UW TACOMA

Academic Innovation Building Predesign Report

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RAILROAD CROSSING
ACADEMIC ADVISING CENTER

1.0.0 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.

Existing UW Tacoma Campus: View looking south down the Prairie Line Trail

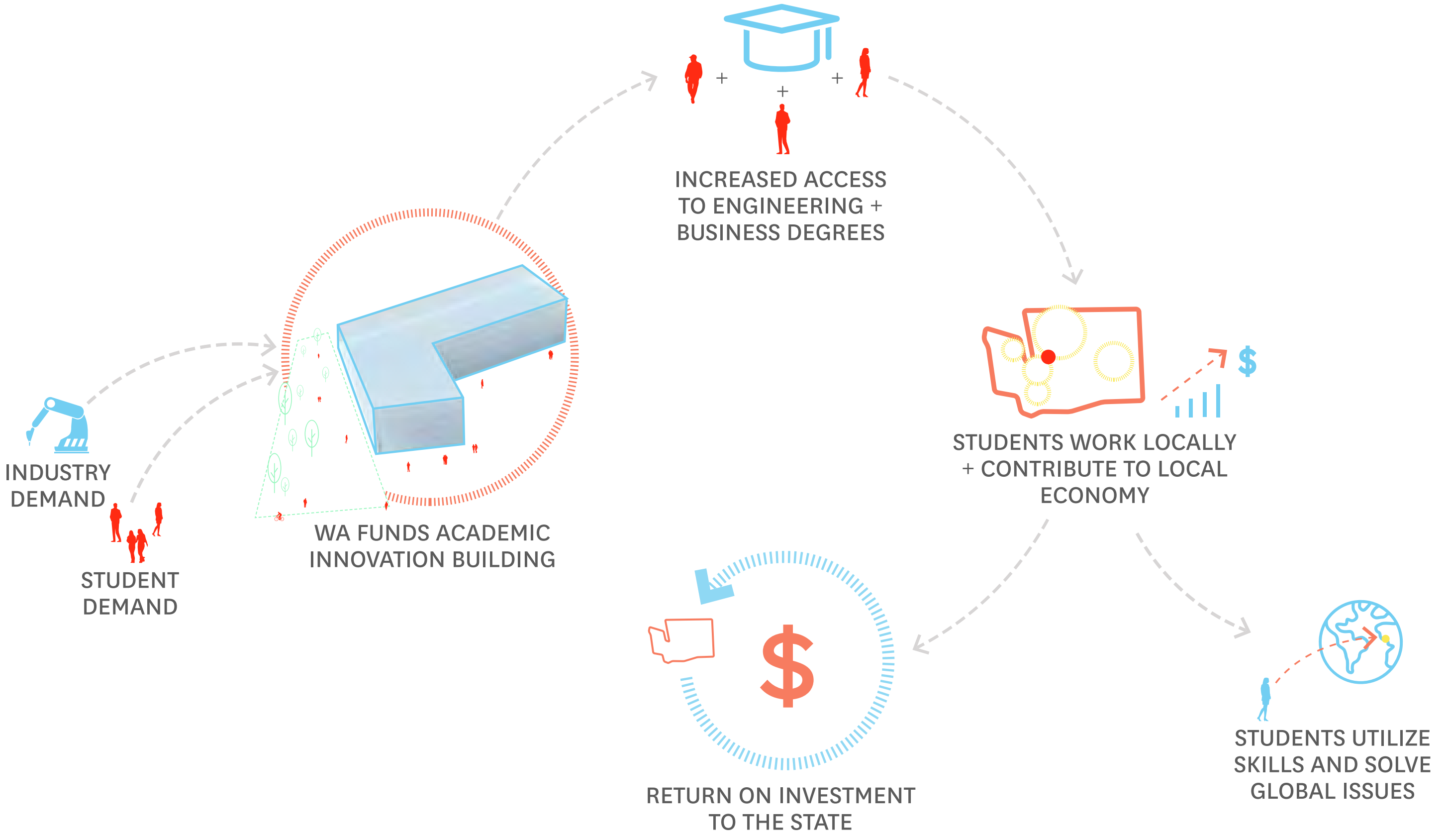
To meet these local industry demands while expanding access to higher education in the South Sound Community in line with its urban-serving mission, UW Tacoma has identified an opportunity to implement a long-term innovative vision which will add new high-demand Engineering programs and more efficiently 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

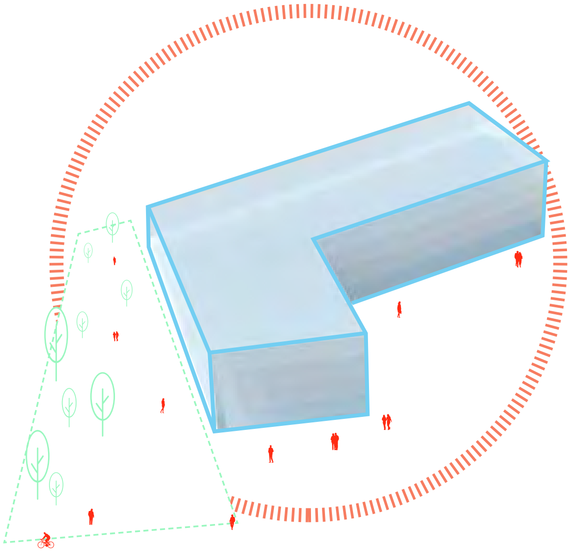
The vision of the Academic Innovation Building for the Business and Engineering programs emerged in response to the following needs identified through the predesign process:

- 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.

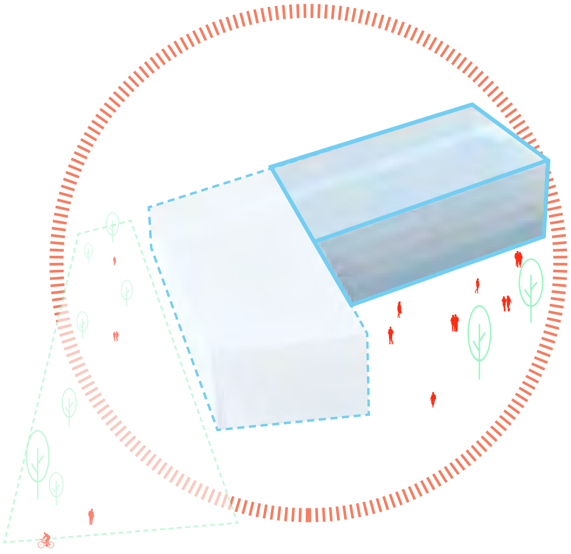
PHASE 1: PREFERRED ALTERNATIVE

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.



FULL VISION



CATALYST

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.

2.0.0 Problem Statement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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.

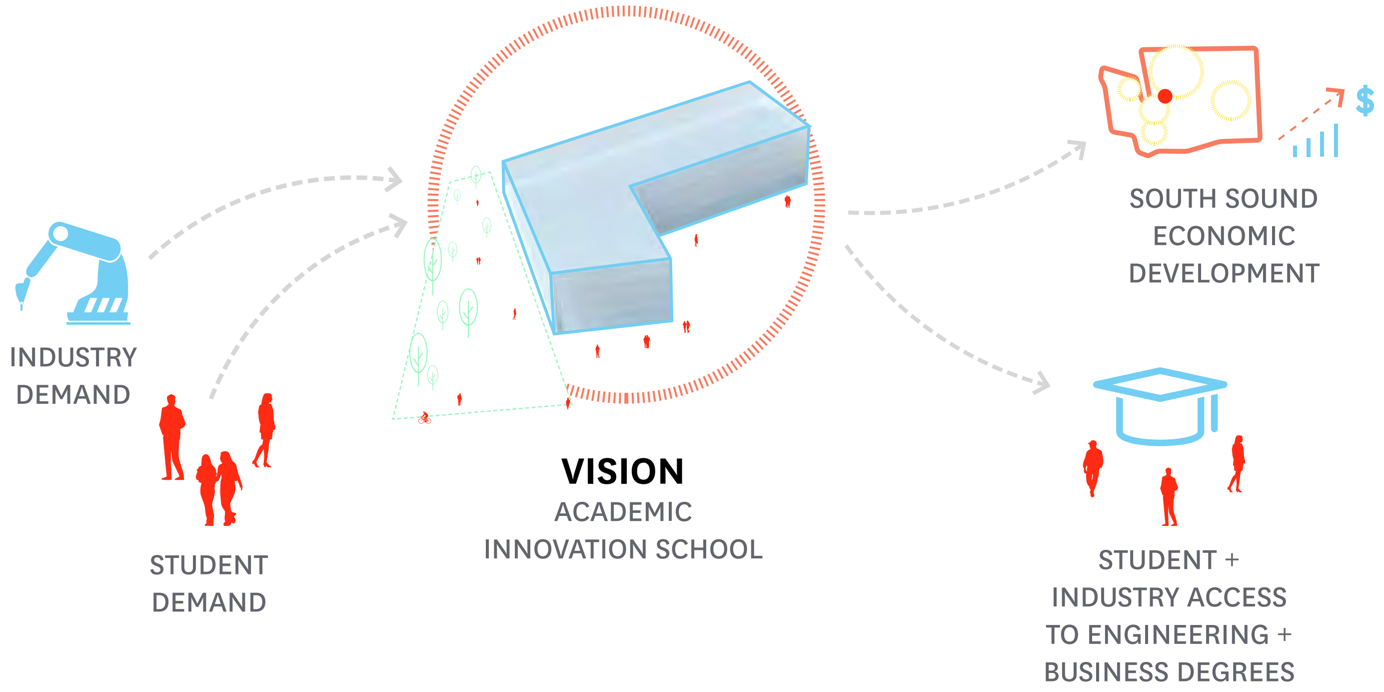
The first phase will **meet the most critical needs and act as a catalyst** to inspire further industry investment and private donations needed to realize the full vision over time.

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.



2.1.0 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.

UW TACOMA OVERVIEW

- 5,185 students
- 20,847 degrees awarded as of Spring 2018
- 63% of freshmen are first-generation students
- 78% 6-year graduation rate, compared to a national average of 59%
- 56% of all students come from minority backgrounds
- Among the top 50 most diverse campuses in the U.S.

UW TACOMA HISTORY

- **1990** University of Washington Tacoma was founded
- **1994** Milgard School of Business was established
- **1999** The Institute of Technology (which would become the School of Engineering and Technology) was established as an academic program
- **2006** first freshmen class admitted, expanding from a history of transfer-only admissions.
- **2016** The Institute of Technology became a school.
- **2017** UW Tacoma campus enrolled over 5,000 students
- **2018** Mechanical Engineering and Civil Engineering applications sent to the state

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.**

"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

"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

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

Challenges:

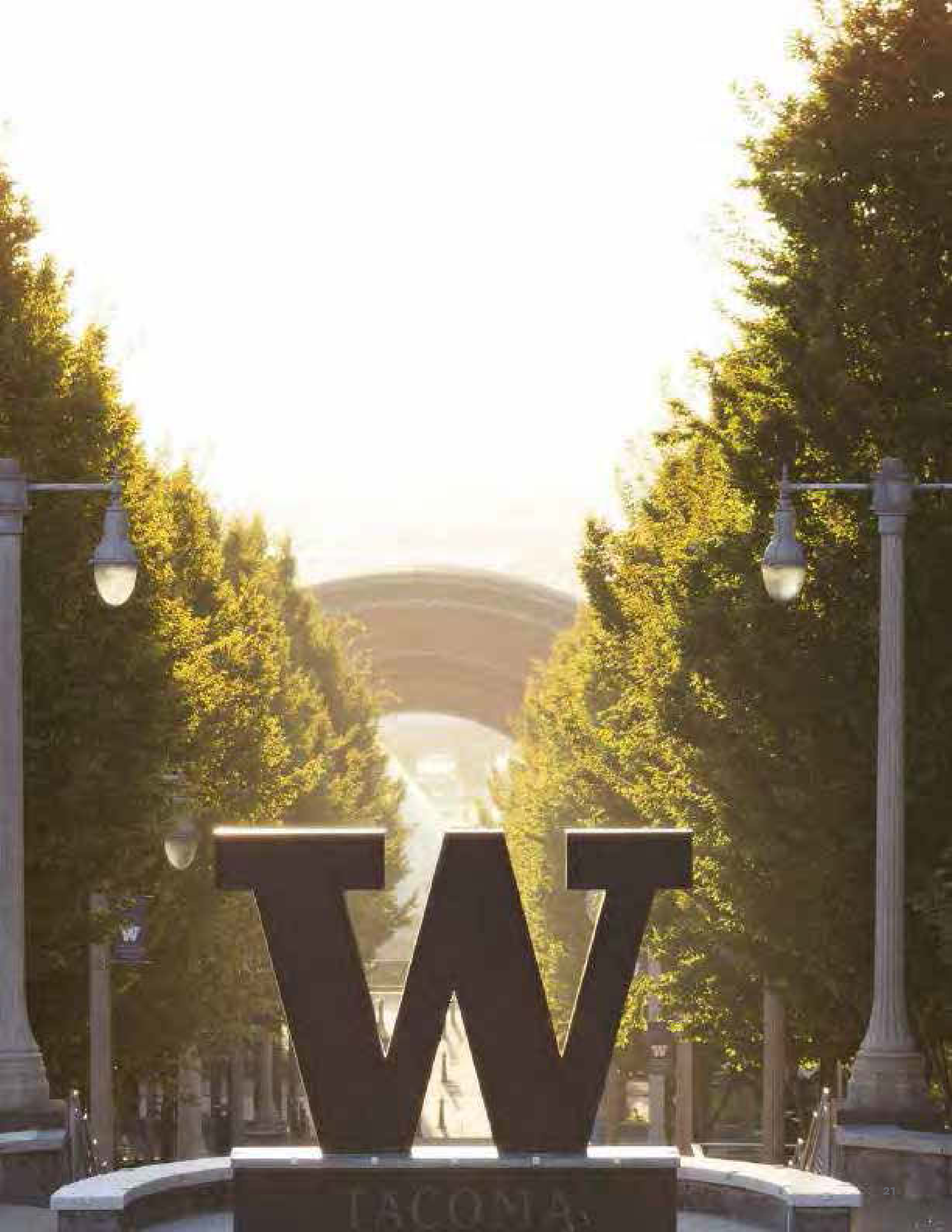
- **Campus Growth and Capacity:** UW Tacoma is growing rapidly to meet the needs of South Sound communities. Currently, the campus is turning away students, specifically in the School of Engineering and Technology and Milgard School of Business, due to insufficient space and resources. (See Growth Projections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

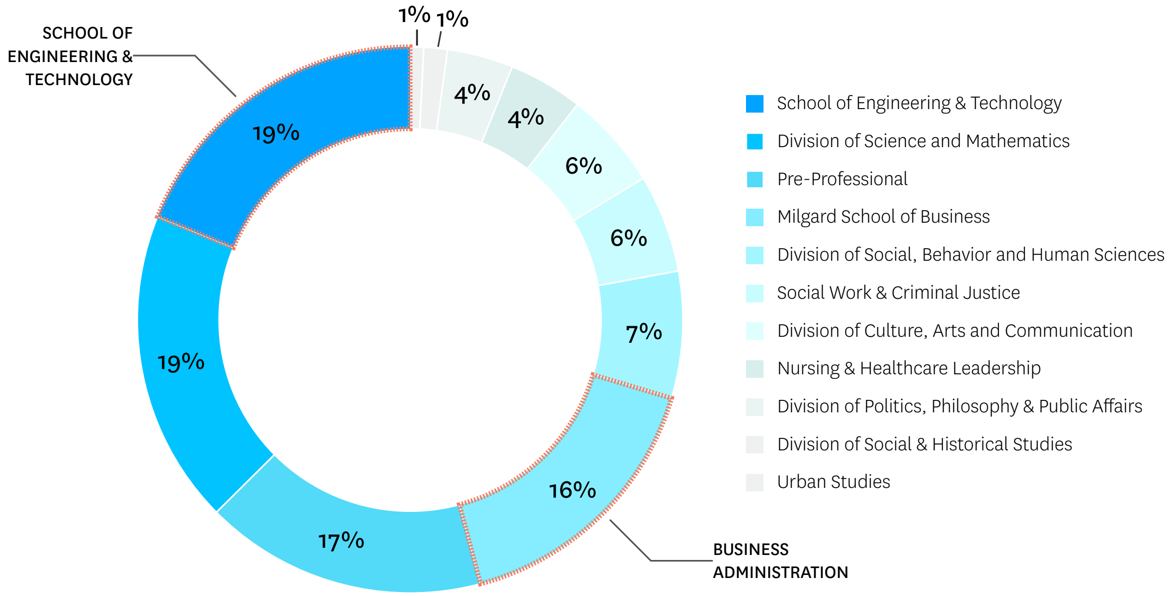
- In 2015, there was an Engineering **job gap of 630** (WA Pathways) in King, Snohomish, and Pierce counties. This number is growing rapidly due to a **10% annual projected increase in Engineering jobs**.
- The School of Engineering and Technology growth projections with no new programs result in an 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.

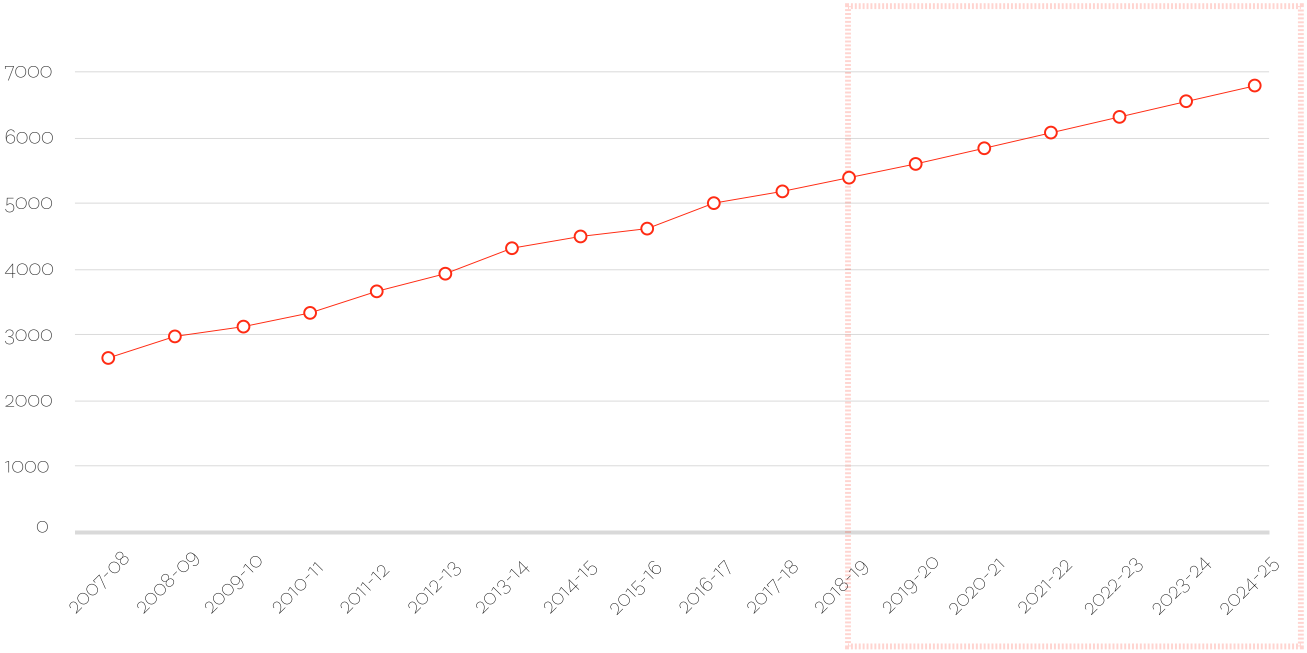
DEPARTMENT REQUESTS: AUTUMN 2018 FIRST TIME ALL-APPLICANT INFORMATION
REFERENCE: UW PROFILES



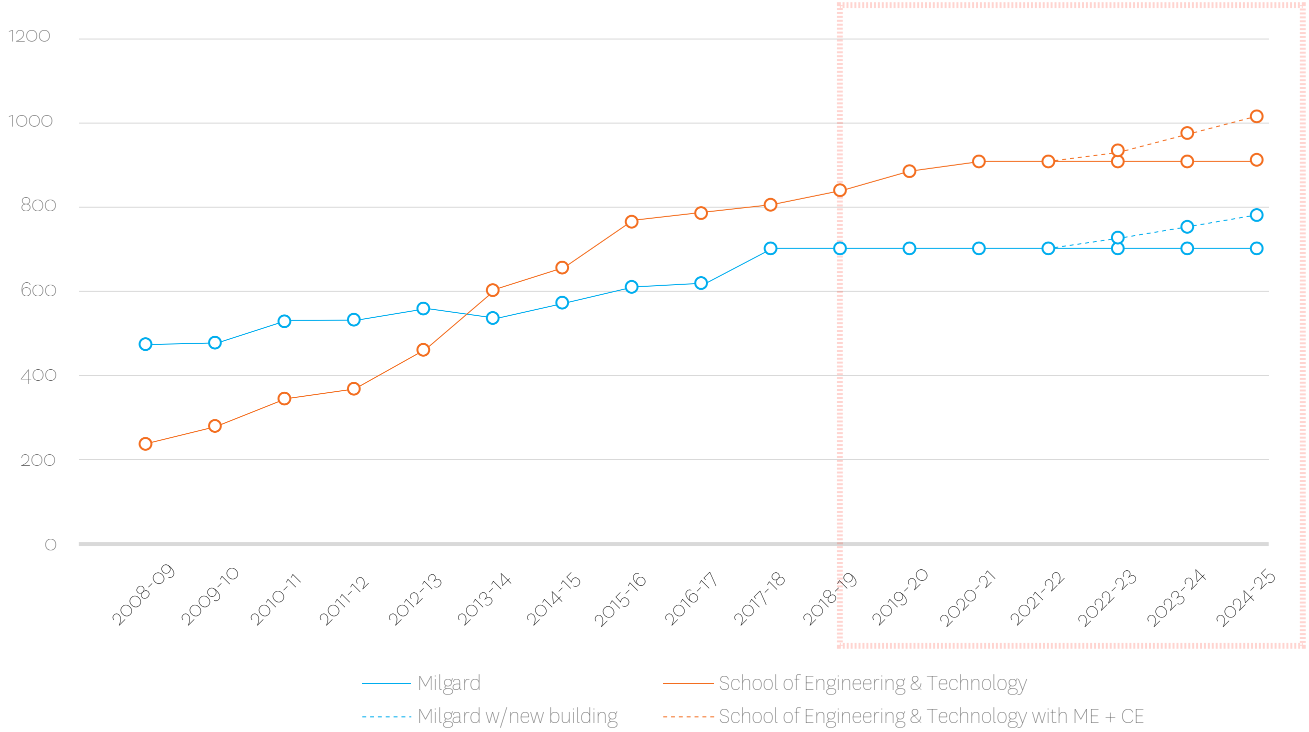
School of Engineering and Technology and Milgard School of Business majors are among the **top requested** in the University.

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



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.

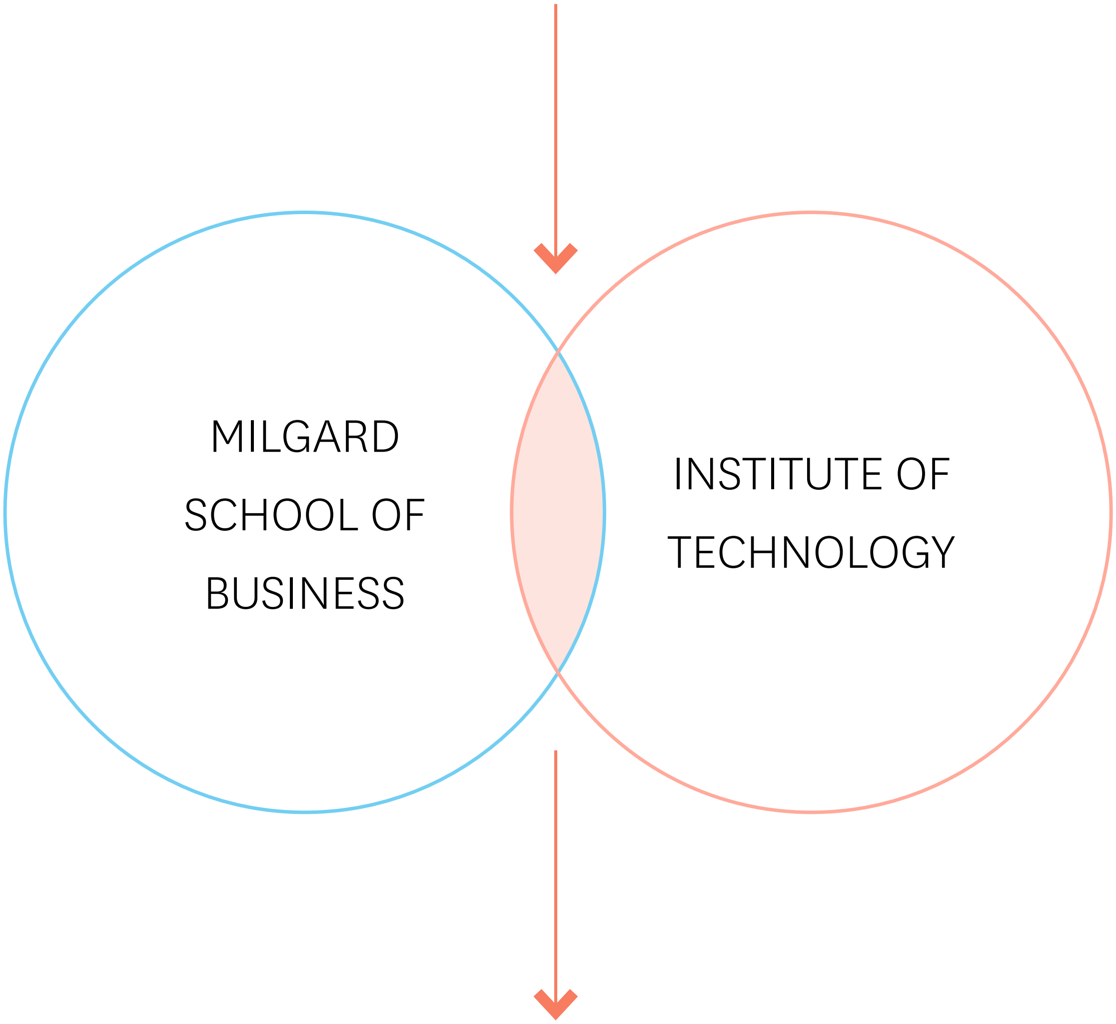
Goals:

- **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 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.

Stanford d.school | CAW Architects

with **COLLABORATION...**



MILGARD SCHOOL OF BUSINESS

INSTITUTE OF TECHNOLOGY

...emerges INNOVATION

Entrepreneurial,
interdisciplinary
environment focused on:
DISCOVERY,
INVESTIGATION +
OPPORTUNITY

DIVERSITY AND ACCESS:

Challenges:

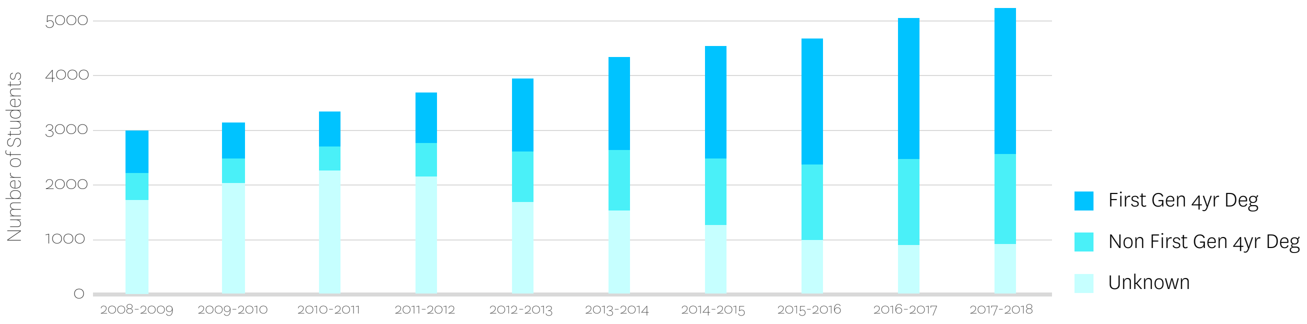
- **Students from underserved regions & place-bound students:** UW Tacoma serves many traditionally underserved and minority communities. 77% of all UW Tacoma students come from Pierce and King counties alone. Many of these students are place-bound, and therefore limited to local opportunities. If degrees 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:

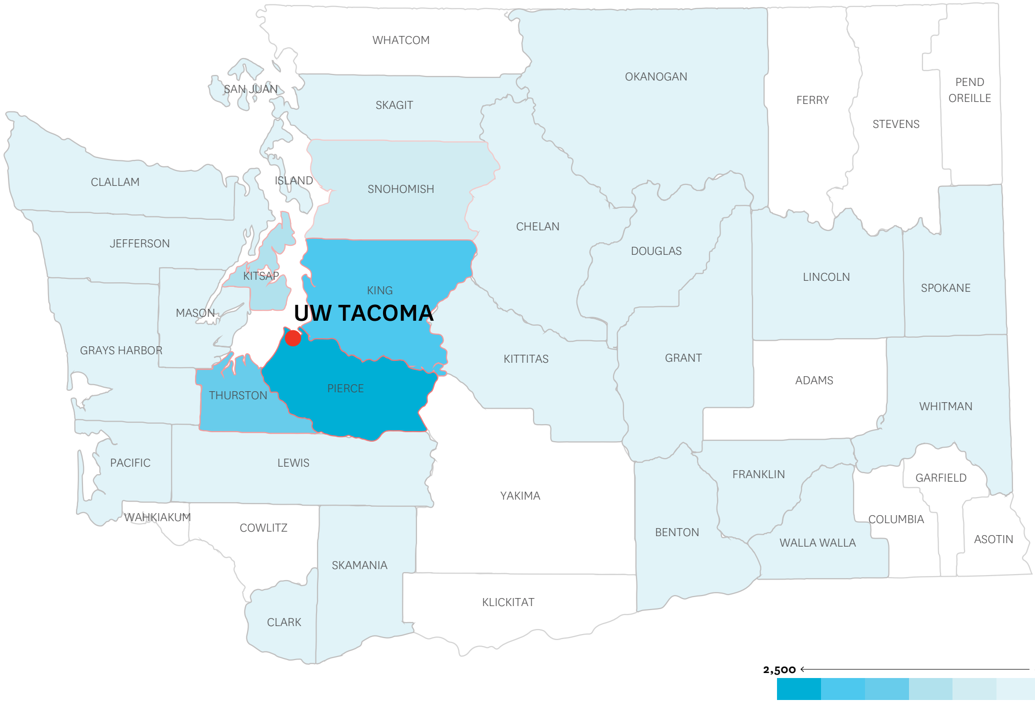
- **Increase access and diversity**. The first point of UW Tacoma's mission is to "Expand access to higher education in an environment where every student has the opportunity to succeed." This campus serves the diverse South Sound community, and this project will increase access to Engineering and Business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



UW TACOMA STUDENT COUNTY OF ORIGIN
REFERENCE: UW PROFILES



- **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.

AMBITIOUS SUSTAINABILITY GOALS

Challenges:

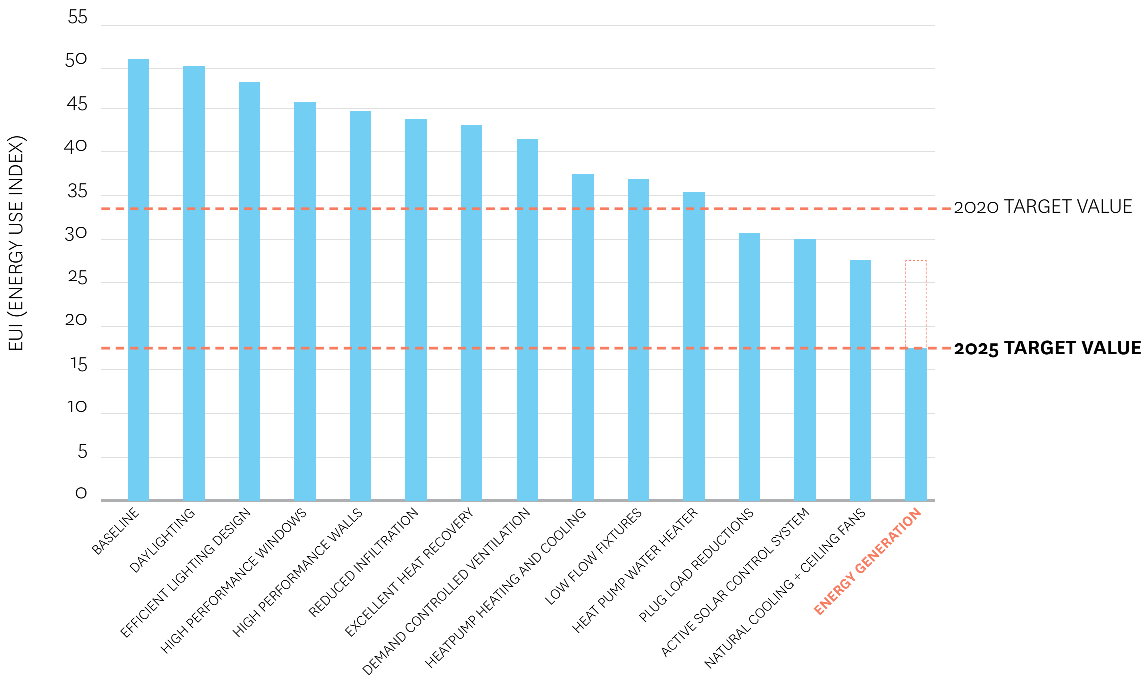
- Washington and UW have identified and committed to carbon emissions reduction goals.
- Washington's timber communities are not experiencing potential benefits from timber extraction.

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



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.

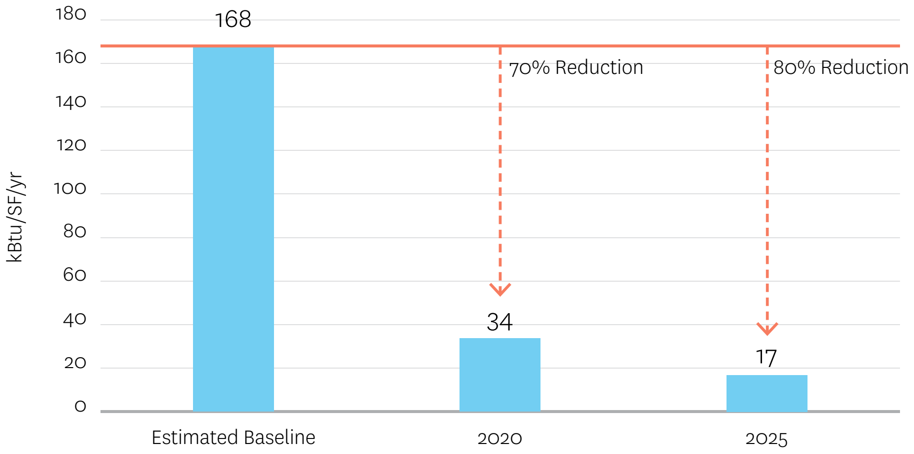
Landscape + Civil:

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).

ARCHITECTURE 2030 CHALLENGE ENERGY USE TARGET VALUES

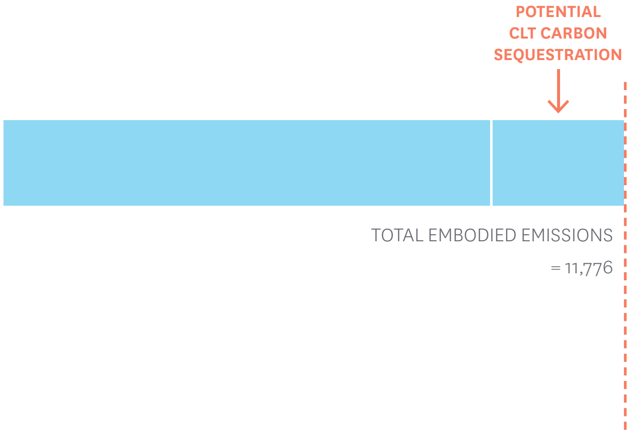


CLT + Mass Timber Structural Systems:

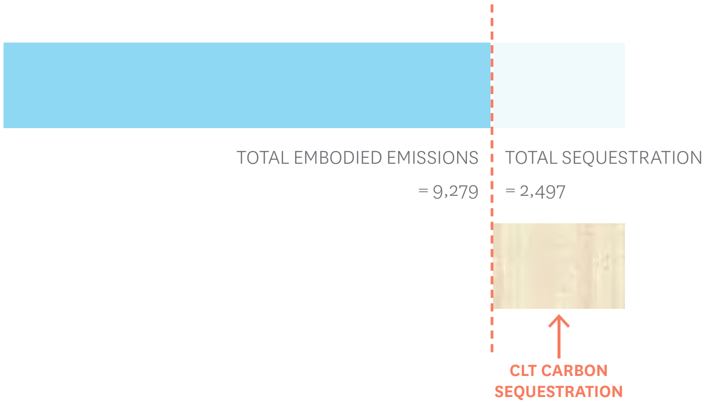
UW Tacoma will be on the cutting edge of sustainability practices by embracing the use of mass timber structural systems, such as Cross-Laminated Timber (CLT). This creates an opportunity to leverage an emerging, yet tested, construction material that has been successfully utilized in Europe over the 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:

- **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.
- **CLT sequesters carbon** that would otherwise be emitted into the atmosphere.
- 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.
- Significantly assists in meeting **LEED certification requirements.**
- Utilizes **locally sourced materials,** reducing carbon emissions associated with transportation of materials.
- Contributes toward the sustainable **management of forests and promoting better forestry practices.**
- CLT requires the use of a pre-fabrication process which pushes design teams to collaborate early on which translates to a shorter construction schedule.
- 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)



GREENHOUSE GAS ANALYSIS -
(GHG EMISSIONS MT CO2e/30 YEAR) - POTENTIAL CLT CARBON SEQUESTRATION



Wood Innovation Design Center (WIDC) | Michael Green Architecture

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

3.0.0 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.

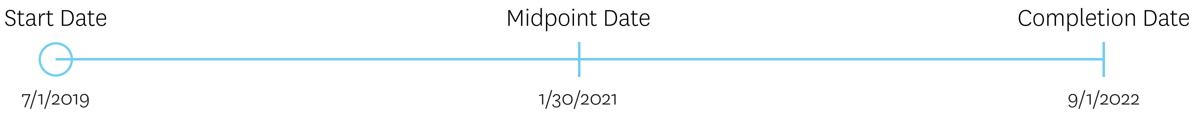
3.3.0 Renovate Existing Campus Space

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.

3.5.0 Preferred Alternative: New Construction, Phase 1

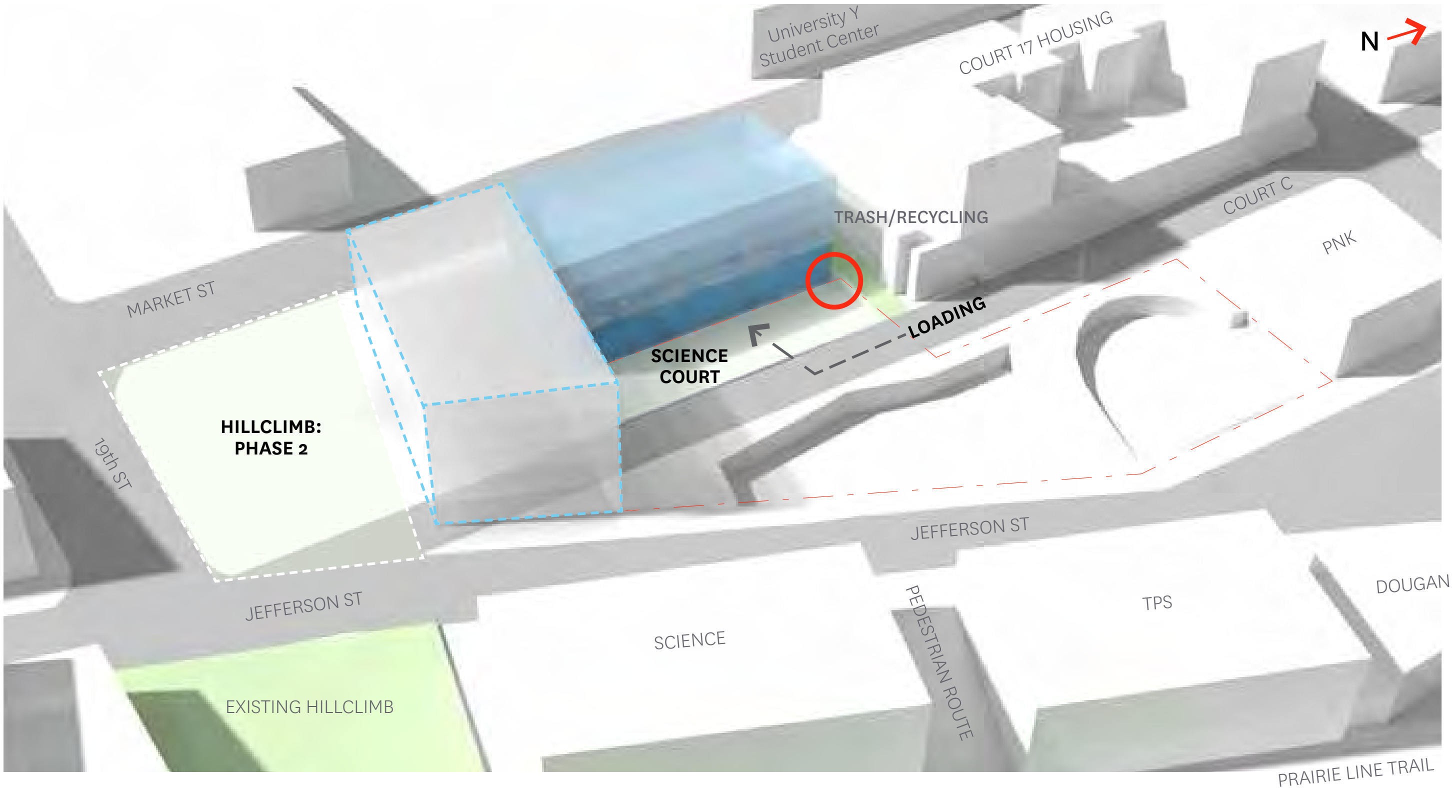
In 2016, the need for additional classroom and lab capacity on the UW Tacoma campus was identified, and the University requested and received funds for this predesign. Specific needs beyond enrollment growth were identified in the fields of Mechanical Engineering, Cybersecurity, Industrial Engineering,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

Start Date	Midpoint Date	Completion Date
7/1/2019	8/1/2021	9/1/2023

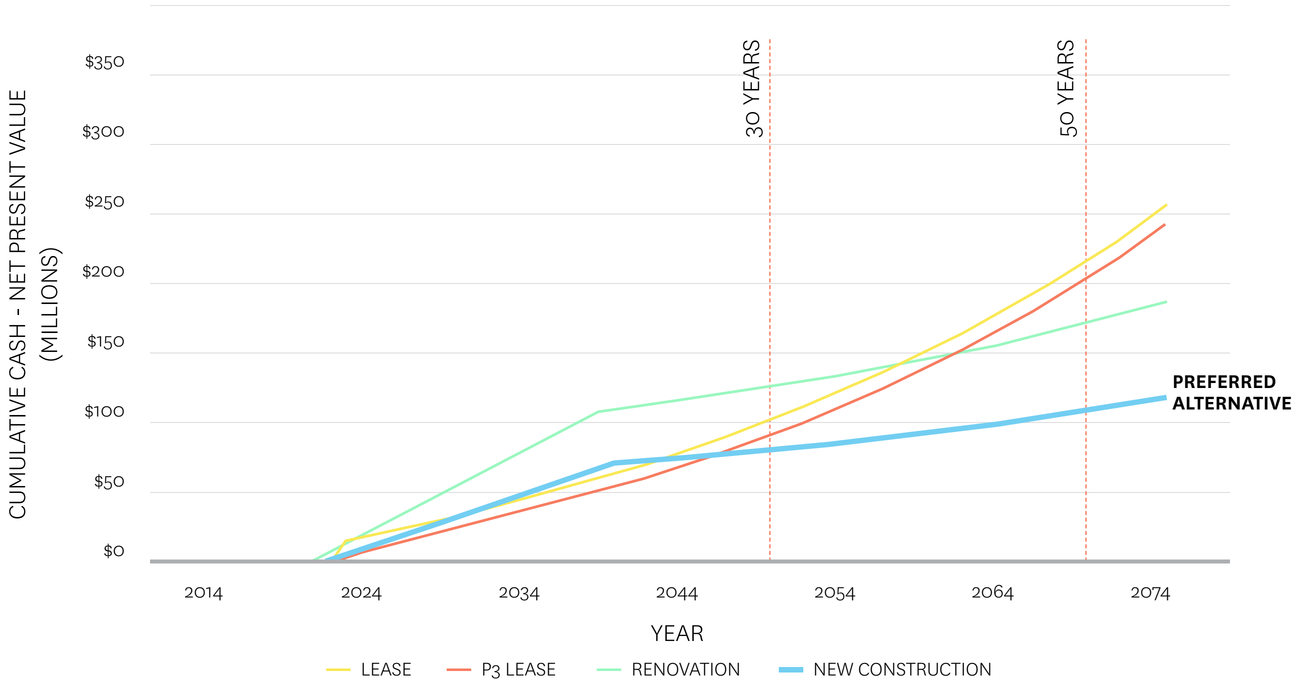


LIFE CYCLE COST ANALYSIS COMPARISON

Alternative	Gross Square Feet	Rentable Square Feet	Occupancy Date	30-year Net Present Value	50-year Net Present Value
Lease	NA	50,000	9/1/2023	$102,451,463	$217,294,186
P3 Lease	NA	50,000	9/1/2023	$75,133,360	$168,130,389
Renovation	54,612	50,759	9/1/2022	$120,073,142	$163,625,551
New Construction	50,000	45,000	9/1/2023	$74,408,136	$99,581,273

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

CUMULATIVE CASH - NET PRESENT VALUE (NPV) OF ALTERNATIVES



4.0.0 Analysis of Preferred Alternative


WALSH
MOBILE CRANE

4.1.0 Preferred Alternative Program + Massing

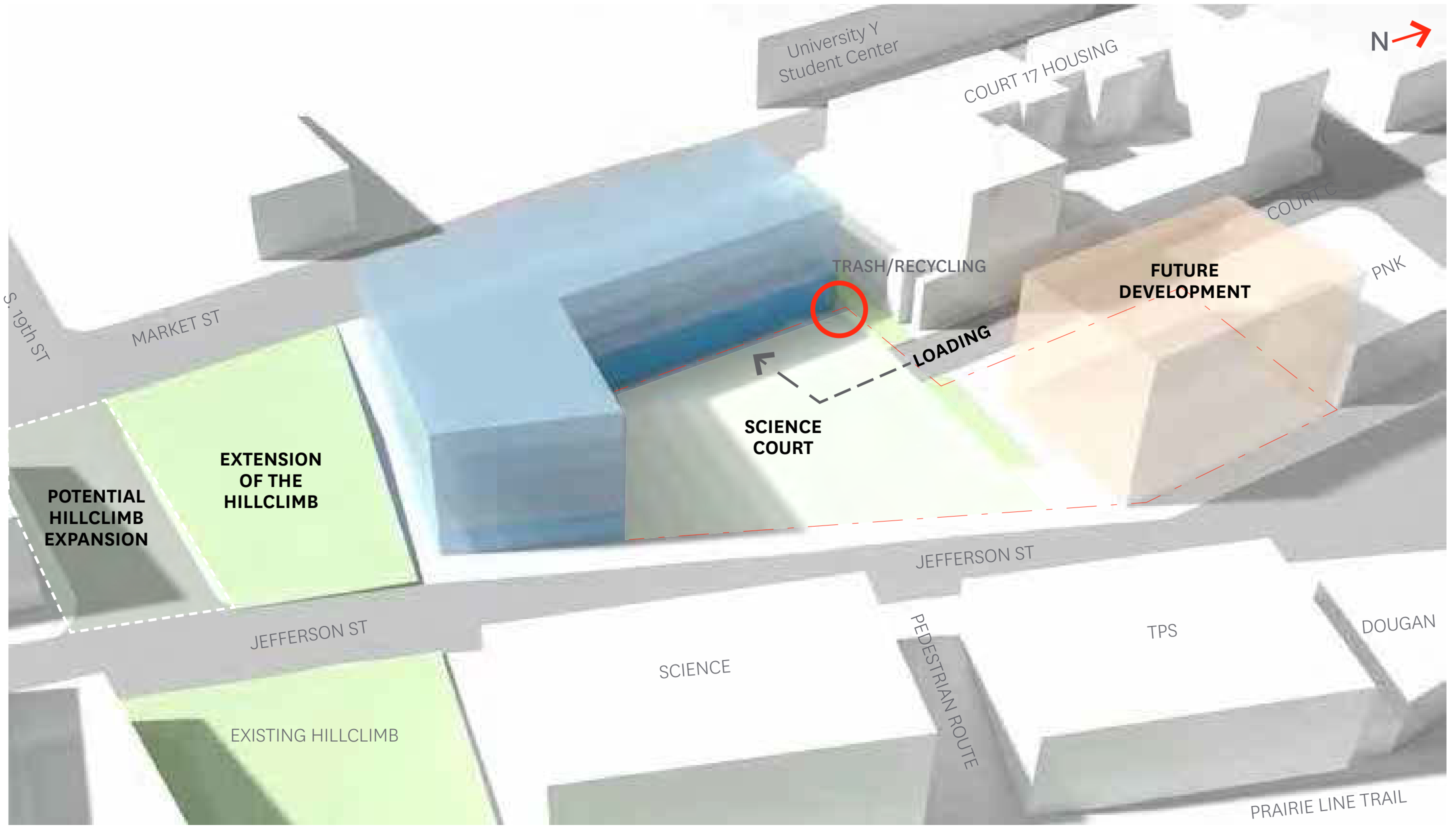
FULL VISION - MASSING

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



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.

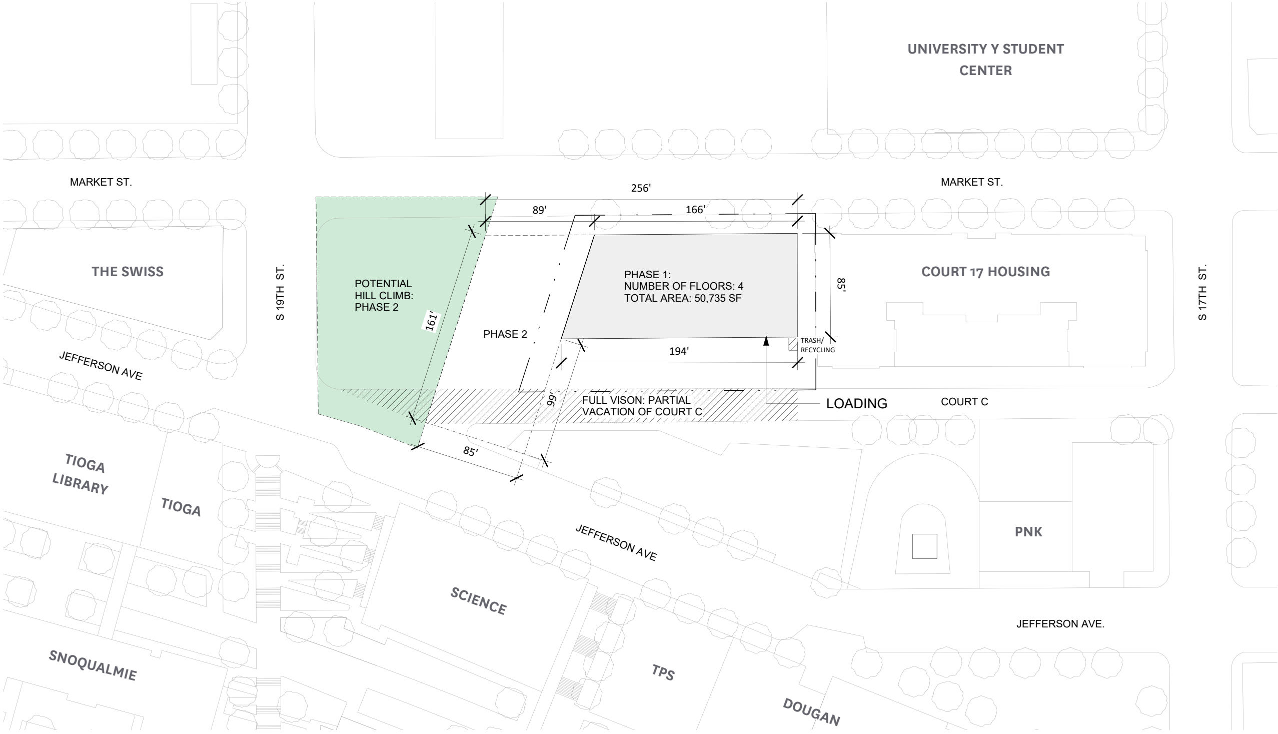
A second ground floor would be accessible from Market Street, one story above the high-bay floor. This floor could be used for public facing program located at grade along Market Street which is a transit corridor and therefore highly visible to the public. Finally, the southern wing of the building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

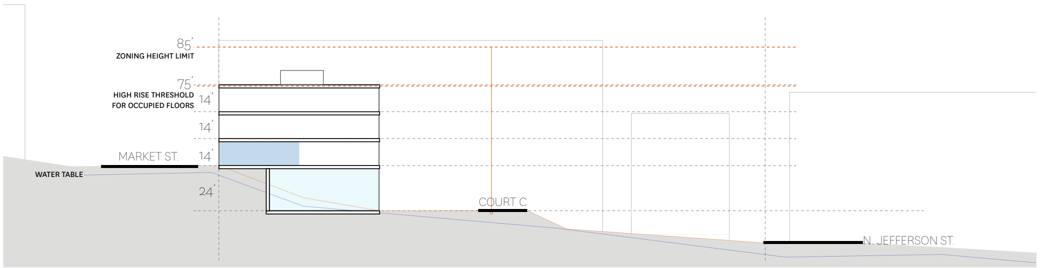


PREFERRED ALTERNATIVE, PHASE 1 - MASSING

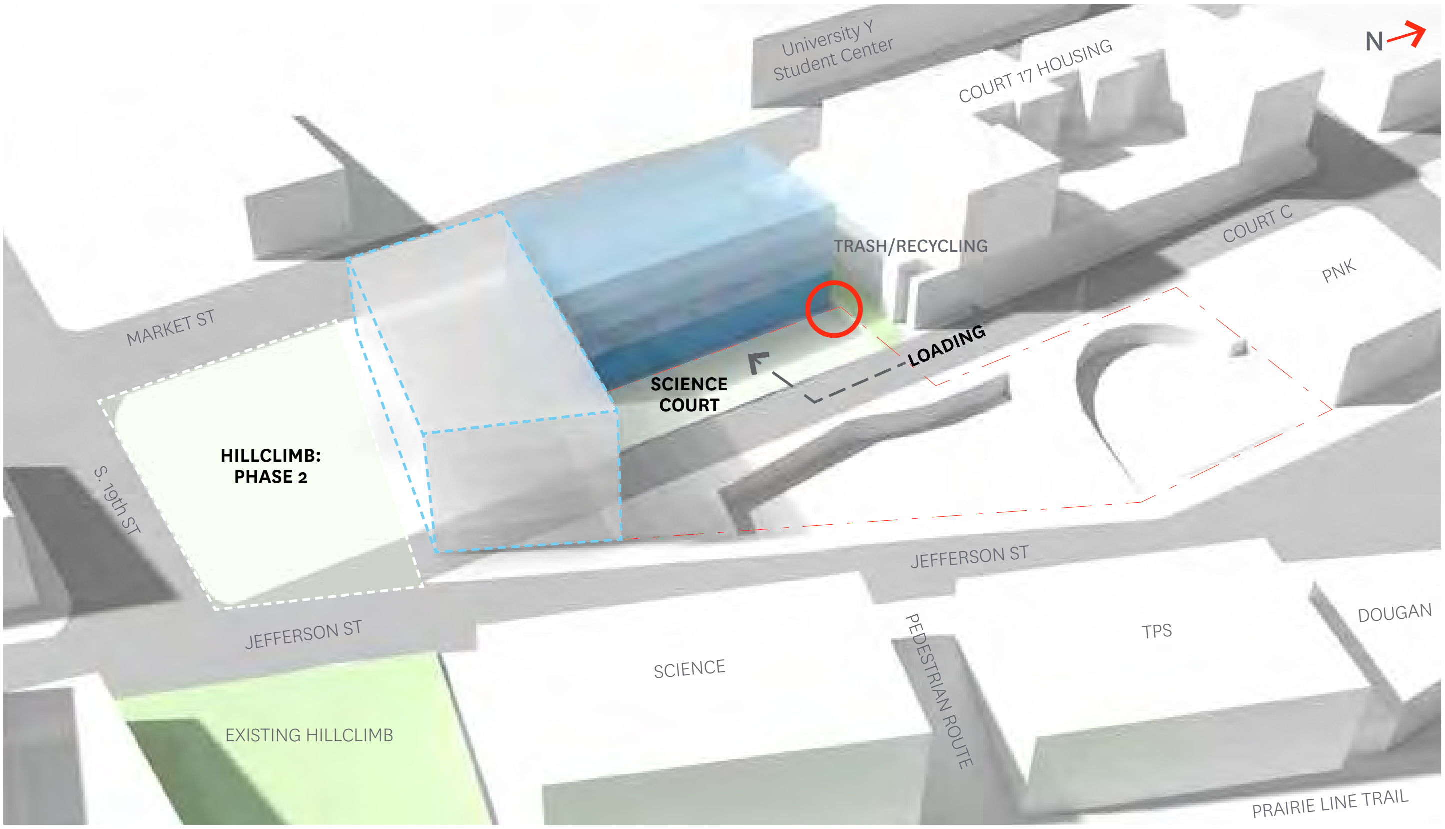
UW Tacoma's preferred alternative to address the needs outlined in this report is to build the northwest wing of the boomerang massing concept as the Phase 1 of building the entire Academic Innovation Building. This portion of the building will be large enough to house the most critical elements of the 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

Commons

- Atrium/Collaboration
- Open Group Work Space
- Individual Study Rooms
- Group Rooms x 12
- 150 Student Large, Flexible Classroom

Hub for Innovation Centers

- Reception
- Meeting Rooms x 2
- Offices x 8
- Workroom
- Storage
- Interview Rooms x 4
- Center for Business Analytics
- Ctr for Leadership & Social Responsibility
- Milgard Success Center
- MS in Business Administration Tech Rm

Milgard Office + Support

- Staff Offices
- Student Advising

School of Engineering and Technology Office + Support

- Mechanical Engineering Offices
- Student Advising
- Meeting Room

Mechanical Engineering Labs + Support

- Thermal Sciences
- Solid Mechanics
- Manufacturing
- Prep Lab/Storage
- Fabrication Shop

Shared Labs

- Engineering Design
- Computer Aided Design Lab

Classrooms

- Seminar Rooms x 2
- 60-70 Seat Classrooms x 3

FULL VISION - ADDITIONAL PROGRAM SUMMARY
78,000 gsf

Commons

- Entry/Lobby
- Student Lounge
- Commercial
- Café

Civil Engineering Labs + Support

- Environmental Engineering
- Fluids/Hydraulics
- Soil Mechanics
- Materials
- Structures
- Construction Design
- Prep Lab/Storage

Shared Labs

- Shared Research

Classrooms

- Computer Classroom
- Open Computer Lab
- Active Learning Classroom
- Campfire Classroom

Mechanical Engineering Labs + Support

- Control Systems
- Mechatronics & Micro-Processor
- Industrial 4.0 Cyber, Phys. Systems

Research Labs

- Faculty Research
- Shared Research

Milgard Office + Support

- Faculty Offices
- Meeting Rooms x 6
- Tutors
- Graduate Students

School of Engineering and Technology Office + Support

- Civil Engineering Offices
- IT Offices
- Tutors
- Graduate Students

IT Labs

- Computer Lab
- Cybersecurity
- Industrial Controls Systems
- Forensics
- Senior Design
- Networking
- Embedded System Design & Micro-processor

🟥 **Office**
🟦 **Labs**
🟨 **Collaboration**
🟩 **Teaching Space**

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

Type of Space	% of Space	Gross Square Footage	Occupants
Student Collaboration	30	15,050	380
Classrooms	25	12,900	335
Administration	11	5,382	31
Faculty	6	2,957	16
Teaching Labs	28	14,250	140

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

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

FACILITIES EVALUATION AND PLANNING GUIDE (FEPG)

Type of Space	Assignable Sf/Workstation or person unless otherwise noted
Classroom 50-99 People, movable tables and chairs	16-22
Class Laboratories, Engineering	120
Open Laboratories	No guideline, driven by specific needs
Computer Laboratories	60
Research Laboratories	No guideline, driven by specific needs
Office - Faculty	140
Office - Staff	120
Conference Rooms	20

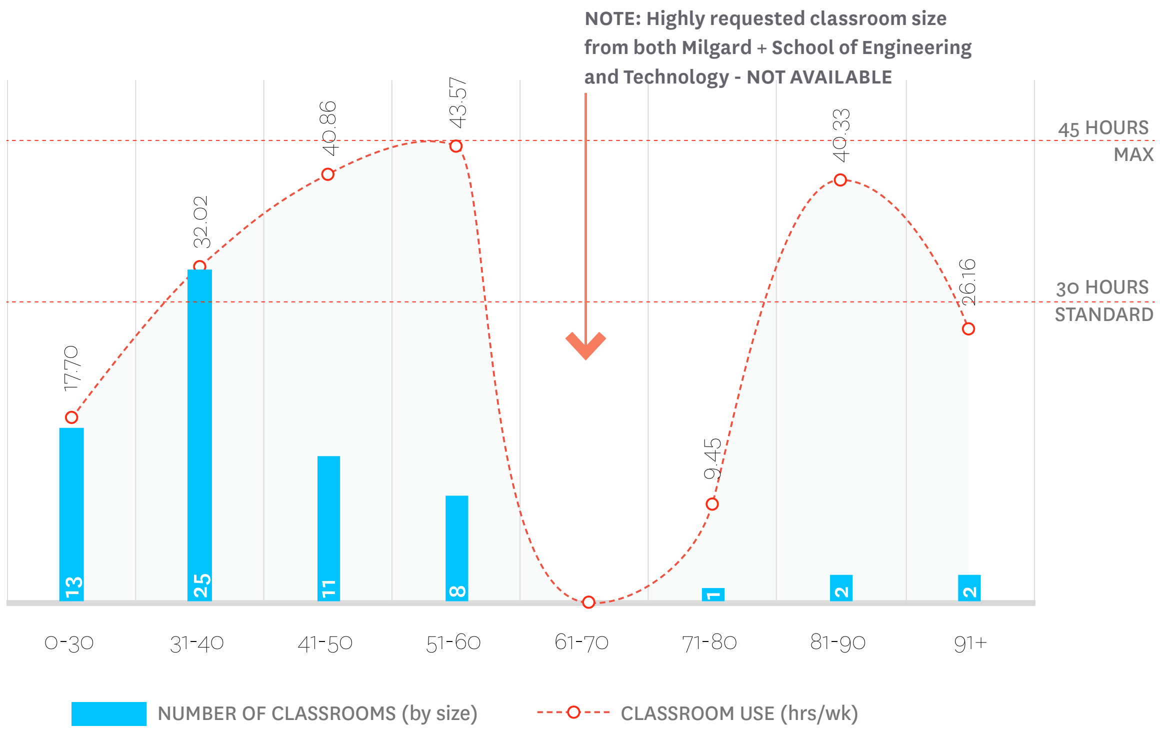
CLASSROOMS NEEDS

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.

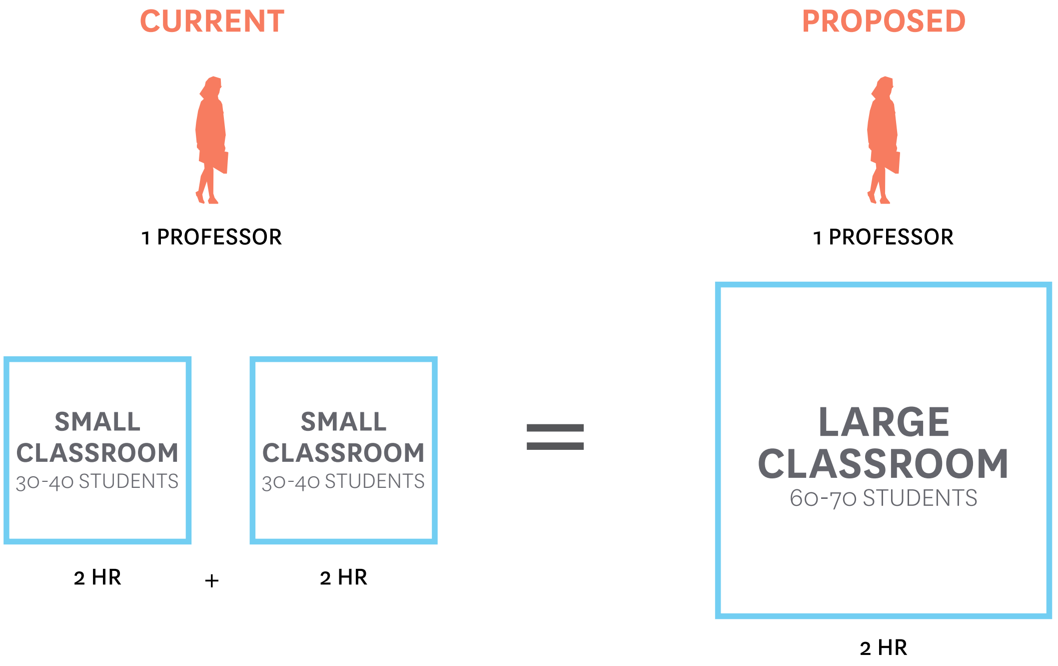
The graph below displays the unavailability of 60-70 person classrooms. The "utilization curve" is highest toward the larger classrooms reinforcing the need for this classroom size. The 71-80 person classroom is greatly underutilized because of its poor condition and A/C issues. UW Tacoma has plans to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

CURRENT LARGE CLASSROOM + GROUP ROOM PROXIMITY



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



TOTAL TIME = 4 HR

Same curriculum taught in each class.

TOTAL TIME = 2 HR

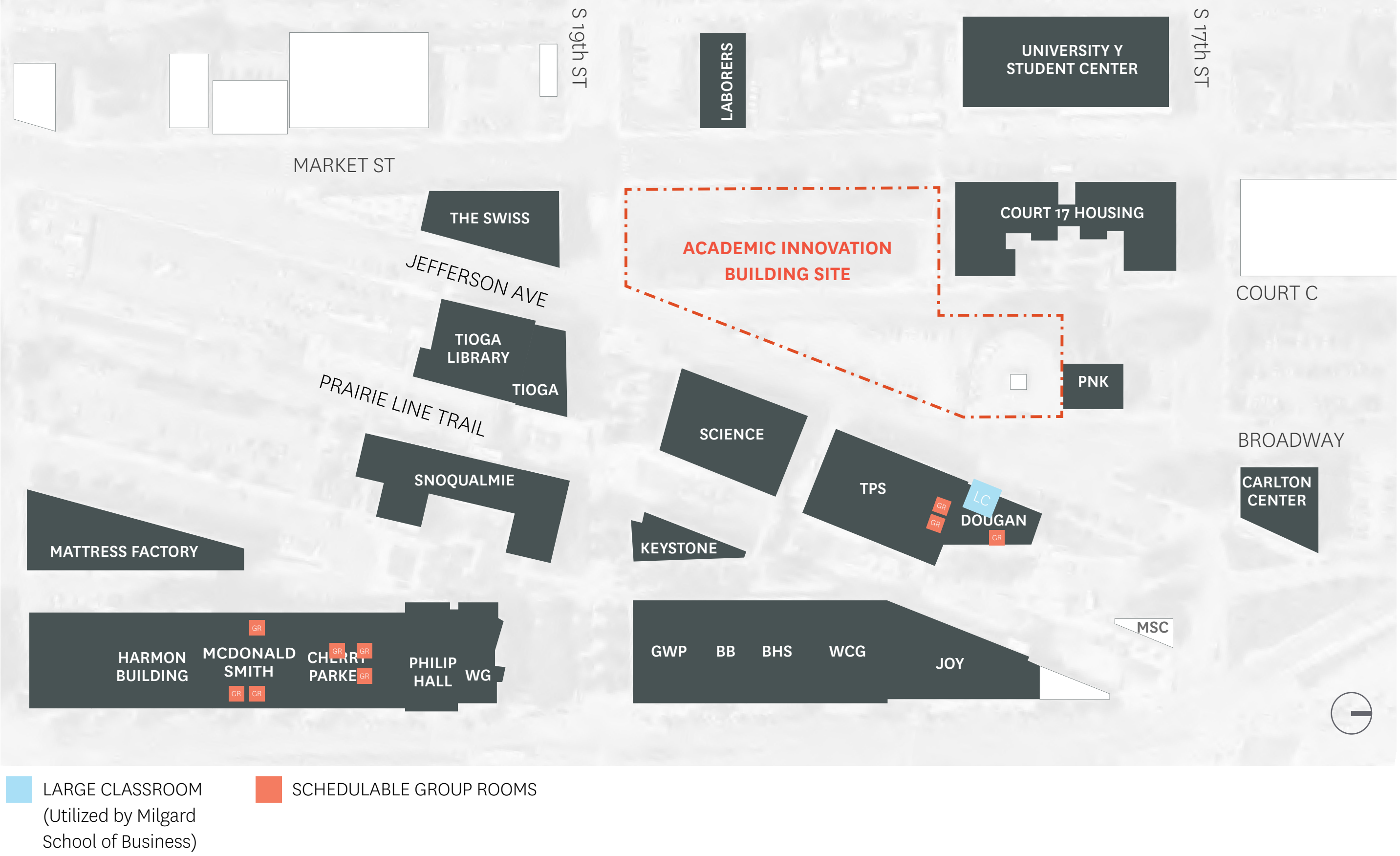
Curriculum reaches more students and taught more efficiently

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.

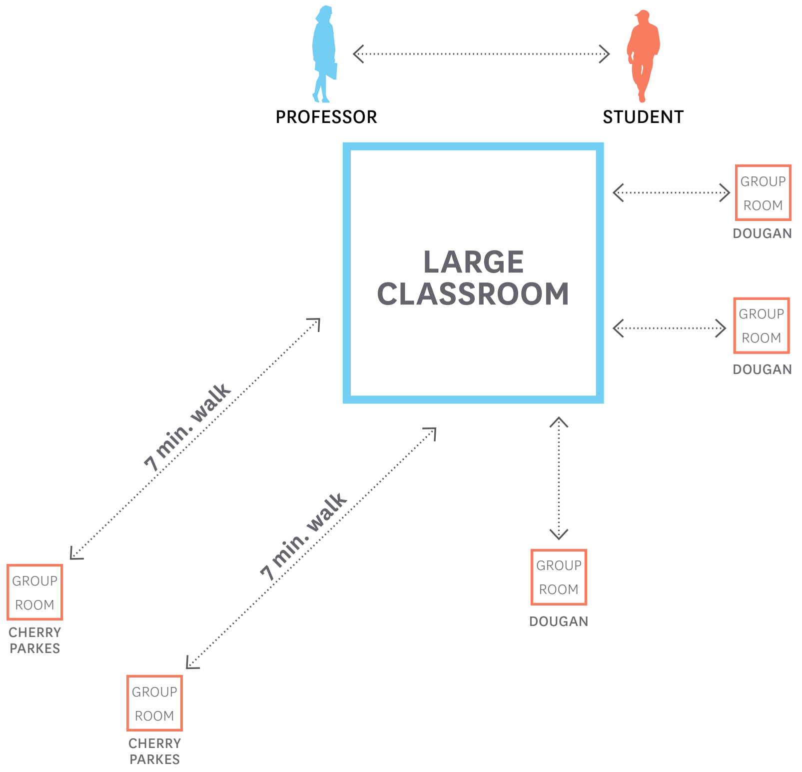
CURRENT LARGE CLASSROOM + GROUP ROOM PROXIMITY



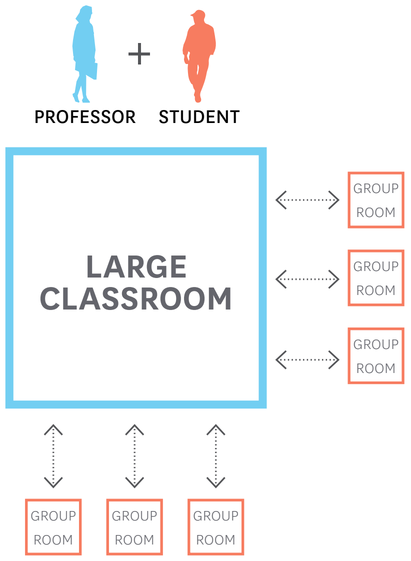
Teaching Goals:

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

MILGARD SCHOOL OF BUSINESS GROUP ROOMS + LARGE CLASSROOM PROXIMITY NEEDS



CURRENT GROUP ROOM TO CLASSROOM PROXIMITY



PROPOSED GROUP ROOM TO CLASSROOM PROXIMITY

LAB NEEDS

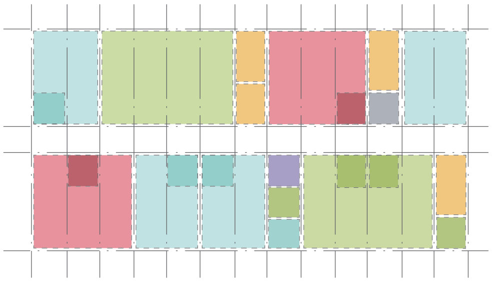
LAB MODULES – PLANNING

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.

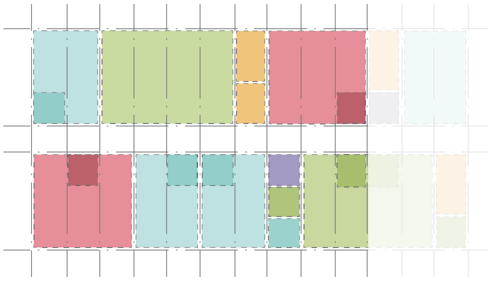
The planning module can be used to organize a systematic delivery of piped laboratory services, HVAC, power and data. These services can be delivered to each laboratory module in a consistent manner, facilitating additions or deletions that could be required by changes in laboratory use.

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

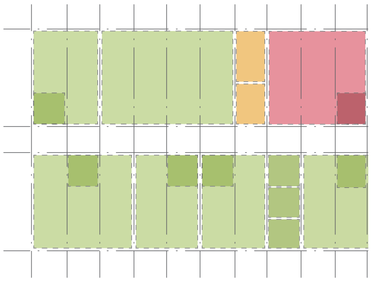
- Bench dimensions should accommodate technical work stations, instruments, and procedures.
- Space between benches is designed to allow people to work back-to-back at adjacent benches, allowing accessibility for disabled persons and movement of people and laboratory carts in the aisle.
- The module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



LAB MODULE



LAB MODULE - SCALABILITY



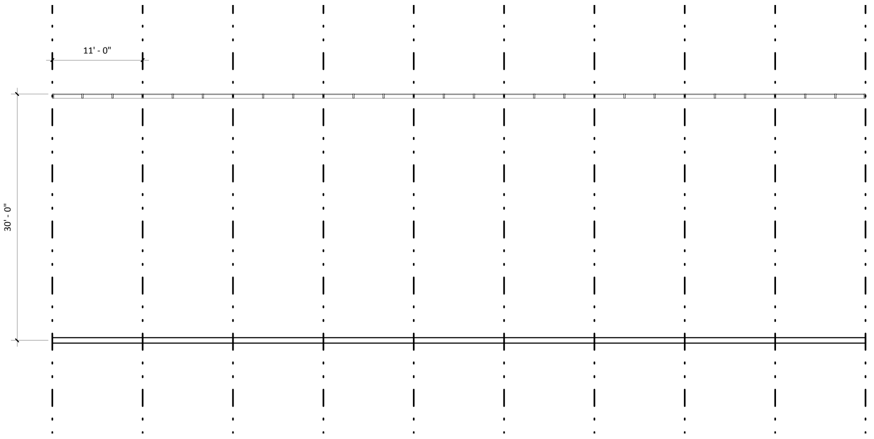
LAB MODULE - ADAPTABILITY

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.

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.

engaging,
accessible
centers

CRITICAL NEEDS, IN ORDER OF PRIORITY:

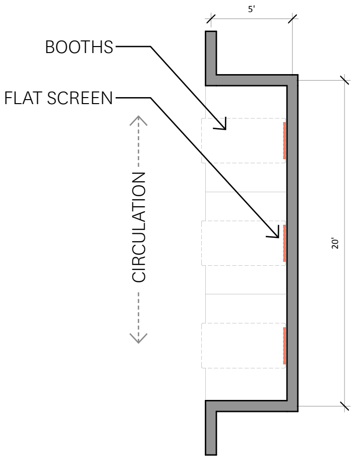
- Public, accessible location
- Proximity to other Centers, to share resources and promote valuable chance interactions
- Shared reception and commons
- Offices
- Meeting rooms
- Interview rooms
- Design center
- Access to classrooms and group rooms
- Access to large event space

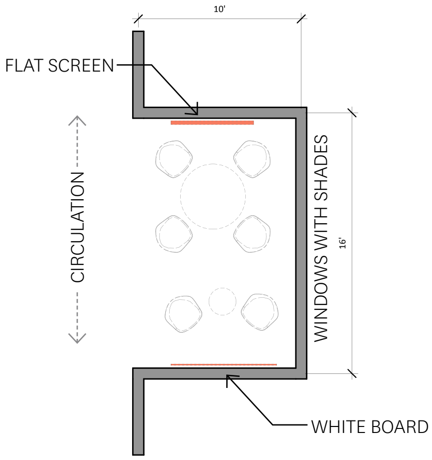
CENTER	WHO IT SERVES				
	Students	Faculty, Visiting Scholars	Business Community, Execs/ Professional, Advisory Boards, Corporate Partners	Research Component to Work	Public, Accessible Location
CLSR	X	X	X	X	X
CBA	X	X	X	X	X
IAC	X	X	X	X	X
MIWI	X	X	X	X	X
MSC	X	X	X		X
CDS	X	X	X	X	

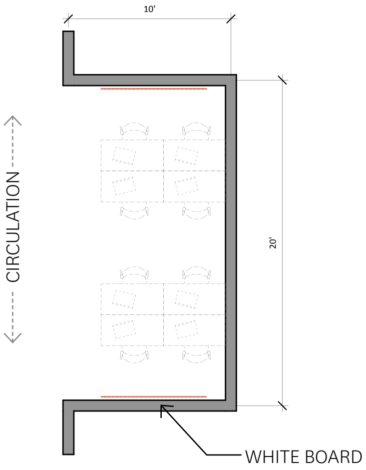
CENTER	SPACE REQUESTS							
	Commons	Office(s)	Meeting	Interview	Design Center	Access to Classrooms	Access to Group Rooms	Event Space
CLSR	X	X	X			X	X	X
CBA	X	X	X		X	X	X	X
IAC	X	X	X		X	X	X	X
MIWI	X	X	X		X	X	X	X
MSC	X	X	X	X		X	X	X
CDS	X	X	X		X		X	

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.







ATRIUM

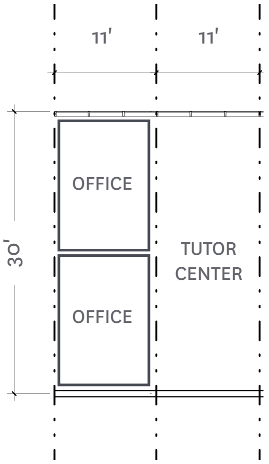
NODES ALONG A PATH

OFFICE AND SUPPORT

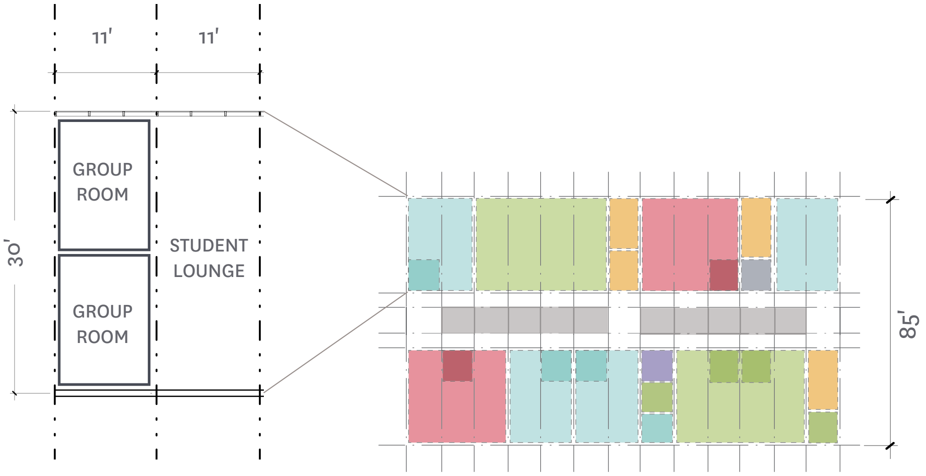
Offices in this building are primarily planned to accommodate only new faculty and staff, not to relocate a large number of faculty and staff, or entire departments. Because of this, office space is a relatively small portion of the building. In addition to the new faculty and staff needed to start the 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.

DW Fritz: Small Conference Room

Simple Headquarters: Professional Board Room



DISTRIBUTED OFFICES



COLLABORATION NODES

CORRIDOR IN THE MIDDLE + COLLABORATION

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

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

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.

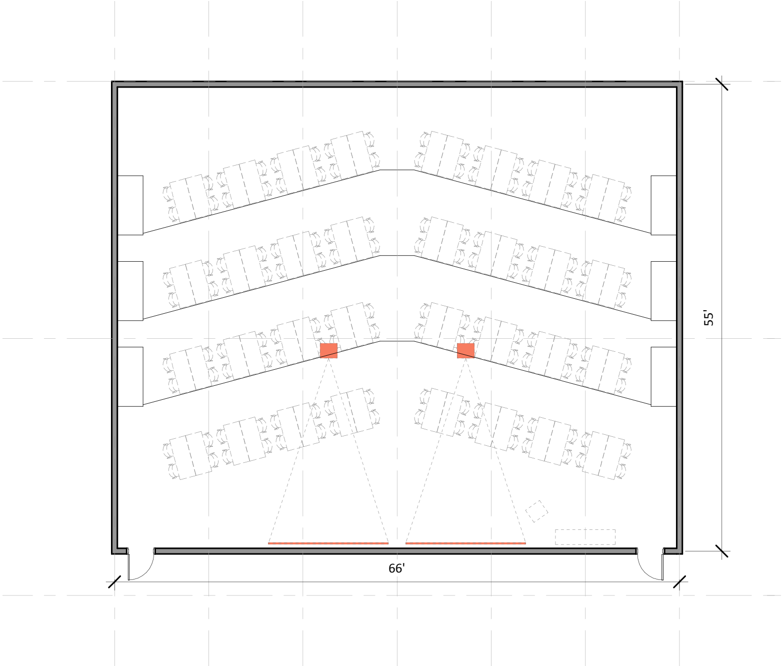
EQUIPMENT

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.

150 SEAT LARGE CLASSROOM (LAYOUT 1)

Area: 3,750 sf

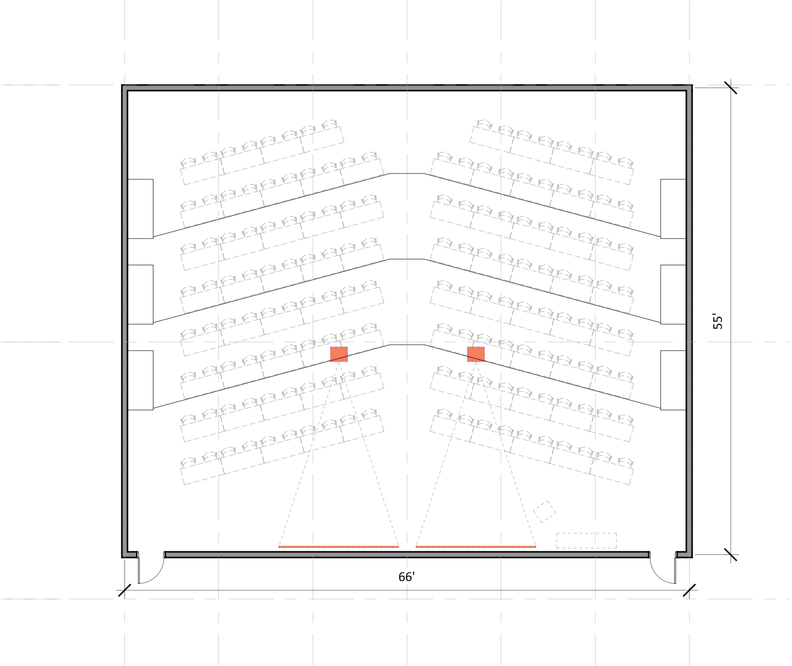
Number of Students: 150



150 SEAT LARGE CLASSROOM (LAYOUT 2)

Area: 3,750 sf

Number of Students: 150



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

ROOM TYPE	60-70 Person Classroom
NUMBER OF THESE SPACES	3
ROOM SIZE	1,540 sf
LEVEL OF TECHNOLOGICAL STANDARD	A
HEIGHT REQUIREMENTS	12'-0" minimum
ADJACENCY REQUIREMENTS	Group rooms
WINDOWS	Desired Natural Daylight
DAYLIGHT CONTROL	Manual shades
LIGHTING	TBD

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.

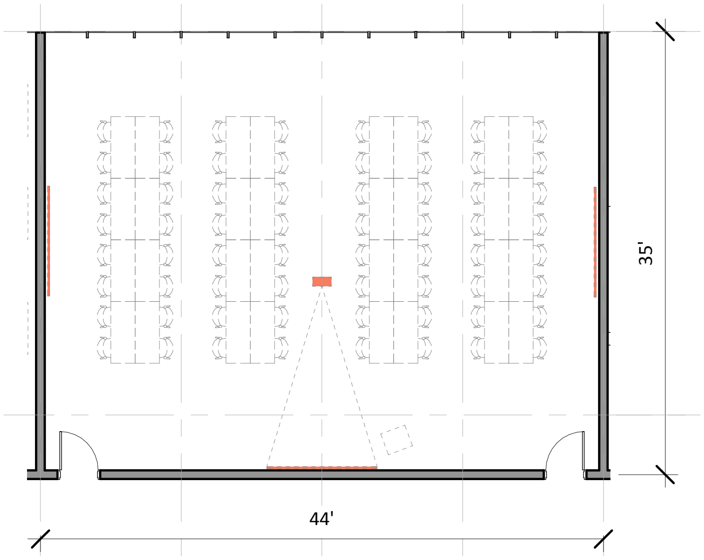
EQUIPMENT

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.

LARGE CLASSROOM (LAYOUT 1)

Area: 1,540 sf

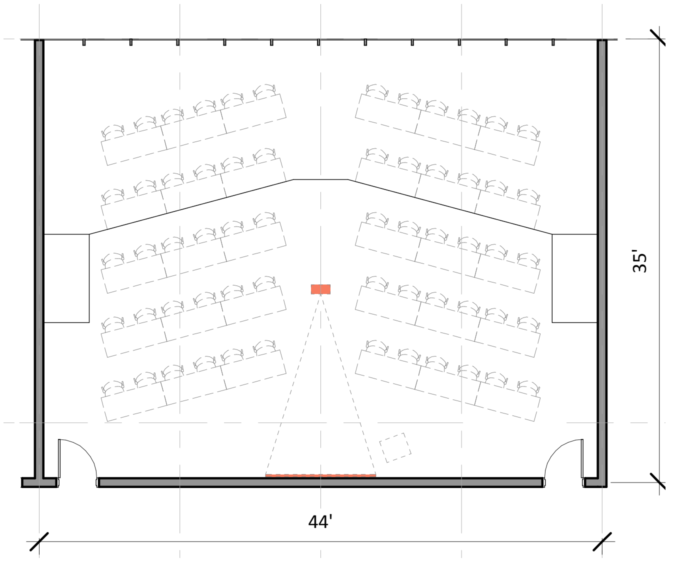
Number of Students: 64



LARGE CLASSROOM (LAYOUT 2)

Area: 1,540 sf

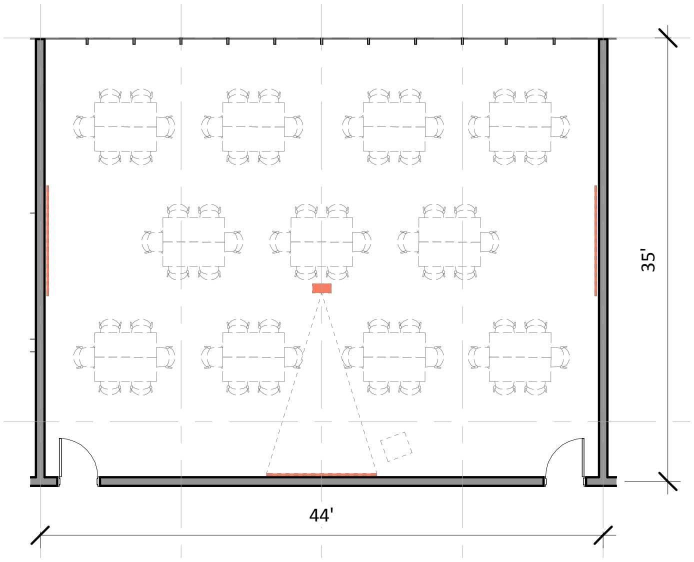
Number of Students: 60



LARGE CLASSROOM (LAYOUT 3)

Area: 1,540 sf

Number of Students: 66



OPEN COMPUTER LAB – GENERAL DESCRIPTION

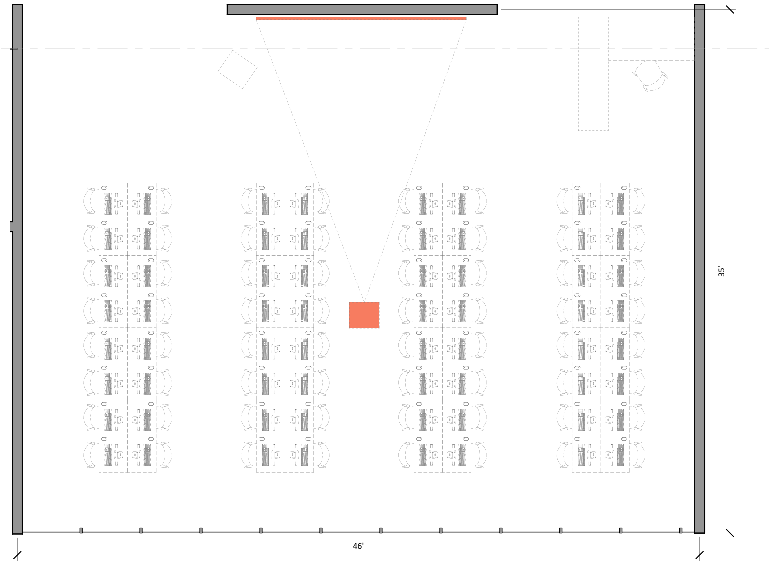
Open computer labs are most successful when there is an ability to use them for formal classes as well as unscheduled student use. This flexibility can be accomplished by using furniture that allows computers to be lowered below the desk and raised, but that poses the risk of pieces breaking over time. 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	
ROOM TYPE	60 Person Open Computer Lab
NUMBER OF THESE SPACES	1
ROOM SIZE	1,200 sf
LEVEL OF TECHNOLOGICAL STANDARD	A
HEIGHT REQUIREMENTS	10'-0" minimum
ADJACENCY REQUIREMENTS	None
WINDOWS	Desired Natural Daylight
DAYLIGHT CONTROL	Manual shades
LIGHTING	TBD
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. Microphones, video recording capabilities and configured for students to share content with the class and in groups.
HVAC/CONTROLS	Comfort heating, cooling, and ventilation.
EQUIPMENT	
FIXED	Podium with AV controls, projection screen white boards along perimeter, storage, instructor station/computer and lab staff reception desk.
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.

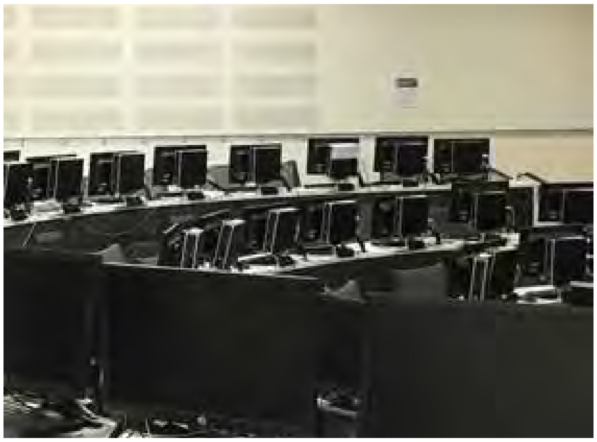
OPEN COMPUTER LAB

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

ROOM TYPE	12 Person Seminar Room
NUMBER OF THESE SPACES	2
ROOM SIZE	240 sf
LEVEL OF TECHNOLOGICAL STANDARD	A
HEIGHT REQUIREMENTS	10'-0" minimum
ADJACENCY REQUIREMENTS	None
WINDOWS	Desired natural daylight
DAYLIGHT CONTROL	Manual shades
LIGHTING	TBD

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.

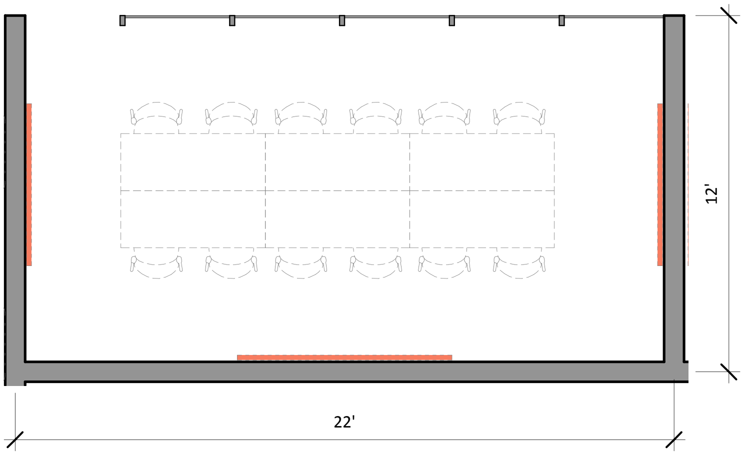
EQUIPMENT

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

SEMINAR ROOM (LAYOUT 1)

Area: 240 sf

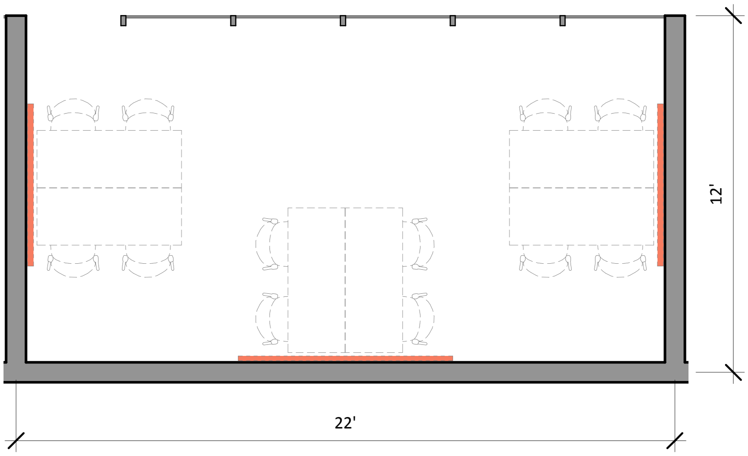
Number of Students: 12



SEMINAR ROOM (LAYOUT 2)

Area: 240 sf

Number of Students: 12



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

ROOM TYPE	6 Person Group Room
NUMBER OF THESE SPACES	12
ROOM SIZE	180 sf
LEVEL OF TECHNOLOGICAL STANDARD	A
HEIGHT REQUIREMENTS	10'-0" minimum
ADJACENCY REQUIREMENTS	Large Classrooms
WINDOWS	Desired natural daylight
DAYLIGHT CONTROL	Manual shades
LIGHTING	TBD

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 projection system and capacity wifi for internet access.
AUDIO-VISUAL	Ceiling mounted projectors, or multiple monitors to be considered.
HVAC/CONTROLS	Comfort heating, cooling, and ventilation.

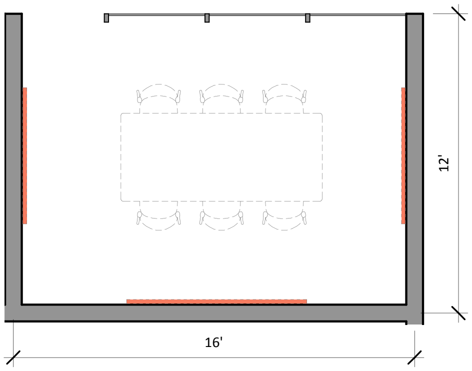
EQUIPMENT

FIXED	White boards along perimeter, and storage.
MOVABLE	Tables, chairs, and storage units.
OTHER	

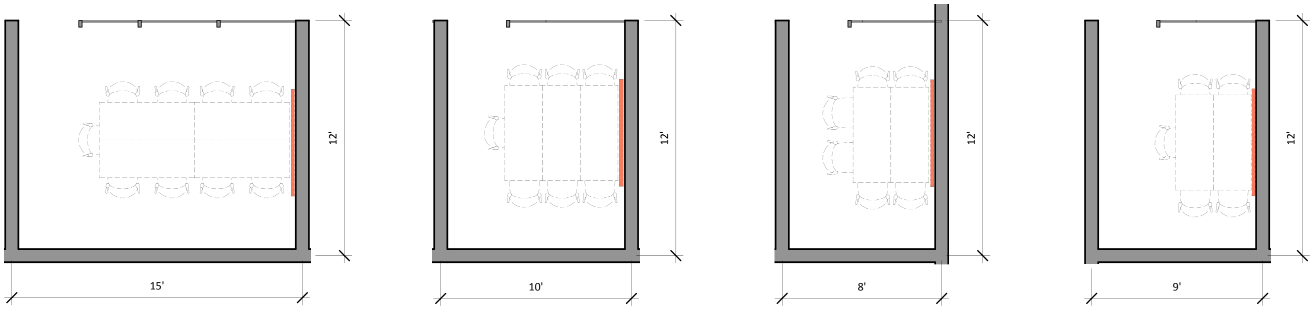
GROUP ROOM (LAYOUT 1)

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

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

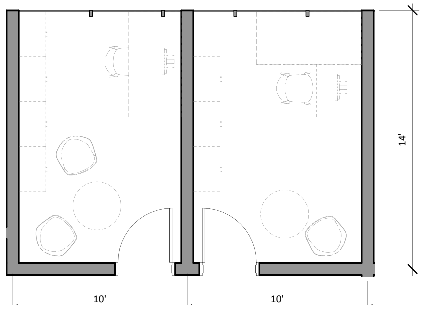
ROOM TYPE	Office + Support
NUMBER OF THESE SPACES	School of Engineering and Technology: 14 Faculty Offices + 2 Advising Milgard: 10 Staff + 6 Advising
ROOM SIZE	130 sf/office + 25 sf/advising space
LEVEL OF TECHNOLOGICAL STANDARD	A
HEIGHT REQUIREMENTS	10’-0” minimum
ADJACENCY REQUIREMENTS	None
WINDOWS	Desired natural daylight
DAYLIGHT CONTROL	Manual shades
LIGHTING	TBD

UTILITY REQUIREMENTS

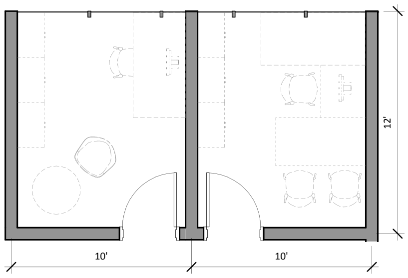
ELECTRICAL	Wall mounted duplex outlets and USB ports for power of devices and overhead or drop down power to be considered.
DATA/TELECOM	Technology package to include capacity wifi for internet access.
AUDIO-VISUAL	N/A
HVAC/CONTROLS	Comfort heating, cooling, and ventilation.

EQUIPMENT

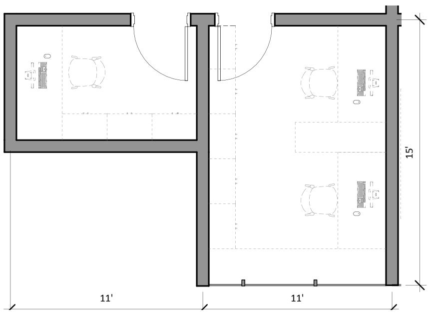
FIXED	White boards along perimeter, and storage.
MOVABLE	Tables, chairs, and storage units.
OTHER	



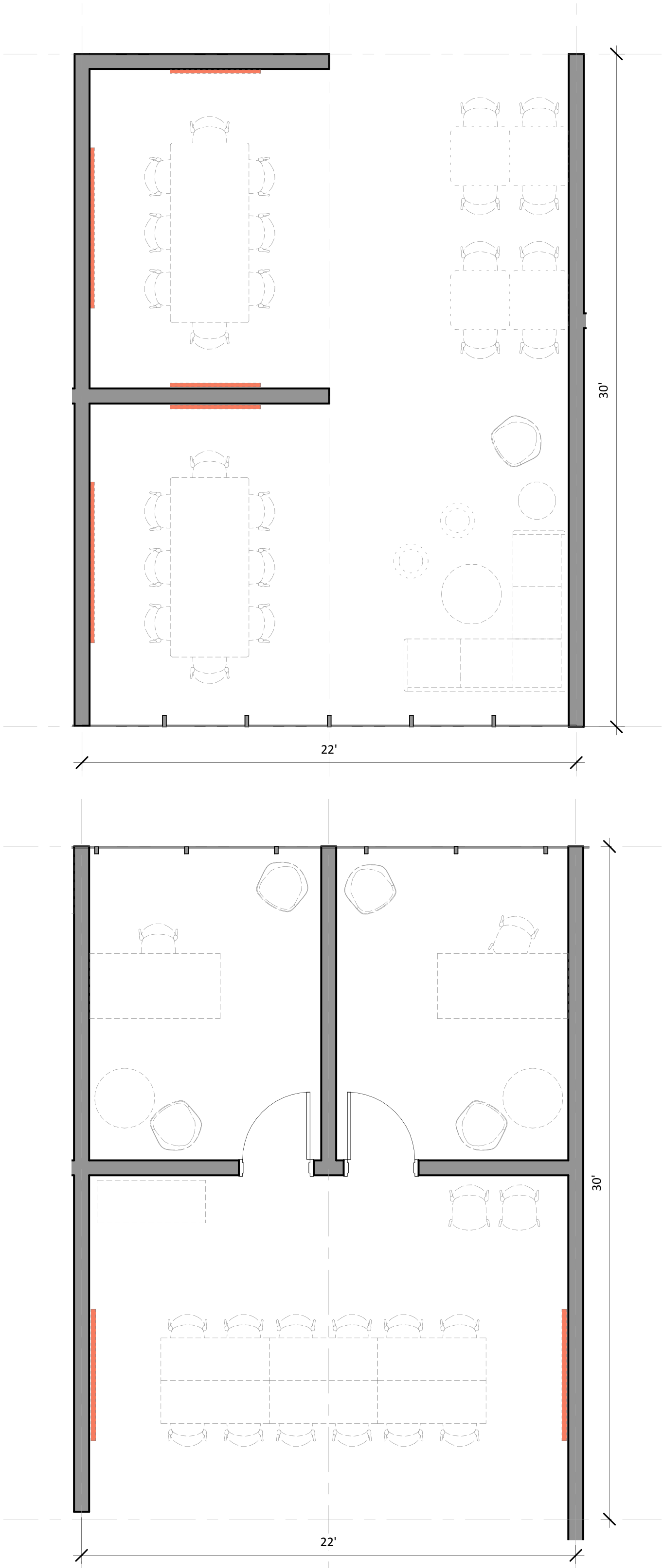
FACULTY OFFICES



STAFF OFFICES



TEACHING ASSISTANT OFFICES



OFFICE + MEETING CONFIGURATIONS

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

ROOM TYPE	25 Person Board Room
NUMBER OF THESE SPACES	1
ROOM SIZE	200 sf
LEVEL OF TECHNOLOGICAL STANDARD	A
HEIGHT REQUIREMENTS	10’-0” minimum
ADJACENCY REQUIREMENTS	None
WINDOWS	Desired natural daylight
DAYLIGHT CONTROL	Manual shades
LIGHTING	TBD

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 projection system and capacity wifi for internet access.
AUDIO-VISUAL	Ceiling mounted projectors, or individual monitors to be considered.
HVAC/CONTROLS	Comfort heating, cooling, and ventilation.

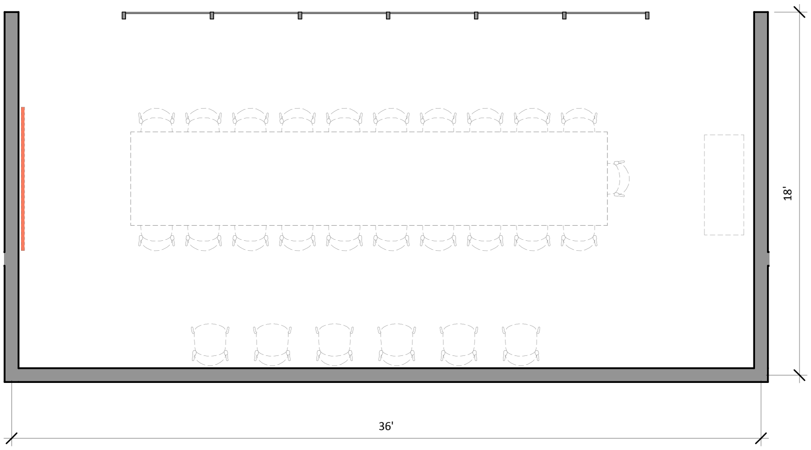
EQUIPMENT

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

BOARD ROOM

Area: 200 sf

Number of People: 25



Simple Headquarters: Professional Board Room

FLUID & THERMAL SCIENCES LAB

Program Component:	*Mechanical Engineering*	Date:	*05.22.2018*
Space:	*Fluid + Thermal Sciences Lab*	Contact:	*Elizabeth Hyun*

Room Size (ft^2):	*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.*
Temperature:	*68 ° - 72°*	Filtration Criteria:	*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 (N_2):	*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

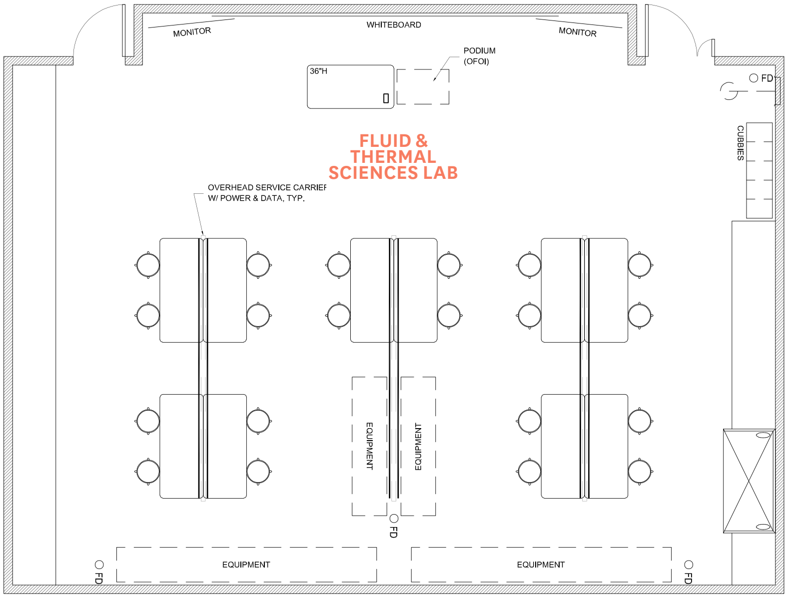
Item:	By / Install:	Elec.	Plumb.	HVAC:	Comments:
Centrifugal Pump Testing Rig	*OFOI*	*Yes*	*Yes*		
Centrifugal Pump Testing Rig	*OFOI*	*Yes*	*Yes*		
Venturi Pump Testing Rig	*OFOI*	*Yes*	*Yes*		
Pelton Wheel	*OFOI*	*Yes*	*Yes*		

Revised 05-29-18

FLUID & THERMAL SCIENCES LAB

Area: 1,320 sf

Number of People: 24



SOLID MECHANICS & MATERIALS LAB

Program Component:	*Mechanical Engineering*	Date:	*05.22.2018*
Space:	*Solid Mechanics & Materials Lab*	Contact:	*Elizabeth Hyun*

Room Size (ft^2):	*1,320*	No. of Occupants:	*Up to 25*
Ceiling Height:	*12'-0"*	Quantity of Rooms:	*1*
Critical Adjacencies:	*Prep. Lab & Fabrication Lab*	Special Requirements:	
CASEWORK			
Counter Top Material:	*Epoxy Resin & Wood*	Upper Cabinet (lf):	*38'*
Cabinet Material:	*Metal w/ Wood Fronts*	Open Shelving (lf):	*0'*
Countertop (lf):	*112'*	Tall Cabinet (lf):	*0'*
Base Cabinet (lf):	*48'*	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:	*Rubber or VCT*	Acoustic Criteria:	*dBA 45 to 55*
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:	*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 (N_2):	*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*

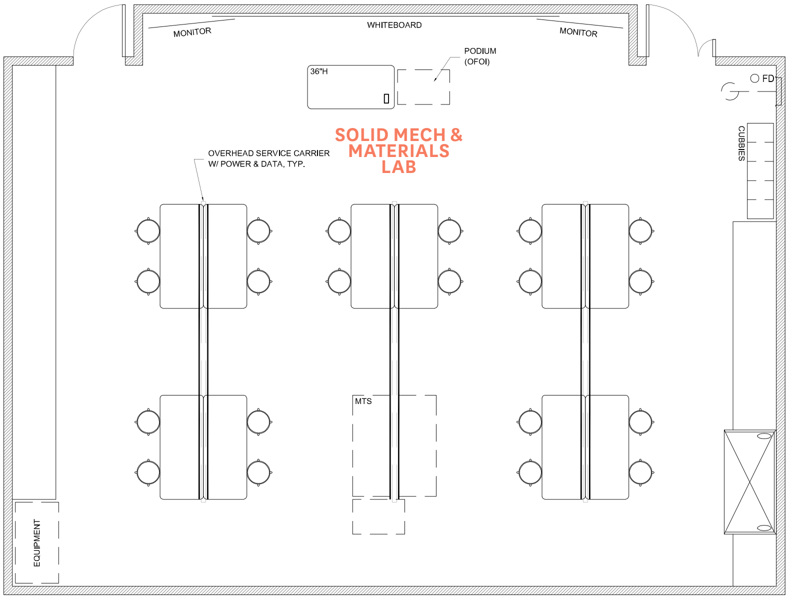
EQUIPMENT

Item:	By / Install:	Elec.	Plumb.	HVAC:	Comments:
Thermoforming Machines	*OFOI*	*Yes*	*Yes*		

SOLID MECHANICS & MATERIALS LAB

Area: 1,320 sf

Number of People: Up to 25



MANUFACTURING LAB

Program Component:	***Mechanical Engineering***	Date:	***05.22.2018***
Space:	***Manufacturing Lab***	Contact:	***Elizabeth Hyun***

Room Size (ft^2):	***1,320***	No. of Occupants:	***Up to 25***
Ceiling Height:	***12'-0"***	Quantity of Rooms:	***1***
Critical Adjacencies:	***Prep. Lab & Fabrication Lab***	Special Requirements:	
CASEWORK			
Counter Top Material:	***Epoxy Resin & Wood***	Upper Cabinet (lf):	***38'***
Cabinet Material:	***Metal w/ Wood Fronts***	Open Shelving (lf):	***0'***
Countertop (lf):	***198'***	Tall Cabinet (lf):	***0'***
Base Cabinet (lf):	***138'***	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:	***Rubber or VCT***	Acoustic Criteria:	***dBA 45 to 55***
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:	***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:	***4***
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 (N_2):	***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***

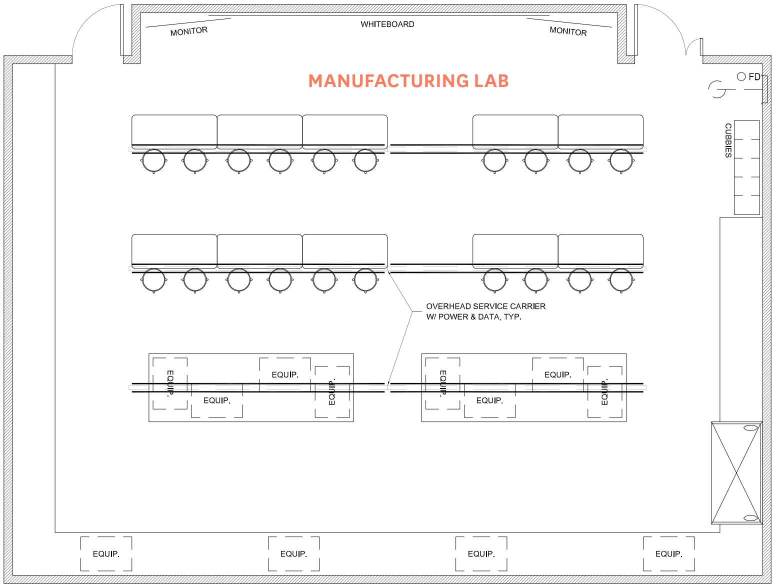
EQUIPMENT

Item:	By / Install:	Elec.	Plumb.	HVAC:	Comments:
Thermoforming Machines	***OFOI***	***Yes***	***Yes***		

MANUFACTURING LAB

Area: 1,320 sf

Number of People: Up to 25



COMPUTER AIDED DESIGN LAB

Program Component:	*Mechanical Engineering*	Date:	*05.22.2018*
Space:	*Computer Aided Design Lab*	Contact:	*Elizabeth Hyun*

Room Size (ft^2):	*1,650*	No. of Occupants:	*Up to 42*
Ceiling Height:	*12'-0"*	Quantity of Rooms:	*1*
Critical Adjacencies:	*n.a.*	Special Requirements:	
CASEWORK			
Counter Top Material:	*P-Lam or Wood*	Upper Cabinet (lf):	*0'*
Cabinet Material:	*n.a.*	Open Shelving (lf):	*40'*
Countertop (lf):	*205'*	Tall Cabinet (lf):	*0'*
Base Cabinet (lf):	*0'*	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:	*n.a.*
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.*
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 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):	*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 (N_2):	*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*

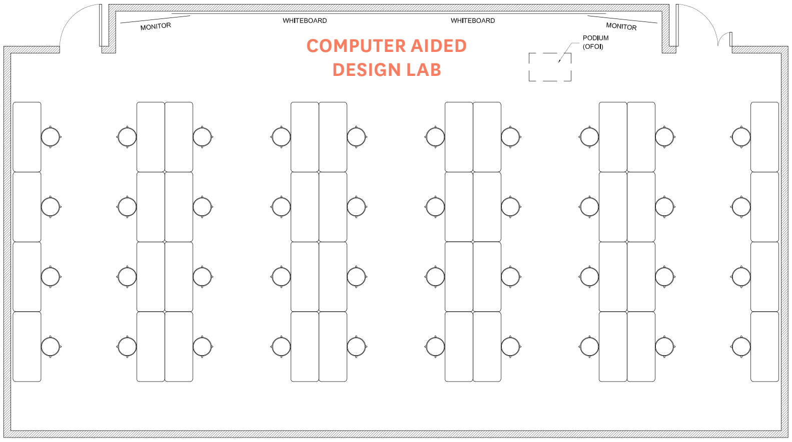
EQUIPMENT

Item:	By / Install:	Elec.	Plumb.	HVAC:	Comments:
Computer Work Stations	*OFOI*	*Yes*	*n.a.*		

COMPUTER AIDED DESIGN LAB

Area: 1,650 sf

Number of People: Up to 42



ENGINEERING DESIGN LAB

Program Component:	*Mechanical Engineering*	Date:	*05.22.2018*
Space:	*Engineering Design Lab*	Contact:	*Elizabeth Hyun*

Room Size (ft^2):	*1,650*	No. of Occupants:	*Up to 35*
Ceiling Height:	*12'-0"*	Quantity of Rooms:	*2*
Critical Adjacencies:	*Prep. Lab & Fabrication Lab*	Special Requirements:	*(7) Roll-up Doors 8'W x 10'H*
CASEWORK			
Counter Top Material:	*Epoxy Resin & Wood*	Upper Cabinet (lf):	*38'*
Cabinet Material:	*Metal w/ Wood Fronts*	Open Shelving (lf):	*0'*
Countertop (lf):	*153'*	Tall Cabinet (lf):	*0'*
Base Cabinet (lf):	*45'*	Vented Tall Cabinet (lf):	*0'*
ARCHITECTURAL			
Door Type:	*(1) 3' ; (1)3'/1' & (7) Rool-up 8'W*	Ceiling Material:	*ACT*
Door Size:	*8', 4' & 3'*	Ceiling Finish Material:	*ACT*
Door Material:	*Wood (1/2 glass), Framed Glass*	Wall Construction:	*Metal Stud/Gyp. Board*
Frame Material:	*Hollow Metal*	Wall Finish Material:	*Latex Paint*
Door Quantity:	*9*	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.*
Temperature:	*68 ° - 72°*	Filtration Criteria:	*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:	*tbd*	No. of Snorkels:	*2*
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):	*tbd*
Sink(s):	*1*	Gas Cylinders:	*tbd*
Floor Drain:	*Yes*	Nitrogen (N$_2$):	*tbd*
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*

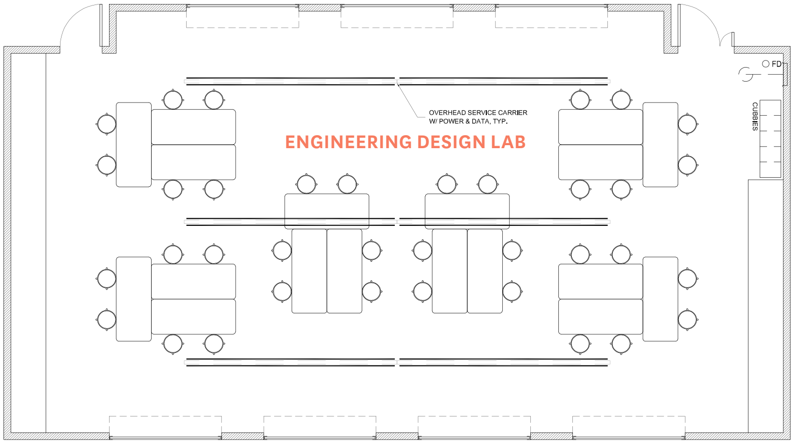
EQUIPMENT

Item:	By / Install:	Elec.	Plumb.	HVAC:	Comments:

ENGINEERING DESIGN LAB

Area: 1,650 sf

Number of People: Up to 35



FABRICATION SHOP

Program Component:	*Mechanical Engineering*	Date:	*05.22.2018*
Space:	*Fabrication Shop*	Contact:	*Elizabeth Hyun*

Room Size (ft^2):	*990*	No. of Occupants:	*Up to 15*
Ceiling Height:	*12'-0"*	Quantity of Rooms:	*1*
Critical Adjacencies:	*Prep. Lab & Fabrication Lab*	Special Requirements:	
CASEWORK			
Counter Top Material:	*Wood*	Upper Cabinet (lf):	*14'*
Cabinet Material:	*Metal w/ Wood Fronts*	Open Shelving (lf):	*0'*
Countertop (lf):	*18'*	Tall Cabinet (lf):	*0'*
Base Cabinet (lf):	*18'*	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:	*n.a.*
Floor Material:	*Epoxy Flooring System*	Acoustic Criteria:	*n.a.*
Base Material:	*Coved Epoxy*		
HVAC			
Noise Criteria (NC Level):	*tbd*	Special HVAC:	*n.a.*
Temperature:	*68 ° - 72°*	Filtration Criteria:	*Dust Collection System*
Relative Humidity:	*30 - 50%*	Humidity Control:	*n.a.*
Pressurization:	*Negative*	Outside Air Requirements:	*100%*
Air Changes/Hour:	*4 min.*	Hazardous Area:	*No*
FUME HOODS, BIOLOGICAL SAFETY CABINETS & OTHER VENTILATED ENCLOSURES			
No. of Fume Hoods & Size:	*6' High Performance*	No. of Snorkels:	*(5) Dust Collection*
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:	*tbd*
Domestic Hot Water (HW):	*Yes*	Drench Hose (DH):	*tbd*
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):	*1*	Gas Cylinders:	*No*
Floor Drain:	*No*	Nitrogen (N_2):	*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*

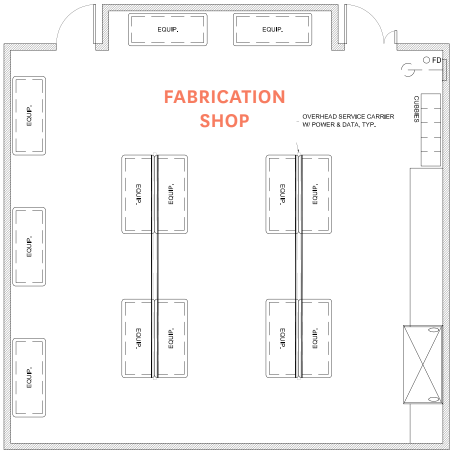
EQUIPMENT

Item:	By / Install:	Elec.	Plumb.	HVAC:	Comments:
Lathe	*OFOI*	*Yes*			*1,800 lbs.*
Axis Knee Mill	*OFOI*	*Yes*			*2,820 lbs.*
Table Saw (10")	*OFOI*	*Yes*			
Drill Press (15")	*OFOI*	*Yes*			
Band Saw (17" Metal/Wood)	*OFOI*	*Yes*			
Auto Router	*OFOI*	*Yes*			
Dust Control System	*OFOI*	*Yes*			

FABRICATION SHOP

Area: 990 sf

Number of People: Up to 15



MECHANICAL ENGINEERING PREP LAB

Program Component:	Mechanical Engineering	Date:	05.22.2018
Space:	Prep Lab	Contact:	Elizabeth Hyun

Room Size (ft^2):	198	No. of Occupants:	Up to 4
Ceiling Height:	10'-0"	Quantity of Rooms:	3
Critical Adjacencies:	Fluid, Solid & Manufacturing Lab	Special Requirements:	
CASEWORK			
Counter Top Material:	Epoxy Resin	Upper Cabinet (lf):	18'
Cabinet Material:	Metal w/ Wood Fronts	Open Shelving (lf):	0'
Countertop (lf):	31'	Tall Cabinet (lf):	0'
Base Cabinet (lf):	31'	Vented Tall Cabinet (lf):	0'
ARCHITECTURAL			
Door Type:	(1)3'/1'	Ceiling Material:	ACT
Door Size:	4'	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:	1	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.
Temperature:	68 ° - 72°	Filtration Criteria:	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:	0
Domestic Hot Water (HW):	Yes	Drench Hose (DH):	No
Industrial Cold Water (ICW):	Yes	Emerg. Shower / Eyewash:	tbd
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):	1	Gas Cylinders:	tbd
Floor Drain:	0	Nitrogen (N_2):	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):	36'	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

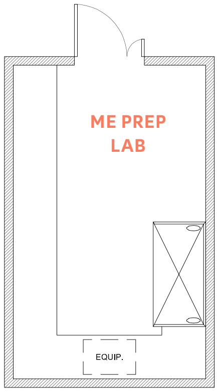
EQUIPMENT

Item:	By / Install:	Elec.	Plumb.	HVAC:	Comments:

ME PREP LAB

Area: 198 sf

Number of People: Up to 4



MECHANICAL ENGINEERING STORAGE

Program Component:	Mechanical Engineering	Date:	05.22.2018
Space:	Lab Storage	Contact:	Elizabeth Hyun

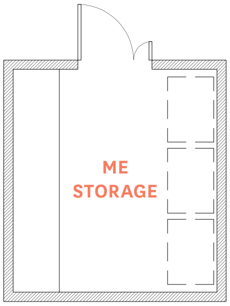
Room Size (ft^2):	132	No. of Occupants:	n.a.
Ceiling Height:	10'-0"	Quantity of Rooms:	3
Critical Adjacencies:	Fluid, Solid & Manufacturing Lab	Special Requirements:	
CASEWORK			
Counter Top Material:	Epoxy Resin	Upper Cabinet (lf):	12'
Cabinet Material:	Metal w/ Wood Fronts	Open Shelving (lf):	0'
Countertop (lf):	12'	Tall Cabinet (lf):	10'
Base Cabinet (lf):	12'	Vented Tall Cabinet (lf):	0'
ARCHITECTURAL			
Door Type:	(1)3'/1'	Ceiling Material:	ACT
Door Size:	4'	Ceiling Finish Material:	ACT
Door Material:	Wood	Wall Construction:	Metal Stud/Gyp. Board
Frame Material:	Hollow Metal	Wall Finish Material:	Latex Paint
Door Quantity:	1	Vibration Criteria:	n.a.
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.
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.	Hazardous Area:	No
FUME HOODS, BIOLOGICAL SAFETY CABINETS & OTHER VENTILATED ENCLOSURES			
No. of Fume Hoods & Size:	0	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):	No	Floor Sink:	0
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:	0	Nitrogen (N$_2$):	No
ELECTRICAL			
120V Outlet - (amp):	Yes	Card Reader:	tbd
208V Outlet - (amp):	No	Security Alarm:	tbd
220-240V Outlet:	No	Network connection:	Yes
Plugmold (lf):	No	Voice connection:	tbd
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:	No
EQUIPMENT			

Item:	By / Install:	Elec.	Plumb.	HVAC:	Comments:

ME STORAGE

Area: 132 sf

Number of People: N/A



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.

UBC Vancouver CIRS | Perkins + Will

UBC Vancouver Earth Sciences | Perkins + Will

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.

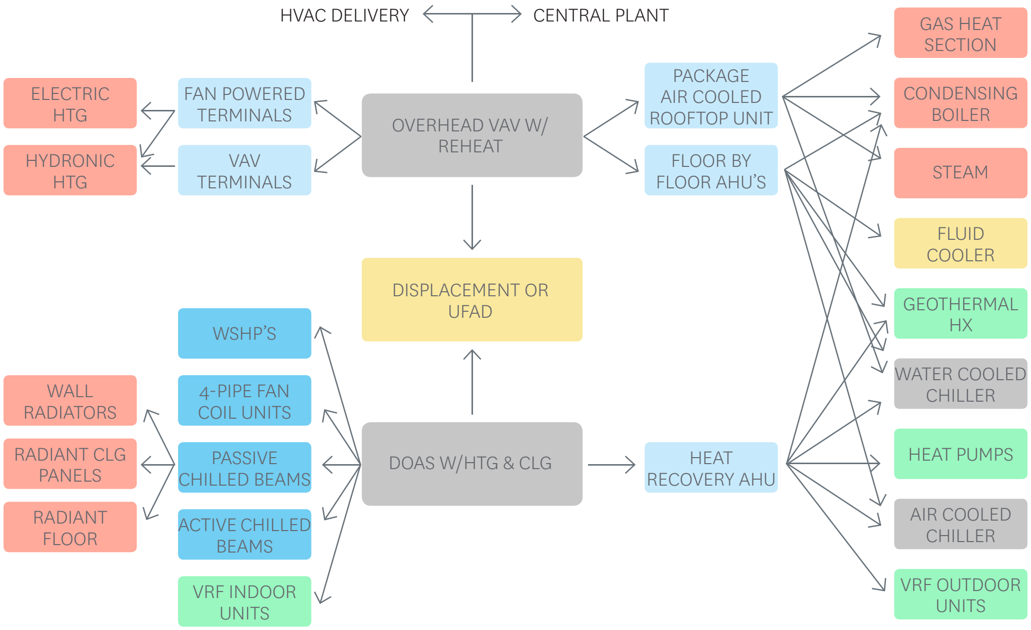
The project has a goal of integrating the performance of the building envelope and systems to optimize both. Options could include insulation beyond code, reduced infiltration, triple pane glass, and any other strategies that help reduce peak mechanical loads and annual energy usage. Passive systems 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.

HVAC SYSTEM OPTIONS + VARIATIONS



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.

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.

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).

4.4.3 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.

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).

4.4.4 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.

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.

TRANSFORMERS:

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.

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.

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 480Y/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.

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 ARMM 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.

4.5.0 Site Analysis

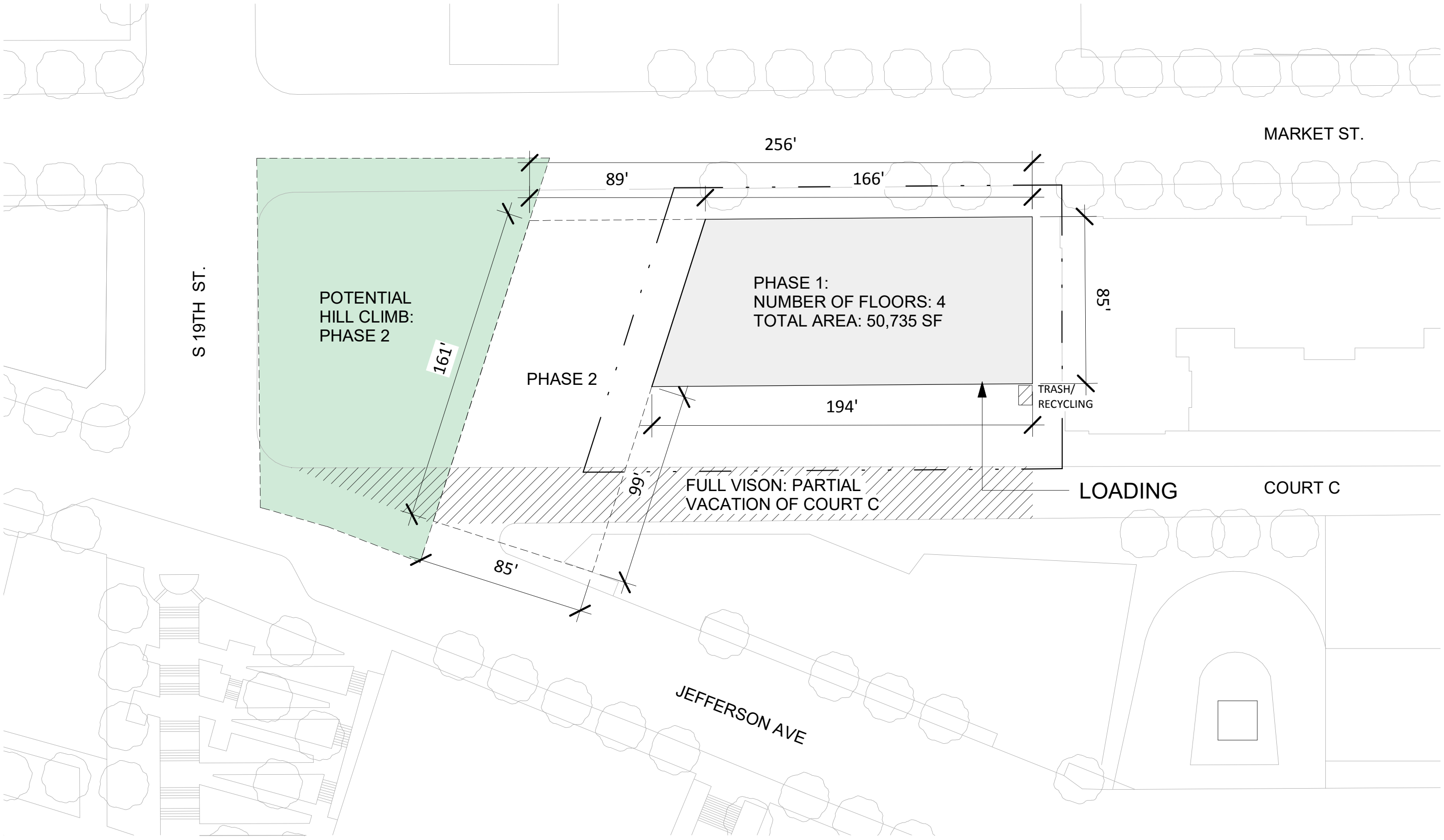
SITE DESCRIPTION

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



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.

LANDSCAPE RELATIONSHIPS

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.

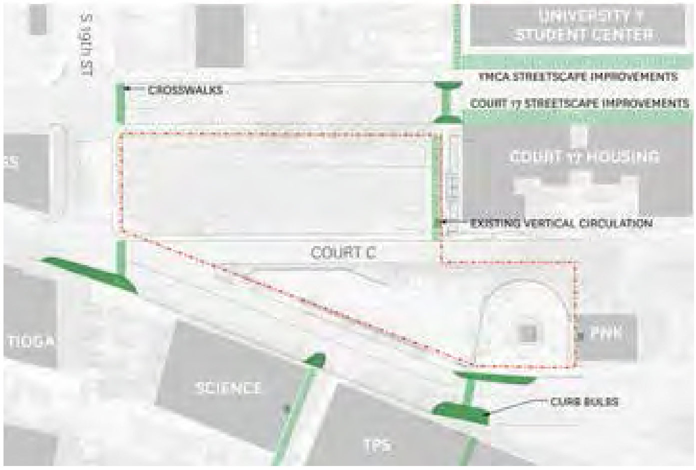
Pedestrian Circulation

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.

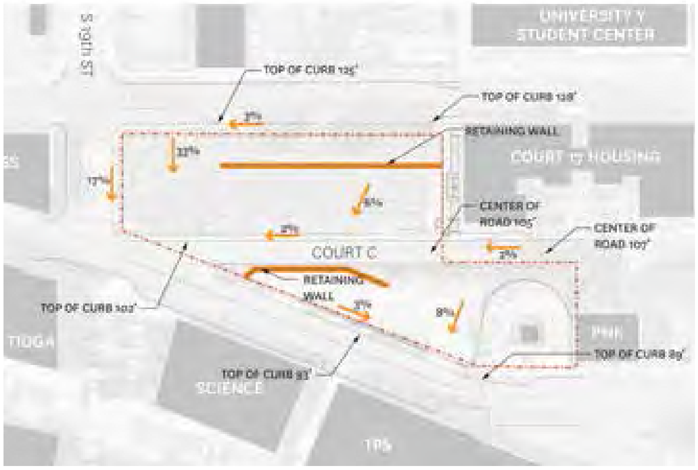
Significant Grade Variation

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.

PEDESTRIAN CIRCULATION



SITE GRADE VARIATION



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.

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.

EARTHWORK QUANTITIES	CUT (cubic yards)	FILL (cubic yards)
Phase 1	4,625	150
Full Vision	5,925	450

PREFERRED ALTERNATIVE SECTIONAL DIAGRAM

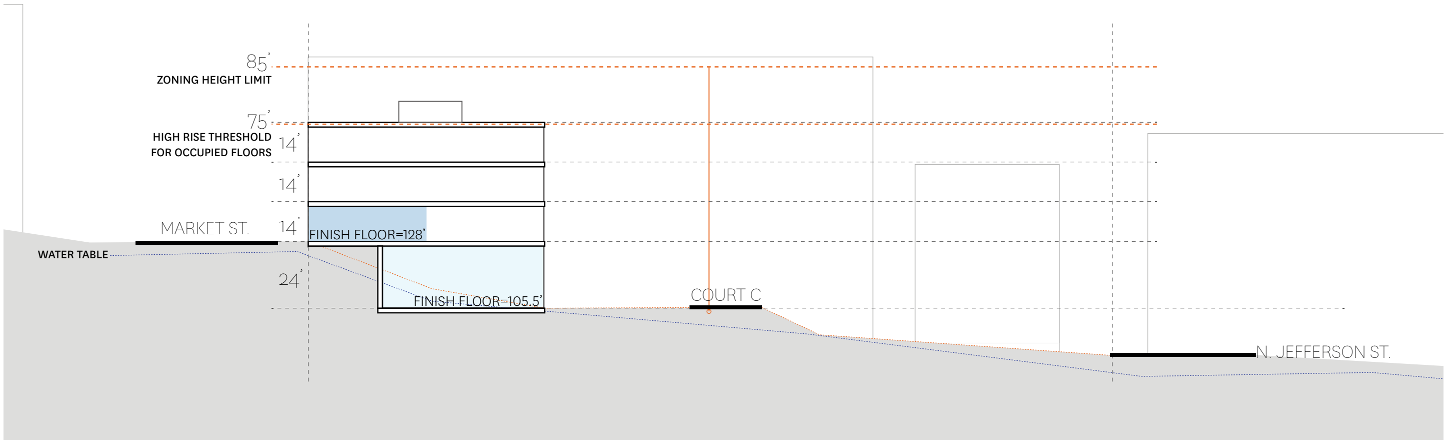


FIGURE 1: EXISTING SLOPE VARIATION DIAGRAM

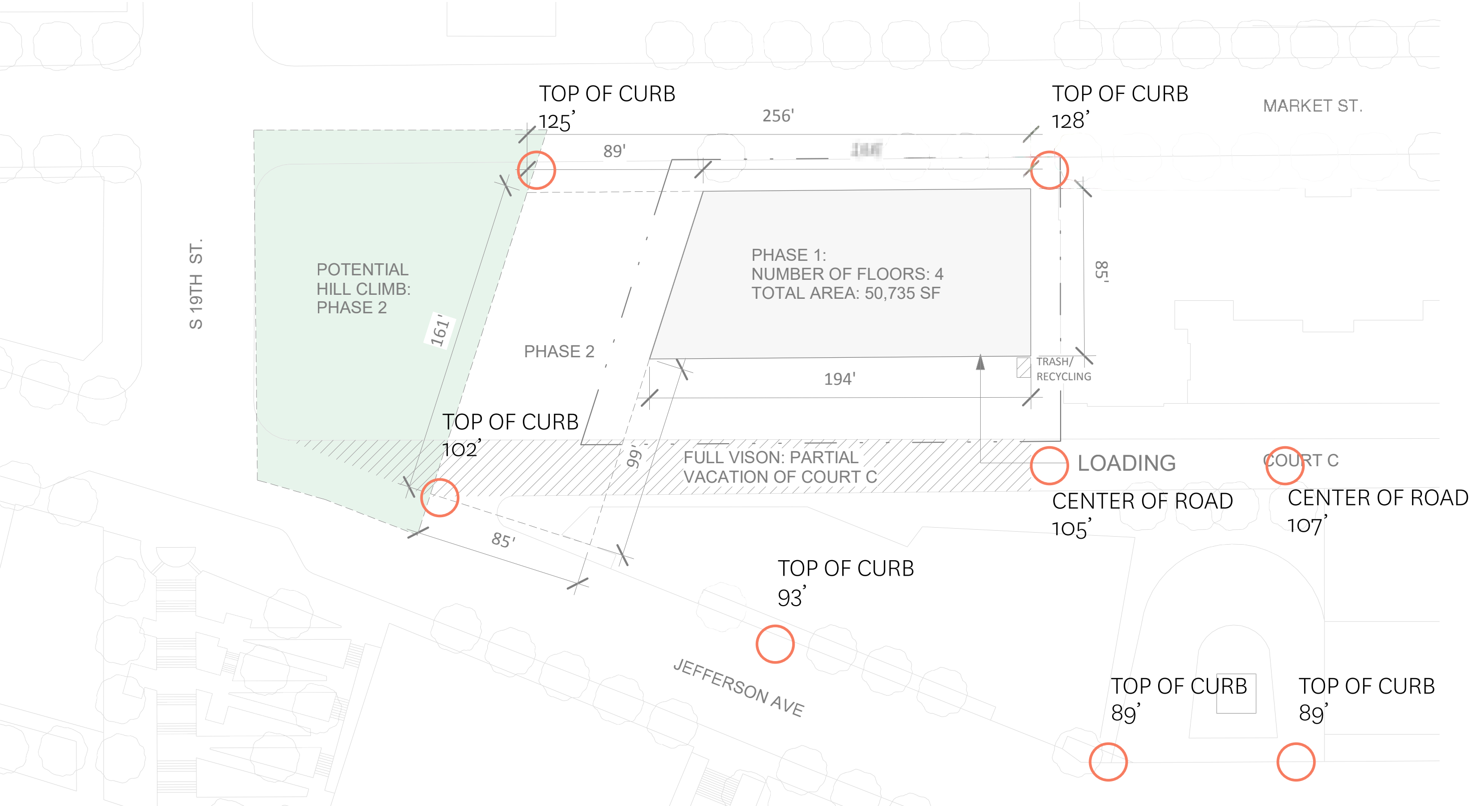
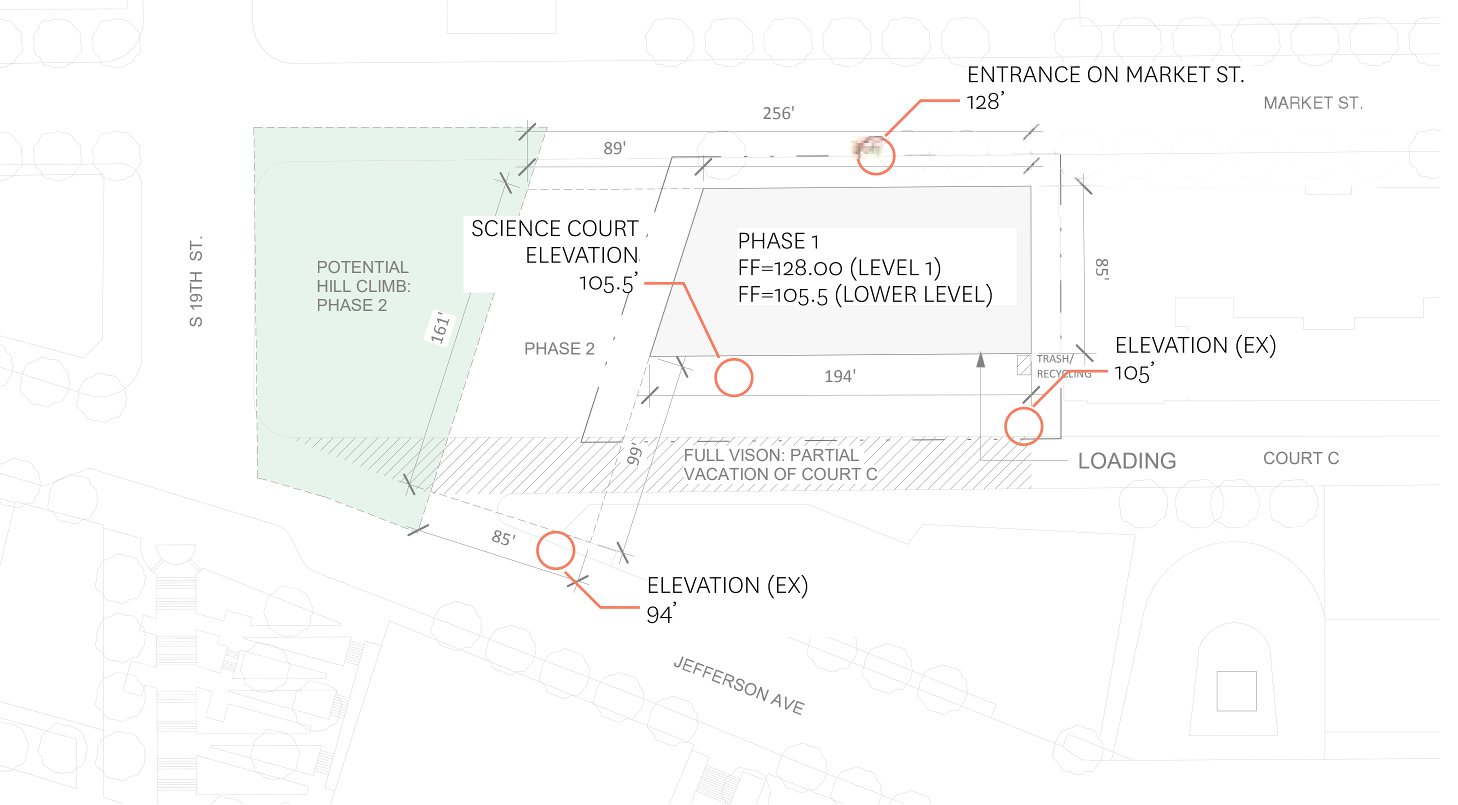


FIGURE 2: POTENTIAL GRADING SOLUTION



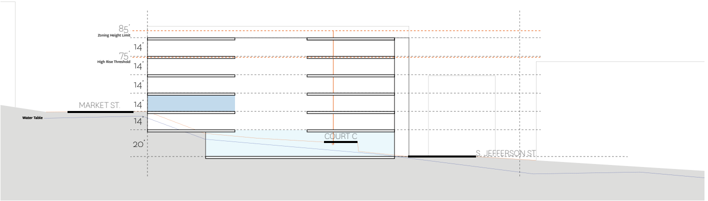
4.5.1 Site Studies

OPTION A: ATRIUM

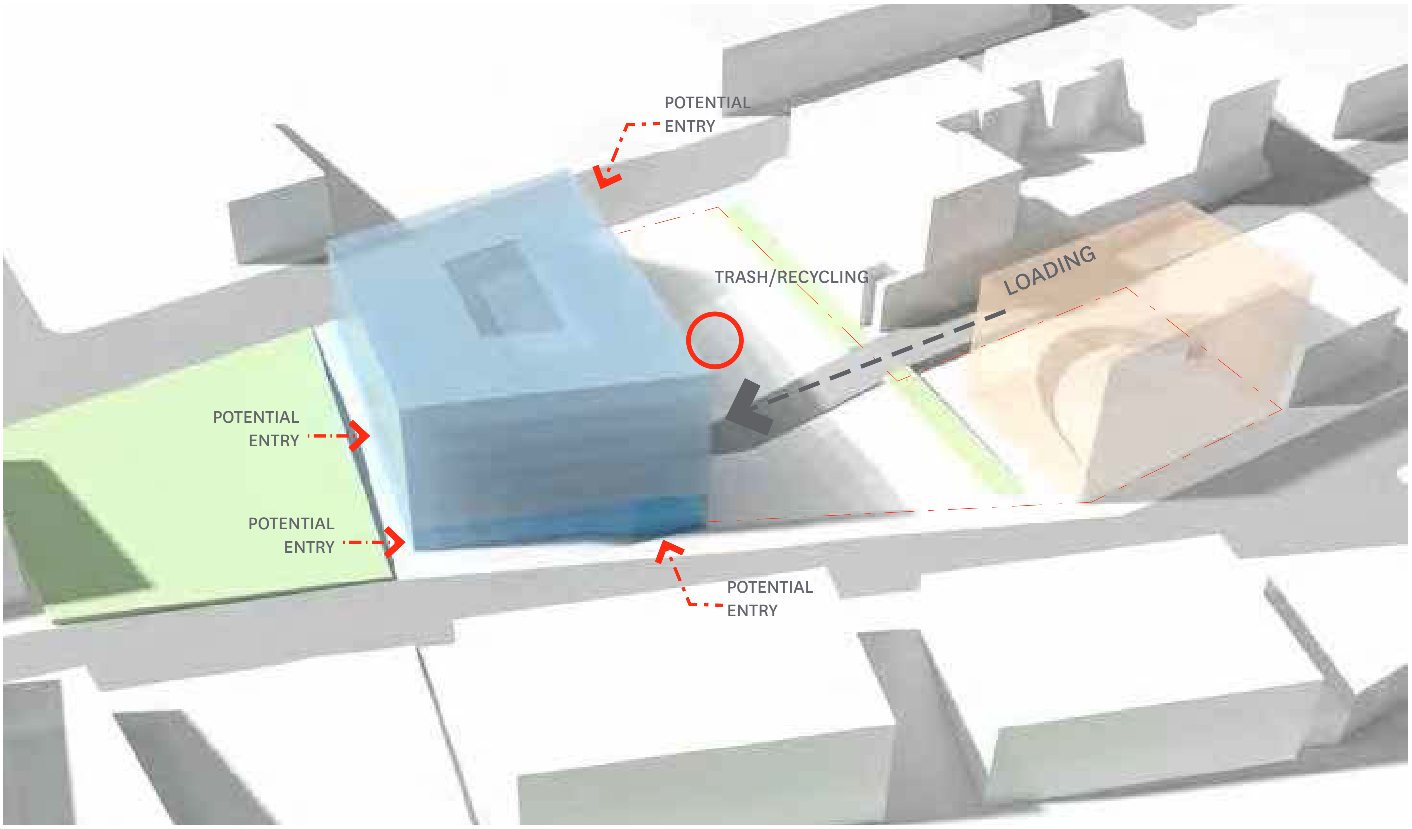
This massing was based on a central collaborative atrium space which could be shared by the Business school and the Engineering programs.

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.

ATRIUM SECTION STUDY



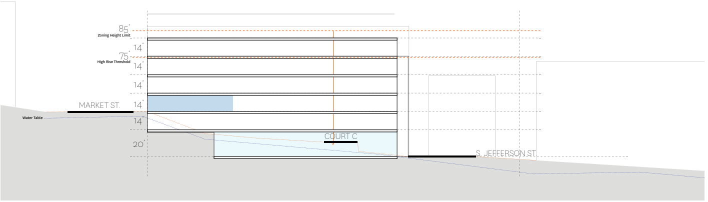
ATRIUM MASSING STUDY



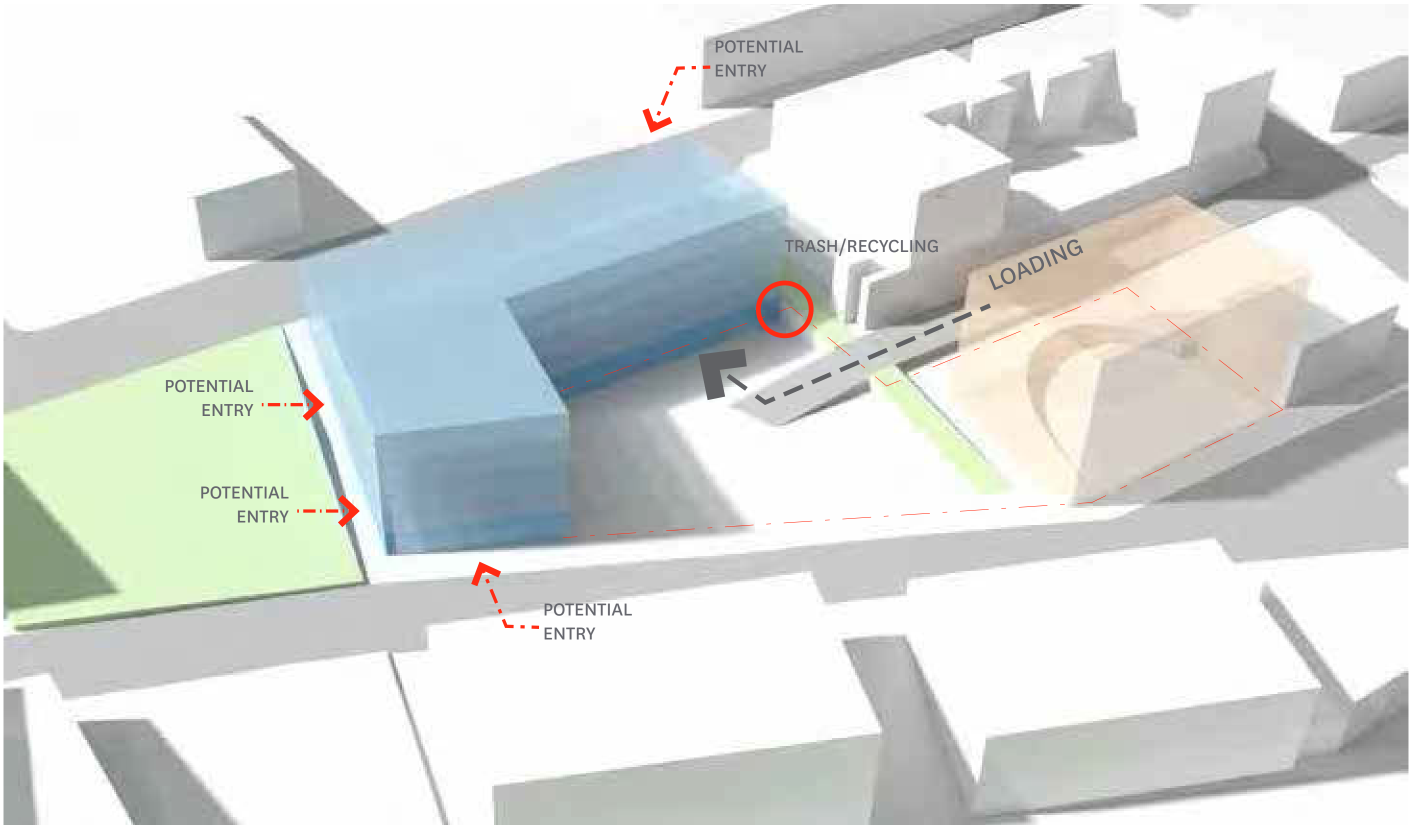
OPTION B: BOOMERANG

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



OPTION C: LEAST SITE INTERVENTION

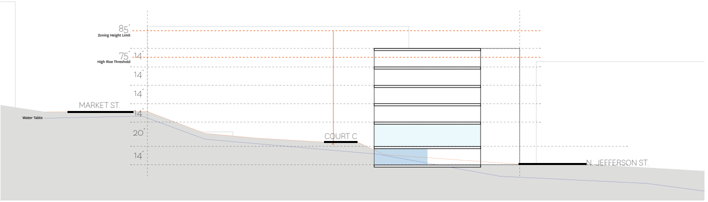
Because this concept was located in the flattest portion of the site it was considered as a potentially less expensive alternative. It would leave space for a future development much like the Boomerang concept on the south and west edges of the site.

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.

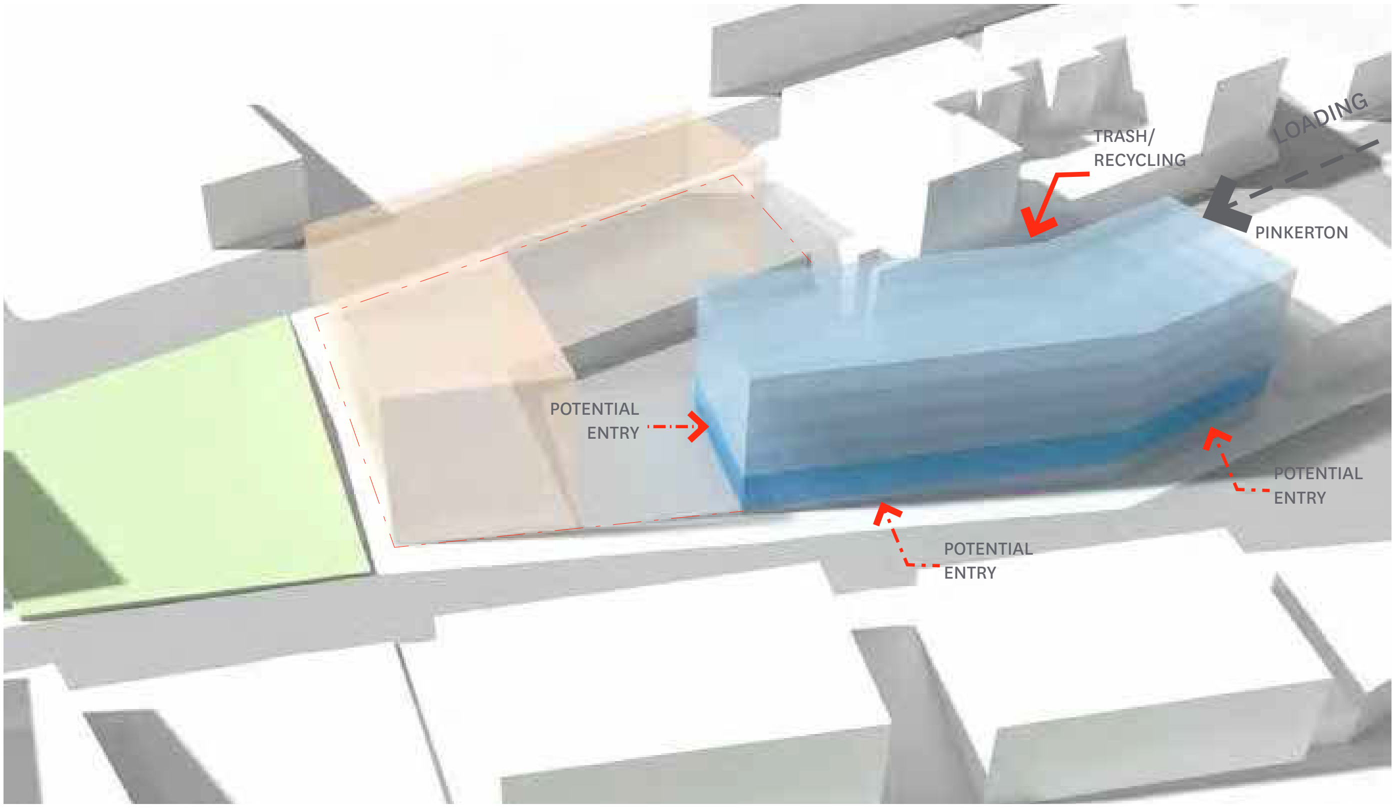
Engineering labs are most practical when located on the same level as the loading access (Court C). This would put the Mechanical Engineering labs with their heavy equipment and materials on an elevated deck, driving up the cost of structure and making vibration isolation much more complicated.

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 SECTION STUDY



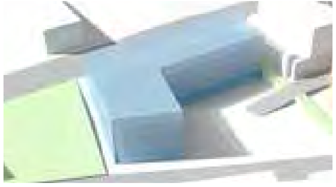
LEAST SITE INTERVENTION MASSING STUDY



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.

Good	
Better	◖
Best	●

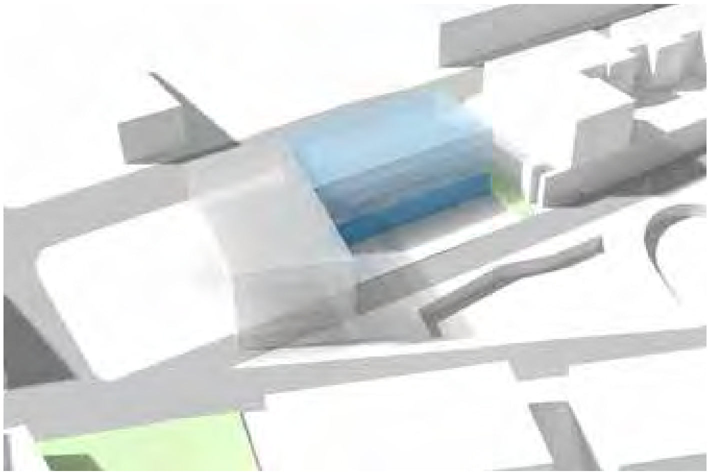
	01 	02 	03 
A. IDENTITY POTENTIAL		●	◖
B. IMPLICATIONS OF SCALE/HEIGHT TOTAL GROUND FLOOR	◖	●	
C. COST: SITE INTERVENTION + BUILDING EFFICIENCY	◖		●
D. PROPORTION/ORIENTATION FOR SUSTAINABILITY + DAYLIGHT	●	◖	
E. COLLABORATION		●	◖
F. POTENTIAL FOR FUTURE DEVELOPMENT	●	◖	
G. QUALITY OF OUTDOOR SPACE	◖	●	
H. COMMERCIAL ENGAGEMENT	◖	●	
I. CAMPUS ENGAGEMENT		●	◖
J. MASTER PLAN + CAMPUS GOALS	◖	●	

SITE PROPOSAL DIAGRAMS

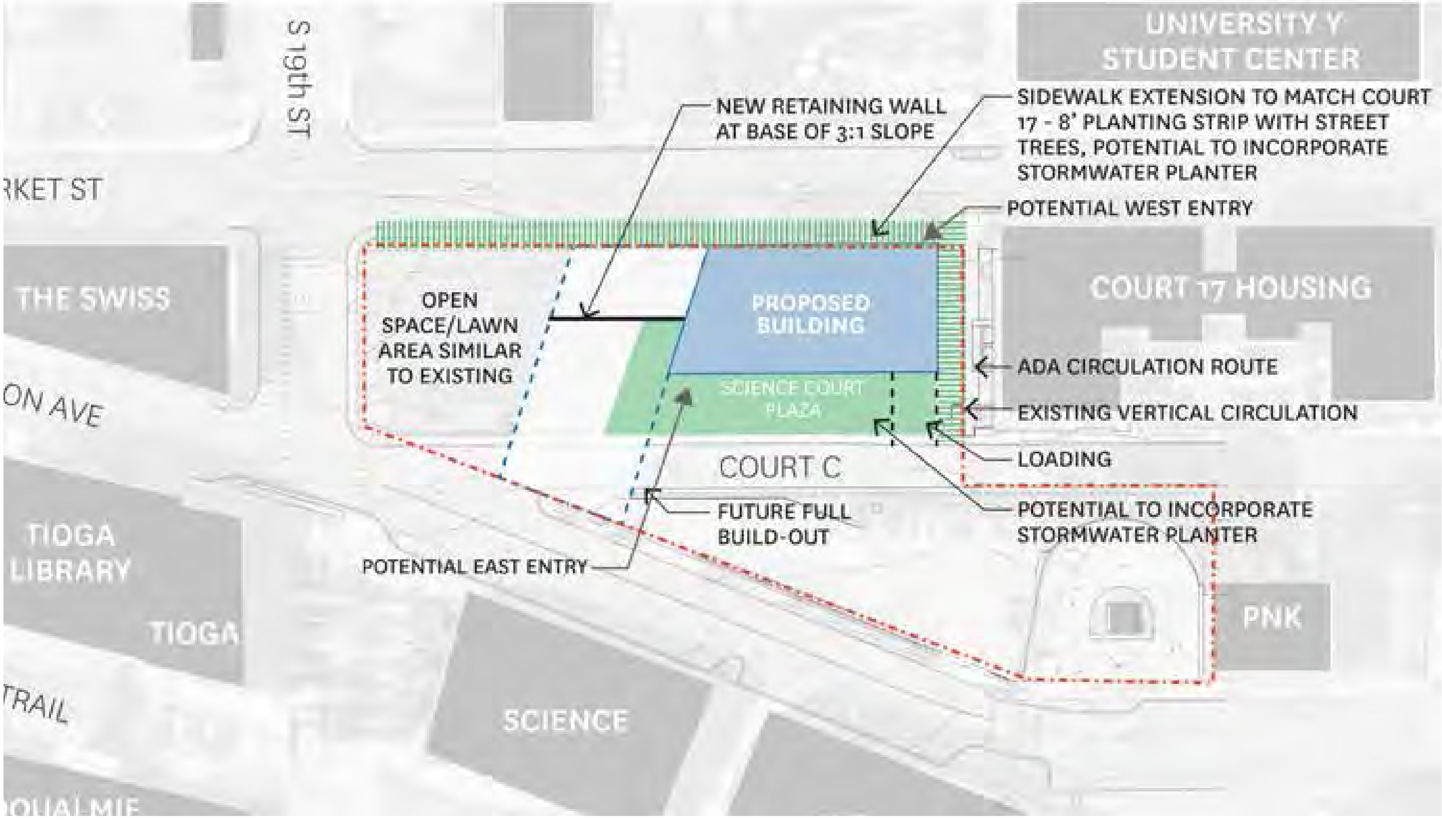
Site - Phase 1

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 MASSING



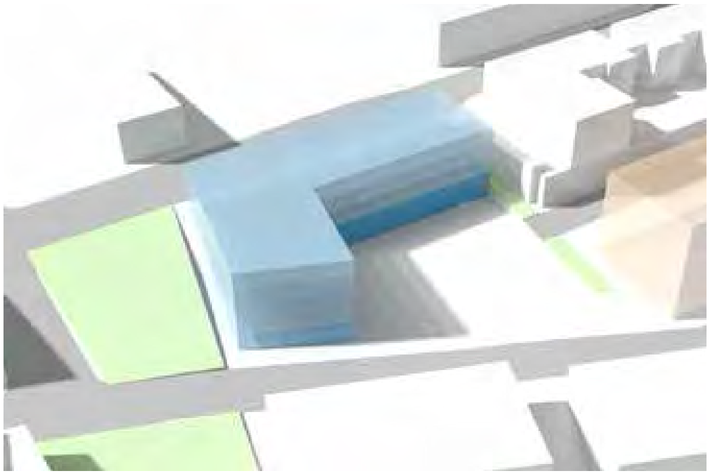
PHASE 1 LANDSCAPE PLAN



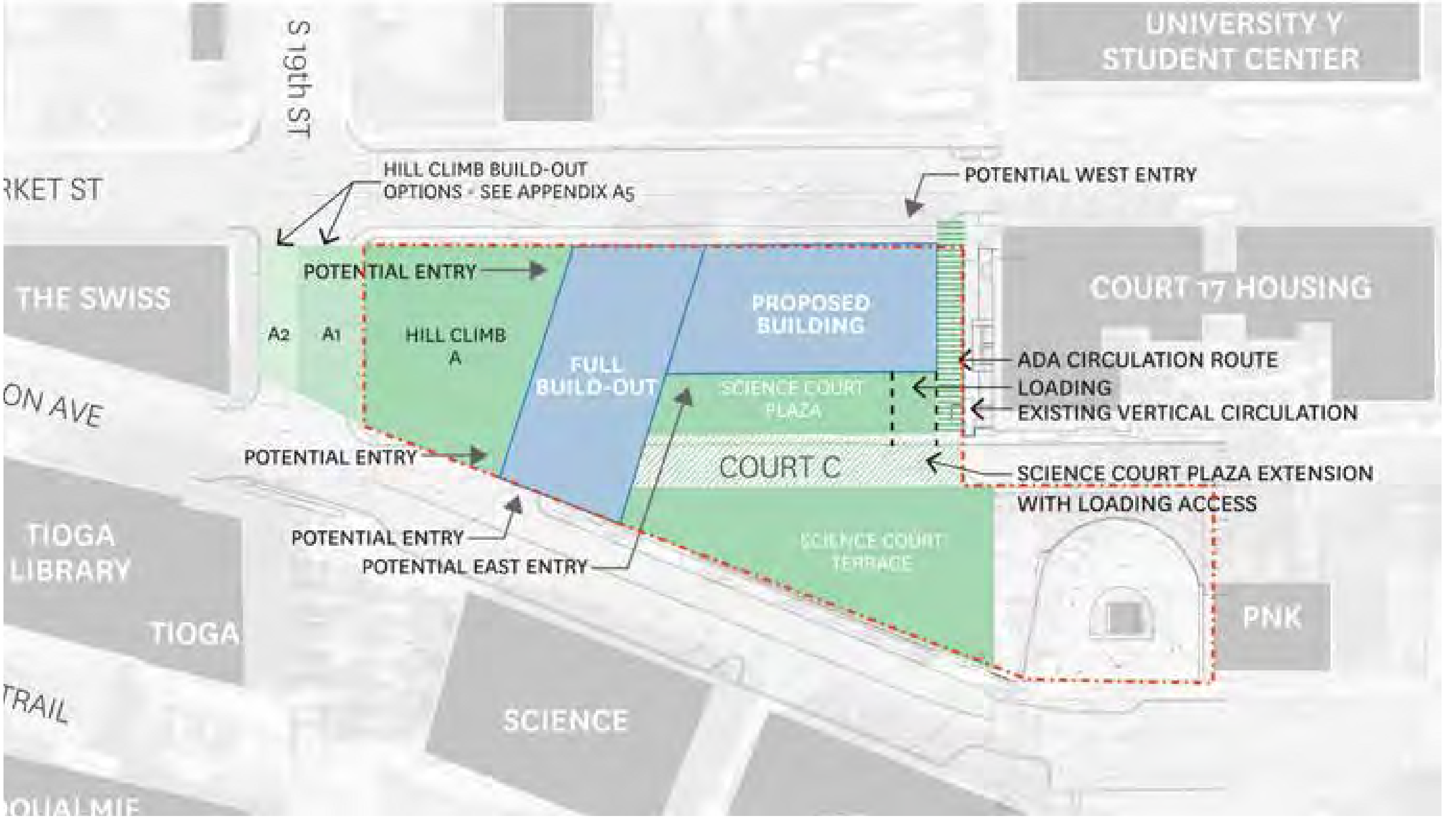
Site - Full Build Out

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 at 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).

FULL BUILD OUT MASSING



FULL BUILD OUT LANDSCAPE PLAN



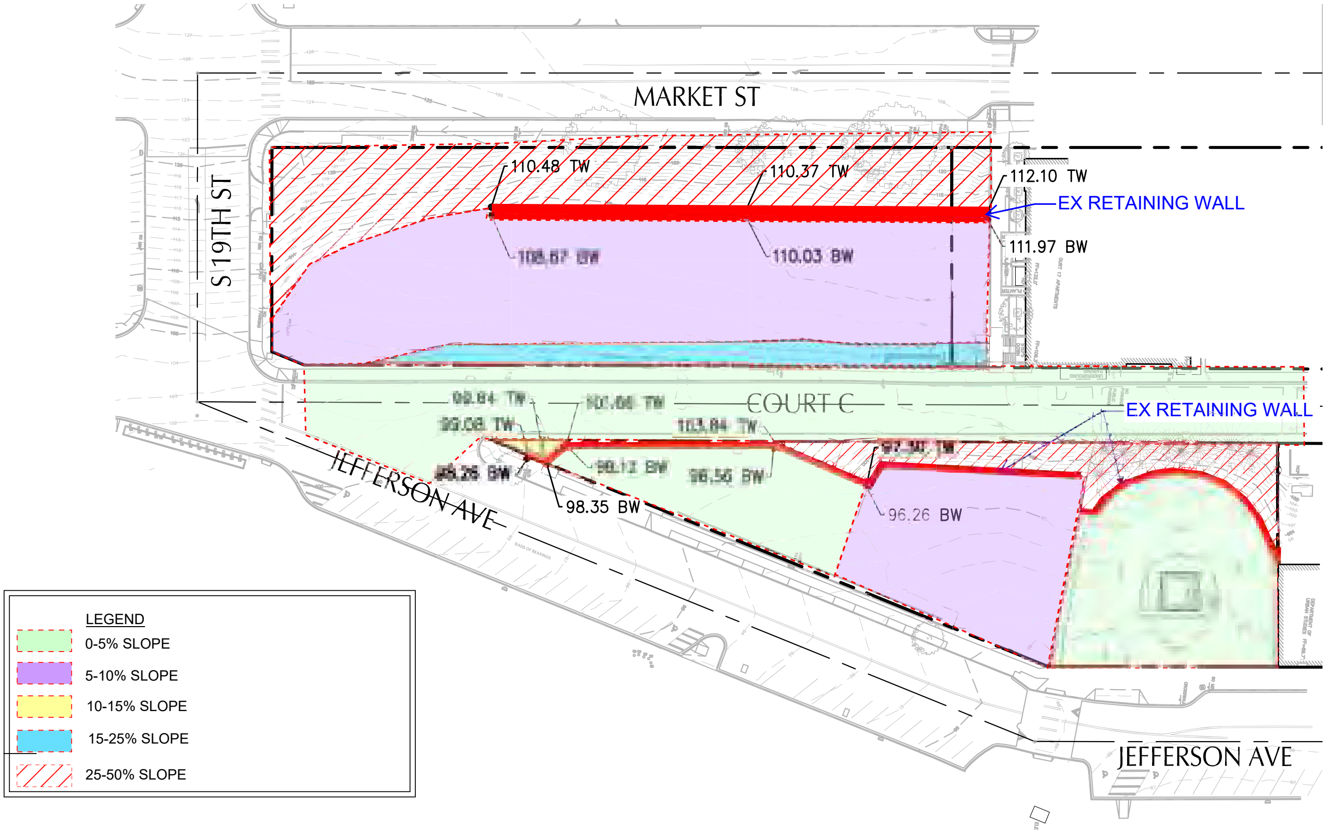
SITE HYDROLOGY

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



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

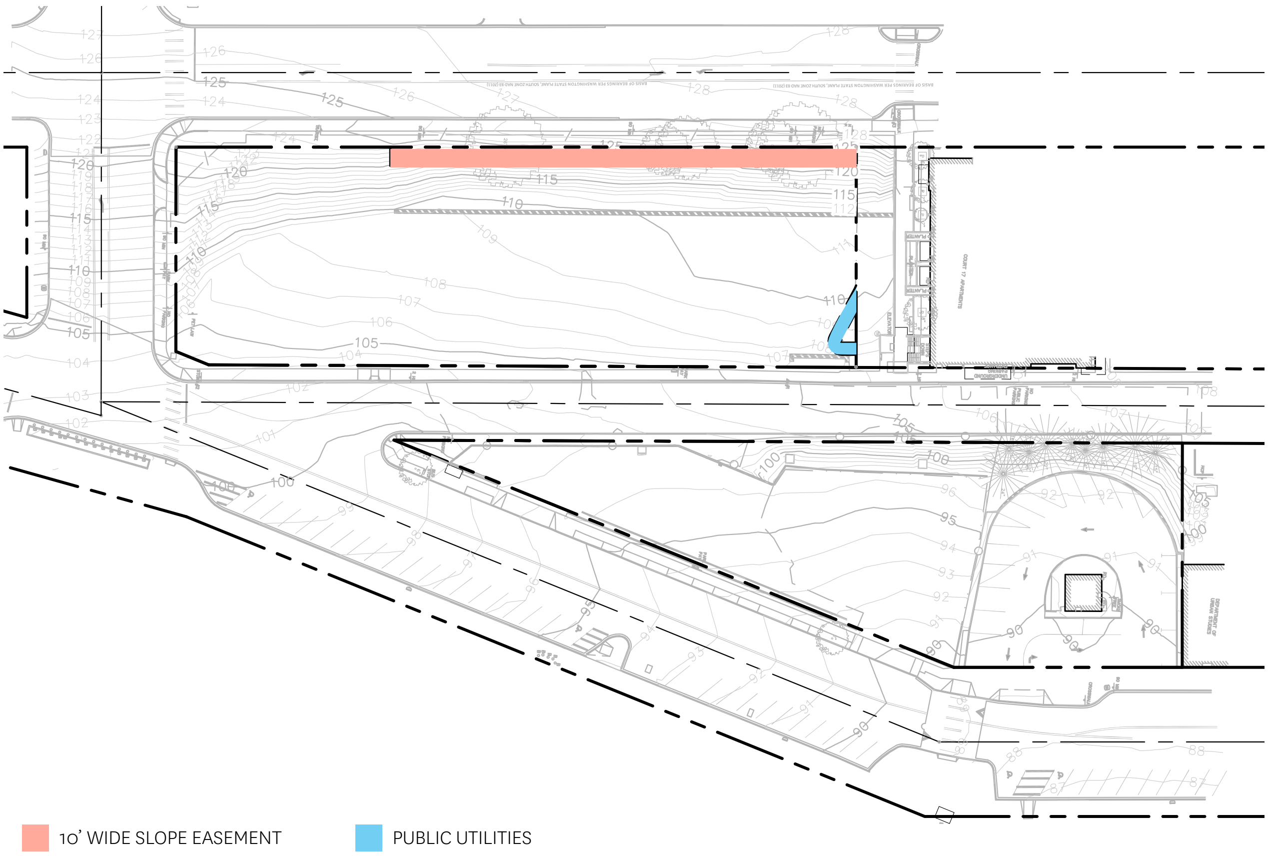
OWNERSHIP OF THE SITE

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.

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.

4.6.0 Master Plan

LONG-TERM PLAN CONSISTENCY

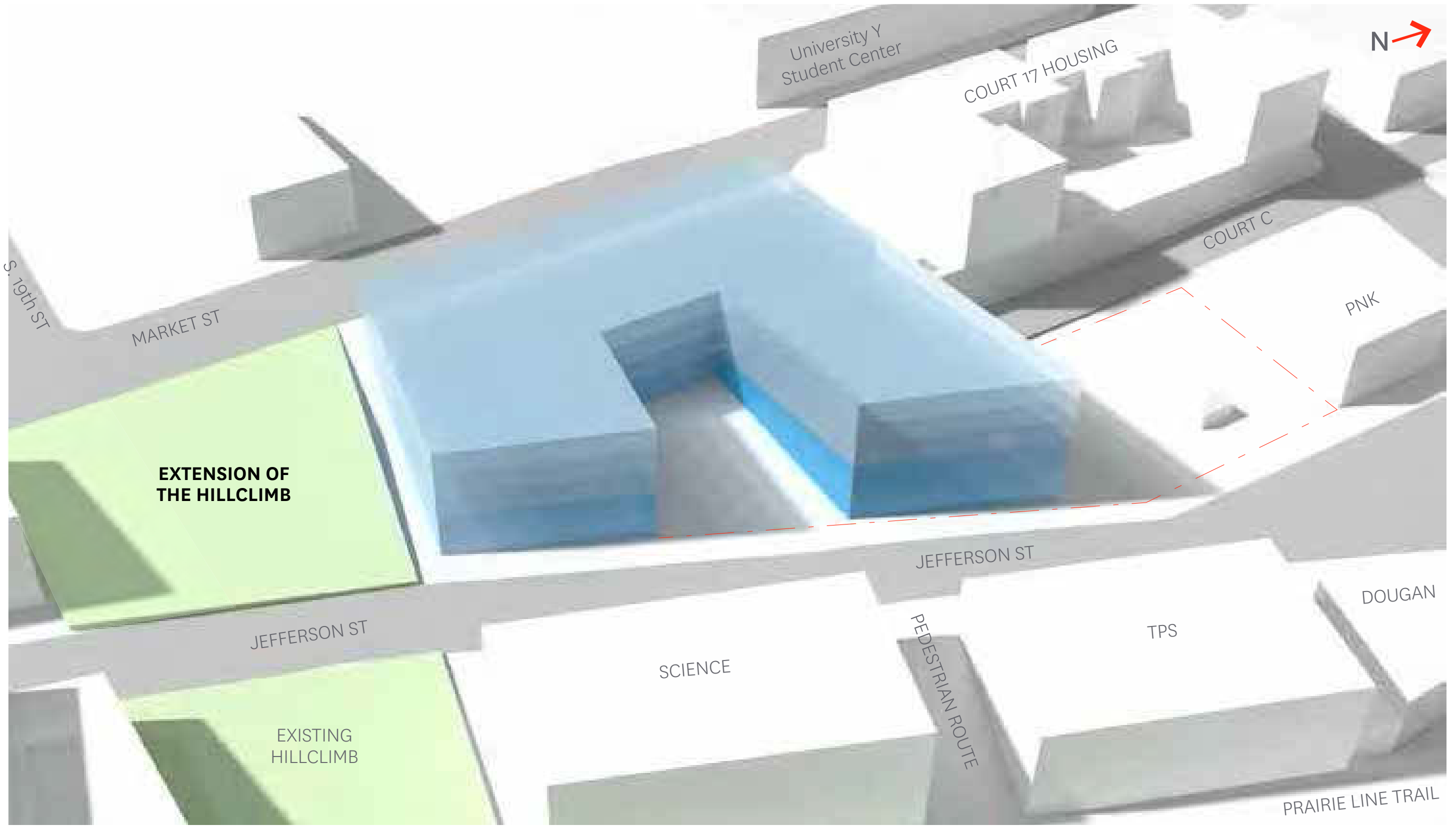
The UW Tacoma Master Plan from 2003 and continuing in 2008-09 planned for development on this proposed site as campus expansion up the hill to the west. The Master Plan massing was intended to continue a strong building edge, consistent with the south façade of the Science Building, for the Hillclimb. 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



2008 MASTER PLAN CAMPUS DEVELOPMENT PLAN | MITHUN

Figure 15 | UW Tacoma Campus Development Plan

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 90.1 – Energy Standard for Buildings except Low-Rise Residential Buildings
- ASHRAE Standard 135 – BACnet, A Data Communication Protocol for Building Automation and Control Networks
- AMCA – Standard 99 (Air Movement and Control Association International, Inc.)
- NEBB – TAB Standards
- SMACNA – Fire and Smoke Damper Installation Guide

- 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
- NFPA 101 – Life Safety Code
- 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

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 36.70ARCW; 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.

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.

4.9.0 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.

4.15.0 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

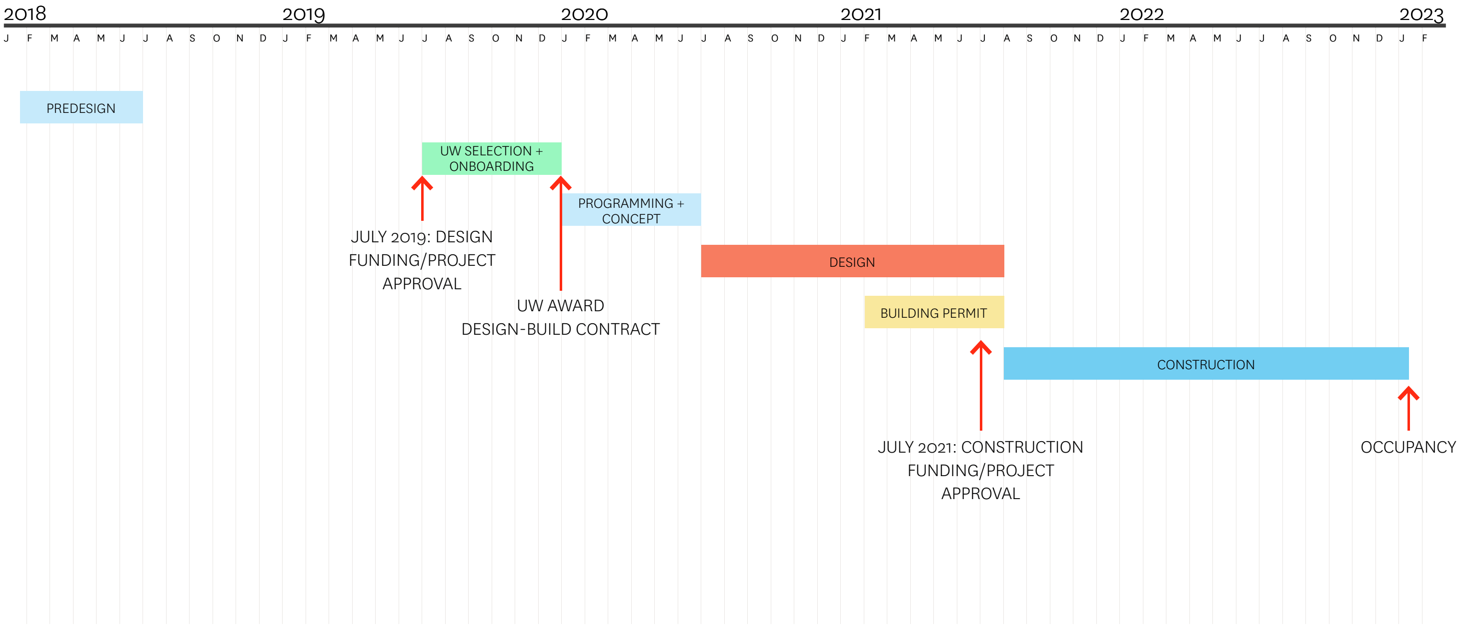
The site identified for the UW Tacoma Academic Innovation Building contains subsurface contaminants, which will require mitigation measures that will need to be employed during design-build. Additional environmental investigations may be necessary prior to selection of the final mitigation measure. The 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



JULY 2019: DESIGN FUNDING/PROJECT APPROVAL

UW AWARD DESIGN-BUILD CONTRACT

JULY 2021: CONSTRUCTION FUNDING/PROJECT APPROVAL

OCCUPANCY

5.0.0

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).

TARGET VALUE BUDGET BREAKDOWN

Uniformat Category	MACC Estimate	MACC Estimate	MACC Estimate	MACC Estimate	MACC Estimate	Low	Average	High	Target Value Budget
	UW Bothell Discovery Hall	**UW CSE II**	**OSU Classroom Building**	**OSU Peavy Hall**	**WSU NPSE**				**Academic Innovation Building (Sloped Site)**
Foundations	$ -	$ 12.64	$ -	$ 18.33	$ -	$ -	$ 6.20	$ 18.33	$ 28.00
Basement Construction	$ 17.05	$ 14.83	$ -	$ 6.52	$ -	$ -	$ 7.68	$ 17.05	$ 19.00
Superstructure	$ 105.50	$ 50.11	$ 174.64	$ 102.64	$ 84.87	$ 50.11	$ 103.55	$ 174.64	$ 64.00
Exterior Enclosure	$ 87.94	$ 72.48	$ 64.18	$ 88.38	$ 76.57	$ 64.18	$ 77.91	$ 88.38	$ 61.00
Roofing	$ 7.34	$ 8.32	$ 4.88	$ 12.67	$ 8.09	$ 4.88	$ 8.26	$ 12.67	$ 8.00
Interior construction	$ 47.54	$ 45.90	$ 73.79	$ 54.17	$ 17.43	$ 17.43	$ 47.77	$ 73.79	$ 30.00
Stairs	$ 9.17	$ 5.93	$ -	$ 4.47	$ 2.15	$ -	$ 4.35	$ 9.17	$ 3.75
Interior finishes	$ 22.85	$ 50.36	$ -	$ 36.44	$ 24.85	$ -	$ 26.90	$ 50.36	$ 29.00
Conveying	$ 9.65	$ 9.52	$ 18.52	$ 3.52	$ 6.06	$ 3.52	$ 9.45	$ 18.52	$ 10.00
Plumbing	$ 34.02	$ 19.43	$ 6.90	$ 13.73	$ 13.37	$ 6.90	$ 17.49	$ 34.02	$ 17.00
HVAC	$ 116.47	$ 90.91	$ 62.32	$ 64.77	$ 54.82	$ 54.82	$ 77.86	$ 116.47	$ 73.50
Fire protection	$ 6.52	$ 6.18	$ 7.46	$ 4.81	$ 5.88	$ 4.81	$ 6.17	$ 7.46	$ 5.25
Electrical	$ 89.52	$ 66.09	$ 53.38	$ 50.74	$ 57.13	$ 50.74	$ 63.37	$ 89.52	$ 57.50
Equipment	$ 23.15	$ 7.40	$ 24.52	$ 11.62	$ 11.82	$ 7.40	$ 15.70	$ 24.52	$ 25.50
Site prep	$ 16.24	$ 7.59	$ -	$ 30.54	$ 6.53	$ -	$ 12.18	$ 30.54	$ 5.00
Site improvements	$ 51.20	$ 20.06	$ 48.27	$ 21.82	$ 12.84	$ 12.84	$ 30.84	$ 51.20	$ 14.00
Site utilities	$ 25.91	$ 2.26	$ -	$ 10.49	$ 4.63	$ -	$ 8.66	$ 25.91	$ 7.00
Escalation, per annum									
Midpoint of construction	$103.03	$ 75.34	$82.85	$82.36	$ 59.51	$ 42.69	$ 80.62	$ 129.55	$ 70.34
Maximum Allowable Construction Cost (MACC)	**$870**	**$ 636**	**$699**	**$695**	**$502**	**$ 360**	**$ 681**	**$ 1,094**	**$ 594**
TCC plus Preconstruction Services	**$972**	**$ 711**	**$782**	**$777**	**$561**	**$ 403**	**$ 761**	**$ 1,222**	**$ 664**
Reference Appendix A3 and the C-100 form for more detail on project cost.									
Total Project Cost	**$972**	**$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

ENCLOSED AREA	COST / sf	TOTAL PROBABLE CONSTRUCTION COST
50,735 sf	$664.22	$33,699,000

PROJECT AREAS

ENCLOSED AREAS	sf
Lower Level	8,735
Level 1	14,000
Level 2	14,000
Level 3	14,000
Roof Level/Penthouse	
Subtotal	**50,735**

COVERED AREAS	sf
Canopies Allowance	750
Subtotal, Covered Area @ 1/2 Value	**375**

TOTAL GROSS FLOOR AREA	**51,110**

5.1.0 Cost Estimate

SUMMARY TABLE OF UNIFORMAT LEVEL II COST ESTIMATES

Total Enclosed Area = 50,735 sf

		Base Bid	
		$/SF	$x1,000
A	Substructure		
A10	Foundations	28.07	1,424
A20	Basement construction	19.08	968
A	**SUBSTRUCTURE**	**47.15**	**2,392**
B	Shell		
B10	Superstructure	63.92	3,243
B20	Exterior enclosure	60.60	3,074
B30	Roofing	7.89	400
B	**SHELL**	**132.40**	**6,718**
C	Interiors		
C10	Interior construction	29.71	1,507
C20	Stairs	3.65	185
C30	Interior finishes	28.51	1,447
C	**INTERIORS**	**61.86**	**3,139**
D	Services		
D10	Conveying systems	9.86	500
D20	Plumbing	17.26	876
D30	Heating, Ventilation and Air Conditioning (HVAC)	73.43	3,725
D40	Fire protection systems	5.24	266
D50	Electrical	57.48	2,917
D	**SERVICES**	**163.27**	**8,284**
E	Equipment and furnishings		
E10	Equipment	19.58	993
E20	Furnishings	5.98	303
E	**EQUIPMENT AND FURNISHINGS**	**25.56**	**1,297**
F	Special construction and demolition		
F10	Special construction	-	-
F20	Selective demolition	-	-
F	**SPECIAL CONSTRUCTION AND DEMOLITION**	**-**	**-**
G	Building sitework		
G10	Site preparation	5.05	256
G20	Site improvements	14.30	725
G30	Site civil/Mechanical utilities	6.90	350
G40	Site electrical utilities	-	-
G90	Other site construction	-	-
G	**BUILDING SITEWORK**	**26.24**	**1,331**

SUMMARY TABLE OF UNIFORMAT LEVEL II COST ESTIMATES

Total Enclosed Area = 50,735 sf

		Base Bid	
SUBTOTAL DIRECT COST		**456.49**	**23,160**
Contingencies			
Design & Estimating Contingency	5.00%	22.82	1,158
Construction/Risk Contingency	0.00%	-	-
Escalation Contingency	15.33%	69.97	3,550
SUBTOTAL SUBCONTRACT COST		**549.28**	**27,868**
General			
NSS/Job Services/Site Logistics	7.50%	41.20	2,090
SUBTOTAL		**41.20**	**2,090**
General			
General Conditions	6.50%	35.70	1,811
Fee	3.50%	20.67	1,049
Preconstruction Fees	0.00%	-	-
SUBTOTAL		**56.37**	**2,860**
SUBTOTAL CONSTRUCTION COST		**646.85**	**32,818**
Permits, Insurances, Bonds & Taxes			
Bid Document Reproduction	0.00%	-	-
GC/CM P&P Bond	1.00%	6.47	328
GL Insurance	1.00%	6.47	328
Builder's Risk Insurance - By UW	0.00%	-	-
Plan Review - EXCLUDED	0.00%	-	-
Permit fees - EXCLUDED	0.00%	-	-
B&O Tax, WA	0.47%	3.05	155
B&O Tax, COS	0.22%	1.39	71
WSST EXCLUDED	EXCLUDED		
TOTAL PROBABLE CONSTRUCTION COST		**664.22**	**33,699**

5.0 Project Budget Analysis

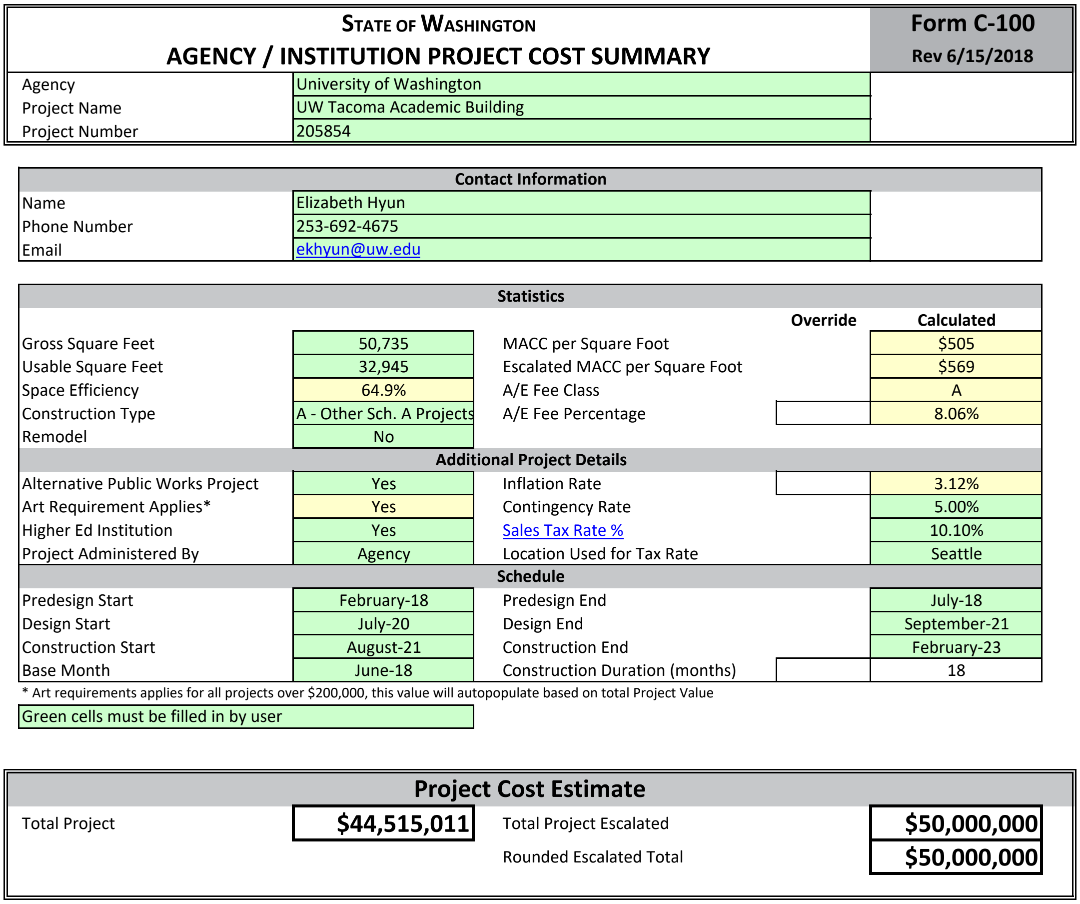
C-100

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

	COSTS
Consultant Services	$4,296,361
Construction Contracts	$41,491,646
Equipment	$1,609,681
Other Costs Including Artwork	$742,408
Project Management	$1,859,904
Total Project Costs	**$50,000,000**



STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Form C-100

Rev 6/15/2018

Agency	University of Washington
Project Name	UW Tacoma Academic Building
Project Number	205854

Contact Information

Name	Elizabeth Hyun
Phone Number	253-692-4675
Email	ekhyun@uw.edu

Statistics

			Override	Calculated
Gross Square Feet	50,735	MACC per Square Foot		$505
Usable Square Feet	32,945	Escalated MACC per Square Foot		$569
Space Efficiency	64.9%	A/E Fee Class		A
Construction Type	A - Other Sch. A Projects	A/E Fee Percentage		8.06%
Remodel	No			

Additional Project Details

Alternative Public Works Project	Yes	Inflation Rate		3.12%
Art Requirement Applies*	Yes	Contingency Rate		5.00%
Higher Ed Institution	Yes	Sales Tax Rate %		10.10%
Project Administered By	Agency	Location Used for Tax Rate		Seattle

Schedule

Predesign Start	February-18	Predesign End		July-18
Design Start	July-20	Design End		September-21
Construction Start	August-21	Construction End		February-23
Base Month	June-18	Construction Duration (months)		18

* Art requirements applies for all projects over $200,000, this value will autopopulate based on total Project Value

Green cells must be filled in by user

Project Cost Estimate

Total Project	**$44,515,011**	Total Project Escalated	**$50,000,000**
		Rounded Escalated Total	**$50,000,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Form C-100
Rev 6/15/2018

Agency	University of Washington
Project Name	UW Tacoma Academic Building
Project Number	205854

Cost Estimate Summary

A. Consultant Services			
Predesign Services	$0		
Basic Services	$0		
Extra Services	$234,477		
Other Services	$303,227		
Design Services Contingency	$104,260		
Design - Build Project Definition Consulting Costs	$0		
Design - Build Consulting Costs	$3,300,000		
Consultant Services Subtotal	**$3,941,964**	**Consultant Services Subtotal Escalated**	**$4,296,361**

B. Construction			
Maximum Allowable Construction Cost (MACC)	$25,599,644	Maximum Allowable Construction Cost (MACC) Escalated	$28,844,618
Other Contracts	$0		$0
GC/CM Items	$0		$0
Design-Build Contractor Costs	$6,251,395		$7,052,199
Management Reserve	$0		$0
Construction Contingencies	$1,279,982	Construction Contingencies Escalated	$1,443,948
Sales Tax	$3,679,533	Sales Tax Escalated	$4,150,881
Construction Subtotal	**$36,810,554**	**Construction Subtotal Escalated**	**$41,491,646**

C. Equipment & Furnishings			
Equipment	$993,000		
Furnishings	$303,000		
Sales Tax	$130,896		
Equipment Subtotal	**$1,426,896**	**Equipment & Furnishings Subtotal Escalated**	**$1,609,681**

D. Project Management			
CPD Management	$1,136,712		
Other Management	$511,993		
Other Costs	$0		
Project Administration Subtotal	**$1,648,705**	**Project Management Subtotal Escalated**	**$1,859,904**

E. Other Costs			
Artwork	$144,223		
Other Costs	$155,770		
In-Plant Services	$46,000		
Utilities/Temporary Facilities	$12,328		
Permits	$255,996		
Builders Risk Insurance	$72,575		
Other Costs Subtotal	**$686,893**	**Other Costs Subtotal Escalated**	**$742,408**

**Blue Italics indicates a Percentage or Amount override was used*

Project Cost Estimate			
Total Project	**$44,515,011**	Total Project Escalated	**$50,000,000**

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

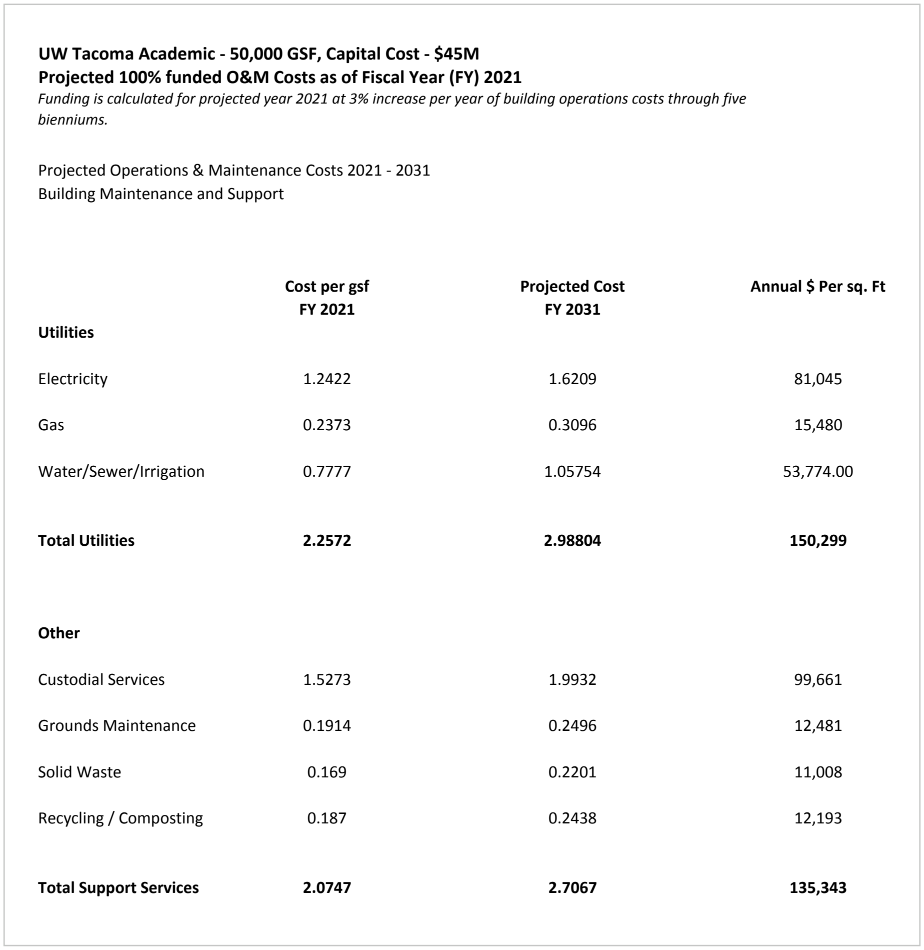
The Academic Innovation Building will have comprehensive operation and maintenance services consistent with those provided across the UW Tacoma campus. Total Costs of Ownership (TCO) funding will come from the University of Washington Tacoma campus operating budget.

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.

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

	Cost per gsf FY 2021	Projected Cost FY 2031	Annual $ Per sq. Ft
Utilities			
Electricity	1.2422	1.6209	81,045
Gas	0.2373	0.3096	15,480
Water/Sewer/Irrigation	0.7777	1.05754	53,774.00
Total Utilities	**2.2572**	**2.98804**	**150,299**
Other			
Custodial Services	1.5273	1.9932	99,661
Grounds Maintenance	0.1914	0.2496	12,481
Solid Waste	0.169	0.2201	11,008
Recycling / Composting	0.187	0.2438	12,193
Total Support Services	**2.0747**	**2.7067**	**135,343**

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.