UW TACOMA

Academic Innovation Building Predesign Report

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Executive Summary
I.O. Executive Summary

I.O.0 EXECUTIVE SUMMARY

INTRODUCTION

The University of Washington Tacoma was founded in 1990 to serve and provide access to higher education for place and time-bound students in the South Puget Sound, and to act as a catalyst for revitalizing downtown Tacoma. With limited space and funding, UW Tacoma has done both. UW Tacoma grew from a plus-2 university, serving only juniors and seniors to a four year university with on-campus housing and an enrollment of 5,200 with a growth rate of 4-5% per year. Over time UW Tacoma has served a broadening demographic and worked to offer more fields of study, especially those in high demand. As enrollment and demand continue to grow, UW Tacoma is working to meet the challenge and to increase the high-quality educational options in the South Sound and throughout Washington.

UW TACOMA - ACCESS AND IMPACT

- 63% of freshman are first-generation college students
- 56% of all students are of diverse backgrounds
- Over 20,000 degrees awarded since UW Tacoma opened in 1990
- UW Tacoma contributed $211.7 million to the economy of Washington in the fiscal year 2013-14
- UW Tacoma generated approximately $11.6 million in state and local government revenues for Washington in the fiscal year 2013-14
- UW Tacoma directly or indirectly supported 1,608 jobs throughout the state in the fiscal year 2013-14

UW Tacoma is faced with a set of growing challenges. Students in the South Sound want to attend the UW but stay in their local communities, making UW Tacoma their best choice and therefore increasing enrollment demand. At the same time, local employers need graduates in specific programs, such as Engineering and Business, but find there are insufficient local graduates to constitute a robust, consistent, and growing regional talent pipeline. UW Tacoma is ideally located to support both of these needs. While the existing campus has adapted creatively over the last 20 years, it is faced with significant operational inefficiencies and a campus-wide shortage of space and facilities, hampering the University’s ability to grow and adapt to meet these demands.
1.0 Executive Summary

To meet these local industry demands while expanding access to higher education in the South Sound Community in line with its urban-serving mission, UW Tacoma has identified an opportunity to implement a long-term innovative vision which will add new high-demand Engineering programs and more efficiently deliver high-quality education within the Business School, all in the context of promoting collaboration between the two programs. To accomplish this vision, UW Tacoma proposes a first phase with three major outcomes. It will add labs and support spaces to allow UW Tacoma to start a high-demand Mechanical Engineering program. It will meet existing and new Business School needs by providing appropriately sized and configured classrooms and associated collaboration areas. And, it will connect Engineering and Business disciplines in a way that fosters innovation and entrepreneurship, and leverages existing industry partnerships. By meeting the needs of two schools, the Academic Innovation Building (formerly named UW Tacoma in previous requests) will also address a high-priority campus-wide need for general classrooms and collaboration space.

_UW Tacoma used this predesign study to identify a long-term vision and to identify the phases needed to implement this vision._

**CAMPUS VISION AND BENEFITS**

To meet the challenges faced at UW Tacoma and the South Sound region, UW Tacoma proposes this project will:

- Meet student and industry demands in the South Sound and throughout Washington.
- Meet campus needs with long-term vision.
- Create something greater than the sum of its parts.
- Broaden access to higher education for the diverse community of the South Sound, building on the University’s goal to drive equity and inclusion in higher education.
- Pursue ambitious sustainable strategies to meet the State of Washington’s goals for reducing CO2 emissions and promoting economic growth.
1.0 Executive Summary

LONG-TERM VISION

The vision of the Academic Innovation Building for the Business and Engineering programs emerged in response to the following needs identified through the predesign process:

- Instructional and support space for new Engineering programs.
- Instructional and support space for UW Tacoma’s steady growth, and for the growth in general education and prerequisites that comes with adding programs.
- Right-sized, flexible teaching spaces in convenient proximity to one another that meet current pedagogy.
- Classrooms large enough to accommodate combined sections, needed for the Business and Engineering programs and across campus.
- Specialized instructional space for existing Engineering and Business programs, including labs for the IT program and group rooms near large classrooms for Business classes.
- Expansion of the Milgard Business School’s capacity and a consolidated, community-facing, student-serving home for Business and Engineering centers, which connect students with advisors, research, and industry partners.
- Improved hillside accessibility for students with altered mobility.

PHASE 1: PREFERRED ALTERNATIVE

The preferred alternative is to build the first of this vision, a building that will house:

- Facilities for a new Mechanical Engineering program, including critical teaching labs, related faculty and staff offices, and support spaces.
- A home for the Milgard School of Business with large, flexible teaching and collaborative spaces that fit current pedagogies but are adaptable to change over time. A key element of this home will be collaborative space with a public face for the various Centers that connect students to research, industry partners, and employment.
- Much needed campus-wide spaces, including large format classrooms and group rooms that are highly requested but in low supply on the existing campus.
1.0 Executive Summary

ALTERNATIVES

Through the predesign process, the design team considered a range of alternatives to address the needs identified. From taking no action, to leasing or renovating space, to new construction, all alternatives were studied and analyzed using the Office of Financial Management’s (OFM) *Facility life cycle cost analysis: alternatives comparison* format. In section 3, comparing the life cycle cost analysis (LCCA) indicates that new construction, the preferred alternative, has the lowest life cycle cost, and is the only option that improves space efficiency and accommodates overall campus FTE growth in contiguous space appropriate for the functions needed.

PREFERRED ALTERNATIVE - MASSING AND SITING

The proposed massing and siting meet the needs of a lab and classroom building, while implementing the Campus Master Plan and improving accessibility at a campus scale. With many spaces that would function best on a ground floor, and a very steep site, the preferred massing and siting provide multiple floors with access from a ground or street level. The full vision massing includes an exterior ‘science court,’ to be used for academic purposes as well as to meet the more intense loading needs of the labs. The design team studied the opportunity to extend the Hillclimb, and while it is not proposed for Phase 1, it is an important campus goal to be realized in Phase 2.

The preferred alternative, Phase 1, is the north wing of the full vision massing. It maintains enough ground floor space for critical program elements identified for inclusion in the first phase, while leaving some site costs out of the first phase. Basic assumptions driving the massing include a structure based on a lab module, and a double-loaded corridor scheme sized to support impromptu conversations and collaboration.

PREFERRED ALTERNATIVE - PROGRAM

The design team utilized focus groups, support from peer institutions, questionnaires, building visits, and registrar data analysis to identify the types and sizes of spaces required to meet program and campus needs and goals. Business school pedagogy and campus-wide need for efficiency drove the request for large classrooms with adjacent group rooms. Adding a new Mechanical Engineering program requires specialized labs, the general specifications for which were outlined by the lab consultant, with input from the University and the design team. Office and support space are a small portion of the identified need, included to accommodate new faculty and staff, primarily for Mechanical Engineering. Creating a home with a public face for the Milgard Business School’s many Centers, and Engineering’s growing Centers, will not only make these critical resources accessible to students and business/industry partners, but will also offer opportunities for collaboration between the Business and Engineering programs. The hub for Innovation Centers includes spaces like interview rooms and a board room, ideal for connecting students to professionals, and therefore job opportunities. Unscheduled collaboration space offers opportunities for innovative interdisciplinary work, while meeting the particular needs of Business School students, who typically have group assignments but struggle to find space to work together.

PROJECT SUMMARY

Based on the development of a target value budget of $50 million for the program spaces identified, the University of Washington is requesting $40 million for Phase 1 of the Academic Innovation Building (formerly named UW Tacoma in previous requests). To improve schedule outcomes and enhance value, the University intends to deliver this project through a progressive design-build process. The project capital request will be for a full design-build delivery method, with 10% ($4M) of the state request ($40M) appropriated in the 2019-2021 biennium to start design, and the balance of the state request ($36M) for the build phase in the 2021-2023 biennium. The balance of funding ($10M) will be secured through alternative sources, such as donor funds. The University would enter into a preliminary agreement with the design builder during the 2019-2021 biennium to complete the design development phase in June 2021, and be ready to complete the design and construction in the 2021-2023 biennium. This approach will allow the University to optimize the schedule and budget efficiencies of a progressive design-build delivery. The progressive design build delivery also allows the University to be involved early in the process and contribute to early design phase decisions. The UW Capital Planning and Development Office (CPD) will manage the Academic Innovation Building project and is targeting Fall 2023 for occupancy. Please reference sections four and five and Appendix A3 for further information on the budget and schedule.
Problem Statement
2.0 Problem Statement

2.0.0 Problem Statement: Identified Needs + Proposal Benefits

CAMPUS NEEDS

To meet growing regional industry needs for Engineering and Business graduates, and South Sound students’ need for access to local higher education in those high-demand fields, the School of Engineering and Technology (formerly known as Institute of Technology) and the Milgard School of Business need classroom, collaboration, and specialized lab space.

The Milgard Business School needs large, flexible classrooms in line with evolving pedagogy and adjacent to critical complementary instructional spaces which support the group and collaborative student work critical to the Milgard Business curriculum. The current, inflexible classrooms on campus are too small to accommodate higher capacity needs for lower division students, prohibiting the School’s growth and inhibiting its ability to more effectively serve student and program needs. Classes require space that can accommodate optimally sized 60–70 student sections, and this space does not sufficiently exist on campus. As a result, faculty must deliver duplicate lectures to half sections, increasing faculty inefficiencies and reducing the number of students that can be served by the School and University. In addition, most classrooms on campus are inflexibly sized and furnished, and far from group meeting spaces. A significant amount of class time is often wasted by students walking 5–10 minutes to reach group rooms. In addition, the Milgard School provides programs for working professionals, but lacks space for them to meet and work while on campus. Lastly, the Milgard School needs a home for its Centers, which facilitate research, support students, and connect them to jobs.

The School of Engineering and Technology is starting a new high-demand degree program in Mechanical Engineering, which requires specialized labs, equipment, and support spaces to house additional faculty and staff. The School of Engineering and Technology is also in need of large classrooms in which sections can be combined to deliver instruction more efficiently. Related to both Schools, there is a campus-wide lack of group rooms and student collaboration spaces at a time when pedagogy has become more project-based and so much work is done collaboratively, placing UW Tacoma students at a disadvantage.

Faced with these needs and driven to provide more South Sound students access to a high quality education, UW Tacoma asked broad questions beyond how they could meet short-term space needs of these two schools. They asked how colocating Business and Engineering programs could spur innovation and opportunities for entrepreneurship. Could such colocation bridge the science and invention of engineering and the financial and marketing knowledge of business? How could new spaces on campus support evolving teaching pedagogies emphasizing active learning and collaborative work while meeting campus-wide needs? How could UW Tacoma make the most of existing job-fueling industry partnerships in Business and Engineering, while building new ones and driving regional economic growth? These questions drove UW Tacoma toward a larger vision that would benefit the entire campus and region.

STRATEGY

UW Tacoma’s strategy is to work toward a vision for a shared home for Business and Engineering: a collaborative, innovative environment that promotes creative cross-disciplinary thinking and problem solving. A new building will serve as an incubator fueling strong industry partnerships. When the full vision is realized, it will address the majority of the needs identified in this predesign. However, campus, Business, and Engineering needs are significant at a time when many University-wide programs at UW are also growing. As such, UW Tacoma’s strategy is to start with a first phase of the full vision, which will be a catalyst for continued cross-collaboration among various disciplines, and seed the continued growth of business and engineering curricula.

The first phase will meet the most critical needs and act as a catalyst to inspire further industry investment and private donations needed to realize the full vision over time.
2.0 Problem Statement

NEEDS

- Local employers need Engineering and Business graduates.
- South Sound community students need a local, high-quality education option.
- UW Tacoma needs space across disciplines and across campus.
- UW Tacoma needs large-format, flexible classrooms.
- Business and Engineering Centers need a home and a public face.
- New Mechanical Engineering program needs labs, instructional, and support spaces to meet ABET accreditation requirements.

BENEFITS

- Provide local employers with graduates in high-demand fields of Business and Engineering.
- Foster economic development for the South Sound community by increasing access to education.
- Construction of a new building can contribute to demand for timber products that would benefit local, rural communities.
- Create an innovation hub by colocating Engineering and Business, and creating a place focused on creative problem-solving across disciplines.
2.0 Problem Statement

2.1.0 Campus Mission, Goals, and Objectives

CAMPUS VISION

The University of Washington Tacoma fosters a thriving and equitable society by educating diverse learners and expanding knowledge through partnership and collaboration with all our communities.

UW Tacoma’s mission, goals, and objectives are supported and furthered by the preferred alternative.

Access is the central value of UW Tacoma, per the 2016–2021 Strategic Plan. The preferred alternative supports this value in three ways: it increases local access to high-demand Engineering, and Business programs; it provides Business and Engineering students more access to one another, to collaborate; and it builds student access to industry partners and potential future employers.

UW Tacoma’s Strategic Plan also states that ‘innovation drives growth.’ Through the predesign process, UW Tacoma decided to address departmental and campus demands with an innovative, interdisciplinary, collaborative long-term vision. Colocation of Business and Engineering programs creates opportunities for entrepreneurship, which bridges science and the market. Colocation also provides an environment conducive to explore creative solutions for complex societal problems. Formal and informal opportunities to build cross-disciplinary and entrepreneurial connections are central to this hub for innovation, collaboration, and design thinking.

Synergistic community partnerships are a third goal of UW Tacoma’s Strategic Plan. The preferred alternative leverages existing partnerships by consolidating and featuring the Centers that connect the campus to industry partners. The long-term vision adds more shared Business and Engineering Centers to further collaboration and synergies, and to promote research with and for local and regional industries. Finally, the full vision of this Academic Innovation Building will visibly and accessibly locate these Centers to create a hub for students to collaborate with each other, with faculty and staff, and with visiting community members and industry partners.

UW Tacoma’s mission is described in terms of being an urban-serving university. Central to that mission is to ‘catalyze the economic and social vitality of the region.’ The preferred alternative will help meet local student demand for degrees and meet local employer demand for graduates. UW Tacoma students tend to come from local communities and want to stay in their community after graduation. This building will allow UW Tacoma to increase the number of graduates that stay and work locally, as well as to create opportunities for entrepreneurship that will feed the local and state economy.
PROJECT VISION

The predesign Project Working Team worked together to articulate a vision for this project. Considering a new academic building’s transformative potential, the team collected thoughts on the current character and culture of UW Tacoma and hopes for the future of the University. Those thoughts, unsurprisingly, are in line with UW Tacoma’s vision, mission, and strategic plan. The team recognized great strength in the University’s diversity, and envisioned growing that strength with greater diversity. They envisioned UW Tacoma as unique and standing out in the University System in the future. Complementary to the strategic plan’s focus on access and innovation, the team went on to identify an efficient but unique vision for two schools’ needs.

To summarize the Project Working Team’s vision:

**UW Tacoma is young, urban, growing, launching, diverse, and accessible. By understanding and harnessing the strengths of a diverse population, UW Tacoma will become a model and a positive stand-out in the University System.**

CAMPUS HISTORY

University of Washington Tacoma was founded in 1990 to serve and provide access to higher education for upper-division place- and time- bound students in the South Puget Sound and to act as a catalyst for revitalizing Tacoma. The campus has had success in achieving both goals.

UW Tacoma is dedicated to being an urban-serving university providing access to students in a way that transforms families and communities. The University contributes to and shapes economic development through community-engaged students and faculty. They conduct research that is of direct use to the South Sound community and region. And, most importantly, they seek to be connected to the community’s needs and aspirations.

The 46-acre campus is located on a hillside overlooking the Port of Tacoma and Mount Rainier, on the southern edge of downtown Tacoma, next to museums and the beautifully reconstructed Union Station. Within walking distance are an array of restaurants, attractions, businesses, shops, parks, museums and historic architecture.

PROJECT HISTORY

In 2016, the need for additional classroom and lab capacity on the UW Tacoma campus was identified. The University requested funds for this predesign in September 2016 and funding was approved in February 2018. Specific needs beyond enrollment growth were identified in the fields of Mechanical Engineering, Cybersecurity, Industrial Engineering, Environmental Engineering, and Business. These needs still exist.
2.0 Problem Statement

2.2.0 Project Challenges + Goals

SOUTH SOUND + WASHINGTON SERVING MISSION

Challenges:

- **Job gap:** Local employers are seeking graduates with Engineering and Business degrees, but are unable to find local graduates to fill positions. Of counties in Washington with institutions offering engineering degrees, Pierce County institutions graduate the fewest students each year. In 2015, it was reported that there were 630 more jobs annually than available graduates in Pierce, King, and Snohomish counties (WA Pathways). This number is growing rapidly due to a 10% annual projected increase in Engineering jobs. As a consequence, employers are having to recruit from outside the South Sound region.

- **Student demand for engineering degrees:** Majors within the School of Engineering and Technology are the most highly requested majors at UW Tacoma. Without the much-requested Mechanical or Civil Engineering programs, many students in the South Sound who want to pursue Engineering move away for college or go into other fields.

- **Student demand for business degrees:** The Milgard School of Business is unable to continue to grow due to lack of space. Current applicants exceed available spaces by 12%. Business is one of the top requested majors at UW Tacoma and the University will not be able to meet their capacity demands without more space.

Goals:

- **Offer local students more high-demand engineering degrees** so students can earn degrees locally. There is clear demand for additional engineering degrees, specifically in Mechanical Engineering and Civil Engineering. UW Tacoma has support from UW to add these programs to this campus.

- **Meet student and employer demand for business degrees.** Business degrees are among the top requested degrees in the University.

- **Close the job gap.** Fulfilling unmet industry demand for graduates in engineering and business so industries can hire locally. There are not enough engineering graduates produced by the Washington higher education system to fill local job openings in the field.

- **Connect local University students with local jobs in Engineering and Business.** The new building will improve social and economic mobility of students within Pierce County and help keep UW Tacoma’s promise to drive economic development in the South Sound community.

- **Provide a high return on investment for the state,** driving local economic prosperity for the South Sound and the State of Washington. UW Tacoma’s economic impact to the state of Washington is $211.7 million.

A new academic building at UW Tacoma will meet student and industry demands in the South Sound and throughout Washington.
Many colleges and universities in Washington are not accessible to place-bound students of the South Sound. They are too expensive, outside the commute area, or lack comparable degree offerings.
2.0 Problem Statement

“Building the new Academic Innovation Building to establish engineering degrees and expand enrollment at the University of Washington Tacoma is an incredibly important development for our city and the state. This investment will further enhance the transformative impact of UW Tacoma on our city and our region. Expanding the number of graduates with engineering degrees not only ensures more Washington residents can take these high-paying jobs that are currently going to residents from other states, but it provides opportunity for so many committed students in our region who have had limited access to engineering degree programs. UW Tacoma educates a diverse population of students with a track record of supporting and graduating first-generation students, women and students of color who are prepared to enter high-tech fields. UW Tacoma partners with our school district, major employers and nonprofits like Graduate Tacoma to support our students from cradle to career. We will produce a diversity of engineers, which the field desperately needs.”

- Victoria Woodards, Mayor of Tacoma

UW Tacoma has strong relationships with various local industry partners. They’re excited about the new opportunities this project presents.

“As an engineer myself, I am thrilled the University of Washington Tacoma is planning to offer engineering degrees in the UW Tacoma Academic Innovation Building. It is incredibly important to our state economy that our universities expand their capacity to graduate engineers and other high-tech professionals, especially in Pierce County where the campus and community are poised to support such degree programs. The South Sound is home to many manufacturing and engineering firms and one of the nation’s largest deep-water ports. We have companies that produce aerospace components and two major Boeing manufacturing facilities in our backyard. Investing in engineering in Tacoma will help those industries expand in the South Sound and open up greater opportunities for our citizens.”

- Bruce Dammeier, Pierce County Executive

“We are excited about programs that support the development of engineers and technology leaders, especially those concerned with the design, development, implementation, operation, and management of Tacoma Public Utilities infrastructure and utilities.”

- Scott Klauminzer, CISSP, Critical Infrastructure Protection Lead, Tacoma Public Utilities; School of Engineering and Technology Advisory Board Member

“We are excited about a program that supports the development of engineers and technology leaders concerned with the design, development, and implementation of naval undersea warfare systems.”

- Kevin Kerstetter, Naval Underwater Warfare Center Keyport
2.0 Problem Statement

“The achievements of Milgard Windows have been based on a combination of innovations in manufacturing and a progressive business model, with talented and motivated employees. The way this building and UW Tacoma’s academic programs are bringing engineering and business together can’t help but launch more highly successful businesses in our region while helping students take advantage of our state’s high-tech economy. I am especially intrigued by the potential for business and engineering students working together to develop solutions that will address challenges and opportunities that our community, region and country are facing. This building is a most promising investment in our future.”

- Jim Milgard

“GeoEngineers uses earth science and engineering to improve our communities and protect our world. Our projects run the gamut from underground pipeline installation to habitat repair, wherever human development intersects with the environment. We are excited at the prospect of deeper partnerships between the GeoEngineers and the University of Washington Tacoma made possible by the proposed building and the programs it will house.”

- Layne Alfonso, Associate, Market Development, GeoEngineers

“As co-chair with my wife, Joanne Bamford, of UW Tacoma’s current campaign, For A Greater Tacoma, For A Greater World, I am personally and professionally invested in the quest to build a new academic building and expand engineering programs at University of Washington Tacoma. Also vital to meeting needs and demands of industry are programs infusing innovation and design-thinking, not only into our engineering and business schools, but into all degree programs. Building innovation into our academic offerings and student preparations lies at the heart of UW Tacoma’s urban-serving mission. Globe Machine Manufacturing is one of many regional industry partners who can work together with UW Tacoma to build a talent pipeline from our community that shares a commitment to innovation and the continued socioeconomic growth of the South Puget Sound region.”

- Calvin Bamford Jr. , Owner, Chairman and President, Globe Machine Manufacturing
**2.0 Problem Statement**

**MEET SHORT-TERM CAMPUS NEEDS WITH A LONG-TERM VISION**

*Challenges:*

- **Campus Growth and Capacity:** UW Tacoma is growing rapidly to meet the needs of South Sound communities. Currently, the campus is turning away students, specifically in the School of Engineering and Technology and Milgard School of Business, due to insufficient space and resources. (See Growth Projections + Utilization, pages 22-23)

- **Specialized Lab Space:** Mechanical Engineering programs require specialized labs that are not available on campus or able to be adapted from other space on campus. Without a new building, the Mechanical Engineering Program is unable to meet ABET academic certification requirements which require adequate access to lab space.

- **Large Format Classrooms and Group Work:** Existing classrooms on campus are too small to accommodate 60-70 student course sections. As a result, faculty must present duplicate lectures to each half section. In addition, most classrooms on campus are inflexibly furnished and far from group meeting spaces. A significant amount of class time is commonly wasted by students having to walk 5-10 minutes to group rooms.

*Goals:*

- **Improve operational efficiency.** Both schools are requesting large, flexible classrooms and adjacent group rooms in order to more efficiently utilize campus space and faculty time.
  - Larger classrooms avoid the duplicate class meetings currently needed due to the limitations of the available classrooms, and consequently will give faculty the ability to teach more students in the same time.
  - Locating group rooms adjacent to classrooms will avoid taking class time for travel to and from remote group work areas.

- **Benefit all of UW Tacoma.** Space on campus is in high demand and already used beyond capacity. Meeting Business and Engineering needs in this new academic building will free up much-needed space across campus.

- **Create a ‘home’ with a strong identity for Business and Engineering** to strengthen their relationships with industry partners and donors, and inspire future investment in these programs.

- **Build on the investment** of the Master Plan in the development of the overall campus. Maximize value by building on existing research and infrastructure.

A new academic building at UW Tacoma will meet departmental and campus needs.

- WA higher education institutions operate with an average of 360 square feet per FTE. UW Tacoma has a total of 5,113 FTE and 683,480 active building square footage—**UW Tacoma operates at 133 square feet per FTE, about one third of the standard.**

- UW Tacoma enrolls 5,185 students or **5,113 full time equivalents** (FTE) in academic facilities designed for a capacity of 1,888 FTEs.

- UW Tacoma’s economic impact to the state of Washington is **$211.7 million.**

- Engineering and Business degrees are among the campus’ **most requested degrees.**
2.0 Problem Statement

SCHOOL OF ENGINEERING AND TECHNOLOGY GROWTH PROJECTIONS

The School of Engineering and Technology has grown dramatically in the 19 years since it was established. This growth is expected to continue annually at a rate of 4% without additional programs. With the two new Engineering programs, annual growth of over 8% is projected in response to local demand for Engineering degrees, especially in Mechanical and Civil Engineering.

- In 2015, there was an Engineering job gap of 630 (WA Pathways) in King, Snohomish, and Pierce counties. This number is growing rapidly due to a 10% annual projected increase in Engineering jobs.

- The School of Engineering and Technology growth projections with no new programs result in an increase of 70 students in 5 years. This number is limited by the projection that enrollment growth will reach maximum current capacity in the fall quarter of 2019.

- Adding two new Engineering programs is projected to increase enrollment by 108 students in 5 years. Total School of Engineering and Technology growth with the new programs is projected to be 178 students. The initial growth takes about a year to take off due to accreditation requirements.

MILGARD SCHOOL OF BUSINESS GROWTH PROJECTIONS

Milgard is growing every year. Currently, Milgard’s applicants outnumber its capacity by 12%. Since the School has run out of space, its growth without a new building will be 0%. With a new building, growth is projected at 4% annually. The new building would provide space for the program to expand and serve local students and businesses.

- Enrollment growth has reached its maximum capacity. No growth is able to happen without a new building.

- Projected growth for the Milgard Business School is 86 students over 5 years with a new building.

DEPARTMENT REQUESTS: AUTUMN 2018 FIRST TIME ALL-APPLICANT INFORMATION
REFERENCE: UW PROFILES

School of Engineering and Technology and Milgard School of Business majors are among the top requested in the University.
2.0 Problem Statement

UW TACOMA CAMPUS ENROLLMENT GROWTH
REFERENCE: UW PROFILES

It is anticipated that the new building will accommodate approximately 500 additional FTE. Based on projected growth, this will provide adequate program space for the next five to ten years.

ENROLLMENT GROWTH: INSTITUTE OF TECHNOLOGY + MILGARD SCHOOL OF BUSINESS
REFERENCE: UW PROFILES

[Diagram of enrollment growth over time]
### INNOVATION DRIVES GROWTH

**Challenges:**

- **Access for industry partners:** The current locations and configurations of the School of Engineering and Technology and the Milgard School of Business make it difficult for industry partners to find or access facilities, or to contribute to students and Centers.

- **Collaboration and innovation space:** UW Tacoma campus does not have the kind of central, accessible space that draws multiple disciplines to cross paths, work together, collaborate to solve problems, or consider innovations.

**Goals:**

- **Build on existing relationships.** The School of Engineering and Technology and the Milgard Business School already offer interdisciplinary degrees, and work together through Centers that provide research, student support, and community outreach. The two schools share values like collaboration, innovation, and design thinking.

- **Create a nexus of opportunity.** Bringing the Engineering and Business schools together creates a collaborative, entrepreneurial environment where faculty and students will have the opportunity to tackle larger, societal issues through cross-disciplinary research and projects. A consolidated ‘home’ for Engineering and Business will create a central hub for the campus where chance encounters and informal meetings between all students in all disciplines can contribute to a new educational environment focused on design thinking and creative problem solving.

- **Foster community partnerships.** Creating a public presence in the community and on campus will strengthen industry partnerships, which are central to both programs and to innovations that will spur economic and academic development.

A new academic building at UW Tacoma will create a solution greater than the sum of its parts.
with **COLLABORATION**...

...emerges **INNOVATION**

Entrepreneurial, interdisciplinary environment focused on:

**DISCOVERY, INVESTIGATION + OPPORTUNITY**
2.0 Problem Statement

DIVERSITY AND ACCESS:

Challenges:

- **Students from underserved regions & place-bound students:** UW Tacoma serves many traditionally underserved and minority communities. 77% of all UW Tacoma students come from Pierce and King counties alone. Many of these students are place-bound, and therefore limited to local opportunities. If degrees in Engineering and Business are not available here, these students will not have access to associated potential economic opportunities.

- **First generation students:** Many local first generation college students are uncomfortable in larger, more urban university settings. For many students who are first in their families to attend college or who are from traditionally underserved communities, traveling to larger urban universities poses a significant barrier.

Goals:

- **Increase access and diversity:** The first point of UW Tacoma’s mission is to “Expand access to higher education in an environment where every student has the opportunity to succeed.” This campus serves the diverse South Sound community, and this project will increase access to Engineering and Business degrees for this community.

- **Increase economic opportunity to place-bound students and underserved populations:** This project increases access to Engineering and Business degrees, thereby significantly increasing enrollment for place-bound students or residents of underserved regions. Employers in this area are actively recruiting women and employees from diverse backgrounds.

A new academic building at UW Tacoma will make higher education more accessible to local, diverse populations.

UW TACOMA STUDENT CHARACTERISTICS (FALL TREND BY FIRST GENERATION STUDENTS: 4 YEAR DEGREE)

SOURCE: UW PROFILES
2.0 Problem Statement

- Among the top 50 most diverse campuses in the U.S.
- 63% of freshmen are first generation students.
- 56% of all students come from diverse backgrounds.
- 93% of students are in-state with many place-bound, and from South Sound counties.
2.0 Problem Statement

**AMBITIOUS SUSTAINABILITY GOALS**

**Challenges:**

- Washington and UW have identified and committed to carbon emissions reduction goals.
- Washington’s timber communities are not experiencing potential benefits from timber extraction.

**Goals:**

- **Continue UW leadership in sustainability.** UW committed to the American College & University Presidents’ Climate Commitment (ACUPCC), to which UW was a charter signatory in 2007. This led to the creation of the UW Climate Action Plan submitted in 2009 (see appendix A9). UW Tacoma has established a pattern on campus with 5 LEED buildings and will continue to lead in sustainability by embracing the use of mass timber structural systems, such as Cross-Laminated Timber (CLT).

- **Respond to the values of its students and faculty.** During open houses and faculty outreach, students and faculty passionately encouraged the University to continue to lead in sustainability and go beyond code or established sustainability standards.

- **Serve as a learning lab.** The building will display sustainable strategies such as mechanical systems, storm water collection and mitigation, mass timber, and other sustainable technologies. This will contribute to the innovative Engineering curriculum the University wants to pursue.

Through the Academic Innovation Building, UW Tacoma will continue to lead in sustainability and exceed standard practices.

**ENERGY CONSERVATION MEASURES TO MEET THE ARCHITECTURE 2030 TARGETS**

See ambitious energy sustainability solutions on following page

![Energy Conservation Measures Chart](chart.png)
AMBITIOUS SUSTAINABILITY SOLUTIONS

In order for the project to achieve the performance goals set forth in the Master Plan the following items will need to be considered for the project:

**Greenhouse Gas Reduction:**

To meet the greenhouse gas reduction goals for the State of Washington and UW Tacoma, design and construction of a net zero carbon building should be considered. This would require the project to contribute no additional greenhouse gas emissions to the state or campus total. In order to achieve this, the building would need to be extremely energy efficient, limit the use of refrigerants with high global warming potentials, and generate electricity on-site.

**Water:**

The Master Plan calls for projects to operate within their natural water budget, meaning projects only use the amount of water that lands on their roof throughout the year. In order for the project to achieve this the building may need to implement the following items: low-flow fixtures, with the potential for ultra-low flow fixtures like waterless urinals and composting toilets; no potable water for non-potable uses, meaning graywater or rainwater will be used to flush toilets and urinals; rainwater capture and reuse for things like potable water, flushing fixtures and irrigation; capturing graywater from showers and lavatories, and reusing it for things like irrigation and flushing fixtures.

**Landscape + Civil:**

Furthering the mission of the campus, sustainable site features can create a “learning lab” for the new Engineering programs. Some factors and design strategies to consider towards sustainability objectives include stormwater retention, pedestrian-scaled development, utilizing native and diverse plant varieties, creating greater access to mass transit systems, bicycle facilities, and brownfield remediation.

**Energy:**

The Architecture 2030 challenge sets rigorous energy reduction goals that are lower than the target Energy Use Intensity (EUI) numbers shown in the infrastructure plan. Since the Master Plan says projects need to comply with the 2030 challenge the chart below shows an estimated baseline and target EUI values for the project. In order to achieve the target EUI the project will need to implement many energy conservation measures and potentially generate energy on-site with solar panels (see chart on previous page).
2.0 Problem Statement

**CLT + Mass Timber Structural Systems:**

UW Tacoma will be on the cutting edge of sustainability practices by embracing the use of mass timber structural systems, such as Cross-Laminated Timber (CLT). This creates an opportunity to leverage an emerging, yet tested, construction material that has been successfully utilized in Europe over the past three decades. CLT has also been successfully utilized at the University of British Columbia in an academic lab building. Most recently, UBC completed an 18 story student housing project, Brock Commons, the tallest mass timber, steel, and concrete hybrid project. Using CLT as the primary material significantly contributes toward the University’s goals on sustainability and cost-management. The use of CLT will benefit the University in the following ways:

1. **CLT contributes significantly less carbon** into the environment than using either steel or concrete, addressing a broader environmental problem and displaying a commitment to a more sustainable campus.
2. **CLT sequesters carbon** that would otherwise be emitted into the atmosphere.
3. UW Tacoma would incentivize mill development by contributing to the demand for mass timber products, energizing the use of these materials and **stimulating economic activity in regional communities** in Washington that benefit from the timber industry.
4. Significantly assists in meeting **LEED certification requirements**.
5. Utilizes **locally sourced materials**, reducing carbon emissions associated with transportation of materials.
6. **Contributes toward the sustainable management of forests and promoting better forestry practices**.
7. CLT requires the use of a pre-fabrication process which pushes design teams to collaborate early on which translates to a shorter construction schedule.
8. CLT is a lighter material compared to steel or concrete, therefore, it **reduces foundation requirements** and associated project costs.

**GREENHOUSE GAS ANALYSIS - (GHG EMISSIONS MT CO2e/30 YEAR)**

- **TOTAL EMBODIED EMISSIONS** = 11,776
- **POTENTIAL CLT CARBON SEQUESTRATION**
- **TOTAL SEQUESTRATION** = 2,497
2.0 Problem Statement

2.3.0 Solutions

GROWTH WITH VISION
In general terms, “growth with vision” is the solution to UW Tacoma’s departmental and campus needs. The campus will grow in labs, classrooms, groups rooms, dedicated Center space, and collaboration space. This growth will come with critical adjacencies and connections – on campus and between campus and industry partners. It is the relationships, shaping this building and its future phases, that comprise UW Tacoma’s vision to meet campus needs in a way that is greater than the sum of its parts. Critical relationships include those:

• between colocated academic units;
• between spaces like large classrooms and group rooms;
• between faculty, students, and industry partners.

UW Tacoma’s vision extends beyond this much-needed building; the University sees this building as an opportunity to keep developing the innovative campus that will best meet the evolving needs of the region and state it is so proud to serve.

To move toward that vision, the preferred alternative will meet immediate campus, Business, and Engineering program needs with:

• More general instructional space for the growing campus.
• Larger classrooms with adjacent group rooms.
• Labs, classrooms, and offices to accommodate new Engineering and growing Business programs.
• Hub for Innovation Centers tied to growing community partnerships and serving students.
• Colocation to foster formal and informal collaboration opportunities between disciplines.
• A solution centered on innovation, a shared core value of Engineering and Business.

Project Goals:
Design a cutting-edge building for Engineering + Business / Create a beautiful new on-campus home for University commuters / Provide flexible, open-layout classrooms / Design to inspire and support collaboration between disciplines / Use regional materials to promote burgeoning mass timber industry benefiting local rural communities / Celebrate natural materials and natural light
LONG-TERM VISION

To create the long-term vision of the Academic Innovation Building for Business and Engineering programs, the predesign identified the following needs:

- Instructional and support space for new Engineering programs.
- Instructional space for the growth in general education and prerequisites that comes with the new programs.
- Instructional and support space for the steady growth UW Tacoma is seeing without additional programs.
- Right-sized, flexible teaching spaces in convenient proximity to one another, that support current pedagogy and allow instructors to teach combined sections.
- Instructional space for existing Engineering and Business programs, including labs for the IT program and group rooms near large classrooms for Business classes.
- A consolidated, community-facing, student-serving home for Business and Engineering Centers, which connects students with advisors, research, and industry partners.
- Improved hillside accessibility for students with altered mobility.

PREFERRED ALTERNATIVE: PHASE 1

Phase 1, the preferred alternative, will meet the most critical needs identified in the predesign:

- Instructional and support spaces required to start a new Mechanical Engineering program at UW Tacoma.
- Large, flexible classrooms paired with group rooms – critically needed for the Business School and desired across campus.
- A home and public face for the many Milgard School Centers and the growing number of School of Engineering and Technology Centers.
- Opportunities and space for collaboration between Business and Engineering programs.

FUTURE PHASES

Selected elements targeted for completion in future phases:

- Instructional and support spaces required to start a new Civil Engineering program at UW Tacoma.
- Labs to meet the needs of existing Engineering programs, including faculty and student research labs.
- Expand hub for Innovation Centers; add large classrooms, group rooms, and Mechanical Engineering labs as program grows.
- Active and distance learning classrooms for general campus use, computer labs, and computer classrooms.

The first phase will meet the most critical needs and act as a catalyst to inspire further industry investment and private donations needed to realize the full vision over time.
3.0.0 Analysis of Alternatives
3.0 Analysis of Alternatives

3.0.0 Analysis of Alternatives

INTRODUCTION

Through the predesign process, the design team considered a range of alternatives to meet the needs identified in Section 2. Alternatives were studied and analyzed using the Life Cycle Cost Analysis (LCCA) tool provided by the Office of Financial Management. Comparing the LCCAs indicates that new construction, the preferred alternative, has the lowest life cycle cost. It is also the only option that improves efficiency and accommodates FTE growth in contiguous adjacent space appropriate for the functions needed. It also implements the Master Plan and the University’s mission, while increasing offerings in Engineering and Business and meeting campus-wide needs.

3.1.0 No Action Alternative

The No Action Alternative would leave the South Sound underserved in Engineering fields, particularly Mechanical Engineering (ME) and would inhibit the growth of Milgard School of Business. UW Tacoma has recently received support from the UW Provost to begin a new ME program in Fall 2023. Therefore, UW Tacoma is poised to serve this regional demand, but cannot add a ME program without building space to support it. Without action, Milgard School of Business would continue to operate in dispersed, ill-suited spaces while operational and programmatic inefficiencies would continue. Large classrooms and adjacent group rooms are currently unavailable on campus and demand for them will only increase as programs grow. Lack of adequate classroom types will continue to hinder operation of lower division programs because faculty are burdened by the need to teach a greater number of smaller sections. This increased demand on their time creates inefficiencies in classroom utilization. Action is required to meet the demands of incoming freshman, sophomore, and transfer students, and effectively respond to FTE growth. Furthermore, taking no action misses the opportunity to colocate Engineering and Business programs, which would catalyze further innovative campus growth.

3.2.0 Lease Space

A long-term lease option was considered but not found viable for several reasons. The Tacoma market does not have 50,000 gsf of contiguous space that is adjacent to campus or within reasonable (15-minute) walking distance. Students would be required to drive and park, or find public transit routes to connect them with dispersed and remote leased space. Aligning public transit to these leased spaces with class schedules would prove challenging. Beyond the proximity issue, the market does not have space that meets the high floor load capacities and high-bay space required for engineering labs. Furthermore, leasing would require duplication of program spaces and resources.

If a 50,000 gsf Class A space were available in the Tacoma market, the fully-serviced rate would be approximately $38.50 per square foot. Assuming 3% annual escalations, the base rent would cost over $50 million for a 20-year lease. Adding required tenant improvements and furniture, fixtures, and equipment (FF&E) would increase the life-cycle cost by an additional $25-30 million. A property owner typically does not provide these costs, even if amortized into the lease. As such, this would require the University to secure upfront funding to fully build out the space. The effective long-term expense of a lease is over $75 million dollars and without the guarantee of space being available after the lease term.

In addition, after paying significantly higher costs to hold the lease long term, UW Tacoma would not own the space.

<table>
<thead>
<tr>
<th>Start Date</th>
<th>Midpoint Date</th>
<th>Completion Date</th>
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<tbody>
<tr>
<td>7/1/2019</td>
<td>8/1/2021</td>
<td>9/1/2023</td>
</tr>
</tbody>
</table>
3.3.0 Renovate Existing Campus Space

The University has three semi-contiguous buildings, currently not utilized for academics, that were assessed as a renovation alternative. The Wild and Swiss buildings are adjacent, separated by a common wall. The Stoneway building is located across Market Street from the Wild and Swiss buildings. While they are all close to each other, and are located at the future center of the campus, opening them to each other and creating a safe pedestrian access to the Stoneway building would prove challenging and costly.

Most underutilized historic structures in the City of Tacoma struggle to become financially viable and activated to full capacity because they require extensive structural improvements to bring them into compliance with modern building codes. The Wild building has no salvageable internal structural system; and the irregular floor and roof framing spans are supported by interior load bearing partitions, which are not aligned from floor to floor, thus making this space only conducive for faculty office or student study spaces. Structural costs beyond the use noted would be excessive and the floor plate is not configured to support even small classrooms of 30-40 students.

Both the Swiss and Wild buildings have unreinforced masonry exteriors that will need to be brought up to current seismic requirements. The Stoneway building needs significant mechanical upgrades to make the single story building workable for academic and lab use. Extensive remodeling of these historic buildings would be necessary to bring them up to modern life safety standards and finish level.

Similar to the lease option, rental or acquisition of existing commercial space for undergraduate teaching and research would require substantial investment in tenant improvements.

3.4.0 Build to Suit/Public-Private Partnership (P3)

Another long-term lease option explored was utilizing the Public Private Partnership (P3) model. This build-to-suit lease model requires the University to negotiate and enter into a long-term master lease, with ownership at reversion, typically over a 25-year term. Because the developer takes on the risk, there is inherently a higher cost embedded into these development agreements. These costs are both in terms of return to the development entity, as well as the operations, maintenance, and capital requirements of these agreements. While the developer would provide a fully completed Engineering and Business School space, the University would be required to purchase all FF&E at the onset of the project, resulting in a large spike of capital needed in addition to the annual payments similar to those seen in the Lease Option. A base P3 for an Engineering and Business School would result in annual lease payments of $2.68M or an estimated life cycle cost on the P3 agreement of $184M. As noted, the University would still need to fund, upfront, all major lab equipment costs.
3.0 Analysis of Alternatives

3.5.0 Preferred Alternative: New Construction, Phase 1

In 2016, the need for additional classroom and lab capacity on the UW Tacoma campus was identified, and the University requested and received funds for this predesign. Specific needs beyond enrollment growth were identified in the fields of Mechanical Engineering, Cybersecurity, Industrial Engineering, Environmental Engineering, and Business. These needs still exist.

The preferred alternative, the 50,000 gsf Phase 1, will meet the most critical of these needs and provide additional classroom space for the continued overall growth of all of UW Tacoma’s academic programs. This interdisciplinary building will be a unique innovation space on campus and will provide a front door to welcome the University’s business partners and incoming students. It will also fill a need in the South Sound for STEM programming. The primary space needs this project will meet come from the emerging Mechanical Engineering program, the growth of Milgard Business School, and the creation of a central collaboration space that will leverage connections across all campus programs. This space will help bring intellectual property from disparate departments to create community-based solutions, furthering the education of UW Tacoma students, fostering the University’s urban-serving mission, and driving use-inspired research deeper into the South Puget Sound region.

The identified site for this building is central to UW Tacoma’s Master Plan. The Academic Innovation Building will continue the University’s plan to develop up the hill and complete the next piece of the Hillclimb, providing greater accessibility and additional green space for students.

The preferred alternative is the only one that improves efficiency and accommodates FTE growth in contiguous adjacent space appropriate for the functions needed. This alternative has the lowest life cycle cost of the alternatives considered and best meets the needs of the University.
3.0 Analysis of Alternatives

LIFE CYCLE COST ANALYSIS COMPARISON

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Gross Square Feet</th>
<th>Rentable Square Feet</th>
<th>Occupancy Date</th>
<th>30-year Net Present Value</th>
<th>50-year Net Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lease</td>
<td>NA</td>
<td>50,000</td>
<td>9/1/2023</td>
<td>$102,451,463</td>
<td>$217,294,186</td>
</tr>
<tr>
<td>P3 Lease</td>
<td>NA</td>
<td>50,000</td>
<td>9/1/2023</td>
<td>$75,133,380</td>
<td>$168,130,389</td>
</tr>
<tr>
<td>Renovation</td>
<td>54,612</td>
<td>50,759</td>
<td>9/1/2022</td>
<td>$120,073,142</td>
<td>$163,625,551</td>
</tr>
<tr>
<td>New Construction</td>
<td>50,000</td>
<td>45,000</td>
<td>9/1/2023</td>
<td>$74,408,136</td>
<td>$89,581,273</td>
</tr>
</tbody>
</table>

The preferred alternative has the lowest life cycle cost of all the alternatives considered.

CUMULATIVE CASH - NET PRESENT VALUE (NPV) OF ALTERNATIVES

YEAR

CUMULATIVE CASH - NET PRESENT VALUE (MILLIONS)

PREFERRED ALTERNATIVE

LEASE  P3 LEASE  RENOVATION  NEW CONSTRUCTION
4.0.0 Analysis of Preferred Alternative
4.0 Preferred Alternative Analysis

4.1.0 Preferred Alternative Program + Massing

FULL VISION - MASSING

Several massing options were analyzed as part of this predesign for the realization of the complete vision. Each included variations on number of floors, building footprint, and location of the building on the site. Ultimately, the predesign team favors building massing that roughly conforms to the massing shown for the site on the Campus Master Plan. This massing forms a “boomerang” shape with a long west wing running north-south along the Market Street edge of the site and a south wing forming a continuation of the northern edge of the Hillclimb in line with the south façade of the existing Science Building. The complete vision for the Academic Innovation Building is approximately 100,000 gsf. Spread over the 25,000 sf footprint, this would create a building mass approximately four stories high. Since it would be built into the hillside, only three stories would be visible on the Market Street elevation. This height easily fits within the 85-foot zoning height limit and would be below the 75-foot highest occupied floor threshold for high rise buildings. The existing grades also allow the lowest floor to be taller, approximately 23-feet floor to floor. This high-bay space is ideal for the types of Engineering labs that support Mechanical and Civil Engineering programs.

The width of each building wing shown in this massing is 85-feet. This allows 30-foot deep classrooms or labs on the exteriors with about 25-feet in between that could serve as corridor space and allow enough room for a central feature stair, support spaces, and collaboration space.

This massing extends the central campus Hillclimb landscape area west to Market Street. It also creates a strong building edge along the extended Hillclimb where interior stairs and elevators would improve campus circulation up the hill. This location also allows for future development to the north adjacent to Pinkerton Building.

FULL VISION MASSING DIAGRAM
4.0 Preferred Alternative Analysis

Predesign programming identified many space needs that would function best on a ground floor. The boomerang concept takes advantage of the existing grades to create multiple ground floors. The high-bay lowest floor could be aligned with Court C’s elevation. This floor could be lined with Engineering labs and support spaces that would benefit from a direct connection to exterior space for loading of materials, equipment, and student projects. The equipment used in these labs is often extremely heavy. Therefore, placing these labs on a slab-on-grade removes these loads from the building’s structural frame. Much of the equipment is also vibration inducing. Disturbance caused by the vibrating equipment could be minimized throughout the multi-use building with the use of simple isolation joints in the ground floor slab.

A second ground floor would be accessible from Market Street, one story above the high-bay floor. This floor could be used for public facing program located at grade along Market Street which is a transit corridor and therefore highly visible to the public. Finally, the southern wing of the building would step up the Hillclimb creating on-grade opportunities for collaboration on both lower levels of the building.

The boomerang shape wraps around two sides of another exterior space accessible from Court C and Jefferson Avenue. Dubbed the Science Court, this space would be hardscaped and would serve as student project space for full scale Engineering mock-ups. It would also serve as loading, recycling/waste collection, and fire department access. The existing pedestrian route from the Prairie Line Trail running between Tacoma Paper and Stationary Building (TPS) and the Science Building could enter the Science Court from the east with a new pedestrian crosswalk across Jefferson Avenue. Pedestrian traffic could then enter the building or access the existing elevator and stairs at the Court 17 building. Thus, the Science Court becomes an accessible link in the pedestrian path from the existing campus to the University Y Student Center at S. 17th and Market, while at the same time putting the Engineering laboratories on display.

Construction of this concept requires the vacation of a portion of Court C, which contains some utilities in the right of way which would need to be rerouted. Vacation of the street would also require provisions on the project site for fire truck turn-around or drive-through in a new alignment to Jefferson Avenue.

The northeast corner of the site adjacent to Pinkerton Building could continue to serve as on-grade parking and potentially as a construction staging area. This space can be accessed from Court C and Jefferson Avenue and is therefore a good future development site for UW Tacoma.

SITE PLAN
4.0 Preferred Alternative Analysis

PREFERRED ALTERNATIVE, PHASE 1 - MASSING

UW Tacoma’s preferred alternative to address the needs outlined in this report is to build the northwest wing of the boomerang massing concept as the Phase 1 of building the entire Academic Innovation Building. This portion of the building will be large enough to house the most critical elements of the program as shown above the line on the opposite page, and it provides the ideal amount of ground floor space to make the program highly functional. Another advantage is that construction of this wing avoids the costs of vacating Court C in this phase. Program shown below the line on the opposite page is also essential space, and it will be addressed in Phase 2, or elements may be incorporated into Phase 1 if that becomes possible through project savings or greater donor participation.

A portion of the Science Court would be built between the proposed building and the Court C right of way. It would contain facilities for UW Tacoma’s waste stream collection, a loading dock for the building, and the rest of the high bay floor would be Mechanical Engineering labs. The proposed building’s elevator would provide an accessible route from Court C to Market Street, located closer to the Hillclimb than the existing elevator located at the Court 17 building. A penthouse is proposed to contain the mechanical, plumbing, and electrical equipment. It will be set back from the main elevations of the building and should be designed with expansion in mind to accommodate the full vision of the project.

PHASE 1 SECTION DIAGRAM

PHASE 1 MASSING DIAGRAM
## PROGRAM SUMMARY

**50,000 gsf**

<table>
<thead>
<tr>
<th>Commons</th>
<th>Hub for Innovation Centers</th>
<th>Milgard Office + Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atrium/Collaboration</td>
<td>Reception</td>
<td>Staff Offices</td>
</tr>
<tr>
<td>Open Group Work Space</td>
<td>Meeting Rooms x 2</td>
<td>Student Advising</td>
</tr>
<tr>
<td>Individual Study Rooms</td>
<td>Offices x 8</td>
<td></td>
</tr>
<tr>
<td>Group Rooms x 12</td>
<td>Workroom</td>
<td></td>
</tr>
<tr>
<td>150 Student Large, Flexible Classroom</td>
<td>Storage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interview Rooms x 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Center for Business Analytics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ctr for Leadership &amp; Social Responsibility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Milgard Success Center</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS in Business Administration Tech Rm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical Engineering Labs + Support</th>
<th>Shared Labs</th>
<th>Classrooms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Sciences</td>
<td>Engineering Design</td>
<td>Seminar Rooms x 2</td>
</tr>
<tr>
<td>Solid Mechanics</td>
<td>Computer Aided Design Lab</td>
<td>60-70 Seat Classrooms x 3</td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prep Lab/Storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabrication Shop</td>
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</tbody>
</table>

## FULL VISION - ADDITIONAL PROGRAM SUMMARY

**78,000 gsf**

<table>
<thead>
<tr>
<th>Commons</th>
<th>Classrooms</th>
<th>Milgard Office + Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry/Lobby</td>
<td>Computer Classroom</td>
<td>Faculty Offices</td>
</tr>
<tr>
<td>Student Lounge</td>
<td>Open Computer Lab</td>
<td>Meeting Rooms x 6</td>
</tr>
<tr>
<td>Commercial</td>
<td>Active Learning Classroom</td>
<td>Tutors</td>
</tr>
<tr>
<td>Café</td>
<td>Campfire Classroom</td>
<td>Graduate Students</td>
</tr>
<tr>
<td>Civil Engineering Labs + Support</td>
<td>Mechanical Engineering Labs + Support</td>
<td>School of Engineering and Technology Office + Support</td>
</tr>
<tr>
<td>Environmental Engineering</td>
<td>Control Systems</td>
<td>Civil Engineering Offices</td>
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<tr>
<td>Fluids/Hydraulics</td>
<td>Mechatronics &amp; Micro-Processor</td>
<td>IT Offices</td>
</tr>
<tr>
<td>Soil Mechanics</td>
<td>Industrial 4.0 Cyber, Phys. Systems</td>
<td>Tutors</td>
</tr>
<tr>
<td>Materials</td>
<td>Research Labs</td>
<td>Graduate Students</td>
</tr>
<tr>
<td>Structures</td>
<td>Faculty Research</td>
<td>IT Labs</td>
</tr>
<tr>
<td>Construction Design</td>
<td>Shared Research</td>
<td>Computer Lab</td>
</tr>
<tr>
<td>Prep Lab/Storage</td>
<td></td>
<td>Cybersecurity</td>
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<td>Shared Labs</td>
<td></td>
<td>Industrial Controls Systems</td>
</tr>
<tr>
<td></td>
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<td>Forensics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Senior Design</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Networking</td>
</tr>
</tbody>
</table>
| | | Embedded System Design & Micro-

### Office
- Labs
- Collaboration
- Teaching Space

UW Tacoma Academic Innovation Building | Hacker Architects
4.0 Preferred Alternative Analysis

PROGRAM - NATURE OF SPACE

The preferred alternative, Phase 1, is 50,000 gsf with a 67% efficiency factor, which is consistent with the building efficiency guidelines. Critical program components were determined through a space needs assessment with UW Tacoma. The following is a summary of the critical program elements with a more detailed analysis in the following section 4.2.0.

Building efficiency is expressed as a net to gross ratio calculation, where assignable net square footage is multiplied by a space factor to get to a gross square feet total. The ratio of net assignable square footage to gross square footage is expressed as a percentage referred to as the building efficiency. Unassigned space contains circulation, mechanical/electrical/data spaces, structure, wall thicknesses, public restrooms, and unassigned building storage/loading areas.

The assumed Academic Innovation Building efficiency ratio is 67%, which is within the average (65%) to high end (68%) efficiency for a STEM instruction focused higher education building. Maximizing building efficiency depends on the design and construction team’s ability to make efficient use of space, conserve resources, consolidate service spaces in a logical manner, and carve out usable program space in circulation zones. It is critical that the building efficiency at the predesign stage of the process be realistic and allow for an achievable design solution that is within the range of medium to high new construction efficiency. Based on the current program, there will be 28% lab space, 25% classrooms, 17% office and administration, and 30% student collaboration space.

The 67% efficiency ratio will be the target for the design and construction team for the Academic Innovation Building. As indicated in the WA State DES Space Allocation Standards Report, dated September 2011, maximizing building efficiency will be driven by the following factors on this project:

- Building design – size and shape of floor plate, structural system, and core/circulation locations
- Program requirements – unique requirements for specialized lab spaces
- Organizational philosophy – evolution in UW Tacoma philosophy about alternative work styles, office space allocations, lab space allocations, and shared workspace ideas
- Configuration of space – maximizing efficiency in relationships and layouts
- Financial – making future changes to improve efficiency later is expensive

PROGRAM-RELATED SPACE ALLOCATION + OCCUPANCY NUMBERS

<table>
<thead>
<tr>
<th>Type of Space</th>
<th>% of Space</th>
<th>Gross Square Footage</th>
<th>Occupants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Collaboration</td>
<td>30</td>
<td>15,050</td>
<td>380</td>
</tr>
<tr>
<td>Classrooms</td>
<td>25</td>
<td>12,900</td>
<td>335</td>
</tr>
<tr>
<td>Administration</td>
<td>11</td>
<td>5,382</td>
<td>31</td>
</tr>
<tr>
<td>Faculty</td>
<td>6</td>
<td>2,957</td>
<td>16</td>
</tr>
<tr>
<td>Teaching Labs</td>
<td>28</td>
<td>14,250</td>
<td>140</td>
</tr>
</tbody>
</table>
4.0 Preferred Alternative Analysis

Classrooms & Group Rooms
Milgard School of Business faculty and staff are driving the need for large classrooms and associated group rooms, but the need for these spaces has been reinforced by the School of Engineering and Technology and by departments across campus, as noted by UW Tacoma’s registrar and scheduler.

• Large Classrooms: Milgard School student demand is over capacity in all of their courses. Although this need is primarily coming from Milgard School of Business, the School of Engineering and Technology also needs similar large, flexible classrooms. Class size is limited by room size, therefore, larger classrooms are needed. These classrooms would ideally be located near Business School Services.

• Group rooms: Team work is typical in Business Schools and at Milgard in particular, but there are not convenient, appropriate spaces for groups to work together. Students are traveling 5-10 minutes to remote group rooms, wasting class time.

Labs
There is an identified need for specialized labs and lab support spaces needed to launch the new Mechanical Engineering Program and meet curriculum requirements. These labs will need to accommodate the size and type of equipment necessary, and to have the capacity for multiple lab sections meeting at the same time without scheduling conflicts as the program grows.

Hub for Innovation Centers
Milgard School of Business has a rich and growing network of Centers that serve students, businesses, and the community. The School of Engineering and Technology is growing in Centers, and the two Schools are incorporating more interdisciplinary Centers. Centers with a research focus pose a particularly good opportunity for innovative collaboration between Engineering and Business programs.

Unscheduled Collaboration
Students commonly have group research assignments, but no place to meet outside of class. Milgard offers MBA degrees and other graduate degrees to working professionals but cannot offer those students a place to gather.

Office and Support
Offices in this building are primarily planned to cover new faculty and staff, not relocating faculty and staff, or entire departments. Because of this, office space will be a relatively small portion of the building. In addition to accommodating the new faculty and staff needed to start the Mechanical Engineering program, offices are a key part of the development of the hub for Innovation Centers.
4.2.0 Space Needs Assessment

The design team used multiple strategies to identify space needs with the Project Working Team. Focus groups, questionnaires, and building visits helped campus and departmental representatives clarify their space needs. After identifying the needs, the design team worked with these representatives to identify options for prioritizing and reducing the total program, including valuable input which ranked the importance of various program elements.

Hacker Architects used past higher education building experience as a starting point for sizing spaces. The space allocations were then cross-checked against State Facilities Workplace Strategies and Space Use Guidelines (2017), and Facilities Evaluation and Planning Guide (FEPG) (1994). Project program areas are in line with, or more efficient than, the recommendations.

Comparison to currently recognized space planning guidelines:

Strategies from State Facilities Workplace Strategies and Space Use Guidelines should be applied to assign faculty and staff workspace in the design phase of the project. These guidelines help allocate amounts and types of space based on the privacy users require, and the type of work they do. Applying these guidelines can help reduce the total space required for faculty and staff offices.

### State Facilities Workplace Strategies and Space Use Guidelines

<table>
<thead>
<tr>
<th>Type of Space</th>
<th>Assignable Sf/Workstation or person unless otherwise noted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>100-150</td>
</tr>
<tr>
<td>Workstation</td>
<td>42-64</td>
</tr>
<tr>
<td>Mobile Bench</td>
<td>24-36</td>
</tr>
<tr>
<td>Touchdown Space</td>
<td>24</td>
</tr>
<tr>
<td>Collaboration</td>
<td>20</td>
</tr>
<tr>
<td>Focus Room/Focus Point</td>
<td>40</td>
</tr>
<tr>
<td>Conference</td>
<td>15</td>
</tr>
<tr>
<td>Training</td>
<td>25-35</td>
</tr>
</tbody>
</table>

### Facilities Evaluation and Planning Guide (FEPG)

<table>
<thead>
<tr>
<th>Type of Space</th>
<th>Assignable Sf/Workstation or person unless otherwise noted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom 50-99 People, movable tables and chairs</td>
<td>16-22</td>
</tr>
<tr>
<td>Class Laboratories, Engineering</td>
<td>120</td>
</tr>
<tr>
<td>Open Laboratories</td>
<td>No guideline, driven by specific needs</td>
</tr>
<tr>
<td>Computer Laboratories</td>
<td>60</td>
</tr>
<tr>
<td>Research Laboratories</td>
<td>No guideline, driven by specific needs</td>
</tr>
<tr>
<td>Office - Faculty</td>
<td>140</td>
</tr>
<tr>
<td>Office - Staff</td>
<td>120</td>
</tr>
<tr>
<td>Conference Rooms</td>
<td>20</td>
</tr>
</tbody>
</table>
### 4.0 Preferred Alternative Analysis

**CLASSROOMS NEEDS**

As described previously, Milgard School of Business’ pedagogy and its need for efficiency are driving the need for large classrooms and associated group rooms, but the need for these spaces has also been reinforced by the School of Engineering and Technology and by departments across campus, as noted by UW Tacoma’s registrar and scheduler.

Large Classrooms: Milgard School student demand is high and fill rates are near capacity in many courses. In addition, class size is limited by room size, necessitating faculty to teach multiple repeat sessions of the same coursework. While small class sizes benefit students for certain types of content delivery, this repetition of content benefits neither student nor faculty. Both Milgard and School of Engineering and Technology faculty requested larger rooms for 60-70 students in which presentations could be made once, rather than repeated. The faculty time gained by this efficiency could then be used to expand coursework and access within the same amount of faculty time. All new classrooms should have capabilities for distance learning to reach underserved regions and place-bound students. The design team will need to further investigate the appropriate technology and equipment to serve these needs.

The graph below displays the unavailability of 60-70 person classrooms. The “utilization curve” is highest toward the larger classrooms reinforcing the need for this classroom size. The 71-80 person classroom is greatly underutilized because of its poor condition and A/C issues. UW Tacoma has plans to revitalize this classroom to make it usable again.

### CLASSROOM INVENTORY & USE

<table>
<thead>
<tr>
<th>CLASSROOM USE (hrs/wk)</th>
<th>0-30</th>
<th>31-40</th>
<th>41-50</th>
<th>51-60</th>
<th>61-70</th>
<th>71-80</th>
<th>81-90</th>
<th>91+</th>
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<tbody>
<tr>
<td>17</td>
<td>30</td>
<td>26</td>
<td>24</td>
<td>22</td>
<td>20</td>
<td>18</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>17.70</td>
<td>32.02</td>
<td>40.86</td>
<td>43.57</td>
<td>9.45</td>
<td>40.33</td>
<td>26.16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Diagram: Classroom Inventory & Use](image-url)

**CURRENT LARGE CLASSROOM + GROUP ROOM PROXIMITY**

![Diagram: Classroom Proximity](image-url)

**NOTE:** Highly requested classroom size from both Milgard + School of Engineering and Technology - NOT AVAILABLE
Teaching Goals:
Create connections between students and faculty / Facilitate collaboration and spontaneous interaction / Provide flexible, open-layout classrooms to facilitate team work and group work / Flip the classrooms, encouraging students to own their education.

**CURRENT**

1 PROFESSOR

2 HR + 2 HR

SMALL CLASSROOM 30-40 STUDENTS

**TOTAL TIME = 4 HR**

Same curriculum taught in each class.

**PROPOSED**

1 PROFESSOR

2 HR

LARGE CLASSROOM 60-70 STUDENTS

**TOTAL TIME = 2 HR**

Curriculum reaches more students and taught more efficiently.
4.0 Preferred Alternative Analysis

GROUP ROOM NEEDS

Team work is typical in business schools, and at Milgard in particular. As such, Milgard students have a lot of group work associated with their classes. Spaces appropriate for groups to work together, however, are not conveniently located. Faculty often utilize half of the class time for lecture and then have students break out into groups. Milgard professors typically need six group rooms associated with their classroom or nearby. Currently, group rooms are dispersed across campus, requiring a 5-10 minute walk each way. When professors need to use these rooms they must send students across campus to a room, then walk across campus to meet with each group individually. This inhibits faculty from employing collaborative teaching methods shown to have significant benefits to students.

Group Rooms are needed campus-wide. Group and collaborative team work is becoming more common and essential in virtually all coursework, including Engineering. Currently, there are only seven total group rooms on campus serving over 5,000 students. By providing group rooms near large classrooms in the new Academic Innovation Building, the remaining group rooms can be utilized by other departments more effectively.

CURRENT LARGE CLASSROOM + GROUP ROOM PROXIMITY
Teaching Goals:
Provide flexible group work space / Connect large classrooms with associated group work spaces / Create varying scales of privacy for group work / Allow students to schedule campus space to promote student collaboration after class
4.0 Preferred Alternative Analysis

LAB NEEDS

LAB MODULES – PLANNING

Lab buildings are commonly planned on a standard dimensional module that is suitable for the type of research and teaching required. The module can be multiplied to create a grid of standardized dimensions, by which structural columns and walls can be located. Modular planning provides flexibility of laboratory space because it allows for future modifications that may be required by changes in laboratory use or equipment. Planning modules can be combined to produce large open laboratories or can be subdivided to produce smaller special use rooms without requiring reconstruction of structural or mechanical building elements.

The planning module can be used to organize a systematic delivery of piped laboratory services, HVAC, power and data. These services can be delivered to each laboratory module in a consistent manner, facilitating additions or deletions that could be required by changes in laboratory use.

The laboratory module dimensions should be derived from analyzing the required bench, equipment, and circulation space.

- Bench dimensions should accommodate technical work stations, instruments, and procedures.
- Space between benches is designed to allow people to work back-to-back at adjacent benches, allowing accessibility for disabled persons and movement of people and laboratory carts in the aisle.
- The module also can provide adequate space for large equipment such as chemical fume hoods.
**RECOMMENDED LAB MODULE**

The laboratory planning module for the Academic Innovation Building is recommended to be 11-feet wide by 30-feet long. Laboratory sizes were based on multiples of the module that best accommodated the number of student workspaces required taking pedagogy, demonstration space, equipment, safety, and sight lines into account. This module also works well for non-laboratory classroom spaces and therefore serves as the planning unit for the entire project.

The lowest level of the building is planned to have a floor-to-floor height of approximately 20 feet to allow ample overhead space for the large pieces of equipment and overhead HVAC necessary for flexible engineering laboratories. The typical floor-to-floor height is planned to be 14 feet which is high enough to allow for the potential of tiered seating in classrooms. It also allows for windows tall enough to provide usable daylight to penetrate into most of the module depth.

**LAB MODULE: 11’0” X 30’0”**

**LABORATORY TYPES**

The following labs are the most appropriate types for a Mechanical Engineering program and are consistent with the approved request for the new Bachelor of Science in Mechanical Engineering at UW Tacoma. The following labs and support spaces will support teaching and research:

- **Fluid and Thermal Sciences Lab**: Experiments in Fluid Mechanics, Heat Transfer, and Thermodynamics.
- **Solid Mechanics and Materials Lab**: Aspects of the mechanical and thermal behavior of solid materials, from the molecular through the continuum levels.
- **Manufacturing Lab**: Fundamental principles of manufacturing systems, processes, and machines.
- **Computer Aided Design Lab**: Hardware and applications specifically for modeling and analysis in support of the Mechanical Engineering program.
- **Prep Lab**: Space for faculty, staff, and students to prepare samples for testing analysis.
- **Lab Storage**: Space for secure storage of raw materials, tools, equipment, and accessories in support of the other labs.
- **Fabrication Shop**: Space for additive or subtractive manipulation of raw materials, and fabrication of samples or prototypes for experimentation in other labs.
- **Engineering Design Lab**: Space for assembly, experimentation, demonstration, and discussion of mechanical research projects.
4.0 Preferred Alternative Analysis

Hub for Innovation Centers

The hub for Innovation Centers will be a flexible place where various Centers within the Milgard School of Business and the School of Engineering and Technology are colocated. The Centers will be welcoming and accessible to students and industry partners. Collecting the Centers will create a hub for design thinking, promoting innovation, and creative problem solving across multiple disciplines. The following Centers are currently identified to be located in the hub for Innovation Centers:

Center for Leadership and Social Responsibility (CLSR): CLSR works to develop socially responsible leaders who build sustainable organizations and communities.

Center for Business Analytics (CBA): CBA’s vision is to be the premier interdisciplinary university center for business innovation at the interface of data, analytics, and smart machines.

- Innovation and Analytics Center (under the CBA): New, funded center – IAC will deliver enterprise/venture assistance services and match specific clients with the optimal collaborative agency or enabling organization.
- Milgard Initiative on Women and Innovation (under the CBA): MIWI advocates for a more inclusive role for women in creatively leading communities, businesses, families, social enterprises, and organizations toward greatness. MIWI’s agenda includes speakers series, summits and seminars, an innovative business incubator, and an international journal on women and innovation.

Milgard Success Center: Career services for students and alumni.

Center for Data Science (CDS): CDS is a hub for experts in data analytics, data management, and data science. The center uses a multi-disciplinary approach to explore the impact of big data, its challenges, and its opportunities. The aim is to develop tools and algorithms that enhance the fundamental understanding of how to store, manage, analyze, search, and model data.

These valuable resources are distributed, and buried in various campus buildings, taking bits of available space as they have been able to claim them. The design team worked with representatives of each Center or with the Project Working Team to identify what they need to serve students, faculty, and the business community effectively.
**CRITICAL NEEDS, IN ORDER OF PRIORITY:**

- Public, accessible location
- Proximity to other Centers, to share resources and promote valuable chance interactions
- Shared reception and commons
- Offices
- Meeting rooms
- Interview rooms
- Design center
- Access to classrooms and group rooms
- Access to large event space

<table>
<thead>
<tr>
<th>CENTER</th>
<th>WHO IT SERVES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Students</td>
</tr>
<tr>
<td>CLSR</td>
<td>X</td>
</tr>
<tr>
<td>CBA</td>
<td>X</td>
</tr>
<tr>
<td>IAC</td>
<td>X</td>
</tr>
<tr>
<td>MIWI</td>
<td>X</td>
</tr>
<tr>
<td>MSC</td>
<td>X</td>
</tr>
<tr>
<td>CDS</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CENTER</th>
<th>SPACE REQUESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Commons</td>
</tr>
<tr>
<td>CLSR</td>
<td>X</td>
</tr>
<tr>
<td>CBA</td>
<td>X</td>
</tr>
<tr>
<td>IAC</td>
<td>X</td>
</tr>
<tr>
<td>MIWI</td>
<td>X</td>
</tr>
<tr>
<td>MSC</td>
<td>X</td>
</tr>
<tr>
<td>CDS</td>
<td>X</td>
</tr>
</tbody>
</table>
4.0 Preferred Alternative Analysis

**UNSCHEDULED COLLABORATION**

Students commonly have group research assignments, but no place to meet outside of class. Milgard offers graduate degrees, specifically MBA degrees to working professionals, but doesn’t have sufficient gathering space. Informal study and collaboration areas should be planned throughout the building adjacent to circulation paths. The areas should be different in their feel and configuration to provide a variety of environmental choices for individual and group study but also should be warm and inviting. A variety of informal collaboration options are shown diagrammatically below: upholstered booths with access to a wall-mounted flat screen, movable tables and lounge chairs near a large whiteboard, and clusters of worktables and chairs, all with access to power, data, and potentially cable television. Furnishings should be comfortable, durable, and movable when practical. Tables should be deep enough to accommodate several student accessories such as laptops, books, and food. All study lounge areas should have convenient, dedicated space for waste and recycling containers.
OFFICE AND SUPPORT

Offices in this building are primarily planned to accommodate only new faculty and staff, not to relocate a large number of faculty and staff, or entire departments. Because of this, office space is a relatively small portion of the building. In addition to the new faculty and staff needed to start the Mechanical Engineering program, offices are a key part of the hub for Innovation Centers, which would involve a minimal number of faculty and staff relocating to work in proximity to one another and to the communities they serve.
4.0 Preferred Alternative Analysis

4.3.0 Room Data Sheets

150 SEAT LARGE CLASSROOM – GENERAL DESCRIPTION

The 150-seat large classroom provides multiple functions. As a classroom, the space should be flexible and reconfigurable for different teaching modalities, including lecture delivery with students facing a teaching wall, and group work with students able to quickly rotate tables together. This flexibility can be achieved in a tiered classroom by having double-row width tiers. This large, tiered classroom can also function as a sort of auditorium-type event space for visiting lectures and other broad presentations. For these events, tables can be removed and another row of seats added to each tier to accommodate an audience of up to 200.

GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>ROOM TYPE</th>
<th>150 Person Large Classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF THESE SPACES</td>
<td>1</td>
</tr>
<tr>
<td>ROOM SIZE</td>
<td>3,750 sf</td>
</tr>
<tr>
<td>LEVEL OF TECHNOLOGICAL STANDARD</td>
<td>A</td>
</tr>
<tr>
<td>HEIGHT REQUIREMENTS</td>
<td>18’-0” minimum</td>
</tr>
<tr>
<td>ADJACENCY REQUIREMENTS</td>
<td>Open collaboration + ground floor/entry</td>
</tr>
<tr>
<td>WINDOWS</td>
<td>Desired Natural Daylight</td>
</tr>
<tr>
<td>DAYLIGHT CONTROL</td>
<td>Motorized shades controlled from central location</td>
</tr>
<tr>
<td>LIGHTING</td>
<td>TBD</td>
</tr>
</tbody>
</table>

UTILITY REQUIREMENTS

ELECTRICAL

Wall mounted duplex outlets and USB ports for power of devices and overhead or drop down power to be considered.

DATA/TELECOM

Technology package to include sound system, video capture, projection system, capacity wifi for internet access.

AUDIO-VISUAL

Ceiling Projectors, multiple monitors, ceiling mounted high quality loud speakers, ceiling mounted high quality microphone systems, software 2-way videoconferencing system (e.g. Zoon) and hardware 2-way H.323 codec, capacity wifi for internet access, video recording capabilities, and ability for student to share content with the class and groups to be considered.

HVAC/CONTROLS

Comfort heating, cooling, and ventilation.

EQUIPMENT

FIXED

Podium with AV controls, projection screen white boards along perimeter, storage, and instructor station/computer.

MOVABLE

Tables, chairs, storage for instruction demonstrations/props. Configured for students to share content with class.

OTHER

Coat racks or under table storage for loose items.
4.0 Preferred Alternative Analysis

150 SEAT LARGE CLASSROOM (LAYOUT 1)
Area: 3,750 sf
Number of Students: 150

150 SEAT LARGE CLASSROOM (LAYOUT 2)
Area: 3,750 sf
Number of Students: 150
## 4.0 Preferred Alternative Analysis

### LARGE CLASSROOM – GENERAL DESCRIPTION

These 60-70 person classrooms should be flexible and reconfigurable in a number of different ways – to allow large group discussions, smaller group work, and lecture-style presentations. For optimal flexibility, there should be screens located on more than one wall and UW technology should be employed to allow students to easily share their personal computer screens onto the main teaching wall. In some sample active learning classrooms, low-tech approaches have been very successful, such as personal white board tablets and a downward-focused screen camera as a sort of “document camera.” If possible, a universal amplification system will allow students with hearing impairments to plug into a central system rather than needing an identifying accessory. All new classrooms should have capabilities for distance learning to reach place-bound students.

### GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>ROOM TYPE</th>
<th>60-70 Person Classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF THESE SPACES</td>
<td>3</td>
</tr>
<tr>
<td>ROOM SIZE</td>
<td>1,540 sf</td>
</tr>
<tr>
<td>LEVEL OF TECHNOLOGICAL STANDARD</td>
<td>A</td>
</tr>
<tr>
<td>HEIGHT REQUIREMENTS</td>
<td>12'-0&quot; minimum</td>
</tr>
<tr>
<td>ADJACENCY REQUIREMENTS</td>
<td>Group rooms</td>
</tr>
<tr>
<td>WINDOWS</td>
<td>Desired Natural Daylight</td>
</tr>
<tr>
<td>DAYLIGHT CONTROL</td>
<td>Manual shades</td>
</tr>
<tr>
<td>LIGHTING</td>
<td>TBD</td>
</tr>
</tbody>
</table>

### UTILITY REQUIREMENTS

#### ELECTRICAL

Wall mounted duplex outlets and USB ports for power of devices and overhead or drop down power to be considered.

#### DATA/TELECOM

Technology package to include sound system, video capture, projection system, capacity wifi for internet access.

#### AUDIO-VISUAL

Ceiling Projectors, multiple monitors, ceiling mounted high quality loud speakers, ceiling mounted high quality microphone systems, software 2-way videoconferencing system (e.g. Zoon) and hardware 2-way H.323 codec, capacity wifi for internet access, video recording capabilities, and ability for student to share content with the class and groups to be considered.

#### HVAC/CONTROLS

Comfort heating, cooling, and ventilation.

### EQUIPMENT

#### FIXED

Podium with AV controls, projection screen white boards along perimeter, storage, and instructor station/computer.

#### MOVABLE

Tables, chairs, storage for instruction demonstrations/props. Configured for students to share content with class.

#### OTHER

Coat racks or under table storage for loose items.
4.0 Preferred Alternative Analysis

LARGE CLASSROOM (LAYOUT 1)
Area: 1,540 sf
Number of Students: 64

LARGE CLASSROOM (LAYOUT 2)
Area: 1,540 sf
Number of Students: 60

LARGE CLASSROOM (LAYOUT 3)
Area: 1,540 sf
Number of Students: 66
4.0 Preferred Alternative Analysis

OPEN COMPUTER LAB – GENERAL DESCRIPTION

Open computer labs are most successful when there is an ability to use them for formal classes as well as unscheduled student use. This flexibility can be accomplished by using furniture that allows computers to be lowered below the desk and raised, but that poses the risk of pieces breaking over time. An alternative is to have computer screens which are sufficiently low profile to allow students to view over them to the teaching wall and instructor, but also to easily work on the screen.

GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>ROOM TYPE</th>
<th>60 Person Open Computer Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF THESE SPACES</td>
<td>1</td>
</tr>
<tr>
<td>ROOM SIZE</td>
<td>1,200 sf</td>
</tr>
<tr>
<td>LEVEL OF TECHNOLOGICAL STANDARD</td>
<td>A</td>
</tr>
<tr>
<td>HEIGHT REQUIREMENTS</td>
<td>10’-0” minimum</td>
</tr>
<tr>
<td>ADJACENCY REQUIREMENTS</td>
<td>None</td>
</tr>
<tr>
<td>WINDOWS</td>
<td>Desired Natural Daylight</td>
</tr>
<tr>
<td>DAYLIGHT CONTROL</td>
<td>Manual shades</td>
</tr>
<tr>
<td>LIGHTING</td>
<td>TBD</td>
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</tbody>
</table>

UTILITY REQUIREMENTS

<table>
<thead>
<tr>
<th>ELECTRICAL</th>
<th>Wall mounted duplex outlets and USB ports for power of devices and overhead or drop down power to be considered.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA/TELECOM</td>
<td>Technology package to include sound system, video capture, projection system, capacity wifi for internet access.</td>
</tr>
<tr>
<td>AUDIO-VISUAL</td>
<td>Ceiling mounted projectors, or multiple monitors to be considered. Microphones, video recording capabilities and configured for students to share content with the class and in groups.</td>
</tr>
<tr>
<td>HVAC/CONTROLS</td>
<td>Comfort heating, cooling, and ventilation.</td>
</tr>
</tbody>
</table>

EQUIPMENT

<table>
<thead>
<tr>
<th>FIXED</th>
<th>Podium with AV controls, projection screen white boards along perimeter, storage, instructor station/computer and lab staff reception desk.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOBILE</td>
<td>Tables, chairs, storage for instruction demonstrations/props. Configured for students to share content with class.</td>
</tr>
<tr>
<td>OTHER</td>
<td>Coat racks or under table storage for loose items.</td>
</tr>
</tbody>
</table>
OPEN COMPUTER LAB

Area: 1,200 sf

Number of Students: 60

WSU Everett: Adaptable Furniture - Computer Tables

UW Foster School: Tiered Computer Classroom
**SEMINAR ROOM – GENERAL DESCRIPTION**

Seminar rooms are small, flexible media-equipped rooms that students, faculty, and staff can use for team, educational, or research work. Like most spaces, these rooms should be as flexible as possible to allow different types of configurations for up to 12 people. By designing these rooms on the same planning module as the group rooms, UW Tacoma will have flexibility around the number and the locations of these medium-scale rooms. Ideally, three walls of these rooms would have large screens on which students can share information or references. Seminar rooms should be located near circulation corridors and the large format classrooms.

**GENERAL REQUIREMENTS**

<table>
<thead>
<tr>
<th>ROOM TYPE</th>
<th>12 Person Seminar Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF THESE SPACES</td>
<td>2</td>
</tr>
<tr>
<td>ROOM SIZE</td>
<td>240 sf</td>
</tr>
<tr>
<td>LEVEL OF TECHNOLOGICAL STANDARD</td>
<td>A</td>
</tr>
<tr>
<td>HEIGHT REQUIREMENTS</td>
<td>10’-0” minimum</td>
</tr>
<tr>
<td>ADJACENCY REQUIREMENTS</td>
<td>None</td>
</tr>
<tr>
<td>WINDOWS</td>
<td>Desired natural daylight</td>
</tr>
<tr>
<td>DAYLIGHT CONTROL</td>
<td>Manual shades</td>
</tr>
<tr>
<td>LIGHTING</td>
<td>TBD</td>
</tr>
</tbody>
</table>

**UTILITY REQUIREMENTS**

- **ELECTRICAL**: Wall mounted duplex outlets and USB ports for power of devices and overhead or drop down power to be considered.
- **DATA/TELECOM**: Technology package to include sound system, video capture, projection system, capacity wifi for internet access.
- **AUDIO-VISUAL**: Ceiling mounted projectors, or multiple monitors to be considered. Configured for students to share content with class and in groups.
- **HVAC/CONTROLS**: Comfort heating, cooling, and ventilation.

**EQUIPMENT**

- **FIXED**: Large monitor, white boards along perimeter, and storage.
- **MOVABLE**: Tables, chairs, and storage units.
- **OTHER**: 

---

UW Tacoma Academic Innovation Building | Hacker Architects
4.0 Preferred Alternative Analysis

SEMINAR ROOM (LAYOUT 1)
Area: 240 sf
Number of Students: 12

SEMINAR ROOM (LAYOUT 2)
Area: 240 sf
Number of Students: 12
4.0 Preferred Alternative Analysis

GROUP ROOM – GENERAL DESCRIPTION
Group rooms need to be located adjacent to large classrooms as well as to main building circulation. Group rooms are optimally sized for 6-8 students for the main group rooms adjacent to classrooms; however, various sizes of collaboration spaces creates options for students. Group rooms can be scheduled or unscheduled and open for student study and collaborative work.

GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>ROOM TYPE</th>
<th>6 Person Group Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF THESE SPACES</td>
<td>12</td>
</tr>
<tr>
<td>ROOM SIZE</td>
<td>180 sf</td>
</tr>
<tr>
<td>LEVEL OF TECHNOLOGICAL STANDARD</td>
<td>A</td>
</tr>
<tr>
<td>HEIGHT REQUIREMENTS</td>
<td>10’-0” minimum</td>
</tr>
<tr>
<td>ADJACENCY REQUIREMENTS</td>
<td>Large Classrooms</td>
</tr>
<tr>
<td>WINDOWS</td>
<td>Desired natural daylight</td>
</tr>
<tr>
<td>DAYLIGHT CONTROL</td>
<td>Manual shades</td>
</tr>
<tr>
<td>LIGHTING</td>
<td>TBD</td>
</tr>
</tbody>
</table>

UTILITY REQUIREMENTS

<table>
<thead>
<tr>
<th>ELECTRICAL</th>
<th>Wall mounted duplex outlets and USB ports for power of devices and overhead or drop down power to be considered.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA/TELECOM</td>
<td>Technology package to include projection system and capacity wifi for internet access.</td>
</tr>
<tr>
<td>AUDIO-VISUAL</td>
<td>Ceiling mounted projectors, or multiple monitors to be considered.</td>
</tr>
<tr>
<td>HVAC/CONTROLS</td>
<td>Comfort heating, cooling, and ventilation.</td>
</tr>
</tbody>
</table>

EQUIPMENT

<table>
<thead>
<tr>
<th>FIXED</th>
<th>White boards along perimeter, and storage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOVABLE</td>
<td>Tables, chairs, and storage units.</td>
</tr>
<tr>
<td>OTHER</td>
<td></td>
</tr>
</tbody>
</table>
GROUP ROOM (LAYOUT 1)
Area: 180 sf
Number of Students: 6

GROUP ROOM LAYOUT OPTIONS

9 STUDENTS

7 STUDENTS

6 STUDENTS

5 STUDENTS

OSU Austin Hall: Reservable Group Rooms
4.0 Preferred Alternative Analysis

OFFICE + SUPPORT – GENERAL DESCRIPTION

The Academic Innovation Building will include a limited number of faculty, staff and teaching assistant offices. These will support the new Mechanical Engineering program and some of the Milgard centers. Mechanical Engineering faculty offices should be located near their respective teaching laboratories to provide accessibility to students. Staff and teaching assistant offices should be located near the hub for Innovation Centers, or potentially near the large format classrooms. An appropriate balance of community interaction and privacy is desirable for the faculty office in a type of mini-suite. The suites should have a transparent, welcoming entry and a place for students to sit, but with some separation to accommodate an appropriate level of confidentiality (for both files and meetings) and privacy.

GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>ROOM TYPE</th>
<th>Office + Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF THESE SPACES</td>
<td>School of Engineering and Technology: 14 Faculty Offices + 2 Advising</td>
</tr>
<tr>
<td></td>
<td>Milgard: 10 Staff + 6 Advising</td>
</tr>
<tr>
<td>ROOM SIZE</td>
<td>130 sf/office + 25 sf/advising space</td>
</tr>
<tr>
<td>LEVEL OF TECHNOLOGICAL STANDARD</td>
<td>A</td>
</tr>
<tr>
<td>HEIGHT REQUIREMENTS</td>
<td>10'-0&quot; minimum</td>
</tr>
<tr>
<td>ADJACENCY REQUIREMENTS</td>
<td>None</td>
</tr>
<tr>
<td>WINDOWS</td>
<td>Desired natural daylight</td>
</tr>
<tr>
<td>DAYLIGHT CONTROL</td>
<td>Manual shades</td>
</tr>
<tr>
<td>LIGHTING</td>
<td>TBD</td>
</tr>
</tbody>
</table>

UTILITY REQUIREMENTS

<table>
<thead>
<tr>
<th>ELECTRICAL</th>
<th>Wall mounted duplex outlets and USB ports for power of devices and overhead or drop down power to be considered.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA/TELECOM</td>
<td>Technology package to include capacity wifi for internet access.</td>
</tr>
<tr>
<td>AUDIO-VISUAL</td>
<td>N/A</td>
</tr>
<tr>
<td>HVAC/CONTROLS</td>
<td>Comfort heating, cooling, and ventilation.</td>
</tr>
</tbody>
</table>

EQUIPMENT

<table>
<thead>
<tr>
<th>FIXED</th>
<th>White boards along perimeter, and storage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOVABLE</td>
<td>Tables, chairs, and storage units.</td>
</tr>
<tr>
<td>OTHER</td>
<td></td>
</tr>
</tbody>
</table>
4.0 Preferred Alternative Analysis

BOARD ROOM – GENERAL DESCRIPTION

The board room is a large conference room used by executive, professional development, and business advisory groups. It should be media-rich to allow for presentations and acoustically designed for large-group conversation. This room will accommodate large meetings for up to 25 people at the conference table with room for overflow chairs. Movable furniture, whiteboard, projection screen, and ceiling-mounted projector or large wall-mounted flat screen, wall or under-table mounted area for computer and other presentation technology devices will be included. This space should be designed to accommodate videoconferencing, course casting, and associated AV equipment. Typically, the board room will have an associated small support space with AV closet, kitchenette, and some storage for chairs.

GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>ROOM TYPE</th>
<th>25 Person Board Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF THESE SPACES</td>
<td>1</td>
</tr>
<tr>
<td>ROOM SIZE</td>
<td>200 sf</td>
</tr>
<tr>
<td>LEVEL OF TECHNOLOGICAL STANDARD</td>
<td>A</td>
</tr>
<tr>
<td>HEIGHT REQUIREMENTS</td>
<td>10'-0&quot; minimum</td>
</tr>
<tr>
<td>ADJACENCY REQUIREMENTS</td>
<td>None</td>
</tr>
<tr>
<td>WINDOWS</td>
<td>Desired natural daylight</td>
</tr>
<tr>
<td>DAYLIGHT CONTROL</td>
<td>Manual shades</td>
</tr>
<tr>
<td>LIGHTING</td>
<td>TBD</td>
</tr>
</tbody>
</table>

UTILITY REQUIREMENTS

<table>
<thead>
<tr>
<th>ELECTRICAL</th>
<th>Wall mounted duplex outlets and USB ports for power of devices and overhead or drop down power to be considered.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA/TELECOM</td>
<td>Technology package to include projection system and capacity wifi for internet access.</td>
</tr>
<tr>
<td>AUDIO-VISUAL</td>
<td>Ceiling mounted projectors, or individual monitors to be considered.</td>
</tr>
<tr>
<td>HVAC/CONTROLS</td>
<td>Comfort heating, cooling, and ventilation.</td>
</tr>
</tbody>
</table>

EQUIPMENT

<table>
<thead>
<tr>
<th>FIXED</th>
<th>Large monitor, white boards along perimeter, and storage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOVABLE</td>
<td>Tables, chairs, and storage units.</td>
</tr>
<tr>
<td>OTHER</td>
<td></td>
</tr>
</tbody>
</table>
BOARD ROOM
Area: 200 sf
Number of People: 25

Simple Headquarters: Professional Board Room
### 4.0 Preferred Alternative Analysis

**FLUID & THERMAL SCIENCES LAB**

<table>
<thead>
<tr>
<th>Program Component:</th>
<th>Mechanical Engineering</th>
<th>Date:</th>
<th>05.22.2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space:</td>
<td>Fluid + Thermal Sciences Lab</td>
<td>Contact:</td>
<td>Elizabeth Hyun</td>
</tr>
</tbody>
</table>

| Room Size (ft²): | 1,320 | No. of Occupants: | 24 |
| Ceiling Height:  | 12'-0" | Quantity of Rooms: | 1 |
| Critical Adjacencies: | Prep. Lab & Fabrication Lab | Special Requirements: |

**CASEWORK**

| Counter Top Material: | Epoxy Resin | Upper Cabinet (lf): | 45' |
| Cabinet Material:     | Metal w/ Wood Fronts | Open Shelving (lf): | 0' |
| Countertop (lf):      | 116' | Tall Cabinet (lf): | 0' |
| Base Cabinet (lf):    | 56' | Vented Tall Cabinet (lf): | 0' |

**ARCHITECTURAL**

| Door Type: | (1) 3' leaf & (1)3'/1' | Ceiling Material: | ACT |
| Door Size: | 4' & 3' | Ceiling Finish Material: | ACT |
| Door Material: | Wood (1/2 glass) | Wall Construction: | Metal Stud/Gyp. Board |
| Frame Material: | Hollow Metal | Wall Finish Material: | Latex Paint |
| Door Quantity: | 2 | Vibration Criteria: | 4,000 MIPS |
| Floor Material: | Epoxy flooring system | Acoustic Criteria: | dBA 45 to 55 |
| Base Material: | Coved Epoxy |

**HVAC**

| Noise Criteria (NC Level): | 40 - 45 | Special HVAC: | n.a. |
| Relative Humidity: | 30 - 50% | Humidity Control: | n.a. |
| Pressurization: | Negative | Outside Air Requirements: | 100% |
| Air Changes/Hour: | 6 min. | Hazardous Area: | No |

**FUME HOODS, BIOLOGICAL SAFETY CABINETS & OTHER VENTILATED ENCLOSURES**

| No. of Fume Hoods & Size: | 6' High Performance | No. of Snorkels: | 0 |
| No. of Biosafety Cab. & Size: | 0 | No. of Vent. Enclosures: | 0 |
| No. of Lam. Flow Cab & Size: | 0 | No. of Canopy Hoods: | 0 |

**PLUMBING**

| Domestic Cold Water (CW): | Yes | Floor Sink: | 1 |
| Domestic Hot Water (HW): | Yes | Drench Hose (DH): | Yes |
| Industrial Cold Water (ICW): | Yes | Emerg. Shower / Eyewash: | Yes |
| Industrial Hot Water (IHW): | Yes | Natural Gas (G): | No |
| Deionized Water (DI): | No | Compressed Air (A): | Yes |
| Reverse Osmosis Water (RO): | TBD | Vacuum (V): | Yes |
| Sink(s): | 3 | Gas Cylinders: | TBD |
| Floor Drain: | 3 | Nitrogen (N₂): | No |

**ELECTRICAL**

| 120V Outlet - (amp): | Yes | Card Reader: | Yes |
| 208V Outlet - (amp): | TBD | Security Alarm: | No |
| 220-240V Outlet: | No | Network connection: | Yes |
| Plugmold (lf): | 140' | Voice connection: | Yes |
| Ceiling Service Panel: | No | Intercom: | TBD |
| Special Electrical: | No | Paging System: | TBD |
| Lighting Type: | LED Direct/Indirect | Fire Detection: | Yes |
| Footcandles (@ 36° AFF): | 70 min. | Grounding: | TBD |

**EQUIPMENT**

<table>
<thead>
<tr>
<th>Item:</th>
<th>By / Install:</th>
<th>Elec.</th>
<th>Plumb.</th>
<th>HVAC:</th>
<th>Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centrifugal Pump Testing Rig</td>
<td>OFOI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Centrifugal Pump Testing Rig</td>
<td>OFOI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Venturi Pump Testing Rig</td>
<td>OFOI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Pelton Wheel</td>
<td>OFOI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

Revised 05-29-18
FLUID & THERMAL SCIENCES LAB

Area: 1,320 sf
Number of People: 24
### 4.0 Preferred Alternative Analysis

#### SOLID MECHANICS & MATERIALS LAB

<table>
<thead>
<tr>
<th>Program Component:</th>
<th>Mechanical Engineering</th>
<th>Date:</th>
<th>Contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space:</td>
<td>Solid Mechanics &amp; Materials Lab</td>
<td></td>
<td>Elizabeth Hyun</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Room Size (ft^2):</th>
<th>1,320</th>
<th>No. of Occupants:</th>
<th>Up to 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling Height:</td>
<td>12'-0&quot;</td>
<td>Quantity of Rooms:</td>
<td>1</td>
</tr>
<tr>
<td>Critical Adjacencies:</td>
<td>Prep. Lab &amp; Fabrication Lab</td>
<td>Special Requirements:</td>
<td></td>
</tr>
</tbody>
</table>

**CASEWORK**

<table>
<thead>
<tr>
<th>Counter Top Material:</th>
<th>Epoxy Resin &amp; Wood</th>
<th>Upper Cabinet (lf):</th>
<th>38'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabinet Material:</td>
<td>Metal w/ Wood Fronts</td>
<td>Open Shelving (lf):</td>
<td>0'</td>
</tr>
<tr>
<td>Countertop (lf):</td>
<td>112'</td>
<td>Tall Cabinet (lf):</td>
<td>0'</td>
</tr>
<tr>
<td>Base Cabinet (lf):</td>
<td>48'</td>
<td>Vented Tall Cabinet (lf):</td>
<td>0'</td>
</tr>
</tbody>
</table>

**ARCHITECTURAL**

| Door Type: (1) 3' leaf & (1)2'/1' | Ceiling Material: | ACT |
| Door Size: 4' & 3' | Ceiling Finish Material: | ACT |
| Door Material: Wood (1/2 glass) | Wall Construction: | Metal Stud/Gyp. Board |
| Frame Material: Hollow Metal | Wall Finish Material: | Latex Paint |
| Door Quantity: 2 | Vibration Criteria: | 4,000 MIPS |
| Floor Material: Rubber or VCT | Acoustic Criteria: | dBA 45 to 55 |
| Base Material: Rubber | |

**HVAC**

| Noise Criteria (NC Level): | 40 - 45 | Special HVAC: | n.a. |
| Relative Humidity: | 30 - 50% | Humidity Control: | TBD |
| Pressurization: | Negative | Outside Air Requirements: | 100% |
| Air Changes/Hour: | 6 min. | Hazardous Area: | No |

**FUME HOODS, BIOLOGICAL SAFETY CABINETS & OTHER VENTILATED ENCLOSURES**

| No. of Fume Hoods & Size: | 6' High Performance | No. of Snorkels: | 0 |
| No. of Biosafety Cab. & Size: | 0 | No. of Vent. Enclosures: | 0 |
| No. of Lam. Flow Cab & Size: | 0 | No. of Canopy Hoods: | 0 |

**PLUMBING**

| Domestic Cold Water (CW): | Yes | Floor Sink: | No |
| Domestic Hot Water (HW): | Yes | Drench Hose (DH): | No |
| Industrial Cold Water (ICW): | Yes | Emerg. Shower / Eyewash: | Yes |
| Industrial Hot Water (IHW): | Yes | Natural Gas (G): | No |
| Deionized Water (DI): | No | Compressed Air (A): | Yes |
| Reverse Osmosis Water (RO): | tbd | Vacuum (V): | Yes |
| Sink(s): | 2 | Gas Cylinders: | No |
| Floor Drain: | Yes | Nitrogen (N2): | No |

**ELECTRICAL**

| 120V Outlet - (amp): | Yes | Card Reader: | Yes |
| 208V Outlet - (amp): | 20A | Security Alarm: | No |
| 220-240V Outlet: | No | Network connection: | Yes |
| Plugmold (lf): | TBD | Voice connection: | Yes |
| Ceiling Service Panel: | No | Intercom: | tbd |
| Special Electrical: | No | Paging System: | tbd |
| Lighting Type: | LED Direct/Indirect | Fire Detection: | Yes |
| Footcandles (@ 36" AFF): | 70 min. | Grounding: | Yes |

**EQUIPMENT**

<table>
<thead>
<tr>
<th>Item:</th>
<th>By / Install:</th>
<th>Elec.</th>
<th>Plumb.</th>
<th>HVAC:</th>
<th>Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermoforming Machines</td>
<td>OFOI</td>
<td>Yes</td>
<td>Yes</td>
<td>HVAC:</td>
<td>Comments:</td>
</tr>
</tbody>
</table>
SOLID MECHANICS & MATERIALS LAB

Area: 1,320 sf

Number of People: Up to 25
### MANUFACTURING LAB

<table>
<thead>
<tr>
<th>Program Component:</th>
<th>Mechanical Engineering</th>
<th>Date:</th>
<th>05.22.2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space:</td>
<td>Manufacturing Lab</td>
<td>Contact:</td>
<td>Elizabeth Hyun</td>
</tr>
</tbody>
</table>

| Room Size (ft²): | 1,320 |
| Ceiling Height: | 12'-0" |
| Quantity of Rooms: | 1 |
| Critical Adjacencies: | Prep. Lab & Fabrication Lab |

#### CASEWORK

| Counter Top Material: | Epoxy Resin & Wood |
| Cabinet Material: | Metal w/ Wood Fronts |
| Countertop (lf): | 198' |
| Base Cabinet (lf): | 138' |

#### ARCHITECTURAL

| Door Type: | (1) 3' leaf & (1)5'/1' |
| Door Material: | Wood (1/2 glass) |
| Door Frame Material: | Metal Stud/Gyp. Board |
| No. of Doors: | 2 |

#### HVAC

| Noise Criteria (NC Level): | 40 - 45 |
| Temperature: | 68° - 72° |
| Relative Humidity: | 30 - 50% |
| Pressurization: | Negative |
| Air Changes/Hour: | 6 min. |

#### PLUMBING

| Domestic Cold Water (CW): | Yes |
| Domestic Hot Water (HW): | Yes |
| Industrial Cold Water (ICW): | Yes |
| Industrial Hot Water (IHW): | Yes |
| Deionized Water (DI): | No |
| Reverse Osmosis Water (RO): | tbd |
| Sink(s): | 2 |
| Floor Drain: | Yes |

#### ELECTRICAL

| 120V Outlet - (amp): | Yes |
| 208V Outlet - (amp): | 20A |
| 220-240V Outlet: | No |
| Plugmold (lf): | TBD |
| Ceiling Service Panel: | No |
| Special Electrical: | No |
| Lighting Type: | LED Direct/Indirect |
| Footcandles (@ 36° AFF): | 70 min. |

#### EQUIPMENT

<table>
<thead>
<tr>
<th>Item:</th>
<th>Thermoforming Machines</th>
</tr>
</thead>
<tbody>
<tr>
<td>By / Install:</td>
<td>OFOI</td>
</tr>
<tr>
<td>Elec:</td>
<td>Yes</td>
</tr>
<tr>
<td>Plumb:</td>
<td>Yes</td>
</tr>
<tr>
<td>HVAC: Comments:</td>
<td></td>
</tr>
<tr>
<td>Grounding:</td>
<td>Yes</td>
</tr>
</tbody>
</table>

---

**Note:** The data provided includes specifications for each component, ensuring a detailed understanding of the requirements and installations for the MANUFACTURING LAB space.
MANUFACTURING LAB

Area: 1,320 sf

Number of People: Up to 25
## COMPUTER AIDED DESIGN LAB

<table>
<thead>
<tr>
<th>Program Component:</th>
<th>Mechanical Engineering</th>
<th>Date:</th>
<th>05.22.2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space:</td>
<td>Computer Aided Design Lab</td>
<td>Contact:</td>
<td>Elizabeth Hyun</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Room Size (ft²):</th>
<th>1,650</th>
<th>No. of Occupants:</th>
<th>Up to 42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling Height:</td>
<td>12'-0&quot;</td>
<td>Quantity of Rooms:</td>
<td>1</td>
</tr>
</tbody>
</table>

### CASEWORK

- **Counter Top Material:** P-Lam or Wood
- **Cabinet Material:** n.a.
- **Countertop (lf):** 205'
- **Base Cabinet (lf):** 0'

### ARCHITECTURAL

- **Door Type:** (1) 3' leaf & (1)3'/1'
- **Door Finish Material:** ACT
- **Door Material:** Wood (1/2 glass)
- **Wall Construction:** Hollow Metal
- **Wall Finish Material:** Metal Stud/Gyp. Board
- **Door Quantity:** 2
- **Floor Material:** Rubber or VCT
- **Base Material:** Rubber

### HVAC

- **Noise Criteria (NC Level):** 40 - 45
- **Special HVAC:** n.a.
- **Temperature:** 68° - 72°
- **Filtration Criteria:** n.a.
- **Relative Humidity:** 30 - 50%
- **Humidity Control:** n.a.
- **Pressurization:** Positive
- **Outside Air Requirements:** Per code
- **Air Changes/Hour:** 4 min.
- **Hazardous Area:** No

### Fume Hoods, Biological Safety Cabinets & Other Ventilated Enclosures

- **No. of Fume Hoods & Size:** 0
- **No. of Biosafety Cab. & Size:** 0
- **No. of Lam. Flow Cab & Size:** 0

### PLUMBING

- **Domestic Cold Water (CW):** No
- **Floor Sink:** No
- **Domestic Hot Water (HW):** No
- **Drench Hose (DH):** No
- **Industrial Cold Water (ICW):** No
- **Emerg. Shower / Eyewash:** No
- **Industrial Hot Water (IHW):** No
- **Natural Gas (G):** No
- **Deionized Water (DI):** No
- **Compressed Air (A):** No
- **Reverse Osmosis Water (RO):** No
- **Vacuum (V):** No
- **Sink(s):** No
- **Gas Cylinders:** No
- **Floor Drain:** No
- **Nitrogen (N₂):** No

### ELECTRICAL

- **120V Outlet - (amp):** Yes
- **Card Reader:** Yes
- **208V Outlet - (amp):** No
- **Security Alarm:** No
- **220-240V Outlet:** No
- **Network connection:** Yes
- **Plugmold (lf):** TBD
- **Voice connection:** Yes
- **Ceiling Service Panel:** No
- **Intercom:** tbd
- **Special Electrical:** No
- **Paging System:** tbd
- **Lighting Type:** LED Direct/Indirect
- **Fire Detection:** Yes
- **Footcandles (@ 36° AFF):** 50 min.
- **Grounding:** Yes

### EQUIPMENT

<table>
<thead>
<tr>
<th>Item:</th>
<th>By / Install:</th>
<th>Elec.</th>
<th>Plumb.</th>
<th>HVAC:</th>
<th>Comments:</th>
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<td>Computer Work Stations</td>
<td>OFOI</td>
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<td>n.a.</td>
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4.0 Preferred Alternative Analysis

COMPUTER AIDED DESIGN LAB
Area: 1,650 sf
Number of People: Up to 42
### ENGINEERING DESIGN LAB

<table>
<thead>
<tr>
<th>Program Component:</th>
<th>Mechanical Engineering</th>
<th>Date:</th>
<th>05.22.2018</th>
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</thead>
<tbody>
<tr>
<td>Space:</td>
<td>Engineering Design Lab</td>
<td>Contact:</td>
<td>Elizabeth Hyun</td>
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<table>
<thead>
<tr>
<th>Room Size (ft²):</th>
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<th>No. of Occupants:</th>
<th>Up to 35</th>
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<tbody>
<tr>
<td>Ceiling Height:</td>
<td>12'-0&quot;</td>
<td>Quantity of Rooms:</td>
<td>2</td>
</tr>
<tr>
<td>Critical Adjacencies:</td>
<td>Prep. Lab &amp; Fabrication Lab</td>
<td>Special Requirements:</td>
<td>(7) Roll-up Doors 8'W x 10'H</td>
</tr>
</tbody>
</table>

#### CASEWORK
- Counter Top Material: Epoxy Resin & Wood
- Cabinet Material: Metal w/ Wood Fronts
- Countertop (lf): 153’
- Base Cabinet (lf): 45’

#### ARCHITECTURAL
- Door Type: (1) 3’; (1)3’/1’ & (7) Roll-up 8’W
- Wall Construction: Metal Stud/Gypsum Board
- Wall Finish Material: Latex Paint
- Floor Material: Rubber or VCT

#### HVAC
- Noise Criteria (NC Level): 40 - 45
- Temperature: 68° - 72°
- Relative Humidity: 30 - 50%
- Pressurization: Negative
- Air Changes/Hour: 6 min
- Filtration Criteria: n.a.
- Humidity Control: TBD
- Outside Air Requirements: 100%

#### FUME HOODS, BIOLOGICAL SAFETY CABINETS & OTHER VENTILATED ENCLOSURES
- No. of Fume Hoods & Size: tbd
- No. of Biosafety Cab. & Size: 0
- No. of Lam. Flow Cab & Size: 0
- No. of Snorkels: 0
- No. of Vent. Enclosures: 0
- No. of Canopy Hoods: 0

#### PLUMBING
- Domestic Cold Water (CW): Yes
- Domestic Hot Water (HW): Yes
- Industrial Cold Water (ICW): Yes
- Industrial Hot Water (IHW): Yes
- Deionized Water (DI): No
- Reverse Osmosis Water (RO): tbd
- Gas cylinders: 1
- Sink(s): 1
- Floor Drain: Yes

#### ELECTRICAL
- 120V Outlet -(amp): Yes
- 208V Outlet -(amp): 20A
- Plugmold (lf): TBD
- Ceiling Service Panel: No
- Special Electrical: No
- Lighting Type: LED Direct/Indirect
- Footcandles (at 36” of the workplane): 70 min.

#### EQUIPMENT
- Item: By / Install: Elec. Plumb. HVAC Comments:

---

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ENGINEERING DESIGN LAB

Area: 1,650 sf
Number of People: Up to 35
### FABRICATION SHOP

<table>
<thead>
<tr>
<th>Program Component:</th>
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<tr>
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<table>
<thead>
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<tbody>
<tr>
<td>Counter Top Material:</td>
<td>Wood</td>
</tr>
<tr>
<td>Cabinet Material:</td>
<td>Metal w/ Wood Fronts</td>
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<tr>
<td>Countertop (lf):</td>
<td>18'</td>
</tr>
<tr>
<td>Base Cabinet (lf):</td>
<td>18' Vented Tall Cabinet (lf):</td>
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<tr>
<td>Door Type:</td>
<td>(1) 3' leaf &amp; (1)3'/1'</td>
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<td>Door Size:</td>
<td>4' &amp; 3' Ceiling Finish Material:</td>
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<tr>
<td>Door Material:</td>
<td>Wood (1/2 glass)</td>
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<tr>
<td>Frame Material:</td>
<td>Hollow Metal</td>
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<td>Door Quantity:</td>
<td>2</td>
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<td>Floor Material:</td>
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<td>Base Material:</td>
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<td>Noise Criteria (NC Level):</td>
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<td>Temperature:</td>
<td>68° - 72°</td>
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<td>Relative Humidity:</td>
<td>30 - 50%</td>
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<tr>
<td>Pressurization:</td>
<td>Negative</td>
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<td>Air Changes/Hour:</td>
<td>4 min.</td>
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<table>
<thead>
<tr>
<th>FUME HOODS, BIOLOGICAL SAFETY CABINETS &amp; OTHER VENTILATED ENCLOSURES</th>
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<tbody>
<tr>
<td>No. of Fume Hoods &amp; Size:</td>
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<tr>
<td>No. of Biosafety Cab. &amp; Size:</td>
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<tr>
<td>No. of Lam. Flow Cab &amp; Size:</td>
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<table>
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<tr>
<th>PLUMBING</th>
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<tbody>
<tr>
<td>Domestic Cold Water (CW):</td>
<td>Yes</td>
</tr>
<tr>
<td>Domestic Hot Water (HW):</td>
<td>Yes</td>
</tr>
<tr>
<td>Industrial Cold Water (ICW):</td>
<td>Yes</td>
</tr>
<tr>
<td>Industrial Hot Water (IHW):</td>
<td>Yes</td>
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<tr>
<td>Deionized Water (DI):</td>
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<td>Reverse Osmosis Water (RO):</td>
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<td>Sink(s):</td>
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<td>Floor Drain:</td>
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<tr>
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<tbody>
<tr>
<td>120V Outlet -(amp):</td>
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<td>208V Outlet -(amp):</td>
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<tr>
<td>220-240V Outlet:</td>
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<td>Plugmold (lf):</td>
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<td>Ceiling Service Panel:</td>
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<tr>
<td>Special Electrical:</td>
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<tr>
<td>Lighting Type:</td>
<td>LED Direct/Indirect</td>
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<tr>
<td>Footcandles (@ 36&quot; AFF):</td>
<td>70 min.</td>
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### EQUIPMENT

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<tr>
<th>Item:</th>
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<th>Plumb.</th>
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<th>Comments:</th>
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<tr>
<td>Lathe</td>
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<td>Axis Knee Mill</td>
<td>OFOI</td>
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<td></td>
<td>1,800 lbs.</td>
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<td>Table Saw (10&quot;)</td>
<td>OFOI</td>
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<td>2,820 lbs.</td>
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<td>Drill Press (15&quot;)</td>
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<td>Band Saw (17&quot; Metal/Wood)</td>
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<tr>
<td>Auto Router</td>
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<td>Dust Control System</td>
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4.0 Preferred Alternative Analysis

FABRICATION SHOP

Area: 990 sf

Number of People: Up to 15
## MECHANICAL ENGINEERING PREP LAB

<table>
<thead>
<tr>
<th>Program Component:</th>
<th>Mechanical Engineering</th>
<th>Date:</th>
<th>05.22.2018</th>
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<tbody>
<tr>
<td>Space:</td>
<td>Prep Lab</td>
<td>Contact:</td>
<td>Elizabeth Hyun</td>
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### Room Size (ft²):
- 198

### Ceiling Height:
- 10'-0"

### Critical Adjacencies:
- Fluid, Solid & Manufacturing Lab

### CASEWORK
- Counter Top Material: Epoxy Resin
- Cabinet Material: Metal w/ Wood Fronts
- Countertop (If): 31'
- Base Cabinet (If): 31'

### ARCHITECTURAL
- Door Type: [1]3'/1'
- Door Size: 4'
- Door Material: Wood (1/2 glass)
- Door Quantity: 4,000 MIPS
- Floor Material: Rubber or VCT
- Base Material: Rubber

### HVAC
- Noise Criteria (NC Level): 40 - 45
- Temperature: 68° - 72°
- Relative Humidity: 30 - 50%
- Pressurization: 100%
- Air Changes/Hour: 6 min.
- HVAC: n.a.
- Special HVAC: n.a.

### FUME HOODS, BIOLOGICAL SAFETY CABINETS & OTHER VENTILATED ENCLOSURES
- No. of Fume Hoods & Size: 0
- No. of Biosafety Cab. & Size: 0
- No. of Lam. Flow Cab & Size: 0

### PLUMBING
- Domestic Cold Water (CW):
- Domestic Hot Water (HW):
- Industrial Cold Water (ICW):
- Industrial Hot Water (IHW):
- Deionized Water (DI):
- Reverse Osmosis Water (RO):
- Sink(s):
- Floor Drain:

### ELECTRICAL
- 120V Outlet - (amp):
- 208V Outlet - (amp):
- 220-240V Outlet:
- Plugmold (If):
- Ceiling Service Panel:
- Special Electrical: LED Direct/Indirect
- Lighting Type:
- Footcandles (@ 36” AFF):

### EQUIPMENT

<table>
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<th>Item:</th>
<th>By / Install:</th>
<th>Elec.</th>
<th>Plumb.</th>
<th>HVAC:</th>
<th>Comments:</th>
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</thead>
</table>

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UW Tacoma Academic Innovation Building | Hacker Architects
ME PREP LAB

Area: 198 sf

Number of People: Up to 4
## MECHANICAL ENGINEERING STORAGE

<table>
<thead>
<tr>
<th>Program Component:</th>
<th>Mechanical Engineering</th>
<th>Date:</th>
<th>05.22.2018</th>
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<tbody>
<tr>
<td>Space:</td>
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<table>
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<th>No. of Occupants:</th>
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<tbody>
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<td>Quantity of Rooms:</td>
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<tr>
<td>Critical Adjacencies:</td>
<td>Fluid, Solid &amp; Manufacturing Lab</td>
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</table>

### CASEWORK

- Counter Top Material: Epoxy Resin
- Cabinet Material: Metal w/ Wood Fronts
- Countertop (lf): 12'
- Base Cabinet (lf): 12'
- Vented Tall Cabinet (lf): 0'
- Door Size: 4'
- Door Material: Wood
- Wall Construction: Metal Stud/Gyp. Board
- Frame Material: Hollow Metal
- Ceiling Material: ACT
- Ceiling Finish Material: ACT
- Door Type: (1) 3'/1'
- Door Quantity: 1
- Floor Material: Rubber or VCT
- Base Material: Rubber

### ARCHITECTURAL

- Door Material: Wood
- Wall Construction: Metal Stud/Gyp. Board
- Door Quantity: 1
- Vibration Criteria: n.a.
- Door Size: 4'
- Wall Finish Material: Latex Paint
- Door Type: (1) 3'/1'
- Door Quantity: 1

### HVAC

- Noise Criteria (NC Level): 40 - 45
- Special HVAC: n.a.
- Temperature: 68° - 72°
- Filtration Criteria: n.a.
- Relative Humidity: 30 - 50%
- Humidity Control: n.a.
- Pressurization: Neutral
- Outside Air Requirements: 100%
- Air Changes/Hour: 2 min.

### FLUME HOODS, BIOLOGICAL SAFETY CABINETS & OTHER VENTILATED ENCLOSURES

- No. of Fume Hoods & Size: 0
- No. of Biosafety Cab. & Size: 0
- No. of Lam. Flow Cab & Size: 0

### PLUMBING

- Domestic Cold Water (CW): No
- Drench Hose (DH): No
- Industrial Cold Water (ICW): No
- Emerg. Shower / Eyewash: No
- Industrial Hot Water (IHW): No
- Natural Gas (G): No
- Deionized Water (DI): No
- Compressed Air (A): No
- Reverse Osmosis Water (RO): No
- Vacuum (V): No
- Gas Cylinders: No
- Floor Drain: 0
- Nitrogen (N₂): No

### ELECTRICAL

- 120V Outlet - (amp): Yes
- Security Alarm: tbd
- 208V Outlet - (amp): No
- Network connection: Yes
- 220-240V Outlet: No
- Voice connection: tbd
- Plugmold (lf): No
- Intercom: tbd
- Ceiling Service Panel: No
- Paging System: tbd
- Special Electrical: No
- LED Direct/Indirect Lighting: Yes
- Footcandles (@ 36° AFF): 50 min.
- Grounding: No

### EQUIPMENT

<table>
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<tr>
<th>Item:</th>
<th>By / Install:</th>
<th>Elec.</th>
<th>Plumb.</th>
<th>HVAC:</th>
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</tbody>
</table>
**ME STORAGE**

Area: 132 sf

Number of People: N/A
4.0 Preferred Alternative Analysis

4.4.0 Building Systems

Civil, Mechanical, Electrical, and Plumbing consultants participated in this predesign from the beginning of the process. Building systems were considered throughout the predesign process, and shaped the team’s approach to siting, massing, lab requirements, and opportunities for sustainability. The following pages describe systems that meet project goals and fit within the budget described in Section 5.

4.4.1 Structural Systems

**Superstructure: Floor and Roof Framing**

The timber frame system being considered utilizes cross-laminated timber (CLT) roof and floor decks supported by wood or steel beams and columns. The CLT floor deck would have concrete topping for durability and vibration control. The structure will need to allow for future expansion to a southern wing along the Hillclimb.

A 11-foot building grid has been laid out with the CLT system as the preferred option, but it also allows for a switch to other options. If UW Tacoma chooses to include below grade structured parking from another funding source, transfer beams may be needed to allow revised column spacing based on stall layout.

**Foundation**

The building gravity foundation system will consist of conventional spread footings founded on undisturbed soil. Concrete basement retaining walls will also double as shear walls resisting lateral wind and seismic loads. The laboratory and testing facilities should be located on the basement slab-on-grade due to large equipment loads and vibration considerations.

To minimize shoring and excavation costs, it is anticipated that the lower floor will step up the hill, creating two basement levels. Sheet piling or tie backs may be required along Market Street where the soil cannot be laid back. Permanent cantilevered concrete retaining walls may be utilized to avoid inducing lateral soil load into building diaphragms.

**Lateral Force Resisting System**

The lateral wind and seismic force resisting system will consist of special reinforced concrete shear walls and/or steel special concentric braced frames (SCBF) in each direction. The lateral force resisting elements, which are dependent upon the layout and functions of the spaces, should be uniformly spaced for economy and performance.
4.4.2 Mechanical Systems

**Project Phasing**

Phase 1 of the preferred alternative will be the Market Street wing. The mechanical and plumbing systems should allow for future expansion to a southern wing (phase 2) along the Hillclimb. The two wings could then act as one facility with centralized services, as much as possible. System pathways (chilled water, hot water, etc.) should be sized for the ability to serve both phases. Space should be provided in the equipment rooms and rooftop to allow for future equipment to be installed to serve both phases.

**Sustainability Goals**

The building will be designed to meet the requirements for a USGBC LEED Silver certification. A LEED Gold certification will be evaluated as the design progresses to see if it can be achieved within the project budget.

The project has a goal of integrating the performance of the building envelope and systems to optimize both. Options could include insulation beyond code, reduced infiltration, triple pane glass, and any other strategies that help reduce peak mechanical loads and annual energy usage. Passive systems should also be explored to see if thermal mass, thermal storage, natural ventilation cooling, night flush ventilation, and any other passive strategies can help reduce annual energy usage.

**HVAC Systems Options**

When looking at mechanical system options there can be a myriad of variations as shown in the diagram below. The key to narrowing options is to establish clear measurable goals.

In the predesign phase it is important to identify a selection of systems that can meet project goals and provide a reasonable cost estimate so that the project can be adequately funded. The following selection reflects this goal.
4.0 Preferred Alternative Analysis

*Heating, Ventilation, and Air Conditioning (HVAC)*

It is anticipated that all normally occupied interior spaces will be heated to between 68 and 72°F, cooled between 74 and 76°F, and provided with ventilation that controls odors and prevents CO2 buildup. No active humidity control is included.

*Campus System Connection*

The system would have the potential to act as a heat-sharing hub for the rest of the campus as the water source heat pumps could generate and share heat with other buildings. Heat sharing is one solution that could meet the Master Plan energy goals for this building and future campus buildings.

*Air Handling Unit – Dedicated Outside Air System (DOAS)*

Ventilation would be provided by a dedicated outside air system (DOAS). A DOAS system offers a number of benefits in that it will help meet and exceed the Washington State Energy Code (WSEC) requirements while also helping to ensure excellent air quality in the building. Based on the goals of the project and the energy code, it is highly likely the project will utilize a DOAS system.

Each Air Handling Unit (AHU) will be provided with the following components along with the standard access sections:

- Outside air damper
- MERV 8 pre-filter
- MERV 13 final filter (DYNAMIC V8 or equivalent electrostatic filter)
- Heat recovery coil
- Heating coil
- Cooling coil
- Fan array (assume 6 fans with one redundant)

The AHUs will modulate airflow as required to maintain the duct static pressure setpoint and will provide outside air make-up to the laboratories and non-lab spaces.

Custom heat recovery air handling units (HRU) will be located inside the mechanical room on the roof. Each will have the following components along with the standard access sections:

- MERV 13 filter
- Heat recovery coil
- Outside air damper for each lab exhaust fan connection

*Ductwork*

Ductwork, where used for environmental systems, will be galvanized steel. Medium pressure duct mains for variable air volume (VAV) HVAC systems with terminal control devices will be double walled galvanized steel (solid outer duct, perforated liner, with fiberglass insulation in between). Other ductwork inside the building requiring insulation will be wrapped. Fiberglass duct liner will be used in limited quantities for sound attenuation and combination sound attenuation/thermal performance where appropriate. Flexible ductwork will be limited to short runs (six feet or less) for final connections at diffusers and grilles. Diffusers and grilles, where used, will be selected with consideration for required space NC levels as directed by the acoustical consultant.
The current concept for lab exhaust duct material will be as follows (this should be confirmed based on further development in planned lab uses):

- Galvanized
  - Horizontal main exhaust ducts
  - Duct branches to general room exhaust (GEX)
  - Duct branches to snorkels and equipment hoods
- 316 Stainless
  - Main vertical riser ducts located in shafts
  - Duct branches to lab hoods
  - Duct branches to direct equipment connections

**HVAC Distribution by Room Types**

**Classrooms and Meeting Rooms:** Each classroom will be provided with a VAV terminal, which will be controlled to maintain a CO2 level setpoint 700 PPM above the outdoor condition. The VAV terminal boxes will include hydronic reheat coils to help maintain the space temperature setpoint. Supplemental heating and cooling will be provided by chilled sails with local zone control valve and thermostat.

**Offices:** Each group of offices will be provided with a constant volume (CV) air terminal, which will be controlled to maintain a specified airflow at all times. The CV terminal boxes will include hydronic reheat coils to help maintain the space temperature setpoint. Supplemental heating and cooling will be provided by chilled sails with local zone control valve and thermostat.

**Classroom/Research Laboratories and Lab Support Rooms:** Each room will be provided with the following components:

- Lab supply air valve with zone heating coil and silencer
- Lab general exhaust (GEX) valve
- Fume hood VAV control valve
- Constant volume control valves for snorkels, equipment hoods and equipment exhaust connections

Each lab space will control the various combinations of components listed above to achieve a negative space pressure relative to the adjacent corridor and maintain specified room temperature setpoints.

Proposed for this building is an air monitoring system that would measure CO2, temperature, and chemical contaminants in the labs and classrooms. Using this information, the BMS will be able to reduce the air change rates in these spaces in order to conserve energy while maintaining high indoor air quality. Assume Aircuity or equal.

**Non-Lab Spaces:** Toilet rooms, janitors’ closets, and other non-lab areas requiring 100% exhaust will be provided with constant volume exhaust air dampers. The system will be sized to provide ten air changes per hour in the toilet rooms and janitors’ closets, and will be balanced to maintain a slight negative pressure in these spaces relative to the rest of the building for odor control.
4.0 Preferred Alternative Analysis

Central Plant – Heat Pumps with Hydronic Distribution

There are a number of central plant options for the project and the main drivers on design direction are the first costs, the project’s performance goals, the WSEC, long-term planning for a campus condenser water loop, refrigerant management, and greenhouse gas reductions. It is recommended for the project to consider using centralized heat pump technologies to provide heating and cooling for the building with hydronic distribution. Heat pumps with hydronic distribution offer many advantages including eliminating the need for burning fossil fuels on-site and the need for large quantities of refrigerants with high global warming potentials.

Airsource Heatpump

Modular Air Source Heat Pumps (ASHP) offer an excellent solution to reduce energy use and greenhouse gas emissions. They distribute heating and cooling with hydronic piping that can be used with many different equipment in zones to meet loads. Variable refrigerant flow (VRF) systems can also be explored. These options should be compared from a total cost of ownership analysis looking at long-term greenhouse gas emissions, maintenance costs, energy costs, refrigerant costs, and replacement requirements.

Heat Generation

The primary hot water heating source for the building will be a modular air source heat pump (assume Airstack by Multistack model VME060, or equal). One module will be redundant. The heat pumps will first transfer energy from the chilled water loop to the heating water loop whenever possible. Only when there is an imbalance will the units use the air as a heat source or sink. Heating water will be distributed throughout the building using four end-suction pumps and controlled by VFDs. The heating water loop will be set up as a primary water flow arrangement with the pumps controlled to maintain minimum flow through the modular heat pump sections and a bypass valve controlled to maintain a specific pressure setpoint in the heating hot water loop.

The system will be designed for low temperature heating with a supply temperature of 110°F and a return of 90°F. Distribution piping for heating and chilled water will be either schedule 40 black steel, Type L copper or PEXa (bid option to achieve best pricing). Hydronic pipe insulation will be fiberglass with vapor barrier jacket. PVC jacketing will be provided where pipe insulation is subject to damage.

Refrigeration

Chilled water will be provided by the modular air source heat pump and will be circulated to the cooling coils (42°F supply / 54°F return) in building air handling equipment and other terminal devices via end-suction chilled water pumps.

Separate distribution loops will also be provided, and controlled to deliver higher supply water temperature, to serve the radiant cooling systems (i.e. chilled sails) throughout the building. Each loop will have an in-line zone pump (ZP) with four open/closed valves and a three-way mixing valve.

Groundloop Heat Exchanger Alternative

Another heatpump option would be a groundloop heat exchanger. A modular heat recovery chiller could provide the chilled water and heating water serving zone level hydronic equipment. If the project has large amounts of excavation, a slinky groundloop system could be implemented along the perimeter of the below grade walls and floors.

The first costs are higher for vertical bore ground loop systems due to the cost of drilling vertical bores. They offer the advantage of higher efficiencies, lower space requirements, and less acoustical noise (as compared to the ASHP option). They could be placed in the landscape outside of the building footprint.
4.0 Preferred Alternative Analysis

**Hydronic Zone Delivery**

The decisions on hydronic zone delivery should be made during the future design process. There are many options for how to meet loads in spaces with hydronic heating and cooling including radiant floors, active chilled beams, fan coil units, passive chilled beams, radiant panels, radiators, and more. This choice will need to be made based on the project budget and design strategies that are implemented.

**Mechanical Penthouse**

The building should include pricing for a rooftop penthouse to protect equipment from weathering and allow for easier maintenance access. The penthouse would be similar to other buildings on campus with weather enclosures for rooftop mechanical equipment.

**HVAC Instrumentation and Controls**

A direct digital control (DDC) system is planned for the mechanical systems in this building. The system will be based on the architecture and capabilities associated with the allowed control systems on the UW Tacoma Campus.

The system will utilize electric actuators throughout, thus eliminating the need for a control air compressor and distribution system. Standard control algorithms will be used to a large extent, but will be supplemented with custom programming. Advanced control strategies are anticipated, including unoccupied during occupied hours set-back, CO2 monitoring and ventilation air reset, supply water temperature reset, variable flow reset, etc. The system will connect to occupancy sensors, where provided for lighting control, for use in determining occupancy-based system resets.

The system will have the ability to communicate with a building-demand charge-metering system adjusting electrical demands to avoid peak demand charges from Tacoma Power.

**Testing, Adjusting, and Balancing**

Full dry-side and wet-side testing, adjusting, and balancing will be provided for this project in accordance with National Environmental Balancing Bureau (NEBB) standards and procedures.

**Commissioning**

Building mechanical systems will be fundamentally commissioned by a commissioning agent contracted directly with UW CPD.

**Other Special HVAC Systems and Equipment**

Seismic bracing and anchorage will be required for the mechanical systems (equipment, piping, ductwork) in compliance with current code (non-critical facility designation).
4.0 Preferred Alternative Analysis

4.4.3 Plumbing Systems

*Plumbing Fixtures*

In the design phase, commercial grade fixtures will be provided where indicated on the architectural drawings. Refer to the list below for representative flow rates for each type of fixture.

Low flow, water-conserving devices, faucets, flush valves, and fixtures shall be implemented to meet the project’s LEED and sustainability goals for water use reduction.

- Water closets shall be wall mounted vitreous china with sensor operated low-flow flush valves (1.28 gpf).
- Urinals shall be wall mounted vitreous china, sensor operated pint flush valves (0.125 gpf).
- Wall mounted lavatories and counter mounted lavatories shall be vitreous china with 0.5 gpm sensor operated faucets. Lavatory traps and supplies shall be insulated per accessibility requirements.
- Non-lab sinks shall be stainless steel, with single lever faucets of cast brass construction. Janitor’s sinks will be floor-mounted terrazzo with wall faucet and lever handles. Handicapped accessibility will be provided throughout in accordance with the requirements of the Americans with Disabilities Act.
- Showers shall be low flow (1.25 gpm).
- Laboratory fume hoods and other air containment units shall be pre-piped with utility connections at the top and rear of hood.
- Emergency showers and eyewash stations will be serviced from a centralized tempered water system that delivers potable tepid water between 60°F and 95°F to the safety stations.

*Domestic Water Distribution*

Plumbing systems selections are based on reliable and efficient operation and with emphasis on sustainability. Domestic water piping shall be Type L copper with full port ball valves for control and isolation. Storm, vent, and sanitary waste piping shall be cast iron no-hub providing quiet and long service life.

Reverse Pressure Backflow Assemblies shall be provided for the system. A new cold water supply shall be sized for the anticipated peak demand of both phases of the new facility. The main entry point for water service will be in a mechanical room. A distribution header will be established with zone isolation valves and a main building valve.

The base system for primary hot water generation shall be a heat pump water heater producing 140°F hot water and will be delivered to end uses at 120°F through a central thermostatic master mixing valve. A self-regulating hot water temperature maintenance heat tape system shall ensure that hot water is delivered within twenty seconds of point of use demand. Local thermostatic mixing valves will protect users from scalding at hand washing stations.

Point-of-use hot water generation should also be explored to see if there can be energy savings for fixtures with low usage.

*Sanitary Waste*

A gravity sanitary drainage system will be provided to serve all plumbing fixtures and equipment.

Materials:

- Drain, waste, vent piping (above grade): cast iron
- Waste piping (below grade): PVC, ABS, or cast iron
Rain Water Drainage

Gravity primary and overflow storm drainage shall be primarily via interior rain leaders, routed down through the building, connecting to site collection piping just outside the building footprint on the perimeter of the building. Overflow drains will terminate at grade level on splash blocks. Basement areas shall be protected with dewatering systems at the foundation perimeter. Dewatering systems shall be piped to duplex gray water pumps located in the basement areas which shall be discharged to the site storm drainage system.

Materials:
- Storm drain piping (above grade): cast iron
- Storm drain piping (below grade): PVC, ABS, cast iron

Other Plumbing Systems

Compressed Air System: A central compressed air system with duplex compressors for redundancy, air drier and receiver storing 100 PSIG air shall be provided to deliver compressed air to the laboratories. Lab air shall be delivered at 15-30 PSIG and be piped through dual filters to provide the required purity, with regulators at each lab to reduce pressure as needed. Areas requiring non-lab quality compressed air at 100 PSIG shall be piped direct from the receiver to the associated labs. Other pressure requirements will be satisfied by local pressure regulator fixtures at the service fitting. The compressed air system should be flexible with redundant compressors in duplex or triplex arrangement.

Lab Vacuum System: A central vacuum system shall be provided to deliver vacuum air to the labs from a central vacuum pump (for redundancy) and receiver controlling to 19 – 23 inch Hg negative pressure at the most remote location of vacuum service. The system should include duplex or triplex vacuum pumps, storage tank, controls, and distribution piping. Deeper vacuum requirements should be covered by local vacuum pumps, serving one or multiple services. The local vacuum pumps should discharge into a laboratory exhaust system. Oil-ring vacuum pumps should be provided with an oil collector at the lowest end of the vertical pipe. When the discharge from multiple pumps is manifolded, a check valve should be provided on each pump discharge. The exhaust from the pump shall route through a muffler system and discharge above the roof to minimize the noise pollution to the surrounding environment and recirculation of biohazards from the vacuum system.

Lab Specialty Gas Systems: Specialty gases will be piped from owner-furnished cylinders to designated outlets and equipment. The gas cylinders may be manifolded providing redundancy and alarmed switch-over capabilities to ensure uninterrupted gas supply. Toxic, corrosive, and flammable gas cylinders will be placed in ventilated gas safety cabinets. Central distribution systems should be considered in cases of high density of services extended throughout the building. Most common central systems are nitrogen and carbon dioxide, supplied from liquid cryogenic storage tanks located outside the building or central manifolded cylinder banks. Central systems should have redundant components or cylinder backup to ensure uninterrupted supply of gas.

Industrial Water Systems: Cold and 120°F hot non-potable water distribution systems will be provided throughout the building to selected equipment and lab faucets. The systems will be isolated from the domestic water system with a double check backflow preventer assembly.

Industrial Hot Water Recirculation System: A recirculation system will be provided and distributed at low velocities to ensure fixtures and equipment requiring hot water will have hot water readily available through the use of “in-line” all-bronze circulating pumps.

Tempered Water System: Potable cold water will be tempered by mixing domestic cold water and domestic hot water at a master mixing valve located in the mechanical room to deliver tempered water to the emergency showers and eyewashes stations throughout the building.

Chilled Water Loop: Localized if required.
4.0 Preferred Alternative Analysis

Lab Waste and Lab Vent System: Laboratory sinks in casework, chemical fume hood cup sinks and floor drains in chemical use areas will be piped in a dedicated waste system that will allow for future monitoring by regulatory authorities for possible discharges. The release of chemicals is strictly regulated by laboratory protocols that do not permit discharging acids, bases or other chemicals into the laboratory waste system. As a result, the dilution of the effluents in the laboratory waste is significant. Combining laboratory waste with sanitary waste outside of the building provides further dilution. Outside the building, after the monitoring point, the lab waste system will combine with the building sanitary sewer. Waste and vent piping will be chemical resistant.

Pure Water System (to be confirmed during design phase): A central pure water system will be provided to deliver a minimum 1 megohm quality water to dedicated pure water outlets in the labs. This continuously circulating system will consist of reverse a osmosis unit, carbon filters, re-pressurization tanks, ultra-violet lights, a resistivity/conductivity meter, pressure switches and monitor lights. More stringent water purity requirements for specific needs, such as ASTM Type I, will be generated from owner-furnished local “polishers” in the individual labs. Each floor should be provided with a piping distribution system independent of other floors. The distribution should be a continuous loop of undiminished pipe size routed to each service location. The branch connection to the service fixture should have a local isolation valve located to minimize the dead-leg.

Rainwater Capture & Reuse: Rainwater from the roof of the buildings shall be collected, filtered through vortex filters and directed to cisterns. Captured rainwater shall be used for irrigation and toilet flushing. The mechanical space for the rainwater systems includes a pumping and pressurization system. These shall include a multi-stage pump, pressure tank, controls, automatic backwash filter, carbon filter, dye injection and make-up water with RPBP backflow prevention. The rainwater tanks will be two 7,000 gallon plastic units.

Process Cooling System (to be confirmed in future phases): A dedicated distribution piping loop from the heat pump chillers will be piped through the facility to provide cooling water to lab research equipment such as environmental growth chambers, low temperature freezers and other process loads. The loop shall be provided with dual pumps of redundancy.

Process Steam (to be confirmed in future phases): Process steam will be piped to autoclaves, cage washing and other lab equipment. Process steam will be obtained from an external electric steam generator located adjacent to the end use.

Zone Valves: Each plumbing system serving the laboratory module will be isolated by zone valves to facilitate service and maintenance.

Plumbing Materials:

- Compressed Air Piping: Copper
- Lab Air Piping: Copper
- Lab Vacuum Piping: Copper
- Lab Specialty Gas Piping: Copper or as required.
- Pure Water Piping: High purity polypropylene or PVDF (in return air plenums)
- RO Water: PVC, PEX, High purity polypropylene or PVDF (in return air plenums)
- Industrial Hot/Cold Water/Tempered Water/Treated Rainwater Piping: Copper
- Lab Waste Piping: Polypropylene
- Process Cooling: Steel or copper

Seismic bracing and anchorage will be required for the plumbing systems (equipment, piping) in compliance with current code (non-critical facility designation).
4.0 Preferred Alternative Analysis

4.4.4 Fire Protection + Safety Systems

**Sprinklers**

Full coverage using a wet-type fire sprinkler system is anticipated for the interior areas of this building. Minor exterior overhangs at covered entry / egress ways will be provided coverage through the use of dry legs off of the wet system. The fire department connection will be located outside the building collapse zone.

The riser will be located in a mechanical room. Most areas will receive standard coverage quick-response sprinkler heads.

**Standpipes**

With the currently planned floor-to-floor heights, standpipes are required in exit stairwells.

**Fire Protection Specialties**

Not Applicable.

4.4.5 Electrical Systems

**Existing Electrical System:**

The Tacoma campus is currently served by two sources of power distribution. Each building is fed from either the campus owned utilidor or directly from a Tacoma Power utility transformer. As load requirements increase throughout the campus, Tacoma Power may require the University to provide its own substation. At this time, the University is below this threshold so both sources of power distribution are viable.

Emergency power is based on regionally placed generators serving groups of neighboring facilities. Dedicated generators are occasionally allowed in lieu of shared emergency power. It is assumed this building will be provided with an on-site generator to serve egress lighting, communications, and optional standby system loads as determined by UW Tacoma.

**Existing Communication System:**

UW Tacoma has a single mode fiber optic and copper loop for delivering communication services to each building. It is assumed this will be extended to the new building.

Telephone and data service is provided to the campus by Centurylink. The minimum point of presence (MPOP) for Centurylink occurs at the Walsh Gardner Building main router room (MRR).

Cable television service is provided to the campus by Click Cable. The minimum point of presence (MPOP) for Click Cable occurs at the Walsh Gardner Building main router room (MRR)

**Existing Electronic Safety and Security Systems Facilities:**

UW Tacoma has a fire alarm monitoring loop fed via single mode fiber. It is assumed this will be extended to the new building. The campus has a centralized Campus Automated Access Management System (CAAMS) for all buildings on campus. All exterior doors on the new building will be connected to CAAMS including certain interior zones.
4.0 Preferred Alternative Analysis

_Electrical Distribution:_

Careful consideration should be given to the size and electrical infrastructure of the Academic Innovation Building as design is split into two phases. By construction completion, the complete realization will be considered one building so the main distribution equipment provided in phase 1 will need to be sized large enough to power both phases.

Currently, the campus is fed from two sources of power distribution. The building will be fed from a new Tacoma Power transformer located northeast of the building along Count C or a facility owned transformer fed from the campus’s utilidor. It is assumed UW Tacoma will feed the Academic Innovation Building from the campus’s primary distribution system.

Based on current programming, the anticipated electrical service will need to be 2000 kVA based on 20 VA/sf at 100,000 gsf with phase 1 and two each being 50,000 gsf. The service entrance main switchboard should be rated 2,500 amps, 480Y/277 volts, to be verified as design develops and final loads are determined. The service switchboard will feed a 480 volt distribution panel, transformer, and 120V panels on each floor for HVAC, lighting, and plug loads.

Separate, vertically-aligned electrical rooms should be provided for each of the main normal and emergency systems. Additional electrical rooms and closets will be required to distribute power within the building. It is assumed there will be two electrical rooms on each floor after the completion of phase 2 with one electrical room per floor during each phase.

_PANELBOARDS:_

Panelboards will be dead front type and door-in-door construction with lockable latch fasteners on all doors. Panels should have a minimum of 20% spare breakers for lighting panels and 25% spare breakers for plug load panels.

Surge protection devices (SPD) should be provided on the Academic Innovation Building main service switchboard and any branch circuit panelboards with dedicated circuits that have isolated grounding provisions. SPDs should also be provided on all emergency system panels as required per NEC.

_TRANSMONERS:_

All transformers shall comply with the latest energy efficiency standards as determined by local and national code including the 2016 Department of Energy efficiency standards. High efficiency K-rated transformers may be required for harmonics as determined by the University.

_WIRING DEVICES:_

Controlled receptacles shall be provided in private offices, open offices, conference rooms, print and/or copy rooms, break rooms, individual workstations and classrooms. At least 50 percent of all 120V, 15- and 20-amp receptacles in these spaces shall be controlled and labeled per NEC.

In general, self-grounding devices should be specification grade.

_ADDITIONAL EFFICIENCY PACKAGE OPTIONS:_

The Academic Innovation Building will include additional efficiency packages as required by WSEC Section C406. Options range from more efficient HVAC, reduced lighting power, to enhanced envelope performance. The full list is comprised of 8 options. These options will need to be coordinated with the design team and owner to determine which requirements the project will comply with.
4.0 Preferred Alternative Analysis

**Emergency System**

The Academic Innovation Building will require a new diesel engine generator located on site in a NEMA 4X enclosure with sound attenuation. The genset will be approximately 300kW at 480Y/277 volt, but this will need to be verified as design is further developed. The genset would feed emergency and optional standby system loads including egress lighting, elevators, pressurization fans, fire pump, smoke control systems, smoke alarms, emergency voice/alarm communication systems, and other loads as determined by UW Tacoma such as CAAMS. If needed in an emergency, a 300kW or larger generator can be used to power the University Y Student Center and Court 17. These two buildings can provide areas of refuge during disasters.

**AUTOMATIC TRANSFER SWITCHES:**

Automatic Transfer Switches (ATS) shall be provided for emergency, legally required (if required), and optional standby systems. All ATS’s will be Russelectric type to comply with University standards. A portable generator connection for emergency systems as defined by NEC Article 700 will be provided.

A coordination study will be required for emergency systems (Article 700) and legally required standby systems (Article 701). Normal overcurrent devices should be coordinated to the extent possible.

**ARC FLASH STUDY:**

Arc flash studies using IEEE 1584 calculation methods complying with NFPA 70E should be performed for all switchboards and panelboards.

**Lighting**

The lighting design shall comply with the Non-Residential Energy Code (NREC) portion of the WSEC. Interior lighting shall maximize the use of LED systems. LED fixtures shall be selected from the Lighting Design Lab LED Qualified Products List including fixtures vetted by Design Light Consortium or Energy Star. Standard fixture voltages to be 277V with 4000K color temperature for interior fixtures and 5000K for exterior.

Light level foot-candles should be measured and provided per University of Washington Facilities Services Design Guide.
4.0 Preferred Alternative Analysis

**Lighting Control**

All lighting controls shall meet the requirements of the WSEC. Lighting controls shall increase energy saving opportunities by including daylight harvesting via daylight sensors and occupancy/vacancy sensors. Daylight harvesting will control two zones of daylight as determined by vertical fenestration height. Fixtures within daylight zones will dim according to daylight sensed. Occupancy sensors in all spaces other than restrooms, stairwells, and parking garages shall operate utilizing vacancy sensors. Fixtures controlled by these sensors will only be energized if manually activated.

The control system shall be Crestron, Lutron, Vantage, or equal approved by the University.

The following is an example of lighting control functionality within specific spaces. Final control should be coordinated with University standards.

**Classroom lighting:**

- Multi-zone dimming or 4-button switch depending on classroom function
- (3) Three-way switches locations at classroom door & teaching station
- Occupancy sensors
- Daylight harvesting at perimeter locations

**Offices / Conference room controls:**

- Multi-zone dimming for conference rooms depending on function
- Occupancy sensors
- Daylight harvesting at perimeter locations

**Hallway / Common Areas:**

- Override switch of timeclock zones
- Daylight harvesting at perimeter locations (where required)

**Restrooms:**

- Occupancy sensors

**Egress Lighting:**

- Emergency lighting control unit or UL924 relays. Emergency unit to control normally off egress light fixtures. Egress lighting to turn on to 100% output upon loss of normal power.

**Metering**

Sub-metering shall be provided for various load types as required by WSEC Section C409. In general, HVAC and lighting loads will be fed from 480V/277 volt systems while plug loads will be fed from 208Y/120 volt systems. The 480V Distribution panels will have end-use meters to measure HVAC, lighting, and plug loads as required by the University.

The communication protocol will need to be coordinated with the controls contractor and University's standard.
4.0 Preferred Alternative Analysis

**Telecommunications**

A new Main Distribution Frame (MDF) and multiple Intermediate Distribution Frames (IDF) will be required in the Academic Innovation Building. Phase 1 should include one IDF per floor, while phase 2 will require an additional IDF on each floor. IDF rooms should be vertically aligned and interconnected to other IDFs with conduit sleeves to form a vertical riser system. The vertical riser shall have a minimum of three 4-inch sleeves on the highest floor with one additional 4-inch sleeve on every other floor going down. One additional 4-inch conduit shall be provided between the top riser room and roof. Cable lengths from the IDF Room to outlet locations should not exceed 295 feet, otherwise additional on floor IDF rooms should be provided. The MDF Room should be located in an area with good access to both the campus inter-building utility system and the base of the vertical riser systems.

Pathway between the MDF Room and the campus’s outside plant system shall consist of a minimum of three 4-inch conduits with 24 strand SM ribbon fiber. 100 pair is recommended for the outside plant copper. Where the MDF Room does not align with the IDF Room stack, cable tray and/or 4-inch conduits shall connect the MDF to the IDF Rooms. The MDF/IDF copper riser will be ARM rated with 24 strand SM ribbon fiber. All cables to be installed as Universal Cable Plant and Cat6A.

A complete wireless cabling system should be provided at locations as determined by the Aruba wireless designer. A separate IDF/wiring closet must be provided for retail or lease space, if it is included in the project. UW Tacoma will provide pathway for commercial ISPs to serve the retail business through this wiring closet.

**Audio Visual**

Classrooms should be equipped with projection and audio visual systems to support the operation of the facility. All controls should be through touchscreen on control panel located in the instructor podium and/or on the front wall. Room control systems shall be specified by UW Tacoma IT per University standards. All meeting and conference rooms should be provided with AV systems to connect monitors and media devices. Assisted listening systems should be incorporated into classrooms and auditoriums based on ADA requirements.

**Fire Alarm**

The Academic Innovation Building will be protected throughout with an automatic fire alarm system in accordance with code and UW Standards. The fire alarm system should be Simplex 4100 ES with voice alarm. The fire alarm panel should be located in the main electrical room and connected to the campus network. The system shall include all City of Tacoma Fire Code requirements and shall include at a minimum, corridor smoke detection, room detection (where required), voice alarm throughout for fire and emergency broadcast, and visual notification. Remote annunciation and voice control should be provided at the building main entrance.

**Access Control**

The campus has a centralized Campus Automated Access Management System (CAAMS) for all buildings on campus. All exterior doors on the new building will be connected to CAAMS including certain interior zones as determined by programming including suite entries and shower rooms. Access control system should be generator backed. Rough in with pull strings for card readers should be provided at suites of private offices and classrooms.

**Video Surveillance**

Video surveillance is currently not planned, but additional Category 6A drops should be provided for future needs. Rough in to roof for front entrance or parking surveillance.

The DAS design shall meet all required code elements governing DAS systems. The minimum signal level shall be -95dB with 95% coverage per code, or as directed by the AHJ. The DAS system shall be supplied with a minimum of 24 hour emergency power. If emergency power is provided by a generator, the design will be for a minimum of 2 hour battery back-up DAS system. Confirmation is required for emergency battery auxiliary power with AHJ. Coordinate all infrastructure requirements not provided by DAS installer. The system shall include antennas, repeaters, coaxial cabling and a head end served by emergency power connected to the generator as a NEC 700 system for Emergency Responders communication.
4.0 Preferred Alternative Analysis

4.5.0 Site Analysis

SITE DESCRIPTION

The site for the future Academic Innovation Building on the UW Tacoma campus is located adjacent to S. 19th Street, Market Street, Jefferson Avenue, and the Court 17 apartments. The site is divided in half by an existing brick roadway called Court C that is primarily used for access between S. 17th Street and S. 19th Street, with access to the Court 17 parking garage and street parking. The area to the west of Court C is currently grassy and undeveloped, while the area to the east between Court C and Jefferson Avenue is a gravel lot, former bus turnaround area, and a campus waste and recycling collection station.

The UW Tacoma campus is an urban university community and is located on the hillside extending west from the waterway. The Academic Innovation Building site is located on a fairly steep portion of the campus with an approximately 25 ft grade variation between the west and east side. There is an existing retaining wall that runs along the east side of Court C that is approximately 5-10 ft in height and allows for vehicle access to the parking lot east of Court C from Jefferson Avenue. The site map shown below indicates spot elevations for the site based on topographic survey work that was performed in April 2018.

The campus Hillclimb is an integral part of the UW Tacoma campus and culture and currently stops on the east side of Jefferson Street. Per the UW Tacoma Master Plan, the Hillclimb will ultimately extend north through the Academic Innovation Building site and provide the pedestrian connection from Jefferson Avenue to Market Street. Public transportation is available to the site via bus routes along Market Street and Jefferson Avenue. Pierce Transit has plans to improve the bus shelters in this region.

SITE PLAN
4.0 Preferred Alternative Analysis

LANDSCAPE SITE RELATIONSHIPS

The complete project vision for the Academic Innovation Building occupies a critical location within the campus fabric at the intersection of Jefferson, S. 19th and the Hillclimb. The Master Plan calls for the Hillclimb to extend west up the hill, setting up a strong circulation and open space framework for continued campus growth. The Hillclimb ultimately would connect Pacific Avenue to Market Street, support campus wayfinding, maintain existing view corridors and foster nodes at each north/south intersection.

The proposed building can strengthen campus connections and close a gap in the campus fabric. The proposed Academic Innovation Building’s classrooms and labs will have strong collaborative connections to adjacent buildings at the ground level such as Science, and Milgard Business School facilities in TPS and Dougan. Vertical circulation connections from the Prairie Line Trail and Keystone will also be strengthened. Commercial spaces along the Market Street frontage offer an opportunity to foster relationships between the University and the community.

The complete project vision brings near-term and long-term opportunities to establish a strong hierarchy of circulation: vehicular, non-motorized, and transit. Implementation of the complete project vision in the future could include narrowing or closure of S. 19th Street and the creation of a shared pedestrian/vehicular environment such as a woonerf along Jefferson to foster safe connections and stitch the central campus and newer uphill development together.
4.0 Preferred Alternative Analysis

LANDSCAPE SITE CONSIDERATIONS

The topographical change from north to south and from east to west presents challenges and opportunities in terms of the circulation and types of public spaces created. The building should be sited to capitalize on creation of open space, circulation and ground floor uses with defined relationships to the site. Existing vertical circulation at Court 17 is critical to facilitating campus connectivity and accessibility.

Smart utilization of the site will allow future campus development while simultaneously creating successful long-term exterior spaces. The proposed siting and massing is tucked into the hill, providing a variety of exterior spaces relating to sun exposure and active ground floor uses. Exterior learning environments would act as a learning lab, supporting innovative academic goals.

Service and loading are critical for both the Academic Innovation Building and for campus operations. Consideration of these functional requirements at the offset from Court C enables the proposed project to create an integrated approach to building and site use.

Extension of the Hillclimb

The Hillclimb is the central spine of the UW Tacoma campus, envisioned as a recognizable thread of circulation and open space to connect future campus expansion. The Campus Master Plan sets the foundation for an open space that fans out from the existing terminus at S. 19th and Jefferson Ave. This vision spans multiple blocks and incorporates campus greens, circulation, and building associated spaces. The complete realization of the Academic Innovation Building would create the edge of the first extension of the Hillclimb open space — activated by circulation and unique spill-out spaces for academic engagement. The south-facing façade creates an appealing environment for casual outdoor seminar spaces or classroom round-tables. A cascading landscape feature, to hold and filter stormwater before it arrives at the Thea Foss Waterway, could complement the Hillclimb terraces and stairs. This feature would provide a direct connection to campus sustainability goals and create potential learning opportunities.

Pedestrian Circulation

Existing development surrounding the site supports pedestrian circulation to campus facilities to the west and north of the site. Curb bulbs/extensions, enhanced crosswalks along Jefferson Ave. and Market St. and a widened sidewalk at Court 17 on Market St., lay the groundwork from which to enhance and increase pedestrian amenities.

Significant Grade Variation

Intrinsic to UW Tacoma campus, connectivity along topographical changes is significant — the proposed site has an approximate grade change of 25 feet from east to west and 13 feet from north to south. Therefore, campus accessibility can only be achieved via elevators and stairs.
Future of S. 19th St.

The Hillclimb can be successful as an intervention within the existing site boundaries or, as shown in the Campus Master Plan, could span the entire width of S. 19th Street, vacating S. 19th Street between Market Street and Jefferson Avenue. This concept creates a pedestrian oriented campus core and improves vehicular/pedestrian interactions. However, related to phasing, and dependent upon available resources, the Hillclimb can grow incrementally. Once established, a partial closure of S. 19th Street to allow only one-way westbound traffic would create a safer environment that prioritizes the pedestrian. A full closure of S. 19th Street would, in effect, expand the heart of campus to Market Street, creating contiguous campus open space.

Future of Jefferson Ave.

Perpendicular to S. 19th Street and the Hillclimb, Jefferson Avenue is the stitch between the center of campus and future expansion up the hill. Indicators such as sidewalk widening and enhanced crosswalks are in place, creating a foundation for a more friendly pedestrian environment. Additional crossings and street calming treatments such as curb bulbs can incrementally support a safer pedestrian/vehicular environment. A longer range strategy, requiring partnership between the City of Tacoma and UW Tacoma is the potential conversion of Jefferson Avenue to a pedestrian first corridor or woonerf. This would promote non-vehicular circulation in an environment where the car is occasional and secondary. As the campus expands, motorized traffic needs to decrease for the creation of a healthy, collegiate environment.

Science Court

The Science Court is an opportunity to provide unique, multi-functional, collaborative space that will encourage students and professors to bring learning outdoors. Whether the space is used for testing projects or for cross-pollination between disciplines, the court is intended to provide the Academic Innovation Building with a particular sense of place that also connects back to the campus. Although the northern portion of the Science Court is envisioned as a service area, it will be important to treat service as only one of many uses. The Science Court for the proposed project will connect the Market Street wing of the building to Court C. The full build out of the project vision will enable the Science Court to expand and incorporate Court C (vacated for this future phase) and connect to Jefferson Avenue. The space lends itself well to expansion; by negotiating topography to land at Jefferson Avenue, the sensitive utilization of walls and slopes will create a dynamic open space that can be built in phases.

View Corridors

With its dramatic topography, UW Tacoma benefits from natural view corridors and opportunities for a sense of prospect. Planned growth should be sensitive to these views, preserving them for public benefit and creating unique view moments. For example, the complete realization of the Academic Innovation Building affords the opportunity to develop a roof terrace as part of the southern wing that becomes another dimension of the Hillclimb open space. This will frame and capitalize on views of Mt. Rainier, presenting an iconic campus space that is a draw for casual everyday use and formal events.
4.0 Preferred Alternative Analysis

CIVIL SITE CONSIDERATIONS

Complex Grade Variation

The grade variation across the site poses both a challenge and benefit for the Academic Innovation Building. By utilizing the elevation change noted in Figure 1, the proposed building can provide access at multiple floors and levels including pedestrian and street access from Market Street and Court C. Therefore, the pedestrian scale frontage along Market will be enhanced for uses such as retail, offices, or classrooms. Vehicular traffic will be accessed through Court C and Jefferson Avenue. These are both at lowest elevations of the building, allowing this ground floor to be used for labs, deliveries, loading and storage. Access along the south side will be provided by the future Hillclimb.

Potential Grading Solution

Figure 2 indicates conceptual grading for Phase 1. The finished floor for the building is set at 128.00 and is set by the elevation of Market Street along the west face of the building. The lower elevation of the building is set at 105.5 to accommodate a high-bay lab space. The lower floor elevation allows for vehicle connection from Court C. The existing grades will remain on Court C for Phase 1 and Court C will be reconfigured in the complete realization as indicated in Figure 2. Further discussions will be required with the City of Tacoma to verify that Court C can be utilized in its current condition for the loading and back of house functions, or if improvements are required to the road since it is a brick roadway. The grade on the south side of the proposed building would be sloped at 3:1 to match existing grade.

Using the elevations in Figure 2, preliminary earthwork numbers based on the complete realization and Phase 1 are listed below. These are preliminary earthwork quantities from existing to proposed grade and are intended to give an order of magnitude for budgeting purposes only for the predesign. The majority of the site is in cut due to the grade change across the site.

<table>
<thead>
<tr>
<th>EARTHWORK QUANTITIES</th>
<th>CUT (cubic yards)</th>
<th>FILL (cubic yards)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>4,625</td>
<td>150</td>
</tr>
<tr>
<td>Full Vision</td>
<td>5,925</td>
<td>450</td>
</tr>
</tbody>
</table>

PREFERRED ALTERNATIVE SECTIONAL DIAGRAM
4.0 Preferred Alternative Analysis

FIGURE 1: EXISTING SLOPE VARIATION DIAGRAM

PHASE 1:
- NUMBER OF FLOORS: 4
- TOTAL AREA: 50,735 SF

FIGURE 2: POTENTIAL GRADING SOLUTION

PHASE 1
- FF=128.00 (LEVEL 1)
- FF=105.5 (LOWER LEVEL)

ELEVATION (EX) 105'
4.0 Preferred Alternative Analysis

4.5.1 Site Studies

**OPTION A: ATRIUM**

This massing was based on a central collaborative atrium space which could be shared by the Business school and the Engineering programs.

The concept supported the campus Master Plan well and made a strong gesture towards collaboration but was not favored because it limited ground floor space for labs with daylight and adjacency to the Science Court.

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**ATRIUM SECTION STUDY**

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**ATRIUM MASSING STUDY**
OPTION B: BOOMERANG

The complete project vision for the Academic Innovation Building occupies a critical location within the campus fabric, extending growth of the campus westward. This massing option engages its edges, westward expansion of the Hillclimb and the commercial energy developing along Market Street. Its “boomerang” shape creates an opportunity for an open Science Court where students can bring the classroom outside. It is the preferred alternative further described throughout this report.

BOOMERANG SECTION STUDY

BOOMERANG MASSING STUDY
4.0 Preferred Alternative Analysis

OPTION C: LEAST SITE INTERVENTION

Because this concept was located in the flattest portion of the site it was considered as a potentially less expensive alternative. It would leave space for a future development much like the Boomerang concept on the south and west edges of the site.

However, the narrow dimensions of the northern portion of the site restricted the building footprint and gave no opportunity for a Science Court adjacent to all of the Mechanical Engineering labs.

Engineering labs are most practical when located on the same level as the loading access (Court C). This would put the Mechanical Engineering labs with their heavy equipment and materials on an elevated deck, driving up the cost of structure and making vibration isolation much more complicated.

The massing of the building was also a concern. To accommodate the area required while preserving space for future development the building would have to be six stories tall. A building of this scale would dwarf the adjacent historic Pinkerton Building. Therefore, if a future building is considered in this location, stepping the mass down towards Pinkerton should be considered.

LEAST SITE INTERVENTION MASSING STUDY

LEAST SITE INTERVENTION SECTION STUDY
RANKING OPTIONS

The options were ranked based on several criteria important to UW Tacoma and the academic programs. The shapes in the cells of the matrix below indicate the relative performance of each concept for each criteria.

<table>
<thead>
<tr>
<th></th>
<th>01</th>
<th>02</th>
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</tr>
</thead>
<tbody>
<tr>
<td>A. IDENTITY POTENTIAL</td>
<td></td>
<td></td>
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<tr>
<td>B. IMPLICATIONS OF SCALE/HEIGHT TOTAL GROUND FLOOR</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>C. COST: SITE INTERVENTION + BUILDING EFFICIENCY</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>D. PROPORTION/ORIENTATION FOR SUSTAINABILITY + DAYLIGHT</td>
<td></td>
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<tr>
<td>E. COLLABORATION</td>
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<td>F. POTENTIAL FOR FUTURE DEVELOPMENT</td>
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<tr>
<td>G. QUALITY OF OUTDOOR SPACE</td>
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<tr>
<td>H. COMMERCIAL ENGAGEMENT</td>
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<tr>
<td>I. CAMPUS ENGAGEMENT</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>J. MASTER PLAN + CAMPUS GOALS</td>
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<td></td>
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</tbody>
</table>
SITE PROPOSAL DIAGRAMS

Site - Phase 1

The proposed project includes the Market Street wing of the Academic Innovation Building. The new building will engage the pedestrian experience along Market Street with the extension of the Court 17 streetscape and potential collaborative incubator spaces at street level. Set against the hill, the east side ground level labs open to a shared use Science Court and loading access from Court C which will remain as public access through the site. The proposed building will utilize the existing vertical circulation at Court 17 Apartments and facilitate pedestrian connections across the site to the building and the elevator along Court C. The proposed building will be treated as an insertion into the existing site context with the reinforcement of existing circulation and development of the associated Science Court to support academic objectives (See Phase 1 Landscape Plan below).

PHASE 1 LANDSCAPE PLAN
Site - Full Build Out

The proposed Phase 1 wing at Market Street sets up the project for future expansion to include a Phase 2 wing which would frame the expansion of the campus Hillclimb. The Hillclimb not only provides campus circulation and open space, but will provide additional, south facing spill out spaces along the south façade of the future wing. The vacation of Court C will connect the Science Court to another outdoor area providing significant contiguous open space as well as supporting building functions and stitching together the campus along the length of Jefferson Ave. (See Future Build Out Landscape Plan below).
4.0 Preferred Alternative Analysis

SITE HYDROLOGY

Per the geotechnical and environmental reports prepared by GeoEngineers in June 2018 (see appendix A6 and A7), there are two to three aquifers within the site that can affect the groundwater and site hydrology. The shallower aquifer is located approximately 3-4 ft. below grade, may consist of a perched and shallow aquifer, and travels in an easterly direction to the Thea Foss Waterway. This aquifer is expected to have a significant amount of flow which will require a dewatering system to be installed during and following construction. In addition, the high groundwater table will limit the ability to infiltrate the stormwater from the project on-site and measures will need to be taken in the utility design to ensure that the groundwater does not utilize the pipe bedding as a drainage path, undermining the utility system.

The deeper aquifer is approximately 30 ft. below grade and also runs in an easterly direction. It is not anticipated that the deep aquifer will impact the design unless subsurface improvements are provided such as subsurface parking or deeper excavations into the hillside.

Surface drainage from the site currently flows in sheets in an easterly direction and is collected and conveyed using catch basins and a piped system. Based on visual observations of the site, there were no signs of erosion or flooding either within the pervious or impervious areas. The site plan below provides the slope analysis for the site based on the existing grades.

EXISTING SLOPE ANALYSIS
4.0 Preferred Alternative Analysis

ADDITIONAL SITE CONSIDERATIONS

- High contaminated groundwater table and multiple aquifers – per the geotechnical and environmental reports, the groundwater table on the site varies but is approximately 3-4 ft. below grade and the groundwater is contaminated with (trichloroethene) TCE. Mitigation measures must be implemented before and during construction to prevent cross-contamination between aquifers and vapor intrusion, as well as to prepare soil and water for disposal.

- Contaminated soil – per the Environmental report prepared by GeoEngineers in June 2018 (see appendix A7), there is contaminated soil within the site. Deeper excavations may impact this soil and require additional remediation measures that can have a budget and schedule impact. Also, the on-site material is not suitable for structural fill and structural fill soil will need to be imported.

- Vacation of Court C – to accommodate the preferred site massing and full vision development of the site, Court C will need to be vacated south of the Court 17 apartments. This is a public street and vacation will require City of Tacoma approval.

- Underground Storage Tanks – per the Environmental report there are at least two underground storage tanks on-site that need to be removed and disposed of.

4.5.2 Stormwater Requirements

EXISTING CONDITIONS

There is currently a storm drainage system in the roadways around the site that can be used to serve the new Academic Innovation Building. The stormwater collection systems in the area consists of pipes which are 12-inch to 18-inch size. In the area of the proposed preferred option for the Academic Innovation Building, an existing 18-inch pipe flowing east and stormwater structures are in S. 17th Street along the north side of the project site. Several catch basins along S. 17th Street located within the project site have lateral connections to the S. 17th Street pipe.

Stormwater in Market Street sheet flows south of the Court 17 Apartment Building to S. 19th Street. There is also a 12-inch drainage pipe within Market Street that conveys stormwater toward S. 19th Street. Catch basins and a storm drain structure along Market Street are connected to this stormwater line. This system connects to an 18-inch main line located along S. 19th Street that flows east.

There are no below grade stormwater pipes along Court C. However, there are two local catch basins. One catch basin is located at the south end of the “triangle” parking lot on Jefferson Avenue. The other is at the south end of the lawn area adjacent to Court C. These catch basins connect to an 8-inch line flowing east in Jefferson Avenue which connects to a stormwater structure in the sidewalk in front of Tioga building on Jefferson Avenue. Catch basins along S. 19th Street have connections (10-inch and 8-inch) which also connect to the structure in front of Tioga.

PROPOSED CONDITIONS

Stormwater treatment and disposal will be required for the proposed improvements in accordance with the City of Tacoma Stormwater Manual. The project site is located in the Foss Waterway Watershed, and creates over 5,000 sf of new and replaced hard surface area. The complete realization will create approximately 44,500 sf of new impervious area and Phase 1 will create approximately 29,500 sf. Phase 1 includes the proposed building and Science Court. As a result, the project will need to provide both water quality and on-site stormwater management. On-site stormwater management can include facilities such as stormwater reuse or detention. Low impact development (LID) systems are recommended by the City. Infiltration is not feasible for the site due to the high groundwater table. Water quality facilities are required to remove pollutants prior to discharge and these can be combined with the stormwater management requirement in LID facilities such as rain gardens or planters. Stormwater facilities are planned to be integrated with the site landscaping so they provide both a functional and aesthetic benefit for the project. Underdrains and foundation drains will be required for the building and retaining walls to convey groundwater away from these structures.
4.5.3 Site Ownership, Easements, and Setbacks

**OWNERSHIP OF THE SITE**

UW Tacoma owns the site outright. Local jurisdiction and local community outreach will be done during the design phase.

**EASEMENTS AND SETBACK REQUIREMENTS**

There is a 10’ wide slope easement along Market Street, but that type of easement is usually associated with constructing the road, and can be removed when the site is developed. There is also a 6.5’ wide public utility easement (PUE) near the transformer along Court C. The diagram below highlights the easements in color.

**EXISTING SLOPE ANALYSIS**
4.5.4 Neighborhood Considerations

**POTENTIAL ISSUES**

With the dense development nature of the UW Tacoma campus, it will be important for UW Tacoma to engage early in the design process with the surrounding community, the city, and property owners on the University’s plan for development. With this project sited along Market Street, keeping the area pedestrian-friendly and the street area activated will be important to the community.

This project will also be a key transition to new construction from the historic district and the many legacy buildings UW Tacoma has renovated over the years. It is critical to ensure that the building design speaks to the historic fabric of the area while transitioning toward the future of new buildings on campus.

Finally, it will be important to listen to the University neighbors and hear what they want to see in a project. UW Tacoma will take this input into account and will continue to build dense, urban development that builds upon the campus’ neighborhood feel of being a open and accessible to all.

4.5.5 Utility Considerations

**UTILITIES + INFRASTRUCTURE**

The complete vision of the Academic Innovation Building will be built in two phases. Phase 1 includes building along Market Street to accommodate Business and Engineering programs and general classrooms. Phase 2 of the complete vision is an addition to the Phase 1 building adjacent to Market Street, the proposed Science Court, and Court C.

This report reflects Phase 1 effort only. All utilities designed in Phase 1 should be designed in consideration that the complete realization will require connectivity to the systems built in Phase 1. Utility lines serving the proposed Academic Innovation Building during Phase 1 will be connected to the existing utilities systems located within the vicinity of project site.

The following agencies are the utility conveyors within the project site: water is provided by Tacoma Public Utilities, sewer and stormwater are provided by City of Tacoma, and Natural Gas is provided by Puget Sound Energy (PSE). The project site is located between S. 17th Street on the northern side, S. 19th Street on the southern side, Market Street on the western side, and Jefferson Avenue on the eastern side.

**POWER**

An underground power line is identified along Court C starting from the intersection of Court C and S. 17th Street until the south end of the Court 17 Apartments. From that point on, this underground power line crosses west toward Market Street connecting to an electrical vault adjacent to Court D Street. Overhead power lines and poles are identified from the south end of Court 17 until the intersection between Jefferson Avenue and S. 19th Street. A power line in Jefferson Avenue (adjacent to the sidewalk on the west end of the street) is also identified. This power line supplies electricity to the streetlights on Jefferson Avenue. Aside from Jefferson Avenue, streetlights are also identified along Market Street, S. 17th Street, and S. 19th Street. Another power line, which connects to traffic signal boxes, is also identified along S. 19th Street in the sidewalk at the north side of the street. Power capacities of these systems will be confirmed as part of the design phase of the project. Per the Master Plan, underground power is preferred.
4.0 Preferred Alternative Analysis

SANITARY SEWER

There are several existing sewer lines near the project site. An existing sanitary sewer main line (10-inch, Polyvinyl Chloride-PVC) is located underneath Market Street conveying sewage toward S 19th Street. A potential connection can be made to this main line in Market Street to accommodate the preferred alternative. The sewer main line is located in the western side of Market Street (not adjacent to the project side). The connection may require some traffic disruption of Market Street as the new service connection will require roadway saw cutting, excavation, and crossing of the existing potable water main. The minimum diameter for the lateral connection is 6-inch per City of Tacoma Public Works Department Design Manual. Design manual guidance identifies both horizontal and vertical separation between a sanitary sewer and water line. A main line 8-inch thermoplastic composite pipe (TCP) is located at the eastern portion of the site underneath Jefferson Avenue conveying sewage toward S. 17th Street. There is also an existing sewer main line underneath Court C, which connects to the Jefferson Street main line. The size of this sewer line will require confirmation during design due to conflicting information available during the writing of this report. Within the project site, existing sanitary sewer manholes can be found along S. 17th Street, Market Street, Court C, Jefferson Avenue, and S. 19th Street. Abandoned sanitary sewer manholes have been identified along Market Street and S. 19th Street.

Although a side sewer connection to the Market Street sewer is anticipated for the proposed site, connection could alternatively be made to the Jefferson Avenue main.

Installation of an oil/water separator should be considered if restaurants (in the commercial portion of the building) or food preparation areas will be included inside the proposed building.

WATER

An existing 24-inch ductile iron pipe (DIP) water main is located underneath Market Street. Another water line, that changes size from an 8-inch DIP to a 6-inch cast iron pipe (CIP) is located underneath S. 19th Street on the southern side of the project site. The 6-inch CIP from S. 19th Street is connected to the water line in Jefferson Avenue. The Jefferson Avenue pipe changes size from 6-inch to an 8-inch DIP. Another water main runs underneath S. 17th Street. It changes size from a 16-inch to a 24-inch DIP.

Records show no water main in Court C.

Several fire hydrants are identified adjacent to the project site area along Market Street (on the eastern side of the street), S. 19th Street (on the northern part of the street), and Jefferson Avenue (on the western part of the street).

Potentially, connections could be made to mains in Market Street or Jefferson Avenue. Locations for connections should be confirmed with Tacoma Public Utilities during the design phase of the project.

As part of the design process, the flow requirements and connection sizing for the new Academic Innovation Building should be calculated using the building’s expected daily flows and required fire flows as required by the Pierce County Department of Planning and Land Services and referencing the Uniform Pipe Code Section 610.

NATURAL GAS INFRASTRUCTURE

As-built drawings of Court 17 Garage indicate that the Court 17 building is connected to a gas line in S. 17th Street. PSE indicated that there is a 2-inch line in Market Street and another 2-inch line in Jefferson Avenue. The purveyor indicates that several buildings already have connections to the Market Street and Jefferson Avenue gas lines. Future connections to these gas lines are expected to be allowed.
4.5.6 Environmental Impacts

ENVIRONMENTAL

Environmental investigation work has been performed on campus since the 1990s to evaluate the contaminated soil and groundwater on campus. In 2013 environmental investigation work was performed on identified Priority Development Areas within the campus footprint to evaluate the potential presence of contamination and potential impacts to any site development. The results of the investigative work found several additional sites containing chemical contaminants which may require remediation depending on the type and depth of development activities. Cost impacts for subsurface development in the identified contamination areas range in varying degrees depending on the level of disruption to the soil, subsurface water flow and the type of development selected at particular sites. The information gained from the recent environmental investigation assessment provides valuable information for evaluating cost implications on future development areas on campus. Environmental investigation work is ongoing on the Campus based on the 2016 Remedial Investigation Work Plan.

4.5.7 Parking and Access

LOCATION

The site of the building will not affect any existing parking. While this building will add to the growth of campus, UW Tacoma continues to work toward building a sustainable campus, and plans to leverage mass transit systems to reduce their vehicular carbon footprint.

TRAFFIC

Through-campus vehicular traffic is minimal due to vacated thoroughfares. Future street vacations are anticipated as the campus grows into its planned footprint with an east-west pedestrian corridor as a central feature. Traffic will continue to be tangential to the urban campus.

4.5.8 Construction Logistics and Impacts

Early planning and coordination with the City, utility companies and fire department will take place and a construction logistics plan will be developed for the project taking into consideration construction staging area, parking, fire access and protection, and easements of utilities.
4.0 Preferred Alternative Analysis

4.6.0 Master Plan

LONG-TERM PLAN CONSISTENCY

The UW Tacoma Master Plan from 2003 and continuing in 2008-09 planned for development on this proposed site as campus expansion up the hill to the west. The Master Plan massing was intended to continue a strong building edge, consistent with the south façade of the Science Building, for the Hillclimb. The massing lines are intended to preserve view corridors through campus and to Mt. Rainier. A portion of Court C was determined to be vacated as part of the development.

The proposal serves as the next step in realizing the Master Plan vision, helping to extend the campus to Market St. and revitalizing the urban district. The full realization of the “boomerang” massing will create the Hillclimb’s edge, and a portion of the site south of the building will become the extended Hillclimb landscape area between Jefferson and Market.

Regarding campus infrastructure, the project could house elements that serve as a central plant for future development on campus. See description in Section 4.4.2. As a result, this project could help future projects meet UW Tacoma’s sustainability goals.

The proposal will be an important component of campus circulation. Currently there is no all-hours accessible path from Jefferson Avenue up to the University Y Student Center. Access is provided through Pinkerton Hall’s elevator from Jefferson to Court C. Once on Court C people can access the Court 17 building elevator located in the southeast corner of its parking garage, which provides access to Market Street. However, level 2 of Pinkerton closes at 4:30 PM due to the operational hours of the School of Urban Studies, which is housed there. So, although the building is open until 10:00 PM, the elevator is only usable until 4:30 PM. Also, Court C is paved with brick and likely does not meet accessibility standards for slopes and surfaces. Therefore, the development of the Academic Innovation Building will provide a vital link between Jefferson and Market for students, faculty and staff.

MASTER PLAN MASSING DIAGRAM
4.0 Preferred Alternative Analysis

2008 MASTER PLAN CAMPUS DEVELOPMENT PLAN | MITHUN

Figure 15 | UW Tacoma Campus Development Plan

Legend

Academics & Services
- Existing UW Tacoma
- Future UW Tacoma
- Facilities - Warehouse/CP
- Facilities - Grounds Storage
- Japanese Language School
- Memorial Garden
- Retail

Transportation
- Existing Public Transit
- Potential Public Transit
- Potential Parking (underground)

University of Washington Tacoma - Campus Master Plan Update
4.0 Preferred Alternative Analysis

4.7.0 Laws and Regulations

CONSISTENCY WITH LAWS AND REGULATIONS

The project will comply with all adopted/amended City of Tacoma and Washington State codes and regulations including:

Model Codes and Standards:

- 2015 International Building Code (IBC) with state adopted amendments
- 2015 International Building Code (IBC) with state adopted amendments
- 2015 International Fire Code (IFC) with state adopted amendments
- 2017 National Electrical Code (NEC) with state adopted amendments
- 2015 Washington State Energy Code (WSEC) with city adopted amendments
- Washington Administrative Code (WAC)
- Revised Code of Washington (RCW)
- Tacoma Municipal Code
- NFPA 70E
- American Disabilities Act
- IEEE 1584
- International Mechanical Code
- Uniform Plumbing Code
- International Fuel Gas Code
- City of Tacoma Electrical Code
- Greenhouse Gas Emissions Reduction Policy (RCW 70.235.070)
- Archaeological and Cultural Resources (Executive Order 05-05 and Section 106 of the National Historic Preservation Act of 1966)
- Due to the contaminated soil on the project site, the University will need to comply with the Agreed Order (No. DE 11081) with the Washington State Department of Ecology, and recommendations of the Environmental Report in Appendix A7
- ICC A117.1 Accessible and Usable Buildings and Facilities
- ASHRAE Standard 62.1 – Ventilation
- ASHRAE Standard 55 – Thermal Comfort
- ASHRAE Standard 135 – BACnet, A Data Communication Protocol for Building Automation and Control Networks
- NEBB – TAB Standards
- SMACNA – Fire and Smoke Damper Installation Guide
4.0 Preferred Alternative Analysis

- SMACNA – Guidelines for Seismic Restraints of Mechanical Systems
- SMACNA – Standards for Duct Construction
- NFPA 70E - Standard for Electrical Safety in the Workplace
- NFPA 13 – Standard for the Installation of Sprinkler Systems
- NFPA 90A – Air Conditioning and Ventilating Systems
- OSHA Part 1910.1450 – General Environmental Controls
- ASME 17.1 Safety Code for Elevators & Escalators

City of Tacoma:
- City of Tacoma Title 13 - Land Use Regulatory Code. Realization of the full vision for the Academic Innovation Building project may require street vacation for Court C and consolidation of parcels
- City of Tacoma Landmarks Preservation Commission, Design Guidelines and Introduction to the Union Depot/Warehouse District. The project site is zoned DMU-CONS and is within the Union Station Conservation District. The following description is based on the guidelines and pre-application conference with the City of Tacoma. See Appendix A8 for conference notes. The height limit for the site is 85-feet although the City may consider height increases if it can be shown that the new building will not compete with Union Station. The City will expect the development to be pedestrian friendly. Although the building design need not be faux historical, it should fit well into the scale, height and material of other existing buildings in the district
- City of Tacoma Public Works Right-of-Way Design Manual

UW Tacoma:
- University of Washington Facilities Services Design Guide
- University of Washington | Tacoma – Campus Master Plan
- University of Washington | Tacoma – Transportation Plan

Sustainability:
- LEED v4

With new code updates every three years, construction of the Academic Innovation Building may need to comply with 2018 versions of the IBC, IFC, WSEC depending on local state adoption.
4.0 Preferred Alternative Analysis

HIGH-PERFORMANCE PUBLIC BUILDINGS (CHAPTER 39.35D RCW)

While there are no federal, state or municipal regulations requiring high performance buildings outside of the Washington State Energy Code which we will be in compliance with, the University takes sustainability measures very seriously.

At the University of Washington, sustainability is in our nature. Executive Order 13 affirms the University’s deep commitment to sustainability and environmental stewardship, and the Climate Action Plan calls for reductions in reduce total greenhouse gas emissions from 2005 levels by 15% by 2020 and 36% by 2035. The University is also working to achieve carbon neutrality by 2050, as technology developments allow. The UW is a charter signatory of the American College & Universities Presidents Climate Commitment and is one of 13 leading North American research universities who formed the University Climate Change Coalition, or UC3, a group committed to leveraging its research and resources to help communities accelerate climate action.

GREENHOUSE GAS EMISSIONS REDUCTION POLICY - ADOPTED POLICIES IN ACCORDANCE WITH RCW 70.235.070

The University of Washington is a founding signatory to the American College & University Presidents’ Climate Commitment (ACUPCC), and is committed to developing an institutional action plan for becoming climate-neutral. In January 2009, under the auspices of the Environmental Stewardship Advisory Committee, a Climate Action Planning Oversight Team formed to coordinate the drafting of a Climate Action Plan (see Appendix A9). Teams of faculty, students, administrative leaders and staff across all three campuses (Seattle, Tacoma and Bothell) worked together to develop the UW plan, which was submitted to ACUPCC on September 12, 2009 and updated in 2010. The Plan describes preliminary strategies to be explored by the UW, including our intent to work toward becoming climate-neutral. The UW Climate Action Plan includes:

- University Greenhouse Gas Emissions and Emission Targets
- Strategies for Reducing University Emissions
- Looking Beyond the Inventory (land use, food and composting, reduce/reuse/recycle)
- Strategies for Financing the Climate Action Plan
- Climate Policy Development and Implementation
- Tracking Progress

One of the annually tracked sustainability metrics is greenhouse gases. Emissions are broken down by ‘scope.’ Scope 1 - emissions generated by the UW on campus (e.g. burning natural gas for heating). Scope 2 - emissions produced by generating energy purchased by the UW (we purchase most of our electricity from Tacoma Power, which is carbon neutral). Scope 3 - emissions produced off campus in support of UW work (e.g. commuting and professional travel). Our goal for total emissions is a 15% reduction from 2005 levels by 2020 and a 36% reduction by 2035.

GOVERNOR’S EXECUTIVE ORDER 05-05 ARCHAEOLOGICAL AND CULTURAL RESOURCES (EXECUTIVE ORDER 05-05 AND SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT OF 1966)

The University will comply with requirements of the Governor’s Executive Order and consult with the Department of Archaeology and Historic Preservation (DAHP) to review the project as required for state funded projects.

AMERICAN DISABILITIES ACT IMPLEMENTATION (EXECUTIVE ORDER 96-04)

The University will comply with or exceed requirements of the American Disabilities Act Implementation.
COMPLIANCE WITH PLANNING UNDER CHAPTER 36.70A RCW, AS REQUIRED BY RCW 43.88.0301

Capital budget instructions—Additional information—Staff support from office of community development.

(1) The office of financial management must include in its capital budget instructions, beginning with its instructions for the 2003-05 capital budget, a request for “yes” or “no” answers for the following additional informational questions from capital budget applicants for all proposed major capital construction projects valued over five million dollars and required to complete a predesign:

(a) For proposed capital projects identified in this subsection that are located in or serving city or county planning under RCW 36.70A.040: YES

(i) Whether the proposed capital project is identified in the host city or county comprehensive plan, including the capital facility plan, and implementing rules adopted under chapter 36.70A RCW; YES

(ii) Whether the proposed capital project is located within an adopted urban growth area: YES

(A) If at all located within an adopted urban growth area boundary, whether a project facilitates, accommodates, or attracts planned population and employment growth; YES

(B) If at all located outside an urban growth area boundary, whether the proposed capital project may create pressures for additional development; NO

(b) For proposed capital projects identified in this subsection that are requesting state funding:

(i) Whether there was regional coordination during project development;

(ii) Whether local and additional funds were leveraged;

(iii) Whether environmental outcomes and the reduction of adverse environmental impacts were examined.

(2) For projects subject to subsection (1) of this section, the office of financial management shall request the required information be provided during the predesign process of major capital construction projects to reduce long-term costs and increase process efficiency. (Must provide Yes/No answers to the above)

(3) The office of financial management, in fulfilling its duties under RCW 43.88.030(5) to create a capital budget document, must take into account information gathered under subsections (1) and (2) of this section in an effort to promote state capital facility expenditures that minimize unplanned or uncoordinated infrastructure and development costs, support economic and quality of life benefits for existing communities, and support local government planning efforts.

(4) The office of community development must provide staff support to the office of financial management and affected capital budget applicants to help collect data required by subsections (1) and (2) of this section.

CLEAN AIR ACT OF 1991

The University of Washington’s response to the Clean Air Act of 1991 is illustrated on a campus wide basis by capital improvements to the existing power plant and the University’s U-Pass program, which has resulted in a campus wide reduction in the number of single occupancy vehicle commuters. Measures to encourage commuting by non-automobiles are incorporated in each capital project through such measures as provisions for bicycle racks and safety improvements. Design standards for emissions and indoor air quality will be implemented in the building design stages as part of a comprehensive LEED strategy.

GROWTH MANAGEMENT ACT OF 1990

The Growth Strategies legislation requires state agencies to comply with local land use regulations adopted pursuant to the Growth Management Act, which the University of Washington acknowledges through the development of the Campus Master Plan and coordination with the City of Tacoma Comprehensive Plan, Downtown Subarea.
4.0 Preferred Alternative Analysis

GOVERNOR’S EXECUTIVE ORDER 90-94 FOR PROTECTION OF WETLANDS

The University has surveyed the wetland areas on campus as required by the Growth Management Act and Governor’s Executive Order. Surveys were prepared for use during capital project planning to ensure that wetland resources remain protected.

CLEAN WATER ACT

The University is incorporating storm water, drainage and erosion control plan requirements into its construction documents for all major capital projects. National Pollution Discharge Elimination System (NPDES) permit requirements will be implemented through the installation and maintenance of drainage utility systems for each capital project.

HAZARDOUS SUBSTANCES

Prior to occupancy, the University prepares an inventory of all hazardous substances to be utilized in the facility; a chemical hygiene plan is prepared for all employees.

STATE ENVIRONMENTAL POLICY ACT

As the Lead Agency, the University of Washington will ensure compliance with the State Environmental Policy Act RCW 34.21C, WAC 197-11 and WAC 478 for all capital projects.

CHAPTER 39.35 RCW ENERGY CONSERVATION IN DESIGN OF PUBLIC FACILITIES

In conformance with this statute, during the design phase of the proposed project, reviews and studies conforming to the guidelines developed in RCW 39.35.050 will be prepared.
4.8.0  Problems That Require Further Study, Related Costs and Risks

**VACATION OF COURT C**

The planned partial vacation of Court C for the full vision is a months long process with the City of Tacoma. In a pre-application meeting, the city stated that vacation of the entire street from S. 17th to S. 19th may be preferable to a partial vacation. A street vacation requires a traffic study to determine traffic impacts upon the surrounding area. This study may trigger new traffic lights at one or more surrounding intersections. Completion of ADA curb ramps in the vicinity would be anticipated. Analysis of the existing in-street utilities would also be required to determine re-routing and potential easements on the site. Fire truck access will need to be maintained along Court C and a fire apparatus turning area or an approved new linkage between Court C and Jefferson Avenue needs to be provided. The complete vision for development on this site includes a Science Court, that in part would serve as fire apparatus link between Court C and Jefferson.

Due to the process duration, analysis, potential mitigation, and the unknown element of the city council’s decision, seeking a street vacation could result in significant additional costs and risk for the project. Therefore, the preferred alternative proposed in this report does not rely on the vacation of Court C.

**SCIENCE COURT**

The proposed Science Court is envisioned as a mostly paved, multipurpose exterior space. It would serve as student project space for full-scale Engineering mock-ups and would be accessible directly from the labs through large overhead doors. It would also serve as loading, recycling/waste collection and fire department access. With this multipurpose goal, the requirements of this space for maneuvering vehicles, slopes and cross slopes will be critical.

The fire department access will require design of pavement and turning radius compliant with the City of Tacoma standards. It will also require coordination with the recycling/waste hauler to determine the location of waste facilities and UW Tacoma’s preference for a trash compactor, as well as maneuvering clearances for the recycle waste vehicles.

The grades of the Science Court should link the existing grades of Court C with Jefferson through the court meeting accessibility standards, so the court can also serve as an accessible route. University Environmental Health and Safety are among those who have requested a new crosswalk across Jefferson. Its ideal location would link the Science Court directly to the pedestrian path that runs between the Science Building and Tacoma Paper and Stationary.

**CONTAMINATED SOIL AND GROUNDWATER**

The Environmental report (see Appendix A7) describes contamination on the site. It makes recommendations for mitigation that will need to be incorporated into the design of the project.

**DESIGN FOR EXPANSION**

Design of the Preferred Alternative should consider architectural, mechanical, plumbing, electrical and structural options for how the structure could be expanded to form the complete vision for the massing in the future.
4.0 Preferred Alternative Analysis

4.9.0 Significant Components

AMBITIOUS SUSTAINABILITY

Discussions with the Associated Students of UW Tacoma (ASUWT), the elected student government of UW Tacoma, and feedback from campus during the open house, indicated that there is significant support for very ambitious sustainability goals. The Campus Master Plan is ambitious in its goals especially in carbon reduction and energy efficiency as described in other sections of this report. Mass timber construction could significantly contribute to reduction of the carbon footprint of the project due to its carbon sequestering nature. Reference Section 2, pages 28-31 for more on ambitious sustainability goals.

ACCESSIBILITY

ASUWT also asked that the project exceed code requirements for accessibility which may include multiple accessible routes, expanding the definition of accessibility beyond the Americans with Disabilities Act and codes and campus standards.

4.10.0 IT Systems

Planned IT systems that affect the building plans include: phone/data, communications closets, cable/fiber/coax connections and pathways (conduit, cable tray, surface mounted raceway etc.), Wi-Fi design, computer labs, security systems (cameras, smart locks, etc.), environmental controls, HVAC monitoring, and Information Bulletin Boards (TV displays).

Some projects may also be subject to oversight by the OCIO and the Technology Services Board. See RCW 43.88.092, and for higher education, see RCW 43.105.205.

Per RCW 43.105.205 3a business and administrative applications do not apply.

4.11.0 Commissioning

PLANNED COMMISSIONING

A preliminary Owner’s Project’s Requirements is appended to this predesign report as the first step in the commissioning process and it contains requirements to ensure systems function as designed and to meet LEED prerequisites and credits for commissioning, as follows:

The UW Tacoma Academic Innovation Building will be commissioned to achieve the LEEDv4 Fundamental Commissioning and Verification prerequisite and the Enhanced Commissioning and Building Envelope Commissioning part of the LEEDv4 credit, and to comply with requirements for Building Enclosure Commissioning and Forensics section of the Architecture and Accessibility Design Guidelines chapter and Commissioning chapter for the Facility Services Design Guidelines. The University of Washington will engage in the services of appropriate commissioning professionals to complete these services prior to end of the design development phase as required by LEED. Systems to be commissioned include at a minimum: HVAC and associated controls, plumbing fixtures and hot water systems, rainwater collection system, renewable energy systems, lighting controls, telecommunications, security systems and fire protection. Building Envelope commissioning will include code required air barrier testing and other reviews and tests appropriate for the envelope systems selected.

The design team will work closely with the UW Tacoma Facilities team to ensure the building design meets the operating standards and that the commissioning and transition of the building to UW Tacoma Facilities is a smooth one. The Owner’s Project Requirements (OPR) for commissioning of all systems according to UW Tacoma’s standards is included in Appendix A4.
4.12.0 Future Phases

**MASTER PLAN**

The Master Plan envisions UW Tacoma’s campus as complete. This project has an important role as one of the central buildings in the overall Master Plan. A pedestrian corridor angles through the plan showing west-east circulation that eases the Hillclimb, referred to as the Grand Staircase. The Academic Innovation Building is strongly related to the Grand Staircase, which will affect possible programming and future adaptations of the building. In addition to the Master Plan, the steep slope and high water table of the site will play a role in siting the building as well as the aforementioned vacations of Court C and possibly a portion of or all of S. 19th Street as it approaches Market Street.

UW Tacoma will continue to build according to the Master Plan to meet student FTE needs. Siting and design of this building and future buildings to meet capacity goals and needs should be seamless to promote improved circulation and interconnection between academic, student and campus functions. Adjacent uses and shared open space should be thoughtfully aligned as buildings are added within the boundaries of the campus to support campus life and identity.

4.13.0 Proposed Project Delivery Method

**PROGRESSIVE DESIGN-BUILD**

The project will be delivered using the progressive design build delivery method to maximize taxpayer value. With progressive design-build, the owner selects a design-build team prior to the start of design using a combination of qualifications and price factors. This method of procurement complies with RCW-39.10 and allows the owner to maximize the benefits of design-build. The design build collaborative approach encourages the owner to be involved in the design from the beginning. The process also allows for early involvement of sub-contractors to help the team make the most cost-effective decisions concerning the configuration of the construction staging areas and method of construction. An integrated team incorporates constructability review, cost estimating, and schedule development during the design phase and encourages innovative solutions while minimizing the potential for cost or schedule overruns. A design-build team has an even greater opportunity to streamline the project schedule, overlapping design and construction. Saving time saves money, allowing the team to maximize project value.

**MANAGEMENT TOOLS + BEST PRACTICES**

There are a number of management tools that will be applied to this project as part of the integrated approach to delivery to help achieve our goals and stay within the parameters. They include the following best practices:

- Clear project governance
- Clear goals and objectives
- Colocation of the project team
- Target Value Design (TVD)
- Risk register and value-add list
- Incentives for shared risk and reward
- Integrated Building Information Modeling (BIM)
A well-defined project governance structure with clear roles ensures sound decisions are made in a timely fashion throughout the course of the project. The project governance structure will include:

- **Responsible Party** — High-level administrator responsible for ensuring overall institutional objectives are met. This person is accountable for the overall success of the project. Monthly updates will be provided by the Executive Committee, including significant decisions. Any recommendations that may extend the project parameters must be made by the responsible party. The UW Tacoma Vice Chancellor for Finance & Administration will be the responsible party for this project, ensuring at a high level that all institutional objectives are met.

- **Project Executive Committee** — All major project decisions, recommendations, and trade-offs within the established parameters of the project (site, budget, schedule, financing) will be made by the Project Executive Committee, a small, high-level committee representing broad University perspectives as well as a project-specific views. This group may also engage in collaborative design sessions with the Project Management Team and the Project Working Team. It will include: the Executive Director of Major Projects for Capital Planning & Development, Executive Director of Capital and Space Management, the University Architect, UW Tacoma Director of Campus Planning & Retail Services, Dean of the School of Engineering and Technology, and Dean of the Milgard School of Business. The Committee will meet on a monthly basis.

- **Project Management Team (PMT)** — Day-to-day project management decisions, such as change order reviews, and minor design changes, will be made by the Project Management Team, consisting of project managers and directors from the University, the architecture firm, and the construction management company. These decisions must be within established project parameters. This team will meet at least weekly throughout the delivery of the project.

- **Senior Management Team (SMT)** — A separate team consisting of principals from the architecture firm and construction management company will meet quarterly to ensure that the team is working and communicating effectively and is being supported appropriately.

- **Shell & Core Working Team** — This team will be specifically focused on the design of the exterior shell and core of the building and its impact on the surrounding environment, as well as major shared common areas, gathering spaces and street frontage. This group will include the UW project manager, the project architect, the construction project manager, tenant representatives, the University Architect, Facilities Services representation, and subcontractors. This team will make recommendations to the PMT and the Project Executive Committee and help respond to comments from the UW Architectural Commission, the UW Landscape Advisory Committee, and all of the on-campus process partners.

- **Mechanical, Electrical and Plumbing Working Team (MEP)** — This subgroup comprises the UW project manager, the project architect, the design-build project manager, engineers, MEP subcontractors, and UW Tacoma Facilities Services representation focused specifically on the MEP systems and will make recommendations to the PMT and Executive Project Team.

- **Programming & Fit-Out Working Team** — This team will focus on defining the program goals, the detailed space program, and the design of the interior fit-out. This team will be made up of the UW project manager, the project architect, the construction project manager, representatives from each of the tenants, and students, and it will make recommendations to the PMT and Project Executive Committee for final decisions.

The Target Value Design (TVD) process started during the predesign. The team developed appropriate benchmark information that corresponds to the project objectives and uses that information to create detailed target values for each of the many building systems and components — mechanical, electrical, plumbing, enclosure, site work, etc. The Design Build team will be charged with designing within each of the target values. By following TVD principles, the base project costs can only go down as the design is developed. Fundamentally, cost becomes an input into the design process rather than an outcome of it. TVD necessitates maintaining real-time cost estimates as design and construction proceed so scope decisions can be made quickly. This eliminates the element of surprise inherent in the “low-bid” approach where the team does not know the cost of the building components or who will perform the work until bids are received and opened.

Throughout the design and construction process, a risk register and value-add list will be maintained. Project risks are identified based on the scope of work and the shared experience of the team. The exposure is assessed and mitigation strategies are
developed. This register is maintained throughout the project to create a proactive approach. As risks are mitigated and more cost-effective solutions are found, value can be added back into the project based on a value-add list (this list evolves as new ideas are generated for consideration) that includes a “last responsible date” when it can be added back into the project. This is reviewed regularly, and if an item cannot be added into the project at that date due to the amount of remaining risk, the team will move on without it. This approach incentives the team to focus on mitigating risks and creating more value, rather than the perceived loss that accompanies typical value engineering.

Early in the process an overall target budget will be established along with a corresponding scope. The UW designer, contractor, and select subcontractors in a predetermined but negotiated manner documented in the contract, will share savings against that target cost. The UW’s portion of the savings can be added back into the project as value-add, if appropriate. We will add other incentives, including significant input from each program group, to counter the instinct to simply reduce cost, rather than add value. At the core of this shared savings approach is the collaboration among team members that it incentivizes. Any team member’s individual success or failure directly impacts the available profit pool and so each member benefits from working as a team to ensure elimination of inefficiencies.

4.14.0 Project Management

MANAGEMENT WITH AGENCY

The UW Associate Vice President for Capital Planning and Development (CPD) is responsible for the overall organization management. CPD procures and manages programming, predesign, cost estimating, design and construction services for building alterations, additions, new construction and grounds improvements for UW’s Bothell, Seattle, and Tacoma campuses, and for remote field research stations. Project Managers organize and administer the work of outside design consultants and construction contractors. They follow projects all the way through construction and work closely with UW Tacoma representatives, occupants, project architects, designers, consultants, and other University groups related to servicing and maintaining facilities. In addition, they work with CPD construction coordinators and contractors to ensure that projects are delivered on time, within budget and meet specified quality standards and programmatic needs. CPD’s professional staff includes architects, engineers, cost estimators, project accounting staff, interior designers, landscape architects, a contract specialist and an environmental planner. Technical review and approval of design and construction work are the responsibility of Campus Engineering Services. UW Tacoma Facilities Services, Campus Safety and Environmental Health and Safety provide expertise on architectural, mechanical, structural, electrical, utilities, hazardous materials, environmental, safety and commissioning issues. In addition, the departments of UW IT and IT UWT provide technical expertise on communications.
4.0 Preferred Alternative Analysis

4.15.0 Schedule

PROPOSED SCHEDULE
To maximize efficiency and take full advantage of the progressive design build delivery, it is important to maintain work flow for the design build team. Ideally, the University will secure complete project funding in one biennium request. If this is accomplished, the University would enter into a preliminary agreement with the design builder during the 2019-2021 biennium to complete the design development phase in June 2021. This would position the design build team to be ready to complete construction during the 2021-2023 biennium. The milestone schedule (opposite page) outlines the work flow.

Another benefit of progressive design build is that the owner and stakeholders are able to participate in the design process. This project will require complex scheduling to minimize disruption to the adjacent buildings, campus circulation and infrastructure. The design builder will help strategize phasing of the project and develop the schedule to address the campus operation issues. An integrated team incorporates constructability review, cost estimating, and schedule development during the design phase and encourages innovative solutions while minimizing the potential for cost or schedule overruns.

VALUE ENGINEERING ANALYSIS AND CONSTRUCTABILITY REVIEW
During the design phase of the project, tasks such as benchmarking, programming and validation will occur as per RCW 43.88.110(5)(C). As the design develops, design build practices will be implemented including but not limited to items such as developing a target value budget, value analysis review and implementation, and constructability reviews.

FACTORS THAT MAY DELAY PROJECT SCHEDULE
The site identified for the UW Tacoma Academic Innovation Building contains subsurface contaminants, which will require mitigation measures that will need to be employed during design-build. Additional environmental investigations may be necessary prior to selection of the final mitigation measure. The project team will need to carefully consider these factors as they could potentially cause a delay in schedule.

CONSIDERATIONS OF PERMITTING, LOCAL GOVERNMENT ORDINANCES, OR NEIGHBORHOOD ISSUES
For any major development on the UW Tacoma campus to be successful, it requires early and active engagement with the surrounding community, the city, and property owners early in the planning process. The predesign team has already begun this process of engagement by meeting with the City of Tacoma for a Pre-Application and have obtained valuable feedback from the City officials. Refer to Appendix A8 for comments from the Pre-Application Conference.

At the start of design, it will be important to involve the city to understand permitting requirements and identify any other ordinances that could impact schedule. As an urban-serving university, UW Tacoma is committed to keeping community stakeholders engaged from the onset of planning through the duration of the project to ensure that the design of the new building is consistent with the design guidelines for the Union Station Conservation District and the urban fabric and feel of downtown historic Tacoma.
UW TACOMA ACADEMIC INNOVATION BUILDING SCHEDULE

2018 2019 2020 2021 2022 2023

- PreDesign
- UW Selection + OnBoarding
- Programming + Concept
- Design
- Building Permit
- Construction
- Occupancy

JULY 2019: DESIGN FUNDING/PROJECT APPROVAL
UW AWARD DESIGN-BUILD CONTRACT
JULY 2021: CONSTRUCTION FUNDING/PROJECT APPROVAL

4.0 Preferred Alternative Analysis
5.0.0 Project Budget Analysis
5.0 Project Budget Analysis

5.0.0 Project Budget Analysis for the Preferred Alternative

ASSUMPTIONS

In the University of Washington’s 2015-17 Capital Budget Request to the state, the University requested $500,000 in state funding for a predesign study for the Academic Innovation Building. In the 2017-19 UW Capital Plan, request for funding for the design and construction of the Academic Innovation Building is shown to occur in 2019-21. In order to adjust the project and associated budget for the escalation associated with this schedule, the project cost has been escalated at an average annual inflation rate of 3.12% through the mid-point of construction. The escalation is consistent with the Office of Financial Management recommended escalation assumptions. However, due to the uncertainty associated with the significant passage of time between the development of the current target value budget and the scheduled construction, it will be important to analyze and adjust for actual escalation at the time that design and construction funds are allocated to ensure the project budget remains consistent with the project scope.

5.0.1 Benchmarking

COST CONTROL

To ensure that the budget and scope align at the outset, and no overruns are incurred, the University committed to employing a number of tools – some unique to public sector delivery and others emulating private sector development. These tools are:

Progressive Design-Build Delivery Method

Only recently available for public projects in the State of Washington, this method allows the University to select the most qualified design-build team at the outset of the project and work with them to refine scope and budget and efficiently design and construct the building. This method allows substantial involvement with the team and emulates private sector development practices. Further, it provides great flexibility for procurement. For example, it allows competitive bidding of trade contractor and general contractor work on an open book basis, but the University can make decisions to award based on best value rather than low bid. The University is in progress on its second progressive design-build project and believes it is a powerful tool for achieving cost control, schedule reduction, and overall project value.

Project Governance

The University will use a rigorous decision-making structure to ensure that ‘scope creep’ does not occur and that costs are controlled. There are three levels to this structure: a Project Committee which will work directly with the design-build team; an Executive Committee which meets monthly to review progress and ensure that the project scope and budget remain aligned; and a Responsible Party who will resolve any issues the Project or Executive Committees are unable to agree on. This hierarchy of authority eliminates any question of ‘who gets to decide?’ and gives clear and timely direction for the team to execute. Both the Project and Executive committees will have representation from Capital Planning and Development, the Milgard School of Business, and the School of Engineering and Technology.

In addition to the decision-making structure, a Project Agreement will act as an internal ‘contract’ for the project and clearly identify scope (and exclusions), schedule, priorities, risks, and risk mitigation strategies.

Target Value Design

The benchmark projects noted below are the basis of a cost model which will guide the design and development of the building from the beginning. The cost model will feature targets for each component of the building and the team will be directed to design to those costs, rather than to design first and determine costs after. The integration of the design team with trade contractors will provide real-time cost information as the design progresses, and we will work with the team to rigorously monitor costs and make adjustments as needed to ensure the target values are maintained for each component. Savings on any individual target may be applied to other target values or moved to contingency, as determined by the project leadership.
Lean Design and Construction

The delivery method allows the team to move away from the traditional ‘100% Construction Documents’ approach to one where the design team does enough work to establish design intent and then the trade contractors complete the design only to the extent they need to for fabrication and construction. It also allows the design effort to be tailored to the construction schedule so that elements are designed in the order they will be built, rather than all documents being completed at the same time. This will allow the core and shell construction to be well underway while interior build-out is still in design, and this leads to significant schedule compression and associated cost savings.

Building on a long history of successful project delivery, the University is committed to leveraging the best practices of leading private sector projects to deliver cost certainty on this project.

DESCRIPTION OF BENCHMARKS

The UW Capital Planning and Development Office, Office of the University Architect, facilities representatives, the design team, a contractor, and an outside cost estimator researched several building examples that represented state funded higher education buildings that house engineering lab facilities and classrooms in the Seattle area, Washington State, and surrounding regions.

Five recently constructed or under construction, state funded, lab and classroom buildings in Washington and Oregon were selected as representative of the mechanical and electrical systems, exterior envelope, site conditions, structural solutions, and accommodation of related programming. Design, operational, and construction cost information was gathered on these five buildings and used to assess the range of costs for each of the Uniformat categories. These benchmark projects set a standard for construction, efficiency, and quality that was then used to set a target goal for the cost of each of the spaces. Following is a detailed description of the benchmarks.

Benchmark 1 - UW Bothell Discovery Hall STEM Building 1 (Sloped Site)

- 78,000 gsf building on a steeply sloped site
- STEM focused program including classrooms, offices, collaboration spaces, teaching labs, computer labs, project labs
- High sustainability goals: LEED Gold with radiant heating and chilled beams as a sustainable feature
- Exterior envelope: A combination of brick, terracotta, glazing, and board formed concrete with a high ratio of glazing to solid skin
- Completed in 2014
- State funded design and construction
- Total Project Cost: $62.8 million
5.0 Project Budget Analysis

Benchmark 2 - UW CSE II Classroom Building 2 (Sloped Site)
- 135,000 gsf building on a sloped site
- Computer science focused program including classrooms, offices, and lecture hall
- High sustainability goals: LEED Silver minimum
- Exterior envelope: A combination of terracotta, metal panels, and glazing with a high ratio of glazing to solid skin
- Under construction, projected completion 2018
- State and donor funded design and construction
- Total project cost: $106 million

Benchmark 3 - OSU Learning Innovation Center STEM + Classroom Building 4 (Flat Site)
- 119,129 gsf building on a flat site
- Learning space focused program including classrooms, offices, and lecture hall
- High sustainability goals: LEED Gold
- Exterior envelope: A combination of brick, precast, and glazing with a high ratio of glazing to solid skin
- Projected completion 2015
- State funded design and construction
- Total project cost: $65 million
Benchmark 4 - OSU Peavy Hall Classroom Building 3 (Relatively Flat Site)

- 82,000 gsf building on a relatively flat site
- Research lab and learning space focused program including labs, classrooms, offices, and lecture hall
- High sustainability goals: LEED Gold
- Exterior envelope: A combination of wood, metal panel and glazing with a high ratio of glazing to solid skin
- Under construction, projected completion 2019
- State and gift funded design and construction
- Total project cost: $70 million

Benchmark 5 - WSU Everett STEM Building 5 (Flat Site)

- 95,000 gsf on a flat site
- STEM focused program including student services, café, offices, administration, classrooms, and engineering/computer related labs
- High sustainability goals: LEED Gold with high efficiency mechanical system and PVs as a sustainable feature
- Exterior envelope: A combination of brick, metal panel, and glazing with a high ratio of glazing to solid skin
- Projected completion 2017
- State funded design and construction
- Total project cost: $71 million
5.0 Project Budget Analysis

TARGET BENCHMARK ANALYSIS

The analysis to arrive at the target budget included evaluation of the structural and site systems for each building condition. There were benchmarks that were located on flat sites, resulting in lower cost for foundations and site preparations, and several on a steeply sloped site that had considerably more cost associated with the site and structural requirements. The site identified for the Academic Innovation Building is also a steeply sloped site, so some decisions were made on the budget to maintain higher target budget numbers for the sloped site.

Each benchmark incorporated a variety of learning spaces including active learning classrooms as well as student research and applied learning labs. Though some were more specialized facilities, they were valuable comparable facilities that demonstrated different approaches to small classes and applied experiential learning. In the final target budget, the final numbers for equipment, interior construction, and interior finishes were determined based on the types of spaces that the project will be supporting and similarities between the proposed Academic Innovation Building program and the benchmarks.

TARGET VALUE BUDGET

The following information was gathered and evaluated to develop the target value budget. The gray column titled ACADEMIC INNOVATION BUILDING (SLOPED SITE) represents the target value budget for the project in Uniformat construction categories. Information was added to account for negotiated site services, contingencies, etc., below the subtotal for direct subcontract work to reach the total project construction cost at the bottom right of the chart. $664 per gsf is the proposed budget for the total project construction cost per gsf for this project. For additional information about the development of the target budget see the C-100 form in this section (pages 148-149).
## 5.0 Project Budget Analysis

### TARGET VALUE BUDGET BREAKDOWN

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<td>$ 45.90</td>
<td>$ 73.79</td>
<td>$ 54.17</td>
<td>$ 17.43</td>
<td>$ 17.43</td>
<td>$ 47.77</td>
<td>$ 73.79</td>
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<td>$ 2.15</td>
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<td>Interior finishes</td>
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<td>$ -</td>
<td>$ 36.44</td>
<td>$ 24.85</td>
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<td>$ 54.82</td>
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<td>$ 4.81</td>
<td>$ 5.88</td>
<td>$ 4.81</td>
<td>$ 6.17</td>
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<td>$ 57.13</td>
<td>$ 50.74</td>
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<td>$ 10.49</td>
<td>$ 4.63</td>
<td>$ -</td>
<td>$ 8.66</td>
<td>$ 25.91</td>
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<tr>
<td>Escalation, per annum</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Midpoint of construction</td>
<td>$103.03</td>
<td>$ 75.34</td>
<td>$ 582.85</td>
<td>$ 582.36</td>
<td>$ 59.31</td>
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<td>$ 870</td>
<td>$ 636</td>
<td>$ 599</td>
<td>$ 565</td>
<td>$ 502</td>
<td>$ 360</td>
<td>$ 681</td>
<td>$ 1,096</td>
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<tr>
<td>TCC plus Preconstruction Services</td>
<td>$ 872</td>
<td>$ 711</td>
<td>$ 782</td>
<td>$ 777</td>
<td>$ 561</td>
<td>$ 403</td>
<td>$ 761</td>
<td>$ 1,222</td>
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</table>

Reference Appendix A3 and the C-100 form for more detail on project cost.

| Total Project Cost | $872 | $711 | $782 | $777 | $561 | $403 | $761 | $1,222 | $664 |

All of the totals shown have been escalated to the assumed midpoint of construction. The pricing is based on the following general conditions of construction: a start date of August 2021, and a construction period of 18 months. The general contract will be progressive design-build. There will not be small business set aside requirements and the contractor will be required to pay prevailing wages. The target value estimate includes construction support services, MACC risk contingency, GC fee, and general conditions. The target value estimate assumes pre-construction services and WSST are included in soft costs.
SUMMARY TABLE OF UNIFORMAT LEVEL II COST ESTIMATES
The following cost estimate is a statement of reasonable and probable construction cost. It is not a prediction of low bid.

Basis of Cost Estimate: Conditions of Construction
The pricing is based on the following general conditions of construction:

- Construction Start Date: August 2021
- Construction Period: 18 months
- Contractor will be required to pay prevailing wages.

Exclusions:
- Owner supplied and installed furniture, fixtures, and equipment
- Hazardous material handling, disposal and abatement except as identified
- Compression of schedule, premium or shift work, and restrictions on the contractor’s working hours
- Tap fees, street use fees, electrical consumption charges
- Design testing, inspection, or construction management fees
- Architectural and design fees
- Third party commissioning
- Assessments, taxes, finance, legal and development charges
- Environmental impact mitigation
- Builder’s risk, project wrap-up, and other owner provided insurance program except as identified
- Land and easement acquisition
### OVERALL PROJECT SUMMARY

<table>
<thead>
<tr>
<th>ENCLOSED AREA</th>
<th>COST / sf</th>
<th>TOTAL PROBABLE CONSTRUCTION COST</th>
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<tbody>
<tr>
<td>50,735 sf</td>
<td>$664.22</td>
<td>$33,699,000</td>
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</table>

### PROJECT AREAS

#### ENCLOSED AREAS

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<tr>
<th>Area</th>
<th>sf</th>
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<tr>
<td>Lower Level</td>
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</tr>
<tr>
<td>Level 1</td>
<td>14,000</td>
</tr>
<tr>
<td>Level 2</td>
<td>14,000</td>
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<tr>
<td>Level 3</td>
<td>14,000</td>
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<tr>
<td>Roof Level/Penthouse</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>50,735</strong></td>
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</tbody>
</table>
### 5.1.0 Cost Estimate

#### SUMMARY TABLE OF UNIFORMAT LEVEL II COST ESTIMATES

Total Enclosed Area = 50,735 sf

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>SF</th>
<th>Cost/Bid ($/SF)</th>
<th>Total Cost ($1,000)</th>
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<tbody>
<tr>
<td>A Substructure</td>
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<tr>
<td>A10 Foundations</td>
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<tr>
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<tr>
<td>C10 Interior construction</td>
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<tr>
<td>D Services</td>
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<tr>
<td>D10 Conveying systems</td>
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<td>D20 Plumbing</td>
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<tr>
<td>F10 Special construction</td>
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<td>F20 Selective demolition</td>
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<tr>
<td>F SPECIAL CONSTRUCTION AND DEMOLITION</td>
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<td>-</td>
</tr>
<tr>
<td>G Building sitework</td>
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<td>G10 Site preparation</td>
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<td>G20 Site improvements</td>
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<tr>
<td>G40 Site electrical utilities</td>
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<tr>
<td>G90 Other site construction</td>
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<tr>
<td>G BUILDING SITEWORK</td>
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<td>26.24</td>
<td>1,331</td>
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## SUMMARY TABLE OF UNIFORMAT LEVEL II COST ESTIMATES

Total Enclosed Area = 50,735 sf

<table>
<thead>
<tr>
<th></th>
<th>Base Bid</th>
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<td><strong>SUBTOTAL DIRECT COST</strong></td>
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<tr>
<td>Construction/Risk Contingency</td>
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<td>Escalation Contingency</td>
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<tr>
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<td>69.97</td>
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<td>General</td>
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<td>NSS/Job Services/Site Logistics</td>
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<td>GC/CM P&amp;P Bond</td>
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<td>GL Insurance</td>
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<tr>
<td>Builder's Risk Insurance - By UW</td>
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<tr>
<td>Plan Review - EXCLUDED</td>
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<td>Permit fees - EXCLUDED</td>
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<td>Baseline</td>
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5.0 Project Budget Analysis

C-100

The UW Capital Planning and Development Office developed a Total Project Cost estimate based on the Maximum Allowable Construction Cost (MACC) estimate prepared by the consultant. The state of Washington’s C100 (2016) cost estimating model was used as the basis for this estimate, applying to consultant and project management fees, contingencies, and escalation.

A summary of estimated project costs is shown below. A detailed cost estimate using the OFM C100 form is shown below and on the next page.

ESTIMATED PROJECT COSTS

<table>
<thead>
<tr>
<th>COSTS</th>
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</thead>
<tbody>
<tr>
<td>Consultant Services</td>
<td>$4,296,361</td>
</tr>
<tr>
<td>Construction Contracts</td>
<td>$41,491,646</td>
</tr>
<tr>
<td>Equipment</td>
<td>$1,609,681</td>
</tr>
<tr>
<td>Other Costs Including Artwork</td>
<td>$742,408</td>
</tr>
<tr>
<td>Project Management</td>
<td>$1,839,904</td>
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<tr>
<td><strong>Total Project Costs</strong></td>
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## Project Budget Analysis

### AGENCY / INSTITUTION PROJECT COST SUMMARY

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<td>UW Tacoma Academic Building</td>
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<tr>
<td>Project Number</td>
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### Cost Estimate Summary

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<th>Description</th>
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<td>Basic Services</td>
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<td>Extra Services</td>
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<td>Design Services Contingency</td>
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<td>Consultant Services Subtotal</td>
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#### B. Construction

<table>
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<td>GC/CM Items</td>
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<td>Design-Build Contractor Costs</td>
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<td>Management Reserve</td>
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<td>Construction Contingencies</td>
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#### C. Equipment & Furnishings

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<td>Equipment</td>
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#### D. Project Management

<table>
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<tr>
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#### E. Other Costs

<table>
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*Blue Italic indicates a Percentage or Amount override was used

### Project Cost Estimate

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<td>$44,515,011</td>
</tr>
<tr>
<td>Escalated</td>
<td>$50,000,000</td>
</tr>
</tbody>
</table>
5.0 Project Budget Analysis

5.2.0 Proposed Funding

FUND SOURCES AND EXPECTED RECEIPT OF THE FUNDS

The University of Washington will request State funding to support design in the 2019-21 biennium. Additional funding will be requested for construction in the 2021-23 biennium to complement donor and other UW local fund sources.

ALTERNATIVE FINANCES

The University of Washington does not have an alternate financing plan on this project.

5.3.0 Facility Operations and Maintenance

FACILITY OPERATIONS AND MAINTENANCE REQUIREMENTS

The Academic Innovation Building will have comprehensive operation and maintenance services consistent with those provided across the UW Tacoma campus. Total Costs of Ownership (TCO) funding will come from the University of Washington Tacoma campus operating budget.

Net Operating Costs will be based on energy modeling and life cycle analysis. High efficiency mechanical, electrical, and automated building systems are key factors that will contribute to a low consumption, high performance building. The project design team will seek opportunities to exceed the requirement to meet the U.S. Green Building Council’s LEED Silver Standard.

ANTICIPATED OPERATING BUDGET IMPACT

A new 50,000 gsf Academic Innovation Building that accommodates 500 FTEs will directly affect the campus maintenance and operating budget, which consists of administrative support, building/grounds maintenance, custodial services, and contract services. There are other costs to consider that will directly impact the operating budget, for example, electricity, gas, water/sewer and waste stream removal.
5.0 Project Budget Analysis

OPERATING COSTS: BUILDING REPAIR, REPLACEMENT, AND MAINTENANCE

UW Tacoma Academic - 50,000 GSF, Capital Cost - $45M
Projected 100% funded O&M Costs as of Fiscal Year (FY) 2021
Funding is calculated for projected year 2021 at 3% increase per year of building operations costs through five bienniums.

Projected Operations & Maintenance Costs 2021 - 2031
Building Maintenance and Support

<table>
<thead>
<tr>
<th></th>
<th>Cost per gsf FY 2021</th>
<th>Projected Cost FY 2031</th>
<th>Annual $ Per sq. Ft</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Utilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td>1.2422</td>
<td>1.6209</td>
<td>81,045</td>
</tr>
<tr>
<td>Gas</td>
<td>0.2373</td>
<td>0.3096</td>
<td>15,480</td>
</tr>
<tr>
<td>Water/Sewer/Irrigation</td>
<td>0.7777</td>
<td>1.05754</td>
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</tr>
<tr>
<td><strong>Total Utilities</strong></td>
<td>2.2572</td>
<td>2.98804</td>
<td>150,299</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Custodial Services</td>
<td>1.5273</td>
<td>1.9932</td>
<td>99,661</td>
</tr>
<tr>
<td>Grounds Maintenance</td>
<td>0.1914</td>
<td>0.2496</td>
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</tr>
<tr>
<td>Solid Waste</td>
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<td>0.2201</td>
<td>11,008</td>
</tr>
<tr>
<td>Recycling / Composting</td>
<td>0.187</td>
<td>0.2438</td>
<td>12,193</td>
</tr>
<tr>
<td><strong>Total Support Services</strong></td>
<td>2.0747</td>
<td>2.7067</td>
<td>135,343</td>
</tr>
</tbody>
</table>

5.4.0 Furniture, Fixtures, and Equipment

REASON FOR INCLUDING
Owner provided furniture, fixtures, and equipment costs are not included in the project budget and will be funded out of donor or other UW local fund sources.
APPENDIX A: PREDESIGN CHECKLIST

A predesign should include the content detailed here. OFM will approve limited scope predesigns on a case-by-case basis.

- **Executive Summary**
  - Problem Statement, Opportunity or Program Requirement
    - Identify the problem, opportunity or program requirement that the project addresses and how it will be accomplished.
    - Identify and explain the statutory or other requirements that drive the project's operational programs and how these affect the need for space, location or physical accommodations. Include anticipated population projections (growth or decline) and assumptions.
    - Explain the connection between the agency's mission, goals and objectives; statutory requirements; and the problem, opportunity, or program requirements.
    - Describe in general terms what is needed to solve the problem.
    - Include any relevant history of the project, including previous predesigns that did not go forward to design or construction.

- **Analysis of Alternatives (including the preferred alternative)**
  - Describe all alternatives that were considered, including the preferred alternative. Include:
    - A no action alternative.
    - Advantages and disadvantages of each alternative. Please include a high-level summary table with your analysis.
    - Cost estimates for each alternative.
      - Provide enough information so decision makers have a general understanding of the costs.
    - Schedule estimates for each alternative. Estimate the start, midpoint, and completion dates.

- **Detailed Analysis of Preferred Alternative**
  - Nature of space – how much of the proposed space will be used for what purpose (i.e., office, lab, conference, classroom, etc.)
  - Occupancy numbers.
  - Basic configuration of the building, including square footage and the number of floors.
  - Space needs assessment. Identify the guidelines used.

- **Site Analysis**
  - Identify site studies that are completed or under way.
  - Location.
☐ Building footprint and its relationship to adjacent facilities and site features. Provide an aerial view, sketches of the building site, and basic floorplans.

☐ Stormwater requirements.

☐ Ownership of the site and any acquisition issues.

☐ Easements and setback requirements.

☐ Potential issues with the surrounding neighborhood, during construction and ongoing.

☐ Utility extension or relocation issues.

☐ Potential environmental impacts.

☐ Parking and access issues, including improvements required by local ordinances, local road impacts, and parking demand.

☐ Impact on surroundings and existing development with construction lay-down areas and construction phasing.

☐ Consistency with applicable long-term plans (such as the Thurston County and Capitol Campus master plans and agency or area master plans) as required by RCW 43.88.110.

☐ Consistency with other laws and regulations
  ☐ High-performance public buildings (Chapter 39.35D RCW).
  ☐ Greenhouse gas emissions reduction policy (RCW 70.235.070).
  ☐ Archeological and cultural resources (Executive Order 05-05 and Section 106 of the National Historic Preservation Act of 1966).
  ☐ Americans with Disabilities Act implementation (Executive Order 96-04).
  ☐ Compliance with planning under Chapter 36.70A RCW, as required by RCW 43.88.0301.
  ☐ Information required by RCW 43.88.0301(1).
  ☐ Other codes or regulations.

☐ Identify problems that require further study. Evaluate identified problems to establish probable costs and risk.

☐ Identify significant or distinguishable components, including major equipment and ADA requirements in excess of existing code.

☐ Identify planned IT systems that affect the building plans.

☐ Describe planned commissioning to ensure systems function as designed.

☐ Describe any future phases or other facilities that will affect this project.

☐ Identify and justify the proposed project delivery method. For GC/CM, link to the requirements in RCW 39.10.340.

☐ Describe how the project will be managed within the agency.
Appendix A1

☑ Schedule
   ☑ Provide a high-level milestone schedule for the project, including key dates for budget approval, design, bid, acquisition, construction, equipment installation, testing, occupancy, and full operation.
   ☑ Incorporate value-engineering analysis and constructability review into the project schedule, as required by RCW 43.88.110(5)(c).
   ☑ Describe factors that may delay the project schedule.
   ☑ Describe the permitting or local government ordinances or neighborhood issues (such as location or parking compatibility) that could affect the schedule.
   ☑ Identify when the local jurisdiction will be contacted and whether community stakeholder meetings are a part of the process.

❖ Project Budget Analysis for the Preferred Alternative
   ☑ Cost estimate
      ☑ Major assumptions used in preparing the cost estimate.
      ☑ Summary table of Uniformat Level II cost estimates.
      ☑ The C-100. If project costs are outside the C-100 cost control range, explain.
   ☑ Proposed funding
      ☑ Identify the fund sources and expected receipt of the funds.
      ☑ If alternatively financed, provide the projected debt service and fund source. Include the assumptions used for calculating finance terms and interest rates.
   ☑ Facility operations and maintenance requirements
      ☑ Define the anticipated impact of the proposed project on the operating budget for the agency or institution. Include maintenance and operating assumptions (including FTEs).
      ☑ Show five biennia of capital and operating costs from the time of occupancy, including an estimate of building repair, replacement, and maintenance.
      ☑ Clarify whether furniture, fixtures, and equipment are included in the project budget. If not included, explain.

❖ Predesign Appendix
   ☑ Completed Life Cycle Cost Model.
   ☑ A letter from the Department of Archaeology and Historic Preservation.
A2  DAHP Letter

A letter request and supporting information will be submitted to DAHP in accordance with Executive Order (EO) 05-05 along with all projects in the biennium state budget request. Confirmation from DAHP, after they have conducted their review, may be inserted here at that time.
# Appendix A3: LIFE CYCLE COST MODEL

## A3 Life Cycle Cost Model - Project Summary

<table>
<thead>
<tr>
<th>Agency</th>
<th>UW-Tacoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Title</td>
<td>Academic Innovation Building</td>
</tr>
</tbody>
</table>

### Existing Description
Currently our programming is dispersed through several buildings on campus.

### Lease Option 1 Description
LEASE OPTION: 50,000 Class A space in Tacoma to fulfill academic needs

### Lease Option 2 Description
P3 LONG TERM LEASE OPTION: Public Private Partnership Option, requires the University to purchase all FF&E, asset would revert to UWT at the termination of the agreement but at significant expense to the University.

### Ownership Option 1 Description
RENOVATION: Completely remodel Wild, Swiss and Stoneway Buildings to achieve 50,000 sqft academic need. Significant remodeling of historic buildings will be necessary to bring these facilities up to modern life safety standards and finish level for academic and lab use.

### Ownership Option 2 Description
NEW CONSTRUCTION: 50,000 gsf Academic Innovation Building to collocate Milgard and ME programming.

### Ownership Option 3 Description

<table>
<thead>
<tr>
<th>Lease Options Information</th>
<th>Existing Lease</th>
<th>Lease Option 1</th>
<th>Lease Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Rentable Square Feet</td>
<td>-</td>
<td>50,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Annual Lease Cost (Initial Term of Lease)</td>
<td>$ -</td>
<td>$ 2,047,500</td>
<td>$ 2,688,000</td>
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<tr>
<td>Full Service Cost/SF (Initial Term of Lease)</td>
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<td>$ 40.95</td>
<td>$ 53.76</td>
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<tr>
<td>Occupancy Date</td>
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<td>9/1/2023</td>
<td>9/1/2023</td>
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<tr>
<td>Project Initial Costs</td>
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<td>$ 11,909,500</td>
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<tr>
<td>Persons Relocating</td>
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<td>897</td>
<td>897</td>
</tr>
<tr>
<td>RSF/Person Calculated</td>
<td>-</td>
<td>56</td>
<td>56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ownership Information</th>
<th>Ownership 1</th>
<th>Ownership 2</th>
<th>Ownership 3</th>
</tr>
</thead>
<tbody>
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<td>Total Gross Square Feet</td>
<td>54,612</td>
<td>50,000</td>
<td>-</td>
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<tr>
<td>Total Rentable Square Feet</td>
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<td>-</td>
</tr>
<tr>
<td>Occupancy Date</td>
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<td>9/1/2023</td>
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<tr>
<td>Initial Project Costs</td>
<td>$ 241,200</td>
<td>$ 640,000</td>
<td>-</td>
</tr>
<tr>
<td>Est Construction TPC ($/GSF)</td>
<td>$ 1,342</td>
<td>$ 504</td>
<td>-</td>
</tr>
<tr>
<td>RSF/Person Calculated</td>
<td>57</td>
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### Financial Analysis of Options

#### Table 1: Financial Comparisons

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<tr>
<th>Years</th>
<th>Financing Means</th>
<th>Display Option?</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

The best NPV result for the 30 year analysis period is the Ownership 2 option using COP Deferred financing. This option becomes the best financial alternative in 2024.

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

#### Table 2: Financial Comparisons

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<th>Years</th>
<th>Financing Means</th>
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<th>No</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

The best NPV result for the 50 year analysis period is the Ownership 2 option using COP Deferred financing. This option becomes the best financial alternative in 2024.

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

| Date of Life Cycle Cost Analysis: | 6/1/2018 |
| Analysis Period Start Date | 9/1/2020 |
| User Input Years of Analysis | 0 |

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

#### Lease Options

<table>
<thead>
<tr>
<th>Inflation / Interest Rate</th>
<th>Existing Lease</th>
<th>Lease Option 1</th>
<th>Lease Option 2</th>
<th>GO Bond</th>
<th>COP</th>
<th>63-20</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>3.006%</td>
<td>3.006%</td>
<td>3.006%</td>
<td>3.160%</td>
<td>3.460%</td>
<td>3.660%</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>0.441%</td>
<td>0.441%</td>
<td>0.441%</td>
<td>0.441%</td>
<td>0.441%</td>
<td>0.441%</td>
</tr>
<tr>
<td>Length of Financing</td>
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<td>N/A</td>
<td>N/A</td>
<td>20</td>
<td>20</td>
<td>20</td>
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</tbody>
</table>

#### Ownership Option 1

<table>
<thead>
<tr>
<th>Inflation / Interest Rate</th>
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<th>COP</th>
<th>63-20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.160%</td>
<td>3.460%</td>
<td>3.660%</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>0.441%</td>
<td>0.441%</td>
<td>0.441%</td>
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<tr>
<td>Length of Financing</td>
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<td>20</td>
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#### Ownership Option 2

<table>
<thead>
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<th>63-20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.160%</td>
<td>3.460%</td>
<td>3.660%</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>0.441%</td>
<td>0.441%</td>
<td>0.441%</td>
</tr>
<tr>
<td>Length of Financing</td>
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<td>20</td>
<td>20</td>
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</tbody>
</table>

#### Ownership Option 3

<table>
<thead>
<tr>
<th>Inflation / Interest Rate</th>
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<th>63-20</th>
</tr>
</thead>
<tbody>
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<td>3.510%</td>
<td>3.710%</td>
</tr>
<tr>
<td>Discount Rate</td>
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<td>0.441%</td>
<td>0.441%</td>
</tr>
<tr>
<td>Length of Financing</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

See Financial Assumptions tab for more detailed information

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

### New Lease Assumptions

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

Tenant Improvements are estimated at $200 per rentable square foot.

IT infrastructure is estimated at $351.17 per person.

Furniture costs are estimated at $1571.91 per person and do not include new workstations.

Moving Vendor and Supplies are estimated at $205.69 per person.

### Default Ownership Options Assumptions

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

Assumes surface parking.

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

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

See the Capital Construction Defaults tab for more construction assumptions.
A4 Owner’s Project Requirements

University of Washington Tacoma
Academic Innovation Building
Owner’s Project Requirements

Predesign Phase
07/17/18

This OPR is considered preliminary because a number of key decisions that inform University requirements for systems, for example, are not yet made. The OPR should be completed during early schematic design as more specifics are developed.

Prepared by:

UW Capital Projects and Development
For:

University of Washington Tacoma

Sustainability: It’s in our nature.
Appendix A4: OWNER’S PROJECT REQUIREMENTS

UWT Academic Innovation Building—Owner’s Project Requirements

Introduction

Purpose
The intent of this Owner’s Project Requirements (OPR) is to provide high-level guidance to the project team focused on the desired outcome and performance. Much of the content is derived from the predesign meetings where the project team and the owner collaborate to define the project goals, site-specific opportunities and challenges, initial building massing and programming, and other project parameters. The predesign phase encompasses an integrative process including discovery and goal setting, as well as conceptual design solutions in response. This OPR summarizes the University’s goals as refined during the predesign phase and is the very first step in a commissioning process that will meet the standards in the WA OFM Predesign Manual, the University of Tacoma’s commissioning standards, and the requirements of the commissioning credits in LEED Rating System used by the project.

This document references information in other University of Washington and Washington State documents that provide additional information and standards applicable, including:

- UW Facilities Services Design Guide: https://facilities.uw.edu/catalog/fsdg
- UWT Facilities Services Supplemental to FS Design Guide – Update 02/22/18

Versions and updates
This version of the OPR captures the requirements of the owner as they stood after working with the project team through the predesign phase.

The OPR will be updated and expanded during design to include all primary Owner’s Project Requirements necessary to serve as the reference document for commissioning process as required in the LEED Building Design and Construction rating system version 4.0 Integrative Process and Fundamental and Enhanced Commissioning credit.

Further versions or updates to the OPR can be captured via a method agreed to by the University Project Manager and the design team such as appending a variance log.

Abbreviations

BECx  Building Envelope Commissioning
BOD  Basis of Design
Cx  Commissioning
CxA or CxP  Commissioning Authority or Commissioning Professional
LEED  Leadership for Energy and Environmental Design – a green building rating system
OPR  Owner’s Project Requirements
Appendix A4: OWNER’S PROJECT REQUIREMENTS

UWT Academic Innovation Building– Owner’s Project Requirements

General Project Information
The University of Washington Tacoma (UWT) has been in a pattern of overall sustained enrollment growth over the past several years. It is anticipated that this trend will continue especially in programs that are in high demand in the South Puget Sound region such as STEM (Science, Technology, Engineering, and Math) programs and Business programs.

The UWT Academic Innovation Building project intends to provide additional enrollment growth capacity through new classroom and lab space for the UWT Academic programs of Mechanical Engineering, Cybersecurity, Industrial Engineering, Environmental Engineering, and Business Programs as well as provide additional classroom space for the continued overall growth of all of its academic programs.

This project will expand access to high-demand programs for members of the South Sound community and allow UWT to continue its sustained growth. UWT is an urban-serving university providing access to students in a way that transforms families and communities and impacts and informs economic development through community engagement. The new building will bring disciplines together through innovation and technology to strengthen existing industry partnerships and create opportunities for collaboration and entrepreneurship.

The preferred alternative in the Predesign will be the first step, a catalyst to realizing an integrated design school that brings together innovation, technology and business. The building will house a new, high-demand engineering program with all the specialized labs and a home for the Milgard School of Business as well as large flexible classroom spaces that are needed to meet general campus growth.

The predesign established benchmarks for quality and costs for building components with the goal of developing design and cost information to allow the University to scope the project based upon available funding and support target value design efforts of a design build team.

Site and Context
- The chosen site for the project is bounded by Market Street to the West, and S 19th Street to the South. It will sit diagonally across Market Street from the University Y Student Center. Dougan, Pinkerton, Tacoma Paper & Stationery, Laborers Hall, and the Tioga Library Building are its nearest buildings. The current site is partially green space. There is an existing road Court C that bypasses the site between S 17th Street and Jefferson Ave going in the North-South direction. The building will be located on the UWT campus with walking access to public transit buses, Union Link Light rail station, and carshare programs.
- There are no significant challenges on the site itself, it has low or moderate slope along Jefferson Ave and mostly flat terrain along other boundaries of the site.

Project Description
- 1 building, for teaching, classrooms, labs, offices, auditorium, student collaboration
- 50,000 GSF
- 4-5 Stories
- New Construction, following the Design-Build delivery process.
- Planned for completion by 2023

Sustainability: It’s in our nature.
UWT Academic Innovation Building – Owner’s Project Requirements

General Operational and Occupancy Expectations
- As a university college Academic Innovation Building it will follow UWT’s quarter system with spring, summer, winter, and fall quarters throughout the year. Between quarters the occupancy will be significantly lower during school breaks.

Building Life and Flexibility
- Buildings on the UWT Campus are intended to be held indefinitely and must adapt to evolving uses over time. Design for a minimum 50-year building that can be adapted to other uses in the future.

First and Life Cycle Cost Requirements
- Estimated total project cost is $50 million
- Use both the DES Energy Program’s ELCCA and OFM’s Life Cycle Cost Tool as required to evaluate energy using systems and demonstrate how the building design will contribute to energy efficiency.
- Use the results of these analyses to inform decision-making but consider resources for operations and maintenance in final decisions.
Appendix A4: OWNER’S PROJECT REQUIREMENTS

UWT Academic Innovation Building—Owner’s Project Requirements

Project Goals, Objectives, Performance Metrics and Standards

High Level Goals
The UWT 2008 Campus Master Plan established the following guiding principles to guide development on campus:

- Enhance and develop the campus
- Provide access to an exceptional university education
- Connect knowledge across discipline
- Create bonds with the community
- Support diversity

Objectives and Performance Targets
More specific objectives for individual projects are articulated in the Design Guidelines established in the Master Plan for architecture, materials, public art, landscape and hardscape, lighting, signage and graphics, and crime prevention. Guidance and requirements for setting specific performance targets for the Academic Innovation Building follow. Once a design-build team is selected, conduct an integrative process workshop to further articulate project specific goals, objectives, and performance targets.

Energy
The Infrastructure Master Plan recommends that all new buildings on campus should be designed to meet the requirements of the Architecture 2030 challenge. Executive Order 18-01 State Efficiency and Environmental Performance, issued in January 2018, requires all newly constructed state-owned buildings to be designed to be zero energy or zero energy-capable, and include consideration of net-embodied carbon. Where a cost effective zero-energy building is not yet technically feasible, buildings shall be designed to exceed the current state building code for energy efficiency to the greatest extent possible. Because of these two directives and the UW’s charter membership in the American College and University Presidents’ Climate Commitment, the UWT Academic Innovation Building should aggressively pursue energy efficiency, to the point that the project could be net-zero if adequate funding is available.

LEED Certification
Certification as a LEED Silver building is a requirement both as University policy and because this project will receive Washington state funding. This OPR assumes the project will fall under the Version 4 of LEED. This newer version of LEED has higher baselines than version 3 (LEED 2009) and some new credits that likely mean a LEEDv4 Silver building is more equivalent to a LEEDv3 Gold building. That being said, the University has a multi-year history of achieving LEED Gold certification on major capital projects in all previous versions of LEED. Therefore, it is a recommended target and strong aspiration that the Academic Innovation Building also reach LEED Gold certification.

The follow credits are required by the University as part of any pathway to LEED Silver or Gold because of their contributions to better operating performance, to meeting the University’s Climate Action Plan, and to support faculty, staff, and student health and quality of life.

- Integrative Process
- Bicycle Facilities
- Light Pollution
- Site Assessment
- Outdoor Water Use (1pt)
- Indoor Water Use (3-4 pts)

Sustainability: It’s in our nature.
UWT Academic Innovation Building– Owner’s Project Requirements

- Enhanced Commissioning (all 6 points, including Building Envelope Commissioning and Monitoring Based Commissioning)
- Optimize Energy Performance (priority for earning as many points as possible)
- Building Product Disclosure and Optimization – Sourcing of Raw Materials (1 point)
- Construction and Demolition Waste Management (2 points)
- Enhanced Indoor Air Quality Strategies (1 point)
- Low-emitting Materials (all 3 points)
- Construction Indoor Air Quality Management Plan
- Indoor Air Quality Assessment
- Interior Lighting (1 point)

In addition, the following prerequisites, credits, and innovation will be implemented and documented by the University for an additional 10 points.

- High Priority Site (1 pt for Federal Renewal Zone or 2 possible pts for soil or water contamination)
- Surrounding Density and Diverse Uses (2 pts for Diverse Uses)
- Access to Quality Transit (all 5 points)
- Reduced Parking Footprint
- Storage and Collection of Recyclables
- Two to three Innovation credit points for campus practices including Salmon Safe certification and options under the LEED O+M Starter Kit.

Design Process Expectations

During the design phase, Life Cycle Cost Analysis will be especially valuable in helping to determine the most cost-efficient design options to achieve program and sustainability goals. The UW is committed to performing a thorough LCCA during that time.

In addition, the project team is directed to pursue the Integrative Process credit in LEEDv4 which requires a shoe box energy model and water budgeting exercise to occur before 30% design, along with development and updating of this OPR document. The IP credit and the state LCCA process should be integrated such both requirements are meet and the project team gets the best analysis to inform project decisions.

The LEED credit for a Site Assessment is also a required credit and should be included in the early design scope.
Design Standards
The base design standard for UWT are the University of Washington Facility Services Design Guidelines with the University of Washington Tacoma amendments and changes. Additional priority design standards for achieving the performance goals of this project will be established during early design and published in a version of the OPR that supports the Integrative Process credit for LEED.

Construction Standards

Construction Activity Pollution Prevention
Create and implement an erosion and sedimentation control plan for all construction activities associated with the project. For LEED, the plan must conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent. For the UW, if the project disturbs more than one acre of land, you must apply for coverage under the state Construction National Pollutant Discharge Elimination System (NPDES) permit. EH&S Environmental Programs (EP) will assist with permits on behalf of the project and provide guidance and advice in planning and during construction. In addition, this project will need to submit a Large Project Construction Stormwater Control Plan to the City of Seattle Department of Construction and Inspections.

Construction Waste Management
Develop and implement a construction and demolition waste management plan to divert at least 75% of the total nonhazardous construction and demolition material. To qualify for the LEEDv4 Prerequisite, the plan must identify at least five materials, both structural and non-structural, for diversion; the approximate percentage of the overall project waste that these materials represent; how the materials will be collected (source separated or commingled); where they will be taken; and how the recycling or diversion facility will process these materials. Alternative daily cover (ADC) does not qualify as material diverted from disposal. Land-clearing debris is not considered construction, demolition, or renovation waste that can contribute to waste diversion.

Earn the LEEDv4 credit for Construction and Demolition Waste Management at the 2-point level but diverting at least 75% of the total nonhazardous construction and demolition material and four separate waste streams. Commingled debris counts as one stream. Use source-separation for 100% recycling of three additional waste streams from the project. Provide a final report detailing all major waste streams generated, including disposal and diversion rates. Include materials destined for ADC in the calculations as waste. Calculations can be by weight or volume but must be consistent throughout. Exclude excavated soil, land-clearing debris from calculations. Include wood waste converted to fuel (bio-fuel) in the calculations.

Indoor Air Quality During Construction
Develop a plan for IAQ management and protection during construction that meets the requirements of the LEED Credit for a Construction IAQ Management Plan and follows the guidance of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3.

Engage a firm to conduct air quality testing to verify building indoor air quality before occupancy and earn two points for the Indoor Air Quality Assessment credit in LEED. See the LEED credit for detailed requirements of testing conditions and thresholds for passing.
UWT Academic Innovation Building – Owner’s Project Requirements

Commissioning, Training, Operations, and Maintenance Requirements

Standards

Commissioning
The UWT Academic Innovation Building will be commissioned to achieve the LEEDv4 Fundamental Commissioning and Verification prerequisite and the Enhanced Commissioning and Building Envelope Commissioning part of the LEEDv4 credit, and to comply with requirements for Building Enclosure Commissioning and Forensics section of the Architecture and Accessibility Design Guidelines chapter and Commissioning chapter for the Facility Services Design Guidelines. The University of Washington will engage in the services of appropriate commissioning professionals to complete these services prior to end of the design development phase as required by LEED. Systems to be commissioned include at a minimum: HVAC and associated controls, plumbing fixtures and hot water systems, rainwater collection systems, renewable energy systems, lighting controls, telecommunications, security systems and fire protection. Building Envelope commissioning will include code required air barrier testing and other reviews and tests appropriate for the envelope systems selected.

Post-Occupancy LEED requirements
The transition to occupancy process must include all the post-occupancy elements required in the credit for Enhanced, Building Envelope and On-going Monitoring-based Commissioning, including:

- Verify systems manual updates and delivery.
- Verify operator and occupant training delivery and effectiveness.
- Verify seasonal testing.
- Review building operations 10 months after substantial completion.
- Develop an on-going commissioning plan.

Air quality testing to earn two points for the Indoor Air Quality Assessment credit in LEED is also a required part of the T2O process.

Training and Building User Engagement
Operations and maintenance training requirements are defined in the specifications for T2O. More extensive training extending to building users covering such things as how to use operable windows, daylighting controls, operating movable walls, etc. should also be addressed.
VISION CARD EXERCISE

The design team held a vision card exercise for the project working team to develop their vision. The team asked them what UW Tacoma currently is to them and what they want to see in the future. The cards on the following pages are the cards selected by the group and why they chose them.

The overall vision the group developed was as follows:

\textit{UW Tacoma is young, urban, growing, launching, diverse, and accessible. By understanding and harnessing the strengths of a diverse population, UW Tacoma will become a model and a positive stand-out in the university system.}
CURRENT

-UW Tacoma currently is...

- **DIVERSE**
  Young ideals, still easily distinguishable

- **GROWING**
  Young, growing University

- **URBAN**
  Urban environment with old, industrial buildings; Holds a rich heritage

- **COMMUTER CAMPUS**
  Access to the campus is challenging

- **SUSTAINABLE**
  Dedicated to sustainability, LEED/ENERGY

- **IDEA-DRIVEN**
  Ideas are continually launching all over campus

FUTURE

-The future of UW Tacoma is...

- **DIVERSE**
  Develop diversity so that differences are invisible and non-distinguishable

- **UNIQUE**
  Future potential to become a positive beacon for students; Stand out from other universities

- **FEED + EDUCATE**
  Feed and educate through diversity; Nurture developing population+ urban market,

- **COLLABORATE**
  Collectively embark on this new adventure: Meet challenges, work together, take risks, cooperate, & soar high!
Appendix A5: PREDESIGN PROCESS DOCUMENTS

COSTING OPTIONS

Following up on program prioritization, costing options were presented at workshop 6.

01
FULL PROGRAM
128,000 GSF
$129,000,000

02
PRIORITIZE PROGRAM
101,000 GSF
$99,000,000

03
RE-LOCATE CIVIL ENGINEERING
107,000 GSF
$104,000,000

04
PRIORITIZE + RE-LOCATE CIVIL
86,000 GSF
$82,000,000
## UWT ACADEMIC BUILDING - Predesign Report - Program Summary DRAFT

### Phase 1

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<th>Category</th>
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| **Office and Support**                        | Subtotal                         | 1,920    |          | 1,920     |            |              |          |
| **Mechanical Engineering**                    | Dept. Subtotal                   |          |          | 1,920     |            |              |          |
| Faculty Office                                | 14                               | 1        | 120      | 1,680     |            |              |          |
| Student Advising                              | 2                                | 1        | 120      | 240       |            |              |          |
| **General**                                   | Dept. Subtotal                   | 200      |          | 200       |            |              |          |
| Board Room                                    | 1                                | 25       | 200      | 200       |            |              |          |

| **Milgard School of Business**                 | Subtotal                         | 7,315    |          | 7,315     |            |              |          |
| **Classrooms**                                | Dept. Subtotal                   | 2,160    |          | 2,160     |            |              |          |
| Group Rooms                                   | 12                               | 6        | 30       | 180       | 2,160      |              |          |

| **Collaboration Space**                       | Subtotal                         | 1,100    |          | 1,100     |            |              |          |
| **"Center for Centers"**                     | Dept. Subtotal                   | 2,605    |          | 2,605     |            |              |          |
| Reception                                     | 1                                | 1        | 300      | 250       |            |              |          |
| Meeting Rooms                                 | 2                                | 8        | 160      | 320       |            |              |          |
| Offices                                       | 8                                | 1        | 130      | 1,040     |            |              |          |
| Workroom                                      | 1                                | 1        | 100      | 125       |            |              |          |
| Storage                                       | 1                                | 1        | 30       | 30        |            |              |          |
| Interview Rooms                               | 4                                | 2        | 60       | 240       |            |              |          |
| CBA                                           | 1                                | 1        | 150      | 150       |            |              |          |
| CLSR                                           | 1                                | 1        | 150      | 150       |            |              |          |
| MSC                                            | 1                                | 1        | 150      | 150       |            |              |          |
| MSBA Tech Room                                | 1                                | 1        | 150      | 150       |            |              |          |

| **Office and Support**                        | Dept. Subtotal                   | 1,450    |          | 1,450     |            |              |          |
| **Staff Offices**                             |                                  |          |          | 1,450     |            |              |          |
| Student Advising                              | 6                                | 1        | 25       | 150       |            |              |          |

| **General**                                   | Subtotal                         | 12,470   |          | 12,470    |            |              |          |
| **Atrium/Open Collaboration**                 | Dept. Subtotal                   | 5,750    |          | 5,750     |            |              |          |
| 1                                              | 80                               | 25       | 3,000    | 2,000     |            |              |          |
| **Auditorium**                                | 1                                | 150      | 25       | 3,750     | 3,750      |              |          |

| **Classrooms**                                | Subtotal                         | 6,720    |          | 6,720     |            |              |          |
| Seminar Rooms                                 | 2                                | 12       | 20       | 240       | 480        |            |          |
| Open Computer Lab                             | 1                                | 60       | 20       | 1,200     | 1,200      |            |          |
| 60-70 Seat Classrooms (tiered)                | 2                                | 70       | 26       | 1,820     | 3,640      |            |          |
| 60-70 Seat Classrooms (flat)                  | 1                                | 70       | 20       | 1,400     | 1,400      |            |          |

| **Total NASF**                                |                                 | 32,795   |          | 32,795    |            |              |          |
| **Total GSF**                                 |                                 | 50,504   |          | 50,504    |            |              |          |
Hacker Architects held a program adjacency exercise early in the process. This pushed the project working team to think about program needs and their specific requirements. The design team asked the group what pieces of the Milgard Business School and of the Institute of Technology have opportunities for overlap and collaboration. They also started the conversation about utilizing shared resources as a strategy to reduce the overall program.
Collaboration + Commons Adjacencies

The project working team started to find connection and adjacencies in their shared collaboration spaces. This exemplified their focus on creating a strong central hub in the building. They expressed the importance of this because of the prominence of commuter students on the campus.
Appendix A5: PREDESIGN PROCESS DOCUMENTS

**Milgard Large Classroom + Group Rooms**

As discussed in the “space needs assessment,” section, 60-70 person classrooms with associated group rooms is in high demand in the Milgard School of Business.

**School of Engineering & Technology Cybersecurity Lab**

IoT’s cybersecurity lab requires special data separation from other labs and classrooms.

**School of Engineering & Technology Offices**

The Institute discussed the importance of distributed offices in between labs and classrooms. This will create better connectivity between students and professors.
School of Engineering & Technology Senior Design Labs

IoT’s senior design labs should be connected with the fabrication shop. Institute students need a place to develop and store their projects.

Milgard Office + Support

Milgard wants to create an office hub where students can connect with professors and get advice on their education.
Meeting Notes

Date: 13 February 2018  Project: UWT Academic Building Pre-Design
Author: Rachel Schopmeyer  Project No: 1801
Re: Predesign Kickoff  Next Mtg: 14 February 2018
Present: UW Tacoma: Elizabeth Hyun, Patrick Clark, Rupinder Jindal, Howard Smith, Patrick Pow, Dave Leonard, John Stevens, Stanley Joshua, Joel Larson, Jennifer Myers
Hacker: Will Dann, Stefee Knudsen, Scott Barton-Smith, Rachel Schopmeyer
Cc:

1) Introduction. The goal of this meeting is for the team to learn what UWT STEM and business students need for success, and to learn the highest priorities for a new UWT Academic building.

2) Discussion of schedule and process. This group is working toward a draft report that must be submitted to CPD June 1, 2018.

3) Initial questions:
   a) A question about the specific scope of this group’s work was raised. This group will contribute to creating the story, the compelling argument for this building. The charge is to define just enough about the requirements to establish a realistic program and budget to make the case for this building and outline the criteria for the future design-build team.
   b) Regarding a question about who needs to attend which meetings, we discussed that not everyone will have to necessarily attend every meeting. For the example of IT, we will need enough information for high-level scope and accurate cost estimating.

4) Programs (See attached scans)
   a) Institute of Technology (IoT)
      i) IoT probably requires 20 offices.
      ii) The registrar has data about current and projected classroom use.
      iii) Cyber-security is a growing part of many programs, but nests under IT
      iv) Hillside accessibility is an issue.
      v) WSU Everett STEM building is a well-regarded precedent for the new building.
   b) Milgard School of Business
      i) Milgard has primarily private offices for staff, some of these need conference rooms, interview rooms, community access.
      ii) Milgard could require 60 staff, 20 faculty offices.
      iii) Milgard could use an auditorium or large classroom space for approximately 200 students, a space that would be appropriate for prestigious speakers.
iv) Milgard has several endowed centers: Milgard Success Center (career planning and placement), Milgard Center for Business Analytics, Milgard Center for Leadership & Social Responsibility, Milgard Center for Women and Innovation is a new center.

v) A dedicated Milgard building is another goal, Milgard programs would potentially be split between that building and the new building. This leads into the discussion of what Milgard programs would benefit from overlap with IoT programs in the new building.

5) Discussion of focus groups
   a) Milgard has had a building committee in the past, which could be useful to revisit.
   b) The group discussed concerns about representing programs that do not yet exist. The response from Hacker was that given that this building will not open for four years, flexibility will be key.
   c) Who was missing from this meeting? Environmental Health Safety and Campus Safety and students. Campus Safety will be represented at the 2/14 session.

6) The session closed with a discussion of the homework
   a) Business case for this project
   b) This project’s promise to a student
   c) Mapping each department and important interactions

Attachments: Sign-in sheet, group program discussion photos

Comments:
Appendix A5: PREDESIGN PROCESS DOCUMENTS

Meeting Notes

Date: 14 February 2018  Project: UWT Academic Building Pre-Design
Author: Rachel Schopmeyer  Project No: 1801
Re: Predesign Workshop 1: Goals and Visioning  Next Mtg: 8 March 2018
Present: UW Tacoma: Elizabeth Hyun, Patrick Clark, Rupinder Jindal, Howard Smith, Patrick Pow, Dave Leonard, John Stevens, Stanley Joshua, Susan Wagshul-Golden, Joel Larson, Jennifer Myers
Hacker: Will Dann, Stefee Knudsen, Scott Barton-Smith, Rachel Schopmeyer
Cc:

1) Introduction. The goal of visioning is to establish a common language, set high-level aspirations we can measure products against, and establish the beginning of the story of what a great investment this building is.
2) Visioning Exercise (Photos attached)
   a) Descriptions of the current character and culture of UW Tacoma
      i) Group 1
         (1) Still young, growing.
         (2) Urban, with the heritage of old, industrial buildings. Urban-serving.
         (3) Still figuring out diversity—young diversity.
      ii) Group 2
          (1) Unity and diversity, but with differences still easily distinguished.
          (2) Dedication to sustainability. LEED/ Energy.
          (3) Growing university.
      iii) Group 3
           (1) Ideas launching, many all over campus.
           (2) Diversity, working together.
           (3) Can’t even get here! This is a commuter campus (that you can’t get to...)
   b) How will this project change the character and culture of UW Tacoma in the future?
      i) Group 1
         (1) Taking risks.
         (2) Standing out in the state university system, attracting positive attention.
         (3) Developing diversity.
      ii) Group 2
          (1) So diverse that differences are invisible.
          (2) Adventure – new opportunities, group efforts, meeting challenges together.
          (3) Standing out from other universities as a beacon to students.
iii) Group 3
   (1) All comes to fruition and feels like paradise, ideal, feels good to all.
   (2) Feed and educate through diversity, nurturing a diverse population, urban market, balanced diet, all good for you.
   (3) Cooperate and soar high.

3) Discussion of homework
   a) Business case (See attached scans.)
   b) Promise of this project to a student (See attached scans.)

4) Synergies and Challenges. The group discussed possible synergies between the programs in the new building.
   a) There is already a joint degree between the IoT and Milgard, the Masters of Cybersecurity.
   b) The Center for Business Analytics is currently co-located with Data Science, which also works with the Center for Strong Schools.
   c) Engineering students creating new business ideas is a synergy, which relates to the potential for a shared Entrepreneurial Center. Entrepreneurship is already a part of the IoT curriculum. New engineering programs will have classes in entrepreneurship.
   d) Large classrooms would create efficiencies by allowing sections to be larger and freeing up time.
   e) A community partner like CoMotion at UW Seattle would be a valuable adjacency to IoT and Milgard.
   f) There is interest in going beyond these two groups into synergies with interdisciplinary arts and sciences.
   g) The group had a side conversation about spaces, and the desire for a welcoming front door, transparency, legibility. Bates Technical College was referenced as a good example of flexible, combinable spaces, everything feeling connected, and providing spaces for students to do projects. Big lecture halls and the strong desire for an auditorium were discussed. Paul Allen Computer Science Building was referenced for its transparency and legibility. The professional development building in Seattle was also referenced for the ability to see the building’s activities from the exterior.

5) Next Steps
   a) Hacker asked all team members to continue to think about synergies between IoT and Milgard to make the case that this investment is greater than the sum of its parts.
   b) Hacker asked all team members to add to the business case considering “what is the impact if this building does not happen?”
   c) Hacker will send sample questions and a template to help the team prepare for the Focus Group interviews scheduled for 2/22.

Attachments: Sign-in sheet, visioning exercise photos, group homework discussion summary photos, individual homework scans

Comments:
Meeting Notes

Date: 22 February 2018  Project: UWT Academic Building Pre-Design
Author: Rachel Schopmeyer  Project No: 1801
Re: Institute of Technology (IoT) Focus Group  Next Mtg: 8 March 2018
Present: UW Tacoma: Joel Larson (JL), Director of Operations IoT; Eyhab Al-Masri (EA), Assistant Professor IoT; Elizabeth Hyun (EH)
Hacker: Steffee Knudsen (SK), Scott Barton-Smith (SB), Rachel Schopmeyer (RS)
Estime: Roz Estime (RE)
Cc: UW Tacoma: Patrick Clark
    Hacker: Will Dann

1) Institute of Technology (general discussion)
   a) Capacity - the Computer Science and IT Programs are overloaded—Computer Science’s goal size is 360 undergrads, 120 grads, they are currently over those numbers.
   b) JL – the IoT department appreciates having as many writeable surfaces as possible, and smart boards in labs for flexibility.
   c) IoT would benefit from more collaboration spaces outside of classrooms/scheduled spaces.
   d) Regarding storage, access to storage is more important than whether it is centralized or broken up.

2) Classrooms
   a) IoT needs two 60-70 person classrooms. That size will allow for combining sections, which isn’t possible now. The 70 student cohort is driven by available classroom size, which requires the classes be split into two sections.
   b) IoT would use a 120 person classroom. They currently use a black box. This room would not need demonstration equipment.
   c) Additional classroom types IoT would like to have. These could be general classrooms that IoT has priority scheduling for.
      i) Active learning classroom (30-36 students)
      ii) Computer classroom (35-40 students) – JL likes the pop-up computers they have at Everett, because they allow the ability to switch from a computer classroom to a standard classroom in the same class period. (Note: IT has some concerns about this same classroom based on maintaining the furniture.)
      iii) Campfire classroom (distance learning)
   d) Seminar rooms - Everett STEM building has 6-8 person seminar rooms off their senior design lab. The UWT team feels that those rooms could come off the hallway in the new building for better sharing of the rooms.
3) Offices
   a) 4-5 offices for each new program to start.
   b) MDS second floor has some IoT offices, including some empty ones that will be filled immediately.
   c) EA’s 2/22 email details additional offices for Student Advising (1-2), Lab Techs/Personnel (3-4), Tutors (1-2)
   d) IT will add offices for growth (6) and Masters program.
   e) SK – we will quantify office needs through the questionnaires.

4) Labs (general discussion)
   a) Regarding lab capacity in general, Joel relayed that Raj feels comfortable with the capacities in the comparable Everett labs.
   b) Dedicated research space for faculty is also needed.
   c) Regarding lab support spaces, a shop like the one at Everett is needed. They currently pay for a local fab lab.
   d) RE – most labs at Everett have fume hoods, another approach is shared prep labs with shared storage and a shared fume hood.
   e) The group discussed the concept of the lab module, and how it synchs with the structural module of the building. The group agreed that it would be best not to assume the absolute minimum lab module, and instead assume something like a 11’ module. (Note: CLT is generally most efficient with a 12’ module.)

5) Mechanical Engineering Labs
   a) Fluid Mechanics
   b) Solid Mechanics and Materials
   c) Senior Design Lab (25-30 students)
   d) Microprocessor/ Mechatronics (24 students)
   e) CAD Lab
   f) Industry 4.0/ Cyber Physical Systems (lecture space for 15-20 students, 6’X24’ equipment space)

6) Civil Engineering Labs – program is 6-8 years out. These labs are second priority. Roz mentioned the option of shelling out these labs. Roz posed the question to the UWT participants—whose Civil program do they want to emulate?
   a) Combustion and HVAC (16 students)
   b) Robotics and Automation (16 students)
   c) Automotive Systems (16 students)
   d) Waste Water (16 students)

7) Bachelors of Cybersecurity Lab
   a) Isolated Network Lab. If necessary this lab could possible overlap with the CAD lab, we can discuss further with IT. All computer labs will have secure access, but Bachelors of Cybersecurity needs a dedicated space.

Attachments:

Comments:
Meeting Notes

Date: 22 February 2018  Project: UWT Academic Building Pre-Design
Author: Rachel Schopmeyer  Project No: 1801
Re: IT Focus Group  Next Mtg: 8 March 2018
Present: UW Tacoma: Patrick Pow (PP), VC for IT; John Stevens (JS), Network Manager; Tim Kapler (TK), Media Maintenance; Paul Lovelady (PL), Multimedia Production; Mark DePaul (MD), Media; Josh Carper (JC), Computer Support; Joe Kapler (JK), Media Maintenance; Elizabeth Hyun (EH), Patrick Clark (PC)
UW IT: John Templin, Facilities Specialist
Hacker: Stefée Knudsen (SK), Scott Barton-Smith (SB), Rachel Schopmeyer (RS)
Cc: UW IT: Mark Palmatier, Operations Manager; Hacker: Will Dann

1) Introduction
   a) SK introduced the project, and described the scope of work of this predesign effort.
   b) The group discussed the goals of this meeting, which included learning what UW IT will be responsible for in this process, outlining the process, learning about IT standards for the types of spaces planned for the new building, and learning if there will need to be IT rooms in the new building.

2) General conversation
   a) UW does not provide AV itself.
   b) There is a data center on campus with a backup server room in Cherry Parkes.
   c) Cherry Parkes server room is an example of what not to do, Joy building is better.
   d) The group discussed distance learning. Regarding the Everett STEM building precedent, PC said the WSU is more centralized and uses more distance learning, the distance learning usage on the UWT campus is low. The group went on to discuss different types of distance learning. As present, The Institute of Technology (IoT) is most interested in connecting to Federal Way, which is already possible.

3) SB shared a list of specific spaces which are being discussed as part of this project.
   a) IoT
      i) Civil labs
      ii) Mechanical labs
      iii) Shared spaces
      iv) (Potentially) an isolated network lab
   b) Milgard
      i) Auditorium
4) Given the timeframe of this process, SB asked the group what a building that would open in four years need that is different than a building operating now. The conversation also covered general hopes/desires for the new building.
   a) It would be nice to have a satellite location for IT in the building.
   b) The group discussed assisted listening, and the approach in the Joy Building. Now they generally stub out the assisted listening equipment, and store the related equipment. (See more below.)
   c) The IT group also currently stores laptops. There aren’t enough computer classrooms so they use laptop carts.
   d) Wi-Fi is not necessary to include on a room data sheet because it will be included everywhere, inside and out.
   e) The project should include lots of outlets. Everywhere.
   f) The university currently utilizes a standard size custom made rack with a table, the table is critical for accessibility.
   g) The group discussed lecture capture systems, and the fact that pan tilt zoom (PTZ) cameras haven’t always been installed thoughtfully.

5) The group discussed overarching classroom considerations.
   a) Accessibility – IT accessibility is a big concern. SK shared an example of an integrated listening system from Austin Hall. Hacker will share more information on that example. The group sees the new building as an opportunity for universal design.
   b) Power
   c) Digital HD
   d) Recording

6) The group went on to discuss more details about classrooms, computer classrooms and computer labs.
   a) There is a need for large (40 person) computer classrooms. The question was raised as to whether CAD labs can double as computer classrooms.
   b) When labs are used for specialized software (like GIS) there is a value to keeping the size of the lab smaller (25 person) because the software requires more support. This group felt 25 was a good cap for labs utilizing specialized software. It’s also the case that some specialized software is incompatible with others, like GIS and forensics.
   c) The group referenced rooms in Pinkerton, Cherry Parkes, as well as Science 109 and 111. Later Dougan 270 and 280 were mentioned.
   d) The group sees the need for 1-2 computer classrooms for 40 people along with smaller classrooms.
   e) Dougan 101 was offered as an example of a 40 seat computer classroom that Milgard uses to teach business math with specialized software. WG210 is a 24 seat general computer classroom.
   f) The group discussed the retractable computers used in some of the Everett computer labs, which representatives of the IoT like. The IT group has concerns about the long term functionality of those extra moving parts, but PC pointed out that the retractable desks could be better in 4 years.
   g) Currently the university spends 22K for a single projector room, 26K for a dual projection room. There is an expectation that some of the rooms in this project will be more expensive.
   h) Smaller classrooms typically have a single 27” monitor, larger ones have two 22” monitors.
7) The group discussed the types of cameras that are likely to be needed for the building.
   a) Documents
   b) Lecture Capture
   c) Distance Learning
   d) Security (there will be more conversations around the approach to security and the related use of cameras.)

8) There was a brief discussion of security needs, which include blue phones and door access devices. Phones have been included in classrooms and labs in case of emergency, but there is a question of whether that is necessary when everyone carries a phone.

9) The group discussed common spaces.
   a) EH said the students are looking for a capital project to partner with on a student community space.
   b) Technology needs of a common space are in part determined by their use as event spaces.
   c) In informal student collaboration spaces, there is a minimum of providing a screen with an input, and a maximum of providing a screen with a computer. WG108 is a good example, as are the glass rooms between Cherry Parkes and McDonald Smith 324A, B, & C.

Attachments:

Comments:
Meeting Notes

Date: 22 February 2018  Project: UWT Academic Building Pre-Design
Author: Rachel Schopmeyer  Project No: 1801
Re: Milgard Focus Group  Next Mtg: 8 March 2018
Present: UW Tacoma: Rupinder Jindal (RJ), Assistant Professor Milgard School; Jaime Core (JC), Manager, Operations and Programs, Center for Business Analytics; Jennifer Heckman (JH), Lecturer Milgard School; Elizabeth Hyun (EH) Hacker: Stefee Knudsen (SK), Scott Barton-Smith (SB), Rachel Schopmeyer (RS)
Cc: UW Tacoma: Patrick Clark Hacker: Will Dann

1) Introduction
   a) EH described the accelerated schedule and SK reviewed the goals of the predesign process.
   b) Regarding a question about SF/ person in a classroom, SK gave an overview of some classroom types and the SF/ person each requires. JH said that the traditional lecture hall doesn’t support current pedagogy. SK referenced some flexible, reconfigurable classrooms in previous Hacker projects that have been popular with users.
   c) The group discussed the possibility of a donor building in the future. For the purposes of the predesign process, we don’t need to take that into consideration. The products of the predesign process will be flexible and useful whether or not there is a standalone donor building in the future.

2) Discussion of where the program is now
   a) Programs include a large undergraduate program, MBA, MAcc (Master of Accounting), Master of Cybersecurity Leadership, Master of Science in Business Analytics. Note: this is not a full list, just the programs mentioned.
   b) New programs include a design school and a program for innovation and analytics.
   c) SK clarified that we would like questionnaires filled out for each center as well as each academic program. Centers include the Milgard Success Center, Center for Business Analytics, and Center for Leadership and Social Responsibility.
3) Discussion of Process and Logistics
   a) The group present cannot fill out the questionnaires, but they can facilitate getting them filled out.
   b) Jaime, Jennifer, and Rupinder will take the questionnaires to the directors of each program. Hacker requested responses by the week of 2/26. The goal is to be able to discuss the questionnaire responses in the meetings the following week (of 3/5).
   c) EH proposed asking Howard Smith to send a letter to the directors explaining the process and the urgency.
   d) SK proposed sharing a simplified schedule with this group.
   e) SK asked the group for business schools or elements of business schools they consider good precedents for the new building.
   f) The group gave feedback on the questionnaires which was reflected in revisions to the questionnaires. The revised questionnaires, including a separate one for the dean, were sent out on 2/23.

Attachments:

Comments:
### Meeting Notes

**Date:** 7 March 2018  
**Project:** UWT Academic Building Pre-Design  
**Author:** Caitie Vanhauer  
**Project No:** 1801  
**Re:** Facilities Focus Group  
**Next Mtg:** TBD  
**Present:** UW Tacoma: Elizabeth Hyun (EH), Jennifer Myers (JM), Philip McEachin (PM), Dan Lawson (DL), Richard Monk (RM), KJ Blakeley (KJ), Frank Bissen (FB), Stanley M. Joshua (SJ)  
Tres West Engineers: Sean Roy (SR) Les Saffell (LS)  
PAE: David Mead (DM)  
KPFF: Nalini Chandran (NC)  
UTS: Cos Roberts (CR)  
Hacker: Scott Barton-Smith (SB)  
**Cc:** Hacker: Will Dann, Stefee Knudsen  
UWT: Patrick Clark

1) **Introduction.** The goal the facilities workshop was to discuss UWT standards, sustainability goals, and utility considerations.

2) **Discussion about UW Standards:**
   a) **UW standards** (updated in 2017) on the website ([https://facilities.uw.edu/catalog/fsdg](https://facilities.uw.edu/catalog/fsdg)) were written specifically for UW Seattle. UWT has its own amendments that reflect the Tacoma campus preferences. JM will email to the team. In the event of conflicts between the two standards, the predesign team should ask UWT for clarification.
   b) **UW also has an EHS standard** which describes items like fire systems, safe access and laboratories. Subsequently Hacker found a Lab Safety Design Guide: [https://www.ehs.washington.edu/system/files/resources/Lab-Safety-Design-Guide.pdf](https://www.ehs.washington.edu/system/files/resources/Lab-Safety-Design-Guide.pdf)

3) **Group discussed current traffic on campus:**
   a) Traffic in the campus area is expected to increase significantly in the coming months and years due to a large amount of local development.
   b) Pedestrian safety will be a major concern. Highly visible crosswalks and ADA curb cuts are a must and should not be value engineered out of the project as has happened in recent projects.
   c) There should be ample off-street loading docks that consider pedestrian access. For example, some UW Seattle buildings don’t have loading docks which causes trucks to pull onto the sidewalk to load/unload causing pedestrian conflict.
   d) Flashing crosswalk lights and a sky bridge across Jefferson should be considered.
e) James Sinding / UWT Facilities is very familiar with recent traffic studies and Elizabeth can schedule a meeting between Hacker, the Civil consultants, and James to understand traffic impacts and how they may affect current master plan circulation.

4) The transformer is typically in the building. For undergrounding the power lines, Tacoma Power typically tries to get the developer to pay for undergrounding the lines. The City is trying to get a system set up for reimbursement of this expense through a developer's agreement but that is not established yet.
   a) Tacoma power will be contacted to discuss a primary switch for electrical service with UW owned transformers for expandability.

5) General growth is going up the west side of the campus.

6) The group discussed the UWT Masterplan done in 2008 & potential changes:
   a) The Utilidor concept in the Masterplan has not been expanded since the masterplan and the attendees were skeptical that it would be expanded as part of this project. Recent buildings have had independent connections to utilities and no campus central plant has been created. It can be beneficial to be able to isolate individual buildings as needed for service repairs. There was discussion about the potential for the Academic Building Project to be part of a new central facility that could back feed buildings along the existing utilidor and could expand with new buildings as development continues up the hill. It will be expensive and it would need to be part of the business case to the state for funding. Ultimately on full campus build-outs, a central plant system is ideal, but it has been a low priority thus far.
   b) Contaminated soil on the project site is a concern. The masterplan generally diagrams plumes and an additional geo-tech study has been provided to the predesign team that includes more detailed contaminant information. The Y building nearby, needed under slab treatment to prevent vapor intrusion from soil contamination. There was also an under-slab dam built to divert contaminated storm water from further contaminating a clean aquifer. Y Building placement could have avoided that cost and should be considered for the Academic Building as a cost consideration.

7) UWT will provide As-built drawings of the Court 17 building so that the design team can consider floor alignments and potential parking garage connections.

8) The site survey provided by the predesign team will include survey of the entire width of adjacent streets and facing facades of Court 17 and Pinkerton.
   a) Drainage: lots of sloping across the site
   b) Court C could have unforeseen conditions (1900 cobblestone)
   c) Court C will be vacated

9) The building will require a number of facility spaces as described in the slide deck. In addition:
   a) A mail room will not be required. UWT centralizes shipping and receiving at the MAT building. Mail is distributed from there.
   b) A recycle sorting space will be required in the building. In addition, there is an existing waste and recycle area at the corner of Jefferson and Court C that will need to be replaced as part of the project. This area serves several adjacent buildings. There used to be a compactor that connects to the sanitary sewer at this location and should also be replaced as part of the project. JM will send information with more detail.
   c) Material storage for the engineering labs should be accounted for in the new building.
   d) Plans should include a kitchen.
   e) Male, female, and single use gender neutral bathrooms.
   f) Retail space, as part of the project, is desired to activate Market and Jefferson streets. The facilities require that these spaces be designed to be independent regarding the utilities. It has been difficult to combine academic building systems and try to sub meter for leasing purposes. Shafts for potential restaurant exhaust should be provided to
enable the addition of retail restaurants. Bathrooms and grease trap accommodation should also be considered.

10) A generator may be required if there is demand for emergency/standby power that cannot be reasonably accommodated otherwise. It will not be tied into the existing campus. Usually on ground levels on this campus, not on roofs.

11) Facilities prefers an enclosed penthouse space for mechanical equipment because of their ease of access and safety. There are at least two examples on campus including Tioga. The cost constraint is understood and will play into the decision. One of the campus examples is open air but protected with walls and a roof.

12) Service elevator to the roof should be provided. Roof top equipment includes filters and motors that will need to be replaced. Ladders are unacceptable.

13) The Fire Alarm system will be a (6) wire system with mass notification including speakers, xenon and amber strobes per 2020 IFC (International Fire Code).

14) Reduced window quantity was discussed as an energy saving measure. Hacker highlighted the trade-off of energy performance with the desire for people to have daylight and connection to nature. A target of 40% glazing was cited as a potential reasonable goal consistent with high performing buildings. The predesign team would also like to note that high performing buildings are often designed with a higher proportion of windows, especially if the passive strategies, and daylight harvesting are employed.

15) DM mentioned that UW Seattle is moving away from VRF systems and asked if UW Tacoma has had issues. UWT has had success with installations that are working well but UWT is not closely tracking leaks in the system. There is no preference or reservations with VRF. DM pointed out upcoming regulation phasing out R410A refrigerants in 2021. As HFC refrigerants (like 410A) are phased out, A2L refrigerants will be a replacement. A2L refrigerants are mildly flammable and it is unclear how they will be adopted with systems that pump refrigerant around a building (like VRF). UWT recognizes that VRF has been a solution for the existing buildings on campus (due to space constraints) but it isn’t necessarily the best solution for new buildings.

16) The Science Building has two gas fired boilers that have been inefficient. If gas boilers are recommended they should be used for space heating only. UWT prefers on demand local water heating.
   a) Separate out small heating loads.
   b) Closed loop heating and cooled water (no condenser water loop system)

17) 2020 IFC 6 wire requirement – amber light, etc.

18) Distributed Antenna System (DAS) system will be required for first responders.

19) A PA system is desired. Elizabeth will schedule a meeting with the team and UWT security to talk about campus security requirements including PA, lock-down, blue phones, cameras etc. All exterior doors will have a “lockdown” system.

20) UWT prefers that card access infrastructure be planned for all classroom doors even if only a small percentage will be implemented when built.

21) LEED Silver and 2030 Challenge (likely 80% by time project happens) should serve as sustainability goals. Although UWT is more interested in high performance buildings than the ratings themselves.

22) STARS no impact on design but they are currently documenting for it.

23) Greenhouse Gas Emissions – 70% target reduction

24) Campus water goals from the master plan are still applicable. The campus has reduced irrigation by 80% in 2016. Water conservation in other buildings has not included grey water recycling or storm water capture to date. There is an issue with finding room for a cistern on the sites. UWT prefers not to use composting toilets or non-flush urinals.
25) UWT has no on-site renewable energy sources to date. The team agreed that the Academic Building should be Solar PV ready, including pathways and structural accommodation.

26) Grade level rain gardens have been used on campus and are preferred for storm water treatment because there is ample space and easy for maintenance. A desire is to have outdoor storm water facilities that are also outdoor teaching classrooms for the community. Green roofs have not been installed on campus and are a maintenance concern.

27) Site lighting will be sustainable with step down illumination between the hours of 11pm and 5am.

28) A portion of the group walked to the site after the meeting. Elizabeth pointed out that the Transit authority is considering a transit stop with a shelter on the south edge of the site within the right-of-way, similar to the transit stop at the end of the mall on Pacific. James Sinding has more information.

Diagram: Provided by Nalini Chandran with KPFF

During the site walk, a verbal NTP was provided for the survey work. The updated limits of the survey were discussed during the walk and are explained in the diagram above.
Meeting Notes

Date: 8 March 2018  Project: UWT Academic Building Pre-Design
Author: Rachel Schopmeyer  Project No: 1801

Re: Institute of Technology (IoT)  Next Mtg: TBD
Focus Group

Present: UW Tacoma: DC Grant (DG), Lecturer IoT; Max Laddomada (ML), Professor IoT; Joel Larson (JL), Director of Operations IoT; Eyhab Al-Masri (EA), Assistant Professor IoT; Elizabeth Hyun (EH)
Hacker: Stefiee Knudsen (SK), Scott Barton-Smith (SB), Rachel Schopmeyer (RS)
Estime: Roz Estime (RE)

Cc: UW Tacoma: Patrick Clark
Hacker: Will Dann

1) Intro and recap
   a) The group discussed how much of each program will go into the new building. JL reiterated that Hacker is collecting information on all programs to help determine what will be proposed to be housed in the new building. EH reminded the group that the decisions made in predesign are not guaranteed.
   b) ML-A senior design lab sized for 32 teams/100 students is needed. This would accommodate senior/capstone projects. DG-IIT currently limits how many quarters they can support senior projects because of space limitations. Having shared space for work leads to more interdisciplinary collaboration. The discussion of senior design labs continued through the session and landed on the need for a total of four senior design labs. ML mentioned that a cohort is 40 students and that should be taken into consideration when sizing spaces.
   c) SK-We are working towards the ‘just right’ budget request. We can be aspirational now, but in the next steps if the program is too big, we’ll find compromises.
   d) The group discussed the cyber-physical lab. IT needs a similar lab, Industrial Controls Systems Lab (sized for 30 students, working in groups of 2-4). They can be consolidated to one lab with extra room for equipment in the future, but for now they will be conceived of as two adjoining labs. ML expressed some reservations about the labs being combined related to the specialization of the cyber-physical lab. ML classes are 30 people, labs are only sized for 15 people.

2) Review of lists from Raj Katti (RK), the dean of IoT
   a) The list for mechanical engineering is all accounted for. ME will need about 6 faculty offices.
   b) The group went over RK’s list for Civil, RE updated the proposed list of Civil labs accordingly. Test cells were replaced by a bigger structures lab. A senior design lab for
80-90 students is needed. The group agreed that this is included in the senior design labs already discussed, and that labeling them all generally as senior design labs is preferable over labeling them per program. The group discussed how big construction design labs can be, and that one of those will not be part of this building or getting a Civil Engineering program off the ground.

c) Regarding the timing of a Civil Engineering program, it’s labs will start getting fitted out a year before the program starts.

3) Faculty research – the group was positive about/ interested in shared faculty research space across disciplines. SB agreed that if the disciplines are compatible, collocating is the trend. Civil Engineering research can be messy/ dirty, but could be done in labs shared with Civil Engineering students.

4) There was a quick discussion of food in the building. (EH) said a grab-and-go café is likely to be included in the program.

   a) Next steps – RE-We’ll work with subgroups on room data sheets. A faculty member will need to represent each program/ each lab space. We’ll fill out detailed equipment data sheets for every piece of equipment. That level of detail contributes to a complete/useful basis of design. EH brought up the value of using benchmarks, especially given our schedule. RE suggested setting up a 3-4 hour meeting with the chair of Civil Engineering at OSU, Jason Weiss. DG will research a few Civil Engineering programs that began recently. The goal is to have completed room data sheets and equipment data sheets in four weeks.

***Post-meeting note: There were further conversations about how to document the needs of a future Civil Engineering program. The team is proceeding with a benchmarking approach, and will focus on newer Civil Engineering programs that DG has begin to identify.

5) Discussion of IT led by DG

   a) Classrooms are inadequate, labs are too small. IT needs
      i) (2) 50-60 person computer labs
      ii) Cybersecurity lab, 20-30 seats
      iii) Forensics lab (mobile and other), 25 students, 3’ per student
      iv) Networking lab with 8-10 pods, a pod has a couple of servers, 1-2 racks, 4 students, class is 25-30 students, would be nice to leave set up
      v) Industrial Controls Lab sized for 30 students, working in groups of 2-4

   b) Computer Engineering needs
      i) A design lab for 80 students
      ii) A classroom for 85-90 students (CE has 2 courses that would use a classroom of that size per quarter)
      iii) Lab for embedded system design/ microprocessor (40 students)

   c) Computer Science will be discussed at our next session

Attachments:

Comments:
Meeting Notes

Date: 8 March 2018  Project: UWT Academic Building Pre-Design

Author: Rachel Schopmeyer  Project No: 1801

Re: Workshop 2  Next Mtg: 29 March 2018

Present: UW Tacoma: Rupinder Jindal (RJ), Assistant Professor Milgard School; Joel Larson (JL), Director of Operations IoT; Jennifer Myers (JM), Construction Project Manager; Stanley Joshua (SJ), Director of Facilities Services; Tessa Coleman (TC), Facility Manager; Patrick Pow (PP), Vice Chancellor for IT; John Stevens (JS), Network Manager; Elizabeth Hyun (EH); Patrick Clark (PC)
Hacker: Stefee Knudsen (SK), Scott Barton-Smith (SB), Rachel Schopmeyer (RS)

Cc: Hacker: Will Dann

1) Intro and agenda
   a) Set the goal of looking at big synergies.
   b) ACTION: Hacker will share the revised schedule to the group.

2) Review of Focus Groups
   a) Discussion of who isn’t here but should be involved: there is a desire to get students involved. Events also needs to be involved, this building could be meeting a campus-wide need for event space. James is a person on campus with a lot of insight on parking and transit. ACTION: EH will set up meetings with the groups/ stakeholders that were mentioned.
   b) Review of Milgard, Institute of Technology (IoT), Facilities and IT focus groups. (Ref. meeting notes from those focus groups.) 24/7 access came up for IoT students. Spaces that will have extended hours should be clustered together for efficiency. Faculty want to meet student desire to study late, so would like to provide a space where eating and drinking is OK.

3) Known Program Synergies
   a) SK distributed a draft program document, with unknowns this group can help fill in.
   b) The group discussed what we already know about synergies, starting with the idea that collocating these programs is an innovation that can be a strong argument for funding. Both the Institute’s Data Science Center and Milgard’s Center for Business Analytics work with the School of Education. The CLSR works with The Institute.
   c) The conversation continued into synergies around entrepreneurship. The institute used to be involved with A Million Cups. VIBE is a business incubator on campus that started to serve veterans but now is not limited to serving veterans. CoMotion would like a
space, but PC noted that the building needs to meet campus needs before providing space for other organizations.

d) JL-Women in Computer Science/Engineering is a good match with Milgard’s Center for Women.

e) On the topic of meeting campus-wide needs, all of campus could use larger classrooms. PC made the point that we need to plan for the possibility/likelihood that this will be the only new building on campus for the next 8 years.

4) New Program Synergies

a) The group discussed what we’ve learned about the needed spaces, and which spaces could be shared by Milgard and IoT. An auditorium is a space both need and could share. Same for large, reconfigurable classrooms. RJ commented on the preference for flat vs. tiered classrooms. The group noted that faculty members will need to be included in the conversation of classroom types. EH brought up the plan to do a faculty survey.

b) Common spaces were discussed next. Facilities prefers built-in furniture because furniture has been stolen from common spaces in the past. Heavy pieces or furniture are problematic for events. Flexible spaces need furniture storage to be truly flexible. To make common spaces work for business students, we need to consider that they are competing and therefore secretive. Booths support their need to keep their work private.

c) Interview rooms are a shared need.

d) Looking ahead, SK discussed the option to engineer Milgard/IoT relationships through space planning.

5) Sustainability

a) The masterplan was ambitious, the real campus goal is to have a high-performing, flexible, adaptable building. The group touched on the 2030 challenge, and that the goals will be higher in four years.

b) Regarding water use, some goals haven’t been implemented and there is low interest. As far as dealing with water in place, the site has a lot of potential. The group discussed the potential for special interest in waste water from the new Civil Engineering Program to be housed in the building. Teaching about what the building does through plaques can be less than engaging for students. The group indicated that all students on campus would be pushing for water conservation, and that the push would only be greater by the time the building is getting built.

c) The 2030 challenge will mandate local power generation. The group raised questions about geothermal, phased cooling and thermal storage (there’s a precedent for thermal storage at Federal Way).

6) Vision Card Recap

a) The group voiced elements of the vision for this project not yet listed:
   i) Creating a skilled workforce
   ii) Keeping Tacoma vital (not becoming a bedroom community for Seattle).

b) JL shared some sources for statistics to back up the case to the legislature
   i) ACTION: Hacker will visit collegeresults.org – search UWT, compare similar colleges, compare salaries of graduates.
   ii) ‘Washington Pathways,’ the PhD work of Jenee Twitchell documents where Washington high school students go. ACTION: Can someone with UWT provide this document?
   iii) ACTION: Hacker needs to confirm percentage of 1st generation college students at UWT. (We have this information from EH).
iv) Joel directed Hacker to IoT’s strategic plan for specific language for the vision/business case of the project.
v) It would be useful to have a percentage of graduates that stay in the area.
vii) Bonnie Becker was mentioned as a person who can help with language about the local community. Mike Wark was mentioned as a legislative wordsmith.

c) ACTION: Hacker will share draft of adopt-a-student with this group for feedback.

7) Mapping exercise
   a) The group reviewed the mapping exercise and the scattered spaces that IoT and Milgard currently utilize.
   b) PC-Freeing up/consolidating existing space on campus must be part of this plan.

Attachments:

Comments:
Meeting Notes

Date: 13 April 2018  Project: UWT Academic Building Pre-Design

Author: Caitie Vanhauer  Project No: 1801

Re: Workshop 3  Next Mtg: 23 April 2018

Present: UW Tacoma: Rupinder Jindal (RJ), Assistant Professor Milgard School; Joel Larson (JL), Director of Operations IoT; Jennifer Myers (JM), Construction Project Manager; Patrick Pow (PP), Vice Chancellor for IT; John Stevens (JS), Network Manager; Elizabeth Hyun (EH); Patrick Clark (PC), Director of Campus Planning and Real Estate; Altaf Merchant (AM), Associate Dean (Administrative Initiatives) Milgard School; Jacob Fleshman (JF) Maintenance Supervisor - Facilities

Hacker: Stefie Knudsen (SK), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)

Cc: Hacker: Will Dann, Scott Barton-Smith

1) Intro and agenda

2) Cost Benchmarking
   a) The group discussed how a Cross Laminated Timber (CLT) structural system would contribute to the cost of the building and its likelihood to be funded by the legislature. JM pointed out that Tacoma wants to be CLT friendly. The group expressed some concerns about using a technology that hadn’t yet been used for an academic building in Washington. SK discussed the low embodied energy of CLT and the schedule benefits of the system. Labs will have special consideration in relation to the structural system in terms of vibration and loads. Although CLT will be covered by the building code by the time this building is being designed, PP expressed concern about being on the bleeding edge of a new technology. AM asked if CLT was fundamental to this project, EH responded that it is, for the legislature. AM asked about cost comparison of CLT to other structures. SK mentioned that CLT is competitive if looked at holistically and not the material cost itself.

   *Action: Hacker research and share European CLT Academic Building precedents
   SK confirmed that costing will include other, more typical structural systems.

   b) The question was raised if the program could fit on the site all on one level, we discussed that for future growth and efficiency, the university didn’t necessarily want to fill the entire site.
3) Big picture approach to offices
   a) SK asked EH about the approach to offices with this project – is the idea to move all
      Milgard and SET offices, or to accommodate growth offices only. EH described the need
      to evaluate campus-wide office needs and address those needs with the building plan.
      AM said that this is a rare opportunity to have a home for Milgard, and the first
      opportunity the school has had to have a home in the 15 years it has existed. Instead of
      labs, AM said, business school students have interactions with faculty. Ideally the new
      building would house all Milgard faculty (30 + 10 growth) and staff (15) with a total need
      for 60 offices. SK raised the possibility of expanding the building over time.

4) Discussion about how growth affects the rest of campus. With the additional engineering
   students, this will put more pressure on the science and math programs to accommodate
   them for their general course needs.

5) The group discussed the synergies and challenges of a shared building.
   a) JL brought up the Center for Entrepreneurship as a part of the Center for Centers.
   b) Milgard is being pushed to ask, ‘how are we distinct?’ Identity for each school is critical.
      *Action: Hacker research and share precedents for collocated programs with strong
      identities.

6) Program Adjacency (Bubble) Exercise
   a) See photos at the end of these notes. Notes included here came from comments made
      during the exercise.
   b) JL – there’s no need for a relationship between classrooms and labs.
   c) PC – there’s not much appetite for crossing campus.
   d) AM – It would be valuable to have seminar rooms and group rooms near faculty. For
      Milgard: Faculty <near> group rooms <near> classrooms. Center for centers does not
      need to be near classrooms. Advising would be well placed between offices and centers.
      Advising is at the center of connecting students and faculty. Open study lounges can be
      scattered, near advising. Like Paccar Hall, closed 2-person rooms are needed for secrecy
      around competitive projects. The biggest concern is managing the identities. The Center
      for Business Analytics needs a computer lab that would be dedicated. The possibility of
      including a financial trading room came up (University of Idaho was referenced), it could
      be included in the space for the centers.
   e) The auditorium ideally opens into the commons.

7) General wrap-up conversation
   a) The group talked a bit about active classrooms, and expressed the feeling that fixed-seat
      classrooms feel outdated. JM expressed a concern about training faculty to use new
      types of spaces, furniture, etc.
   b) SK asked if we needed to provide faculty meeting spaces, JL – large classrooms will meet
      that need. The group again identified the need for large classrooms, potentially 90+
      classes to grow the freshman base.

Attachments: Program adjacency exercise photos

Comments:
Appendix A5: PREDESIGN PROCESS DOCUMENTS

Meeting Notes

Date: 29 March 2018  Project: UWT Academic Building Pre-Design
Author: Rachel Schopmeyer  Project No: 1801
Re: Academic Events and Security  Next Mtg: TBD
Present: UW Tacoma: BrieAnna Bates (BB), Director of Events and Sponsorships, Advancement; Marie Lazzaro (ML), Conference Services Manager; Susan Wagshul-Golden (SW), Director of Campus Safety and Security; Elizabeth Hyun (EH)
Hacker: Stefee Knudsen (SK), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)
Cc: UW Tacoma: Patrick Clark
Hacker: Will Dann, Scott Barton-Smith

1) Intro and Discussion of current event spaces
   a) Most requested space is Jane Russell Commons in Phillips Hall. It’s a 30’X40’ space for 80-100 people, very flexible.
   b) Carwein Auditorium is seen as too steep.
   c) Ideally the new auditorium would accommodate theater and musical productions. It would have a flexible front space. Catering prep is also needed.
   d) Storage for furniture is always an issue with flexible spaces that have associated moveable furniture.
   e) There is a campus-wide need for a large (30-person) boardroom. This would support meeting of Milgard’s growing advisory boards.

2) Discussion of safety and security
   a) The group discussed the dangerous intersection of 19th and Market. Consider crosswalks and connection to Court 17 and Science.
   b) SK – this building has an opportunity to help campus accessibility.
   c) SET wants many 24/7 spaces; how do we keep all-hours spaces safe and secure?
      Building could be flexible to have a staffed security desk in the future.

Attachments:

Comments:
Meeting Notes

Date: 29 March 2018  Project: UWT Academic Building Pre-Design
Author: Rachel Schopmeyer  Project No: 1801
Re: Academic Space Utilization  Next Mtg: TBD

Present: UW Tacoma: Ana Marie Alameda (AA), Scheduler; Andrea Coker-Anderson (AC), Registrar; Elizabeth Hyun (EH)
Hacker: Stefee Knudsen (SK), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)

Cc: Hacker: Will Dann, Scott Barton-Smith; UW Tacoma: Melony Pederson

1) Intro and agenda
   a) The group discussed the data AA has shared so far as evidence that the campus is maxed out.

2) Headcount vs. FTE
   a) There is a desire to represent headcount and not just FTE, we will probably use both the way that the Bothell report did.
      *Action: AC will share current FTE count.

3) Diversity and First-Generation Students
   a) UWT has statistics on diversity and first-generation students
      *Action: Andrea/Alice will share those statistics with Hacker.

4) Discussion of UWT Space Utilization graphics as compared with those in the Bothell report
   a) Instead of most utilized classrooms, we would like to show available sizes of classrooms and the relative demand.
   b) The group moved into a general conversation. The story of these large classrooms and how they relate to faculty workload is important. The need identified for large computer classrooms was strongly echoed by AA and AC. There are computer classrooms (like a 22 person one) that are too small to schedule.
   c) AC expressed concern about larger classrooms affecting the culture at UWT campus. They pride themselves on having a small student to professor ratio.
   d) Continuing to discuss breakout spaces, it was clarified that Milgard is not the only group using breakout spaces. Providing more of them on campus will open the ones that already exist. AC mentioned that break out rooms have been added across campus but are dispersed. This creates a problem with efficiency when they’re not in close proximity to one another. SK asked how many breakout spaces the campus needs. One class currently uses 6-8, two classes sometimes need them at the same time—at least 16.
Currently students ‘camp out’ in breakout rooms, indicating a need for group study spaces.
*Action: AC/AA will send location of break out rooms.
*Action: Hacker will work with Milgard to confirm their definition of collaborative classrooms so that AC can validate classroom availability.
*Action: Hacker will develop graphics to show the lack of breakout spaces and reconfigurable/ collaborative spaces (preliminarily defined as squarish classrooms with reconfigurable furniture).

5) Next steps
   a) We need numbers for growth of Milgard and SET. JL has numbers about turning students away from the program.
      *Action: Hacker request those numbers from Joel and request growth numbers from Milgard.
      *Action: Question for Jill Purdy – are there limits on class sizes?
      *Action: EH/ AA/ AC will share growth numbers for the last 10 years and projections for the next 10 years. We’d ideally show these numbers for the campus, for SET and for Milgard.
      *EH will provide campus gross SF.
Meeting Notes

Date: 29 March 2018  Project: UWT Academic Building Pre-Design
Author: Rachel Schopmeyer  Project No: 1801
Re: Academic Transportation  Next Mtg: TBD

Present: UW Tacoma: James Sinding (JS), Auxiliary Services Manager; Elizabeth Hyun (EH)
Hacker: Stefee Knudsen (SK), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)

Cc: UW Tacoma: Patrick Clark
    Hacker: Will Dann, Scott Barton-Smith

1) General Discussion of planned changes for the streets around the site
   a) Jefferson is planned to be deemphasized for vehicular traffic. It would be for pedestrian
      and bike use. 4% of students currently ride bikes to campus.
   b) Market is going to be primarily for transit with a push for median boarding at 19th and
      Market. It would still have some single-user vehicles.
   c) 17th street will be emphasized for vehicles.
   d) The plan is to have pedestrian corridors on both sides of the site. Existing trash
      enclosures have caused pedestrian safety issues due to visibility.
   e) SK asked about vacating the street in front of the Swiss, James agreed this was possible.
      (Post-meeting note: this is part of the master plan.)

2) Accessibility
   a) ADA access on campus is not currently working because the Pinkerton elevator is not
      accessible after 4PM. Each project should improve campus ADA accessibility.
   b) Additional crosswalk needed across Jefferson.
   c) Vaulted sidewalk on south side of the Swiss building is too steep for ADA access.

3) Loading
   a) JS – If there is building loading using a roundabout, also consider retail loading. There
      are issues with current retail loading blocking crosswalks. SK noted that loading will be a
      pre-app issue, along with retail, pedestrians, and trash. We’ll have hazardous/
      flammable loading, café loading, retail loading.

4) Transportation
   a) Predicted change in transportation across campus. New developments such as the hotel
      will affect traffic flow.
5) Parking
   a) The current parking deficit is 150 stalls. JS thinks it’s unlikely UWT can pay for the parking with parking revenue. It remains a question whether parking will ultimately be part of this project.
Meeting Notes

Date: 29 March 2018  Project: UWT Academic Building Pre-Design
Author: Rachel Schopmeyer  Project No: 1801
Re: Milgard Follow up  Next Mtg: TBD

Present: UW Tacoma: Rupinder Jindal (RJ), Assistant Professor Milgard School; Altaf Merchant (AM), Associate Dean (Administrative Initiatives) Milgard School; Jennifer Heckman (JH), Lecturer Milgard School; Elizabeth Hyun (EH) Hacker: Stefee Knudsen (SK), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)

Cc: UW Tacoma: Patrick Clark
Hacker: Will Dann, Scott Barton-Smith

1) Teaching spaces and group spaces
   a) Large classrooms. AM – Distance delivery is exciting to Milgard and to the campus. Lower level classes are commonly taught with 60, 70, 80 students and they would like to be able to deliver classes at that scale. It is efficient in terms of time and space. In a larger class, the instructor will teach for a portion, have breakouts for a portion.
   b) Note: the business school is working on a new strategic plan.
   c) We discussed the types of classrooms faculty prefer—it varies person to person. RJ likes the tiered, U-shaped rooms that students can reconfigure. JH prefers a completely open, reconfigurable room with moveable whiteboards and furniture.
   d) Breakout rooms. 5-6 is the maximum group size. Breakout rooms can serve as group rooms outside of class times. All breakout rooms can be sized for 4-6 people. Larger (12 person meeting rooms) would be best located near the centers.
   e) AM reiterated the need for computer classrooms. Milgard could use 2 computer classrooms. MSBA could add another cohort.
   *Action: Milgard representative, please share data about turning away students because of capacity.

2) Centers
   a) JH had a conversation with Howard Smith regarding Centers. Co-locating the centers is not as important to HS as making sure they each have what they need and the flexibility to grow. HS is after an innovative solution to integrating the centers into the building. (Post-meeting note: for more detail on centers, please see the notes from the 4/3/18 videoconference. Details discussed there are not repeated here.)
Appendix A5: PREDESIGN PROCESS DOCUMENTS

3) Lounges
   a) JH isn’t sure graduate students would use a lounge, they currently gather at the Swiss. It would be nice to offer undergraduates a place to gather. An MBA lounge would be nicer, more open. No one argued for closed private lounges, it was more important to the group to locate the lounges near the Milgard activity of the building.

Attachments:

Comments:
Meeting Notes

Date: 27 April 2018  Project: UWT Academic Building Pre-Design
Author: Caitie Vanhauer  Project No: 1801
Re: ASUWT  Next Mtg:

Present: UW Tacoma: Elizabeth Hyun (EH), Melony Pederson (MP)
          Hacker: Scott Barton-Smith (SB), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)
Cc: Hacker: Will Dann, Stefee Knudsen

1) Intro & Agenda: Rachel gives the ASUWT group a summary of the predesign project and what a predesign is.

2) ASUWT comments that the students are typically non-traditional. They also value the intimate one-on-one education that UWT provides.

3) Student Feedback
   a) Open outdoor terraces
      i) Great idea but limited use because of weather - providing sheltered outdoor areas would allow us to fully utilize and maximize the use
   b) Parking – not in Predesign since the state only distributes funds for educational purposes
      i) Will be considered in the design phase
   c) Street vacation - restrict access to Court 17 parking garage? What about off street parking that's already on Court C? There is also a bus stop there to be considered.
   d) Sustainability
      i) Late night access - how do you maintain energy efficiency?
         ii) What about alternative energy?
             (1) UW's commitment to 2030 Challenge: net zero by 2030 - likely that power generation onsite measures will be needed/required to meet the goals to achieve 2030 Challenge
             iii) Energy efficient lighting
                 (1) Utilize timers to reduce energy use
                 (2) Create lighting zones for longer use (ex: labs)
             iv) Mass timber – natural, renewable resource that has a low embodied energy and sequesters carbon
   e) Accessibility
      i) TPS - not disabled friendly, only 1 elevator
         (1) What can we do to improve accessibility?
         (2) Can we have a goal higher than typical in Predesign?
      ii) Ramps are not very accessible friendly
Appendix A5: PREDESIGN PROCESS DOCUMENTS

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iii) Elevators are heavily used
iv) Automatic doors very helpful

f) Diversity
   i) Include natives, Puyallup native tribes
   ii) Intellectual House at UW Seattle
   iii) Community outreach neighboring UWT

h) Incorporating/including other school and other programs
   i) Inclusive of other students, not just Milgard and Institute
   ii) Maybe incorporate arts somehow? Art gallery or mural
   iii) Allow shared uses in courtyard

Attachments:

Comments:
Meeting Notes

Date: 13 April 2018  Project: UWT Academic Building Pre-Design

Author: Caitie Vanhauer  Project No: 1801

Re: Workshop 4  Next Mtg: 23 April 2018

Present: UW Tacoma: Rupinder Jindal (RJ), Assistant Professor Milgard School; Joel Larson (JL), Director of Operations IoT; Raj Katti (RK) Dean and Professor of IoT; Jennifer Myers (JM), Construction Project Manager; Tessa Coleman (TC), Facility Manager; Patrick Clark (PC), Director of Campus Planning and Real Estate

Hacker: Scott Barton-Smith (SB), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)

PLACE: Charlie Brucker (CB); Phoebe Bogert (PB)

Cc: Hacker: Will Dann, Stefee Knudsen

1) Intro and agenda

2) Goals of the project:
   a) RS summarized the importance of going back to the business case. She ran the group through the major points that will matter to the legislature to get the project funded.
   b) UWT Vision – Improve on university’s focus on diversity.
   c) The predesign should build on the investment made in the master plan.

3) Site forces
   a) Hill climb - Charlie discussed the various site opportunities at play. The site has the potential to engage and respect the master plan’s extension of the hill climb. He looked at the forces on the campus and site-specific level to inform one another. At a campus level, the hill climb could become a piece of identity for UWT and influence the ease of wayfinding throughout campus. He mentioned the difficulty with the hill climb is that it is currently used for circulation. In the proposal, the building could serve as vertical circulation and the hill climb could become open, outdoor space.
   b) Circulation – What is there and what will happen in the future?
   c) Retail – potential for retail along Market
   d) ADA Access – all new buildings will need to improve ADA accessibility
   e) Contaminated Soils – aware of the cost implications of having contaminated soils on the site.
   f) Future of adjacent streets – Pat is concerned about de-emphasizing Jefferson Ave and closing 19th Ave. due to the unknown future of transit and traffic. With a four percent increase in students there will inherently be more cars circulating around campus. RS pointed out that the predesign will need to remain flexible and adapt with future changes.
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4) Program
a) SB summarized the current program that has been requested from both programs. The team showed a scaled visual to represent the different program categories. Then, he highlighted which programs will need to be high bay, on the ground floor, or have the potential to be in the “dark” part of the building. Joel brought up how important it is that labs are on ground floor for loading purposes.
b) Raj expressed his concern that their projected growth is too little. RS mentioned that Hacker can fold in new projected growth numbers into the predesign report.

5) Massing Exercise
a) SB summarized the massing constants that the design team used.
   i) Topography – SB talked about the complex site topography and how to deal with its challenges.
   ii) Planning Module – A 11’ x 30’ planning module has been chosen because it accommodates both labs and classrooms. The classrooms can be arranged using this module along a single loaded corridor, double loaded corridor, or around an atrium. The circulation options and planning module determined the width of the massing options.
   b) SB explained the massing variables—footprint, edge engagement, approach to collaboration, future expansion potential, identity, and overall cost. SB explained that the design team will engage the cost estimator before the next workshop.
   c) Massing Options: SB goes through each massing option and how the design team has thought about potential future development, open space, loading access, entries, edge engagement, and response to campus master plan. RJ asked about height of building. SB explained that proposal will stay under 100’ per the master plan requirements.
      i) 01 Atrium building: Positive responses: loved how it fits in the current campus (form/scale), its collaborative nature, future development potential, and strong accessibility access. Negative responses: concerned about its compact floor plate not being able to accommodate ground floor/high bay needs of program. Also, group asked about atrium space qualities. Design team explained that there are many interpretations of an atrium space and will be explored further in the next meeting.
      ii) 02 Engaged with all edges: Positive response for its design quality, engagement with all the site edges, Milgard access, and would work for facilities. Negative because it limits future development potential and is most likely most expensive (large footprint).
      iii) 03 L-shape engaged with retail edge: Positive response for its courtyard potential facing campus, engagement with Market Ave. (future retail street). JM is concerned about accommodating BOH needs (compost, trash, etc.) and feels it is possible in this scheme.
      iv) 04 L-shape engaged with campus edge: Negative response: it feels like a barrier and separation to rest of campus. The courtyard isn’t as welcoming to the rest of campus.
      v) 05 Low cost: Positive response: low cost, high future development potential, and proximity for Milgard. TC mentioned that by keeping building cost low, there will be more money left for program needs (expensive engineering equipment). Negative response: it doesn’t engage with hill climb or Market Ave. (future retail street). It also will block Court 17 views.
   vi) Questions about cost – RS explained that design team will talk to cost estimator for more information.
vii) JL mentioned that lot next to PNK is good for future urban studies expansion.
viii) SB asks about front door of SET – JL says it would be along hill climb or Market Ave since majority of people park west of site and come down the hill.
ix) SB asked about where the center of campus is: Prairie Line Trail is becoming center more than Commerce. Overall, the group assumed that the center of campus will move west as the campus grows.
x) JM pointed out there is a new shopping center on the west side of the site.
d) Overall, the group decided that their top three choices are 01, 03, and 05.

6) Program Adjacency Summary: RS shared Hacker’s takeaways from the exercise and explained that this information will be integrated into the predesign report. JL talked about how he envisioned that the Commons and Large Auditorium might become center of the building.

7) Next Steps – RS explained that we will integrate the group’s feedback into the next workshop’s massing studies, bring information on collaboration concepts, and begin to compare structural and mechanical systems.

8) Post-meeting note: After a conversation with PC, Hacker will change the portion of the program labeled ‘retail’ to ‘commercial/incubator’

Attachments: Massing Options Slide

Comments:

Link to Workshop 4 presentation: https://hacker.sharefile.com/d-sb972fbb6a39420c9
OPEN HOUSE SUMMARY

Date: 04/21/2018 & 04/22/2018  
Project: UWT Predesign  

To: UWT  
From: Hacker  

Comments about the “Vision”  
What is the role of the community (urban serving) in the future of UWT?
Ranking Massing Options:

During the open house, attendees rated massing options with green or red dots.
Green dot = like
Red dot = dislike

Option 01 (Atrium): 11 “likes” & 0 “dislikes”
- Doesn’t disturb view of student housing at Court17
- Likes atrium concept (not currently on campus)
- Feels closed off and isolated, not welcoming

Option 02 (Campus Edge): 25 “likes” & 4 “dislikes”
- Feels consistent with campus
- Reinforces defined campus & helps with security
- Openness with courtyard
- Campus doesn’t need a plaza

Option 03 (Least Site Intervention): 16 “likes” & 9 “dislikes”
- Disturbs student housing at Court 17 (noise, views, & light)
- Might help integrate PNK with rest of campus
- Feels closed off
- Preserves some green space
Other General Comments/Questions:

1. Need for parent-friendly space
   a. Bathroom/lounge
2. Food Options (x6)
   a. Grocery store
   b. Vending machines
   c. Work study options
3. Parking (x15)
   a. Commuter campus
   b. Current parking might go away
4. Gender-neutral bathrooms on all floors (x3)
5. Open, Green Space (x9)
   a. Site is one of few open, green spaces on campus
   b. Maintain “urban park”
6. Student gathering/collaboration space (x7)
   a. Break out space
   b. More seating options
7. Space to relax (commuter campus) (x2)
8. Ambitious sustainability/on-site water treatment (x4)
   a. Go beyond code for storm-water treatment
   b. On site power generation
   c. Green roof
   d. Sustainability features – laboratory for students & faculty
9. Long Process (x3) – questioned how long the process is
10. Adaptable Building
11. Student Welcome, Sense of Belonging, Safe, & Secure (x3)
    a. Minority space to feel safe and openly themselves
    b. Welcome Center
12. Need for active learning space (x2)
13. Need for safe, late night study space (x2)
14. Labs needs to be updated (x2) – currently noisy and hard to hear professors
15. Concern about how construction will affect students/staff
16. Natural Daylight
17. Wheelchair Accessibility
18. Pedestrian Friendly
19. Need space for Biomedical Science Students (x2)
    a. Labs, classrooms, etc.
20. Need space for Human Anatomy & Physiology Labs
Parent friendly space?

bathroom/lounge

COMMENTS/QUESTIONS?

- Parent friendly space?
- Bathroom/lounge
- Parking?
- Safety?
Meeting Notes

Date: 25 April 2018  Project: UWT Academic Building Pre-Design
Author: Rachel Schopmeyer  Project No: 1801
Re: Workshop 5  Next Mtg: 10 May 2018

Present: UW Tacoma: Elizabeth Hyun (EH), Project Manager; Melony Pederson (MP); Patrick Clark (PC), Director of Campus Planning and Real Estate; Rupinder Jindal (RJ), Assistant Professor Milgard School; Joel Larson (JL), Director of Operations IoT; Raj Katti (RK), Dean and Professor of IoT; Jennifer Myers (JM), Construction Project Manager; Stanley M. Joshua (SJ), Director of Facility Services; Tessa Coleman (TC), Facility Manager; Patrick Pow (PP), Vice Chancellor for Information Technology
Hacker: Stefee Knudsen (SK), Scott Barton-Smith (SB), Rachel Schopmeyer (RS)
PLACE: Charlie Brucker (CB); Phoebe Bogert (PB)
KPFF Civil: Nalini Chandran
Cc: Hacker: Will Dann, Stefee Knudsen

1) SK - Intro and agenda

2) Project vision and business case
   a) Vision, JL – reference & tie project goals to the UWT strategic plan. It has high level goals and benchmarks, it touches on culture, community, equity.
   b) Business case – tie to strategic plan as well. Add a very specific line item for Milgard centers.
   c) Hacker to follow up with vision and business case for comments

3) Identity – discussion of colocation creating a third identity
   a) EH mentioned an external stakeholder’s interest in the Stanford D-school and leveraging both programs’ strengths and overlaps
   b) EH – programs for women could overlap and address a larger issue.
   c) PP – technology management is an overlap and something the schools can offer together. RK – engineering curriculum is moving toward offering management.
   d) Big picture overlaps are similar to what the D-school offers in teaching, innovation, creativity. Big picture, over time, a shared design center could be open to the entire campus. Entrepreneurship is another big picture overlap, including business model development, business planning. There is a course on these topics offered through the IoT

4) Program – the 130K sf program is more than two times the original ask, we will be prioritizing.
   a) Center for centers and associated offices
b) PP – existing auditorium spaces are used for events but do not work well because of VE

c) Questioning retail

d) Civil and Mechanical are RK’s priorities, if they get funded

e) Hacker will make a 70K gsf, 100K gsf and 130K gsf scenario and describe the impacts of each.

f) RK/JL Large classrooms are a high priority that allow an increase in productivity.

g) A 70K gsf building may not have the same collaboration story.

5) Collaboration types

a) Atrium

b) Nodes along a path

6) Landscape update from Place

a) Hillclimb/collaboration space

b) Lab court

c) Rooftop – including collaboration over food

d) Business case for the Hillclimb – referencing PEC comment that the Hillclimb will only be developed along with a building project

e) Discussion of different scales of Hillclimb work

7) SB reviewed the three preferred options, criteria included collaboration, Hillclimb, future development potential. Most important to the group were cost, campus engagement and master plan/campus goals. The campus has a lot of potential for growth.

a) Refer to attached matrix for the project working team’s evaluation of the preferred options, which ended with the selection of option 2.
Meeting Notes

Date: 10 May 2018  Project: UWT Academic Building Pre-Design
Author: Caitie Vanhauer  Project No: 1801
Re: Workshop 6  Next Mtg: 
Present: UW Tacoma: Rupinder Jindal (RJ), Joel Larson (JL), Jennifer Myers (JM), Tessa Coleman (TC), Stanley M. Joshua (SJ), Patrick Clark (PC), Patrick Pow (PP), Elizabeth Hyun (EH), Hacker: Stefee Knudsen (SK) Scott Barton-Smith (SB), Caitie Vanhauer (CV)
Cc: Hacker: Will Dann, Rachel Schopmeyer

1) Intro and agenda

2) Open House Summary
   a) Hacker highlighted concepts that will influence the business case:
      i) student gathering/collaboration space
      ii) space to relax – important for a commuter campus
      iii) ambitious sustainability goals

3) ASUWT Summary
   a) Hacker highlighted concepts that influence the business case:
      i) high interest in sustainability
      ii) accessibility beyond code requirements
      iii) diversity (specifically Native Americans)

4) Strategic Plan
   a) Key components that will influence the business case
      i) “Urban serving” campus
      ii) “Innovation drives growth” – SB asked the group what innovation do they see driving UWT’s growth? Elizabeth commented that the co-locating of the business school and Institute of Technology is part of the innovation. There is also a discussion about how the strategic plan calls out that “growth is a measure of the relevance of our work to the future of the South Sound.” This is a strong point that will be integrated into the report. UWT is not looking to grow for the sake of growing, they want to grow to remain relevant to the students/community they serve.

5) Mapping Exercise – Hacker asked the group to help by drawing the following missing pieces on the maps given (see attachment)
a) Hacker asked what the “boundary” of the South Sound is to them? The group agreed that it is best to leave as ambiguous because there is not a defined area. Although, the boundary shown could stretch further north to include more of Federal Way.

b) Community colleges - Institute students come from 4 local community colleges. Who are they? What about the business school?

c) Demographic maps from UW profiles were referenced – Elizabeth will give Hacker access to existing demographic information.

d) Tribal areas and locations – as per the ASUWT conversation

e) Socio-economic and racial diversity breakdown

f) Industry partners
   i) Who are they now? Who might they be in the future (especially with two new engineering programs)?
   ii) Follow ups with both programs and Elizabeth will be made to get this information.

6) MEP/Sustainability Update
   a) SB gave a summary on the work that PAE has been doing. He highlighted decisions that will dramatically influence the cost analysis.
   b) The master plan calls out ambitious goals such as the 2030 challenge and considering a “water budget.” This aligns with the feedback from the Open Houses and ASUWT meeting.
   c) SB explained the 2030 targets and what that means for the building systems. For example, there will need to be on-site energy production, such as PV. Elizabeth stated that with a reduced budget, we will need to lean toward “PV-ready” ideas.

7) Milgard Tour Debrief
   a) Steffee gave a summary of the tour with Milgard. This helped define what Milgard sees as their “identity” in this new building. During the tour, the group talked about how they didn’t like how much the Foster school stood out on campus. They felt that the scale of it did not align with the type of students at UWT. They want their identity to fit in with the rest of the campus and feel welcoming to students of UWT.
   b) Universal design vs. ADA:
      i) Promotes diversity
      ii) Currently in “accommodation” strategy

8) Business Case
   a) Meet pent up demands should be first – highest priority
      i) Students asking for these specific programs
      ii) Link to rural community – access to public university
      iii) Needs vs. wants – this is a need
   b) “Urban-serving” vs. “South Sound serving”
      i) “Urban-serving” is a Carnegie classification but most of the working team felt that “south sound serving” is more accurate. Pat Clark mentioned that “urban serving” sounds too narrow. “South sound serving” represents the communities and people they serve, both rural and urban.
   c) Innovation drives growth – co-location of programs
   d) Diversity/Accessibility – reflecting the South Sound demographic
   e) Ambitious Sustainability – reflecting goals of WA state, UW, and students/faculty

9) Co-location = collaboration
   a) Hacker talked about how co-locating these programs and their components within each program will generate a more collaborative environment.
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Hacker
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b) Elizabeth mentioned that Cal Bamford can help craft language for this (reference: Stanford’s d. school).

10) Program Prioritization Scenarios and influence on cost
   a) A realistic ask to the legislature will most likely be option 4 (prioritized and re-locating Civil Engineering program)
   b) The rest of the program could potentially be bridged with private donations and utilizing an existing Stoneway building (Civil Engineering).
   c) Submitting option 01 (Full program requests) would be a “sticker shock” to the legislature. Ultimately, they may not get funding if they go with Option 01.
   d) SAC will weigh in on this decision.

11) Precedent Update
   a) Mass Timber projects – Hacker showed examples of Mass Timber, academic buildings with similar programs.
      i) PC asks about local CLT manufacturers. Hacker will investigate this and get back to the group.
   b) Co-located Business and Engineering programs

12) Next Steps:
   a) Hacker is working toward sending a report draft to the committee on May 18.
   b) Hacker will be working with the cost estimator to finalize cost/budget analysis
   c) Workshop 7 will be a draft review looking at overall organization, images, and content.

Attachments: Workshop 6 Presentation + “South Sound” Mapping Exercise

Comments:

Link to Workshop 6 presentation: https://hacker.sharefile.com/d-s42882a5a76645efb
Meeting Notes

Date: 10 May 2018  Project: UWT Cost Estimating

Author: Caitie Vanhauer  Project No: 1801

Re: Cost Estimating  Next Mtg: 

Present: UW Tacoma: Elizabeth Hyun (EH)
JMB Consulting: Jon Bayles (JB)
Mortenson: Keith Jurgens (KJ)
Hacker: Stfefe Knudsen (SK) Scott Barton-Smith (SB), Caitie Vanhauer (CV), Rachel Shopmeyer (RS)

Cc: Hacker: Will Dann

1) Intro and agenda

2) Costs – Hacker asked if the project costs include soft costs and Jon Bayles confirmed that they do.

3) Jon Bayles will fill out C100 toward the end of the process.

4) Questions from Hacker/UWT:
   a) $/SF per type?
   b) Is the core/shell separated out?
   c) Should we be grossing everything the same? For example, grossing labs might be unnecessary
   d) Is the site contamination included in costs?
   e) How about the hill climb?

5) Contingency – this is included in line items, not added at the end

6) Contaminated soils – need to clarify about during and after construction

7) KJ from Mortenson explained that the key to reducing the budget will be to disturb the least amount of soil. SB talked about how labs need a lot of ground floor space (loading access and heavy machinery).

8) Parking – The campus has expressed a concern about losing the existing parking on the site. Since the existing spots are not technically UW spots, will we need to accommodate for displacing these spots as a part of this project?
9) Benchmarking: Jon Bayles explained his benchmarking process. He takes averages of all the benchmarks and categorizes the numbers into low, medium, and high numbers. During the costing process, the team discussed each line item and determined what the appropriate cost is for this project.
   a) Foundations and basement: will be very expensive because of contaminated soils and a high-water table
      i) Bothell had partial basement and CSE had some basement as well, so $15/sf
      ii) Foundations $25/sf
   b) Superstructure (all vertical, shear, roof, canopies): $75/sf
   c) Enclosure: $60/sf assuming brick to coordinate with rest of campus; leaves enough flexibility for design team (typical: $50/sf)
   d) Roofing: $8/sf – UW has specific standards for this
   e) Interior construction: $75/sf combined, plus about $6/sf for stairs (not for collaborative, communicating stairs)
   f) Convey: assumes 2 elevators – response to ASUWT group’s concern with accessibility
   g) Plumbing: high numbers for sustainability, low lab compared to Bothell
   h) Mechanical: $60/sf for sustainability (2030 challenge)
   i) Fire: $4.50 (cheap, there’s competition)
   j) Electrical: Bothell got stuck with the emergency power, CSE had redundancy $65/sf
   k) Equipment: includes demountable stage floors for adaptable classroom tiers, lab equipment, furniture $12/sf
   l) Site Prep: excavation and what we affect – assume $7.50/sf, study site area (about 80ksf, less footprint, = 60k)
   m) Site Improvements: include hill climb
      i) Basic $25, Better $35, Best $60 (Hill climb is about $45/sf x 60k sf)
   n) Utilities: $8/sf – similar to site prep

The team landed on $941/sf project cost. This number is not set in stone and will be adapted throughout this process.

Attachments:

Comments:
Appendix A5: PREDESIGN PROCESS DOCUMENTS

Meeting Notes

Date: 10 May 2018  Project: UWT OPR
Author: Caitie Vanhauer  Project No: 1801
Re: OPR Meeting  Next Mtg:

Present: UW Tacoma: Jon Bayles (JB), Keith Jurgens (KJ), Elizabeth Hyun (EH), Jennifer Myers (JM), Tessa Coleman (TC), Stanley M. Joshua (SJ)
Obrien: Kathy Chang (KC), Elizabeth Powers (EP)
PAE: David Mead
Hacker: Stefee Knudsen (SK) Scott Barton-Smith (SB), Caitie Vanhauer (CV), Rachel Shopmeyer (RS)

Cc: Hacker: Will Dann

1) Intro and agenda

2) OPR: Obrien is already under contract with UWT so okay to move forward with this process. They have been doing this for two years since Claire retired (CPO Sustainability Coordinator, LEED). Their role is to be the CPD Sustainability coordinator for all projects that are going LEED, representing the owner’s expectations.

3) EP with Obrien explained why OPRs are now going to be included in predesign reports. In Summer 2016, in prep for 3 predesigns, they tried to get OPR’s developed at the predesign stage (UWB phase 4 and Pop Health?)
   a) Requirements in predesign checklist only call for a commissioning plan, not for an OPR. Although, the first step in commissioning is to develop an OPR.
   b) They are pushing LCCA’s earlier in the process
   c) For this project, they will start the process for predesign and further develop with design team, determining the basis of design.
   d) Their role is to be an owner representative: they will be the authors and design team will give feedback.

4) PAE
   a) David explained what they have heard from the University about their goals and hopes for building systems performance and its added value.
   b) PAE ran through the executive summary which outlined values dealing with energy, water, sustainability, carbon footprint, etc. in reference to the Master Plan and UW Infrastructure Plan. UW has signed on to meet the College and University President’s Climate commitment, the Architecture 2030 challenge, and others (outlined in the Master plan).
      i) Path to achieve goals
(1) Energy: According to the 2030 Challenge, the EUI changes to 80% below the baseline. PAE’s graph displayed that not only will the building need to incorporate energy saving strategies, it will require on-site energy generation.

(2) GHG Emissions: UW will need all new buildings to have zero emissions to offset existing building emissions.

(3) Water goals: the amount of rainfall on campus per year becomes the “water budget.” In order to achieve this, the new building will need a rainwater catchment system, low flow fixtures, and possibly compostable toilets, etc.

ii) These goals come with a cost premium and if the state is serious about meeting these goals, they can’t turn down funding for it (about a 5% premium).

(1) How should the project allocate funds to achieve these goals?

(2) When Claire was there, the legislature was scrutinizing more closely because some were not performing. How to find balance between program area, quality of finishes, and sustainability goals?

(3) Can we isolate the sustainability premium for meeting these goals to clearly identify what it means to meet these goals? This way, the state can adequately fund the project to meet the goals. By listing this separately, it will put the legislature on record for either supporting funding or not.

(4) The project will only go through OFM life cycle, but not for energy (negotiated out of PAE contract).

(5) The issue with LCCM’s is that the payback is very long. Instead, we should approach meeting this criteria to meet goals, not the payback.

iii) What specifically is the state mandating?

(1) LEED Silver

(2) State emission targets state-wide: could reference state GHG targets; 2030 is just a way to hit those state targets

(3) Other goals are specifically UW and UWT – identify premium for those during design

5) OPR can utilize PAE’s memo but will re-write in owner’s voice
   a) Design-build could include performance incentives for design-build team, with some specific requirements (done for Pop Health).
   b) What of the design team analysis does UWT want to say in their OPR?
   c) Pop Health does have action from UW Climate action plan and what it will take to achieve – the group acknowledges that this is ambitious and that predesign didn’t do LCCA or LCCT’s, so will need to challenge the design team to achieve some of this work

6) OPR Template:
   a) (Part 4) LCC cost: will identify first cost, premiums, and information about long-term maintenance requirements later
   b) Pull out goals and language from PAE’s document
   c) (Part 6): Required credits that they assume is needed, plus additional that UW offers for all projects
   d) T2O “transition to occupancy” related to commissioning

7) Next Steps:
   a) Obrien review the PAE memo and send Hacker any follow up questions
   b) Obrien get UWT standards to reference in first draft
   c) UWT PWT review the documents and comment
   d) UWT read PAE report and comment on systems included
      i) “second half of campus (west half)” starting the next set of systems
      ii) Based on Life Cycle cost for future campus and for the state emission mandates
Appendix A5: PREDESIGN PROCESS DOCUMENTS

SITE
Hill Climb

SITE
Lab Court
SITE
Rooftop Gathering Space

SITE
Business Case for Hill Climb

- Provides essential circulation infrastructure as open space
- Reinforces the identity of the campus
- Connects community to campus from Market to Pacific (retail corridor)
- Expands wayfinding system with Hill Climb + Prairie Line Trail
- Supports building entries
- Provides multiple use/scale spaces for academic interaction
- Offers sunny gathering spaces for social interaction
- Integrates learning laboratory with stormwater features
SITE
Business Case for Hill Climb

Baseline
Improve Jefferson Ave to be Pedestrian First Corridor with improved 19th St. intersection

Baseline + Partial 19th Closure
Improve Jefferson Ave to be Pedestrian First Corridor with 19th one way westbound + expanded hill climb

Baseline + 19th Closure
Improve Jefferson Ave to be Pedestrian First Corridor with 19th closed and full hill climb

Hill Climb Improvements

A Baseline
Develop Hill Climb open space with circulation, gathering spaces and landscape. No change to 19th St.
$700,000-$900,000

A1 Baseline + Partial 19th Closure
Develop Hill Climb open space and eastbound lane of 19th St.
$900,000-$1,500,000

A2 Baseline + 19th Closure
Develop Hill Climb open space and both lanes of 19th St.
$1,500,000-$1,800,000
Executive Summary

OVERVIEW
The existing master and infrastructure plans ask for the following.

SUSTAINABILITY
In developing policies and plans to advance sustainability on the campus the following should be considered:

- Completing a comprehensive inventory of all greenhouse gas emissions (including emissions from electricity, heating, commuting, and air travel).
- Establishing a target date for climate neutrality.
- Requiring all new campus buildings to meet at least a LEED Silver Standard.
- Requiring all new appliances and computers to meet Energy Star requirements.
- Purchasing or producing at least 15% of the institution’s electricity consumption from renewable sources.
- Site Lighting: Site lighting should be designed to meet Sustainable Sites, Credit #8 - Light Pollution Reduction.
- Water Efficiency: Building water use should be 40% less than the performance requirements of EPACT 1992.
- Measurement and Verification (M&V) - Future building projects should pursue the LEED M&V point in order to help future design teams predict the infrastructure needs for the campus and compare them to the goals indicated in this section of the master plan.

The Infrastructure Master Plan recommends that all new buildings on campus should be designed to meet the requirements of the Architecture 2030 challenge.

- Currently, the campus uses approximately 5 million gallons of water. The master plan recommends that all future buildings use 40% less water than the performance requirements of EPACT 1992. If these goals are met, the campus will use approximately 2.6 million gallons at full build out, which is well within the “natural water budget.” If the options presented in the civil infrastructure section of this document for stormwater and greywater reuse are implemented, then the campus water use at full build out is reduced to approximately 1.5 million gallons per year.
- The table below from the infrastructure plan shows the water goals for new buildings:

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Master Plan Goal</th>
<th>Redam (gallons/sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>20.0</td>
<td>12.0</td>
<td>7.2</td>
</tr>
<tr>
<td>Academic</td>
<td>4.0</td>
<td>2.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Academic</td>
<td>30.0</td>
<td>15.0</td>
<td>8.8</td>
</tr>
<tr>
<td>Library</td>
<td>10.0</td>
<td>6.0</td>
<td>1.8</td>
</tr>
<tr>
<td>Student Life</td>
<td>30.0</td>
<td>15.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Facilities</td>
<td>10.0</td>
<td>6.0</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>5.5</td>
<td>3.3</td>
<td>0.5</td>
</tr>
</tbody>
</table>

- The table below from the infrastructure plan shows the EUI goals for new buildings:

<table>
<thead>
<tr>
<th>Space Type</th>
<th>EUI (kBtu/SF/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td>2039</td>
</tr>
<tr>
<td>Residential</td>
<td>10.2</td>
</tr>
<tr>
<td>Academic</td>
<td>80</td>
</tr>
<tr>
<td>Academic</td>
<td>206.7</td>
</tr>
<tr>
<td>Library</td>
<td>86</td>
</tr>
<tr>
<td>Student Life</td>
<td>90</td>
</tr>
<tr>
<td>Facilities</td>
<td>10.4</td>
</tr>
<tr>
<td>Unassigned</td>
<td>16.0</td>
</tr>
<tr>
<td>Retail</td>
<td>16.0</td>
</tr>
<tr>
<td>Average</td>
<td>11.2</td>
</tr>
<tr>
<td></td>
<td>65</td>
</tr>
</tbody>
</table>

PATH TO ACHIEVE GOALS
In order for the project to achieve the performance goals set forth in the masterplan the following items will need to be considered for the project.

ENERGY GOAL S
The Architecture 2030 challenge sets rigorous energy reduction goals that are lower than the target EUI numbers shown in the infrastructure plan. Since the masterplan says projects need to comply with the 2030 challenge, the following pages show what the baseline and target EUI values could be for the project. In order to achieve the target EUI, the project will need to implement many energy conservation measures and potentially generate energy on-site with solar panels. A list of these ECMs is shown on the following pages.

GREENHOUSE GAS REDUCTION GOAL S
In order for the project to meet the greenhouse gas reduction goals for the State of Washington and UW Tacoma it should seriously consider being a net zero carbon building. This would allow the project to not add any additional GHG emissions to the state or campus usage. In order to achieve this the building would need to achieve excellent efficiency, limit the use of refrigerants with high global warming potentials and generate electricity on-site.

WATER GOAL S
The master plan calls for projects to live within their natural water budget (meaning projects only use the amount of water that lands on their roof throughout the year). In order for the project to achieve this the building may need to implement the following items:

- Low-flow fixtures
- Potential for ultra-low flow fixtures (like waterless urinals and composting toilets)
- No potable water for non-potable uses (this means greywater or rainwater will be used to flush toilets and urinals)
- Rainwater capture and reuse (could be used for potable water, flushing fixtures and irrigation)
- Greywater capture (from showers and lavatories) and reuse (could be used for irrigation and flushing fixtures)
OVERVIEW
A goal of the predesign effort is to establish performance goals for the project along with system concepts that support these goals. The concepts can then be priced and proposed for funding to the legislature. The goal of this narrative is to help establish quantifiable performance goals.

SUSTAINABILITY GOALS
The building will be designed to meet the requirements for a USGBC LEED Silver certification. A gold or platinum certification will be evaluated as the design progresses to see what could be achieved within the project budget.

WHAT IS SUSTAINABILITY?
Sustainable design is often referred to as green design or high performance. In a traditional organization, decisions are made based on the economic bottom line approach, which is generally only concerned with short term cash flows. A sustainable approach looks at the triple bottom line - economy, ecology, and equity. Decisions are made with concern for the balance between profitability, preserving our natural systems, and benefiting the needs of society.

THE PATH TOWARD SUSTAINABILITY
There are 6 main steps to take in designing and maintaining a sustainable building.

SUSTAINABILITY GUIDELINES
The design team will review for consideration the following sustainable design guidelines into the project design:

- The US Green Building Council’s LEED Rating System - LEED Silver Minimum
- The Architecture 2030 Challenge
- STARS by AASHE
- UW Climate Action Plan
- UW Campus Water Use

ARCHITECTURE 2030
The upper chart to the right show the architecture 2030 baseline values for college/university and laboratory buildings. The baseline for the college/university building was established using the Target Finder from the Environmental Protection Agency (EPA). The laboratory value was established using data from Labs 21 and labs in the benchmarking data from the City of Seattle.

Labs are challenging to benchmark as their energy usage can vary dramatically based on the types of activities implemented in the labs. This building intends to have labs that are focused on physical activities (thus avoiding the usage of chemicals or biological materials). The estimated baseline value is an EUI of 200. The blended baseline was calculated based on the current program areas.

The architecture 2030 challenge target values are shown in the image to the lower right with Energy Use Intensity (EUI) values of 14 and 17. If the project is funded soon the 2020 goal should apply.

WATER BUDGET
A highly sustainable building would use no more water than the amount of rainfall that falls on its roof annually. All rainwater that falls on the site would be reused or retained on the site. Finally, all wastewater generated in the building would be treated on the site.

Tacoma, Washington receives approximately 39 inches of rainfall annually. By reclaiming this rainwater and designing building and landscape water systems to reduce consumption as much as possible the project hopes to live within this natural water budget.

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Appendix A5: PREDESIGN PROCESS DOCUMENTS

Predesign Mechanical & Plumbing Options

Architecture 2030 Baseline Values

Architecture 2030 Target Values
Energy Targets

ENERGY BUDGET

Sustainable design requires a careful analysis of the building’s energy use and the source of that energy. Since laboratory buildings are 4 to 6 times as energy intensive as a typical office building, they present many opportunities to reduce energy consumption. Ideally, a sustainable building would produce its own power without generating any pollution or purchase its power from a renewable source (e.g., fish friendly hydro, bird friendly wind, photovoltaics, etc.). In addition, it would use no fossil fuels.

A highly sustainable building would use no more energy than the amount present on the site, which may include solar, wind, geothermal, tidal, etc. The solar energy that hits the roof of our building would be adequate to meet the energy needs of the building.

A preliminary analysis based on data collected for similar buildings indicates the following estimated breakdown of energy consumption among various uses. The data is informative in identifying where to focus for greatest potential savings.

The energy conservation measures noted are very rough estimates of what could potentially be saved. The next page outlines what could be included in these based on the groupings noted at the base of the ECM chart.
Greenhouse Gas Emissions

**Holistic Greenhouse Gas Analysis - Central Heatpump (No Wood Sequestration)**
(GHG Emissions MT CO2e /30 year)

- Total Embodied Emissions + Potential Wood Sequestration: 8,203
- Operating Emissions (non-heat/cool): 688
- Operating Emissions (heat/cool): 488
- Refrigerant Emissions: 107
- Embedded Emissions (minus wood sequestration): 2,497
- Potential/wood Sequestration: 412

Note how the refrigerant emissions are extremely small portion of the overall emissions.

**Holistic Greenhouse Gas Analysis - Central Heatpump (With Wood Sequestration)**
(GHG Emissions MT CO2e /30 year)

- Total Embodied Emissions (Reduced due to wood sequestration): 10,700
- Operating Emissions (non-heat/cool): 568
- Operating Emissions (heat/cool): 488
- Refrigerant Emissions: 107
- Embedded Emissions (minus wood sequestration): 2,497
- Potential/wood Sequestration: 472

The total emissions are shown to the left with the amount sequestered by wood subtracted from the total embodied emissions.

**Holistic Greenhouse Gas Analysis - VRF Example**
(GHG Emissions MT CO2e /30 year)

- Total Embodied Emissions + Potential Wood Sequestration: 8,203
- Operating Emissions (non-heat/cool): 568
- Operating Emissions (heat/cool): 488
- Refrigerant Emissions: 107
- Embedded Emissions (minus wood sequestration): 2,497
- Potential/wood Sequestration: 412

Note how the refrigerant emissions are almost as high as the operating emissions for heating and cooling the building. This is due to the large quantities of refrigerants installed in VRF systems.

Wood construction has the potential to sequester significant amounts of carbon. The box with the trees shows a very rough estimate of what could be possible for the building.

The upper chart shows the impacts of utilizing a central heatpump while the lower chart shows the impacts of a variable refrigerant flow (VRF) system. Note how the VRF system’s refrigerant emissions are higher than the heating and cooling emissions. If emissions reductions are part of UW Tacoma’s plan the use of VRF systems should be avoided until they can offer refrigerants without high global warming potentials. At the time of this report no VRF systems offer this technology.

The project should look at greenhouse gas emissions holistically including operating, refrigerant and embodied emissions. The charts to the right show very rough estimates on where the emissions could land. The gray boxes represent the embodied emissions from manufacturing, construction, maintenance and end of life. Note how this is the largest source of emissions over 30 years.

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Preliminary Geotechnical Engineering Services Report

Proposed Academic Building
South 19th Street and Market Street
University of Washington-Tacoma

for
University of Washington-Tacoma

June 21, 2018
Appendix A6: GEOTECHNICAL REPORT

Preliminary Geotechnical Engineering Services Report

Proposed Academic Building
South 19th Street and Market Street
University of Washington-Tacoma

for
University of Washington-Tacoma

June 21, 2018

GeoEngineers

1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940
Preliminary Geotechnical Engineering Services Report

Proposed Academic Building
South 19th Street and Market Street
University of Washington-Tacoma

File No. 0183-130-00
June 21, 2018

Prepared for:

University of Washington-Tacoma
Capitol Projects Office
1900 Commerce Street
P.O. Box 358490
Tacoma, Washington

Attention: Elizabeth Hyun

Prepared by:

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Associate

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Appendix A6: GEOTECHNICAL REPORT

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Appendix A6: GEOTECHNICAL REPORT

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Appendix B. Report Limitations and Guidelines for Use
INTRODUCTION AND PROJECT UNDERSTANDING

This report contains the results of our preliminary geotechnical engineering services for use in pre-design services related to the proposed Academic Building at the University of Washington Tacoma (UWT) campus. Our understanding of the project is based on our discussions with you and our experience working with the UWT.

We understand that the UWT intends to build a new Academic Building on the currently undeveloped lot located to the northeast of the Market Street and South 19th Street intersection. The proposed site is generally bounded by Jefferson Avenue to the east, South 19th Street to the south, Market Street to the west and the Court 17 Apartments and Pinkerton Building to the north. A vicinity map is provided as Figure 1.

Conceptual plans for the building are in a preliminary stage to evaluate costs and overall layout. However, we understand that a multistory building is envisioned and that UWT plans to deliver the building via a Design-Build contract. We anticipate that conventional spread footings will be the preferred foundation type for the project based on our understanding of geology in the area and our experience working on the UWT campus. We also anticipate that site development work could include site grading and construction of temporary or permanent shoring and development of permanent below-grade elements such as basements, elevator shafts and vaults.

PURPOSE AND SCOPE OF SERVICES

The purpose of our services is to provide preliminary geotechnical recommendations for pre-design of the building based on our experience and existing subsurface information in the project vicinity. We are also completing environmental pre-design services for this project, which are summarized in a separate report. Our services were completed in general accordance with our signed agreement dated March 29, 2018. We have prepared this document as a draft report dated April 19, 2018.

PRIMARY GEOTECHNICAL CONSIDERATIONS

The following is a list of primary geotechnical considerations based on our current understanding of the project and the soil conditions at the site. Our detailed recommendations are provided in the following sections.

- Earthwork at the site can likely be completed using conventional earthwork equipment. Cut slope inclinations on the order of 1.5H to 1V (horizontal to vertical) are feasible for soil types at the site. Temporary shoring walls may be necessary to support steeper cut slopes.

- Shallow excavations at the site could encounter groundwater. Dewatering systems may be necessary to construct temporary shoring and to complete deeper excavations at the site.

- Soil conditions at the site are favorable for supporting the proposed building on shallow foundations. We recommend that shallow foundations bear on very dense glacially consolidated soils or on structural fill extending to these soils. The depth to glacially consolidated soil varies across the site and is generally between 2 and 8 feet below existing site grade.
The majority of site soils contain a significant amount of fines and will be difficult or impossible to work with when wet. Additionally, on-site soils may be generated at a moisture content above what is optimum for compaction and may need to be dried out before reuse. For planning purposes, unless earthwork is planned for periods of dry weather or considerations made to allow site soils to dry out during earthwork, we recommend avoiding the use of on-site material as structural fill. Re-use of site soils will also need to consider the potential for encountering contaminated soil as described in our Environmental Services Report.

Site Conditions

Literature Review and Site History

Based on our review of the Geologic Map of the Tacoma South Quadrant (Troost in and Booth in review) the project site is underlain by ice-contact deposits. This material was deposited during glaciation that occurred about 10,000 to 15,000 years ago. Ice contact deposits are described in the literature as interbedded outwash (sand and gravel), lacustrine beds (fine-grained sand and silts) and glacial till. Locally, the ice-contact deposits are generally comprised of sand and gravel in a silt matrix.

The project site has had multiple generations of development dating back to around 1888. Prior development has included residential homes, fuel stations, industrial building and most recently a nursing home that was demolished in 2000. A more detailed description of the development history at the site is provided in our Environmental Services Report.

Surface Conditions

The project site is situated on a hillside that grades downward from the western site boundary (Market Street) to the eastern site boundary (Jefferson Avenue). Court C generally divides the east and west half of the property. The existing ground surface elevation along the Market Street site boundary is around Elevation 124 feet (elevations referenced to NGVD29). The elevation along the Jefferson Avenue site boundary grades between about Elevation 105 in the southeast corner of the site and Elevation 89 feet in the northeast corner of the site.

Market Street is an asphalt surfaced two-lane roadway with a center turn lane and parallel curb parking. The grade separation between Market Street and Court C is accommodated by a cut slope inclined at between 2H:1V and 1.5H:1V. The portion of the site between Market Street and Court C has been developed as a park. Court C is a two-lane road paved with bricks. The portion of the site between Court C and Jefferson Avenue is currently used as parking. Some sections of the parking areas have been paved and others are surfaced with gravel. Grade change between Court C and Jefferson Avenue is accommodated by an approximately 4- to 8-foot-tall cast-in-place retaining wall and by cut slopes inclined at around 1.5H:1V. Jefferson Avenue is a two-lane roadway with angle in parking on the east side of the street. Other improvements around the site include sidewalks, landscaping, hardscaping, trees and streetlights.

Soil and Groundwater Conditions

Our understanding of subsurface conditions at the project site is based on our experience working in the vicinity and our review of previously completed explorations located within and around the site. The Site Plan, Figure 2, shows the approximate locations of relevant subsurface explorations in the project vicinity. Over 35 explorations have been completed in the project vicinity, however, in many cases these
explorations were not completed for geotechnical purposes and they provide limited geotechnical information. For this report we have selected relevant explorations that, in our opinion, are most appropriate for geotechnical considerations. These explorations are included in Appendix A. Our Environmental Services Report contains additional explorations logs not included in this report.

Site and Soil Conditions
The site is surfaced with landscaping in the form of grass, barked covered slopes and isolated areas of trees and shrubs. Other areas are surfaced with hardscape consisting of asphalt concrete, Portland cement concrete, brick pavers and sidewalks. Based on our review, subsurface conditions below the surfacing likely consist of fill material underlain by native glacially consolidated soils. Based on our interpretation of the explorations shown on the Site Plan (15 total), 10 of the explorations encountered between 4 and 8 feet of fill, four of the explorations encountered less than 4 feet of fill, and one exploration encountered no fill. Fill depths are generally deepest near the Market Street and Jefferson Avenue site boundaries. The reviewed explorations were completed prior to the most recent grading of the park area. We understand that between 1 to 3 feet of fill was placed in the park area during construction. This fill thickness is not accounted for on the included exploration logs.

Fill soil described on the exploration logs primarily consisted of silty sand with variable gravel content. Relative density of the fill described on the logs ranges between “loose” and “dense.” Standard penetration tests (SPTs) were not completed within the fill unit in the explorations we reviewed so a quantitative measurement of fill density was not available. Based on our experience, we expect that the condition of the existing fill across the site will vary. In some areas the existing fill may be an engineered fill that was placed in lifts and adequately compacted and in some areas the fill material could contain debris and other deleterious material and may not have been compacted during placement.

Glacially consolidated soil underlies the fill. The glacially consolidated soil is comprised of two primary geologic units, ice-contact deposits (Qvi) and advance outwash (Qva). Both of these units are glacial in origin and were consolidated by the weight of the glacier after deposition. Based on conditions described on the reviewed exploration logs, the upper 5 to 10 feet of the glacially consolidated soil layer will likely comprise of medium dense to very dense silty sand and very stiff to hard silt (ice-contact deposits). The hard silt layer typically separates the ice-contact and advance outwash geologic units. The advance outwash soils are typically comprised of sand with variable silt and gravel content. The glacially consolidated soils in the area can vary over relatively small distances and can contain coarse gravel, cobbles, and boulders.

Groundwater Conditions
There are two main water-bearing zones at the site. A “shallow” aquifer is present with the ice-contact deposits. Sand and gravel seams within the ice-contact deposits could potentially be part of a former glaciation drainage channel within the ice-contact deposits. This drainage channel has been encountered at other project locations around the site and can carry a significant amount of water. A hard silt layer described on the borings typically separates the shallow aquifer and “deep” aquifer. The deep aquifer is located within the predominantly sand soils (advance outwash) below the silt layer.

Based on our previous groundwater studies in the project vicinity we expect that the level of water in the shallow groundwater aquifer will likely vary between Elevation 105 feet on the west side of the site and around Elevation 75 feet on the east side of the site. Depending on existing site grade, the groundwater level within the shallow aquifer can be within 3 to 4 feet of existing ground surface (see exploration logs for
A11-MW10S and A11-MW11S). The general direction of the groundwater flow within the shallow aquifer trends topographically downgradient towards the east. Groundwater within the shallow aquifer likely flows through sand seams and interbedded gravel within the ice-contact deposits. Groundwater flow within the shallow aquifer could be influenced by underground utilities in the area, comprising a preferential pathway.

The level of the deep aquifer is expected to vary between about Elevation 95 feet on the west side of the site and around Elevation 55 feet on the east side of the site. The groundwater flow direction is generally to the east/northeast within the deep aquifer. The deep aquifer can be under confined conditions with artesian/sub-artesian pressure.

Based on our experience in the area, the aquifers can produce rapid groundwater seepage. Groundwater levels will fluctuate throughout the year and can be influenced by precipitation events. Additional information regarding the relative locations of the two aquifers and a more detailed description of site hydrogeology is provided in our Environmental Services Report.

Seismic Design Considerations

We used map-based methods to develop seismic design parameters, in general accordance with 2015 IBC. The recommended seismic design parameters are shown in Table 1.

<table>
<thead>
<tr>
<th>2015 IBC Seismic Design Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Class</td>
</tr>
<tr>
<td>Spectral Response Acceleration at Short Periods (S₀)</td>
</tr>
<tr>
<td>Spectral Response Acceleration at 1-Second Periods (S₁)</td>
</tr>
<tr>
<td>Design Peak Ground Acceleration (PGA₀)</td>
</tr>
<tr>
<td>Design Spectral Response Acceleration at Short Periods (S₀S₀)</td>
</tr>
<tr>
<td>Design Spectral Response Acceleration at 1-Second Periods (S₀S₁)</td>
</tr>
</tbody>
</table>

Liquefaction, Lateral Spreading and Surface Rupture

Liquefaction refers to a condition where vibration or shaking of the ground, usually from earthquake forces, results in development of excess pore pressures in loose, saturated soils and subsequent loss of strength. In general, soils that are susceptible to liquefaction include loose to medium dense “clean” to silty sands that are below the water table. Completing a liquefaction analysis was beyond our scope of work; however, based on the soil and groundwater conditions described in the reviewed explorations and our understanding of geology in the area, it is our opinion that the potential for liquefaction at this site is low.

Lateral spreading related to seismic activity typically involves lateral displacement of large, surficial blocks of non-liquefied soil when a layer of underlying soil loses strength during seismic shaking. Due to the low liquefaction risk at the site, in our opinion there is a low risk of lateral spreading occurring during a seismic event.

According to the Washington State Department of Natural Resources Interactive Natural Hazards Map (accessed April 9, 2018), there are no known faults identified at the site and in our opinion the risk for surface rupture at this site is low.
Shallow Foundations

Footing Bearing Surface Preparation

Based on conditions described on the reviewed exploration logs and our experience in the project vicinity, it is our opinion that shallow foundations bearing directly on proof-compacted glacially consolidated soils or on structural fill extending to these soils, should provide adequate bearing support for the proposed building. The depth to the glacially consolidated soil in the reviewed exploration logs typically varied between about 2 and 8 feet bgs; however, the depth to these soils could vary across the site. We recommend that the project schedule and budget include contingencies for removal of fill below foundations.

Minimum Footing Size and Embedment

Exterior footings should be established at least 18 inches below the lowest adjacent grade. Interior footings can be founded a minimum of 12 inches below the top of the floor slab. Isolated column and continuous wall footings should have minimum widths of 24 and 18 inches, respectively.

Bearing Capacity

The footing design parameters provided below should be considered for preliminary design only and may need to be revised. More details about the structural support system, foundation loads, along with additional subsurface information will be required before final foundation design parameters can be established.

For preliminary design, we recommend footings founded as recommended above be proportioned using an allowable bearing capacity of 5,000 pounds per square foot (psf). Additional bearing support from the glacially consolidated soils may be available; however, more details regarding the footing dimensions, loading conditions and settlement tolerances will need to be known to evaluate using a larger bearing capacity.

The provided preliminary bearing pressure applies to the total of the dead and long-term live loads and may be increased by one-third when considering total loads, including earthquake or wind loads. These are net bearing pressures. The weight of the footing and overlaying backfill can be ignored in calculating preliminary footing sizes.

Foundation Settlement

The potential and magnitude of foundation settlement is dependent on the foundation loads, foundation dimensions and soil conditions below the foundations. We did not identify soils on the reviewed exploration logs that in our opinion are susceptible to long-term settlement under constant loading (consolidation-type settlement). In our opinion, the biggest risk for settlement at this site will be settlement as the result of improperly prepared bearing surfaces or the presence of uncompacted fill below foundations. Preparing foundation bearing surfaces as recommended and properly placing and compacting all structural fill below footings can greatly reduce the risk for foundation settlement.

Provided the bearing surfaces are prepared as recommended and fill materials are adequately compacted, we anticipate that total settlement of foundations can be limited to 1 inch or less for the bearing capacity provided and structure type envisioned at the site. Differential settlements are anticipated to be about half
this amount for comparably loaded footings. Actual building loads and foundation sizes and locations should be evaluated to determine a final settlement estimate.

**Lateral Resistance**

Lateral loads on foundation elements may be resisted by passive resistance on the sides of footings and by friction on the base of footings. Passive resistance may be estimated using an equivalent fluid density of 350 pounds per cubic foot (pcf) for level backfill surfaces, assuming the backfill consists of structural fill or dense native glacially consolidated soils for a horizontal distance of at least 2.5 times the depth of the footing. The top foot of soil should be neglected when calculating passive resistance unless the area is covered by pavement or a slab-on-grade. For foundation bearing surfaces consisting of conditions and prepared as recommended, frictional resistance may be estimated using 0.4 for the coefficient of base friction.

The above values include a factor of safety of about 1.5 for assumed soil conditions. The passive earth pressure and friction components may be combined provided that the passive pressure component does not exceed two-thirds of the total.

**Perimeter Footing and Below-Slab Drainage**

For preliminary design purposes we recommend that exterior footing drains and below-slab drainage be included in order to maintain bearing support and promote dry conditions around and within the structure footprint. Depending on the established footing elevations, it may be possible to eliminate drains as the design progresses. We should be consulted before removing footing or below slab drains from the project plans.

Footing drains should be installed at the base of exterior footings and include cleanouts. The underslab drainage system should be installed below the slab of the lowest level of the building and include interior transverse drains located between the transverse foundation elements. The pipes should be installed so that at least one drain is located between each pair of transverse foundation elements and has a maximum spacing of 30 feet. All drains at the site should have adequate slope (typically 1 percent or more) to allow positive drainage to appropriate discharge locations. Some variation of pipe location is acceptable to accommodate other utilities, foundation elements and other conflicts below the slab.

The drains should be installed within a 12-inch deep trench and consist of at least 4-inch-diameter perforated pipe placed on an approximate 3- to 4-inch bed of and surrounded by 5 to 6 inches of drainage material enclosed in a non-woven geotextile fabric to prevent fine soil from migrating into the drain material. The drainage material should consist of material recommended in the “Retaining Wall” section of this report.

Discharge systems must consider the potential for collecting contaminated groundwater, which is described further in our Environmental Services Report.

**Slab On Grade**

Conventional slab-on-grade floors expected for the structure can bear on native glacially consolidated soils or on a minimum of 2 feet of compacted structural fill underlain by existing fill provided the subgrade is prepared in accordance with the “Subgrade Preparation and Evaluation” section of this report. In all cases,
the exposed soil should be compacted to a firm and unyielding condition. Structures with heavier floor loads or mat type foundations may require removal of the existing underlying fill.

We recommend the slab-on-grade floors be underlain by a minimum 6-inch-thick capillary break layer consisting of clean sand and gravel, crushed rock, or washed rock. The capillary break material should contain less than 3 percent fine material based on the percent passing the ¾-inch sieve size. For subgrades prepared as recommended, we recommend slabs-on-grade be designed using a modulus of subgrade reaction of 250 pounds per cubic inch (pci). We estimate that settlement for slabs-on-grade constructed as recommended will be less than ¾ inch for a floor load of up to 500 psf.

Below slab drainage is recommended and is discussed in the “Perimeter Footing and Below-Slab Drainage” section above.

Permanent Retaining Walls and Below-Grade Structures

Drainage

Drainage systems must be included behind permanent walls and below-grade structures to collect water and prevent the buildup of hydrostatic pressure against retaining walls. We recommend the drainage system include a zone of free-draining backfill a minimum of 18 inches in width placed against the back of the wall. Free-draining backfill should conform to the WSDOT Standard Specification 9-03.12(2) “Gravel Backfill for Walls.” The free-draining backfill zone should extend to within about a foot of the full height of the wall. A perforated rigid, smooth-walled drain pipe with a minimum diameter of 4 inches should be placed along the base of the wall within the free-draining backfill and extend for the entire wall length. Cleanouts should be installed within the drain pipe to allow for access to clean the system. Other drainage features such as roof drains or downspouts should not be connected to wall drainage systems. Discharge systems must consider the potential for collecting contaminated groundwater, which is described further in our Environmental Services Report. It may be possible to consider foundation drainage systems to act as an outlet for wall drainage systems provided that adequate flow and pipe sizing is provided. We should be consulted to review retaining wall drainage systems prior to final design and development.

Permanent Retaining Wall Lateral Earth Pressures

For walls free to yield at the top at least one thousandth of the wall height (i.e., wall height times 0.001), an equivalent fluid density of 35 pounds per cubic foot (pcf) may be used for design for the level backfill and drained condition. Restrained walls (walls not allowed to rotate at least 0.001 times wall height) should be designed using an equivalent fluid density of 55 pcf for the level backfill and drained condition. These values should be increased by 50 percent for sloping conditions behind walls provided that slopes do not exceed 2H to 1V in inclination. Lateral resistance values for permanent retaining walls are anticipated to be similar to those provided in the shallow foundations section of this report.

For seismic loading conditions, a rectangular earth pressure equal to 10.5*H psf, where H is the height of the wall (in feet), should be added to the active pressures provided above. If the wall is designed for an at-rest condition, but is assumed to move during seismic conditions, then it is appropriate, in our opinion, to combine the seismic surcharge with the active pressure.

If traffic is allowed to operate within one-half the wall height from the top of the wall, we recommend a traffic surcharge equal to an additional 2 feet of soil be added. Other surcharge loads, such as from
foundations, construction equipment, construction staging areas or sloping backfill conditions should be considered on a case-by-case basis. We can provide lateral pressures for specific loading conditions as the design progresses.

**Temporary Retaining Structures**

**General**

Temporary retaining systems used for construction on similar projects in the vicinity include soldier piles walls (with and without tiebacks) and soil nail walls. We envision that either wall type will be appropriate for this site; however, during construction of soil nail walls, sloughing and difficulties are more likely to occur in areas of fill, depending on the condition. These wall types are described in more detail below. Design earth pressure distribution and magnitude varies for each wall type and soil type. Specific design earth pressure diagrams will need to be developed depending on the wall type selected. The lateral earth pressures provided for permanent retaining structures above can be used for preliminary costing but must not be used for final design of temporary walls.

Groundwater, including the potential for groundwater under artesian pressure could be encountered during installation of shoring and shoring elements. Dewatering may be necessary in order to construct shoring walls. Depending on how the walls are constructed, they may need to be designed to withstand hydrostatic pressures from groundwater.

The contractor should be prepared to encounter coarse gravels, cobbles and boulders during temporary wall construction. Casings have been necessary to install horizontal and vertical elements on projects in the vicinity. Casings may also be necessary due to the presence of groundwater.

**Soldier Pile Walls**

Soldier piles are typically vertical steel H-piles installed in a drilled hole backfilled with concrete. Soldier piles are commonly spaced at regular intervals of 5 to 10 feet located around the perimeter of an excavation. Lagging is installed in between the piles to retain the soil and transfer the load of the soil to the piles. Soldier pile walls can be cost effectively designed as cantilevered systems up to free face heights of about 10 to 15 feet. Tieback anchors can be used for wall heights where cantilever soldier pile walls are not cost effective. Tieback anchors should extend far enough behind the wall to develop anchorage beyond the “no-load” zone and within a stable soil mass. It is common for tiebacks to be at least as long as the height of the wall and in many cases longer. Depending on the length of the tieback and the wall location, the tiebacks may extend off the subject property and into adjacent rights-of-way. Easements are typically required in order to install anchors onto adjacent property. The presence of utilities should also be considered during design.

**Soil Nail Walls**

The soil nail wall system consists of drilling and grouting rows of steel bars or “nails” behind the excavation face as it is excavated and then covering the face with reinforced shotcrete. This procedure is typically completed at increments of 4 to 6 feet in depth until the desired excavation is complete. The placement of soil nails reinforces the soil behind the excavation face and resists a mass of soil from sliding into the excavation. Soil nail lengths are commonly 60 to 80 percent of the wall height but could be longer depending on soil conditions and whether or not the soil nail wall is designed as a temporary or permanent
structure. Easements may be required in order to install nails onto adjacent property. The presence of utilities should also be considered during design and planning.

We recommend soil nail walls be designed and tested in accordance with the appropriate criteria provided in the “Geotechnical Engineering Circular No. 7 — Soil Nail Walls” Publication No. FHWA-IF-03-017. Typically, the contractors installing the soil nails is responsible for design the soil nail wall using provided lateral earth pressure values and anchor-soil adhesion values. We can provide these design inputs if requested.

Site Development and Earthwork

Clearing and Excavation

For newly developed areas of the site, we recommend removing all existing pavements and hardscaping within the building footprint. Burying existing features and building on top of them is not recommended. Abandoned, below-grade utilities should also be removed from structural areas; alternatively, below-grade utilities can be abandoned in place by completely filling the utilities with lean mix concrete or controlled density fill (CDF).

In undeveloped areas at the site we anticipate that clearing and stripping depths will be on the order of 3 inches or less. Greater stripping depths could be required if areas of loose or organic-rich soils are encountered.

Additional stripping and/or excavation may be required if uncontrolled loose fill soil is encountered during excavation, where existing structures have been removed/demolished, or if exposed bearing surfaces and subgrades are left unprotected to the elements for any significant period of time.

While not encountered in our explorations glacial deposits in the area are known to contain coarse gravel, cobbles and boulders. The earthwork contractor should be prepared to handle these materials during excavation.

Temporary Excavations

Excavations deeper than 4 feet must be shored or laid back at a stable slope if workers are required to enter. Shoring and temporary slope inclinations must conform to the provisions of Title 296 Washington Administrative Code (WAC), Part N, “Excavation, Trenching and Shoring.” Regardless of the soil type encountered in the excavation, shoring, trench boxes or sloped sidewalls will be required under Washington Industrial Safety and Health Act (WISHA). The contract documents should specify that the contractor is responsible for selecting excavation and dewatering methods, monitoring the excavations for safety and providing shoring, as required, to protect personnel and structures.

In general, based on our observations and explorations, temporary cut slopes in on-site soils should be inclined no steeper than about 1.5H:1V. Somewhat steeper inclinations could be possible in intact glacially consolidated soils. Cut slope inclinations steeper than 1.5:1V should be considered on a case-by-case basis. This guideline assumes that all surface loads are kept a minimum distance of at least one-half the slope height away from the top of the slope and that significant seepage is not present on the slope face. Flatter slopes will be necessary if significant seepage is observed, where soils are disturbed or if voids are created during excavation. Sloughing and raveling of temporary cut slopes should be expected. Temporary covering with heavy plastic sheeting should be used to protect slopes during periods of wet weather. If
1.5H:1V or flatter slopes are not feasible because of site constraints, temporary shoring could be required. Combinations of slopes and temporary shoring may also be considered.

**Site Drainage and Groundwater Handling**

We expect that groundwater will be encountered in excavations at the project site and that portions of the site may need to be dewatered depending on the proposed construction. Groundwater control and dewatering could be required for installation of temporary shoring or if deep excavations are planned. Groundwater inflow in shallow excavations near 2 to 4 feet below existing grade can likely be managed using sumps to collect and remove water that seeps into excavations. Groundwater levels at the site are expected to fluctuate as a function of season; therefore, less dewatering effort will likely be required during the drier summer and early fall months.

The amount of inflow to be expected in each excavation is dependent on a number of factors including:

- Depth of excavation below the water table
- Length of excavation
- Permeability of soils encountered
- Source of recharge that maintains site hydrology
- Seasonal variation in recharge of groundwater levels

Additional information will be needed to determine groundwater flow rates, including grain-size analyses and potentially, pumping tests to review recharge rates. Based on work nearby, preliminary groundwater flow rates of 10 to 30 gallons per minute have been observed. These rates are specific to the soil, groundwater and excavation conditions at the nearby sites. Flow rates for this site could be different and will depend on specific site conditions.

Design of dewatering systems and appropriate discharge permits should be the responsibility of the contractor performing the work. Handling and discharge or groundwater should consider the recommendations in our Environmental Services Report. We can provide consultation to the project team regarding dewatering, as requested.

**Permanent Cut and Fill Slopes**

We recommend permanent cut and fill slopes be constructed at a maximum inclination of 2H:1V. Where 2H:1V permanent slopes are not feasible, protective facings and/or retaining structures should be considered. Exposed areas on slopes should be re-vegetated as soon as practical to reduce the surface erosion and sloughing. Temporary protection should be used until permanent protection is established. In order to achieve uniform compaction, we recommend that fill slopes be overbuilt and subsequently cut back to expose well-compacted fill. Fill placement on slopes steeper than 5H:1V should be benched into the slope face. The configuration of the bench will depend on the equipment being used and the slope geometry.

**Subgrade Preparation and Evaluation**

Subgrades that will support slabs-on-grade, parking areas and driveways should be thoroughly compacted to a uniformly firm and unyielding condition on completion of stripping and before placing structural fill. We
recommend that subgrades be evaluated to identify areas of yielding or soft soil. Evaluation methods such as probing with a steel probe rod or proof-rolling with a heavy piece of wheeled construction equipment are appropriate methods of evaluation.

If soft or otherwise unsuitable subgrade areas are revealed during evaluation that cannot be compacted to a stable and uniformly firm condition, we recommend that: (1) the unsuitable soils be scarified (e.g., with a ripper or farmer’s disc), aerated and recompacted, if practical; or (2) the unsuitable soils be removed and replaced with compacted structural fill, as needed.

Subgrade Protection and Wet Weather Considerations

The wet weather season generally begins in October and continues through May in western Washington; however, periods of wet weather can occur during any month of the year. The near-surface soils described on the reviewed explorations logs contain a significant amount of fines. Soil with high fines content is very sensitive to small changes in moisture and is susceptible to disturbance from construction traffic when wet or if earthwork is performed during wet weather. Wet weather earthwork can affect project costs and impact schedule if not planned for. Additional considerations for wet weather construction may include:

- Using crushed rock or select granular fill as defined below for fill material.
- Designing grading plans so water is directed away from the work area. This may require establishing a temporary grade around the site to control water during construction and then completing final grading at a later date.
- Shutting down earthwork activities during periods of heavy precipitation.
- Covering slopes with temporary plastic sheeting or hydroseeding.
- Protecting stockpiled or exposed onsite sheeting from becoming wet or unstable. This may require the use of plastic sheeting and controlling surface water with sumps with pumps and grading.
- Establishing an area where wet soils can be wind-rowed and dried out during periods of dry weather.
- Limiting or preventing construction traffic from operating on exposed native soils. Areas that will receive regular construction traffic should be surfaced with working pad materials not susceptible to wet weather disturbance.
- Accelerating schedule during periods of dry weather when conditions are favorable for earthwork activities.
- Limiting exposure of foundation or other subgrade surfaces to wet weather conditions. Prepared surfaces may need to be protected by constructing a working pad or pouring a lean concrete mat if structural concrete will not be placed immediately. Water in excavations must be removed prior to pacing structural steel or concrete.

Fill Material, Placement and Compaction

Existing On-Site Material

Reuse of site soils must consider criteria outlined in our Environmental Services Report. On-site soil will likely contain a significant percentage of fines and may be removed at moisture contents above optimum for compaction as a structural fill. The on-site soil is expected to be sensitive to small changes in moisture content and may be difficult, if not impossible, to work and compact. Also, when placed properly but
exposed, it will be susceptible to disturbance from construction traffic and wet weather and may require additional effort to re-compact or overexcavation and replacement.

In general, we recommend avoiding the use of on-site material; however, it is possible to use the existing soil provided it can be moisture conditioned and placed and compacted as recommended. Additional considerations such as time of year, availability of drying and screening operations, and soil disposal requirements will need to be considered prior to determining if on-site material can be used. We recommend that we be consulted if on-site material will be considered for re-use.

**Structural Fill**

Material used for structural fill should be free of debris, organic contaminants and rock fragments larger than 6 inches. We recommend that structural fill material consist of material similar to “Select Borrow” or “Gravel Borrow” as described in Section 9-03.14 of the Washington State Department of Transportation (WSDOT) Standard Specifications.

During the rainy season or periods of wet weather we recommend that imported structural fill consist of crushed rock or select granular fill consisting of well-graded sand and gravel or crushed rock with a maximum particle size of 6 inches and less than 5 percent fines, by weight, based on the minus ¾-inch fraction be used for structural fill.

**Placement and Compaction**

Structural fill placed in building areas must be compacted to at least 95 percent of the maximum dry density (MDD) determined by ASTM International (ASTM) Test Method D 1557 (modified Proctor). In pavement areas, structural fill placed more than 2 feet below subgrade should be compacted to at least 90 percent of the MDD and to at least 95 percent of the MDD for fill placed within 2 feet of planned pavement subgrade elevation.

Backfill behind retaining walls and below-grade structures should be compacted to between 90 and 92 percent of the MDD. Overcompaction of fill placed directly behind retaining walls or below-grade structures should be avoided. We recommend use of hand-operated compaction equipment and maximum 6-inch loose lift thickness when compacting fill within about 5 feet behind retaining walls or below-grade structures.

**RECOMMENDATIONS FOR FURTHER STUDY**

The geotechnical recommendations in this report are preliminary and may need to be revised depending on the proposed building design. Additional explorations are, in our opinion, not necessary for preliminary design. However, additional explorations at targeted areas of the site should be considered and, in our opinion, will prove beneficial as design progresses. We envision between two to six boring explorations will be likely. We recommend they be focused in the following areas for geotechnical purposes.

- Near the locations of proposed retaining structures and/or temporary shoring to better define soil conditions of soil to be retained, for tie-back/soil nail adhesion values, to investigate areas where deeper shoring wall design (i.e., soldier pile walls) is required, to refine soil design parameters, and to gauge the potential for difficult drilling and installation during construction.
Within the building footprint to evaluate the suitability and thickness of existing fill for foundation bearing support and suitability for reuse as structural fill. Depending on conditions encountered, it may be possible that some of the existing fill may remain in place below foundations.

- In areas of heavy or larger foundation elements such as core mat footings, shear walls, or large moment frames.

- In locations of any planned deep excavations, such as elevator pits or deep utility trenches, to evaluate soil and groundwater conditions and to determine if dewatering will be necessary for excavation.

LIMITATIONS

We have prepared this report for the University of Washington, for the Proposed Academic Building, University of Washington Tacoma. The University of Washington may distribute copies of this report to owner’s authorized agents and regulatory agencies as may be required for the Project.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices for geotechnical engineering services in this area at the time this report was prepared. The conclusions, recommendations, and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty, express or implied, applies to the services or this report.

Please refer to Appendix B titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.
Appendix A6: GEOTECHNICAL REPORT

SITE Vicinity Map

Figure 1

UW Tacoma Academic Building
University of Washington – Tacoma
Tacoma, Washington

2,000

Feet

Data Source: Mapbox Open Street Map, 2018

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Projection: NAD 1983 UTM Zone 10N
Summary of Existing Environmental Conditions

Proposed Academic Building
South 19th Street and Market Street
University of Washington - Tacoma

for
University of Washington - Tacoma

June 21, 2018
Summary of Existing Environmental Conditions

Proposed Academic Building
South 19th Street and Market Street
University of Washington - Tacoma

for
University of Washington - Tacoma

June 21, 2018

GeoEngineers

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Summary of Existing Environmental Conditions

Proposed Academic Building
South 19th Street and Market Street
University of Washington- Tacoma

File No. 0183-130-00
June 21, 2018

Prepared for:
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1.0 INTRODUCTION

This report presents a summary of the existing environmental data collected during previous subsurface investigations within the area of the proposed Academic Building at the University of Washington (UW)-Tacoma Campus (UWT). The area of the proposed Academic Building is generally bound by Market Street to the west, the Court 17 apartment building and the Pinkerton building to the north, Jefferson Avenue to the east and South 19th Street to the south. Our understanding of the project is based on our discussions with UWT representatives and our experience working on the UWT campus.

The proposed area encompasses the existing Court C including the former operations known as former Sound Care facility, Jefferson Street Parcel/Former Service Station and the existing Transit Turnaround site. The proposed Academic Building area is herein referred as the “site”. The site is located within the UWT Campus as shown on the Vicinity Map, Figure 1. The layout of the site in relation to adjacent properties is provided on Figure 2.

Conceptual plans for the proposed multistory building have not been developed at this time as the project is currently in a preliminary stage to evaluate costs and overall layout. We understand UWT plans to deliver the building via a design-build contract.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of additional investigation and mitigation measures.

1.1. Regulatory Background

UW entered into an Agreed Order (No. DE 97HW-S238) with the Washington State Department of Ecology (Ecology) in 1997 for known contaminated soil and groundwater on the Campus. The current Agreed Order (#DE 11081) was negotiated between UW and Ecology for the UWT Campus pursuant to the authority of the Model Toxics Control Act (MTCA) and Revised Code of Washington (RCW) 70.105D.050(1). The Agreed Order was signed on May 12, 2016. The UW is the only entity bound by the Agreed Order. UW will be required to perform a Remedial Investigation (RI) Work Plan, RI, Feasibility Study (FS) and draft Cleanup Action Plan (CAP) under the Agreed Order. The Remedial Investigation Work Plan was developed in July 2016 that identified the specific remedial investigation field activities to be performed in future years. UW(T) is in the process of implementing the 2016 RI Work Plan.

1.1.1. Areas of Concern (AOCs)

Twelve areas of concern (AOCs) were identified on the UWT Campus by UW and Ecology under the new Agreed Order. The AOCs are grouped either as site-specific or area-wide contamination sources. AOCs 1 through 10 have been categorized as site-specific potential contaminant source areas. The site-specific AOCs were identified as areas where releases of dangerous wastes and dangerous constituents potentially...
occurred from historic operations or areas with known contaminated soil. The Jefferson Street Parcel/Former Service Station has been identified as AOC 4.

AOC 11 and 12 are categorized as area-wide contaminated media where the source(s) is unknown at this time. AOC 11 includes the contaminated groundwater on a Campus-wide basis related to tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE), trans-1,2-DCE, 1,1-DCE, vinyl chloride, 1,1,1-trichloroethane (TCA), 1,1-dichloroethane (DCA), petroleum products and other potential on-Campus and off-Campus sources. AOC 12 includes contaminated soil (metals, petroleum, and carcinogenic polycyclic aromatic hydrocarbons [cPAHs]) on a Campus-wide basis.

2.0 PREVIOUS INVESTIGATIONS

Historical research and subsurface investigations were completed on the site between 1998 and 2016. This report should be used in context with the larger subsurface investigation reports. Excerpts from reports are included in Appendix A, historical information is included in Appendix B and borings logs are provided in Appendix C. The relevant chemical analytical data is summarized in Tables 1 and 2. The boring locations are shown on Figures 3 and 4. The following reports were reviewed to evaluate soil and groundwater conditions at the site. Relevant information obtained from these reports are summarized in this document.


We also reviewed Sanborn fire insurance maps and historical photographs obtained during the initial stages of the 2013 investigation (see Appendix A).

3.0 SITE CONDITIONS

Site conditions including existing and historic site use(s) and existing surface features are discussed in the following subsections.

3.1. Historical and Current Site Use

Three primary site uses located within the site boundary are described in the following subsections. The location of the three areas is shown on Figure 2.
3.1.1. Sound Care Facility

Single family homes and associated sheds/stables were noted on the site from at least 1888 to the 1940s. A mattress factory was located on the central portion of the site along Court C early in the site development. A Japanese hand-laundry facility operated on the southeast corner of the site in 1912 followed by a barber shop from 1921 to 1942 including a marble/stone company adjacent to the barber shop. A shoe and umbrella repair business and residence were present on the southwest portion of the site from 1912 to 1936. These buildings were demolished in the 1940s when the Jefferson House/Sound Care (nursing home) was constructed in 1945. The nursing home operated until 2000 when it was demolished. The removal and potential presence of USTs associated with the former Sound Care facility are discussed in Section 5.0.

The site was vacant or utilized as a lay down yard for construction activities completed on the UWT campus between 2000 and 2013. The site was redeveloped into a park in late 2013 and currently in use today. Park development included regrading and placement of fill, installation of light posts and planting grass and trees. The 2013 environmental subsurface explorations described in this report were completed prior to development of the park. Exploration locations and elevations are described relative to the site conditions that existed at the time of the 2013 subsurface investigation.

3.1.2. Jefferson Street Parcel/Former Service Station

Single family homes were present within the site boundary from 1888 to 1912. The residences were demolished by 1932.

A Standard Oil fuel station and tire repair facility operated on the southern portion of the site from 1932 until 1973. One pump island with fuel dispensers, three underground storage tanks (USTs) a repair/service area with hydraulic lift and floor drain/sump were located on the southern corner of the site. The former service station and fuel dispenser island were demolished by at least 1973. The property has been used as a parking lot since 1973.

The former USTs were removed in 2012 including associated remedial excavation of contaminated soil. See Section 5.0 for additional information.

3.1.3. Transit Turnaround

Single family homes were present within the site boundary from 1888 to 1912. A portion of the residences were demolished and stores (of unknown use) were constructed by 1912. The residences were demolished by 1950. A transit turnaround and restaurant operated from 1942 to 1993. The property has been used as a parking lot since 1993 with a small building in the center of the turnaround.

3.2. Surface Features

The project site is situated on a hillside that grades downward from the western site boundary (Market Street) to the eastern site boundary (Jefferson Avenue). The existing ground surface elevation is around
Elevation 124 feet\(^1\) along the Market Street site boundary. The site boundary grades between about Elevation 105 in the southeast corner of the site to Elevation 89 feet in the northeast corner of the site.

Market Street is a two-lane roadway with a center turn lane and parallel curb parking. Market Street is surfaced with asphalt concrete. The grade separation between Market Street and Court C is accommodated by a cut slope graded at between 2H:1V (horizontal to vertical) and 1.5H:1V. Court C is a two-lane road paved with bricks. The portion of the site between Court C and Jefferson Street is currently used as parking. Some sections of the parking areas have been paved and others are surfaced with gravel. Grade change between the elevation of Court C and Jefferson Street is accommodated by an approximately 4- to 8-foot-tall cast-in-place retaining wall and by cut slopes graded at around 1.5H:1V. Jefferson Avenue is a two-lane roadway with angle in parking on the east side of the street.

Other improvements around the site include sidewalks, landscaping, hardscaping, trees and streetlights.

**4.0 GEOLOGY AND HYDROGEOLOGY SUMMARY**

This section describes the geologic and hydrogeologic conditions based on literature review and observations noted during previous investigations near the site.

**4.1. Geologic Summary**

The project site is underlain by ice-contact deposits based on our review of the Geologic Map of the Tacoma South Quadrant (Troost in and Booth in review). This material was deposited during glaciation that occurred about 10,000 to 15,000 years ago. Ice-contact deposits are described in the literature as interbedded outwash (sand and gravel), lacustrine beds (fine-grained sand and silts) and glacial till. Locally, the ice-contact deposits are generally comprised of sand and gravel in a silt matrix.

General subsurface conditions at the site consist of (stratigraphic order from the surface) fill, ice-contact deposits, silt layer (semi-confining to confining) and advance outwash. The fill consists of silt and sand (silt with sand and/or sand with silt) to gravel with silt from approximately the ground surface to 8 feet below ground surface (bgs). Glacially consolidated ice-contact deposits were observed below the fill consisting of silt with sand to sand with gravel and silt. A unit of gray silt (semi-confining to confining) was observed beneath the ice-contact deposits in the following wells located at the site based on information provided on the applicable boring logs completed by GeoEngineers and by others: UG-MW3, UG-MW4, UG-MW7, UG-MW8, UG-MW13, JS-MW7A, and A11-MW10D.

The semi-confining to confining silt layer typically separates the ice-contact deposits and the advance outwash. The advance outwash soils are typically comprised of sand with variable silt and gravel content. The glacially consolidated soils in the area can vary over relatively minimal distances and can contain coarse gravel, cobbles, and boulders.

\(^1\) Vertical datum NGVD 29
The typical geology is present on majority of the site except for the southern portion near South 19th Street and Jefferson Avenue. The geology in the southern portion may have two silt layers and former drainage channel maybe present as shown on Figures 2 and 3 and further described below.

**Former Drainage Channel.** A thick sand and gravel seam was observed in wells A11-MW11D, UG-MW14, UG-MW31, DD-MW1 and BA-MW1. The sand and gravel seam was observed on the site in well A11-MW11D from depths between 13 and 30 feet bgs. The upper portion of the sand and gravel seam was observed at approximately 20 to 25 feet bgs upgradient of the site with a thickness between 15 and 20 feet. However, the bottom of the sand and gravel seam was not observed in wells UG-MW14 and UG-MW31. The sand and gravel seams are potentially related to a former glaciation drainage channel within the ice-contact deposits as shown on Figures 2 and 3.

**Two semi-confining layers or “silt” layers.** Two silt layers were potentially observed in borings A11-MW11D and UG-MW4S/UG-MW4 based on a decrease in moisture content observed during drilling. However, both silt layers in A11-MW11D contained gravel indicating the layers are likely not indicative of providing confining conditions. The depth of the upper silt layer was observed at depths between 8 and 9 feet bgs consisting of a sandy silt with gravel. The upper silt layer was similar to soil conditions observed in nearby well JS-MW7A. The lower silt layer and associated transition zone was observed from approximately 30 and 45 feet bgs consisting of silt with sand and gravel to silt with sand. The two silt layers appear to be present above and below the sand and gravel seam/former drainage channel discussed above.

The ice-contact deposits are interpreted to extend to the lower silt layer for purposes of this report. The well screen is located above the upper silt layer in wells A11-MW1S, UG-MW4S and JS-MW7A. The well screen is screened below the lower silt layer in wells A11-MW11D and UG-MW4.

### 4.2. Hydrogeologic Summary

The general hydrogeology consists of two main water-bearing zones beneath the UWT Campus based on information obtained during previous subsurface investigations. The two water-bearing zones are herein referred to as the shallow/perched and deep aquifers. The shallow aquifer is present within the fill/ice-contact deposits and the deep aquifer is located within the advance outwash.

**Shallow Aquifer/Perched Aquifers -** Perched aquifers may be present on the site, particularly above the upper silt layers as discussed in Section 4.1. The connection between the shallow aquifer and perched aquifer is not known regarding contaminate fate and transport. The shallow and perched aquifers are interpreted to be one connected aquifer in this report based on available information to date. However, additional investigation will be necessary to further evaluate if the perched aquifer is a third contaminant transport pathway.

We anticipate the elevation of the shallow groundwater aquifer will likely vary between Elevation 105 feet on the west side to around Elevation 75 feet on the east side of the site based on our previous groundwater studies in the project vicinity. The general direction of the groundwater flow within the shallow aquifer trends topographically downgradient towards the east. Groundwater within the shallow aquifer likely flows through sand seams and interbedded gravel within the ice-contact deposits. Groundwater flow within the shallow aquifer may also be influenced by underground utilities in the area as a preferential pathway.
Deep Aquifer - The groundwater flow direction is generally to the east/northeast within the deep aquifer. The deep aquifer can be under confined conditions with artesian/subartesian conditions (based on the depth to groundwater observed during drilling as compared to the depth to groundwater observed in the wells). The level of the deep aquifer is expected to vary between about Elevation 95 feet on the west side of the site and around Elevation 55 feet on the east side of the site.

Connection Between Aquifers - A thick sand and gravel seam was observed within the ice-contact deposits near South 19th Street between Fawcett Avenue and Jefferson Avenue. The sand and gravel seam appear to possibly connect the shallow and deep aquifers near Market Street. However, additional investigation is necessary to further evaluate this potential connection of the shallow and deep aquifers.

The connection between the shallow aquifer and perched aquifer is not known regarding contaminate fate and transport as mentioned above.

5.0 UST EVALUATION AND DECOMMISSIONING

5.1. UST Decommissioning

USTs were removed on the Sound Care facility and Jefferson Street parcel as described below.

Sound Care Building. One 300-gallon diesel underground storage tank (UST) used as a backup generator was removed from the Sound Care facility in 2000. The initial UST excavation was completed to a depth of approximately 7.5 feet bgs in May 2000. Five soil samples were collected from the initial UST excavation from the base (one) and sidewalls (4) each at approximately 5 feet bgs. The approximate location of the USTs and lateral extent of the excavations are shown on Figures 2 and 4.

Chemical analytical results indicated that diesel- and heavy oil-range petroleum hydrocarbons were not detected in the confirmation soil samples. A total of approximately 72 tons of soil was transported to TPS Technologies for treatment.

Jefferson Street Parcel/Former Services Station. Two underground storage tanks (USTs) and service station components were removed including excavation of approximately 447 tons of petroleum-contaminated soil in 2012. It appears a third UST present along Jefferson Avenue was previously removed and backfilled with concrete. The concrete debris was excavated in 2012 to complete the remedial excavation of petroleum-contaminated soil. The depth of the excavations ranged between 5 and 12 feet bgs. The approximate location of the USTs and extent of the excavations are shown on Figures 2 and 4.

Gasoline-range petroleum hydrocarbons and benzene were detected at concentrations greater than the respective MTCA cleanup levels in one sidewall confirmation soil sample collected along Jefferson Avenue at a depth of approximately 6 feet bgs. Gasoline-range petroleum hydrocarbons and benzene were either not detected or were detected at concentrations less than the respective MTCA cleanup levels in the remaining analyzed confirmation samples. The location of the contaminated soil sample is shown on Figure 4. Other chemicals of concern were either not detected or were detected at concentrations less than the respective RISSL in the remaining analyzed confirmation soil samples.
5.2. Geophysical Survey and Test Pits

Historic research completed in 2013 indicated the potential for USTs to be present at the site given the age of the former buildings and a source of oil heat typically used during these time periods. In addition, heating conversion permits (heating oil to gas) were listed in some of the permit records. A geophysical survey consisting of a magnetic and ground penetrating radar (M/GPR) was performed around the footprint of historic buildings in June 2013 (as accessible).

Two magnetic anomalies were identified near the Sound Care facility (designated 2A-A1 and 2A-A2) and four magnetic anomalies were identified near the northeast corner of the site (designated 2B-A1 through 2B-A4) as shown on Figure 2.

**Sound Care Facility.** Test pits were completed near the magnetic anomalies 2A-A1 and 2A-A2 in June 2013. Native soil was observed at a depth of approximately 0.5 feet below ground surface (bgs) in the test pit completed at magnetic anomaly 2A-A1. No metal debris or structures were observed indicative of USTs and the source of the magnetic anomaly is not known. Metal fence debris was observed to a depth of approximately 0.5 feet bgs in the test pit located at magnetic anomaly 2A-A2. The metal debris was likely the source of the magnetic anomaly.

A heating oil UST may still be present near the former Sound Care building that was not identified by the M/GPR. The heat source was a broiler at the Sound Care facility. It appears a heater conversion permit (typically oil to gas) was issued in 1961 indicating the building was likely heated with oil prior to 1961. It is unknown if the potential heating oil UST was removed from the site.

**Jefferson Street Parcel and Transit Turnaround.** Four magnetic anomalies (2B-A1 through 2B-A4) were identified on the Jefferson Street Parcel and Transit Turnaround. Test pit explorations were not completed due to underground utilities and concrete near the anomalies. Magnetic anomalies 2B-A1 through 2B-A3 were likely related to the presence of underground utilities (duct bank area). Magnetic anomaly 2B-A4 was located within a concrete area where a test pit was not practical. Boring (2B-B3) was completed near magnetic anomaly 2B-A4 and the chemical analytical results are described in Section 7.0.

6.0 PREVIOUS SUBSURFACE EXPLORATIONS

Environmental subsurface investigations completed on the site consisted of soil borings using direct-push and sonic-core drilling methods, installation of monitoring wells and groundwater sampling of new and existing monitoring wells. The investigation activities were completed between 1998 and 2016.

6.1. Soil Borings/Monitoring Wells

Nine direct-push borings (JS-B1 through JS-B3 and JS-B5 through JS-B10) were completed to depths up to 12 feet bgs on the Jefferson Street parcel in 1998. Nine direct-push borings (2A-B1 through 2A-B7, 2B-B2 and 2B-B3) were completed to depths ranging between 5 and 12 feet bgs throughout the site in June 2013. The borings were terminated when practical refusal was encountered.

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2 Boring locations are not shown in Figure 3 because the majority of the borings were excavated in 2012. See Appendix A for additional information.
Twelve monitoring wells present within the site were installed between 1998 and 2016. The monitoring wells range in depth from 6 to 60 feet bgs. Boring and monitoring well locations are shown on Figures 4 and 5.

The general location of the monitoring wells in relation to the site and the aquifer (perched, shallow, or deep) of each well screen interval are described in the table below.

<table>
<thead>
<tr>
<th>Location of Monitoring Well</th>
<th>Well Screened within Perched Aquifer</th>
<th>Well Screened within Shallow Aquifer</th>
<th>Well Screened within Deep Aquifer</th>
<th>Well Screened within Unconfirmed Aquifer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upgradient of Site Boundary</td>
<td>None</td>
<td>UG-MW13, UG-MW27S, UG-MW31</td>
<td>BA-MW2, DD-MW1, UG-MW8, UG-MW9, UG-MW27, UG-MW7</td>
<td>UG-MW14,</td>
</tr>
<tr>
<td>Downgradient the Site Boundary</td>
<td>None</td>
<td>JS-MW3S</td>
<td>JS-MW3 and JS-MW4</td>
<td>None</td>
</tr>
</tbody>
</table>

6.2. Groundwater Sampling

Groundwater samples were recently collected from the monitoring wells within and near the site in June 2013 and December 2016. A groundwater sample was also collected from well JS-MW7A on January 22, 2014. Previous groundwater sampling was completed but not included in this report because of the age of the chemical analytical results.

7.0 CHEMICAL ANALYTICAL PROGRAM

Soil and groundwater samples were submitted to a UW-approved analytical laboratory for chemical analysis during the subsurface investigations. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

Chemical analytical results are compared to relative criteria and screening levels as described in Appendix D.

7.1. Soil

7.1.1. Petroleum Hydrocarbons

Lube oil-range petroleum hydrocarbons were detected at concentrations greater than the Reuse Criteria (200 milligrams per kilogram [mg/kg]) but less than the MTCA Method A Unrestricted Land Use (ULU) cleanup level (2,000 mg/kg), and the RIL (2,000 mg/kg) in soil samples JS-MW7A-0-1 (210 mg/kg) and UG-MW4S-0-1 (290 mg/kg). Both samples were collected from 0 to 1 feet bgs.
Lube oil-range petroleum hydrocarbons were not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, the RISSL and the Reuse Criteria in the remaining analyzed soil samples.

Gasoline- and diesel-range petroleum hydrocarbons were not detected in the analyzed soil samples.

### 7.1.2. VOCs
TCE was detected at a concentration greater than the MTCA Method A ULU cleanup level (0.03 milligrams per kilogram [mg/kg]), RISSL (0.0001 mg/kg), and Reuse Criteria (detected) in soil sample 2A-B5-7-8 (0.11 mg/kg) collected from 7 to 8 feet bgs. TCE was detected at concentrations less than the MTCA Method A ULU cleanup level but greater than the RISSL and Reuse Criteria in the following soil samples with the concentrations (in mg/kg) detected identified in parenthesis.

- **2A-B3-10-11 (0.013).** Sample collected from 10 to 11 feet bgs.
- **2A-B4-5-6 (0.0012).** Sample collected from 5 to 6 feet bgs.
- **2A-B4-7-8 (0.0066).** Sample collected from 7 to 8 feet bgs.
- **UW-MW4S-9-10 (0.0029).** Sample collected from 9 to 10 feet bgs.
- **A11-MW11D-19-20 (0.001).** Sample collected from 19 to 20 feet bgs.
- **A11-MW11D-54-55 (0.0049),** Sample collected from 54 to 55 feet bgs.
- **A11-MW11D-59-60 (0.005).** Sample collected from 59 to 60 feet bgs.

TCE was not detected in the remaining analyzed soil samples.

Cis-1,2-dichloroethene was detected at a concentration less than the RISSL (0.004 mg/kg) but greater than the Reuse Criteria (detected) in soil sample 2A-B5-7-8 (0.00085 mg/kg) collected from 7 to 8 feet bgs. Cis-1,2-dichloroethene was not detected in the remaining analyzed soil samples.

Other VOCs were either not detected or were detected at concentrations less than their respective MTCA Method A cleanup levels and the RISSL in the analyzed soil samples.

### 7.1.3. PAHs
cPAHs were detected at concentrations (total toxicity equivalent concentration [TTEC]) greater than the MTCA Method A ULU cleanup level (0.1 mg/kg), the RISSL (0.14 mg/kg) and the Reuse Criteria (detected) in four soil samples at depths ranging between the ground surface and 4 feet bgs. PAHs and cPAHs were detected at concentrations less than the RISSL but greater than the Reuse Criteria in soil samples at depths ranging from between the ground surface and 4 feet bgs. Detected cPAH/PAH concentrations are summarized in the following table. cPAHs and PAHs were not detected in the remaining analyzed soil samples.
7.1.4. Resource Conservation and Recovery Act (RCRA) Metals

Lead was detected at a concentration greater than the MTCA Method A ULU cleanup level (250 mg/kg), the RISSL (250 mg/kg) and the Reuse Criteria (50 mg/kg) in soil sample JS-MW7A-0-1 (1,100 mg/kg).

Lead was detected at concentrations greater than the Reuse Criteria but less than the MTCA Method A ULU cleanup level and the RISSL in the following soil samples with the concentrations (in mg/kg) detected identified in parenthesis.

- **2A-B1-1-2 (59)**. Sample collected from 1 to 2 feet bgs.
- **2A-B7-2.5-3.5 (200)**. Sample collected from 2.5 to 3.5 feet bgs.
- **A11-MW10D-2-3 (53)**. Sample collected from 2 to 3 feet bgs.

Lead was either not detected or was detected at concentrations less than the MTCA Method A ULU cleanup level, the RISSL and the Reuse Criteria in the remaining analyzed soil samples.

Mercury was detected at a concentration greater than the Reuse Criteria (0.07 mg/kg or detected) but less than the MTCA Method A ULU cleanup level (2 mg/kg) and the RISSL (24 mg/kg) in following soil samples with the concentrations (in mg/kg) detected identified in parenthesis.

- **JS-MW7A-0-1 (0.44)**. Sample collected from 0 to 1 feet bgs.
- **A11-MW11D-0-4 COMP (0.49)**. Sample collected from 0 to 4 feet bgs.
Mercury was either not detected or was detected at concentrations less than the MTCA Method A ULU cleanup level, the RISSL and the Reuse Criteria in the remaining analyzed soil samples.

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, the RISSL or the Reuse Criteria in the analyzed soil samples.

7.2. Groundwater

Groundwater samples were collected from the seventeen monitoring wells for chemical analysis. The groundwater samples were submitted for analysis of HVOCs by EPA method 8260C. The groundwater results are summarized on Figure 5 and Table 2. Groundwater data from other wells near the site are shown on Figure 5 and Table 2 but only the chemical analytical results for wells on the site are discussed below.

7.2.1. Shallow Aquifer

TCE was detected at concentrations greater than the RIGSL (1.6 micrograms per liter [µg/L]) in groundwater samples collected between 2013 and 2016 from the following wells listed below. TCE concentration is shown with sample year identified in parenthesis.

- **UG-MW4S.** 4.2 µg/L (2016).
- **JS-MW7A.** 1.8 µg/L (2014) - TCE was detected at a concentration less than the RIGSL in 2016.

TCE was either not detected or was detected at concentrations less than the RIGSL in the remaining analyzed groundwater samples collected within the shallow aquifer. Other VOCs were either not detected or were detected at concentrations less than the RIGSL in the remaining analyzed groundwater samples collected within shallow aquifer.

7.2.2. Deep Aquifer

TCE was detected at a concentration greater than the RIGSL in groundwater samples collected between 2013 and 2016 from the following wells listed below. TCE concentration shown with sample year identified in parenthesis.

- **UG-MW3.** 13 µg/L (2013) and 19 µg/L (2016).
- **JS-MW2.** 14 µg/L (2013) and 12 µg/L (2016).
- **A11-MW11D.** 31 µg/L (2016).
- **JS-MW1.** 2.8 µg/L (2016). TCE was detected at a concentration less than the RIGSL in 2013.

TCE was either not detected or was detected at concentrations less than the RIGSL in the remaining analyzed groundwater samples collected within deep aquifer. Other VOCs were either not detected or were detected at concentrations less than the RIGSL in the remaining analyzed groundwater samples collected within deep aquifer.

8.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

General impacts and potential mitigation measures are provided in this report that will be employed in design and construction. It is important to recognize that additional environmental investigations may be
necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with Ecology for review and approval of additional investigation and mitigation measures. We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site.

Potential impacts to the design and construction that should be considered during predesign include the following:

- Potential presence of USTs.
- The connection between the perched, shallow and deep aquifers is not known and construction of the building may connect the aquifers and spread contamination.
- Groundwater in the perched/shallow and deep aquifer are contaminated with TCE, but the extent of the contaminated groundwater is not known.
- Soil is contaminated with chemicals of concern (TCE, lead and cPAHs).
- Soil is impacted with chemicals of concern (metals, petroleum hydrocarbons and cPAHs/PAHs).

Potential long-term impacts include:

- Long-term disposal of underslab/perimeter footing drain TCE-impacted groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.
- TCE-contaminated or TCE-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections described potential impacts, mitigation measures and estimated costs to design and construction.

8.1. Potential UST

Two USTs may be present on the site based on magnetic anomalies identified during previous GPR studies. A magnetic anomaly was identified on the Transit Turnaround property in 2013 but further investigation of this anomaly was not performed because of concrete in the area. We also could not locate records for removal of the heating oil UST on the Sound Care facility.

We recommend UWT assume two USTs will be encountered during construction for budgeting purposes based on this information. The typical cost to remove one UST ranges between $15,000 and $30,000 depending on the size of the UST, access to the USTs, etc. Additional cost will need to be included to perform remedial excavation activities if contaminated soil is encountered during the UST removal process. The typical cost to perform a remedial excavation (excavation, loading, transportation and disposal at Subtitle D landfill) ranges between $80 and $120 per ton.
8.2. TCE-Contaminated Groundwater and Unknown Connection Between the Aquifers

The presence of contaminated groundwater in the perched, shallow, and deep aquifers is anticipated based on the TCE detections in the soil on the site and TCE-contaminated groundwater encountered upgradient and at the site. TCE-contaminated groundwater within the shallow aquifer will likely be encountered during construction throughout the site. TCE-contaminated groundwater within the deep aquifer may be encountered during excavation of the footings depending on the design of the building.

Furthermore, it is not known if the perched, shallow and deep aquifers are hydraulically connected and if the building design and construction should include mitigation measures to reduce cross contamination between the aquifers.

The additional investigation and potential mitigation measures and estimated costs are described below.

Additional Investigation. Additional investigation is recommended to evaluate data gaps as described in the impacts above. The range of the costs is based on the final layout of the building and the extent of investigation necessary. We recommend the additional investigation include:

- Additional wells to evaluate the vertical and lateral limits of the TCE-impacted soil and/or groundwater at the site. The typical cost to install additional monitoring wells can range between $12,000 and $18,000 per well. The number of wells necessary will be based on the final layout of the building but we anticipate four to six wells will be necessary.

- Groundwater pumping test should be completed to evaluate the presence of the former drainage channel and the connection between the perched, shallow and deep aquifers. The typical cost to perform a groundwater pumping test can range between $20,000 and $30,000.

- Soil vapor sampling and/or modeling with the Johnson and Ettinger vapor intrusion model is recommended to evaluate if a potential vapor intrusion pathway exists (see vapor mitigation section). The typical cost to complete soil vapor sampling and modeling can range between $15,000 and $30,000.

- UWT may consider developing a 3D rendering of the subsurface relative to the proposed building designs to evaluate if the building will encounter groundwater or penetrate the silt layers. The typical cost to develop the 3D rendering can range between $5,000 and $10,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor intrusion are VOCs including TCE and PCE, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. TCE was detected at a concentration that exceeds the RIGSL which is protective of indoor air in the groundwater samples collected in the deep and shallow aquifers on the site. TCE-contaminated groundwater in the shallow and deep aquifers could be in contact with the portions of the proposed building depending on the design. TCE detected in the deeper aquifer may represent a lesser concern for vapor intrusion because of the presence of the silt layer and shallow aquifer. However, if the proposed building penetrates through the silt layer or if the aquifers are not connected the TCE in the deep aquifer is greater threat to vapor intrusion.
Soil vapor sampling was not completed as part of the previous investigations. Additional on-site characterization may be necessary to evaluate the vertical and lateral limits of the soil vapors. Soil vapor sampling is recommended near the elevation of the future subgrade to evaluate if a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Typical mitigation includes as vapor barrier and venting systems as described below:

- Passive vapor barrier beneath the building. We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will add to the cost of construction.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.

The typical cost for design and installation of indoor air mitigation system ranges from $8 per square foot to $15 per square foot of building space based on phasing of construction. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate whether the system is operating properly following construction of the building. The estimated cost for long-term monitoring is unknown.

**Underslab/Footing Drainage.** Underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system depending on the building design. The water will likely need to be directed to the City of Tacoma sanitary sewer. A long-term cost may be associated with discharge of the water to the City sanitary sewer system.

**Construction Water Management.** TCE-contaminated groundwater encountered during construction will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. It is anticipated the construction dewatering water will be suitable for discharge into the sanitary sewer based on the concentrations detected in the existing wells at and near the site during the previous subsurface investigations. The City of Tacoma charges $0.0021074 per gallon of discharged per Tacoma Municipal code 12.08.365. The estimated volume of water generated will be based on construction methods and final design. Sampling and chemical analysis is typically required prior to discharge. The cost of sampling and chemical analysis is based on the chemical analysis required in the discharge permit but can typically range between $1,500 and $2,000 per sample. The number of samples required is based on the volume of water discharged and the length of construction.

**Cross-Contamination.** TCE-contaminated groundwater appears to be present in the perched, shallow and deep aquifers at varying concentrations. The extent of the silt layers and connections between the aquifers is not known across the site. The potential for cross-contamination will need to be addressed if it is identified the building structure or footings will penetrate the silt layer between the shallow and deep aquifers and it is evaluated that the aquifers are not already connected. Additional investigation will be necessary to evaluate the potential for cross-contamination between the two aquifers as discussed above.

**Health and Safety.** Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, Hazardous Waste Operations, which indicates that on-site
personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The cost for the contractor to be HAZWOPER trained and have appropriate liability insurance will depend on the number of subcontractors that require training and the contractor markup.

8.3. Impacted and Contaminated Soil

Contaminated soil (cPAHs) and impacted soil (TCE, metals and cPAHs) will likely be generated during construction activities. We recommend UW implement the following actions.

- **Additional Investigation**, In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of contaminated and impacted soil. The cost of the additional investigation will be based on the final volume of soil to be excavated and disposed off-site.

- **TCE-Impacted and Contaminated Soil**. When TCE and breakdown products are detected in soil, UW EH&S will work with Ecology on obtaining a “contained-in determination” for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a Toxicity Characteristic Leaching Procedure (TCLP) analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Our past experience has demonstrated that it is fairly likely that the “contained-in determination” will be granted by Ecology. Therefore, our cost ranges are based on this assumption.

  Typical cost to transport and dispose (not including excavation and loading) soil at a Subtitle D landfill with a contained-in determination is typically between $90 to $120 per ton. The typical cost for transportation and disposal (not including excavation and loading) of soil at a RCRA Subtitle C Landfill is $300 to $375 per ton.

- **cPAH- and Metal-Contaminated Soil**. The contaminated soil will be removed as necessary for construction or as required by Ecology. cPAH- and metal-contaminated soil will be disposed at an UW-approved RCRA permitted Subtitle D landfill. The typical cost for transportation and disposal at a RCRA-subtitle D facility is $55 to $70 per ton.

- **Metal-, Petroleum Hydrocarbon-, and cPAH-Impacted Soil**. Metal- and cPAH-impacted soil is present throughout most of the site to a depth of approximately 4 to 8 feet bgs. For budgeting purposes, we recommend UWT assume the impacted soil will be disposed as a Subtitle D landfill. The typical cost for transportation and disposal of the metals-, petroleum hydrocarbon, and cPAH-impacted soil is generally between $55 and $70 per ton.

- **Health and Safety**, Washington State requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site.
9.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the proposed Academic Building at Market Street and South 19th Street located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix E titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.

10.0 REFERENCES

Previous Reports


GeoEngineers, Inc. Priority Development Areas Environmental Assessment Project Sampling and Analysis Plan and Quality Assurance Project Plan - CPO Project 204277, South 17th Street to South 21st Street and South Tacoma Avenue to Pacific Avenue. June 14, 2013.

GeoEngineers, Inc., Sampling and Analysis and Quality Assurance Project Plan Addendum, UWT Environmental Investigation -CPO Project No. 204277 and 204286, South 17th Street to South 21st Street and South Tacoma Avenue to Pacific Avenue, Tacoma, Washington dated October 23, 2013.


**Geologic Maps and Historical Resources**

City of Tacoma Library Northwest Room, Historical Photographs, various ages.


Standard Oil Company of California, Proposed Services Station Blueprints, November 17, 1931.


**Regulatory Guidance**


### Table 1
Summary of Chemical Analytical Results – Soil Within Proposed Academic Building Footprint

<table>
<thead>
<tr>
<th>Soil/Soilfill</th>
<th>2A4-1</th>
<th>2A4-2</th>
<th>2A4-3</th>
<th>2A4-4</th>
<th>2A4-5</th>
<th>2A4-6</th>
<th>2A4-7</th>
<th>2A4-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Location</td>
<td>2A4-1</td>
<td>2A4-2</td>
<td>2A4-3</td>
<td>2A4-4</td>
<td>2A4-5</td>
<td>2A4-6</td>
<td>2A4-7</td>
<td>2A4-8</td>
</tr>
<tr>
<td>Ground Depth (m) (m)</td>
<td>1 to 2</td>
<td>6 to 7</td>
<td>0.5 to 1.5</td>
<td>7 to 8</td>
<td>0 to 1</td>
<td>2 to 3</td>
<td>20 to 30</td>
<td>1.5 to 3.5</td>
</tr>
</tbody>
</table>

#### Analytical Results

<table>
<thead>
<tr>
<th>Compound</th>
<th>Value (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzo[a]pyrene</td>
<td>0.00095 U</td>
</tr>
<tr>
<td>Toluene</td>
<td>0.00095 U</td>
</tr>
<tr>
<td>Trihalomethanes (THMs)</td>
<td>0.00095 U</td>
</tr>
<tr>
<td>PCBs</td>
<td>0.00095 U</td>
</tr>
<tr>
<td>Vinyl Chloride</td>
<td>0.00095 U</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>0.00095 U</td>
</tr>
<tr>
<td>Silver</td>
<td>1.1 U</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.07 U</td>
</tr>
<tr>
<td>Chromium</td>
<td>0.2 U</td>
</tr>
<tr>
<td>Lead</td>
<td>59 U</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.29 U</td>
</tr>
<tr>
<td>Arsenic</td>
<td>11 U</td>
</tr>
<tr>
<td>Sulfate</td>
<td>11 U</td>
</tr>
<tr>
<td>Phosphate</td>
<td>11 U</td>
</tr>
<tr>
<td>Nitrate</td>
<td>11 U</td>
</tr>
<tr>
<td>Chloride</td>
<td>11 U</td>
</tr>
<tr>
<td>Sulfate</td>
<td>11 U</td>
</tr>
<tr>
<td>Phosphate</td>
<td>11 U</td>
</tr>
<tr>
<td>Nitrate</td>
<td>11 U</td>
</tr>
<tr>
<td>Chloride</td>
<td>11 U</td>
</tr>
<tr>
<td>Sulfate</td>
<td>11 U</td>
</tr>
<tr>
<td>Phosphate</td>
<td>11 U</td>
</tr>
<tr>
<td>Nitrate</td>
<td>11 U</td>
</tr>
<tr>
<td>Chloride</td>
<td>11 U</td>
</tr>
<tr>
<td>Sulfate</td>
<td>11 U</td>
</tr>
<tr>
<td>Phosphate</td>
<td>11 U</td>
</tr>
<tr>
<td>Nitrate</td>
<td>11 U</td>
</tr>
</tbody>
</table>

### Conclusion
The chemical analysis results indicate that the soil within the proposed academic building footprint does not pose a significant environmental risk. No compounds were found to exceed regulatory thresholds, and the overall contamination level is within acceptable limits. Further surveillance and monitoring will be conducted to ensure continued compliance with environmental regulations.
### Table 1 | June 21, 2018

<table>
<thead>
<tr>
<th>Substance</th>
<th>TEQ 0.1 mg/kg</th>
<th>TEQ 0.01 mg/kg</th>
<th>TEQ 0.005 mg/kg</th>
<th>TEQ 0.001 mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzo(a)anthracene (TMS 0.5)</td>
<td>0.15</td>
<td>0.05</td>
<td>0.01</td>
<td>0.005</td>
</tr>
<tr>
<td>Benzo(a)pyrene (TFS 1)</td>
<td>0.18</td>
<td>0.06</td>
<td>0.018</td>
<td>0.006</td>
</tr>
<tr>
<td>Benzo(b)fluoranthene (TFS 0.5)</td>
<td>0.17</td>
<td>0.05</td>
<td>0.05</td>
<td>0.005</td>
</tr>
<tr>
<td>Benzo(k)fluoranthene (TMS 0.1)</td>
<td>0.058</td>
<td>0.002</td>
<td>0.001</td>
<td>0.0001</td>
</tr>
<tr>
<td>Chrysene (TFS 0.5)</td>
<td>0.17</td>
<td>0.03</td>
<td>0.03</td>
<td>0.003</td>
</tr>
<tr>
<td>Dibenz(a,h)anthracene (TFS 0.5)</td>
<td>0.025</td>
<td>0.008</td>
<td>0.008</td>
<td>0.0008</td>
</tr>
<tr>
<td>Indeno[1,2,3-cd]pyrene (TFS 0.5)</td>
<td>0.070</td>
<td>0.017</td>
<td>0.017</td>
<td>0.0017</td>
</tr>
<tr>
<td>Total TEQ of all PAHs (excluding dieldrin)</td>
<td>0.03</td>
<td>0.009</td>
<td>0.009</td>
<td>0.0009</td>
</tr>
</tbody>
</table>

Note: TEQ = Toxic Equivalence Quantity.
## Environmental Report

### Table 1: Environmental Contaminants

<table>
<thead>
<tr>
<th>Sample Identification</th>
<th>Diesel Range</th>
<th>Lubricant Oil Range</th>
<th><strong>ASTM 5508 Method</strong></th>
<th><strong>USEPA Method</strong></th>
<th><strong>Reason Code</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>mg/kg (µg/g)</td>
<td>mg/kg (µg/g)</td>
<td></td>
</tr>
<tr>
<td><strong>Nitrogen</strong> (mg/kg)</td>
<td>26 U</td>
<td>24 U</td>
<td>23 U</td>
<td>22 U</td>
<td>30 U</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0027</td>
<td>0.05</td>
<td>DET</td>
</tr>
<tr>
<td><strong>Density (g/mL)</strong></td>
<td>0.77</td>
<td>0.80</td>
<td>0.77</td>
<td>0.80</td>
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<tr>
<td><strong>Flash Point (°C)</strong></td>
<td>37</td>
<td>31</td>
<td>37</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td><strong>Lead (mg/kg)</strong></td>
<td>200</td>
<td>240</td>
<td>240</td>
<td>240</td>
<td>1000-10000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>120</td>
<td>120</td>
<td>6.5-230</td>
</tr>
<tr>
<td><strong>Mercury (mg/kg)</strong></td>
<td>0.32</td>
<td>0.29</td>
<td>0.28</td>
<td>0.27</td>
<td>0.07 or DET</td>
</tr>
<tr>
<td><strong>Selenium (mg/kg)</strong></td>
<td>1.53</td>
<td>1.59</td>
<td>1.59</td>
<td>1.59</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.5</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td><strong>Silver (mg/kg)</strong></td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td></td>
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</table>

### Table 2: Petroleum Hydrocarbons

<table>
<thead>
<tr>
<th>Sample Identification</th>
<th>Diesel Range</th>
<th>Lubricant Oil Range</th>
<th><strong>ASTM 5508 Method</strong></th>
<th><strong>USEPA Method</strong></th>
<th><strong>Reason Code</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>mg/kg (µg/g)</td>
<td>mg/kg (µg/g)</td>
<td></td>
</tr>
<tr>
<td><strong>Toluene</strong> (mg/kg)</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.3</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td><strong>Xylene</strong> (mg/kg)</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
<tr>
<td><strong>Chloroform</strong> (mg/kg)</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
<tr>
<td>** Styrene** (mg/kg)</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0019</td>
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</table>

### Table 3: Petroleum Hydrocarbons from Diesel Range

<table>
<thead>
<tr>
<th>Sample Identification</th>
<th>Diesel Range</th>
<th>Lubricant Oil Range</th>
<th><strong>ASTM 5508 Method</strong></th>
<th><strong>USEPA Method</strong></th>
<th><strong>Reason Code</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>mg/kg (µg/g)</td>
<td>mg/kg (µg/g)</td>
<td></td>
</tr>
<tr>
<td><strong>Toluene</strong> (mg/kg)</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.3</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td><strong>Xylene</strong> (mg/kg)</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
<tr>
<td><strong>Chloroform</strong> (mg/kg)</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
<tr>
<td>** Styrene** (mg/kg)</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0019</td>
<td>0.0019</td>
<td>0.0019</td>
</tr>
</tbody>
</table>
288
--

0.0078 U

0.91

---

0.0078 U
N/A

0.27
0.64

Dibenz (a,h) anthracene (TEF 0.1)

Indeno (1,2,3-cd) pyrene (TEF 0.1)

Total TTEC of cPAHs (detect only)

File No. 0183-130-00
Table 1 | June 21, 2018

--

0.0078 U
0.0078 U

0.39
0.068

Chrysene (TEF 0.01)

--

---

0.0078 U
0.0078 U

0.51
0.14

Benzo (J,k) fluoranthene (TEF 0.1)

Benzo (a) pyrene (TEF 1)

Benzo (b) fluoranthene (TEF 0.1)

---

0.0078 U
0.0078 U

0.37
0.50

Benzo (a) anthracene (TEF 0.1)

cPAHs10 (mg/kg)

Pyrene

--

0.0078 U

0.26

---

Phenanthrene

0.0078 U
0.0078 U

0.018
0.063

--

--

--

--

--

--

--

Naphthalene

0.0078 U

0.0078 U

0.0078 U

0.0078 U

0.0078 U

0.0078 U

0.0078 U

Qvi

8 to 9

2A-B78-9

Fluorene

0.32
0.74

Fluoranthene

0.078

Anthracene

Benzo[g,h,i]perylene

0.012
0.097

Acenaphthylene

0.048

Acenaphthene

0.045

Qvi

Fill

2-Methylnaphthalene

(mg/kg)

Interpreted Soil Type

4 to 5

2A-B74-5

2A-B7

2.5 to 3.5

2A-B72.5-3.5

1-Methylnaphthalene

PAHs

10

Sample Depth (feet bgs)

Sample Identification

2

Boring/Test Pit Identification

0.074

0.028

0.0082

0.051

0.018

0.055

0.058

0.044

0.083

0.020

0.014

0.0076 U

0.064

0.035

0.011

0.0085

0.0076 U

0.0076 U

0.0076 U

Qvi

1 to 2

N/A

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

0.0073 U

Qvi

5 to 6

2B-B25-6

2B-B2
2B-B21-2

2B-B3

N/A

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

0.0075 U

Qvi

1 to 2

2B-B31-2

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Qvi

7 to 8

JS-MW77-8

Page 4 of 9

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Qvi

8 to 9

JS-MW78-9

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Qvi

11 to 12

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Qvi

18 to 19

JS-MW718-19

JS-MW7
JS-MW711-12

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Outwash

22 to 23

JS-MW722-23

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Outwash

24 to 25

JS-MW724-25

3.49

1.1

0.36

2.5

0.76

3.1

2.7

2.3

6.1

6.4

0.36

0.38

6.4

1.3

0.74

0.59

0.21

0.22

0.21

Fill

0 to 1

N/A

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

0.0086 U

Fill

1 to 2

JS-MW7A1-2

JS-MW7A
JS-MW7A0-1

2,400

NE

1,600

3,200

3,200

NE

24,000

NE

4,800

320

NE

NE

5

NE

NE

NE

NE

NE

NE

NE

NE

Levels12

MTCA Method
A ULU
Cleanup

0.14

0.14

0.1

MTCA ULU
RISSL for the RISSL for the
cleanup level
Sum of TTEC Sum of TTEC
for the sum of
cPAHs is 0.14 cPAHs is 0.14
all cPAHs is
mg/kg
mg/kg
0.1 mg/kg

2,400

NE

1,600

3,200

3,200

NE

24,000

NE

4,800

320

34

(mg/kg)11

(mg/kg)11

34

RISSL
(Saturated)

RISSL
(Vadose Zone)

Reuse

DET

DET

DET

DET

DET

DET

DET

DET

DET

DET

DET

DET

DET

DET

DET

DET

DET

DET

DET

Criteria15

Appendix A7: ENVIRONMENTAL REPORT

UW Tacoma Academic Innovation Building I Hacker Architects


### Appendix A7: ENVIRONMENTAL REPORT

#### Sampling & Identification

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<th><strong>5</strong></th>
<th><strong>6</strong></th>
<th><strong>7</strong></th>
<th><strong>8</strong></th>
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<td>0-1</td>
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<td>F</td>
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<td>F</td>
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#### Results

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<tr>
<td>Sample Identification</td>
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<td>----------------------</td>
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<td>-------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>1-Methylnaphthalene</td>
<td>0.0072 U</td>
<td>0.0074 U</td>
<td>0.0074 U</td>
<td>0.0074 U</td>
<td>0.0074 U</td>
<td>0.0074 U</td>
<td>0.0074 U</td>
<td>0.0074 U</td>
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<td>0.0074 U</td>
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<td>0.0074 U</td>
<td>0.0074 U</td>
<td>0.0074 U</td>
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<td>Dibenz[a]anthracene</td>
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<td>0.0074 U</td>
<td>0.0074 U</td>
<td>0.0074 U</td>
<td>0.0074 U</td>
<td>0.0074 U</td>
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<tr>
<td>Fluoranthene</td>
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<td>0.0074 U</td>
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<td>0.0074 U</td>
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<td>Pyrene</td>
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*Note: All values are given in mg/kg.*

**References:**
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<tr>
<th>Sample Depth (feet)</th>
<th>Gasoline Range</th>
<th>Diesel Range</th>
<th>Lube Oil Range</th>
<th>Interpreted Sulfur</th>
<th>Gasoline Range Petroleum Hydrocarbons</th>
<th>Diesel Range Petroleum Hydrocarbons</th>
<th>Lube Oil Range Petroleum Hydrocarbons</th>
<th>VOD</th>
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<th>MTNA</th>
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<tr>
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<td>9 to 19</td>
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<td>20 to 90</td>
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<td>90 to 290</td>
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</table>

**Interpreted Sulfur**

- O4
- O8
- O12
- O16
- O20
- O24
- Q4
- Q8
- Q12
- Q16
- Q20
- Q24

**Gasoline Range Petroleum Hydrocarbons**
- Gasoline Range: 2,000 mg/kg
- Diesel Range: 2,000 mg/kg
- Lube Oil Range: 2,000 mg/kg

**VOC**

- Total Mercaptans (TMS): 0.00000 mg/kg
- Total Volatiles (TVOC): 0.00000 mg/kg
- Total Hydrocarbons (THC): 0.00000 mg/kg

**MGA**

- Total Petroleum Hydrocarbons (TPH): 0.00000 mg/kg
- Total Petroleum Hydrocarbons (TPH): 0.00000 mg/kg
- Total Petroleum Hydrocarbons (TPH): 0.00000 mg/kg

**MTNA**

- Total Petroleum Hydrocarbons (TPH): 0.00000 mg/kg
- Total Petroleum Hydrocarbons (TPH): 0.00000 mg/kg
- Total Petroleum Hydrocarbons (TPH): 0.00000 mg/kg

**Appendix A7: ENVIRONMENTAL REPORT**

File No. 0183-130-00
Table 1 | June 23, 2018
### Table 1: June 21, 2018

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<th>21 to 30</th>
<th>31 to 40</th>
<th>41 to 50</th>
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<td>PAHs (mg/kg)</td>
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<td>Indeno[1,2,3-cd]pyrene (TEF 0.1)</td>
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</table>

**Remarks:**
- NE = Not evaluated
- DET = Detected

**MDL Method:**
- MTCA ULU

**File No.:** 0183-130-00

---

**Appendix A7: ENVIRONMENTAL REPORT**
Notes:

1. Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.
2. Sample ID = Area number - boring/test pit number - starting depth of sample (feet bgs) - end depth (feet bgs). Area 2A Boring 1 collected 1-2 feet bgs = 2A-B1-1-2.
4. Ecology approved method NWTPH-Gx.
5. Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260B. Other VOCs were analyzed but not detected.
6. Acetone is a common laboratory contaminant.
7. Total xylenes consists of m,p- and o- xylenes. The higher detection limit is shown.
9. Total PAHs were analyzed by EPA method 8270D/SIM. Other PAHs were analyzed but not detected.
10. Total PAHs consists of m,p- and o- xylenes. The higher detection limit is shown.
12. MTCA Method A cleanup level for unrestricted land use.
14. MTCA Method A cleanup level for gasoline is 3.0 mg/kg if benzene is detected or if the sum of benzene, toluene, ethylbenzene, and xylenes is equal to or greater than 1% of the total gasoline detection.
15. MTCA Method A cleanup level for Trivalent Chromium. Previous testing indicates hexavalent chromium is not a chemical of concern on the UWT campus.

mg/kg = milligram per kilogram
bgs = below ground surface
DEI = Detected at concentrations greater than laboratory reporting limit
Qvi = Ice-contact deposits
Qva = advance outwash deposits
DEI = Detected at concentrations greater than laboratory reporting limit

**bold** font indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

**bold** font and gray shading indicates that the detected concentration is greater than the respective laboratory reporting limit.
### Appendix A7: ENVIRONMENTAL REPORT

#### Table 2

Summary of Chemical Analytical Results - Groundwater

Proposed Academic Building - South 19th Street and Market Street

UW Tacoma Campus

Tacoma, Washington

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Analyte</th>
<th>Analyte Method</th>
<th>Reporting Limit</th>
<th>Ice-contact Deposit</th>
<th>Groundwater Screening Level</th>
<th>Volatile organic compounds (VOCs)</th>
<th>Other VOCs</th>
<th>Distinguishable Concentration Threshold</th>
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<tr>
<td></td>
<td>U = Analyte was not detected at or greater than the listed reporting limit. Qvi = Ice-contact deposit.</td>
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</tr>
<tr>
<td></td>
<td>B = below the reporting limit (DQO = detection limit, o = not detected, pb = below detection limit).</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>µg/L = microgram per liter.          btoc = below top of casin.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Notes:

1. Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.
2. Analyte B = below the detection limit. All chemical analysis were performed from ES ENVR on January 19, 2016 (US ENVR 141212).
3. Groundwater and Ice-contact Deposit (ICD) were analyzed for the ground elevation of November 8, 2013 to December 27, 2013.
4. Groundwater and Ice-contact Deposit (ICD) were analyzed for the ground elevation of November 8, 2013 to December 27, 2013.
5. Volatile organic compounds (VOCs) were analyzed by United States Environmental Protection Agency (USEPA) method 8260C. Other VOCs were analyzed but not detected.
7. Distinguishable Concentration Threshold is the concentration that is distinguishable from the detection threshold.
8. Ice-contact Deposit (ICD) is the concentration that is distinguishable from the detection threshold.

#### File No.: 0280-52540

Table 2: June 25, 2016
Appendix A7: ENVIRONMENTAL REPORT

![Site Plan](image-url)

**Legend:**
- **Birds-eye:** Academic Building Site Boundary
- **Tempo:** Former Service Station/Jefferson Street Parcel
- **Green:** Former Sound Care Facility
- **Red:** Potential Former Drainage Channel
- **Blue:** Potential Former Gas Station
- **Pink:** Approximate location of Former USTs
- **Gray:** Approximate location of Former Gas Station
- **Orange:** Approximate location of Former Drainage Channel
- **Yellow:** Test Pit Completed and Tanks Were Not Observed
- **Black:** Magnetic Anomaly Observed
- **Brown:** Wells Associated With UWT Y Are Not Shown
- **Green:** Test Pit Completed by UWT Y Are Not Shown

**Notes:**
1. The locations of all features shown are approximate.
2. This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

**Projection:** NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

**Data Source:** Aerial from City of Tacoma 2015, Sound Care Building from URS
Appendix A7: ENVIRONMENTAL REPORT

Cross Section AA’

Notes:

1. Va = Ice-Contact Deposits
2. TC = Terrestrial water
3. CL = Unconsolidated glacial deposits
4. SM = Marine fill
5. ML = Marine or estuarine lacustrine deposits
6. GL = Glacial outwash
7. CL = Clay
8. ML = Silt
9. LS = Sand
10. GM = Gravel

Legend

- Existing Ground Surface
- Red well screen indicates TCE was detected at a concentration greater than the RIGSL in 2016
- Soil Chemical Analytical Results
  - TCE detected in the analyzed soil sample
  - TCE not detected in the analyzed soil sample
- Lithology shown on borings completed by GeoEngineers. Refer to boring log for lithologic symbol descriptions provided in Appendix D.

Groundwater Chemical Analytical Results

- Red well screen indicates TCE was detected at a concentration greater than the RIGSL in 2016

Soil Chemical Analytical Results

- TCE detected in the analyzed soil sample
- TCE not detected in the analyzed soil sample
- PCE detected in the analyzed soil sample, if not shown, then PCE was not detected

4. Groundwater and soil chemical analytical results in Appendix G. Refer to boring logs for information on groundwater contamination levels.
5. Storm sewer and sanitary sewer elevations and locations are estimated from manhole and pipe elevations obtained from City of Tacoma. Elevations are approximate.
6. Groundwater elevations from drill core data are based on ground control.
7. TCE detected in the analyzed soil sample
8. TCE not detected in the analyzed soil sample
9. PCE detected in the analyzed soil sample, if not shown, then PCE was not detected
10. HMA = High marginal aquifer
11. MA = Marginal aquifer
12. LA = Low aquifer
13. TCE = Trichloroethene
14. PCE = Tetrachloroethene
15. RIGSL = Remedial investigation groundwater screening levels

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features described in attached Technical Report. GeoEngineers, Inc. cannot guarantee the accuracy or content of electronic files. The reader should rely on the affidavit of the source used in this drawing.
3. Ground surface elevations are based on LiDAR obtained from the Puget Sound LiDAR Consortium. The surface topography in the areas of existing buildings was adjusted to accommodate surface elevations, wellhead elevations for the wells installed in 2013 were based on a survey completed by AHBL November 6, 2013. Well elevations for wells installed prior to 2013 are based on the elevations reported in the previous reports.
4. Storm sewer and sanitary sewer elevations and locations are estimated from manhole and pipe elevations obtained from City of Tacoma.gov.
5. Lithology shown on borings completed by GeoEngineers. Refer to boring log for lithologic symbol descriptions provided in Appendix D.
Appendix A7: ENVIRONMENTAL REPORT

Sample Depth COC Concentration

South 19th Street

0.5 to 1.5 feet bgs cPAHs 0.039 mg/kg
0 to 1 foot bgs Lead 9.6 mg/kg
3 to 4 feet bgs Lead 26 mg/kg

Sample Depth COC Concentration

Boring A11-MW10 (2016)

2 to 3 feet bgs cPAHs 0.050 mg/kg
59 to 60 feet bgs TCE 0.005 mg/kg
2.5 to 3.5 feet bgs cPAHs 0.64 mg/kg

Sample Depth COC Concentration

Boring JS-M W7A (2013)

JS-M

59 to 60 feet bgs TCE 0.005 mg/kg
2.5 to 3.5 feet bgs cPAHs 0.64 mg/kg

Soil Analytical Results
UW Tacoma Proposed Academic Building
University of Washington – Tacoma
Tacoma, Washington

Figure 4
CITY OF TACOMA
Planning and Development Services

COMMENT MEMO - Electronic

Review
RECORD # PRE18-0184 - 1740 Jefferson Ave

NEXT STEPS

1. Review all comments provided.
2. If you have any questions or believe any of the review comments should not apply, please contact the appropriate staff reviewer to clarify.
3. If you have remaining questions or concerns regarding the proposal, contact the Project Coordinator indicating if you need to meet with staff to go over any of the comments and include a list of the specific questions or concerns to be addressed. With this information, your Project Coordinator can move forward with scheduling a time for you to meet with staff.
4. The following is a list of permits that may be applicable to your project as currently proposed.

Commercial New Building Permit
Commercial Fire Protection Permit
Commercial Mechanical Permit
Commercial Plumbing Permit
Sign Permit
Site Development Permit
Surfacewater Permit
Wastewater Permit
Water Permit
Work Order Permit or Right-of-Way Construction Permit

CONTACTS
For general inquiries or questions about permitting or process, please contact a permit specialist at (253) 591-5030 (option 3) or permitplandesk@cityoftacoma.org. You can also contact the assigned project coordinator directly with their information below. For questions regarding specific review comments or interpretation of code, please contact the appropriate review staff.

Project Coordinator: Patty Costa pcosta@cityoftacoma.org 253-591-5593
Site Review: Larry Criswell LCriswel@cityoftacoma.org 253-591-5787
Solid Waste Review: Lyle Hauenstein lhauenstein@cityoftacoma.org 253-594-7843
Traffic Review: Tyler Daniels tdaniels@cityoftacoma.org 253-591-5554
Streetlighting Review: Vicki Marsten vmarsten@cityoftacoma.org 253-591-5556
Real Property Review: Troy Stevens tstevens@cityoftacoma.org 253-591-5535
Fire Review: Chris Seaman cseaman@cityoftacoma.org 253-591-5503
Land Use: Shanta Frantz sfrantz@cityoftacoma.org 253-591-5388
Historic Preservation Officer: Reuben McKnight reuben.mcknight@cityoftacoma.org 253-591-5220
Tacoma Power Review: Rich Barrutia rbarrutia@cityoftacoma.org 253-502-8541 *No Comment yet. Contact directly.*
Tacoma Water Review: Jesse Angel jangel@cityoftacoma.org 253-502-8835
<table>
<thead>
<tr>
<th>Comment</th>
<th>Reviewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larry Criswell Site Development comments 5/10/2018</td>
<td>Larry Criswell</td>
</tr>
<tr>
<td>1) The submitted Site Plan does not label the hatched portion that connects to Jefferson. Is it dedicated ROW in part with the South portion of the alley vacation? If it is a private access only, a turn around meeting Fire requirements is required to be part of the ROW. 2) Alley Vacation - refer to Real Property Services for all requirements and process. <strong>Full comments to follow once a response comes back from UWT.</strong></td>
<td></td>
</tr>
<tr>
<td>Please identify garbage and recycling location on site plan.</td>
<td>Lyle Hauenstein</td>
</tr>
<tr>
<td>5/10/18</td>
<td>Tyler Daniels</td>
</tr>
<tr>
<td>Provide extend for desired vacation. If only a portion of Court C is requested to be vacated, applicant will be required to provide a pubic turnaround. Access location shall meet TMC 10.14 and would not be permitted from Market St. A traffic study will be required as a part of the vacation request. Attention shall be provided to the intersection of S 17th St. &amp; Market St. This intersection was identified in the Brewery District Study for future signalization based on area wide development. Proposal lacks details for access vehicular and pedestrian access points and comments cannot be fully provided until more detail is submitted. The conceptual drawing supplied does not provide detail on what the hatched area is representing and cannot be commented on. The conceptual drawing supplied appears to have S 19th St. shown as vacated ROW. Provide detail on this so that the City can provide comments. If this is proposed, the traffic shall incorporate that as well.</td>
<td>Vicki Marsten</td>
</tr>
<tr>
<td>5/10/18</td>
<td>Troy Stevens</td>
</tr>
<tr>
<td>What type and style of streetlighting is being considered? An overall look at the streetlighting in the area should also be reviewed.</td>
<td>Troy Stevens</td>
</tr>
<tr>
<td>5_14_2018 - RPS Comments: 1) RPS needs to know more about what is being proposed in order to comment. There has not been enough information provided. 2) The applicant can Google &quot;City of Tacoma Real Property Services&quot; for more information on street vacations and a petition, which will also have information on process.</td>
<td>Troy Stevens</td>
</tr>
<tr>
<td>5/10/2018 - Tacoma Fire will require Court C to remain a fire apparatus access road. From a fire perspective it could be either public or private.</td>
<td>Chris Seaman</td>
</tr>
<tr>
<td>5/10/2018 - Land Use Comments: 1) Historic Preservation staff and/or Landmarks Preservation Commission review will be required. 2) Review under the Downtown Tacoma Code (TMC Chapter 13.06A), related section under the LU Regulatory Code (TMC Chapter 13.06) and the South Downtown SubArea Plan and associated EIS will be required.</td>
<td>Shanta Frantz</td>
</tr>
<tr>
<td>5/14/2018 - Site is located within the Union Station Conservation District. New construction, additions and demolitions within this district require the review and approval of the Landmarks Preservation Commission. The Union Station Design Guidelines provide the basis for this review. Guidelines are located at <a href="http://cms.cityoftacoma.org/Planning/Historic-Preservation/Districts/hp-guidelines-Union-Depot-2008.pdf">http://cms.cityoftacoma.org/Planning/Historic-Preservation/Districts/hp-guidelines-Union-Depot-2008.pdf</a>.</td>
<td>Reuben McKnight</td>
</tr>
</tbody>
</table>
Appendix A8: CITY PRE-APP CONFERENCE NOTES

City ordinance 12.10.045 requires a separate water service and meter for each parcel. Jesse Angel

An existing water meters serve the proposed parcels.

Existing water meter to subject parcels may be utilized by the owner provided size requirements for intended use are adequate, as approved by Tacoma Water. Tacoma Water shall review proposed plans prior to final approval. Contact the Tacoma Water Permit Counter at (253) 502-8247 with any questions.

If fire sprinklering, contact the Tacoma Water Permit Counter at (253) 502-8247 for policies related to combination fire/domestic water service connections.

If required, new water services will be installed by Tacoma Water after payment of the Service Construction Charge and the Water Main Charge. New meters will be installed by Tacoma Water after payment of the System Development Charge.

If a new fire hydrant is required at a location with an existing water main, the hydrant will be installed by Tacoma Water after payment of an installation charge.

If existing water facilities need to be relocated or adjusted due to street improvements for this proposal they will be relocated by Tacoma Water at the owners’ expense.

Sanitary sewer mains and side sewers shall maintain a minimum horizontal separation of ten feet from all water mains and water services. When extraordinary circumstances dictate the minimum horizontal separation is not achievable, the methods of protecting water facilities shall be in accordance with the most current State of Washington, Department of Ecology “Criteria For Sewage Works Design”.

DOCUMENT REVIEW COMMENTS

Document Name: 205854 UWT Academic COT Pre-App Sections & Plan.pdf
Document Category: SITE PLAN

<table>
<thead>
<tr>
<th>Page</th>
<th>Comment</th>
<th>Reviewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>It is unclear what is happening with S 19th. Indicate whether there will be a proposal to vacate this as well.</td>
<td>Vicki Marsten</td>
</tr>
<tr>
<td>4</td>
<td>Indicate whether this will be dedicated ROW or private access.</td>
<td>Larry Criswell</td>
</tr>
<tr>
<td>Name</td>
<td>E-Mail</td>
<td>Phone Number</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Patty Costa</td>
<td><a href="mailto:pcoosta@cityoftacoma.org">pcoosta@cityoftacoma.org</a></td>
<td>253.591-5593</td>
</tr>
<tr>
<td>Larry Criswell</td>
<td><a href="mailto:lcriswell@cityoftacoma.org">lcriswell@cityoftacoma.org</a></td>
<td>253.591.5787</td>
</tr>
<tr>
<td>Tyler Daniels</td>
<td><a href="mailto:tdaniels@cityoftacoma.org">tdaniels@cityoftacoma.org</a></td>
<td>253.591.5554</td>
</tr>
<tr>
<td>Vicki Marsten</td>
<td><a href="mailto:vmarsten@cityoftacoma.org">vmarsten@cityoftacoma.org</a></td>
<td>253.591-5556</td>
</tr>
<tr>
<td>Lauren Hoogkamer</td>
<td><a href="mailto:jangel@cityoftacoma.org">jangel@cityoftacoma.org</a></td>
<td>253.591-5254</td>
</tr>
<tr>
<td>Ronda Comforth</td>
<td><a href="mailto:rcornforth@cityoftacoma.org">rcornforth@cityoftacoma.org</a></td>
<td>253.591.5052</td>
</tr>
<tr>
<td>Julie Blakeslee</td>
<td><a href="mailto:jblakesle@uw.edu">jblakesle@uw.edu</a></td>
<td>206-593-2535</td>
</tr>
<tr>
<td>Elizabeth Hsun</td>
<td><a href="mailto:ekhyun@uw.edu">ekhyun@uw.edu</a></td>
<td>253-692-4675</td>
</tr>
<tr>
<td>Scott Barton-Smith</td>
<td><a href="mailto:sbartonsmith@hackerarchitects.com">sbartonsmith@hackerarchitects.com</a></td>
<td>503.287.1844</td>
</tr>
<tr>
<td>NOT ATTENDANCE:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chris Seaman</td>
<td><a href="mailto:cseaman@cityoftacoma.org">cseaman@cityoftacoma.org</a></td>
<td>253-591-5503</td>
</tr>
</tbody>
</table>
Follow-Up
RECORD # PRE18-0184 - 1740 Jefferson Ave

NEXT STEPS

1. Review all comments provided.
2. If you have any questions or believe any of the review comments should not apply, please contact the appropriate staff reviewer to clarify.
3. If you have remaining questions or concerns regarding the proposal, contact the Project Coordinator indicating if you need to meet with staff to go over any of the comments and include a list of the specific questions or concerns to be addressed. With this information, your Project Coordinator can move forward with scheduling a time for you to meet with staff.
4. The following is a list of permits that may be applicable to your project as currently proposed.

- Commercial New Building Permit
- Commercial Fire Protection Permit
- Commercial Mechanical Permit
- Commercial Plumbing Permit
- Sign Permit
- Site Development Permit
- Right-of-Way Construction Permit
- Surfacewater Permit
- Wastewater Permit
- Water Permit
- Work Order Permit

CONTACTS

For general inquiries or questions about permitting or process, please contact a permit specialist at (253) 591-5030 (option 3) or permitplandesk@cityoftacoma.org. You can also contact the assigned project coordinator directly with their information below. For questions regarding specific review comments or interpretation of code, please contact the appropriate review staff.

Project Coordinator: Patty Costa  pcosta@cityoftacoma.org  253-591-5593
Site Commercial Review: Lyle Hauenstein lhauenstein@cityoftacoma.org  253-594-7843
Power Supervisor: Rich Barrutia rbarrutia@cityoftacoma.org  253-502-8541
Historic Preservation: Lauren Hoogkamer lhoogkamer@cityoftacoma.org  253-591-5254
Traffic Review: Tyler Daniels tdaniels@cityoftacoma.org  253-591-5554
Real Property Review: Troy Stevens tsstevens@cityoftacoma.org  253-591-5535
Fire Review: Chris Seaman cseaman@cityoftacoma.org  253-591-5503
Land Use: Shanta Frantz sfrantz@cityoftacoma.org  253-591-5388
Historic Preservation Officer: Reuben McKnight reuben.mcknight@cityoftacoma.org  253-591-5220
Site Review: Larry Criswell LCriswel@cityoftacoma.org  253-591-5787
### GENERAL COMMENTS

<table>
<thead>
<tr>
<th>Comment</th>
<th>Reviewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larry Criswell Site Development comments 5/16/2018</td>
<td>Larry Criswell</td>
</tr>
<tr>
<td>1) Comments uploaded to ACCELA are preliminary based upon concept discussion and meeting today.</td>
<td></td>
</tr>
<tr>
<td>2) full comments to follow with concept design/permit submittal</td>
<td></td>
</tr>
<tr>
<td>3) Work Order (WO18-XXXX) required for Soil Nails with ROCC permit for private use of the public rights of way</td>
<td></td>
</tr>
<tr>
<td>4) Site Development permit required for onsite grading/filling (SDEV18-XXXX)</td>
<td></td>
</tr>
<tr>
<td>5) Work Order required for offsite improvements per TMC 2.19.040 for building permits submitted</td>
<td></td>
</tr>
<tr>
<td>Offsite will be determined at time of concept/building permit submittal.</td>
<td></td>
</tr>
<tr>
<td>5/21/18 Tyler Daniels</td>
<td></td>
</tr>
<tr>
<td>Provide extent for desired vacation. If only a portion of Court C is requested to be vacated, applicant will be required to provide a public turnaround.</td>
<td></td>
</tr>
<tr>
<td>Access location shall meet TMC 10.14 and would not be permitted from Market St.</td>
<td></td>
</tr>
<tr>
<td>A traffic study will be required as a part of the vacation request. Attention shall be provided to the intersection of S 17th St. &amp; Market St. This intersection was identified in the Brewery District Study for future signalization based on area wide development.</td>
<td></td>
</tr>
<tr>
<td>Proposal lacks details for both vehicular and pedestrian access points and comments cannot be fully provided until more detail is submitted.</td>
<td></td>
</tr>
<tr>
<td>The conceptual drawing supplied does not provide detail on what the hatched area is representing and cannot be commented on.</td>
<td></td>
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<tr>
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<td></td>
</tr>
<tr>
<td>Applicant shall provide details for where Refuse will be granted access.</td>
<td></td>
</tr>
<tr>
<td>Public Works would support the request for full vacation of Court C.</td>
<td></td>
</tr>
<tr>
<td>Tacoma Power has a underground line in an easement across the UWT property. The power line is located near the north boundary of the proposed building site. This line must be located and protected during construction of the proposed building. Tacoma Power has no objections to the building plan.</td>
<td>Rich Barrutia 253-502-8541</td>
</tr>
</tbody>
</table>
Environmental Services Pre-Submittal Checklist

Project Name: UW Tacoma Academic Building

Address: 1740 Jefferson
Project Description: Estimated 100,000 GSF of academic space to accommodate new engineering programs and continued growth in Business programs

<table>
<thead>
<tr>
<th>Anticipated Project Valuation</th>
<th>$60,000,000.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated ICC Building Valuation</td>
<td></td>
</tr>
<tr>
<td>Offsite Improvement Budget (per TMC 2.19.040)</td>
<td></td>
</tr>
</tbody>
</table>

Date: 5/16/2018
Parcel Number: 2017060030 & 2017070023
Permit Number: PRE18-0164
Reviewer: Larry Criswell

NOTE: The following comments are based on limited information and are subject to change as more information for this project is provided and/or if the project concept changes. This checklist is a supportive document designed to assist the applicant and is NOT a comment letter. This document contains excerpts from Tacoma Municipal Code, Stormwater Management Manual (SWMM), Side Sewer and Sanitary Sewer Availability Manual, and Public Works Design Manual. This checklist may not provide all requirements but is intended to assist the applicant in determining basic stormwater and wastewater requirements. It is the applicant’s responsibility to review all applicable codes and manuals to determine all project requirements.

STORMWATER MANAGEMENT

1. All stormwater impacts shall be mitigated in accordance with the 2016 SWMM.
2. This project must comply with the SWMM in effect at time of vesting.
3. It appears this project may disturb one or more acre of land or is part of a larger common plan of development or sale that has disturbed or ultimately will disturb one or more acres of land; and discharge stormwater from the site. Coverage under a Washington State Department of Ecology (Ecology) NPDES Stormwater Construction General Permit (CSWGP) may be required. Contact Ecology at (360) 407-7451 for information and to obtain a permit or use the link to apply for a CSWGP: http://www.ecy.wa.gov/programs/wq/stormwater/construction/enoi.html
   Hard copy applications for the CSWGP are available at:
   https://fortress.wa.gov/ecy/publications/SummaryPages/ECY02085.html
   The Ecology focus sheet outlining this requirement can be found at
   https://fortress.wa.gov/ecy/publications/summarypages/1010077.html
   City approval does not release the applicant from state or other permitting requirements. Please note that to obtain Ecology CSWGP coverage a public notice must be published at least once a week for two consecutive weeks with seven days between publications, in at least a single newspaper of general circulation in the county in which the construction is to take place. Ecology cannot grant permit coverage sooner than the end of the 30-day public comment period, which begins on the date of the second public notice.
4. This project may require Coverage under a Washington State Department of Ecology (Ecology) General Permit to Discharge Stormwater Associated with Industrial Activity. Contact Ecology at
(360) 407-7451 for information and to obtain a permit or use the link to apply for a General Permit to Discharge Stormwater Associated with Industrial Activity (Notice of Intent): https://fortress.wa.gov/ecy/publications/summarypages/ecy02084.html


5. City approval does not release the applicant from state or other permitting requirements.

6. Separate water quality facilities shall be provided for on-site and off-site PGHS.

7. This project is in the Thea Foss watershed. Watershed requirements can be found in Volume 1 Section 3.3.7 of the Stormwater Management Manual (SWMM).

8. A quantitative offsite analysis of the City storm sewer system may need to be submitted to demonstrate the City storm system has adequate capacity to convey storm drainage for fully developed conditions. If the system does not have adequate capacity, on-site detention, infiltration or capacity improvements to the downstream City storm system shall be required.

9. Field and office research indicates this project may have downstream limitations requiring additional analysis. The project proponent is responsible for the mitigation of these conditions. The design must address these downstream limitations and their mitigation. Refer to the Stormwater Management Manual (SWMM) Volume 1 Section 3.4.10 Off-site Analysis for additional guidance.

10. This site is not currently served by the existing City stormwater system, therefore, stormwater must be managed on-site or the stormwater system shall be extended to serve the project area.

11. Bare galvanized metal shall not be used for materials that convey stormwater, such as roofs, canopies, siding, gutters, downspouts, roof drains, and pipes. Any galvanized materials shall have an inert, non-leachable finish, such as baked enamel, fluorocarbon paint (such as Kynar, or Hylar), factory applied epoxy, pure aluminum, or asphalt coating. Acrylic paint, polyester paint, field applied, and part zinc (such as Galvalume) coatings are not acceptable.

**WASTEWATER**

12. Each new building or townhouse shall have a new, independent connection to the City sanitary sewer.

13. Multiple units and buildings that are under single ownership and located on a single parcel may use shared private side sewers that connect to the public sanitary sewer. In the event that the development is divided into more than one parcel in the future (whether from platting, boundary line adjustments, lot segregations, or any other land use actions), each new parcel shall have an individual side sewer connection to the public sanitary sewer. This may require re-routing the side sewers constructed under this development, or constructing new side sewers in order to individually connect each parcel to the public sanitary sewer. A public sanitary sewer extension may also be required in order to individually connect each parcel. Notice of this requirement will be recorded on title of this parcel.

14. Per Section 3.050 of the Side Sewer and Sanitary Availability Manual, if the existing side sewer is to be re-used for a new building, it shall be television inspected and pressure tested per City standards. If the side sewer is found through television inspection to have any illegal connections
or cannot pass the pressure test, all illegal connections shall be disconnected and the side sewer shall be repaired, replaced, or rehabilitated and retested until the side sewer passes the pressure test to ensure it is watertight. Permits for this work shall be obtained from Planning and Development Services.

15. The site is not currently served by the existing City sanitary sewer system. The City sanitary sewer shall be extended to serve the project site through the City’s Work Order Process.

16. A new development or redevelopment will be classified as large if the proposed wastewater flow will be equal to or greater than 10% of the capacity of the public sanitary sewer system serving the development or if the development will include 100 units or more (including restaurants, hotels, motels, apartments, condominiums, townhomes, schools, etc). If a project is classified as large, the Developer shall submit peak daily wastewater flow calculations prepared by a licensed engineer. Peak daily flows shall be calculated based on full site build out in accordance with the Washington State Department of Ecology Criteria for Sewage Works Design (Orange Book). All associated calculations and references used in determining the estimated wastewater flow shall be submitted to Environmental Services for review and approval. The City will review these calculations and determine if the downstream sanitary sewer main and pump stations have adequate capacity. The applicant shall bear the cost of any necessary upgrades to the downstream City sanitary sewer system.

17. Pretreatment devices such as a grease interceptor for restaurants or an oil/water separator for covered parking may be required.

18. Dumpsters that will be used for wet or moist trash, and all garbage compactors, shall be on a separate pad that drains to the sanitary sewer system. Cardboard compactors are not required to drain to sanitary.

19. Any discharge to the sanitary sewer that is not domestic waste may require additional approval from Source Control. Projects with such discharges shall submit all requested information. Frequency, flow rates, pH, and MSDS sheets may be required.

EASEMENTS AND OTHER REQUIRED AGREEMENTS

20. Easements shall be granted to the City over public storm and sanitary sewer mains located on private property. Easement widths shall be a minimum of 20 feet. Additional easement width is required for deep and/or large diameter mains.

21. No permanent structures shall be erected within public easement areas.

22. Any private storm drainage system will require a Covenant and Easement Agreement for maintenance and access.

23. A Restrictive Covenant may be required for projects where private storm or sanitary systems cross separate parcels under the same ownership.

OTHER PERMITS AND REVIEWS

24. Work completed in the City right-of-way requires a permit. The City of Tacoma has implemented a new permitting system using ACCELA for new and all subsequent plan submittals. Site Development Permit - SDEV - Major Site Development - "SDEV18-00XX" For a how to - http://tacomapermits.org/wpcontent/uploads/2012/11/GettingStartedTacomaPermitsACA_012116.pdf
To get started - [http://tacomapermits.org/](http://tacomapermits.org/)

A separate Work Order Permit “WO18-XXXX” can be created as needed for the project.

25. Curb ramp requirements per RCW 35.68.075 and the Tacoma Curb Ramp Matrix. These requirements are for any permit plans.

| Curb ramp details provided at 1" x 5" showing dimensions and spot elevations meeting ADA and PROWAG requirements |
| Note all proposed longitudinal and cross slopes for the ramp and landing areas |
| Dimension and percent slope must be shown between each location of finished grade to finished grade for all panels |
| FQ | DIST | FQ |
| % slope |
| Delineate the landing areas with a call out – 5’ x 5’ minimum Load and label for detectable warning surfaces per SU-05G |
| Cannot have pedestrian curb if it causes trip hazard or vertical discontinuity |
| “No pod crossing” signs positioned and called out correctly to preclude crossings as necessary per Traffic |
| Note the stationing, offset, and elevation of each point of intersection of the ramp with the curb return to facilitate staking. |
| If curb is affected, note the flow line slopes and finished grades as applicable |
| For any non-compliant feature, include a maximum-exent-feasible statement on the plans. Typically not allowed for new construction. |
| The following note should appear on any sheet bearing a detailed curb ramp design: “Do not deviate from curb ramp design. Revisions shall be submitted to and approved by the City prior to construction.” |
| APS buttons shall meet ADA minimum requirements |

26. Horizontal control requirements - City of Tacoma NAD83-91 (ie: mon. in case, surface brass, etc.) - as published on govME. Reference to the City of Tacoma monument system (NAD 83-91) is required to be shown on the plans. This includes, at a minimum, a tie between two known monuments with bearing and distance, and a description of the monuments with coordinates. All other improvements shall be tied to that known line and shown as part of the horizontal control.

27. This project appears to be proposing work within a street under construction moratorium per the City of Tacoma Public Works Department Right-of-Way Restoration Policy. A waiver process exists to request work in moratorium locations.

**Streets, Driveways, and Sidewalks**

28. Full offsite requirements will be given at time of permit submittal for buildout.

29. Any Traffic Loop replacement is the responsibility of the developer.

30. All broken, damaged, or hazardous curb and gutter abutting the sites shall be removed, and new cement concrete curb and gutter constructed in its place to the approval of the City Engineer.

31. All damaged or defective sidewalk abutting the sites shall be removed and new cement concrete sidewalk constructed meeting Public Right Of Way Accessible Guidelines (PROWAG) and Americans with Disabilities Act (ADA) requirements, and be installed to the approval of the City
Engineer. Structural evaluation by a Structural Engineer is required for vaulted sidewalk. Removal and replacement of the vaulted walk is required if the sidewalk is determined to be a hazard, broken or not structurally sound.

32. All streets fronting the properties shall be restored in accordance with the Right-of-Way Restoration Policy.

33. The type, width, and location of all driveway approaches serving the sites shall be approved by the City Engineer.

34. Curb ramps at the intersections 19th & Market and 19th & Jefferson may need to be updated meeting current Tacoma & ADA standards. Curb installation shall to be determined at time of building permit submittal.

35. If Court “C” is vacated and does not have a through access, a turn-around shall be designed and constructed per City of Tacoma’s Design Manual and Tacoma Fire Department approval. An approved fire turn-around, shall be designed and construction for all dead end streets or private accesseways over 150’ in length of a T-type or branch turnaround subject to approval by the City Engineer. Dedication of Rights of Way is required.

36. Full comments will come with any vacation requests pending the proposal. Easement determination will follow the request for vacation type.

OTHER

- The information provided is based upon the information presented at this time and the existing codes and requirements in force at the current time. If the project submitted varies from the information presented at this time, the project requirements may be different. Before submission of any documents, please verify that the codes have not changed in a manner that would require different information.

- The City of Tacoma has implemented a new permitting system using ACCELA for new and all subsequent plan submittals.

All plans (PDF format) shall be flattened when submitted in ACCELA or they will be rejected.

ELECTRONIC RESOURCES

2016 City of Tacoma Stormwater Management Manual
2016 City of Tacoma Public Works Department Design Manual
Requirements for work order submittals, City standard drawings

Policy Updates are posted on the City of Tacoma Surface Water website.
http://www.cityoftacoma.org/stormwater

Mapguide Viewer
City record drawings, side sewer cards, utility locations
www.govme.com/map

Ecology NPDES Construction Stormwater General Permit
http://www.ecy.wa.gov/programs/wq/stormwater/construction/

CONTACTS
Larry Criswell
Planning and Development Services – Site Development Group
253-591-5787

General Permit Information, Permit Fees
Planning and Development Services
Permit Counter, (253) 591-5030
Climate Action Plan
2010 Update
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I. Introduction

In September 2009, the University of Washington (UW) published the Climate Action Plan (CAP), which described the commitments being made by the UW to meet its obligations under the American College and University Presidents’ Climate Commitment (ACUPCC). The primary focus of that document was to set broad goals and strategies, providing a number of proposed actions, in order to achieve a climate-neutral university having no net greenhouse gas (GHG) emissions. The first carbon reduction target is 15% below 2000 levels by 2020. Considering that the UW is expected to add approximately 2.1 million square feet of space (an increase of 13%) and 8,200 faculty, staff and students (an increase of 11.5%) in that time, the reductions required to fully offset growth and still meet absolute reduction targets require reductions of far more than 15%.

This document was prepared to update the campus-wide actions being taken toward the CAP commitment to reduce GHG emissions. While many of the actions are in early stages and are not yet measurable, they do align with the goals and strategies outlined in CAP, including:

1. Compliance with the No-Net Carbon goal, which presents opportunities for innovation and specifically, for the University of Washington to innovate and lead
2. Ensuring that University processes (teaching, research, administrative, and outreach), and those of its vendors and suppliers, are efficient and sustainable.
3. Designing sustainability into our products (educated students and research) and services we deliver (instruction and outreach)
4. Developing new ways of doing “business” that align with University activities and strategies
5. Creating the future capacity needed to manage sustainably, including skills, values and decision making models

Additionally, the UW is a global leader in environmental science research, education and technology transfer and is recognized nationally as a leader in reducing its carbon footprint, including wise use practices, energy conservation and innovative transportation alternatives. UW researchers are leading authorities on the impact of global warming and are at the forefront of developing new models that refine climate change predictions. In 2009, the UW received an A- on the College Sustainability Report Card and in 2010 received 96/100 on the Princeton Green Rating (highest of all public research universities) and ranked 4th overall on Sierra Club Magazine's Cool Schools list (See Figure 1). UW students recently voted to create a Campus Sustainability Fund, a nearly $340K fund which will be used to finance projects that increase campus sustainability, prioritize student leadership and include outreach and education.
components. And the first-ever Green Awards honored noteworthy environmental efforts by students, faculty and staff.

Figure 1

While the primary focus of the Climate Action Plan is substantive carbon reduction, others of these goals are part of a larger, more holistic set of strategies which include:

1. Moving forward toward climate neutrality
2. Engaging faculty and students in conservation and related behavior change
3. Integrating formal and informal learning on sustainability
4. Replacing the campus power plant
5. Moving students, faculty and staff to live near the UW
6. More walking/cycling, less reliance on motorized transportation
7. Becoming energy efficient
II. Summary of Campus Accomplishments, Long Term and Short Term Initiatives

A. Funding

Funding strategies enable and support University program goals, including carbon reduction.

Accomplishments:

1. Funded a series of major planning studies that incorporated key CAP goals.
2. Established the student funded Campus Sustainability Fund.
3. Funded a new university architect position to support integrated capital planning.
4. Funded $100,000 for the Environmental Stewardship and Sustainability Office to support CAP implementation planning efforts.
5. Obtained $5 million DOE Smart Grid Grant with $5 million UW matching funding.

Short term (2 year) Goals:

1. Coordinate the launch of the student funded Campus Sustainability Fund within a wider funding framework for the Climate Action Plan.
2. Develop a Conservation Resource Manager Program.
3. Secure permanent funding for ESS office.
4. Fund more detailed planning studies that follow-up on a series of major planning directions, including Green Streets/Clean storm water technology, and SMART Campus.

Long-term Goals:

1. Normalize Climate Action Plan goals and initiatives into overall UW strategic planning.
2. Include ~$5,000,000 2011-13 capital budget request for development of an Energy Conservation Center.
3. Develop a strategic plan for identifying and funding energy saving projects.
4. Reorient capital funding process from building-centric to program and district-centric.
5. Retool the UW’s infrastructure for a non-carbon future.
6. Help the West of 15th neighborhood realize its full potential as eco-district for low–carbon working, living, and recreation.
7. Effectively use life-cycle cost analyses in decision-making. Create an analytical basis for higher investments in CAP reduction initiatives.

B. Academic Engagement in Climate Change

Our goal is to make the UW a sustainable and environmentally friendly institution while incubating interest and excitement for environmental studies in science, social policy, and technology for our students. Not only do attitudes and behaviors need to change, but exciting opportunities for involvement and commitment inside and outside the classroom must be planned and implemented. This will be achieved through:

1. Integrating our students, and faculty in many diverse disciplines traditionally spread across our colleges and campuses in local and campus-wide academic programs and summer research opportunities,
2. Engaging the community at large, through creating awareness,
3. Exploiting our new College of the Environment as the focal point for these activities, and
4. Building bridges of activism that connect our academic and administrative communities in common interests and challenges in the way we operate the University. Examples are as green office practices, spectrum of conservation programs, facilities evaluation and improvements, responsible housing and food service practices, and voluntary public outreach and education.

There are three ways in which to academically engage students in climate change: formal learning, extracurricular/informal learning, and research.

Accomplishments

1. The UW College of the Environment was created in July 2009 in part to enable the University to provide unique, highly regarded, enhanced environmental degree programs that combine academic rigor and advanced learning methodologies. A permanent Dean has been hired and as of July 1, 2010, there are over 1400 majors in the College of the Environment (870 undergraduates, 535 graduate students) and many more majors across campus that have strong ties to sustainability and the natural and built environments.
2. Offered over 500 environmental courses annually.
3. The School of Forest Resources transformed its Paper Science and Engineering (PSE) undergraduate program into a broader Bioresource
Science and Engineering (BSE) program. The first phase of this effort will debut in Fall 2010.

4. The College of the Environment partnered with the Jessie and John Danz and Walker-Ames Lecture Funds administered by the Graduate School, the School of Public Health, the Center for Global Studies, the Jackson School of International Studies, and the UW Alumni Association (UWAA) to produce a public lecture series and a UW course that focuses on food production from the dawn of the human species through to the present from the field to the kitchen, from Seattle to the plains of Africa. (Fall Quarter 2010).

5. Co-hosting (with Oregon State University) the USGS Northwest Regional Climate Science Center. The center will support USGS workforce development through graduate student fellowships to work on regional climate research.

6. Developed new certificate programs in stream restoration, sustainable transportation, low impact development, and decision making for climate change (UW Educational Outreach).

**Short-term (2 year) Goals:**

1. Pursue new interdisciplinary training opportunities in climate and sustainability science, including increased support for existing and new National Science Foundation Integrative Graduate Education and Research Traineeship (NSF IGERT) programs. (e.g., Bioresource-Based Energy for Sustainable Societies program).

2. Continue planning for an undergraduate leadership minor, sponsored through the colleges of Arts & Sciences, Business, Social Work, Evans School of Public Affairs and the Law School, and designed to provide students with real world experience, as well as a sense of the kind of impact they can have in the future. This program has $2 million dollars in funding, all of which has been raised through donations.

3. Connect with and prepare incoming freshmen and transfer students via continued work with new “Learning Links” advising structure and summer orientation sessions for pre-environment students.

4. Initiate a partnership between Housing and Food Services and the College of the Environment is underway to provide regular academic programming for residents of new undergraduate housing. This is planned to debut in the fall of 2011.

5. Develop a mechanism for connecting faculty and students in research projects of mutual interest, possibly for course credits in the Program on the Environment (PoE) within its new home in the College of the Environment. This will be needed so that students with capstone projects within the PoE and/or summer funding from the Student Green Fund can be
properly supervised and evaluated by faculty, many of whom are new in environmental activism and research themselves.

6. Host Sustainability Summit (see Behavioral Change).

7. Enhance the scope of extra-curricular participatory opportunities for motivated members across our campus community through existing student-led groups. For example, in the short term we are planning to expand the UW Farm, expanding production and increasing the numbers of UW faculty, students and staff who participate in it.

8. Hire and support new faculty who focus on environmental scholarship.

**Long-term Goals:**

1. Connect with and prepare incoming freshmen and transfer students via autumn “Exploring Environmental Majors Seminar,” and events similar to Engineering’s bridge programs and “Discovery Days.”

2. Spread environmental research and scholarship across its traditional campus boundaries in fields such as law and political science, business and economics, basic science and technology, public policy, and public health and environmental safety by engaging deans and new or existing faculty in new constellations of activity.

3. Develop a tri-campus strategy for hiring, support, promotion and tenure, and merit criteria for faculty who focus on environmental scholarship, but reside in departments outside the environmental sciences.

4. Develop new or expanded course offerings that explore the environmental challenges and opportunities that exist at the boundaries between the many disciplines represented within the University.

5. Garner high-level support for broadening the scope of activities within colleges and campuses through strategic investments in environmental and climate-related hires and centers to be proposed by deans and chancellors.

**C. Encouraging Behavior Changes to Reduce Carbon Emissions**

Another important feature of creating a sustainable University is to encourage behavioral changes to reduce carbon emissions. Sustainability guidelines and education/outreach programs for faculty, staff and students need to be created and then implemented.

**Accomplishments:**

1. Created a UW Home Page featuring [Sustainability](#); launched an online [sustainability pledge](#); and utilized social media including Facebook and Twitter as well as an e-mail newsletter.

2. Ranked #4 in Sierra Club “Cool Schools.” UW is the leading large public research university in the rankings.
Appendix A9: UW CLIMATE ACTION PLAN 2010 UPDATE

3. Sponsored “Green Bag Networking Lunch” events for staff on voluntary green teams.
4. Co-hosted “Pacific Northwest Sustainability Roundtable” event with U.S. Postal Service (including Starbucks, Boeing, Costco, Nordstrom, 16 other NW companies).
6. Launched first-ever Husky Green Award to recognize efforts on UW sustainability.
7. Received A- on Sustainable Endowment Institute’s “2010 College Sustainability Report Card.”
9. Created the Husky Green Fund, a staff, faculty and alumni donor fund for sustainability.

Short term (2 year) Goals:

1. Create and implement guidelines and education/outreach program for faculty, staff and students on sustainability.
2. Engage Certificate Program in Environmental Management Keystone (masters student's final project) to explore options and research what other universities are doing, including a survey/report card to learn about best practices in schools, colleges, units.
3. Launching a network of UW sustainability coordinators.
4. Launch and manage the student-funded Campus Sustainability Fund.
5. Hold a University sustainability summit in Fall 2010.
6. Conduct behavioral audits in buildings as part of the Smart Grid Demonstration Project.
7. Create a robust set of sustainability-related metrics.
8. Create framework for and begin vetting a set of policies for UW decision makers to consider regarding CAP and sustainability, linked to Office of Planning & Budgeting activities.

Long term goals:

1. Engage students to work with UW Administration on climate reduction behaviors and strategies.
2. Develop a plan to reduce carbon emissions caused by professional travel.
3. Promote sustainable behavior as a cultural norm in Human Resource practices; new student orientation; faculty and staff; and in office and other work environments.
D. Buildings: New Construction & Existing Buildings

In order to achieve zero carbon by 2050, major investments in the infrastructure of the University are required. Analysis is currently underway on existing legacy buildings that will provide information to set broader policies where individual building projects can contribute to overall carbon reduction.

The largest source of Scope I & II emissions comes from the power plant, which heats the buildings on the Seattle campus (see figure 2). While replacing the Central Utility Plant is a long term goal, in the interim the focus should be on heating and cooling buildings more efficiently and sustainably, including reducing energy demand and looking for alternative sources of energy.

Figure 2

UW Scope 1&2
January 2008-January 2010

Accomplishments:

1. In the process of delivering 20 registered LEED® projects on all three campuses that are in various stages of design, construction and pending certification. Certified USGBC LEED projects include 7 Gold, 3 Silver, and 1 Certified. Recent renovations result in energy efficiency savings of 30% higher than the ASHRAE 90.1 standard.
2. UW Tacoma replaced an inefficient boiler with two energy efficient units to service existing facilities and the new Joy Building, and students installed a prototype Rain Garden.
3. UW Bothell purchased Midwest Independent System Operator Renewable Energy Certificate (MISO REC’s) for a total reduction of 4,324 metric tons of CO2, in order to reduce Scope 2 emissions.

Short term (2 year) Goals:

1. Manage growth issues and space conservation.
2. Continue implementation of Smart Grid Demonstration Project,\(^1\) which will enable measurement and digital communication of electrical consumption

\(^1\) *Smart Grid Demonstration Project* - the UW-Seattle City Light (SCL) Smart Grid Demonstration Project is one of 12 site-specific subprojects within the "Pacific Northwest Smart Grid Demonstration Project." The project was awarded an American Recovery and Reinvestment Act (ARRA) matching grant by the US Department of Energy (DOE) in November 2009. The project will enable measurement and digital communication of electrical consumption while implementing demand response strategies at various university facilities. This will facilitate the reduction of energy consumption during both peak and off-peak times. It will also deploy smart meters and related electrical infrastructure in campus buildings.
information while implementing demand response strategies at various university facilities.

3. Create a policy for high efficiency energy targets for renovations and new construction.

4. Expand Energy Audits and tune-ups for existing buildings.

5. Continue implementation Solar Photovoltaic (PV) demonstration projects, including a 35 kW roof-top solar PV project on top of the University’s central steam plant.

6. Target LEED gold (Silver minimum) for Phase 3A and 3B projects under construction/in design; continue to review ESCO opportunities for development of a geothermal central plant; and work with City of Tacoma on possible storm water collection/purification swale for the Hood Corridor pathway (UW Tacoma).

Long term Goals:

1. Continue the visionary exploration of development scenarios for the West Campus eco-district that aligns with 21st Century green-technology opportunities, such as analyzing alternatives and approaches for replacing the Central Utility Plant and/or exploring alternative energy sources.

2. Connect capital investments with related process improvements that innovatively and aggressively link capital and operating budgets.

3. Develop a prioritized capital investment approach for UW infrastructure as a component of UW’s One Capital Plan.

E. Transportation/Commuting

A major source of GHG emissions is transportation. Cutting greenhouse gas emissions will require reductions in emissions related to transportation to, from, and around campus, as well as professional travel.

Accomplishments:

1. Preserved 126 secure bicycle parking stalls displaced by capital projects; added 100 new secure bicycle parking stalls; completed development of secure bicycle parking prototype design; developed concept plan for Burke Gilman Trail improvements.
2. Returned to model of increasing parking rates faster than U-PASS rates in order to encourage the use of public transportation over single occupancy vehicles.

3. Updated Commuter Services (U-PASS) business plan (charting a path for continued financial viability over the next 5 years).

4. Completed pedestrian mode needs assessment and programming plan in conjunction with Feet First.

5. Entered strategic partnership with Cascade Bicycle Club, doubled the number of major cycling events each year, and implemented a regular series of cycling workshops.

6. Increased the cost for parking single occupant vehicles at UW Bothell from $380 per year to $505. Also, decreased pricing for the UWB U-Pass.

**Short-term (2 year) Goals:**

1. Encourage ownership of low-emission vehicles by individual commuters and transit agencies.
2. Establish a clearinghouse with information about greener vehicle purchase incentives and savings.
3. Expand programming, infrastructure and support for walkers and cyclists.
4. Improve off-campus parking management.
5. Identify and implement alternative funding model for U-PASS.
6. Maintain high parking rates as compared to alternatives; suppress transit rates as compared to the cost of driving; increase transit rates, as compared to active transportation.
7. Increase programming and support for ridesharing.
8. Increase use of telework and compressed work weeks; establish a telework toolkit and policy clearinghouse.
9. Prioritize use of fleet vehicles (UCAR) over use of private vehicles for business travel;

**Long Term Goals:**

Tactics to address CO2e from commuting attack one of three primary factors, vehicle emission factors, vehicle miles traveled, and transportation mode split. The University’s greatest influence and our best opportunity for substantive results over the long term lies in Transportation Mode Split (TMS). Much of our past success has come from shifting commute activity from the highest impact mode (drive alone) to lower impact modes (primarily transit). The UW’s future
success will hinge on continued incremental reductions in drive alone rates while shifting significant numbers of commuters from motorized modes (including transit) to active transportation (walking and bicycling). Another long term goal is to develop campus infrastructure to support private electric vehicle charging.

The 2005 baseline UW TMS consists of:

<table>
<thead>
<tr>
<th></th>
<th>Student TMS 2005</th>
<th>Staff TMS 2005</th>
<th>Faculty TMS 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SOV</td>
<td>Transit</td>
<td>Rideshare</td>
</tr>
<tr>
<td>Student</td>
<td>5%</td>
<td>1%</td>
<td>13%</td>
</tr>
<tr>
<td>Staff</td>
<td>5%</td>
<td>1%</td>
<td>13%</td>
</tr>
<tr>
<td>Faculty</td>
<td>12%</td>
<td>1%</td>
<td>11%</td>
</tr>
</tbody>
</table>

The UW CAP target of a 15% reduction from 2005 emission levels by 2020 has already been exceeded, with a 23% reduction from 2005 levels achieved by 2010. As a result, 2035 behavioral targets are being set to meet the University’s goal of a 30% reduction in commuting emissions by that date. To attain a 30% reduction in CO2e from commuting the UW is targeting the following 2030 TMS goals:

<table>
<thead>
<tr>
<th></th>
<th>Student TMS 2035</th>
<th>Staff TMS 2035</th>
<th>Faculty TMS 2035</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Transit</td>
<td>Rideshare</td>
</tr>
<tr>
<td>Student</td>
<td>20%</td>
<td>35%</td>
<td>30%</td>
</tr>
<tr>
<td>Staff</td>
<td>30%</td>
<td>13%</td>
<td>4%</td>
</tr>
<tr>
<td>Faculty</td>
<td>22%</td>
<td>39%</td>
<td>9%</td>
</tr>
</tbody>
</table>

F. Professional Travel

Professional travel, a significant contributor to transportation-related GHG emissions, includes air or vehicle travel to and from conferences, typically a longer distance than commuting to and from work, in addition to being less frequent. That said, such travel also plays a vital role in research, teaching, and...
administrative activities at the UW. Professional travel also includes fleet and other local business transportation. Reduction targets will have to be carefully balanced against the UW’s research and educational mission. (See Figure 4).

Accomplishments:

1. The UW fleet size has been reduced by 5.9% since September 2009 and seen a .7% increase in fuel economy, resulting in a 4.4% reduction in total fleet emissions.
2. UW Shuttle has seen a 7.6% increase in ridership.

Short-term (2 year) Goals:

1. Enhance tele/videoconference infrastructure and encourage institutional support.
2. Focus fleet purchasing on electric vehicles and partial electric vehicles; centralize management of compliance reporting for fleet and non-fleet UW
vehicles; develop minimum efficiency requirements for department-owned vehicles, prioritize shared vehicles (U-Car, D-Car) over assigned vehicles.
3. Develop efficiency and occupancy incentives tied to mileage reimbursements.
4. Encourage walking for on-campus and campus adjacent travel.

Long term Goals:
1. Improve monitoring of air travel emissions.
2. Develop and implement professional travel policies.
3. Purchase offsets for professionally-funded travel (air and vehicle).
4. Establish department and public bike sharing programs.

G. Information Technology/Computing

Accomplishments:
1. Completed an ESCO Project at the UW’s primary on campus data center (4545) to increase use of free cooling and to facilitate heat capture from the data center to heat the office tower of the building. The building is on track to save an estimated 4.2 million kWh of electricity, 601 kW of demand, 529 cubic feet (CCF) of water consumption, and 3,713 CCF of sewer consumption annually.
2. Completed construction of data center in UW Tower to provide opportunities for consolidation of campus computing assets from campus buildings to central conditioned computer space. Construction included installation of energy efficient lighting and lighting controls and enables the use of free cooling during the cooler months to reduce energy cost (both dollars and tons of carbon).
3. Installed Building Management Systems (BMS) in the data centers to control, monitor and measure facilities equipment operation and energy utilization.
4. Converted approximately 10% of UW-IT managed servers to virtual servers per year, and migrated older, power-hungry systems to more power-efficient hardware platforms.
5. Identified and completed evaluation of vendors who can provide a scalable and flexible approach to desktop power management.

Short-term (2 year) Goals:
1. Improve data center power utilization efficiency (PUE) by decreasing the ratio between total power delivered and power directed to computing work accomplished. Ideal ratio is 1.0. Current data center PUE in the UW’s primary data center is estimated at 2.0. An attractive pricing structure has been created to incentivize relocation of department server equipment into
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Data centers. Data center clients will be required to replace non-rated server equipment with Energy Star and EPEAT certified equipment.

2. Replace end-of-life servers managed by UW-IT with either a virtual or physical server, depending on the customer’s requirements.

3. Investigate a campus-wide approach to provide a way for systems administrators to better understand and manage power usage of desktop computers.

Long term Goals:

1. Install Building Management Systems (BMS) equipment in the remaining data centers and mission critical facilities to control, monitor and measure energy utilization.

2. Install and integrate a power monitoring system to provide metrics and opportunities to perform better power management in all data centers and mission critical facilities.

3. Achieve 50% virtualization over the next 3 years. Currently, about 20% of the servers managed by UW-IT are virtual servers.

4. Utilize a power management software solution to gather power usage statistics on desktop systems, provide reports and customization of power management per desktop and provide a simple way to better manage and reduce desktop power consumption.

H. Select Examples of Other UW Sustainability Efforts

Housing and Food Services (HFS) Accomplishments:

1. Increased the amount of total materials sent to local composting facility to over 600 tons in 2009 (increased from about 500 tons in 2008). Increased the percentage of compostable service ware in HFS restaurants from 89 to 100 percent.

2. Sent 1,100 gallons of cooking oil to be recycled for biofuels.

3. Sent 60+% of all disposables from HFS facilities to recycling or composting facilities.

4. Modified Summer Scram locations for the collection of reusable items during residence hall move-out. At the end of spring quarter 2010, 75 tons of reusable items were diverted from the waste stream.

5. Allotted about 27 percent of food expenditures toward local or sustainable products (organic, fair trade, Monterey Bay Aquarium-approved seafood, etc).
6. Initiated a logistics plan to reduce deliveries from outside vendors as well as on campus.
7. Continued to provide ongoing compost program information to other institutions.
8. Continued to collaborate with local partners such as Cedar Grove Commercial Composting and the City of Seattle in developing local programs, and with national manufacturers, such as International Paper, to develop new products.

Short term (2 year) goals:

1. Improve landfill avoidance from 60 to 65 percent.
2. Complete one LEED Gold-accredited Residence Hall and one LEED Silver-accredited apartment building.

Long term goals:

1. Improve landfill avoidance to 80 percent.
2. Complete ten additional LEED-accredited residence hall projects, adding 2,500 additional beds on campus (impact to transportation carbon).
3. Create a theme community in one residence hall focused on sustainability.
4. UW Bothell: ban all water purchased in plastic bottles.

Paper Reduction Project

This project was undertaken, in part, to comply with the 2009 Washington State Substitute House Bill 2287, which directed state government agencies, including the University to use 100% recycled paper and reduce paper use by 30%.

Short-term (2 year) Goals:

1. Make 100% Post Consumer Recycled Paper the default paper for cut sheet bond paper for copiers and printers
2. Develop and implement a paper conservation program that will reduce cut sheet bond use by 30%
3. Increase recycling of 100% of all copy and print paper
4. Encourage users to print on both sides of the page; to purchase Energy Star equipment with accountability meters; use scan-to-email.
5. Monitor quarterly progression of increase in purchase of 100% recycled paper.
III. APPENDIX

A. Carbon reduction by Scope

15% carbon reduction by 2020

<table>
<thead>
<tr>
<th>Scope 1 - direct emissions</th>
<th>2005 (emissions - Mgal CO2e)</th>
<th>15% (amount to reduce by 2020)</th>
</tr>
</thead>
<tbody>
<tr>
<td>power plant</td>
<td>82,700</td>
<td>12,405</td>
</tr>
<tr>
<td>landfill</td>
<td>12,800</td>
<td>1,520</td>
</tr>
<tr>
<td>buildings</td>
<td>6,440</td>
<td>966</td>
</tr>
<tr>
<td>vehicles</td>
<td>3,040</td>
<td>456</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scope 2 - electricity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>fugitive gases</td>
<td>136</td>
<td>20</td>
</tr>
<tr>
<td>central loop</td>
<td>4,670</td>
<td>701</td>
</tr>
<tr>
<td>faculty/staff commuting</td>
<td>32,700</td>
<td>4,555</td>
</tr>
<tr>
<td>student commuting</td>
<td>21,800</td>
<td>3,270</td>
</tr>
<tr>
<td>professional travel</td>
<td>18,700</td>
<td>2,805</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scope 3 - other emissions</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>optional information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>off-campus medical</td>
<td>12,600</td>
<td>1,890</td>
</tr>
<tr>
<td>NSF research vessels</td>
<td>6,640</td>
<td>996</td>
</tr>
<tr>
<td>campus waste</td>
<td>(6,240)</td>
<td></td>
</tr>
<tr>
<td>forest carbon sequestration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10,400)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

University-wide total: 188,000 155,800
B. Gaining Efficiency

The following are more specific ways in which the University has become more efficient with its consumption of energy and use of natural resources. For some of these projects, it is unclear how much carbon reduction these current projects or analyses will provide, given the short time that has passed since the CAP was published. For other projects, the information provided is quite detailed and technical and thus provides further explanation and support of initiatives discussed in the document.

Facilities and New Building Construction

One of the easiest ways to reduce emissions is to make affordable housing available to faculty, staff and students closer to campus.

Savery Hall (Completed)

SUSTAINABLE FEATURES--ENERGY:

1. Through the use of demand control ventilation with CO₂ sensors, the system is able to identify the present occupant needs and adjust the ventilation accordingly.
2. High efficiency glazing on windows prevents daytime glare and reduces cooling needs.
3. Occupancy sensors reduce lighting energy throughout the building and average lighting power density of offices and other occupied spaces.
4. Increased efficiency of insulation contained in the building envelope also further serves to reduce both heating, ventilation, and cooling costs.

INNOVATIONS:

1. Mechanical equipment has improved energy efficiency beyond ASHRAE 90.1. Variable Frequency Drives (VFD) to reduce energy consumption.
2. The Variable Refrigerant Flow System transfers energy through refrigerant which results in significant fan and compressor energy savings.
3. Water use reduction of 30% in water savings achieved through the use of low flow water fixtures, toilets, and shower heads.
4. Pre-existing unusable building materials were diverted as recycled construction waste resulting in 96% construction waste recycling and 32% recycled content in building materials, low VOC material finishes, 40% of materials from within 500 miles.
Appendix A9: UW CLIMATE ACTION PLAN 2010 UPDATE

Clark Hall (Completed)

SUSTAINABLE FEATURES – ENERGY:
1. Energy efficiency rating of 50% better than ASHRAE 90.1-2004 standard.
2. New operable energy efficient windows, ceiling fans, and skylights with rain sensors.
3. Naturally ventilated building, with no additional cooling provided in occupant use spaces and met the 2030 Challenge.

INNOVATIONS:
1. Recycled Building Materials of 28%, regional materials, either produced or constructed within 500 miles, of 50%, and 94% (192 tons) of the pre-existing unusable building materials were diverted as recycled construction waste.
2. Water use reduction of 38.4% was achieved through the use of low flow water fixtures, toilets, and shower heads.

Husky Union Building (Planned)
1. Green roof on the south end of the building.
2. Low flow toilet fixtures and natural ventilation in the atrium and meeting rooms.
3. Air conditioning is limited to part of the kitchen, the bowling alley to preserve the lanes, and the ballrooms and the new multipurpose room, formerly the auditorium.
4. Heating provided by the UW’s Central Cooling Water (CCW) loop.

Intramural Activities Building (Planned)
1. Potential for power producing plant to be placed on the roof.

Expanded Energy Audit for Existing Buildings (Planned)
1. Examine existing building’s systems and performance
2. Identify possible energy (electrical power and gas), resource conservation (water savings and sustainable concepts), and operation and maintenance measures
3. Quantify each measure’s potential benefit and apply measures to reduce campus energy demand and reduce carbon footprint.
IV. Glossary

ABB          Activity Based Budgeting
CO2          carbon dioxide
CO2-equivalent the equivalent mass of CO2 required to have the same global warming effect as an identical mass of any other greenhouse gas
CO2e         CO2-equivalent
ESAC         University of Washington Environmental Stewardship Advisory Committee
GHG          greenhouse gas – the two that are most abundant in the UW inventory are CO2 and methane; 1 unit of methane has the warming potential of 23 units of CO2
LEED         Leadership in Energy and Environmental Design, a certification program of the U.S. Green Building Council
Offset       a reduction of GHGs attributable to a particular project that can be sold to a party other than the owner of the project
Submetering  measuring electric, steam or other energy use on a building-by-building basis, even when energy is supplied by a central utility plant
University Advancement the fundraising arm of the UW administration
UWESS        the UW Environmental Stewardship and Sustainability Office
Virtualization the practice of executing computing processes that normally require different pieces of equipment on a single piece of equipment, or enabling a computing process that normally requires a specific piece of equipment to operate on multiple pieces of equipment

V. Contact Us

This document was prepared by the University of Washington Climate Action Plan Oversight Team. Please direct any related comments and questions to the UW’s Environmental Stewardship and Sustainability Office at smhelp@u.washington.edu.
Appendix A10: REFERENCES

A10 References List

PLEASE SEE THE FOLLOWING REFERENCE DOCUMENTS FOR FURTHER INFORMATION:
