharing a neutral will be fed from multi-pole breakers. Branch circuit neutrals will be oversized on shared circuits with high harmonic loads.

Ground fault circuit interrupter receptacles will be provided at sinks, kitchens, toilet rooms, and all other wet areas. Weatherproof-in-use hoods and outdoor-rated ground fault circuit interrupter receptacles will be provided at all roofs and outdoor areas.

Labs and maker spaces will utilize surface metal raceway (Wiremold) to locate power and data outlets adjacent to the tasks in a flexible method. The surface metal raceway permits ease of reconfiguration of power and data cabling within a space without disturbing building walls and finishes. Overhead cord reels may also be provided in these spaces to provide a flexible means of power to equipment.

Electrical power connections will be made to all mechanical equipment, to include providing all electrically associated devices such as disconnect switches, contactors, magnetic or manual starters, lock-out switches, etc., not furnished under Division 23. Variable frequency drives (VFDs) will be furnished under Division 23 and installed under Division 26. Receptacles will be provided within 25 feet of all mechanical equipment.

Electrical power connections will be made to support miscellaneous equipment. Connections include disconnect safety switches and wiring to support interlocks to remote devices.

5.8 Emergency Power Systems

No generator is anticipated for the building, as the only emergency power required is for emergency egress lighting. Per Olympic College Standards, light fixtures designated for emergency egress lighting will be specified with individual backup batteries. However, use of these backup batteries require additional maintenance for testing and each fixture requires a red "push to test" button. To avoid this additional maintenance and create a cleaner aesthetic, mini-inverters may be utilized that would be connected to lighting designated as emergency egress. The mini-inverters typically supply 200 to 800 watts of power to a group of light fixtures and may be located in a central location for ease of testing. For this project, it is suggested they be located in the main electrical room.

5.9 Renewable Energy Systems

While a photovoltaic (PV) system will not be installed at the time of construction, the building will include provisions for a future PV system. In addition to having area at the roof reserved for the PV system, the following items will also need to be provided:

- Spare breaker at MDP that includes ground fault provisions for future connection
- Empty conduit from MDP to roof for future connection
- Emergency power-off (EPO) switch at main electrical room for future connection

5.10 Lighting and Lighting Controls

The electrical lighting system will be designed in compliance with all applicable codes and ordinances. Efficient sources and automatic control technologies will be implemented to provide the most efficient and effective electric lighting system for the building occupants and tasks. Controls will provide switching and dimming of the lighting to permit maximum use of the available nature light.

Daylighting will provide the first level of illumination for most interior spaces. In spaces with adequate daylight, daylight harvesting shall be implemented in the appropriate daylight control zones. Skylights at the second floor will help provide top lighting strategies and will allow a lower lighting energy load throughout the day. Side lighting strategies will be used for the lower floor and upper perimeter floor.

Energy efficient local task lighting may be implemented where appropriate including the labs and offices.

Control of lighting will be provided by the following methods for the respective areas:

Task/Area	Control Method*
Classrooms/Labs	Room scene controller, vacancy sensor
Student Services/Program Support Spaces	Room scene controller, vacancy sensor
Office Spaces	Vacancy sensor, local dimming switch
Circulation/Transition	Timeclock control, local override switch
Restrooms	Occupancy sensors with manual on
Storage	Vacancy sensors, local switch
Mech/Elec Rooms	Local switch (no automatic control)

*Photocells will be used for daylight harvesting for all spaces with daylighting zones

Table 5: Lighting Control Methods by Area

6.0 Fire Alarm

The building fire alarm system will consist of a fully addressable system. The main fire alarm control panel will reside in the main electrical room at the ground floor. A remote fire alarm annunciator panel will be located in the main entry vestibule, or in an area designated by the local fire marshal. The annunciator will provide the fire department with a summary of the fire alarm system status and events once they arrive.

The following table summarizes the fire alarm system components for the project:

Device	Coverage
Manual pull stations	Located at each exit and each exit leaving an elevated floor
Smoke detectors	Air handlers (>2000 CFM), elevator lobbies, elevator control rooms, elevator hoistways, electrical rooms, mechanical rooms
Fire sprinkler	Tamper and flow
Annunciation	Remote annunciation at fire department entry
Building annunciation	Horn and strobe annunciation thru out the facility
System output	Relay interface for mechanical system shut-down and elevator recall, fire department dialer
Monitoring	Fire department station monitoring via dedicated telephone line

Table 6: Fire Alarm Device Coverage

7.0 Technology

7.1 Code References

- American National Standards Institute (ANSI)
- Institute of Electrical and Electronics Engineers (IEEE)
- National Electrical Manufactures Association (NEMA)
- Underwriters Laboratories (UL)
- American's with Disabilities Act (ADA)
- Telecommunications Industry Association (TIA)
- Building Industry Consulting Service International (BICSI)
- ANSI/TIA-568-C.0, Generic Telecommunications Cable for Customer Premises
- ANSI/TIA-569-C, Telecommunications Pathways and Spaces
- ANSI/TIA-607-C, Generic Telecommunications Bonding and Grounding
- ANSI/TIA-606-B, Administration Standard for Telecommunications Infrastructure
- ANSI/BICSI-006-2015, Distributed Antenna System (DAS) Design and Implementation Best Practices
- ANSI/TIA-607-C, Generic Telecommunications Bonding and Grounding
- INFOCOMM 1M-2009, Audio Coverage Uniformity Standard
- ANSI/INFOCOMM 2M-2010, Standard Guide for Audiovisual Systems Design and Coordination Processes
- ANSI/INFOCOMM 3M-2011, Projected Image System Contrast Ratio
- ANSI/INFOCOMM 4: 2012, Audiovisual Systems Energy Management
- ANSI/SIA PIR-01-002, Passive Infrared Motion Detector Standard - Features for Enhancing False Alarm Immunity
- ANSI/SIA CP-01-00, Control Panel Standard-Features for False Alarm Reduction
- NFPA 731, Standards for the Installation of Electric Premises Security Systems
- UL 609-96, Local Burglar Alarm Units and Systems
- UL 639-07, Standards for Intrusion Detection Units
- UL 1037-09, Standard for Anti-theft Alarms and Devices
- UL 1635-10, Digital Alarm Communicator System Units

7.2 Design Criteria

Technology systems provide flexible flow of information, dynamic content exchange, efficient end user communications, and maximizes building managers' oversight and support of building usage. Included in the Innovation center will be standard structured cabling systems, electronic security systems, and audiovisual systems for classrooms and conference rooms.

7.3 Structured Cabling Systems (Telecom/Data)

A single telecommunications room shall be established on the first floor. It will combine the functions of the main equipment room (ER) for services and head-end active equipment, the entrance facility (EF) for OSP services to enter the building, and horizontal cabling terminations and Ethernet switches.

Based on the building's square footage and program, it is not anticipated that multiple telecom rooms will be required provided a sufficient chase and transition point is provided for on the second level. All cabling lengths shall remain under 90M for the permanent link cabling.

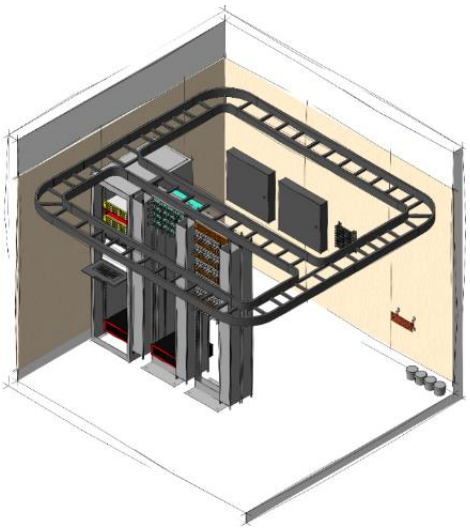


Figure 3: Example Equipment Room (ER)

Telecommunication rooms shall be fitted with plywood backboards on all walls, painted with 2 layers of white fire-rated paint.

Access Provider (CenturyLink, Comcast, etc.) equipment will also be installed in TRs and in the EF.

Wire management rings will be utilized to route cabling from different pieces of wall mount equipment.

Where telecom racks and enclosures are provided, cable runways shall be provided above them to route cabling to/from racks.

110 wiring blocks will be provided in TRs/TEs for cross-connecting copper cabling.

2-post racks, floor enclosures, and wall-mount Telecommunications Enclosures (TEs) will be provided where required for the installation of copper patch panels and fiber optic distribution units. Racks/enclosures will be 19-inches EIA-310 compliant, with vertical and horizontal cable management systems.

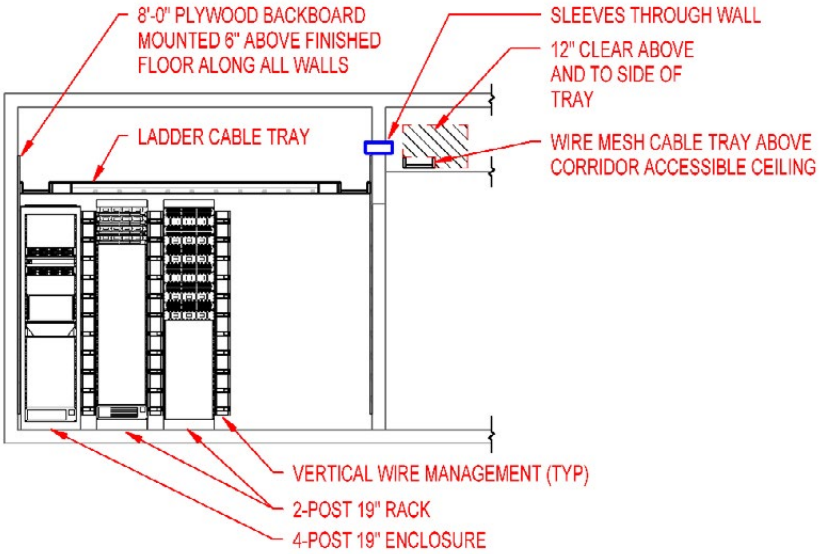


Figure 4: Example Section with Equipment

Horizontal cabling shall be provided from patch panels in TRs, to work are outlets and other devices throughout the building. Cabling will be installed, terminated, labeled, tested and administered by the contractor. The cabling plant will consist of the following cable types:

- Horizontal Data/Voice – Category 6
- Horizontal Data (for WAPs) – Category 6A
- Horizontal MATV – Radio Grade Series 6 Quad Shield (RG-6/UQ)
- A minimum number of two cables will be extended to each Work Area Outlet location.

Wireless access points (WAPs) and other active equipment will be owner furnished, owner installed. Approximate spacing between adjacent WAPs is 25-35-feet. Wireless access points shall feature two Category 6A cables terminated and installed in ceiling or wall mounted junction boxes.

Where PoE (Power over Ethernet) endpoint devices require power exceeding 60W, CAT6A cabling will be provided at a minimum, with LP rated cables being used where design conditions require large bundles of cables servicing high powered PoE devices.

The following table illustrates the number of estimated equipment outlets (EO) for the horizontal cabling system:

Ports per Equipment Outlet (EO):	2
Patch Panel Capacity (Ports):	48
Patch Panel Height (in RU):	2
Rack Capacity (in RU)	45
Square footage per EO:	150

Building	Floor Area	Excluded Area	Serving Area	EO Qty	Cable Count	Patch Panels	Total Rack Units	Racks Estimate	TRs Estimate	TR Size
OC CIC	41,000	12,000	29,000	193	387	9	36	2	1	10'x14'

7.4 Outside Plant

Service to the building will be provided via existing underground tunnel pathways from existing infrastructure on campus.

A total of two 4-inch conduits shall be provided:

- One 4-inch for campus copper cabling
- One 4-inch for campus fiber cabling

7.5 Pathways

In order to provide a flexible and scalable communications system, the design of the pathways which transport, protect and support the cables must be designed with easy access and growth in mind. Telecommunications pathways shall be designed and constructed in accordance with the ANSI/TIA-569-C standard, including minimum bend radii on telecommunications conduits.

Dedicated vertical conduit risers for data, legacy analog systems and MATV will be provided between each TR.

In areas with no accessible ceiling and when cabling is routed below-grade, conduits and duct banks shall be used for cable distribution.

Conduits will be sized for 40 percent fill, with cable trays sized for 25 percent fill. In areas with greater accessibility and those which may need frequent cable changes the preferred method of cabling support will be cable tray.

Ladder-type tray will be installed in the EF and TRs where equipment racks are located, as a means for routing cabling and also to help seismically secure the equipment racks. Wire-mesh cable tray will be used throughout corridors for horizontal cabling.

J-hooks will be located above accessible ceilings in areas where smaller amounts of cables (under 50 total quantity) need to be routed to work area outlets. We do not anticipate many locations within the building with accessible ceiling therefore not many scenarios where this method will be utilized for routing of cable.

A 2-inch conduit will be provided to a weather head on the roof for future services (SMATV, P-to-P Microwave, etc).

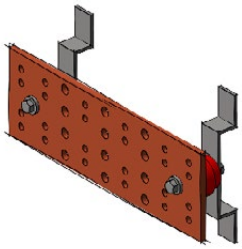
7.6 Grounding and Bonding

A performance grounding and bonding system will be provided for all telecommunications, AV systems, and other sensitive equipment throughout the building. This system is separate from the electrical grounding system in that an electrical grounding system is required for safety, but telecommunications grounding and bonding systems are required to protect active equipment in the system from disruptions due to either outside interference or unbalanced voltage potentials to ground. They are integral in that telecommunication system must be bonded to the electrical system so that they may function as a single cabling system.

A Primary Bonding Busbar (PBB) will be installed in the ER. The PBB will be connected (bonded) to the electrical system's main panel board's (sometimes referred to as the main switch board, or main distribution board) ground via the Telecommunications Bonding Conductor (TBC).

Secondary Bonding Busbars (SBB) shall be located in every TR to provide a bonding point for all equipment in that room.

Rack Bonding Busbars (RBB) will be provided in every Telecommunication Enclosure (TE).



Racks, cable trays, conduits, and other telecommunications system equipment shall be bonded to the system.

7.7 Intercommunications

An integrated public address, intercom, and synchronized clock system will be provided for the building. Management of bell schedules, clocks, paging zones, and intercom end-points will be managed by a single, and IP-based, software platform.

7.8 Public Address

A public address system shall provide voice notifications via overhead speakers through common areas and corridors. The system shall be capable of basic zoning of message delivery, and be centrally controlled by a single operators station.

The public address system shall be capable of integrating with a phone system to allow paging communication through user phones.

7.9 Clock Systems

A synchronized clock system will be provided for the building. Clocks will be capable of being have dedicated 120V power nearby, with time synchronization occurring wirelessly.

The clocks will be capable of providing both analog face and digital style clocks. Clock faces will come in various sizes, as well as digit heights for digital clocks.

7.10 Audio Visual Systems

Multimedia presentation systems enhance communication by amplifying sound and allowing the use of multiple sources of visual data, be it video playback, spreadsheets – the goal of a multimedia presentation system is to enhance learning.

The audio visual system should not get in the way of the user or instructor so care must be taken to design a system that is as easy to use as functionally possible with technology currently available.

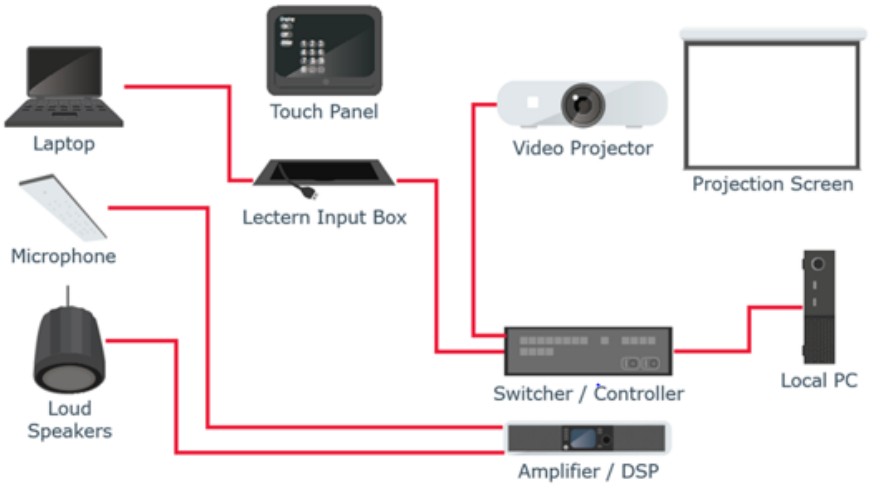


Figure 5: Typical Multimedia Presentation System Diagram

Spaces

Labs, Classrooms and Conference Rooms will be outfitted with multi-media presentation systems. The spaces will feature a form of video display, audio program and voice reinforcement, source input and system control.

Exact quantity and size of displays in other spaces to be determined based on final room size and specific function/use. For larger rooms, projection systems are to be considered to accommodate legibility/image size requirements.

Typical classrooms will include a dedicated podium/lectern for instruction with integrated AV cable input/outputs and system control panel. The podium/lectern shall be mobile and power and data infrastructure will be designed to accommodate maximum flexibility.

Mobile AV system equipment will also be provided for large labs in the form of a rolling enclosure with dedicated rack rails for mounting AV equipment.

Control Systems

Integrated control systems will be part of all audiovisual spaces and will control AV systems. Room lighting and shade scene and preset controls are to be integrated at select areas. All control systems user interfaces will be network-based, and either by wall mounted, or integrated into countertop presentation workstations and other presentation devices. Interfaces with identical functions to other existing presentation spaces are to mimic existing control interfaces.

Digital Signage

Digital signage displays will be provided at each floor in common areas such as entry vestibules and lobbies.

The digital signage system will provide a platform for communicating daily events, upcoming events in the form of a schedule as well as any custom video content playback.

A web-based software system will be provided for the authoring of digital signage content to provide maximum flexibility of managing the system.

Requirements for displays for the digital signage system shall be as outlined previously.

Assistive Listening Systems

Included with all multimedia presentation systems where instruction will take place a code-compliant assistive listening system will be provided.

Assistive listening systems are required by the 2010 ADA and are included in current revision of the IBC.

These systems allow people with difficulty hearing to be able to hear the program content of the system in the form of wireless transmitters and wireless receivers worn on the individual.

7.11 Video Surveillance

Video Surveillance systems will be IP based and signals will be routed back to a video management system (VMS). Archival requirements and additional video storage requirements will be detailed in future versions of this document.

Cameras

All cameras will be IP-based, and ONVIF compliant, allowing them to be used with a variety of VMS software platforms and accessible through the LAN and WAN.

Cameras will include Wide Dynamic Range (WDR) capabilities to allow more detailed capture of images in areas where natural or artificial lighting presents scenes with high contrast.

The cameras will also include automatic day-night functionality, allowing full color capture during daylight hours, and blank-and white capture during the night.

The cameras resolution will be 1.3 Megapixels at a minimum, allowing greater detail image capture.

7.12 Intrusion Detection

Intrusion Detection system will be deployed to provide the ability to monitor the building. The system shall be capable of connecting with real-time monitoring companies. Real-time monitoring companies shall be owner provided.

IDS systems will include initiation devices such as:

- Motion Sensors
- Glass Break Sensors
- Door Contacts

In addition, communications modules such as dialers and/or Ethernet cards will be provided for connecting to 3rd party monitoring agencies or local command centers.

Control devices (such as keypads) will be located at primary entry points to provide for arming, and disarming the system.

7.13 Access Control

Electronic Access Control system will be provided to control access to the building during off-hours, or between back-of-house and secured spaces where the public or non-credentialed personnel are not allowed.

A variety of devices are required for an effective electronic access control system. These include, but are not limited to:

- Card readers (proximity wireless)
- Door position switches
- Request to exit sensors
- Request to exit manual push buttons
- Electronic locks (by others)
- Electronic strikes (by others)
- Electromagnetic locks (by others)
- Panic hardware (by others)
- Power transfer hinges (by others)
- Automatic door operators (by others)
- Automatic door operator buttons (by others)

At each designated door location a card reader, door position switch (or door contact), request-to-exit (either standalone or hardware combined), electric strike or transfer hinge (as specified by others), cabling, along with associated pathways and support will be provided.

Card/credential reader will be provided at each location. The card readers must be mounted at ADA compliant heights.

A door contact is a supervisory device which reports the position (propped open, Forced, closed etc.) of a given electronically controlled door back to the Access Control management system.

Request to exit sensors and buttons (or integral to panic hardware) shall report an approved opening of the controlled door without the presentation of a valid credential; it works in conjunction with a door position switch. These devices are typically located on the secure side of the door to allow free egress to the non-secure side of the door.

Automatic door operators will integrate with the system so that the door motor will not activate without an approved opening credential.

Other components of designated doors work in conjunction with the access control systems and are included as part of the Division 08 Door Hardware groups.

DESIGN TEAM - ALTERNATIVE (ENGINEER'S REPORTS)

STRUCTURAL ENGINEERING

Olympic College Innovation & Technology Center

B.3 STRUCTURAL NARRATIVE

Authors: PCS
Page Count: 1

3.A CONCEPT STRUCTURAL DESIGN NARRATIVE – ALTERNATE OPTION

ii. The Alternate Option consists of renovating the existing Engineering Building, which will require a substantial seismic upgrade, as well as the addition of (2) 2-story additions on the North and South end of the building.

iii. North (12,330SF) and South (20,340 SF) 2-Story Additions:
   1 Construction for the required additions would be a similar steel-framed structure supported by augercast piles as the primary option. The additions would be required to be separated from the existing Engineering Building by seismic joints and fire walls may be required due to the type III construction of the existing building.

v. Existing Engineering Building.
   1 The existing Engineering Building is a single-story building constructed in the late 1960's that consists of steel bar joist with T&G decking, which is supported by steel columns and unreinforced masonry walls. The building consists of two distinct wings, a rotunda auditorium and a classroom wing and will require extensive seismic upgrades in order to be utilized for the program of the Innovation and Technology Center.

   2 The following issues are deficiencies that will need to be addressed in the seismic renovation of the building.
      a. The unreinforced masonry walls are required to be anchored to the T&G decking with steel straps. This will require the addition of ½" plywood to the top of the T&G decking roof framing. Furthermore, the entire roof will be required to be sheathed with ½" plywood, which will require a complete re-roof.
      b. The unreinforced masonry walls will require wood or metal stud backing walls, which will need to be anchored to the foundation with steel anchors. Steel ties will also be required to attach the unreinforced masonry walls to the backing walls.
      c. Where the steel bar joists are supported by unreinforced masonry walls a redundant load path will be required. Supplemental steel beams supported by posts that are integrated into the existing foundation will be required.
      d. The current building lacks a sufficient amount of shear walls and either wood-framed plywood shear walls or sure-board sheathed metal stud walls will be required to add strength.

Civil Site Selection Narrative

Olympic College Engineering Building Renovation & Addition

Coughlin Porter Lundeen, Inc.

Project No. C170624-04
December 1, 2017

Introduction

Olympic College is proposing to renovate and construct an addition to the Engineering Building located in its main campus in Bremerton, WA. The new addition would provide the campus with 33,500 square feet of building space on two stories which will include labs, classrooms, offices, and student service spaces. The current site under consideration for locating this facility addition is to the south and north of the existing Engineering Building which is located in the central-east portion of campus.

In addition to the Engineering Building renovation and addition, the project is proposing to redevelop the existing campus pedestrian spine which runs north and south through the center of the campus. The redevelopment will offer a better pedestrian experience traversing the campus and will also allow emergency vehicle through access, which is currently not provided.

Following is a summary of the development requirements for utilities and earthwork necessary for the proposed site.

Earthwork Demolition and Paving

Engineering Building Renovation & Addition

The project is proposing to remove and reroute the pedestrian concrete walkways along with any vegetated surfaces that are located below the new additions. Paving is expected to include new concrete sidewalk to the north and south of the proposed additional to reconnect to adjacent walkways.

Earthwork is limited to leveling the site for the ground floor slab and structural foundations for the additions. Existing fill soils have been determined to consist of a fill material. Existing fill soils are understood to be not suitable for structural support or structural fill, as such all fill for structural support will be imported. Building foundations will likely implement augercast piles designed to penetrate the fill soils into the bearing layer below. The building slab on grade for the additions would either be supported by pile foundations and be designed as a structural slab, or would be required to bear on a minimum of 2-feet of well compacted imported structural fill, in addition to 4" of capillary break material.

Pedestrian Spine Site Alternative

The proposed pedestrian spine redevelopment is replacing the existing stairway connecting the pedestrian paths with a more gradual sloping walk. In order to accomplish the intended design the grades will need to be raised at the existing bottom of stair locations and substantial earthwork will be required. The redevelopment of the pedestrian spine will install approximately 10,000 square feet of concrete paving designed to support traffic loading from emergency vehibles.

Water Distribution

Engineering Building Renovation & Addition

There is a private main which currently services the existing buildings that runs along the proposed project site approximately 35 feet to the east and is available to be utilized for water services.

The installation of domestic water service is required for the proposed project and will connect to the existing water main mentioned above. As required as part of the domestic service a water meter sized to meet the building will be included in the project. An exterior reduced pressure backflow assembly (RPBA) is required for

the domestic service. An independent irrigation meter is not expected and existing irrigation services are proposed to be reconfigured to meet the needs of the project.

Fire service will be required for the project and include backflow prevention, fire department connection, post-indicator valve, and the service line connected to the existing water main mentioned above.

The building fire service could potentially require a booster pump to augment the available water pressure depending on the height, construction type, and fire sprinkler requirements. We recommend a fire flow test be conducted during the design process to better understand the available water pressure.

Storm Water Runoff

Engineering Building Renovation & Addition

Storm water runoff flow control will be required for the expansion. The expanded building will add approximately 10,000-square feet of impervious surfaces which will drain east to the existing storm system which carries water north to Chester Avenue and eventually drains into the Port of Washington Narrows. Due to the increase in impervious area, a small detention system will be required and could include CMP pipe storage along the east edge of the building.

Installation of Low Impact Design (LID) systems will be required to the maximum extent feasible. Potential LID systems may include rain gardens and bioretention planters. Porous paving is another potential option dependent on site programming. Existing site fill soils are not conducive to full onsite infiltration, however will be pursued on a limited basis.

Water quality treatment will be required for pavements greater than 5,000 square feet subject to vehicular access. Based on our understanding of the building and site design the project is not proposing the addition of any substantial parking areas. As such, water quality requirements are not anticipated for this project. However, to achieve LEED goals for the project water quality elements may be implemented to treat the runoff from the development area.

A perimeter footing drain system will be installed around the proposed building. An underdrain system is not anticipated for the project.

Pedestrian Spine Site Alternative

The redevelopment of the pedestrian spine does not require stormwater runoff control, LID systems, or water quality treatement. However, due to the major elevation changes a new drainage design is required and multiple catch basin inlets will be installed and connected to the adjacent existing storm system to ensure adequate drainage of the area.

Sanitary Sewer

Engineering Building Renovation & Addition

An existing 12" sewer main is located approximately 60 feet to the east of the current engineering building and turns west 50 feet north of the rotunda. The existing sewer main falls under the proposed expansion to the north end of the engineering building and will need to be rerouted further the north, outside the fooprint of the addition. Approximately 200LF of 12" sewer main would be required, including 4 new sewer manholes.

It is anticipatd that both of the proposed additions to the building will have a new 6" side sewer conection to the sewer main.

Sewer waste from any food preparation or chemical lab areas will discharge through a grease interceptor and acid neutralization vault prior to discharging to the sewer main. Similarly, any dumpster areas will need to be routed through a sand filter prior to discharging to the sewer system.

Gas Service

Engineering Building Renovation & Addition

If required for building systems, gas service will need to be extended approximately 260 feet to the project site from the gas main located to the north of the proposed building or approximately 300 feet to the project from the gas line located to the east of the proposed building.

Utility Corridor

Engineering Building Renovation & Addition

An existing utility corridor is located below the proposed southern addition running east/west. The building addition design proposes to circumvent the existing utility corridor and protect in-place. The structural system would be designed such that no foundations will bear on the existing utility corridor to remain below the addition. It is unknown what utilities if any utilize the existing cooridor, however it is a desireable amenity to keep in place for future planning.

Electrical Services

Engineering Building Renovation & Addition

The installation of electrical services for the site will require coordination with the service provider (PSE). The project requires a transformer to reduce the primary power to secondary power.

The proposed project will be required to relocate disrupted site lighting conduit in order to maintain power to existing site lights to remain.

Pedestrian Spine Site Alternative

The proposed redevelopment of the pedestrian spine will require the installation of new site lighting and associated infrastruction such as handholes and conduits.

Summary Table

The following table shows the approximate length of utility extensions required for the site. These connections are shown without knowledge of where the mechanical rooms will be, so modifications and adjustments should be anticipated as the design is developed.

TABLE 1 - Approximate utility extension and site requirements for the Engineering Building Renovation and Addition.

APPROX. LENGTH OF WATER (FT)	APPROX. LENGTH OF SEWER (FT)	APPROX. LENGTH OF STORM (FT)	APPROX. LENGTH OF GAS (FT)	APRROX. SITE AREA (AC)
60	240	225	300	1.3

MECHANICAL & ELECTRICAL ENGINEERING

1.0 Project Description

The project is a 32,670 square foot addition and alteration to the existing Engineering Building on the Olympic College campus in Bremerton, Washington. The program consists of classrooms, labs, maker spaces, office space, conference rooms, and study areas. The building program is intended to support workforce development and military members looking to enter the workforce.

The scope of work includes the following:

- 12,330 square foot two-story addition to the north of the existing Engineering Building
- 20,340 square foot two-story addition to the south of the existing Engineering Building
- Reconfiguration of lecture room and enclosed portico to fit four classrooms
- Repurposing Vets Lounge to Veterans and Military Services Center

1.1 Sustainability Goals

The building will be designed to meet the requirements for a USGBC LEED Silver certification.

2.0 Mechanical

2.1 Design Conditions

Outdoor Conditions	Summer	Winter
Washing State Energy Codes	86°F DB/ 65°F WB1	24°F

Table 1: Outdoor Conditions

Indoor Conditions	Summer	Winter
Labs	75°F ±2°F	70°F ±2°F
Student Services	75°F ±2°F	70°F ±2°F
Program Support Spaces	75°F ±2°F	70°F ±2°F
Offices	75°F ±2°F	70°F ±2°F
Support	80°F ±2°F	70°F ±2°F
Relative Humidity	<50% ±5%RH	No control

Table 2: Indoor Conditions

Medium-Pressure Ductwork	
Static Pressure Loss	Maximum 0.2 inches WC per 100 feet
Main Velocity	Maximum 2,400 feet per minute
Branch Velocity	Maximum 1,600 fpm
Low-Pressure Ductwork	
Static Pressure Loss	Maximum 0.1 inches WC per 100 feet
Main Velocity	Maximum 1,400 feet per minute
Main Velocity in Theater	Maximum 600-800 feet per minute
Branch Velocity	Maximum 1,500 fpm
Branch Velocity in Theater	Maximum 400feet per minute
Flexible Ducts	Maximum length 6 feet, maximum of two 90° bends
Hydronic Piping	
Static Pressure Loss	Maximum 4 feet WC per 100 feet
Main Velocity	Maximum 8 feet per second

Table 3: Duct Design Criteria

2.2 Demolition

Demolish all existing HVAC equipment, ductwork, piping, and appurtenances

2.3 Heating Systems

Heating Source – Air to Water Heat Pump

A multi-module (minimum three modules) air to water heat pump roof will provide heating water for the building.

The system will be piped in a variable primary pumping arrangement. The heating water system will be a 20% glycol solution. Secondary loops with control valves for temperature control will serve space heating devices.

Heating Delivery

Heating will be provided to the main building spaces with an in slab radiant floor, radiant ceiling panels, finned tube radiator, four pipe fan coil units, or active chilled beams.

Cabinet unit heaters will be provided in all building vestibules, exit stairs with exterior walls, and other spaces requiring heating but not cooling.

Unit heaters will be provided in mechanical rooms and back of house spaces for freeze protection.

2.4 Cooling Systems

Cooling Source – Air to Water Heat Pump

A multi-module air to water heat pump located on the roof will provide cooling water for the building.

The system will be piped in a variable primary pumping arrangement. The chilled water system will be a 20% glycol solution. Secondary loops with control valves for temperature control will space cooling devices.

Cooling Delivery

Cooling will be provided to the main building spaces with an in slab radiant floor, radiant ceiling panels, finned tube radiator, four pipe fan coil units, or active chilled beams.

Cooling for telecom, electric, and transformer rooms will be provided by split system heat pumps. The condensing units will be located on grade or the roof.

2.5 Air Handling Systems

The building will be served by a dedicated outside air systems (DOAS) providing outside air to all occupied spaces.

To accommodate the existing building structure and duct coordination it is anticipated that three air handlers will be required. One air handler for the existing building and on air handler for each of the additions.

2.6 Air Distribution and Ductwork

Air will distributed through medium pressure round or flat oval ductwork to a network of pressure independent air terminal units.

The remainder of the air distribution will be supplied in low pressure rectangular ductwork directly from the air handling systems to the air diffusers.

Return/exhaust air will be ducted for all systems.

CO2 control shall be provided for all densely occupied spaces.

2.7 Special Systems & Program

General: Experimental labs, technology simulation labs, small projects labs, maker spaces and energy labs may contain 3D printers, laser cutters, wood working equipment, metal working equipment, soldering rooms, and other specialized equipment requiring independent exhaust.

Wood Working Station

Wood working stations in maker spaces will be served by a dust collection system with dust collection at each dust producing device and floor sweeps.

Laser Cutter

Laser cutters are anticipated equipment for the maker space. Provide independent exhaust for laser cutter equipment. Make up provided from the building DOAS unit.

Metal Working Station

Metal working stations in the maker space will be served by a new dust collection system with dust collection at each dust producing device and floor sweeps.

Soldering Station

Soldering stations in the maker space shall be provided with independent exhaust system. Make up provided by the building DOAS unit.

Maker Space

Provide independent exhaust for maker spaces and room where other specialized equipment require independent exhaust.

2.8 Building Control System

The temperature control system will consist of a Honeywell direct digital control (DDC) system that will tie into the Olympic College Campus DDC system. The system will be networked within the building and have a central computer as the operator interface point. That computer will have a connection to permit remote monitoring of the system by facility maintenance.

The temperature control system will consist of a stand-alone direct digital control (DDC) system. Electric actuators will be used for all valve and damper control. The system will be networked within the building and have a central computer as the operator interface point. That computer will have internet conductivity to permit remote monitoring of the system by facility maintenance.

2.9 Measurement and Verification

Controls will be provided to allow for a measurement and verification system to provide continuous metering of equipment for the following systems:

- Lighting systems and controls
- Cooling loads
- Heating loads
- HVAC fans and pumps
- Plug loads
- Elevators

3.0 Plumbing

3.1 Design Criteria

Domestic cold water shall be sized with velocities not exceed 8ft/sec and the domestic hot water system shall be sized with velocities not to exceed 5ft/sec.

3.2 Demolition

Demolish all plumbing piping systems including waste & vent, domestic water, and natural gas piping back to the mains. Cap the mains.

3.3 Plumbing Fixtures

Plumbing fixture will be commercial quality and will be water conserving type.

3.4 Domestic Cold Water System

A new water service is anticipated to serve the building to meet the additional load from the addition and will be provided from the city water main for the building. A new meter and a backflow preventer assembly will be provided for the domestic water system. Additional reduced pressure backflow preventers will be provided for:

- Industrial Cold Water
- HVAC Makeup
- Irrigation
- Other potential contamination sources

3.5 Industrial Cold Water System

Provide industrial cold water to labs where needed to support programmatic needs.

3.6 Domestic Hot Water System

A high efficiency air to water heat pump and a water storage tank will provide domestic hot water to the building. The water heater will produce 140°F. A master mixing valve assembly will be utilized to temper the hot water for plumbing fixture use to deliver 120°F hot water. An expansion tank will be provided on domestic hot water systems. Temperature maintenance will be provided by a recirculating hot water loop and hot water circulation pump or heat trace installed on hot water piping.

3.7 Storm Drain System

An internal roof and overflow drain system will be provided as required by code. It is anticipated that existing building will connect to the existing storm water connections. New storm water connections are anticipated for the additions.

3.8 Sanitary Sewer System

A Sanitary waste pipe will stub out of the West end of the building for connection to site sanitary system designed by the civil engineer. It is anticipated that the existing building will connect to the existing sanitary connection. Now sanitary connections are anticipated for the additions.

3.9 Natural Gas System

A new gas service will be provided to the building and coordinated with the civil engineer to serve gas fired equipment.

3.10 Irrigation

Irrigation piping and valves will be shown on the civil or landscape drawings.

3.11 Special Systems & Program

General: Experimental labs, technology simulation labs, small projects labs, maker spaces and energy labs may contain 3D printers, laser cutters, wood working equipment, metal working equipment, soldering rooms, and other specialized equipment requiring compressed air, vacuum systems, industrial cold water.

Wood Working Station

Wood working stations in the maker space will be served by a central compressed air system.

Laser Cutter

No special plumbing systems anticipated.

Metal Working Station

Metal working stations in the maker space will be served by a central compressed air system.

Soldering Station

No special plumbing systems anticipated.

Maker Space

Maker spaces shall be served by a central compressed air system.

4.0 Fire Protection

4.1 Wet Pipe Sprinkler System

The entire building will be totally sprinkled in accordance with NFPA 13. In general, system to consist of connection to new water service, including detector double check assembly, main flow alarm station, zone control valves and flow indicators, alarm bell, wet and combination standpipe, standpipe hose valves, fire department connection, roof outlets, wall and/or post type control valves for roof outlets, and sprinkler piping and heads. All required system isolation valves shall be provided with tamper switches.

Class 1 standpipes with required hose connections will be provided within stairways in accordance with NFPA 14. The sprinkler system/combination standpipe system shall provide a fire protection system designed and installed in strict accordance with NFPA, OFC, and local Fire Marshal requirements.

Sprinkler heads to be chrome plated semi-recessed pendant type or sidewall type with polished chrome escutcheons in finished areas and upright rough brass finish type heads in unfinished areas. High temperature heads will be provided in the classrooms where required by classroom use (hot work). Horizontal dry sidewall sprinkler heads will be provided for overhangs, and other perimeter areas subject to freezing. Quick-Response heads will be provided in all light hazard areas.

5.0 Electrical

5.1 Code References

- 2017 National Electric Code (NEC)
- 2015 Washington State Energy Code (WSEC)

5.2 Design Criteria

The following table indicates allowances that will be used to confirm the service size for renovation of the Engineering Building with the OC CIC Innovation Center addition. Lighting allowances are in conjunction with the current Washington State Energy Code (WSEC); power allowances are based on past experience with buildings of similar use. Power as noted for labs includes an allowance for equipment loads such as 3D printers, laser cutters, soldering stations, etc. that are expected to be installed in those spaces.

	Lighting (VA/SF)	Power (VA/SF)
Classrooms	1.0	3.5
Labs	1.5	15.0
Student Services	1.0	4.0
Program Support Spaces	1.0	3.5
Office Space	0.9	4.5
Support	0.8	1.5

Table 4: Load Density and Equipment Loads

Elevator loads are not included as they are assumed to be existing. HVAC and network loads are unknown at this time as they are dependent upon the existing systems installed in the Engineering Building currently.

There will be two additions to the existing Engineering Building; a two-story addition to the north and a two-story addition to the south. The north addition is 12,330 square feet while the south addition is 20,340 square feet. While the total square footages are known at this time, the square footages by space are not. Therefore the total connected for the building is not able to be calculated.

5.3 Service

A 30-day meter reading will be required for the existing building per NEC 220.87. This reading will be added to the additional load proposed for the building. It will then be determined if a service upgrade is required for the building. Based on the total square footage of the additions, a service upgrade is expected and would potentially require a transformer replacement.

5.4 Distribution

An upgrade to the main switchboard of the building is anticipated pending final load calculations outlined in the previous section. It will remain in the main electrical room of the building and be braced to exceed available fault current at the main lugs of the switchboard.

It is recommended that the existing electrical distribution system be replaced with new. This equipment includes the main switchboard and branch panelboards located in the main electrical room and throughout the building.

The main switchboard will then feed additional panelboards, to be located in electrical closets in the new additions. Additional fire alarm and lighting control equipment will also be located in the electrical closets. Panelboards dedicated to lab equipment will be located immediately adjacent to those spaces.

Electrical feeders from the main switchboard to subsequent distribution panelboards will be copper conductors routed in conduit.

The main switchboard and branch panels serving sensitive loads, will each be provided with an integral surge protective device (SPD).

5.5 Metering, Measurement, and Verification Systems

Metering for the building will be in conjunction with standards set forth by Olympic College. It is understood that the campus power loop utilizes a master meter. The master meter shall meter the new building, assuming capacity of the master meter is adequate. Verification with the College will be required to ensure capacity.

Because the addition is less than 50,000 square feet, metering provisions per WSEC C409 do not apply.

5.6 Grounding System

A complete safety grounding system in compliance with the NEC for the existing building shall be maintained and extended to the new additions. New feeders and branch circuits shall be provided with an insulated grounding conductor ran with the circuit conductors. The grounding conductor shall be in addition to the ground path provided by the continuously grounded metallic raceway system that encloses the phase and neutral conductors.

Performance grounding will also be maintained and extended as applicable. It includes a system of grounding conductors and busses to be used for the telecommunication rooms throughout the building. The performance ground system will tie into the code required safety grounding system at the building main ground bus bar.

5.7 Branch Circuits

Branch circuit wiring shall be copper and will be routed in conduit from the panel to a junction box in the accessible ceiling space in area served, then extended to devices utilizing cable in conduit.

Branch circuits sharing a neutral will be fed from multi-pole breakers. Branch circuit neutrals will be oversized on shared circuits with high harmonic loads.

Ground fault circuit interrupter receptacles will be provided at sinks, kitchens, toilet rooms, and all other wet areas. Weatherproof-in-use hoods and outdoor-rated ground fault circuit interrupter receptacles will be provided at all roofs and outdoor areas.

Labs and maker spaces will utilize surface metal raceway (Wiremold) to locate power and data outlets adjacent to the tasks in a flexible method. The surface metal raceway permits ease of reconfiguration of power and data cabling within a space without disturbing building walls and finishes. Overhead cord reels may also be provided in these spaces to provide a flexible means of power to equipment.

Electrical power connections will be made to all mechanical equipment, to include providing all electrically associated devices such as disconnect switches, contactors, magnetic or manual starters, lock-out switches, etc., not furnished under Division 23. Variable frequency drives (VFDs) will be furnished under Division 23 and installed under Division 26. Receptacles will be provided within 25 feet of all mechanical equipment.

Electrical power connections will be made to support miscellaneous equipment. Connections include disconnect safety switches and wiring to support interlocks to remote devices.

5.8 Emergency Power Systems

More information is needed regarding the existing emergency power system for the Engineering Building. Egress lighting located in the addition will either be fed via individual backup batteries, mini-inverters, or an existing generator if applicable. No other emergency loads are anticipated for the addition.

5.9 Renewable Energy Systems

While a photovoltaic (PV) system will not be installed at the time of construction, the building will include provisions for a future PV system. In addition to having area at the roof of the addition reserved for the PV system, the following items will also need to be provided:

- Spare breaker at main switchboard that includes ground fault provisions for future connection
- Empty conduit from main switchboard to roof for future connection
- Emergency power-off (EPO) switch at main electrical room for future connection

5.10 Lighting and Lighting Controls

The electrical lighting system for the new additions will be designed in compliance with all applicable codes and ordinances. Efficient sources and automatic control technologies will be implemented to provide the most efficient and effective electric lighting system for the building occupants and tasks. Controls will provide switching and dimming of the lighting to permit maximum use of the available nature light.

Daylighting will provide the first level of illumination for most new interior spaces. In spaces with adequate daylight, daylight harvesting shall be implemented in the appropriate daylight control zones. Skylights at the second floor will help provide top lighting strategies and will allow a lower lighting energy load throughout the day. Side lighting strategies will be used for the lower floor and upper perimeter floor.

Energy efficient local task lighting may be implemented where appropriate including the labs and offices.

Repurposed areas in the existing building will be required to comply with the WSEC, in terms of allowable lighting power densities and control methodologies.

Control of lighting will be provided by the following methods for the respective areas in the additions and areas of alteration:

Task/Area	**Control Method***
Classrooms/Labs	Room scene controller, vacancy sensor
Student Services/Program Support Spaces	Room scene controller, vacancy sensor
Office Spaces	Vacancy sensor, local dimming switch
Circulation/Transition	Timeclock control, local override switch
Restrooms	Occupancy sensors with manual on
Storage	Vacancy sensors, local switch
Mech/Elec Rooms	Local switch (no automatic control)

*Photocells will be used for daylight harvesting for all spaces with daylighting zones

Table 5: Lighting Control Methods by Area

6.0 Fire Alarm

The building fire alarm system will be extended as required to serve the new additions.

The following table summarizes the fire alarm system components for the project:

Device	Coverage
Manual pull stations	Located at each exit and each exit leaving an elevated floor
Smoke detectors	Air handlers (>2000 CFM), elevator lobbies, elevator control rooms, elevator hoistways, electrical rooms, mechanical rooms
Fire sprinkler	Tamper and flow
Annunciation	Remote annunciation at fire department entry
Building annunciation	Horn and strobe annunciation thru out the facility
System output	Relay interface for mechanical system shut-down and elevator recall, fire department dialer
Monitoring	Fire department station monitoring via dedicated telephone line

Table 6: Fire Alarm Device Coverage

7.0 Technology

7.1 Code References

- American National Standards Institute (ANSI)
- Institute of Electrical and Electronics Engineers (IEEE)
- National Electrical Manufactures Association (NEMA)
- Underwriters Laboratories (UL)
- American's with Disabilities Act (ADA)
- Telecommunications Industry Association (TIA)
- Building Industry Consulting Service International (BICSI)
- ANSI/TIA-568-C.0, Generic Telecommunications Cable for Customer Premises
- ANSI/TIA-569-C, Telecommunications Pathways and Spaces
- ANSI/TIA-607-C, Generic Telecommunications Bonding and Grounding
- ANSI/TIA-606-B, Administration Standard for Telecommunications Infrastructure
- ANSI/BICSI-006-2015, Distributed Antenna System (DAS) Design and Implementation Best Practices
- ANSI/TIA-607-C, Generic Telecommunications Bonding and Grounding
- INFOCOMM 1M-2009, Audio Coverage Uniformity Standard
- ANSI/INFOCOMM 2M-2010, Standard Guide for Audiovisual Systems Design and Coordination Processes
- ANSI/INFOCOMM 3M-2011, Projected Image System Contrast Ratio
- ANSI/INFOCOMM 4: 2012, Audiovisual Systems Energy Management
- ANSI/SIA PIR-01-002, Passive Infrared Motion Detector Standard - Features for Enhancing False Alarm Immunity
- ANSI/SIA CP-01-00, Control Panel Standard-Features for False Alarm Reduction
- NFPA 731, Standards for the Installation of Electric Premises Security Systems
- UL 609-96, Local Burglar Alarm Units and Systems
- UL 639-07, Standards for Intrusion Detection Units
- UL 1037-09, Standard for Anti-theft Alarms and Devices
- UL 1635-10, Digital Alarm Communicator System Units

7.2 Design Criteria

Technology systems provide flexible flow of information, dynamic content exchange, efficient end user communications, and maximizes building managers' oversight and support of building usage. Included in the Innovation center will be standard structured cabling systems, electronic security systems, and audiovisual systems for classrooms and conference rooms.

7.3 Structured Cabling Systems (Telecom/Data)

It is anticipated that two additional telecommunications room will be provided. One to service the 20,300 square foot 2 story addition to the North of the existing engineering building, and one to service the 12,300 square foot 2 story addition to the South of the existing engineering building.

Existing telecom rooms may be utilized for renovation portions of the engineering building.

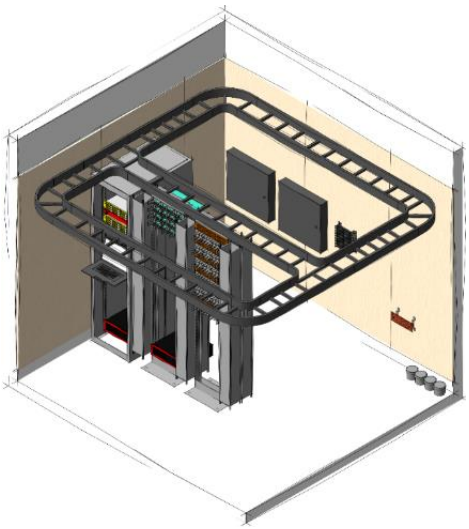


Figure 1: Example Equipment Room (ER)

Telecommunication rooms shall be fitted with plywood backboards on all walls, painted with 2 layers of white fire-rated paint.

Wire management rings will be utilized to route cabling from different pieces of wall mount equipment.

Where telecom racks and enclosures are provided, cable runways shall be provided above them to route cabling to/from racks.

110 wiring blocks will be provided in TRs/TEs for cross-connecting copper cabling.

2-post racks, floor enclosures, and wall-mount Telecommunications Enclosures (TEs) will be provided where required for the installation of copper patch panels and fiber optic distribution units. Racks/enclosures will be 19-inches EIA-310 compliant, with vertical and horizontal cable management systems.

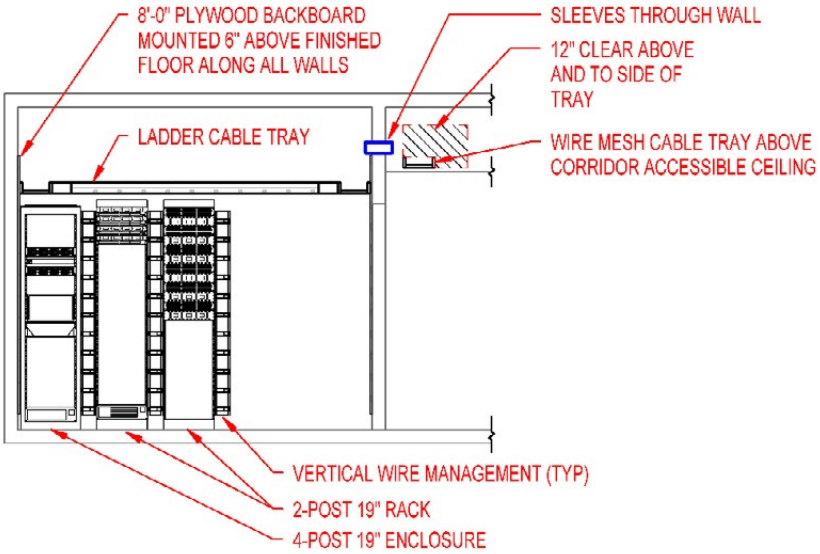


Figure 2: Example Section with Equipment

Horizontal cabling shall be provided from patch panels in TRs, to work are outlets and other devices throughout the building. Cabling will be installed, terminated, labeled, tested and administered by the contractor. The cabling plant will consist of the following cable types:

- Horizontal Data/Voice – Category 6
- Horizontal Data (for WAPs) – Category 6A
- Horizontal MATV – Radio Grade Series 6 Quad Shield (RG-6/UQ)
- A minimum number of two cables will be extended to each Work Area Outlet location.

Wireless access points (WAPs) and other active equipment will be owner furnished, owner installed. Approximate spacing between adjacent WAPs is 25-35-feet. Wireless access points shall feature two Category 6A cables terminated and installed in ceiling or wall mounted junction boxes.

Where PoE (Power over Ethernet) endpoint devices require power exceeding 60W, CAT6A cabling will be provided at a minimum, with LP rated cables being used where design conditions require large bundles of cables servicing high powered PoE devices.

In areas of the engineering building that will be renovated, new CAT6/CAT6A cabling that will be routed back to the nearest existing telecommunications room. These rooms will be outfitted with new patch panels mounted alongside existing patch panels in the telecom racks.

The following table illustrates the number of estimated equipment outlets (EO) for the horizontal cabling system:

Ports per Equipment Outlet (EO):	2
Patch Panel Capacity (Ports):	48
Patch Panel Height (in RU):	2
Rack Capacity (in RU)	45
Squarefootage per EO:	150

Building	Floor Area	Excluded Area	Serving Area	EO Qty	Cable Count	Patch Panels	Total Rack Units	Racks Estimated	TRs Estimated	TR Sizes
Renovation	900	0	900	6	12	1	4	-	-	-
Addition North	20,300	8,000	12,300	82	164	4	16	1	1	10'x11'
Addition South	12,300	2,000	10,300	69	137	3	12	1	1	10'x11'
Totals	**33,500**			**157**	**313**	**8**	**32**	**2**	**2**	

7.4 Outside Plant

New outside plant or underground telecommunications infrastructure is not anticipated for the renovation/remodel.

7.5 Pathways

In order to provide a flexible and scalable communications system, the design of the pathways which transport, protect and support the cables must be designed with easy access and growth in mind. Telecommunications pathways shall be designed and constructed in accordance with the ANSI/TIA-569-C standard, including minimum bend radii on telecommunications conduits.

Dedicated vertical conduit risers for data, legacy analog systems and MATV will be provided between each TR.

In areas with no accessible ceiling and when cabling is routed below-grade, conduits and duct banks shall be used for cable distribution.

Conduits will be sized for 40 percent fill, with cable trays sized for 25 percent fill. In areas with greater accessibility and those which may need frequent cable changes the preferred method of cabling support will be cable tray.

Ladder-type tray will be installed in the EF and TRs where equipment racks are located, as a means for routing cabling and also to help seismically secure the equipment racks. Wire-mesh cable tray will be used throughout corridors for horizontal cabling.

J-hooks will be located above accessible ceilings in areas where smaller amounts of cables (under 50 total quantity) need to be routed to work area outlets. We do not anticipate many locations within the building with accessible ceiling therefore not many scenarios where this method will be utilized for routing of cable.

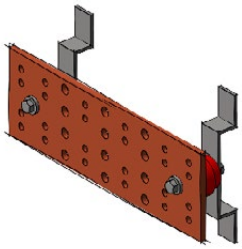
7.6 Grounding and Bonding

A performance grounding and bonding system will be provided for all telecommunications, AV systems, and other sensitive equipment throughout the renovation and addition. This system is separate from the electrical grounding system in that an electrical grounding system is required for safety, but telecommunications grounding and bonding systems are required to protect active equipment in the system from disruptions due to either outside interference or unbalanced voltage potentials to ground. They are integral in that telecommunication system must be bonded to the electrical system so that they may function as a single cabling system.

It is assumed a Primary Bonding Busbar (PBB) will be installed in the ER/MDF.

Secondary Bonding Busbars (SBB) shall be located in every TR to provide a bonding point for all equipment in that room.

Rack Bonding Busbars (RBB) will be provided in every Telecommunication Enclosure (TE).



Racks, cable trays, conduits, and other telecommunications system equipment shall be bonded to the system.

7.7 Intercommunications

Existing systems will be tied back to provide integrated public address, intercom, and synchronized clock system will be provided for the building.

7.8 Public Address

A public address system shall provide voice notifications via overhead speakers through common areas and corridors. The system shall be capable of basic zoning of message delivery, and be centrally controlled by a single operators station.

The public address system shall be capable of integrating with a phone system to allow paging communication through user phones.

7.9 Clock Systems

A synchronized clock system will be an extension of the building's existing system. Faces will come in various sizes, as well as digit heights for digital clocks.

7.10 Audio Visual Systems

Multimedia presentation systems enhance communication by amplifying sound and allowing the use of multiple sources of visual data, be it video playback, spreadsheets – the goal of a multimedia presentation system is to enhance learning.

The audio visual system should not get in the way of the user or instructor so care must be taken to design a system that is as easy to use as functionally possible with technology currently available.

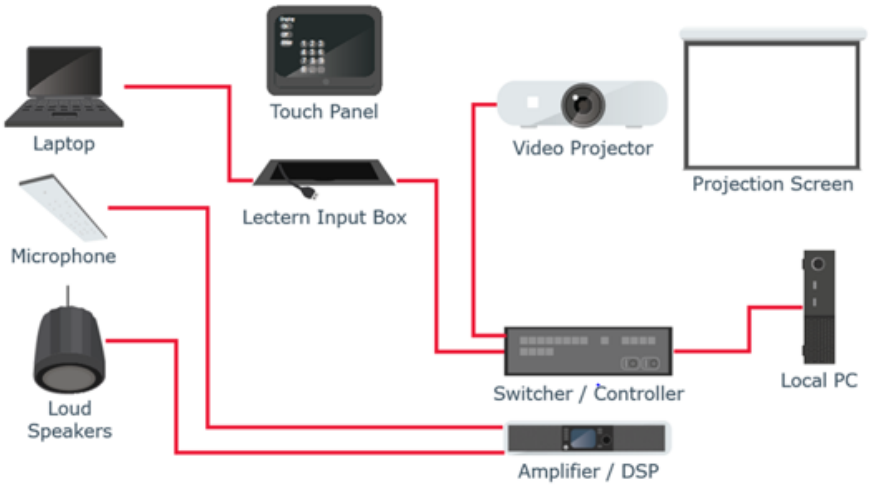


Figure 3: Typical Multimedia Presentation System Diagram

Spaces

Labs, Classrooms and Conference Rooms will be outfitted with multi-media presentation systems. The spaces will feature a form of video display, audio program and voice reinforcement, source input and system control.

Exact quantity and size of displays in other spaces to be determined based on final room size and specific function/use. For larger rooms, projection systems are to be considered to accommodate legibility/image size requirements.

Typical classrooms will include a dedicated podium/lectern for instruction with integrated AV cable input/outputs and system control panel. The podium/lectern shall be mobile and power and data infrastructure will be designed to accommodate maximum flexibility.

Mobile AV system equipment will also be provided for large labs in the form of a rolling enclosure with dedicated rack rails for mounting AV equipment.

Control Systems

Integrated control systems will be part of all audiovisual spaces and will control AV systems. Room lighting and shade scene and preset controls are to be integrated at select areas. All control systems user interfaces will be network-based, and either by wall mounted, or integrated into countertop presentation workstations and other presentation devices. Interfaces with identical functions to other existing presentation spaces are to mimic existing control interfaces.

Digital Signage

Digital signage displays will be provided at each floor in common areas such as entry vestibules and lobbies.

The digital signage system will provide a platform for communicating daily events, upcoming events in the form of a schedule as well as any custom video content playback.

A web-based software system will be provided for the authoring of digital signage content to provide maximum flexibility of managing the system.

Requirements for displays for the digital signage system shall be as outlined previously.

Assistive Listening Systems

Included with all multimedia presentation systems where instruction will take place a code-compliant assistive listening system will be provided.

Assistive listening systems are required by the 2010 ADA and are included in current revision of the IBC.

These systems allow people with difficulty hearing to be able to hear the program content of the system in the form of wireless transmitters and wireless receivers worn on the individual.

7.11 Video Surveillance

Video Surveillance system will be an extension of the building's existing system and will be IP based with signals routed back to the existing video management system (VMS). Archival requirements and additional video storage requirements will be detailed in future versions of this document.

Cameras

All cameras will be IP-based, and ONVIF compliant, allowing them to be used with a variety of VMS software platforms and accessible through the LAN and WAN.

Cameras will include Wide Dynamic Range (WDR) capabilities to allow more detailed capture of images in areas where natural or artificial lighting presents scenes with high contrast.

The cameras will also include automatic day-night functionality, allowing full color capture during daylight hours, and blank-and white capture during the night.

The cameras resolution will be 1.3 Megapixels at a minimum, allowing greater detail image capture.

7.12 Intrusion Detection

Intrusion Detection system will be an extension of the building's existing system's ability to monitor the building. The system shall be capable of connecting with real-time monitoring companies. Real-time monitoring companies shall be owner provided.

IDS systems will include initiation devices such as:

- Motion Sensors
- Glass Break Sensors
- Door Contacts

In addition, communications modules such as dialers and/or Ethernet cards will be provided for connecting to 3rd party monitoring agencies or local command centers.

Control devices (such as keypads) will be located at primary entry points to provide for arming, and disarming the system.

7.13 Access Control

Electronic Access Control system will be an extension of the building's existing system and will be utilized to control access to the building during off-hours, or between back-of-house and secured spaces where the public or non-credentialed personnel are not allowed.

A variety of devices are required for an effective electronic access control system. These include, but are not limited to:

- Card readers (proximity wireless)
- Door position switches
- Request to exit sensors
- Request to exit manual push buttons
- Electronic locks (by others)
- Electronic strikes (by others)
- Electromagnetic locks (by others)
- Panic hardware (by others)
- Power transfer hinges (by others)
- Automatic door operators (by others)
- Automatic door operator buttons (by others)

At each designated door location a card reader, door position switch (or door contact), request-to-exit (either standalone or hardware combined), electric strike or transfer hinge (as specified by others), cabling, along with associated pathways and support will be provided.

Card/credential reader will be provided at each location. The card readers must be mounted at ADA compliant heights.

A door contact is a supervisory device which reports the position (propped open, Forced, closed etc.) of a given electronically controlled door back to the Access Control management system.

Request to exit sensors and buttons (or integral to panic hardware) shall report an approved opening of the controlled door without the presentation of a valid credential; it works in conjunction with a door position switch. These devices are typically located on the secure side of the door to allow free egress to the non-secure side of the door.

Automatic door operators will integrate with the system so that the door motor will not activate without an approved opening credential.

Other components of designated doors work in conjunction with the access control systems and are included as part of the Division 08 Door Hardware groups.

BEST PRACTICES TO REDUCE GREENHOUSE GAS EMISSIONS

System / Best Practices	**Included in Project?**
Mechanical	
Solar water heating	No
Above code HVAC system efficiency	Yes
Use natural gas instead of electricity for heating	Yes
Geothermal heat pump	No
Post occupancy commissioning	Yes
Interconnectivity of room scheduling in 25Live and HVAC controls	Yes
Electrical	
Photovoltaic energy systems	No
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	No
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