A1-A10 # Appendix


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A1 Predesign Checklist

- **Executive Summary**
- **Problem Statement, Opportunity or Program Requirement**
  - ☑ Identify the problem, opportunity or program requirement that the project addresses and how it will be accomplished.
  - ☑ Identify and explain the statutory or other requirements that drive the project's operational programs and how these affect the need for space, location or physical accommodations. Include anticipated population projections (growth or decline) and assumptions.
  - ☑ Explain the connection between the agency's mission, goals and objectives; statutory requirements; and the problem, opportunity, or program requirements.
  - ☑ Describe in general terms what is needed to solve the problem.
  - ☑ Include any relevant history of the project, including previous predesigns that did not go forward to design or construction.
- **Analysis of Alternatives (including the preferred alternative)**
  - ☑ Describe all alternatives that were considered, including the preferred alternative. Include:
    - ☑ A no action alternative.
    - ☑ Advantages and disadvantages of each alternative. Please include a high-level summary table with your analysis.
    - ☑ Cost estimates for each alternative.
      - ☑ Provide enough information so decision makers have a general understanding of the costs.
      - ☑ Complete OFM's Life Cycle Cost Model (RCW 39.35B.050).
    - ☑ Schedule estimates for each alternative. Estimate the start, midpoint, and completion dates.
- **Detailed Analysis of Preferred Alternative**
  - ☑ Nature of space – how much of the proposed space will be used for what purpose (i.e., office, lab, conference, classroom, etc.)
  - ☑ Occupancy numbers.
  - ☑ Basic configuration of the building, including square footage and the number of floors.
  - ☑ Space needs assessment. Identify the guidelines used.
  - ☑ Site Analysis
    - ☑ Identify site studies that are completed or under way.
    - ☑ Location.

- ☑ Building footprint and its relationship to adjacent facilities and site features. Provide an aerial view, sketches of the building site, and basic floorplans.
- ☑ Stormwater requirements.
- ☑ Ownership of the site and any acquisition issues.
- ☑ Easements and setback requirements.
- ☑ Potential issues with the surrounding neighborhood, during construction and ongoing.
- ☑ Utility extension or relocation issues.
- ☑ Potential environmental impacts.
- ☑ Parking and access issues, including improvements required by local ordinances, local road impacts, and parking demand.
- ☑ Impact on surroundings and existing development with construction lay-down areas and construction phasing.

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

☑ Consistency with other laws and regulations

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

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

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

☑ Identify planned IT systems that affect the building plans.

☑ Describe planned commissioning to ensure systems function as designed.

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

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

☑ Describe how the project will be managed within the agency.

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

❖ Project Budget Analysis for the Preferred Alternative

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

❖ Predesign Appendix

- ☑ Completed Life Cycle Cost Model.
- ☑ A letter from the Department of Archaeology and Historic Preservation.

A2 DAHP Letter

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

Appendix A3: LIFE CYCLE COST MODEL

A3 Life Cycle Cost Model - Project Summary

Agency	UW-Tacoma
Project Title	Academic Innovation Building

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

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

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

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

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

Ownership Option 3 Description	

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

Ownership Information	**Ownership 1**	**Ownership 2**	**Ownership 3**
Total Gross Square Feet	54,612	50,000	-
Total Rentable Square Feet	50,759	45,000	-
Occupancy Date	9/1/2022	9/1/2023	
Initial Project Costs	$ 241,200	$ 640,000	$ -
Est Construction TPC ($/GSF)	$ 1,342	$ 504	$ -
RSF/Person Calculated	57	50	50

Financial Analysis of Options

	Display Option?	Yes	Yes	Yes	No	No	Yes	No
	Financial Comparisons	**Existing Lease**	**Lease 1**	**Lease 2**	**Ownership 1**			
Years	**Financing Means**	**Current**	**Current**	**Current**	**GO Bond**	**COP**	**COP Deferred ***	**63-20**
0	0 Year Cumulative Cash	$ -	$ -	$ -			$ -	
	0 Year Net Present Value	$ -	$ -	$ -			$ -	
	Lowest Cost Option (Analysis Period)							

	Financial Comparisons	**Existing Lease**	**Lease 1**	**Lease 2**	**Ownership 1**			
Years	**Financing Means**	**Current**	**Current**	**Current**	**GO Bond**	**COP**	**COP Deferred ***	**63-20**
30	30 Year Cumulative Cash	$ -	$ 104,868,238	$ 93,763,959			$ 130,024,039	
	30 Year Net Present Value	$ -	$ 97,667,902	$ 86,915,107			$ 122,872,592	
	Lowest Cost Option (30 Years)		**3**	**2**			**4**	

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

	Financial Comparisons	**Existing Lease**	**Lease 1**	**Lease 2**	**Ownership 1**			
Years	**Financing Means**	**Current**	**Current**	**Current**	**GO Bond**	**COP**	**COP Deferred ***	**63-20**
50	50 Year Cumulative Cash	$ -	$ 238,334,628	$ 224,922,750			$ 184,117,814	
	50 Year Net Present Value	$ -	$ 209,163,778	$ 196,483,248			$ 168,067,205	
	Lowest Cost Option (50 Years)		**4**	**3**			**2**	

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

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

Financial Analysis of Options

	Display Option?	No	No	Yes	No	No	No	Yes	No
	Financial Comparisons	**Ownership 2**				**Ownership 3**			
Years	**Financing Means**	**GO Bond**	**COP**	**COP Deferred**	**63-20**	**GO Bond**	**COP**	**COP Deferred**	**63-20**
0	0 Year Cumulative Cash			$ -				$ -	
	0 Year Net Present Value			$ -				$ -	
	Lowest Cost Option (Analysis Period)								

	Financial Comparisons	**Ownership 2**				**Ownership 3**			
Years	**Financing Means**	**GO Bond**	**COP**	**COP Deferred**	**63-20**	**GO Bond**	**COP**	**COP Deferred**	**63-20**
30	30 Year Cumulative Cash			$ 83,628,082				$ -	
	30 Year Net Present Value			$ 78,804,054				$ -	
	Lowest Cost Option (30 Years)			**1**					

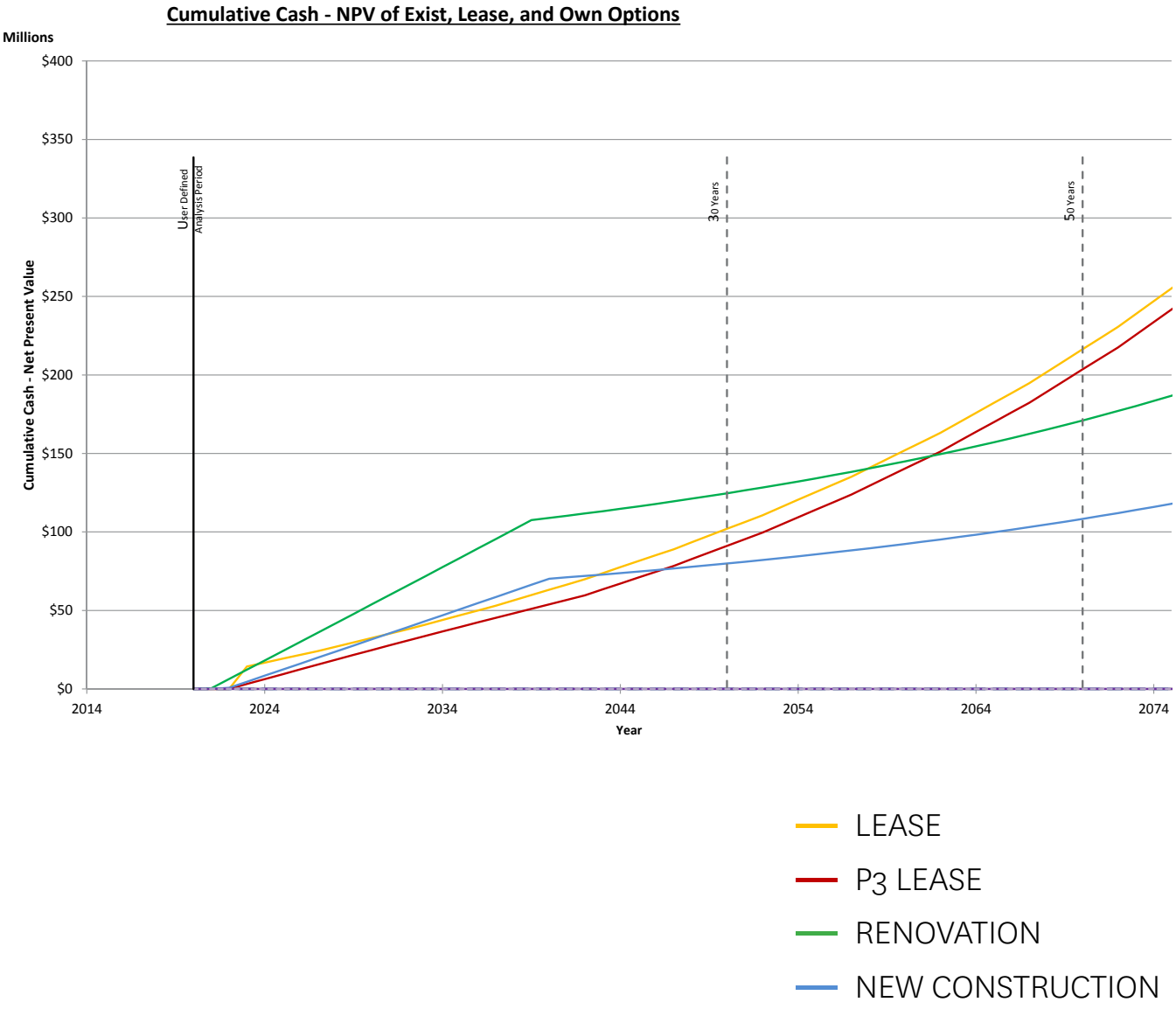
The best NPV result for the 30 year analysis period is the Ownership 2 option using COP Deferred financing. This option becomes the best financial alternative in 2024.

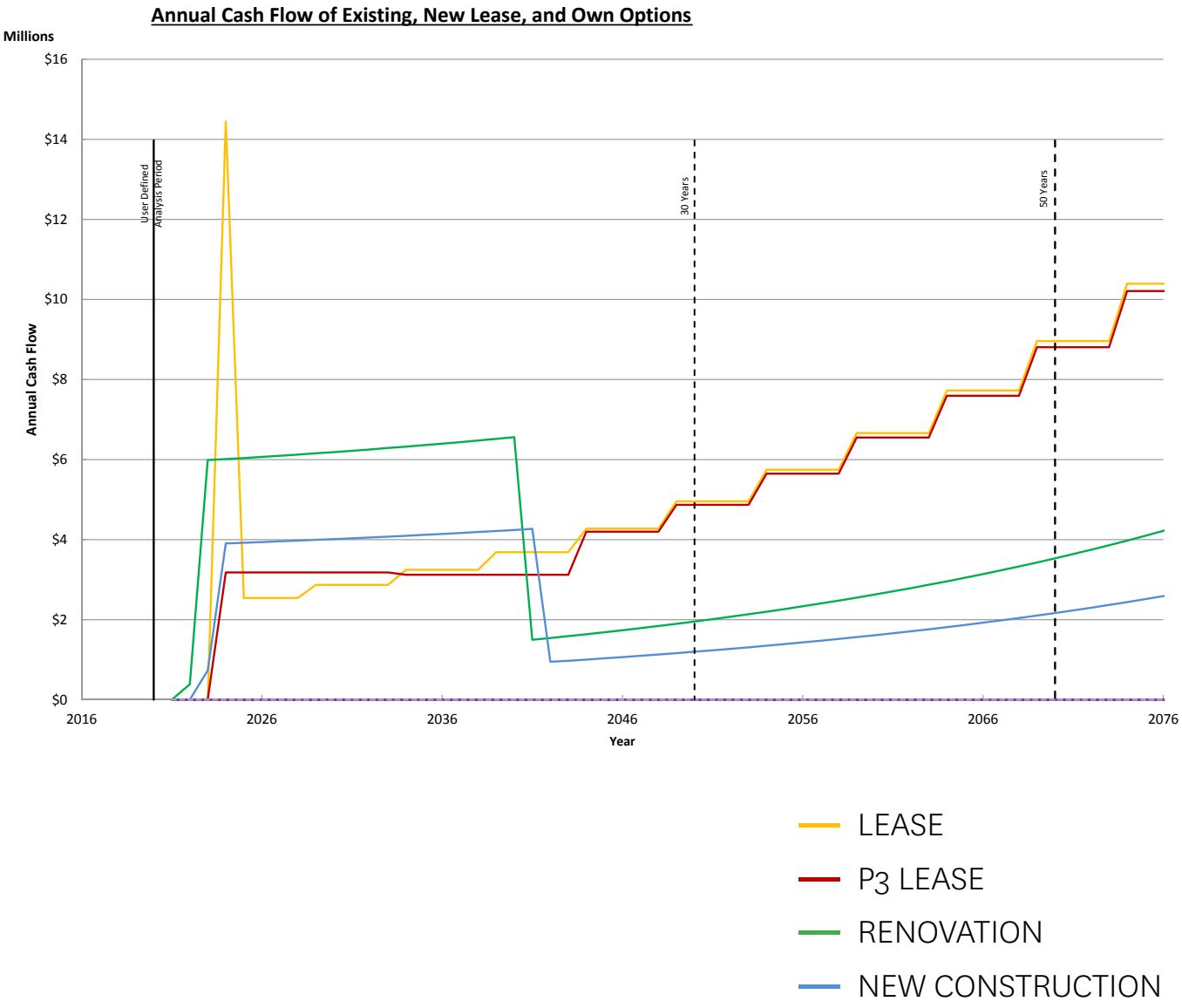
	Financial Comparisons	**Ownership 2**				**Ownership 3**			
Years	**Financing Means**	**GO Bond**	**COP**	**COP Deferred**	**63-20**	**GO Bond**	**COP**	**COP Deferred**	**63-20**
50	50 Year Cumulative Cash			$ 116,802,041				$ -	
	50 Year Net Present Value			$ 106,520,445				$ -	
	Lowest Cost Option (50 Years)			**1**					

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

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

Appendix A3: LIFE CYCLE COST MODEL




Annual Cash Flow of Existing, New Lease, and Own Options
Millions
$16
$14
$12
$10
$8
$6
$4
$2
$0
Annual Cash Flow
User Defined Analysis Period
30 Years
50 Years
2016
2026
2036
2046
2056
2066
2076
Year
LEASE
P3 LEASE
RENOVATION
NEW CONSTRUCTION

Appendix A3: LIFE CYCLE COST MODEL

Financial Assumptions

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

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

	Lease Options			Ownership Option 1		
	Existing Lease	**Lease Option 1**	**Lease Option 2**	**GO Bond**	**COP**	**63-20**
Inflation / Interest Rate	3.006%	3.006%	3.006%	3.160%	3.460%	3.660%
Discount Rate	0.441%	0.441%	0.441%	0.441%	0.441%	0.441%
Length of Financing	N/A	N/A	N/A	20	20	20

	Ownership Option 2			Ownership Option 3		
	GO Bond	**COP**	**63-20**	**GO Bond**	**COP**	**63-20**
Inflation / Interest Rate	3.160%	3.460%	3.660%	3.160%	3.510%	3.710%
Discount Rate	0.441%	0.441%	0.441%	0.441%	0.441%	0.441%
Length of Financing	20	20	20	20	20	20

See Financial Assumptions tab for more detailed information

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

New Lease Assumptions

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

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

IT infrastructure is estimated at $351.17 per person.

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

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

Default Ownership Options Assumptions

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

Assumes surface parking.

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

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

See the Capital Construction Defaults tab for more construction assumptions.

Appendix A3: LIFE CYCLE COST MODEL

A4 Owner's Project Requirements

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

Predesign Phase

07/17/18

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

Prepared by:

UW Capital Projects and Development

For:

University of Washington Tacoma

Sustainability: It's in our nature.

UWT Academic Innovation Building– Owner's Project Requirements

Introduction

Purpose

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

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

- UW Facilities Services Design Guide: https://facilities.uw.edu/catalog/fsdg
- UW Building Services Design Guide: https://facilities.uw.edu/files/media/fsdg-bsd-design-guide.pdf

UWT Facilities Services Supplemental to FS Design Guide – Update 02/22/18

- WA State Office of Financial Management Predesign Manual: https://www.ofm.wa.gov/sites/default/files/public/legacy/budget/instructions/predesign/2016predesignmanual.pdf

Versions and updates

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

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

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

Abbreviations

BECx	Building Envelope Commissioning
BOD	Basis of Design
Cx	Commissioning
CxA or CxP	Commissioning Authority or Commissioning Professional
LEED	Leadership for Energy and Environmental Design – a green building rating system
OPR	Owner's Project Requirements

UWT Academic Innovation Building– Owner's Project Requirements

General Project Information

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

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

Project Team Members (for Predesign)

Client Group:	University of Washington Tacoma (UWT)
Owner's PM:	Elizabeth Hyun
Architect:	Hacker
Mechanical Engineer:	PAE
Electrical Engineer:	PAE
Civil Engineer:	PAE

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

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

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

Site and Context

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

Project Description

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

UWT Academic Innovation Building– Owner's Project Requirements

General Operational and Occupancy Expectations

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

Building Life and Flexibility

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

First and Life Cycle Cost Requirements

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

UWT Academic Innovation Building– Owner's Project Requirements

Project Goals, Objectives, Performance Metrics and Standards

High Level Goals

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

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

Objectives and Performance Targets

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

Energy

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

LEED Certification

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

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

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

UWT Academic Innovation Building– Owner's Project Requirements

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

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

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

Design Process Expectations

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

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

The LEED credit for a Site Assessment is also a required credit and should be included in the early design scope.

UWT Academic Innovation Building– Owner's Project Requirements

Design Standards

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

Construction Standards

Construction Activity Pollution Prevention

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

Construction Waste Management

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

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

Indoor Air Quality During Construction

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

Engage a firm to conduct air quality testing to verify building indoor air quality before occupancy and earn two points for the Indoor Air Quality Assessment credit in LEED. See the LEED credit for detailed requirements of testing conditions and thresholds for passing.

UWT Academic Innovation Building– Owner's Project Requirements

Commissioning, Training, Operations, and Maintenance Requirements Standards

Commissioning

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

Post-Occupancy LEED requirements

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

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

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

Training and Building User Engagement

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

A5 Predesign Process Documents

VISION CARD EXERCISE

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

The overall vision the group developed was as follows:

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

CURRENT

UW Tacoma currently is...

DIVERSE

Young ideals, still easily distinguishable

GROWING

Young, growing University

URBAN

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

COMMUTER CAMPUS

Access to the campus is challenging

SUSTAINABLE

Dedicated to sustainability, LEED/ ENERGY

IDEA-DRIVEN

Ideas are continually launching all over campus

FUTURE

The future of UW Tacoma is...

DIVERSE

Develop diversity so that differences are invisible and non-distinguishable

UNIQUE

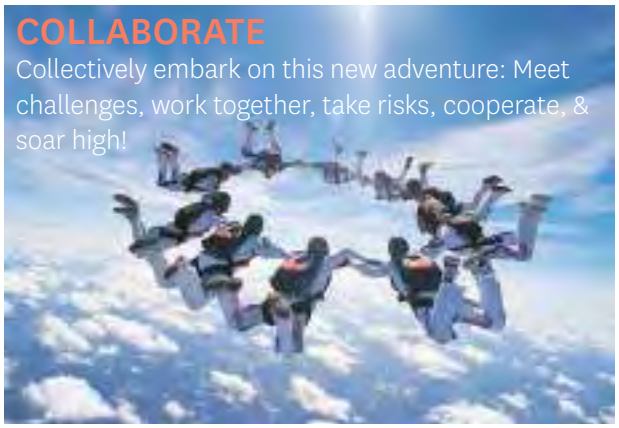
Future potential to become a positive beacon for students; Stand out from other universities

FEED + EDUCATE

Feed and educate through diversity; Nurture developing population+ urban market,

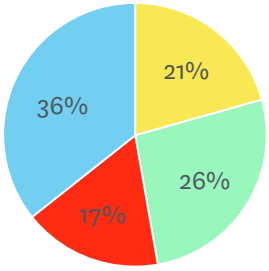
COLLABORATE

Collectively embark on this new adventure: Meet challenges, work together, take risks, cooperate, & soar high!



COSTING OPTIONS

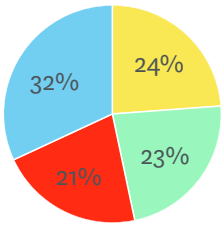
Following up on program prioritization, costing options were presented at workshop 6.



01

FULL PROGRAM

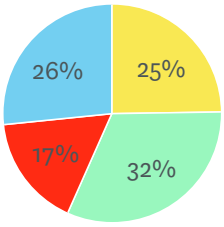
128,000 GSF
$129,000,000



02

PRIORITIZE PROGRAM

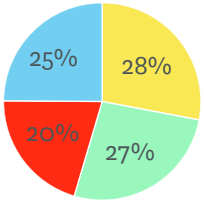
101,000 GSF
$99,000,000



03

RE-LOCATE CIVIL ENGINEERING

107,000 GSF
$104,000,000



04

PRIORITIZE + RE-LOCATE CIVIL

86,000 GSF
$82,000,000

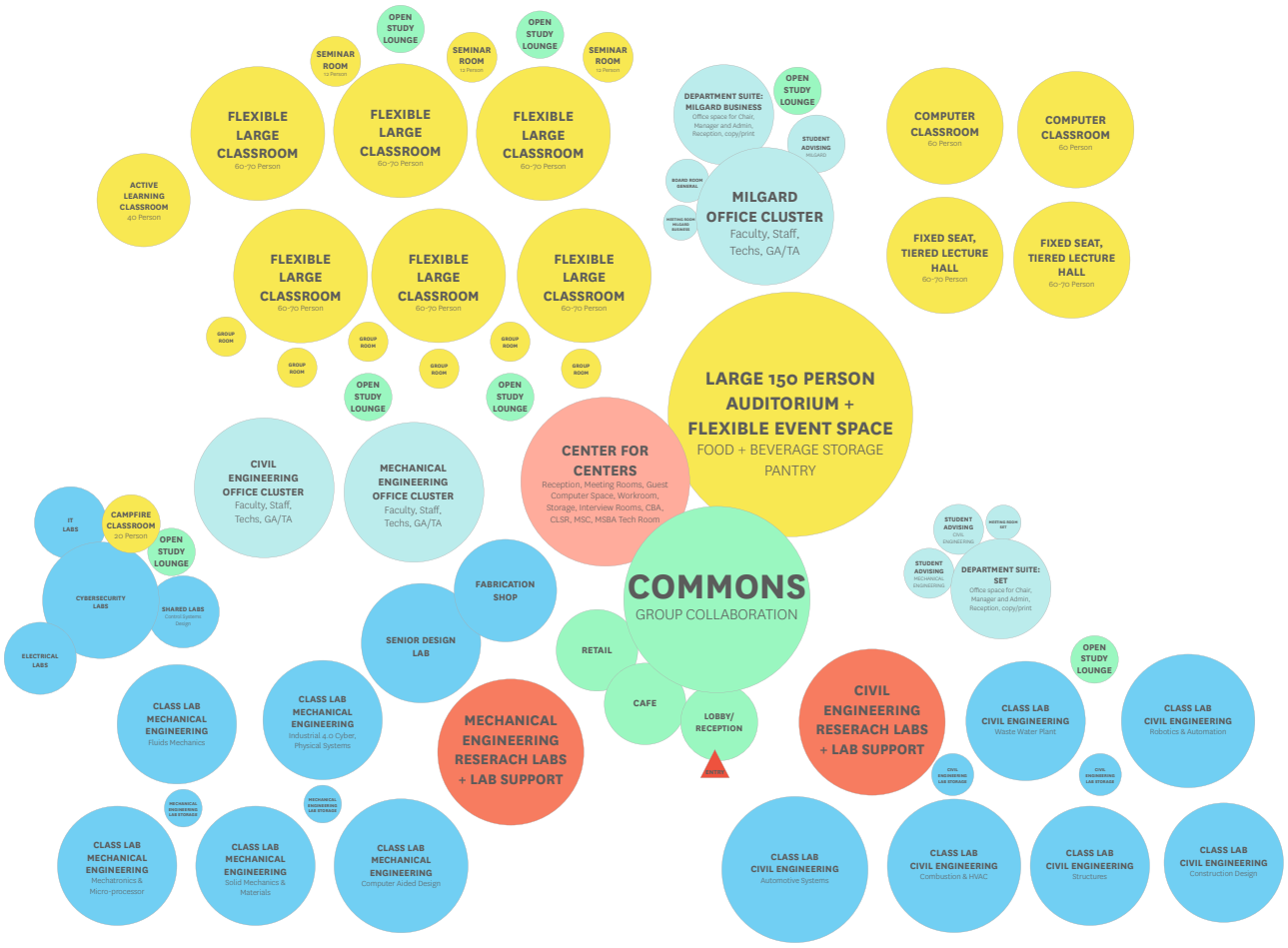
UWT ACADEMIC BUILDING - Predesign Report - Program Summary DRAFT

Phase 1

Category	Room Name	Quantity	Capacity	SF/Person	Proposed Net SF per	Proposed Net SF Total
School of Engineering & Technology (SET)					**Subtotal**	**13,010**
Labs	**Mechanical Engineering**				**Dept. Subtotal**	**7,590**
	Fluids Mechanics Lab	1	20		1,320	1,320
	Solid Mechanics & Materials Lab	1	20		1,320	1,320
	Manufacturing Lab	1	20		1,320	1,320
	Computer Aided Design Lab	1	40		1,650	1,650
	Prep. Lab	3	2		198	594
	Lab Storage	3	1		132	396
	Fabrication Shop	1	8		990	990
	Shared				**Dept. Subtotal**	**3,300**
	Engineering Design Lab	2	30		1650	3300
Office and Support	**Mechanical Engineering**				**Dept. Subtotal**	**1,920**
	Faculty Office	14	1		120	1,680
	Student Advising	2	1		120	240
	General				**Dept. Subtotal**	**200**
	Board Room	1	25		200	200
Milgard School of Business					Subtotal	**7,315**
Classrooms					**Dept. Subtotal**	**2,160**
	Group Rooms	12	6	30	180	2,160
Collaboration Space					**Dept. Subtotal**	**1,100**
	Group Work space (non-scheduled)	2	6	25	150	300
	Individual Study Room	4	4	50	200	800
Student Resource	**"Center for Centers"**				**Dept. Subtotal**	**2,605**
	Reception	1	1		300	250
	Meeting Rooms	2	8	20	160	320
	Offices	8	1	130	130	1,040
	Workroom	1	1		100	125
	Storage	1	1		30	30
	Interview Rooms	4	2	30	60	240
	CBA	1	1		150	150
	CLSR	1	1		150	150
	MSC	1	1		150	150
	MSBA Tech Room	1	1		150	150
Office and Support					**Dept. Subtotal**	**1,450**
	Staff Offices	10	1	130	130	1,300
	Student Advising	6	1	25	25	150
General					Subtotal	**12,470**
					Dept. Subtotal	**5,750**
	Atrium/Open Collaboration	1	80	25	3,000	2,000
	Auditorium	1	150	25	3,750	3,750
Classrooms					**Subtotal**	**6,720**
	Seminar Rooms	2	12	20	240	480
	Open Computer Lab	1	60	20	1200	1,200
	60-70 Seat Classrooms (tiered)	2	70	26	1,820	3,640
	60-70 Seat Classrooms (flat)	1	70	20	1400	1400
	Total NASF					**32,795**
						32,795
	Total GSF					**50,504**

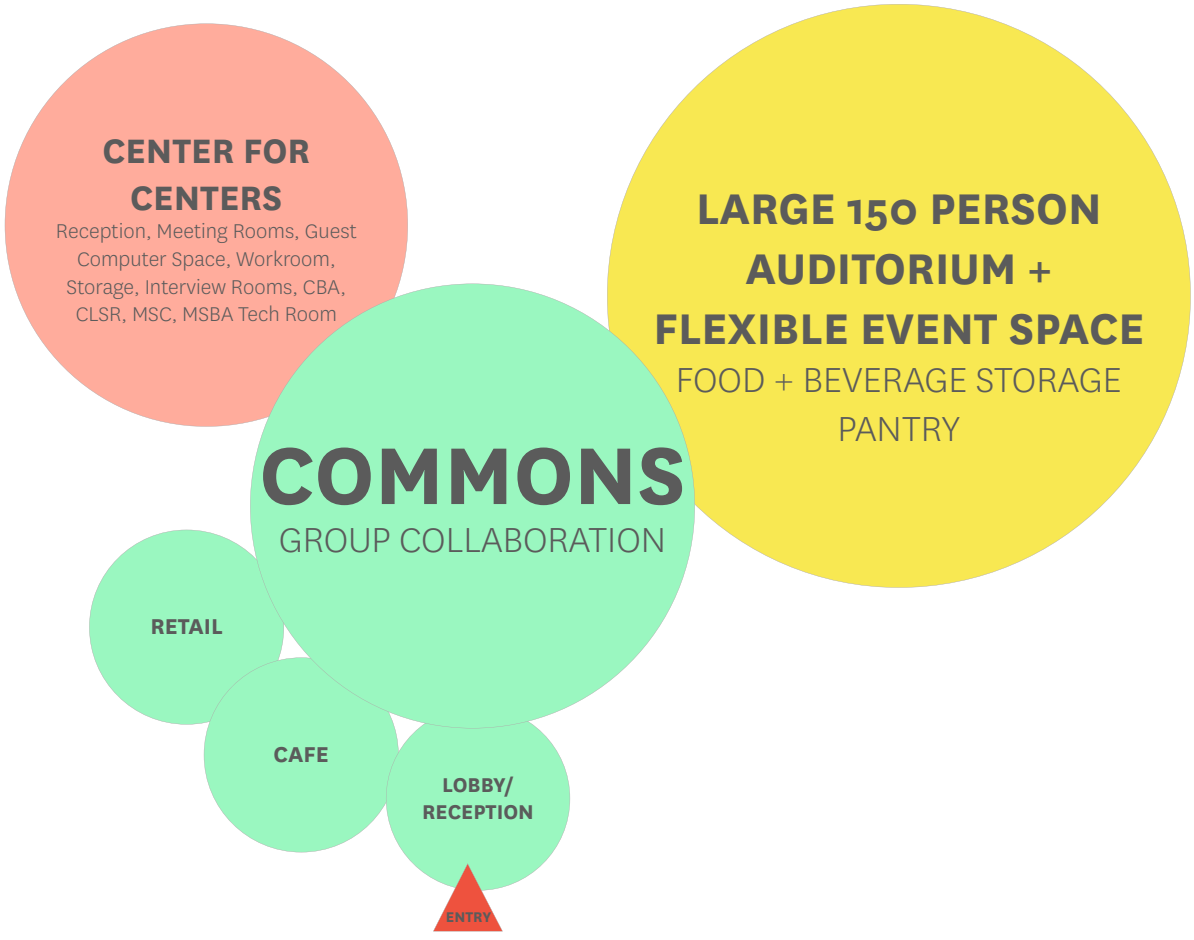
PROGRAM ANALYSIS

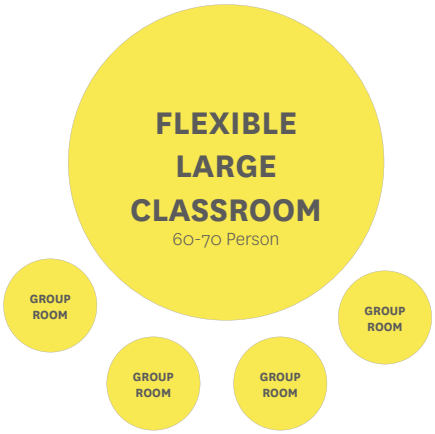
Hacker Architects held a program adjacency exercise early in the process. This pushed the project working team to think about program needs and their specific requirements. The design team asked the group what pieces of the Milgard Business School and of the Institute of Technology have opportunities for overlap and collaboration. They also started the conversation about utilizing shared resources as a strategy to reduce the overall program.



Collaboration + Commons Adjacencies

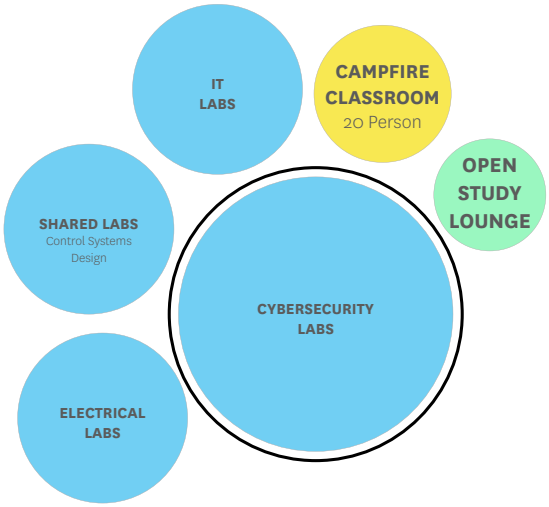
The project working team started to find connection and adjacencies in their shared collaboration spaces. This exemplified their focus on creating a strong central hub in the building. They expressed the importance of this because of the prominence of commuter students on the campus.





Milgard Large Classroom + Group Rooms

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

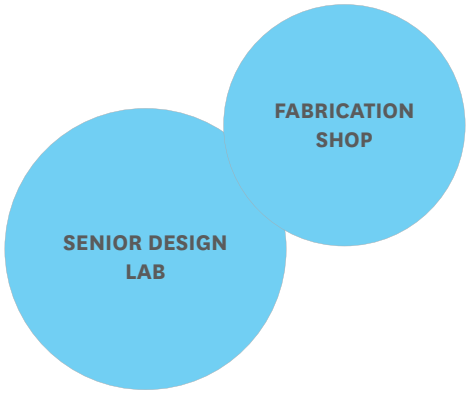


School of Engineering & Technology Cybersecurity Lab

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

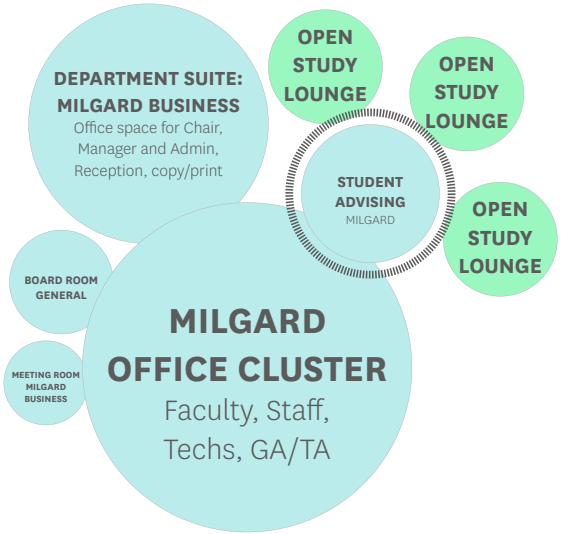
School of Engineering & Technology Offices

The Institute discussed the importance of distributed offices in between labs and classrooms. This will create better connectivity between students and professors.



School of Engineering & Technology Senior Design Labs

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



Milgard Office + Support

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

Meeting Notes

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

1) Introduction. The goal of this meeting is for the team to learn what UWT STEM and business students need for success, and to learn the highest priorities for a new UWT Academic building.
2) Discussion of schedule and process. This group is working toward a draft report that must be submitted to CPD June 1, 2018.
3) Initial questions:
    a) A question about the specific scope of this group's work was raised. This group will contribute to creating the story, the compelling argument for this building. The charge is to define just enough about the requirements to establish a realistic program and budget to make the case for this building and outline the criteria for the future design-build team.
    b) Regarding a question about who needs to attend which meetings, we discussed that not everyone will have to necessarily attend every meeting. For the example of IT, we will need enough information for high-level scope and accurate cost estimating.
4) Programs (See attached scans)
    a) Institute of Technology (IoT)
        i) IoT probably requires 20 offices.
        ii) The registrar has data about current and projected classroom use.
        iii) Cyber-security is a growing part of many programs, but nests under IT
        iv) Hillside accessibility is an issue.
        v) WSU Everett STEM building is a well-regarded precedent for the new building.
    b) Milgard School of Business
        i) Milgard has primarily private offices for staff, some of these need conference rooms, interview rooms, community access.
        ii) Milgard could require 60 staff, 20 faculty offices.
        iii) Milgard could use an auditorium or large classroom space for approximately 200 students, a space that would be appropriate for prestigious speakers.

iv) Milgard has several endowed centers: Milgard Success Center (career planning and placement), Milgard Center for Business Analytics, Milgard Center for Leadership & Social Responsibility, Milgard Center for Women and Innovation is a new center.
v) A dedicated Milgard building is another goal, Milgard programs would potentially be split between that building and the new building. This leads into the discussion of what Milgard programs would benefit from overlap with IoT programs in the new building.

5) Discussion of focus groups
   a) Milgard has had a building committee in the past, which could be useful to revisit.
   b) The group discussed concerns about representing programs that do not yet exist. The response from Hacker was that given that this building will not open for four years, flexibility will be key.
   c) Who was missing from this meeting? Environmental Health Safety and Campus Safety and students. Campus Safety will be represented at the 2/14 session.
6) The session closed with a discussion of the homework
   a) Business case for this project
   b) This project's promise to a student
   c) Mapping each department and important interactions

Attachments: Sign-in sheet, group program discussion photos

Comments:

Meeting Notes

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

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

iii) Group 3
(1) All comes to fruition and feels like paradise, ideal, feels good to all.
(2) Feed and educate through diversity, nurturing a diverse population, urban market, balanced diet, all good for you.
(3) Cooperate and soar high.

3) Discussion of homework
a) Business case (See attached scans.)
b) Promise of this project to a student (See attached scans.)
4) Synergies and Challenges. The group discussed possible synergies between the programs in the new building.
a) There is already a joint degree between the IoT and Milgard, the Masters of Cybersecurity.
b) The Center for Business Analytics is currently co-located with Data Science, which also works with the Center for Strong Schools.
c) Engineering students creating new business ideas is a synergy, which relates to the potential for a shared Entrepreneurial Center. Entrepreneurship is already a part of the IoT curriculum. New engineering programs will have classes in entrepreneurship.
d) Large classrooms would create efficiencies by allowing sections to be larger and freeing up time.
e) A community partner like CoMotion at UW Seattle would be a valuable adjacency to IoT and Milgard.
f) There is interest in going beyond these two groups into synergies with interdisciplinary arts and sciences.
g) The group had a side conversation about spaces, and the desire for a welcoming front door, transparency, legibility. Bates Technical College was referenced as a good example of flexible, combinable spaces, everything feeling connected, and providing spaces for students to do projects. Big lecture halls and the strong desire for an auditorium were discussed. Paul Allen Computer Science Building was referenced for its transparency and legibility. The professional development building in Seattle was also referenced for the ability to see the building's activities from the exterior.
5) Next Steps
a) Hacker asked all team members to continue to think about synergies between IoT and Milgard to make the case that this investment is greater than the sum of its parts.
b) Hacker asked all team members to add to the business case considering "what is the impact if this building does not happen?"
c) Hacker will send sample questions and a template to help the team prepare for the Focus Group interviews scheduled for 2/22.

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

Comments:

Meeting Notes

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

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

2) Classrooms
   a) IoT needs two 60-70 person classrooms. That size will allow for combining sections, which isn't possible now. The 70 student cohort is driven by available classroom size, which requires the classes be split into two sections.
   b) IoT would use a 120 person classroom. They currently use a black box. This room would not need demonstration equipment.
   c) Additional classroom types IoT would like to have. These could be general classrooms that IoT has priority scheduling for.
      i) Active learning classroom (30-36 students)
      ii) Computer classroom (35-40 students) – JL likes the pop-up computers they have at Everett, because they allow the ability to switch from a computer classroom to a standard classroom in the same class period. (Note: IT has some concerns about this same classroom based on maintaining the furniture.)
      iii) Campfire classroom (distance learning)
   d) Seminar rooms - Everett STEM building has 6-8 person seminar rooms off their senior design lab. The UWT team feels that those rooms could come off the hallway in the new building for better sharing of the rooms.

3) Offices
   a) 4-5 offices for each new program to start.
   b) MDS second floor has some IoT offices, including some empty ones that will be filled immediately.
   c) EA's 2/22 email details additional offices for Student Advising (1-2), Lab Techs/ Personnel (3-4), Tutors (1-2)
   d) IT will add offices for growth (6) and Masters program.
   e) SK – we will quantify office needs through the questionnaires.

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

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

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

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

Attachments:

Comments:

Meeting Notes

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

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

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

3) SB shared a list of specific spaces which are being discussed as part of this project.
   a) IoT
      i) Civil labs
      ii) Mechanical labs
      iii) Shared spaces
      iv) (Potentially) an isolated network lab
   b) Milgard
      i) Auditorium

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

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

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

7) The group discussed the types of cameras that are likely to be needed for the building.
   a) Documents
   b) Lecture Capture
   c) Distance Learning
   d) Security (there will be more conversations around the approach to security and the related use of cameras.)

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

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

Attachments:

Comments:

HACKER

733 Southwest Oak Street v 503-227-1254
Portland, Oregon 97205 hackerarchitects.com

Meeting Notes

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

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

2) Discussion of where the program is now
   a) Programs include a large undergraduate program, MBA, MAcc (Master of Accounting), Master of Cybersecurity Leadership, Master of Science in Business Analytics. Note: this is not a full list, just the programs mentioned.
   b) New programs include a design school and a program for innovation and analytics.
   c) SK clarified that we would like questionnaires filled out for each center as well as each academic program. Centers include the Milgard Success Center, Center for Business Analytics, and Center for Leadership and Social Responsibility.

3) Discussion of Process and Logistics
   a) The group present cannot fill out the questionnaires, but they can facilitate getting them filled out.
   b) Jaime, Jennifer, and Rupinder will take the questionnaires to the directors of each program. Hacker requested responses by the week of 2/26. The goal is to be able to discuss the questionnaire responses in the meetings the following week (of 3/5).
   c) EH proposed asking Howard Smith to send a letter to the directors explaining the process and the urgency.
   d) SK proposed sharing a simplified schedule with this group.
   e) SK asked the group for business schools or elements of business schools they consider good precedents for the new building.
   f) The group gave feedback on the questionnaires which was reflected in revisions to the questionnaires. The revised questionnaires, including a separate one for the dean, were sent out on 2/23.

Attachments:

Comments:

HACKER

733 Southwest Oak Street v 503-227-1254
Portland, Oregon 97205 hackerarchitects.com

Meeting Notes

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

1) Introduction. The goal the facilities workshop was to discuss UWT standards, sustainability goals, and utility considerations.
2) Discussion about UW Standards:
   a) UW standards (updated in 2017) on the website (https://facilities.uw.edu/catalog/fsdg) were written specifically for UW Seattle. UWT has its own amendments that reflect the Tacoma campus preferences. JM will email to the team. In the event of conflicts between the two standards, the predesign team should ask UWT for clarification.
   b) UW also has an EHS standard which describes items like fire systems, safe access and laboratories. Subsequently Hacker found a Lab Safety Design Guide: https://www.ehs.washington.edu/system/files/resources/Lab-Safety-Design-Guide.pdf
3) Group discussed current traffic on campus:
   a) Traffic in the campus area is expected to increase significantly in the coming months and years due to a large amount of local development.
   b) Pedestrian safety will be a major concern. Highly visible crosswalks and ADA curb cuts are a must and should not be value engineered out of the project as has happened in recent projects.
   c) There should be ample off-street loading docks that consider pedestrian access. For example, some UW Seattle buildings don't have loading docks which causes trucks to pull onto the sidewalk to load/unload causing pedestrian conflict.
   d) Flashing crosswalk lights and a sky bridge across Jefferson should be considered.

e) James Sinding / UWT Facilities is very familiar with recent traffic studies and Elizabeth can schedule a meeting between Hacker, the Civil consultants, and James to understand traffic impacts and how they may affect current master plan circulation.

4) The transformer is typically in the building. For undergrounding the power lines, Tacoma Power typically tries to get the developer to pay for undergrounding the lines. The City is trying to get a system set up for reimbursement of this expense through a developer's agreement but that is not established yet.
   a) Tacoma power will be contacted to discuss a primary switch for electrical service with UW owned transformers for expandability.
5) General growth is going up the west side of the campus.
6) The group discussed the UWT Masterplan done in 2008 & potential changes:
   a) The Utilidor concept in the Masterplan has not been expanded since the masterplan and the attendees were skeptical that it would be expanded as part of this project. Recent buildings have had independent connections to utilities and no campus central plant has been created. It can be beneficial to be able to isolate individual buildings as needed for service repairs. There was discussion about the potential for the Academic Building Project to be part of a new central facility that could back feed buildings along the existing utilidor and could expand with new buildings as development continues up the hill. It will be expensive and it would need to be part of the business case to the state for funding. Ultimately on full campus build-outs, a central plant system is ideal, but it has been a low priority thus far.
   b) Contaminated soil on the project site is a concern. The masterplan generally diagrams plumes and an additional geo-tech study has been provided to the predesign team that includes more detailed contaminant information. The Y building nearby, needed under slab treatment to prevent vapor intrusion from soil contamination. There was also an under-slab dam built to divert contaminated storm water from further contaminating a clean aquifer. Y Building placement could have avoided that cost and should be considered for the Academic Building as a cost consideration.
7) UWT will provide As-built drawings of the Court 17 building so that the design team can consider floor alignments and potential parking garage connections.
8) The site survey provided by the predesign team will include survey of the entire width of adjacent streets and facing facades of Court 17 and Pinkerton.
   a) Drainage: lots of sloping across the site
   b) Court C could have unforeseen conditions (1900 cobblestone)
   c) Court C will be vacated
9) The building will require a number of facility spaces as described in the slide deck. In addition:
   a) A mail room will not be required. UWT centralizes shipping and receiving at the MAT building. Mail is distributed from there.
   b) A recycle sorting space will be required in the building. In addition, there is an existing waste and recycle area at the corner of Jefferson and Court C that will need to be replaced as part of the project. This area serves several adjacent buildings. There used to be a compactor that connects to the sanitary sewer at this location and should also be replaced as part of the project. JM will send information with more detail.
   c) Material storage for the engineering labs should be accounted for in the new building.
   d) Plans should include a kitchen.
   e) Male, female, and single use gender neutral bathrooms.
   f) Retail space, as part of the project, is desired to activate Market and Jefferson streets. The facilities require that these spaces be designed to be independent regarding their utilities. It has been difficult to combine academic building systems and try to sub meter for leasing purposes. Shafts for potential restaurant exhaust should be provided to

enable the addition of retail restaurants. Bathrooms and grease trap accommodation should also be considered.

10) A generator may be required if there is demand for emergency/standby power that cannot be reasonably accommodated otherwise. It will not be tied into the existing campus. Usually on ground levels on this campus, not on roofs.
11) Facilities prefers an enclosed penthouse space for mechanical equipment because of their ease of access and safety. There are at least two examples on campus including Tioga. The cost constraint is understood and will play in to the decision. One of the campus examples is open air but protected with walls and a roof.
12) Service elevator to the roof should be provided. Roof top equipment includes filters and motors that will need to be replaced. Ladders are unacceptable.
13) The Fire Alarm system will be a (6) wire system with mass notification including speakers, xenon and amber strobes per 2020 IFC (International Fire Code).
14) Reduced window quantity was discussed as an energy saving measure. Hacker highlighted the trade-off of energy performance with the desire for people to have daylight and connection to nature. A target of 40% glazing was cited as a potential reasonable goal consistent with high performing buildings. The predesign team would also like to note that high performing buildings are often designed with a higher proportion of windows, especially if the passive strategies, and daylight harvesting are employed.
15) DM mentioned that UW Seattle is moving away from VRF systems and asked if UW Tacoma has had issues. UWT has had success with installations that are working well but UWT is not closely tracking leaks in the system. There is no preference or reservations with VRF. DM pointed out upcoming regulation phasing out R410A refrigerants in 2021. As HFC refrigerants (like 410A) are phased out, A2L refrigerants will be a replacement. A2L refrigerants are mildly flammable and it is unclear how they will be adopted with systems that pump refrigerant around a building (like VRF). UWT recognizes that VRF has been a solution for the existing buildings on campus (due to space constraints) but it isn't necessarily the best solution for new buildings.
16) The Science Building has two gas fired boilers that have been inefficient. If gas boilers are recommended they should be used for space heating only. UWT prefers on demand local water heating.
    a) Separate out small heating loads.
    b) Closed loop heating and cooled water (no condenser water loop system)
17) 2020 IFC 6 wire requirement – amber light, etc.
18) Distributed Antenna System (DAS) system will be required for first responders.
19) A PA system is desired. Elizabeth will schedule a meeting with the team and UWT security to talk about campus security requirements including PA, lock-down, blue phones, cameras etc. All exterior doors will have a "lockdown" system.
20) UWT prefers that card access infrastructure be planned for all classroom doors even if only a small percentage will be implemented when built.
21) LEED Silver and 2030 Challenge (likely 80% by time project happens) should serve as sustainability goals. Although UWT is more interested in high performance buildings than the ratings themselves.
22) STARS no impact on design but they are currently documenting for it.
23) Greenhouse Gas Emissions – 70% target reduction
24) Campus water goals from the master plan are still applicable. The campus has reduced irrigation by 80% in 2016. Water conservation in other buildings has not included grey water recycling or storm water capture to date. There is an issue with finding room for a cistern on the sites. UWT prefers not to use composting toilets or non-flush urinals.

25) UWT has no on-site renewable energy sources to date. The team agreed that the Academic Building should be Solar PV ready, including pathways and structural accommodation.
26) Grade level rain gardens have been used on campus and are preferred for storm water treatment because there is ample space and easy for maintenance. A desire is to have outdoor storm water facilities that are also outdoor teaching classrooms for the community. Green roofs have not been installed on campus and are a maintenance concern.
27) Site lighting will be sustainable with step down illumination between the hours of 11pm and 5am.
28) A portion of the group walked to the site after the meeting. Elizabeth pointed out that the Transit authority is considering a transit stop with a shelter on the south edge of the site within the right-of-way, similar to the transit stop at the end of the mall on Pacific. James Sinding has more information.

Diagram: Provided by Nalini Chandran with KPFF

During the site walk, a verbal NTP was provided for the survey work. The updated limits of the survey were discussed during the walk and are explained in the diagram above.

Attachments:

Comments:

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Meeting Notes

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

1) Intro and recap
   a) The group discussed how much of each program will go into the new building. JL reiterated that Hacker is collecting information on all programs to help determine what will be proposed to be housed in the new building. EH reminded the group that the decisions made in predesign are not guaranteed.
   b) ML-A senior design lab sized for 32 teams/ 100 students is needed. This would accommodate senior/ capstone projects. DG-IT currently limits how many quarters they can support senior projects because of space limitations. Having shared space for work leads to more interdisciplinary collaboration. The discussion of senior design labs continued through the session and landed on the need for a total of **four senior design labs.** ML mentioned that a cohort is 40 students and that should be taken into consideration when sizing spaces.
   c) SK-We are working towards the 'just right' budget request. We can be aspirational now, but in the next steps if the program is too big, we'll find compromises.
   d) The group discussed the cyber-physical lab. IT needs a similar lab, Industrial Controls Systems Lab (sized for 30 students, working in groups of 2-4). They can be consolidated to one lab with extra room for equipment in the future, but for now they will be conceived of as two adjoining labs. ML expressed some reservations about the labs being combined related to the specialization of the cyber-physical lab. ML classes are 30 people, labs are only sized for 15 people.

2) Review of lists from Raj Katti (RK), the dean of IoT
   a) The list for mechanical engineering is all accounted for. **ME will need about 6 faculty offices.**
   b) The group went over RK's list for Civil, RE updated the proposed list of Civil labs accordingly. **Test cells were replaced by a bigger structures lab.** A senior design lab for

80-90 students is needed. The group agreed that this is included in the senior design labs already discussed, and that labeling them all generally as senior design labs is preferable over labeling them per program. The group discussed how big construction design labs can be, and that one of those will not be part of this building or getting a Civil Engineering program off the ground.

c) Regarding the timing of a Civil Engineering program, it's labs will start getting fitted out a year before the program starts.

3) Faculty research – the group was positive about/ interested in **shared faculty research space across disciplines. SB agreed that if the disciplines are compatible, collocating is the trend. Civil Engineering research can be messy/ dirty, but could be done in labs shared with Civil Engineering students.**

4) There was a quick discussion of food in the building. (EH) said **a grab-and-go café** is likely to be included in the program.

a) Next steps – RE-We'll work with subgroups on room data sheets. A faculty member will need to represent each program/ each lab space. We'll fill out detailed equipment data sheets for every piece of equipment. That level of detail contributes to a complete/ useful basis of design. EH brought up the value of using benchmarks, especially given our schedule. RE suggested setting up a 3-4 hour meeting with the chair of Civil Engineering at OSU, Jason Weiss. DG will research a few Civil Engineering programs that began recently. The goal is to have completed room data sheets and equipment data sheets in four weeks.
***Post-meeting note: There were further conversations about how to document the needs of a future Civil Engineering program. The team is proceeding with a benchmarking approach, and will focus on newer Civil Engineering programs that DG has begin to identify.

5) Discussion of IT led by DG
   a) Classrooms are inadequate, labs are too small. IT needs
      i) (2) 50-60 person computer labs
      ii) Cybersecurity lab, 20-30 seats
      iii) Forensics lab (mobile and other), 25 students, 3' per student
      iv) Networking lab with 8-10 pods, a pod has a couple of servers, 1-2 racks, 4 students, class is 25-30 students, would be nice to leave set up
      v) Industrial Controls Lab sized for 30 students, working in groups of 2-4
   b) Computer Engineering needs
      i) A design lab for 80 students
      ii) A classroom for 85-90 students (CE has 2 courses that would use a classroom of that size per quarter)
      iii) Lab for embedded system design/ microprocessor (40 students)
   c) Computer Science will be discussed at our next session

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Meeting Notes

Date:	8 March 2018	**Project:**	UWT Academic Building Pre-Design
Author:	Rachel Schopmeyer	**Project No:**	1801
Re:	Workshop 2	**Next Mtg:**	29 March 2018
Present:	UW Tacoma: Rupinder Jindal (RJ), Assistant Professor Milgard School; Joel Larson (JL), Director of Operations IoT; Jennifer Myers (JM), Construction Project Manager; Stanley Joshua (SJ), Director of Facilities Services; Tessa Coleman (TC), Facility Manager; Patrick Pow (PP), Vice Chancellor for IT; John Stevens (JS), Network Manager; Elizabeth Hyun (EH); Patrick Clark (PC) Hacker: Stefee Knudsen (SK), Scott Barton-Smith (SB), Rachel Schopmeyer (RS)		
Cc:	Hacker: Will Dann		

1) Intro and agenda
   a) Set the goal of looking at big synergies.
   b) ACTION: Hacker will share the revised schedule to the group.

2) Review of Focus Groups
   a) Discussion of who isn't here but should be involved: there is a desire to get students involved. Events also needs to be involved, this building could be meeting a campus-wide need for event space. James is a person on campus with a lot of insight on parking and transit. ACTION: EH will set up meetings with the groups/ stakeholders that were mentioned.
   b) Review of Milgard, Institute of Technology (IoT), Facilities and IT focus groups. (Ref. meeting notes from those focus groups.) 24/7 access came up for IoT students. Spaces that will have extended hours should be clustered together for efficiency. Faculty want to meet student desire to study late, so would like to provide a space where eating and drinking is OK.

3) Known Program Synergies
   a) SK distributed a draft program document, with unknowns this group can help fill in.
   b) The group discussed what we already know about synergies, starting with the idea that collocating these programs is an innovation that can be a strong argument for funding. Both the Institute's Data Science Center and Milgard's Center for Business Analytics work with the School of Education. The CLSR works with The Institute.
   c) The conversation continued into synergies around entrepreneurship. The institute used to be involved with A Million Cups. VIBE is a business incubator on campus that started to serve veterans but now is not limited to serving veterans. CoMotion would like a

space, but PC noted that the building needs to meet campus needs before providing space for other organizations.

d) JL-Women in Computer Science/ Engineering is a good match with Milgard's Center for Women.
e) On the topic of meeting campus-wide needs, all of campus could use larger classrooms. PC made the point that we need to plan for the possibility/ likelihood that this will be the only new building on campus for the next 8 years.

4) New Program Synergies
   a) The group discussed what we've learned about the needed spaces, and which spaces could be shared by Milgard and IoT. An auditorium is a space both need and could share. Same for large, reconfigurable classrooms. RJ commented on the preference for flat vs. tiered classrooms. The group noted that faculty members will need to be included in the conversation of classroom types. EH brought up the plan to do a faculty survey.
   b) Common spaces were discussed next. Facilities prefers built-in furniture because furniture has been stolen from common spaces in the past. Heavy pieces or furniture are problematic for events. Flexible spaces need furniture storage to be truly flexible. To make common spaces work for business students, we need to consider that they are competing and therefore secretive. Booths support their need to keep their work private.
   c) Interview rooms are a shared need.
   d) Looking ahead, SK discussed the option to engineer Milgard/ IoT relationships through space planning.

5) Sustainability
   a) The masterplan was ambitious, the real campus goal is to have a high-performing, flexible, adaptable building. The group touched on the 2030 challenge, and that the goals will be higher in four years.
   b) Regarding water use, some goals haven't been implemented and there is low interest. As far as dealing with water in place, the site has a lot of potential. The group discussed the potential for special interest in waste water from the new Civil Engineering Program to be housed in the building. Teaching about what the building does through plaques can be less than engaging for students. The group indicated that all students on campus would be pushing for water conservation, and that the push would only be greater by the time the building is getting built.
   c) The 2030 challenge will mandate local power generation. The group raised questions about geothermal, phased cooling and thermal storage (there's a precedent for thermal storage at Federal Way).

6) Vision Card Recap
   a) The group voiced elements of the vision for this project not yet listed:
      i) Creating a skilled workforce
      ii) Keeping Tacoma vital (not becoming a bedroom community for Seattle).
   b) JL shared some sources for statistics to back up the case to the legislature
      i) ACTION: Hacker will visit collegeresults.org – search UWT, compare similar colleges, compare salaries of graduates.
      ii) 'Washington Pathways,' the PhD work of Jenee Twitchell documents where Washington high school students go. ACTION: Can someone with UWT provide this document?
      iii) ACTION: Hacker needs to confirm percentage of 1st generation college students at UWT. (We have this information from EH).

iv) Joel directed Hacker to IoT's strategic plan for specific language for the vision/ business case of the project.
v) It would be useful to have a percentage of graduates that stay in the area.
vi) Bonnie Becker was mentioned as a person who can help with language about the local community. Mike Wark was mentioned as a legislative wordsmith.

c) ACTION: Hacker will share draft of adopt-a-student with this group for feedback.

7) Mapping exercise
   a) The group reviewed the mapping exercise and the scattered spaces that IoT and Milgard currently utilize.
   b) PC-Freeing up/ consolidating existing space on campus must be part of this plan.

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Meeting Notes

Date:	13 April 2018	**Project:**	UWT Academic Building Pre-Design
Author:	Caitie Vanhauer	**Project No:**	1801
Re:	Workshop 3	**Next Mtg:**	23 April 2018
Present:	UW Tacoma: Rupinder Jindal (RJ), Assistant Professor Milgard School; Joel Larson (JL), Director of Operations IoT; Jennifer Myers (JM), Construction Project Manager; Patrick Pow (PP), Vice Chancellor for IT; John Stevens (JS), Network Manager; Elizabeth Hyun (EH); Patrick Clark (PC), Director of Campus Planning and Real Estate; Altaf Merchant (AM), Associate Dean (Administrative Initiatives) Milgard School; Jacob Fleshman (JF) Maintenance Supervisor - Facilities Hacker: Stefee Knudsen (SK), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)		
Cc:	Hacker: Will Dann, Scott Barton-Smith		

1) Intro and agenda

2) Cost Benchmarking
   a) The group discussed how a Cross Laminated Timber (CLT) structural system would contribute to the cost of the building and its likelihood to be funded by the legislature. JM pointed out that Tacoma wants to be CLT friendly. The group expressed some concerns about using a technology that hadn't yet been used for an academic building in Washington. SK discussed the low embodied energy of CLT and the schedule benefits of the system. Labs will have special consideration in relation to the structural system in terms of vibration and loads. Although CLT will be covered by the building code by the time this building is being designed, PP expressed concern at being on the bleeding edge of a new technology. AM asked if CLT was fundamental to this project, EH responded that it is, for the legislature. AM asked about cost comparison of CLT to other structures. SK mentioned that CLT is competitive if looked at holistically and not the material cost itself.
      *Action: Hacker research and share European CLT Academic Building precedents
      SK confirmed that costing will include other, more typical structural systems.
   b) The question was raised if the program could fit on the site all on one level, we discussed that for future growth and efficiency, the university didn't necessarily want to fill the entire site.

3) Big picture approach to offices
   a) SK asked EH about the approach to offices with this project – is the idea to move all Milgard and SET offices, or to accommodate growth offices only. EH described the need to evaluate campus-wide office needs and address those needs with the building plan. AM said that this is a rare opportunity to have a home for Milgard, and the first opportunity the school has had to have a home in the 15 years it has existed. Instead of labs, AM said, business school students have interactions with faculty. Ideally the new building would house all Milgard faculty (30 + 10 growth) and staff (15) with a total need for 60 offices. SK raised the possibility of expanding the building over time.

4) Discussion about how growth affects the rest of campus. With the additional engineering students, this will put more pressure on the science and math programs to accommodate them for their general course needs.

5) The group discussed the synergies and challenges of a shared building.
   a) JL brought up the Center for Entrepreneurship as a part of the Center for Centers.
   b) Milgard is being pushed to ask, 'how are we distinct?' Identity for each school is critical. *Action: Hacker research and share precedents for collocated programs with strong identities.

6) Program Adjacency (Bubble) Exercise
   a) See photos at the end of these notes. Notes included here came from comments made during the exercise.
   b) JL – there's no need for a relationship between classrooms and labs.
   c) PC – there's not much appetite for crossing campus.
   d) AM – It would be valuable to have seminar rooms and group rooms near faculty. For Milgard: Faculty <near> group rooms <near> classrooms. Center for centers does not need to be near classrooms. Advising would be well placed between offices and centers. Advising is at the center of connecting students and faculty. Open study lounges can be scattered, near advising. Like Paccar Hall, closed 2-person rooms are needed for secrecy around competitive projects. The biggest concern is managing the identities. The Center for Business Analytics needs a computer lab that would be dedicated. The possibility of including a financial trading room came up (University of Idaho was referenced), it could be included in the space for the centers.
   e) The auditorium ideally opens into the commons.

7) General wrap-up conversation
   a) The group talked a bit about active classrooms, and expressed the feeling that fixed-seat classrooms feel outdated. JM expressed a concern about training faculty to use new types of spaces, furniture, etc.
   b) SK asked if we needed to provide faculty meeting spaces, JL – large classrooms will meet that need. The group again identified the need for large classrooms, potentially 90+ classes to grow the freshman base.

Attachments: Program adjacency exercise photos

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Meeting Notes

Date:	29 March 2018	**Project:**	UWT Academic Building Pre-Design
Author:	Rachel Schopmeyer	**Project No:**	1801
Re:	Academic Events and Security	**Next Mtg:**	TBD
Present:	UW Tacoma: BrieAnna Bates (BB), Director of Events and Sponsorships, Advancement; Marie Lazzaro (ML), Conference Services Manager; Susan Wagshul-Golden (SW), Director of Campus Safety and Security; Elizabeth Hyun (EH) Hacker: Stefee Knudsen (SK), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)		
Cc:	UW Tacoma: Patrick Clark Hacker: Will Dann, Scott Barton-Smith		

1) Intro and Discussion of current event spaces
   a) Most requested space is Jane Russell Commons in Phillips Hall. It's a 30'X40' space for 80-100 people, very flexible.
   b) Carwein Auditorium is seen as too steep.
   c) Ideally the new auditorium would accommodate theater and musical productions. It would have a flexible front space. Catering prep is also needed.
   d) Storage for furniture is always an issue with flexible spaces that have associated moveable furniture.
   e) There is a campus-wide need for a large (30-person) boardroom. This would support meeting of Milgard's growing advisory boards.

2) Discussion of safety and security
   a) The group discussed the dangerous intersection of 19th and Market. Consider crosswalks and connection to Court 17 and Science.
   b) SK – this building has an opportunity to help campus accessibility.
   c) SET wants many 24/7 spaces; how do we keep all-hours spaces safe and secure? Building could be flexible to have a staffed security desk in the future.

Attachments:

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Meeting Notes

Date:	29 March 2018	**Project:**	UWT Academic Building Pre-Design
Author:	Rachel Schopmeyer	**Project No:**	1801
Re:	Academic Space Utilization	**Next Mtg:**	TBD
Present:	UW Tacoma: Ana Marie Alameda (AA), Scheduler; Andrea Coker-Anderson (AC), Registrar; Elizabeth Hyun (EH) Hacker: Stefee Knudsen (SK), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)		
Cc:	Hacker: Will Dann, Scott Barton-Smith; UW Tacoma: Melony Pederson		

1) Intro and agenda
   a) The group discussed the data AA has shared so far as evidence that the campus is maxed out.

2) Headcount vs. FTE
   a) There is a desire to represent headcount and not just FTE, we will probably use both the way that the Bothell report did.
      *Action: AC will share current FTE count.

3) Diversity and First-Generation Students
   a) UWT has statistics on diversity and first-generation students
      *Action: Andrea/ Alice will share those statistics with Hacker.

4) Discussion of UWT Space Utilization graphics as compared with those in the Bothell report
   a) Instead of most utilized classrooms, we would like to show available sizes of classrooms and the relative demand.
   b) The group moved into a general conversation. The story of these large classrooms and how they relate to faculty workload is important. The need identified for large computer classrooms was strongly echoed by AA and AC. There are computer classrooms (like a 22 person one) that are too small to schedule.
   c) AC expressed concern about larger classrooms affecting the culture at UWT campus. They pride themselves on having a small student to professor ratio.
   d) Continuing to discuss breakout spaces, it was clarified that Milgard is not the only group using breakout spaces. Providing more of them on campus will open the ones that already exist. AC mentioned that break out rooms have been added across campus but are dispersed. This creates a problem with efficiency when they're not in close proximity to one another. SK asked how many breakout spaces the campus needs. One class currently uses 6-8, two classes sometimes need them at the same time—at least 16.

Currently students 'camp out' in breakout rooms, indicating a need for group study spaces.
*Action: AC/AA will send location of break out rooms.
*Action: Hacker will work with Milgard to confirm their definition of collaborative classrooms so that AC can validate classroom availability.
*Action: Hacker will develop graphics to show the lack of breakout spaces and reconfigurable/ collaborative spaces (preliminarily defined as squarish classrooms with reconfigurable furniture).

5) Next steps
   a) We need numbers for growth of Milgard and SET. JL has numbers about turning students away from the program.
   *Action: Hacker request those numbers from Joel and request growth numbers from Milgard.
   *Action: Question for Jill Purdy – are there limits on class sizes?
   *Action: EH/ AA/ AC will share growth numbers for the last 10 years and projections for the next 10 years. We'd ideally show these numbers for the campus, for SET and for Milgard.
   *EH will provide campus gross SF.

Attachments:

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Meeting Notes

Date:	29 March 2018	**Project:**	UWT Academic Building Pre-Design
Author:	Rachel Schopmeyer	**Project No:**	1801
Re:	Academic Transportation	**Next Mtg:**	TBD
Present:	UW Tacoma: James Sinding (JS), Auxiliary Services Manager; Elizabeth Hyun (EH) Hacker: Stefee Knudsen (SK), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)		
Cc:	UW Tacoma: Patrick Clark Hacker: Will Dann, Scott Barton-Smith		

1) General Discussion of planned changes for the streets around the site
   a) Jefferson is planned to be deemphasized for vehicular traffic. It would be for pedestrian and bike use. 4% of students currently ride bikes to campus.
   b) Market is going to be primarily for transit with a push for median boarding at 19th and Market. It would still have some single-user vehicles.
   c) 17th street will be emphasized for vehicles.
   d) The plan is to have pedestrian corridors on both sides of the site. Existing trash enclosures have caused pedestrian safety issues due to visibility.
   e) SK asked about vacating the street in front of the Swiss, James agreed this was possible. (Post-meeting note: this is part of the master plan.)

2) Accessibility
   a) ADA access on campus is not currently working because the Pinkerton elevator is not accessible after 4PM. Each project should improve campus ADA accessibility.
   b) Additional crosswalk needed across Jefferson.
   c) Vaulted sidewalk on south side of the Swiss building is too steep for ADA access.

3) Loading
   a) JS – If there is building loading using a roundabout, also consider retail loading. There are issues with current retail loading blocking crosswalks. SK noted that loading will be a pre-app issue, along with retail, pedestrians, and trash. We'll have hazardous/ flammable loading, café loading, retail loading.
4) Transportation
   a) Predicted change in transportation across campus. New developments such as the hotel will affect traffic flow.

5) Parking
   a) The current parking deficit is 150 stalls. JS thinks it's unlikely UWT can pay for the parking with parking revenue. It remains a question whether parking will ultimately be part of this project.

Attachments:

Comments:

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Portland, Oregon 97205 hackerarchitects.com

Meeting Notes

Date:	29 March 2018	**Project:**	UWT Academic Building Pre-Design
Author:	Rachel Schopmeyer	**Project No:**	1801
Re:	Milgard Follow up	**Next Mtg:**	TBD
Present:	UW Tacoma: Rupinder Jindal (RJ), Assistant Professor Milgard School; Altaf Merchant (AM), Associate Dean (Administrative Initiatives) Milgard School; Jennifer Heckman (JH), Lecturer Milgard School; Elizabeth Hyun (EH) Hacker: Stefee Knudsen (SK), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)		
Cc:	UW Tacoma: Patrick Clark Hacker: Will Dann, Scott Barton-Smith		

1) Teaching spaces and group spaces
   a) Large classrooms. AM – Distance delivery is exciting to Milgard and to the campus. Lower level classes are commonly taught with 60, 70, 80 students and they would like to be able to deliver classes at that scale. It is efficient in terms of time and space. In a larger class, the instructor will teach for a portion, have breakouts for a portion.
   b) Note: the business school is working on a new strategic plan.
   c) We discussed the types of classrooms faculty prefer—it varies person to person. RJ likes the tiered, U-shaped rooms that students can reconfigure. JH prefers a completely open, reconfigurable room with moveable whiteboards and furniture.
   d) Breakout rooms. 5-6 is the maximum group size. Breakout rooms can serve as group rooms outside of class times. All breakout rooms can be sized for 4-6 people. Larger (12 person meeting rooms) would be best located near the centers.
   e) AM reiterated the need for computer classrooms. Milgard could use 2 computer classrooms. MSBA could add another cohort.
      *Action: Milgard representative, please share data about turning away students because of capacity.

2) Centers
   a) JH had a conversation with Howard Smith regarding Centers. Co-locating the centers is not as important to HS as making sure they each have what they need and the flexibility to grow. HS is after an innovative solution to integrating the centers into the building. (Post-meeting note: for more detail on centers, please see the notes from the 4/3/18 videoconference. Details discussed there are not repeated here.)

3) Lounges
    a) JH isn't sure graduate students would use a lounge, they currently gather at the Swiss. It would be nice to offer undergraduates a place to gather. An MBA lounge would be nicer, more open. No one argued for closed private lounges, it was more important to the group to locate the lounges near the Milgard activity of the building.

Attachments:

Comments:

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Meeting Notes

Date:	27 April 2018	**Project:**	UWT Academic Building Pre-Design
Author:	Caitie Vanhauer	**Project No:**	1801
Re:	ASUWT	**Next Mtg:**	
Present:	UW Tacoma: Elizabeth Hyun (EH), Melony Pederson (MP) Hacker: Scott Barton-Smith (SB), Caitie Vanhauer (CV), Rachel Schopmeyer (RS)		
Cc:	Hacker: Will Dann, Stefee Knudsen		

1) Intro & Agenda: Rachel gives the ASUWT group a summary of the predesign project and what a predesign is.

2) ASUWT comments that the students are typically non-traditional. They also value the intimate one-on-one education that UWT provides.

3) Student Feedback
   a) Open outdoor terraces
      i) Great idea but limited use because of weather - providing sheltered outdoor areas would allow us to fully utilize and maximize the use
   b) Parking – not in Predesign since the state only distributes funds for educational purposes
      i) Will be considered in the design phase
   c) Street vacation - restrict access to Court 17 parking garage? What about off street parking that's already on Court C? There is also a bus stop there to be considered.
   d) Sustainability
      i) Late night access - how do you maintain energy efficiency?
      ii) What about alternative energy?
         (1) UW's commitment to 2030 Challenge: net zero by 2030 - likely that power generation onsite measures will be needed/required to meet the goals to achieve 2030 Challenge
      iii) Energy efficient lighting
         (1) Utilize timers to reduce energy use
         (2) Create lighting zones for longer use (ex: labs)
      iv) Mass timber – natural, renewable resource that has a low embodied energy and sequesters carbon
   e) Accessibility
      i) TPS - not disabled friendly, only 1 elevator
         (1) What can we do to improve accessibility?
         (2) Can we have a goal higher than typical in Predesign?
      ii) Ramps are not very accessible friendly

iii) Elevators are heavily used
iv) Automatic doors very helpful

f) Diversity
   i) Include natives, Puyallup native tribes
   ii) Intellectual House at UW Seattle
   iii) Community outreach neighboring UWT

g) Safety Concerns
   i) Locks on doors
   ii) Intercoms in building
   iii) Security cameras
   iv) Better outdoor lighting

h) Incorporating/including other school and other programs
   i) Inclusive of other students, not just Milgard and Institute
   ii) Maybe incorporate arts somehow? Art gallery or mural
   iii) Allow shared uses in courtyard

Attachments:

Comments:

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Meeting Notes

Date:	13 April 2018	**Project:**	UWT Academic Building Pre-Design
Author:	Caitie Vanhauer	**Project No:**	1801
Re:	Workshop 4	**Next Mtg:**	23 April 2018
Present:	UW Tacoma: Rupinder Jindal (RJ), Assistant Professor Milgard School; Joel Larson (JL), Director of Operations IoT; Raj Katti (RK) Dean and Professor of IoT; Jennifer Myers (JM), Construction Project Manager; Tessa Coleman (TC), Facility Manager; Patrick Clark (PC), Director of Campus Planning and Real Estate Hacker: Scott Barton-Smith (SB), Caitie Vanhauer (CV), Rachel Schopmeyer (RS) PLACE: Charlie Brucker (CB); Phoebe Bogert (PB)		
Cc:	Hacker: Will Dann, Stefee Knudsen		

1) Intro and agenda

2) Goals of the project:
   a) RS summarized the importance of going back to the business case. She ran the group through the major points that will matter to the legislature to get the project funded.
   b) UWT Vision – Improve on university's focus on diversity.
   c) The predesign should build on the investment made in the master plan.

3) Site forces
   a) Hill climb - Charlie discussed the various site opportunities at play. The site has the potential to engage and respect the master plan's extension of the hill climb. He looked at the forces on the campus and site-specific level to inform one another. At a campus level, the hill climb could become a piece of identity for UWT and influence the ease of wayfinding throughout campus. He mentioned the difficulty with the hill climb is that it is currently used for circulation. In the proposal, the building could serve as vertical circulation and the hill climb could become open, outdoor space.
   b) Circulation – What is there and what will happen in the future?
   c) Retail – potential for retail along Market
   d) ADA Access – all new buildings will need to improve ADA accessibility
   e) Contaminated Soils – aware of the cost implications of having contaminated soils on the site.
   f) Future of adjacent streets – Pat is concerned about de-emphasizing Jefferson Ave and closing 19th Ave. due to the unknown future of transit and traffic. With a four percent increase in students there will inherently be more cars circulating around campus. RS pointed out that the predesign will need to remain flexible and adapt with future changes.

g) Loading – how do we acknowledge the loading needs for both Milgard and SET.

4) Program
   a) SB summarized the current program that has been requested from both programs. The team showed a scaled visual to represent the different program categories. Then, he highlighted which programs will need to be high bay, on the ground floor, or have the potential to be in the "dark" part of the building. Joel brought up how important it is that labs are on ground floor for loading purposes.
   b) Raj expressed his concern that their projected growth is too little. RS mentioned that Hacker can fold in new projected growth numbers into the predesign report.

5) Massing Exercise
   a) SB summarized the massing constants that the design team used.
      i) Topography – SB talked about the complex site topography and how to deal with its challenges.
      ii) Planning Module – A 11' x 30' planning module has been chosen because it accommodates both labs and classrooms. The classrooms can be arranged using this module along a single loaded corridor, double loaded corridor, or around an atrium. The circulation options and planning module determined the width of the massing options.
   b) SB explained the massing variables – footprint, edge engagement, approach to collaboration, future expansion potential, identity, and overall cost. SB explained that the design team will engage the cost estimator before the next workshop.
   c) Massing Options: SB goes through each massing option and how the design team has thought about potential future development, open space, loading access, entries, edge engagement, and response to campus master plan. RJ asked about height of building. SB explained that proposal will stay under 100' per the master plan requirements.
      i) 01 Atrium building: Positive responses: loved how it fits in the current campus (form/scale), its collaborative nature, future development potential, and strong accessibility access. Negative responses: concerned about its compact floor plate not being able to accommodate ground floor/high bay needs of program. Also, group asked about atrium space qualities. Design team explained that there are many interpretations of an atrium space and will be explored further in the next meeting.
      ii) 02 Engaged with all edges: Positive response for its design quality, engagement with all the site edges, Milgard access, and would work for facilities. Negative because it limits future development potential and is most likely most expensive (large footprint).
      iii) 03 L-shape engaged with retail edge: Positive response for its courtyard potential facing campus, engagement with Market Ave. (future retail street). JM is concerned about accommodating BOH needs (compost, trash, etc.) and feels it is possible in this scheme.
      iv) 04 L-shape engaged with campus edge: Negative response: it feels like a barrier and separation to rest of campus. The courtyard isn't as welcoming to the rest of campus.
      v) 05 Low cost: Positive response: low cost, high future development potential, and proximity for Milgard. TC mentioned that by keeping building cost low, there will be more money left for program needs (expensive engineering equipment). Negative response: it doesn't engage with hill climb or Market Ave. (future retail street). It also will block Court 17 views.
      vi) Questions about cost – RS explained that design team will talk to cost estimator for more information.

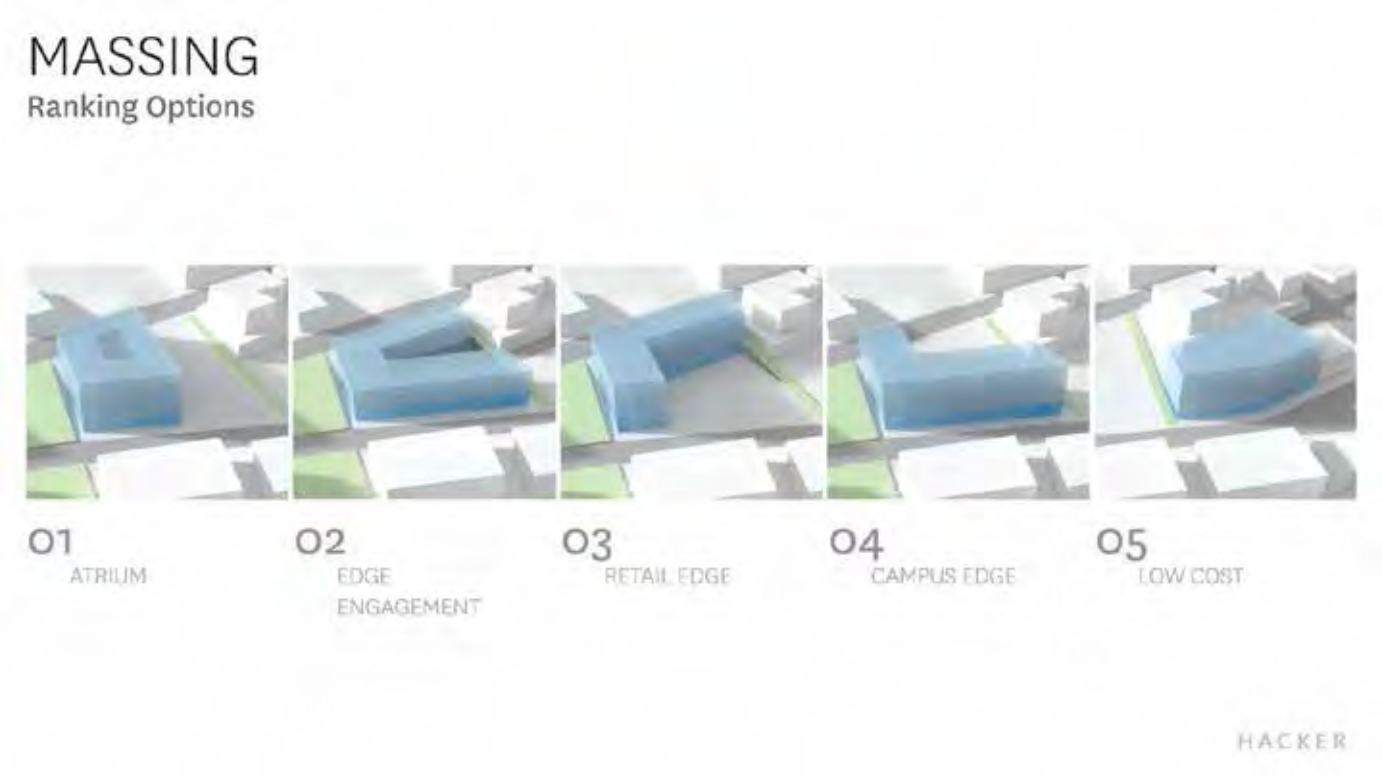
vii) JL mentioned that lot next to PNK is good for future urban studies expansion.
viii) SB asks about front door of SET – JL says it would be along hill climb or Market Ave since majority of people park west of site and come down the hill.
ix) SB asked about where the center of campus is: Prairie Line Trail is becoming center more than Commerce. Overall, the group assumed that the center of campus will move west as the campus grows.
x) JM pointed out there is a new shopping center on the west side of the site.

d) Overall, the group decided that their top three choices are 01, 03, and 05.

6) Program Adjacency Summary: RS shared Hacker's takeaways from the exercise and explained that this information will be integrated into the predesign report. JL talked about how he envisioned that the Commons and Large Auditorium might become center of the building.
7) Next Steps – RS explained that we will integrate the group's feedback into the next workshop's massing studies, bring information on collaboration concepts, and begin to compare structural and mechanical systems.
8) Post-meeting note: After a conversation with PC, Hacker will change the portion of the program labeled 'retail' to 'commercial/ incubator.'

Attachments: Massing Options Slide

Comments:



Link to Workshop 4 presentation: https://hacker.sharefile.com/d-sb972fbb6a39420c9

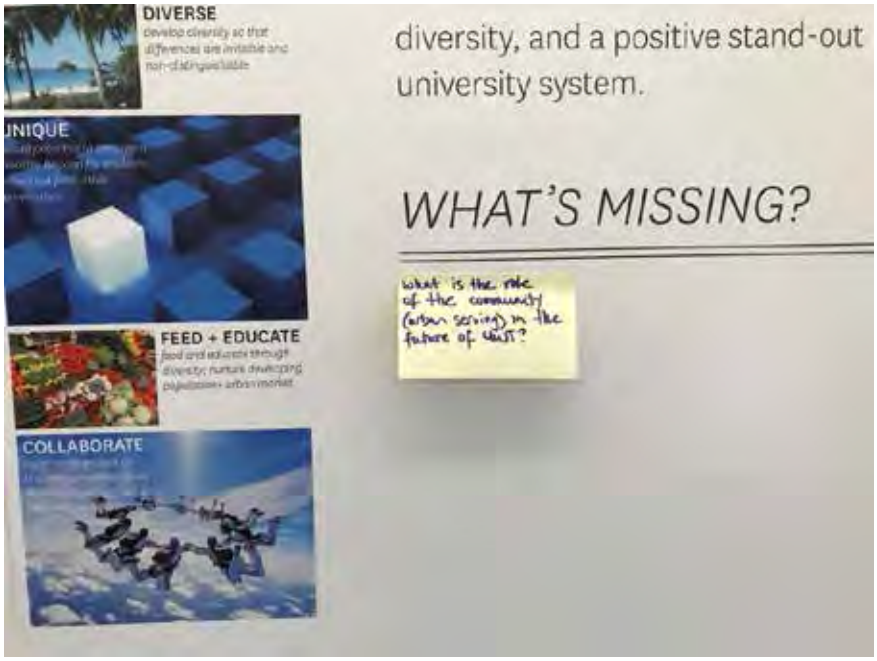
OPEN HOUSE SUMMARY

Date:	04/21/2018 & 04/22/2018	**Project: UWT Predesign**
To:	UWT	**Project No: 1801**
From:	Hacker	**cc:**

UWT predesign design team, Hacker, and Elizabeth Hyun (UWT Campus Planning & Retail Services) held two workshops (4/21/2018 4pm-7pm) and (4/22/2018 11pm-1pm) in the Tacoma Paper & Stationary (TPS) building. The design team had boards up for students/faculty to vote and leave comments/questions.

Comments about the "Vision"

What is the role of the community (urban serving) in the future of UWT?



Ranking Massing Options:

During the open house, attendees rated massing options with green or red dots.
Green dot = like
Red dot = dislike

Option 01 (Atrium): 11 "likes" & 0 "dislikes"

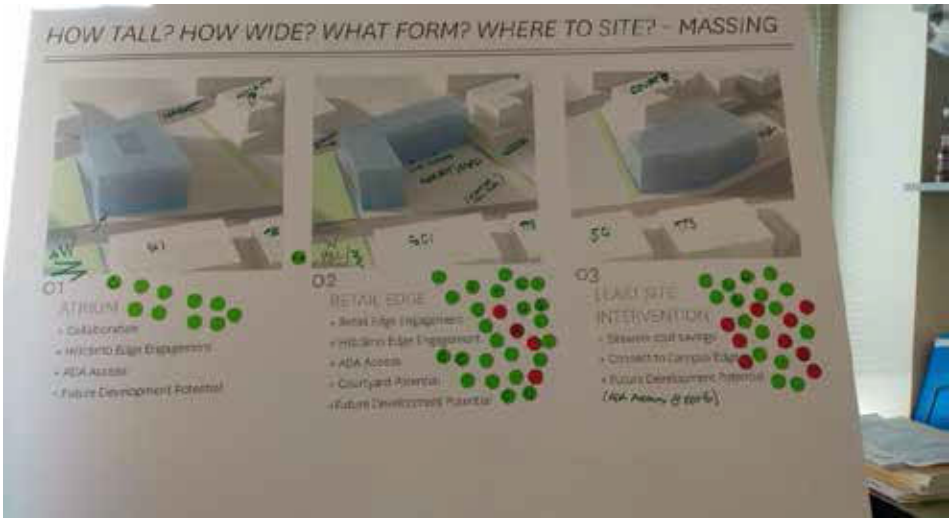
- Doesn't disturb view of student housing at Court17
- Likes atrium concept (not currently on campus)
- Feels closed off and isolated, not welcoming

Option 02 (Campus Edge): 25 "likes" & 4 dislikes"

- Feels consistent with campus
- Reinforces defined campus & helps with security
- Openness with courtyard
- Campus doesn't need a plaza

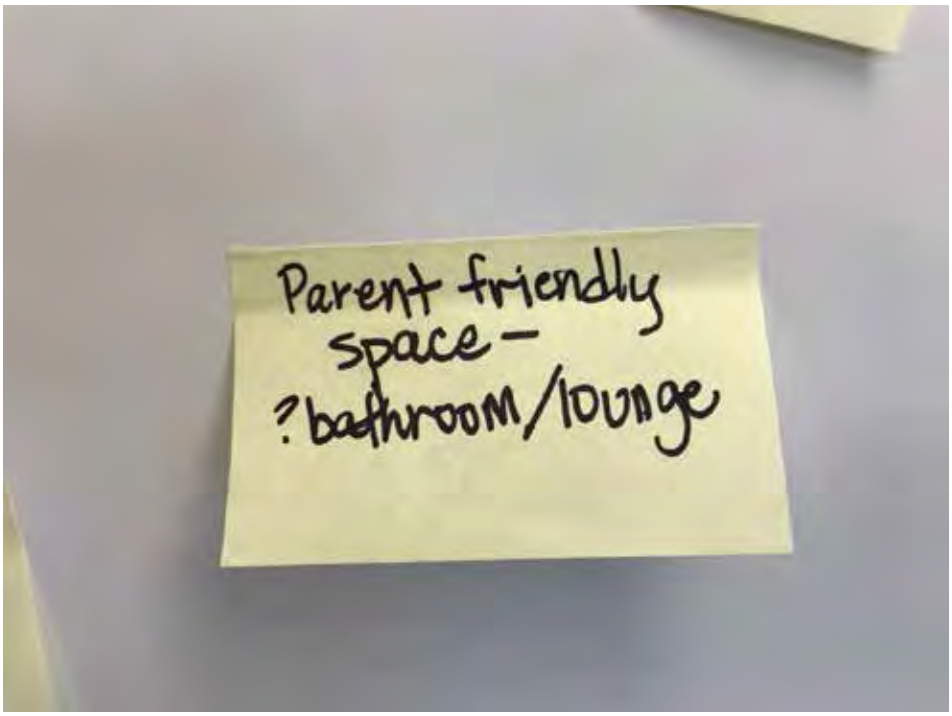
Option 03 (Least Site Intervention): 16 "likes" & 9 "dislikes"

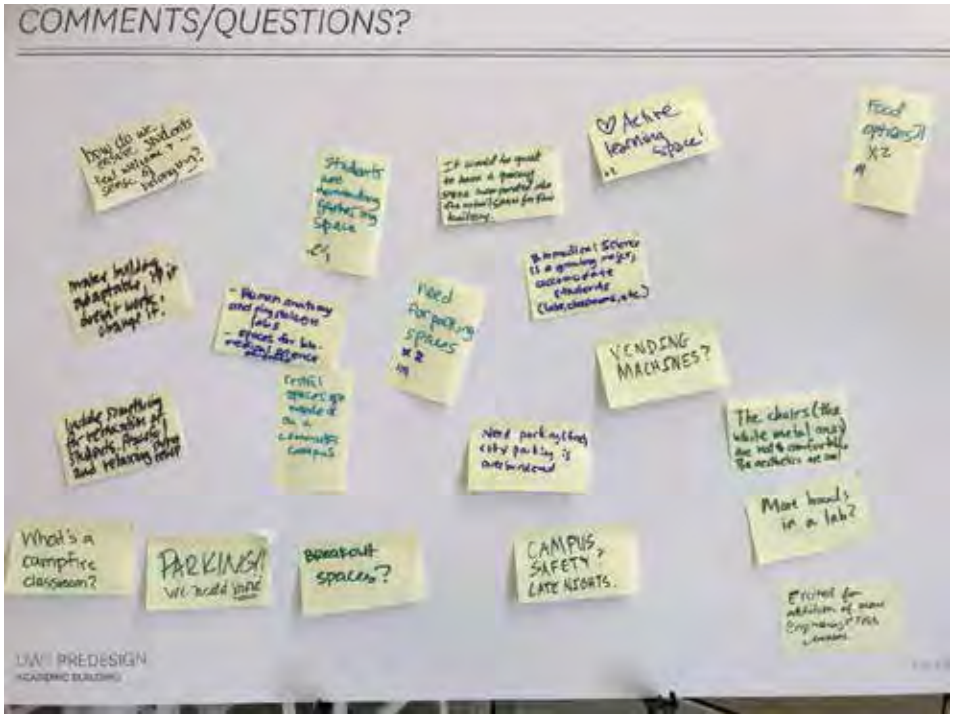
- Disturbs student housing at Court 17 (noise, views, & light)
- Might help integrate PNK with rest of campus
- Feels closed off
- Preserves some green space



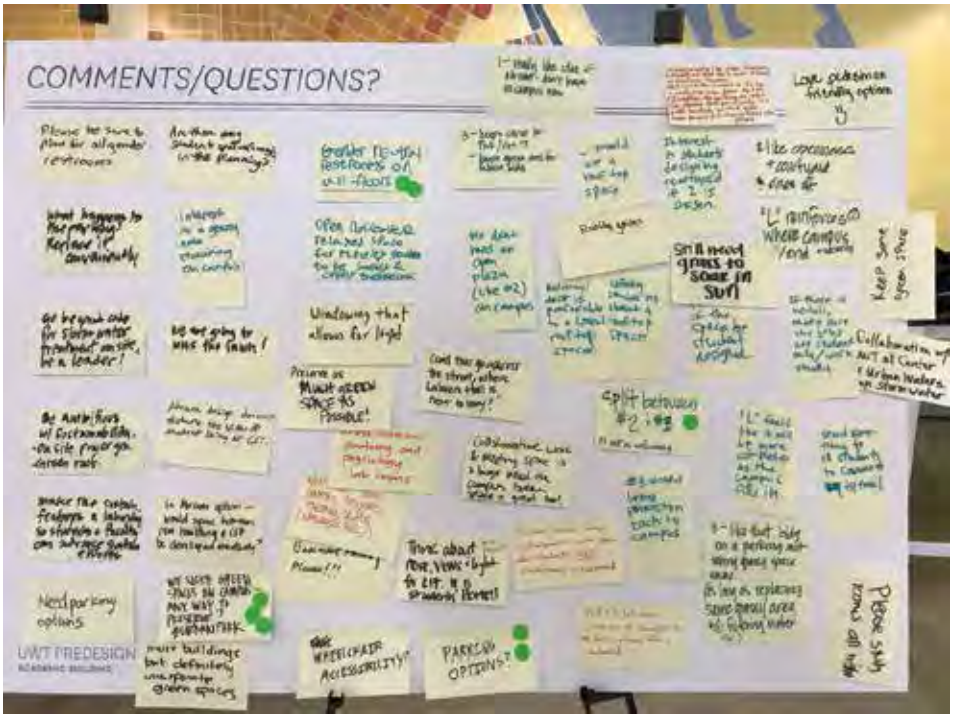
Other General Comments/Questions:

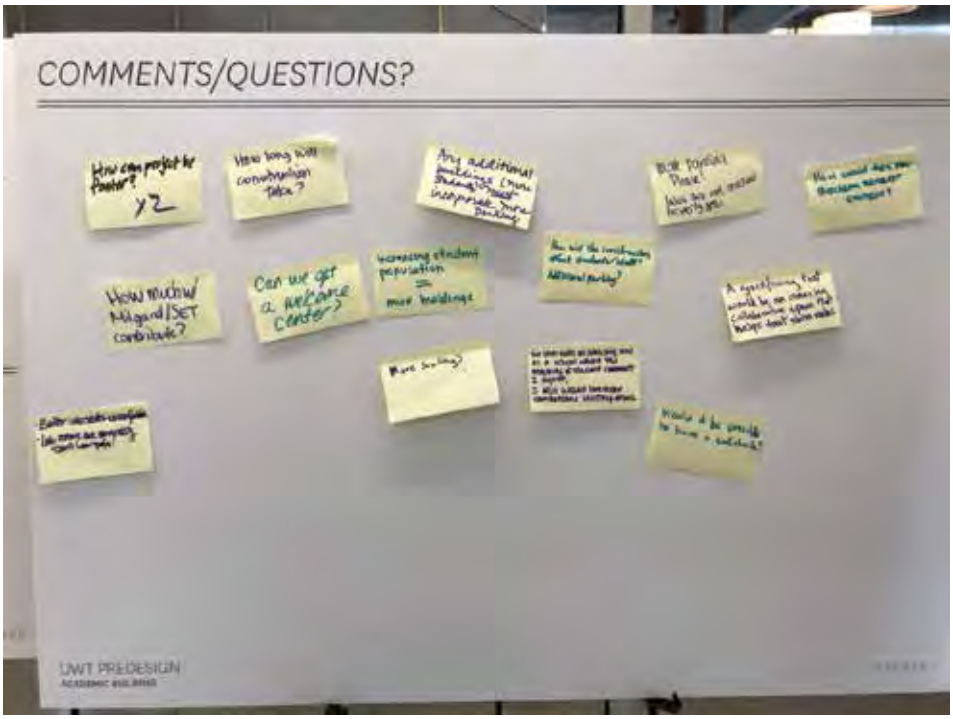
1. Need for parent-friendly space
    a. Bathroom/lounge
2. Food Options (x6)
    a. Grocery store
    b. Vending machines
    c. Work study options
3. Parking (x15)
    a. Commuter campus
    b. Current parking might go away
4. Gender-neutral bathrooms on all floors (x3)
5. Open, Green Space (x9)
    a. Site is one of few open, green spaces on campus
    b. Maintain "urban park"
6. Student gathering/collaboration space (x7)
    a. Break out space
    b. More seating options
7. Space to relax (commuter campus) (x2)
8. Ambitious sustainability/on-site water treatment (x4)
    a. Go beyond code for storm-water treatment
    b. On site power generation
    c. Green roof
    d. Sustainability features – laboratory for students & faculty
9. Long Process (x3) – questioned how long the process is
10. Adaptable Building
11. Student Welcome, Sense of Belonging, Safe, & Secure (x3)
    a. Minority space to feel safe and openly themselves
    b. Welcome Center
12. Need for active learning space (x2)
13. Need for safe, late night study space (x2)
14. Labs needs to be updated (x2) – currently noisy and hard to hear professors
15. Concern about how construction will affect students/staff
16. Natural Daylight
17. Wheelchair Accessibility
18. Pedestrian Friendly
19. Need space for Biomedical Science Students (x2)
    a. Labs, classrooms, etc.
20. Need space for Human Anatomy & Physiology Labs


Parent friendly
space –
? bathroom/lounge


COMMENTS/QUESTIONS?
Active learning space!
Food options?
VENDING MACHINES?
The chairs (the white metal ones) are not comfortable.
More hoods in a lab?
What's a campfire classroom?
PARKING!!
Breakout spaces?
CAMPUS SAFETY, LATE NIGHTS.
UW PREDESIGN

Appendix A5: PREDESIGN PROCESS DOCUMENTS





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Meeting Notes

Date:	25 April 2018	**Project:**	UWT Academic Building Pre-Design
Author:	Rachel Schopmeyer	**Project No:**	1801
Re:	Workshop 5	**Next Mtg:**	10 May 2018
Present:	UW Tacoma: Elizabeth Hyun (EH), Project Manager; Melony Pederson (MP); Patrick Clark (PC), Director of Campus Planning and Real Estate; Rupinder Jindal (RJ), Assistant Professor Milgard School; Joel Larson (JL), Director of Operations IoT; Raj Katti (RK), Dean and Professor of IoT; Jennifer Myers (JM), Construction Project Manager; Stanley M. Joshua (SJ), Director of Facility Services; Tessa Coleman (TC), Facility Manager; Patrick Pow (PP), Vice Chancellor for Information Technology Hacker: Stefee Knudsen (SK), Scott Barton-Smith (SB), Rachel Schopmeyer (RS) PLACE: Charlie Brucker (CB); Phoebe Bogert (PB) KPFF Civil: Nalini Chandran		
Cc:	Hacker: Will Dann, Stefee Knudsen		

1) SK - Intro and agenda

2) Project vision and business case
   a) Vision, JL – reference & tie project goals to the UWT strategic plan. It has high level goals and benchmarks, it touches on culture, community, equity.
   b) Business case – tie to strategic plan as well. Add a very specific line item for Milgard centers.
   c) Hacker to follow up with vision and business case for comments

3) Identity – discussion of colocation creating a third identity
   a) EH mentioned an external stakeholder's interest in the Stanford D-school and leveraging both programs' strengths and overlaps
   b) EH – programs for women could overlap and address a larger issue.
   c) PP – technology management is an overlap and something the schools can offer together. RK – engineering curriculum is moving toward offering management.
   d) Big picture overlaps are similar to what the D-school offers in teaching, innovation, creativity. Big picture, over time, a shared design center could be open to the entire campus. Entrepreneurship is another big picture overlap, including business model development, business planning. There is a course on these topics offered through the IoT
4) Program – the 130K sf program is more than two times the original ask, we will be prioritizing.
   a) Center for centers and associated offices

b) PP – existing auditorium spaces are used for events but do not work well because of VE
c) Questioning retail
d) Civil and Mechanical are RK's priorities, if they get funded
e) Hacker will make a 70K gsf, 100K gsf and 130K gsf scenario and describe the impacts of each.
f) RK/JL Large classrooms are a high priority that allow an increase in productivity.
g) A 70K gsf building may not have the same collaboration story.

5) Collaboration types
   a) Atrium
   b) Nodes along a path

6) Landscape update from Place
   a) Hillclimb/collaboration space
   b) Lab court
   c) Rooftop – including collaboration over food
   d) Business case for the Hillclimb – referencing PEC comment that the Hillclimb will only be developed along with a building project
   e) Discussion of different scales of Hillclimb work

7) SB reviewed the three preferred options, criteria included collaboration, Hillclimb, future development potential. Most important to the group were cost, campus engagement and master plan/campus goals. The campus has a lot of potential for growth.
   a) Refer to attached matrix for the project working team's evaluation of the preferred options, which ended with the selection of option 2.

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Meeting Notes

Date:	10 May 2018	**Project:**	UWT Academic Building Pre-Design
Author:	Caitie Vanhauer	**Project No:**	1801
Re:	Workshop 6	**Next Mtg:**	
Present:	UW Tacoma: Rupinder Jindal (RJ), Joel Larson (JL), Jennifer Myers (JM), Tessa Coleman (TC), Stanley M. Joshua (SJ), Patrick Clark (PC), Patrick Pow (PP), Elizabeth Hyun (EH), Hacker: Stefee Knudsen (SK) Scott Barton-Smith (SB), Caitie Vanhauer (CV)		
Cc:	Hacker: Will Dann, Rachel Schopmeyer		

1) Intro and agenda

2) Open House Summary
   a) Hacker highlighted concepts that will influence the business case:
      i) student gathering/collaboration space
      ii) space to relax – important for a commuter campus
      iii) ambitious sustainability goals

3) ASUWT Summary
   a) Hacker highlighted concepts that influence the business case:
      i) high interest in sustainability
      ii) accessibility beyond code requirements
      iii) diversity (specifically Native Americans)

4) Strategic Plan
   a) Key components that will influence the business case
      i) "Urban serving" campus
      ii) "Innovation drives growth" – SB asked the group what innovation do they see driving UWT's growth? Elizabeth commented that the co-locating of the business school and Institute of Technology is part of the innovation. There is also a discussion about how the strategic plan calls out that "growth is a measure of the relevance of our work to the future of the South Sound." This is a strong point that will be integrated into the report. UWT is not looking to grow for the sake of growing, they want to grow to remain relevant to the students/community they serve.

5) Mapping Exercise – Hacker asked the group to help by drawing the following missing pieces on the maps given (see attachment)

a) Hacker asked what the "boundary" of the South Sound is to them? The group agreed that it is best to leave as ambiguous because there is not a defined area. Although, the boundary shown could stretch further north to include more of Federal Way.
b) Community colleges - Institute students come from 4 local community colleges. Who are they? What about the business school?
c) Demographic maps from UW profiles were referenced –Elizabeth will give Hacker access to existing demographic information.
d) Tribal areas and locations – as per the ASUWT conversation
e) Socio-economic and racial diversity breakdown
f) Industry partners
    i) Who are they now? Who might they be in the future (especially with two new engineering programs)?
    ii) Follow ups with both programs and Elizabeth will be made to get this information.

6) MEP/Sustainability Update
    a) SB gave a summary on the work that PAE has been doing. He highlighted decisions that will dramatically influence the cost analysis.
    b) The master plan calls out ambitious goals such as the 2030 challenge and considering a "water budget." This aligns with the feedback from the Open Houses and ASUWT meeting.
    c) SB explained the 2030 targets and what that means for the building systems. For example, there will need to be on-site energy production, such as PV. Elizabeth stated that with a reduced budget, we will need to lean toward "PV-ready" ideas.

7) Milgard Tour Debrief
    a) Stefee gave a summary of the tour with Milgard. This helped define what Milgard sees as their "identity" in this new building. During the tour, the group talked about how they didn't like how much the Foster school stood out on campus. They felt that the scale of it did not align with the type of students at UWT. They want their identity to fit in with the rest of the campus and feel welcoming to students of UWT.
    b) Universal design vs. ADA:
        i) Promotes diversity
        ii) Currently in "accommodation" strategy

8) Business Case
    a) Meet pent up demands should be first – highest priority
        i) Students asking for these specific programs
        ii) Link to rural community – access to public university
        iii) Needs vs. wants – this is a need
    b) "Urban-serving" vs. "South Sound serving"
        i) "Urban-serving" is a Carnegie classification but most of the working team felt that "south sound serving" is more accurate. Pat Clark mentioned that "urban serving" sounds too narrow. "South sound serving" represents the communities and people they serve, both rural and urban.
    c) Innovation drives growth – co-location of programs
    d) Diversity/Accessibility – reflecting the South Sound demographic
    e) Ambitious Sustainability – reflecting goals of WA state, UW, and students/faculty

9) Co-location = collaboration
    a) Hacker talked about how co-locating these programs and their components within each program will generate a more collaborative environment.

b) Elizabeth mentioned that Cal Bamford can help craft language for this (reference: Stanford's d. school).

10) Program Prioritization Scenarios and influence on cost
    a) A realistic ask to the legislature will most likely be option 4 (prioritized and re-locating Civil Engineering program)
    b) The rest of the program could potentially be bridged with private donations and utilizing an existing Stoneway building (Civil Engineering).
    c) Submitting option 01 (Full program requests) would be a "sticker shock" to the legislature. Ultimately, they may not get funding if they go with Option 01.
    d) SAC will weigh in on this decision.

11) Precedent Update
    a) Mass Timber projects – Hacker showed examples of Mass Timber, academic buildings with similar programs.
        i) PC asks about local CLT manufacturers. Hacker will investigate this and get back to the group.
    b) Co-located Business and Engineering programs

12) Next Steps:
    a) Hacker is working toward sending a report draft to the committee on May 18.
    b) Hacker will be working with the cost estimator to finalize cost/budget analysis
    c) Workshop 7 will be a draft review looking at overall organization, images, and content.

Attachments: Workshop 6 Presentation + "South Sound" Mapping Exercise

Comments:

Link to Workshop 6 presentation: https://hacker.sharefile.com/d-s42882a5a76645efb

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Meeting Notes

Date:	10 May 2018	**Project:**	UWT Cost Estimating
Author:	Caitie Vanhauer	**Project No:**	1801
Re:	Cost Estimating	**Next Mtg:**	
Present:	UW Tacoma: Elizabeth Hyun (EH) JMB Consulting: Jon Bayles (JB) Mortenson: Keith Jurgens (KJ) Hacker: Stefee Knudsen (SK) Scott Barton-Smith (SB), Caitie Vanhauer (CV), Rachel Shopmeyer (RS)		
Cc:	Hacker: Will Dann		

1) Intro and agenda

2) Costs – Hacker asked if the project costs include soft costs and Jon Bayles confirmed that they do.

3) Jon Bayles will fill out C100 toward the end of the process.

4) Questions from Hacker/UWT:
   a) $/SF per type?
   b) Is the core/shell separated out?
   c) Should we be grossing everything the same? For example, grossing labs might be unnecessary
   d) Is the site contamination included in costs?
   e) How about the hill climb?

5) Contingency – this is included in line items, not added at the end

6) Contaminated soils – need to clarify about during and after construction

7) KJ from Mortenson explained that the key to reducing the budget will be to disturb the least amount of soil. SB talked about how labs need a lot of ground floor space (loading access and heavy machinery).

8) Parking – The campus has expressed a concern about losing the existing parking on the site. Since the existing spots are not technically UW spots, will we need to accommodate for displacing these spots as a part of this project?

9) Benchmarking: Jon Bayles explained his benchmarking process. He takes averages of all the benchmarks and categorizes the numbers into low, medium, and high numbers. During the costing process, the team discussed each line item and determined what the appropriate cost is for this project.
   a) Foundations and basement: will be very expensive because of contaminated soils and a high-water table
      i) Bothell had partial basement and CSE had some basement as well, so $15/sf
      ii) Foundations $25/sf
   b) Superstructure (all vertical, shear, roof, canopies): $75/sf
   c) Enclosure: $60/sf assuming brick to coordinate with rest of campus; leaves enough flexibility for design team (typical: $50/sf)
   d) Roofing: $8/sf – UW has specific standards for this
   e) Interior construction: $75/sf combined, plus about $6/sf for stairs (not for collaborative, communicating stairs)
   f) Convey: assumes 2 elevators – response to ASUWT group's concern with accessibility
   g) Plumbing: high numbers for sustainability, low lab compared to Bothell
   h) Mechanical: $60/sf for sustainability (2030 challenge)
   i) Fire: $4.50 (cheap, there's competition)
   j) Electrical: Bothell got stuck with the emergency power, CSE had redundancy $65/sf
   k) Equipment: includes demountable stage floors for adaptable classroom tiers, lab equipment, furniture $12/sf
   l) Site Prep: excavation and what we affect – assume $7.50/sf, study site area (about 80ksf, less footprint, = 60k)
   m) Site Improvements: include hill climb
      i) Basic $25, Better $35, Best $60 (Hill climb is about $45/sf x 60k sf)
   n) Utilities: $8/sf – similar to site prep

The team landed on $941/sf project cost. This number is not set in stone and will be adapted throughout this process.

Attachments:

Comments:

HACKER

733 Southwest Oak Street v 503-227-1254
Portland, Oregon 97205 hackerarchitects.com

Meeting Notes

Date:	10 May 2018	**Project:**	UWT OPR
Author:	Caitie Vanhauer	**Project No:**	1801
Re:	OPR Meeting	**Next Mtg:**	
Present:	UW Tacoma: Jon Bayles (JB), Keith Jurgens (KJ), Elizabeth Hyun (EH), Jennifer Myers (JM), Tessa Coleman (TC), Stanley M. Joshua (SJ) Obrien: Kathy Chang (KC), Elizabeth Powers (EP) PAE: David Mead Hacker: Stefee Knudsen (SK) Scott Barton-Smith (SB), Caitie Vanhauer (CV), Rachel Shopmeyer (RS)		
Cc:	Hacker: Will Dann		

1) Intro and agenda

2) OPR: Obrien is already under contract with UWT so okay to move forward with this process. They have been doing this for two years since Claire retired (CPO Sustainability Coordinator, LEED). Their role is to be the CPD Sustainability coordinator for all projects that are going LEED, representing the owner's expectations.
3) EP with Obrien explained why OPRs are now going to be included in predesign reports. In Summer 2016, in prep for 3 predesigns, they tried to get OPR's developed at the predesign stage (UWB phase 4 and Pop Health?)
    a) Requirements in predesign checklist only call for a commissioning plan, not for an OPR. Although, the first step in commissioning is to develop an OPR.
    b) They are pushing LCCA's earlier in the process
    c) For this project, they will start the process for predesign and further develop with design team, determining the basis of design.
    d) Their role is to be an owner representative: they will be the authors and design team will give feedback.

4) PAE
    a) David explained what they have heard from the University about their goals and hopes for building systems performance and its added value.
    b) PAE ran through the executive summary which outlined values dealing with energy, water, sustainability, carbon footprint, etc. in reference to the Master Plan and UW Infrastructure Plan. UW has signed on to meet the College and University President's Climate commitment, the Architecture 2030 challenge, and others (outlined in the Master plan).
        i) Path to achieve goals

(1) Energy: According to the 2030 Challenge, the EUI changes to 80% below the baseline. PAE's graph displayed that not only will the building need to incorporate energy saving strategies, it will require on-site energy generation.
(2) GHG Emissions: UW will need all new buildings to have zero emissions to offset existing building emissions.
(3) Water goals: the amount of rainfall on campus per year becomes the "water budget." In order to achieve this, the new building will need a rainwater catchment system, low flow fixtures, and possibly compostable toilets, etc.

ii) These goals come with a cost premium and if the state is serious about meeting these goals, they can't turn down funding for it (about a 5% premium).
(1) How should the project allocate funds to achieve these goals?
(2) When Claire was there, the legislature was scrutinizing more closely because some were not performing. How to find balance between program area, quality of finishes, and sustainability goals?
(3) Can we isolate the sustainability premium for meeting these goals to clearly identify what it means to meet these goals? This way, the state can adequately fund the project to meet the goals. By listing this separately, it will put the legislature on record for either supporting funding or not.
(4) The project will only go through OFM life cycle, but not for energy (negotiated out of PAE contract).
(5) The issue with LCCM's is that the payback is very long. Instead, we should approach meeting this criteria to meet goals, not the payback.

iii) What specifically is the state mandating?
(1) LEED Silver
(2) State emission targets state-wide: could reference state GHG targets; 2030 is just a way to hit those state targets
(3) Other goals are specifically UW and UWT – identify premium for those during design

5) OPR can utilize PAE's memo but will re-write in owner's voice
a) Design-build could include performance incentives for design-build team, with some specific requirements (done for Pop Health).
b) What of the design team analysis does UWT want to say in their OPR?
c) Pop Health does have action from UW Climate action plan and what it will take to achieve – the group acknowledges that this is ambitious and that predesign didn't do LCCA or LCCT's, so will need to challenge the design team to achieve some of this work

6) OPR Template:
a) (Part 4) LCC cost: will identify first cost, premiums, and information about long-term maintenance requirements later
b) Pull out goals and language from PAE's document
c) (Part 6): Required credits that they assume is needed, plus additional that UW offers for all projects
d) T2O "transition to occupancy" related to commissioning

7) Next Steps:
a) Obrien review the PAE memo and send Hacker any follow up questions
b) Obrien get UWT standards to reference in first draft
c) UWT PWT review the documents and comment
d) UWT read PAE report and comment on systems included
i) "second half of campus (west half)" starting the next set of systems
ii) Based on Life Cycle cost for future campus and for the state emission mandates

SITE
Hill Climb

PLACE HACKER

SITE
Lab Court

PLACE HACKER

SITE

Rooftop Gathering Space



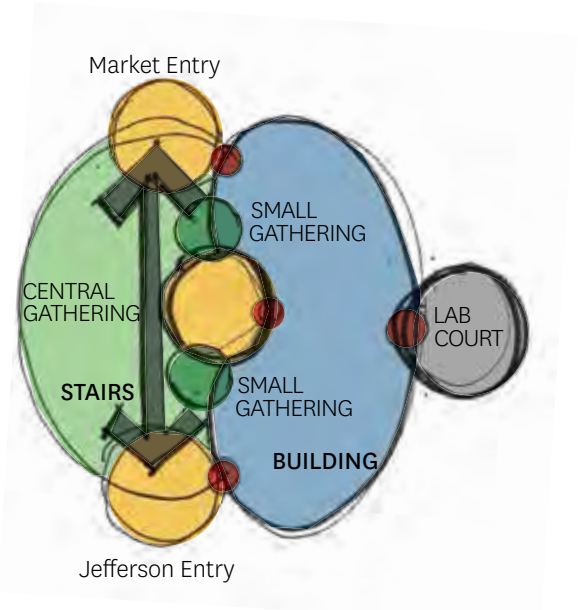


PLACE HACKER

SITE

Business Case for Hill Climb

- Provides essential circulation infrastructure as open space
- Reinforces the identity of the campus
- Connects community to campus from Market to Pacific (retail corridor)
- Expands wayfinding system with Hill Climb + Prairie Line Trail
- Supports building entries
- Provides multiple use/scale spaces for academic interaction
- Offers sunny gathering spaces for social interaction
- Integrates learning laboratory with stormwater features



PLACE HACKER

SITE

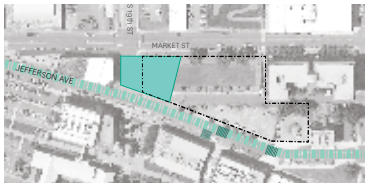
Business Case for Hill Climb

Baseline

Improve Jefferson Ave to be Pedestrian First Corridor with improved 19th St. intersection

Baseline + Partial 19th Closure

Improve Jefferson Ave to be Pedestrian First Corridor with 19th one way westbound + expanded hill climb



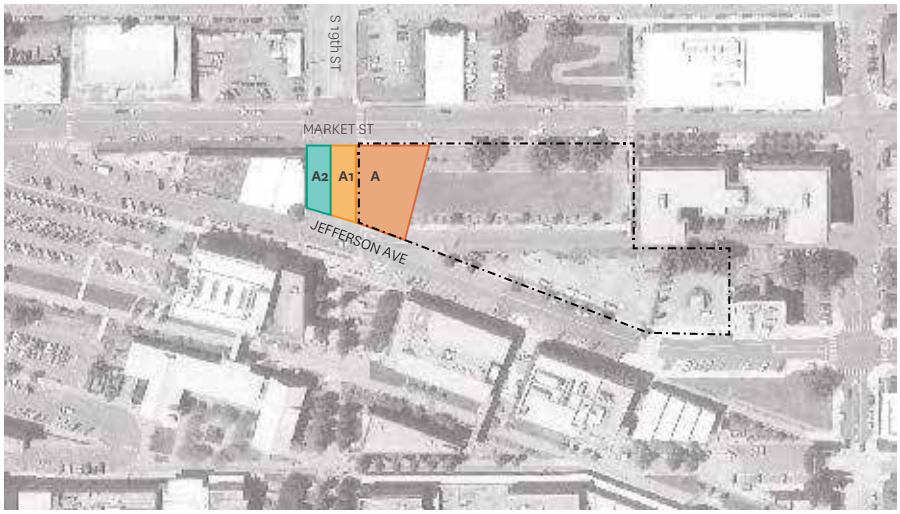
Baseline + 19th Closure

Improve Jefferson Ave to be Pedestrian First Corridor with 19th closed and full hill climb

PLACE HACKER

SITE

Business Case for Hill Climb



Hill Climb Improvements

A Baseline
Develop Hill Climb open space with circulation, gathering spaces and landscape. No change to 19th St.
$700,000-$900,00

A1 Baseline + Partial 19th Closure
Develop Hill Climb open space and eastbound lane of 19th St.
$900,00-$1,500,000

A2 Baseline + 19th Closure
Develop Hill Climb open space and both lanes of 19th St.
$1,500,000-$1,800,000

PLACE HACKER


PAE
UW Tacoma
Predesign System Benchmarking
6/22/2018
pae-engineers.com

Executive Summary

OVERVIEW

The existing master and infrastructure plans ask for the following.

SUSTAINABILITY

In developing policies and plans to advance sustainability on the campus the following should be considered:

As a member of the "American College and University Presidents' Climate Commitment," the UW is committed to include:

- Completing a comprehensive inventory of all greenhouse gas emissions (including emissions from electricity, heating, commuting, and air travel) .
- Establishing a target date for climate neutrality .
- Requiring all new campus buildings to meet at least a LEED™ Silver Standard .
- Requiring all new appliances and computers to meet Energy Star requirements .
- Purchasing or producing at least 15% of the institution's electricity consumption from renewable sources.
- Site Lighting -Site lighting should be designed to meet Sustainable Sites, Credit #8 - Light Pollution Reduction
- Water Efficiency - Building water use should be 40% less than the performance requirements of EPACT 1992 .
- Measurement and Verification (M&V) - Future building projects should pursue the LEED™ M&V point in order to help future design teams predict the infrastructure needs for the campus and compare them to the goals indicated in this section of the master plan
- The Infrastructure Master Plan recommends that all new buildings on campus should be designed to meet the requirements of the Architecture 2030 challenge
- Currently, the campus uses approximately 5 million gallons of water. The master plan recommends that all future buildings use 40% less water than the performance requirements of EPACT 1992 . If these goals are met, the campus will use approximately 26 million gallons at full build out, which is well within the "natural water budget". If the options presented in the civil infrastructure section of this document for stormwater and greywater reuse are implemented, then the campus water use at full build out is reduced to approximately 15 million gallons per year.
- The table below from the infrastructure plan shows the water goals for new buildings:

Type Code	Code	Master Plan Goal	Reclaim
	(gallons/sf)	(gallons/sf)	(gallons/sf)*
Residential	20.0	12.0	7.2
Academic	4.0	2.5	0.5
Academic Science	30.0	15.0	3.8
Library	10.0	6.0	1.8
Student Life	30.0	15.0	9.0
Facilities	10.0	6.0	1.8
	5.5	3.3	0.5

- The table below from the infrastructure plan shows the EUI goals for new buildings:

Space Type	EUI (kBtu/SF/year)	
	Existing	2039
Residential	102	36
Academic	80	28
Academic Science	206	72
Library	86	30
Student Life	90	32
Facilities	104	36
Unassigned/ Retail	160	56
Not Used	160	56
Weighted Average	112	65

PATH TO ACHIEVE GOALS

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

ENERGY GOALS

The Architecture 2030 challenge sets rigorous energy reduction goals that are lower than the target EUI numbers shown in the infrastructure plan. Since the masterplan says projects need to comply with the 2030 challenge the following pages show what the baseline and target EUI values could be for the project. In order to achieve the target EUI the project will need to implement many energy conservation measures and potentially generate energy on-site with solar panels. A list of these ECMs is shown on the following pages.

GREENHOUSE GAS REDUCTION GOALS

In order for the project to meet the greenhouse gas reduction goals for the State of Washington and UW Tacoma it should seriously consider being a net zero carbon building. This would allow the project to not add any additional GHG emissions to the state or campus usage. In order to achieve this the building would need to achieve excellent efficiency, limit the use of refrigerants with high global warming potentials and generate electricity on-site.

WATER GOALS

The master plan calls for projects to live within their natural water budget (meaning projects only use the amount of water that lands on their roof throughout the year). In order for the project to achieve this the building may need to implement the following items:

- Low-flow fixtures
- Potential for ultra-low flow fixtures (like waterless urinals and composting toilets)
- No potable water for non-potable uses (this means graywater or rainwater will be used to flush toilets and urinals).
- Rainwater capture and reuse (could be used for potable water, flushing fixtures and irrigation)
- Graywater capture (from showers and lavatories) and reuse (could be used for irrigation and flushing fixtures)

Predesign Mechanical & Plumbing Options

OVERVIEW

A goal of the predesign effort is to establish performance goals for the project along with system concepts that support these goals. The concepts can then be priced and proposed for funding to the legislature. The goal of this narrative is to help establish quantifiable performance goals.

SUSTAINABILITY GOALS

The building will be designed to meet the requirements for a USGBC LEED Silver certification. A gold or platinum certification will be evaluated as the design progresses to see what could be achieved within the project budget.

WHAT IS SUSTAINABILITY?

Sustainable design is often referred to as green design or high performance. In a traditional organization, decisions are made based on the economic bottom line approach, which is generally only concerned with short term cash flows. A sustainable approach looks at the triple bottom line – economy, ecology, and equity. Decisions are made with concern for the balance between profitability, preserving our natural systems, and benefiting the needs of society.

THE PATH TOWARDS SUSTAINABILITY

There are 6 main steps to take in designing and maintaining a sustainable building.

SUSTAINABILITY GUIDELINES

The design team will review for consideration the following sustainable design guidelines into the project design:

- The US Green Building Council's LEED Rating System - LEED Silver Minimum
- The Architecture 2030 Challenge
- STARS by AASHE
- UW Climate Action Plan
- UW Campus Water Use

ARCHITECTURE 2030

The upper chart to the right show the architecture 2030 baseline values for college/university and laboratory buildings. The baseline for the college/university building was established using the Target Finder from the Environmental Protection Agency (EPA). The laboratory value was established using data from Labs 21 and labs in the benchmarking data from the City of Seattle.

Labs are challenging to benchmark as their energy usage can vary dramatically based on the types of activities implemented in the labs. This building intends to have labs that are focused on physical activities (thus avoiding the usage of chemicals or biological materials). The estimated baseline value is an EUI of 200. The blended baseline was calculated based on the current program areas.

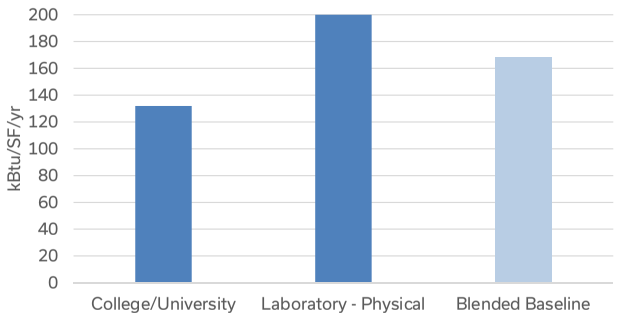
The architecture 2030 challenge target values are shown in the image to the lower right with Energy Use Intensity (EUI) values of 34 and 17. If the project is funded soon the 2020 goal should apply.

WATER BUDGET

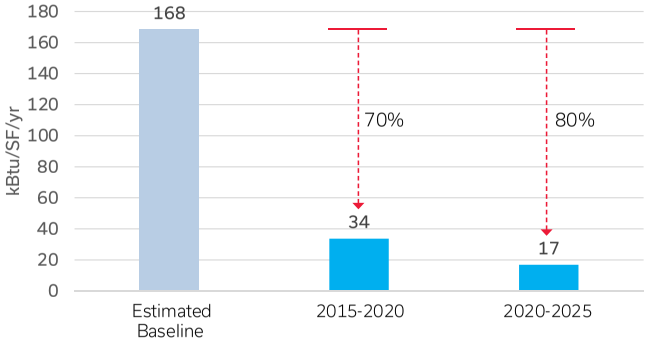
A highly sustainable building would use no more water than the amount of rainfall that falls on its roof annually. All rainwater that falls on the site would be used or retained on the site. Finally, all wastewater generated in the building would be treated on the site.

Tacoma, Washington receives approximately 39-inches of rainfall annually. By reclaiming this rainwater and designing building and landscape water systems to reduce consumption as much as possible, the project hopes to live within this natural water budget.

Architecture 2030 Baseline Values



Architecture 2030 Target Values



Energy Targets

ENERGY BUDGET

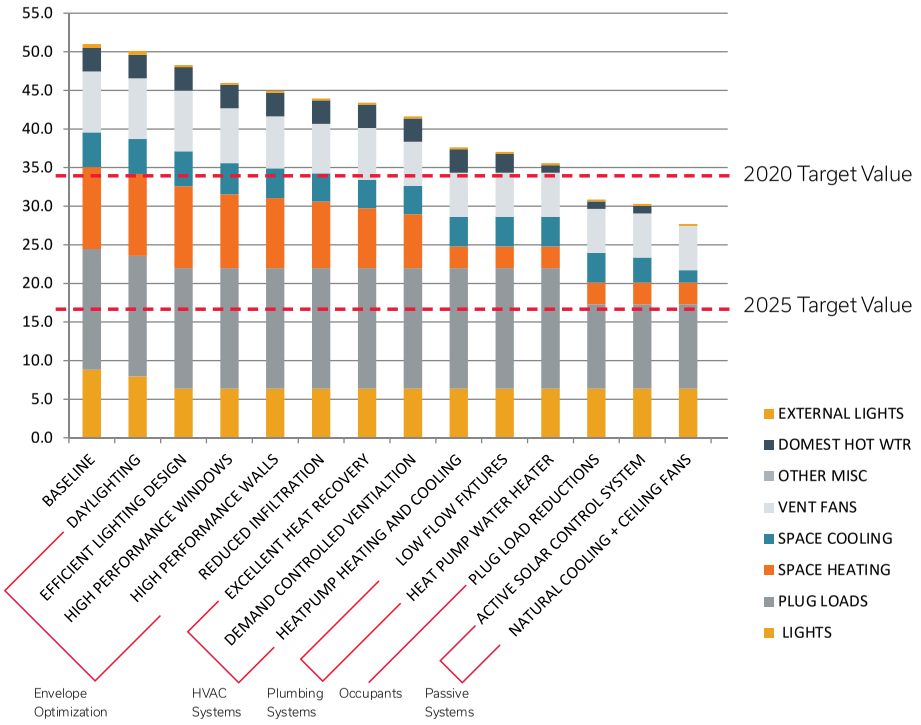
Sustainable design requires a careful analysis of the building's energy use and the source of that energy. Since laboratory buildings are 4 to 6 times as energy intensive as a typical office building, they present many opportunities to reduce energy consumption. Ideally, a sustainable building would produce its own power without generating any pollution or purchase its power from a renewable source (i.e. fish friendly hydro, bird friendly wind, photovoltaics, etc.). In addition, it would use no fossil fuels.

A highly sustainable building would use no more energy than the amount present on the site, which may include solar, wind, geothermal, tidal, etc. The solar energy that hits the roof of our building would be adequate to meet the energy needs of the building.

A preliminary analysis based on data collected for similar buildings indicates the following estimated breakdown of energy consumption among various uses. The data is informative in identifying where to focus for greatest potential savings.

The energy conservation measures noted are very rough estimates of what could potentially be saved. The next page outlines what could be included in these based on the groupings noted at the base of the ECM chart.

Energy Conservation Measure Example to Meet the Architecture 2030 Targets



Greenhouse Gas Emissions

GREENHOUSE GAS EMISSIONS

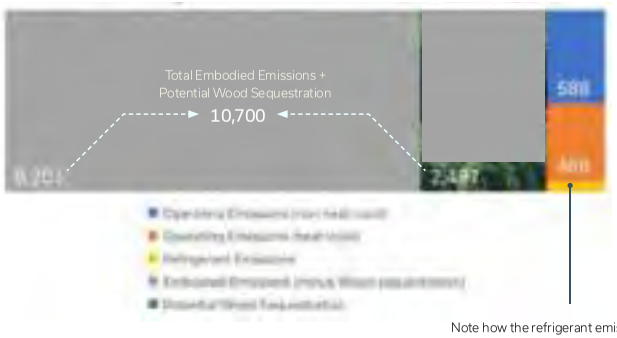
The project should look at greenhouse gas emissions holistically including operating, refrigerant and embodied emissions. The charts to the right show very rough estimates on where the emissions could land. The gray boxes represent the embodied emissions (from manufacturing, construction, maintenance and end of life). Note how this is the largest source of emissions over 30 years.

Wood construction has the potential to sequester significant amounts of carbon. The box with the trees shows a very rough estimate of what could be possible for the building.

The upper chart shows the impacts of utilizing a centralized heatpump while the lower chart shows the impacts of a variable refrigerant flow (VRF) system. Note how the VRF system's refrigerant emissions are higher than the heating and cooling emissions. If emissions reductions are part of UW Tacoma's plan the use of VRF systems should be avoided until they can offer refrigerants without high global warming potentials. At the time of this report no VRF systems offer this technology.

HOLISTIC GREENHOUSE GAS ANALYSIS - CENTRAL HEATPUMP (NO WOOD SEQUESTRATION)

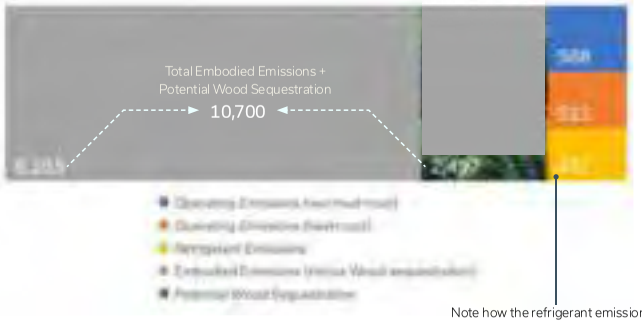
(GHG Emissions MT CO2e /30 year)



Note how the refrigerant emissions are extremely small portion of the overall emissions.

HOLISTIC GREENHOUSE GAS ANALYSIS - VRF EXAMPLE

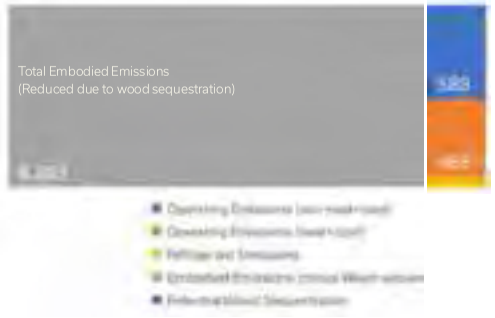
(GHG Emissions MT CO2e /30 year)



Note how the refrigerant emissions are almost as high as the operating emissions for heating and cooling the building. This is due to the large quantities of refrigerants installed in VRF systems.

HOLISTIC GREENHOUSE GAS ANALYSIS - CENTRAL HEATPUMP (WITH WOOD SEQUESTRATION)

(GHG Emissions MT CO2e /30 year)



The total emissions are shown to the left with the amount sequestered by wood subtracted from the total embodied emissions.

These embodied emissions could be offset with wood sequestration


Preliminary Geotechnical Engineering Services Report
Proposed Academic Building
South 19th Street and Market Street
University of Washington-Tacoma
for
University of Washington-Tacoma
June 21, 2018
GeoEngineers
Earth Science + Technology

Preliminary Geotechnical Engineering Services Report

Proposed Academic Building
South 19th Street and Market Street
University of Washington-Tacoma

for
University of Washington-Tacoma

June 21, 2018

GeoEngineers

1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

Preliminary Geotechnical Engineering Services Report

Proposed Academic Building
South 19th Street and Market Street
University of Washington-Tacoma

File No. 0183-130-00

June 21, 2018

Prepared for:

University of Washington-Tacoma
Capitol Projects Office
1900 Commerce Street
P.O. Box 358490
Tacoma, Washington

Attention: Elizabeth Hyun

Prepared by:

GeoEngineers, Inc.
1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

Brett E. Larabee, PE
Geotechnical Engineer

Dennis (D.J.) Thompson, PE
Associate

BEL:DJT:tt

GeoEngineers

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LIST OF FIGURES

APPENDICES

INTRODUCTION AND PROJECT UNDERSTANDING

This report contains the results of our preliminary geotechnical engineering services for use in pre-design services related to the proposed Academic Building at the University of Washington Tacoma (UWT) campus. Our understanding of the project is based on our discussions with you and our experience working with the UWT.

We understand that the UWT intends to build a new Academic Building on the currently undeveloped lot located to the northeast of the Market Street and South 19th Street intersection. The proposed site is generally bounded by Jefferson Avenue to the east, South 19th Street to the south, Market Street to the west and the Court 17 Apartments and Pinkerton Building to the north. A vicinity map is provided as Figure 1.

Conceptual plans for the building are in a preliminary stage to evaluate costs and overall layout. However, we understand that a multistory building is envisioned and that UWT plans to deliver the building via a Design-Build contract. We anticipate that conventional spread footings will be the preferred foundation type for the project based on our understanding of geology in the area and our experience working on the UWT campus. We also anticipate that site development work could include site grading and construction of temporary or permanent shoring and development of permanent below-grade elements such as basements, elevator shafts and vaults.

PURPOSE AND SCOPE OF SERVICES

The purpose of our services is to provide preliminary geotechnical recommendations for pre-design of the building based on our experience and existing subsurface information in the project vicinity. We are also completing environmental pre-design services for this project, which are summarized in a separate report. Our services were completed in general accordance with our signed agreement dated March 29, 2018. We have prepared this document as a draft report dated April 19, 2018.

PRIMARY GEOTECHNICAL CONSIDERATIONS

The following is a list of primary geotechnical considerations based on our current understanding of the project and the soil conditions at the site. Our detailed recommendations are provided in the following sections.

- Earthwork at the site can likely be completed using conventional earthwork equipment. Cut slope inclinations on the order of 1.5H to 1V (horizontal to vertical) are feasible for soil types at the site. Temporary shoring walls may be necessary to support steeper cut slopes.
- Shallow excavations at the site could encounter groundwater. Dewatering systems may be necessary to construct temporary shoring and to complete deeper excavations at the site.
- Soil conditions at the site are favorable for supporting the proposed building on shallow foundations. We recommend that shallow foundations bear on very dense glacially consolidated soils or on structural fill extending to these soils. The depth to glacially consolidated soil varies across the site and is generally between 2 and 8 feet below existing site grade.

- The majority of site soils contain a significant amount of fines and will be difficult or impossible to work with when wet. Additionally, on-site soils may be generated at a moisture content above what is optimum for compaction and may need to be dried out before reuse. For planning purposes, unless earthwork is planned for periods of dry weather or considerations made to allow site soils to dry out during earthwork, we recommend avoiding the use of on-site material as structural fill. Re-use of site soils will also need to consider the potential for encountering contaminated soil as described in our Environmental Services Report.

Site Conditions

Literature Review and Site History

Based on our review of the *Geologic Map of the Tacoma South Quadrant* (Troost in and Booth in review) the project site is underlain by ice-contact deposits. This material was deposited during glaciation that occurred about 10,000 to 15,000 years ago. Ice contact deposits are described in the literature as interbedded outwash (sand and gravel), lacustrine beds (fine-grained sand and silts) and glacial till. Locally, the ice-contact deposits are generally comprised of sand and gravel in a silt matrix.

The project site has had multiple generations of development dating back to around 1888. Prior development has included residential homes, fuel stations, industrial building and most recently a nursing home that was demolished in 2000. A more detailed description of the development history at the site is provided in our Environmental Services Report.

Surface Conditions

The project site is situated on a hillside that grades downward from the western site boundary (Market Street) to the eastern site boundary (Jefferson Avenue). Court C generally divides the east and west half of the property. The existing ground surface elevation along the Market Street site boundary is around Elevation 124 feet (elevations referenced to NGVD29). The elevation along the Jefferson Avenue site boundary grades between about Elevation 105 in the southeast corner of the site and Elevation 89 feet in the northeast corner of the site.

Market Street is an asphalt surfaced two-lane roadway with a center turn lane and parallel curb parking. The grade separation between Market Street and Court C is accommodated by a cut slope inclined at between 2H:1V and 1.5H:1V. The portion of the site between Market Street and Court C has been developed as a park. Court C is a two-lane road paved with bricks. The portion of the site between Court C and Jefferson Avenue is currently used as parking. Some sections of the parking areas have been paved and others are surfaced with gravel. Grade change between Court C and Jefferson Avenue is accommodated by an approximately 4- to 8-foot-tall cast-in-place retaining wall and by cut slopes inclined at around 1.5H:1V. Jefferson Avenue is a two-lane roadway with angle in parking on the east side of the street. Other improvements around the site include sidewalks, landscaping, hardscaping, trees and streetlights.

Soil and Groundwater Conditions

Our understanding of subsurface conditions at the project site is based on our experience working in the vicinity and our review of previously completed explorations located within and around the site. The Site Plan, Figure 2, shows the approximate locations of relevant subsurface explorations in the project vicinity. Over 35 explorations have been completed in the project vicinity, however, in many cases these

explorations were not completed for geotechnical purposes and they provide limited geotechnical information. For this report we have selected relevant explorations that, in our opinion, are most appropriate for geotechnical considerations. These explorations are included in Appendix A. Our Environmental Services Report contains additional explorations logs not included in this report.

Site and Soil Conditions

The site is surfaced with landscaping in the form of grass, barked covered slopes and isolated areas of trees and shrubs. Other areas are surfaced with hardscape consisting of asphalt concrete, Portland cement concrete, brick pavers and sidewalks. Based on our review, subsurface conditions below the surfacing likely consist of fill material underlain by native glacially consolidated soils. Based on our interpretation of the explorations shown on the Site Plan (15 total), 10 of the explorations encountered between 4 and 8 feet of fill, four of the explorations encountered less than 4 feet of fill, and one exploration encountered no fill. Fill depths are generally deepest near the Market Street and Jefferson Avenue site boundaries. The reviewed explorations were completed prior to the most recent grading of the park area. We understand that between 1 to 3 feet of fill was placed in the park area during construction. This fill thickness is not accounted for on the included exploration logs.

Fill soil described on the exploration logs primarily consisted of silty sand with variable gravel content. Relative density of the fill described on the logs ranges between "loose" and "dense." Standard penetration tests (SPTs) were not completed within the fill unit in the explorations we reviewed so a quantitative measurement of fill density was not available. Based on our experience, we expect that the condition of the existing fill across the site will vary. In some areas the existing fill may be an engineered fill that was placed in lifts and adequately compacted and in some areas the fill material could contain debris and other deleterious material and may not have been compacted during placement.

Glacially consolidated soil underlies the fill. The glacially consolidated soil is comprised of two primary geologic units, ice-contact deposits (Qvi) and advance outwash (Qva). Both of these units are glacial in origin and were consolidated by the weight of the glacier after deposition. Based on conditions described on the reviewed exploration logs, the upper 5 to 10 feet of the glacially consolidated soil layer will likely comprise of medium dense to very dense silty sand and very stiff to hard silt (ice-contact deposits). The hard silt layer typically separates the ice-contact and advance outwash geologic units. The advance outwash soils are typically comprised of sand with variable silt and gravel content. The glacially consolidated soils in the area can vary over relatively small distances and can contain coarse gravel, cobbles, and boulders.

Groundwater Conditions

There are two main water-bearing zones at the site. A "shallow" aquifer is present with the ice-contact deposits. Sand and gravel seams within the ice-contact deposits could potentially be part of a former glaciation drainage channel within the ice-contact deposits. This drainage channel has been encountered at other project locations around the site and can carry a significant amount of water. A hard silt layer described on the borings typically separates the shallow aquifer and "deep" aquifer. The deep aquifer is located within the predominantly sand soils (advance outwash) below the silt layer.

Based on our previous groundwater studies in the project vicinity we expect that the level of water in the shallow groundwater aquifer will likely vary between Elevation 105 feet on the west side of the site and around Elevation 75 feet on the east side of the site. Depending on existing site grade, the groundwater level within the shallow aquifer can be within 3 to 4 feet of existing ground surface (see exploration logs for

A11-MW10S and A11-MW11S). The general direction of the groundwater flow within the shallow aquifer trends topographically downgradient towards the east. Groundwater within the shallow aquifer likely flows through sand seams and interbedded gravel within the ice-contact deposits. Groundwater flow within the shallow aquifer could be influenced by underground utilities in the area, comprising a preferential pathway.

The level of the deep aquifer is expected to vary between about Elevation 95 feet on the west side of the site and around Elevation 55 feet on the east side of the site. The groundwater flow direction is generally to the east/northeast within the deep aquifer. The deep aquifer can be under confined conditions with artesian/sub-artesian pressure.

Based on our experience in the area, the aquifers can produce rapid groundwater seepage. Groundwater levels will fluctuate throughout the year and can be influenced by precipitation events. Additional information regarding the relative locations of the two aquifers and a more detailed description of site hydrogeology is provided in our Environmental Services Report.

Seismic Design Considerations

We used map-based methods to develop seismic design parameters, in general accordance with 2015 IBC. The recommended seismic design parameters are shown in Table 1.

TABLE 1. SEISMIC DESIGN CRITERIA

2015 IBC Seismic Design Parameters	
Site Class	C
Spectral Response Acceleration at Short Periods (S_S)	1.293g
Spectral Response Acceleration at 1-Second Periods (S_1)	0.504g
Design Peak Ground Acceleration (PGA_M)	0.50g
Design Spectral Response Acceleration at Short Periods (S_{DS})	0.862g
Design Spectral Response Acceleration at 1-Second Periods (S_{D1})	0.437g

Liquefaction, Lateral Spreading and Surface Rupture

Liquefaction refers to a condition where vibration or shaking of the ground, usually from earthquake forces, results in development of excess pore pressures in loose, saturated soils and subsequent loss of strength. In general, soils that are susceptible to liquefaction include loose to medium dense “clean” to silty sands that are below the water table. Completing a liquefaction analysis was beyond our scope of work; however, based on the soil and groundwater conditions described in the reviewed explorations and our understanding of geology in the area, it is our opinion that the potential for liquefaction at this site is low.

Lateral spreading related to seismic activity typically involves lateral displacement of large, surficial blocks of non-liquefied soil when a layer of underlying soil loses strength during seismic shaking. Due to the low liquefaction risk at the site, in our opinion there is a low risk of lateral spreading occurring during a seismic event.

According to the Washington State Department of Natural Resources Interactive Natural Hazards Map (accessed April 9, 2018), there are no known faults identified at the site and in our opinion the risk for surface rupture at this site is low.

Shallow Foundations

Footing Bearing Surface Preparation

Based on conditions described on the reviewed exploration logs and our experience in the project vicinity, it is our opinion that shallow foundations bearing directly on proof-compacted glacially consolidated soils or on structural fill extending to these soils, should provide adequate bearing support for the proposed building. The depth to the glacially consolidated soil in the reviewed exploration logs typically varied between about 2 and 8 feet bgs; however, the depth to these soils could vary across the site. We recommend that the project schedule and budget include contingencies for removal of fill below foundations.

Minimum Footing Size and Embedment

Exterior footings should be established at least 18 inches below the lowest adjacent grade. Interior footings can be founded a minimum of 12 inches below the top of the floor slab. Isolated column and continuous wall footings should have minimum widths of 24 and 18 inches, respectively.

Bearing Capacity

The footing design parameters provided below should be considered for preliminary design only and may need to be revised. More details about the structural support system, foundation loads, along with additional subsurface information will be required before final foundation design parameters can be established.

For preliminary design, we recommend footings founded as recommended above be proportioned using an allowable bearing capacity of 5,000 pounds per square foot (psf). Additional bearing support from the glacially consolidated soils may be available; however, more details regarding the footing dimensions, loading conditions and settlement tolerances will need to be known to evaluate using a larger bearing capacity.

The provided preliminary bearing pressure applies to the total of the dead and long-term live loads and may be increased by one-third when considering total loads, including earthquake or wind loads. These are net bearing pressures. The weight of the footing and overlaying backfill can be ignored in calculating preliminary footing sizes.

Foundation Settlement

The potential and magnitude of foundation settlement is dependent on the foundation loads, foundation dimensions and soil conditions below the foundations. We did not identify soils on the reviewed exploration logs that in our opinion are susceptible to long-term settlement under constant loading (consolidation-type settlement). In our opinion, the biggest risk for settlement at this site will be settlement as the result of improperly prepared bearing surfaces or the presence of uncompacted fill below foundations. Preparing foundation bearing surfaces as recommended and properly placing and compacting all structural fill below footings can greatly reduce the risk for foundation settlement.

Provided the bearing surfaces are prepared as recommended and fill materials are adequately compacted, we anticipate that total settlement of foundations can be limited to 1 inch or less for the bearing capacity provided and structure type envisioned at the site. Differential settlements are anticipated to be about half

this amount for comparably loaded footings. Actual building loads and foundation sizes and locations should be evaluated to determine a final settlement estimate.

Lateral Resistance

Lateral loads on foundation elements may be resisted by passive resistance on the sides of footings and by friction on the base of footings. Passive resistance may be estimated using an equivalent fluid density of 350 pounds per cubic foot (pcf) for level backfill surfaces, assuming the backfill consists of structural fill or dense native glacially consolidated soils for a horizontal distance of at least 2.5 times the depth of the footing. The top foot of soil should be neglected when calculating passive resistance unless the area is covered by pavement or a slab-on-grade. For foundation bearing surfaces consisting of conditions and prepared as recommended, frictional resistance may be estimated using 0.4 for the coefficient of base friction.

The above values include a factor of safety of about 1.5 for assumed soil conditions. The passive earth pressure and friction components may be combined provided that the passive pressure component does not exceed two-thirds of the total.

Perimeter Footing and Below-Slab Drainage

For preliminary design purposes we recommend that exterior footing drains and below-slab drainage be included in order to maintain bearing support and promote dry conditions around and within the structure footprint. Depending on the established footing elevations, it may be possible to eliminate drains as the design progresses. We should be consulted before removing footing or below slab drains from the project plans.

Footing drains should be installed at the base of exterior footings and include cleanouts. The underslab drainage system should be installed below the slab of the lowest level of the building and include interior transverse drains located between the transverse foundation elements. The pipes should be installed so that at least one drain is located between each pair of transverse foundation elements and has a maximum spacing of 30 feet. All drains at the site should have adequate slope (typically 1 percent or more) to allow positive drainage to appropriate discharge locations. Some variation of pipe location is acceptable to accommodate other utilities, foundation elements and other conflicts below the slab.

The drains should be installed within a 12-inch deep trench and consist of at least 4-inch-diameter perforated pipe placed on an approximate 3- to 4-inch bed of and surrounded by 5 to 6 inches of drainage material enclosed in a non-woven geotextile fabric to prevent fine soil from migrating into the drain material. The drainage material should consist of material recommended in the “Retaining Wall” section of this report.

Discharge systems must consider the potential for collecting contaminated groundwater, which is described further in our Environmental Services Report.

Slab On Grade

Conventional slab-on-grade floors expected for the structure can bear on native glacially consolidated soils or on a minimum of 2 feet of compacted structural fill underlain by existing fill provided the subgrade is prepared in accordance with the “Subgrade Preparation and Evaluation” section of this report. In all cases,

the exposed soil should be compacted to a firm and unyielding condition. Structures with heavier floor loads or mat type foundations may require removal of the existing underlying fill.

We recommend the slab-on-grade floors be underlain by a minimum 6-inch-thick capillary break layer consisting of clean sand and gravel, crushed rock, or washed rock. The capillary break material should contain less than 3 percent fine material based on the percent passing the ¾-inch sieve size. For subgrades prepared as recommended, we recommend slabs-on-grade be designed using a modulus of subgrade reaction of 250 pounds per cubic inch (pci). We estimate that settlement for slabs-on-grade constructed as recommended will be less than ¾ inch for a floor load of up to 500 psf.

Below slab drainage is recommended and is discussed in the "Perimeter Footing and Below-Slab Drainage" section above.

Permanent Retaining Walls and Below-Grade Structures

Drainage

Drainage systems must be included behind permanent walls and below-grade structures to collect water and prevent the buildup of hydrostatic pressure against retaining walls. We recommend the drainage system include a zone of free-draining backfill a minimum of 18 inches in width placed against the back of the wall. Free-draining backfill should conform to the WSDOT Standard Specification 9-03.12(2) "Gravel Backfill for Walls." The free-draining backfill zone should extend to within about a foot of the full height of the wall. A perforated rigid, smooth-walled drain pipe with a minimum diameter of 4 inches should be placed along the base of the wall within the free-draining backfill and extend for the entire wall length. Cleanouts should be installed within the drain pipe to allow for access to clean the system. Other drainage features such as roof drains or downspouts should not be connected to wall drainage systems. Discharge systems must consider the potential for collecting contaminated groundwater, which is described further in our Environmental Services Report. It may be possible to consider foundation drainage systems to act as an outlet for wall drainage systems provided that adequate flow and pipe sizing is provided. We should be consulted to review retaining wall drainage systems prior to final design and development.

Permanent Retaining Wall Lateral Earth Pressures

For walls free to yield at the top at least one thousandth of the wall height (i.e., wall height times 0.001), an equivalent fluid density of 35 pounds per cubic foot (pcf) may be used for design for the level backfill and drained condition. Restrained walls (walls not allowed to rotate at least 0.001 times wall height) should be designed using an equivalent fluid density of 55 pcf for the level backfill and drained condition. These values should be increased by 50 percent for sloping conditions behind walls provided that slopes to not exceed 2H to 1V in inclination. Lateral resistance values for permanent retaining walls are anticipated to be similar to those provided in the shallow foundations section of this report.

For seismic loading conditions, a rectangular earth pressure equal to 10.5*H psf, where H is the height of the wall (in feet), should be added to the active pressures provided above. If the wall is designed for an at-rest condition, but is assumed to move during seismic conditions, then it is appropriate, in our opinion, to combine the seismic surcharge with the active pressure.

If traffic is allowed to operate within one-half the wall height from the top of the wall, we recommend a traffic surcharge equal to an additional 2 feet of soil be added. Other surcharge loads, such as from

foundations, construction equipment, construction staging areas or sloping backfill conditions should be considered on a case-by-case basis. We can provide lateral pressures for specific loading conditions as the design progresses.

Temporary Retaining Structures

General

Temporary retaining systems used for construction on similar projects in the vicinity include soldier piles walls (with and without tiebacks) and soil nail walls. We envision that either wall type will be appropriate for this site; however, during construction of soil nail walls, sloughing and difficulties are more likely to occur in areas of fill, depending on the condition. These wall types are described in more detail below. Design earth pressure distribution and magnitude varies for each wall type and soil type. Specific design earth pressure diagrams will need to be developed depending on the wall type selected. The lateral earth pressures provided for permanent retaining structures above can be used for preliminary costing but must not be used for final design of temporary walls.

Groundwater, including the potential for groundwater under artesian pressure could be encountered during installation of shoring and shoring elements. Dewatering may be necessary in order to construct shoring walls. Depending on how the walls are constructed, they may need to be designed to withstand hydrostatic pressures from groundwater.

The contractor should be prepared to encounter coarse gravels, cobbles and boulders during temporary wall construction. Casings have been necessary to install horizontal and vertical elements on projects in the vicinity. Casings may also be necessary due to the presence of groundwater.

Soldier Pile Walls

Soldier piles are typically vertical steel H-piles installed in a drilled hole backfilled with concrete. Soldier piles are commonly spaced at regular intervals of 5 to 10 feet located around the perimeter of an excavation. Lagging is installed in between the piles to retain the soil and transfer the load of the soil to the piles. Soldier pile walls can be cost effectively designed as cantilevered systems up to free face heights of about 10 to 15 feet. Tieback anchors can be used for wall heights where cantilever soldier pile walls are not cost effective. Tieback anchors should extend far enough behind the wall to develop anchorage beyond the “no-load” zone and within a stable soil mass. It is common for tiebacks to be at least as long as the height of the wall and in many cases longer. Depending on the length of the tieback and the wall location, the tiebacks may extend off the subject property and into adjacent rights-of-way. Easements are typically required in order to install anchors onto adjacent property. The presence of utilities should also be considered during design.

Soil Nail Walls

The soil nail wall system consists of drilling and grouting rows of steel bars or “nails” behind the excavation face as it is excavated and then covering the face with reinforced shotcrete. This procedure is typically completed at increments of 4 to 6 feet in depth until the desired excavation is complete. The placement of soil nails reinforces the soil behind the excavation face and resists a mass of soil from sliding into the excavation. Soil nail lengths are commonly 60 to 80 percent of the wall height but could be longer depending on soil conditions and whether or not the soil nail wall is designed as a temporary or permanent

structure. Easements may be required in order to install nails onto adjacent property. The presence of utilities should also be considered during design and planning.

We recommend soil nail walls be designed and tested in accordance with the appropriate criteria provided in the "Geotechnical Engineering Circular No. 7 — Soil Nail Walls" Publication No. FHWA-IF-03-017. Typically, the contractors installing the soil nails is responsible for design the soil nail wall using provided lateral earth pressure values and anchor-soil adhesion values. We can provide these design inputs if requested.

Site Development and Earthwork

Clearing and Excavation

For newly developed areas of the site, we recommend removing all existing pavements and hardscaping within the building footprint. Burying existing features and building on top of them is not recommended. Abandoned, below-grade utilities should also be removed from structural areas; alternatively, below-grade utilities can be abandoned in place by completely filling the utilities with lean mix concrete or controlled density fill (CDF).

In undeveloped areas at the site we anticipate that clearing and stripping depths will be on the order of 3 inches or less. Greater stripping depths could be required if areas of loose or organic-rich soils are encountered.

Additional stripping and/or excavation may be required if uncontrolled loose fill soil is encountered during excavation, where existing structures have been removed/demolished, or if exposed bearing surfaces and subgrades are left unprotected to the elements for any significant period of time.

While not encountered in our explorations glacial deposits in the area are known to contain coarse gravel, cobbles and boulders. The earthwork contractor should be prepared to handle these materials during excavation.

Temporary Excavations

Excavations deeper than 4 feet must be shored or laid back at a stable slope if workers are required to enter. Shoring and temporary slope inclinations must conform to the provisions of Title 296 Washington Administrative Code (WAC), Part N, "Excavation, Trenching and Shoring." Regardless of the soil type encountered in the excavation, shoring, trench boxes or sloped sidewalls will be required under Washington Industrial Safety and Health Act (WISHA). The contract documents should specify that the contractor is responsible for selecting excavation and dewatering methods, monitoring the excavations for safety and providing shoring, as required, to protect personnel and structures.

In general, based on our observations and explorations, temporary cut slopes in on-site soils should be inclined no steeper than about 1.5H:1V. Somewhat steeper inclinations could be possible in intact glacially consolidated soils. Cut slope inclinations steeper than 1.5:1V should be considered on a case-by-case basis. This guideline assumes that all surface loads are kept a minimum distance of at least one-half the slope height away from the top of the slope and that significant seepage is not present on the slope face. Flatter slopes will be necessary if significant seepage is observed, where soils are disturbed or if voids are created during excavation. Sloughing and raveling of temporary cut slopes should be expected. Temporary covering with heavy plastic sheeting should be used to protect slopes during periods of wet weather. If

1.5H:1V or flatter slopes are not feasible because of site constraints, temporary shoring could be required. Combinations of slopes and temporary shoring may also be considered.

Site Drainage and Groundwater Handling

We expect that groundwater will be encountered in excavations at the project site and that portions of the site may need to be dewatered depending on the proposed construction. Groundwater control and de-watering could be required for installation of temporary shoring or if deep excavations are planned. Groundwater inflow in shallow excavations near 2 to 4 feet below existing grade can likely be managed using sumps to collect and remove water that seeps into excavations. Groundwater levels at the site are expected to fluctuate as a function of season; therefore, less dewatering effort will likely be required during the drier summer and early fall months.

The amount of inflow to be expected in each excavation is dependent on a number of factors including:

- Depth of excavation below the water table
- Length of excavation
- Permeability of soils encountered
- Source of recharge that maintains site hydrology
- Seasonal variation in recharge of groundwater levels

Additional information will be needed to determine groundwater flow rates, including grain-size analyses and potentially, pumping tests to review recharge rates. Based on work nearby, preliminary groundwater flow rates of 10 to 30 gallons per minute have been observed. These rates are specific to the soil, groundwater and excavation conditions at the nearby sites. Flow rates for this site could be different and will depend on specific site conditions.

Design of dewatering systems and appropriate discharge permits should be the responsibility of the contractor performing the work. Handling and discharge or groundwater should consider the recommendations in our Environmental Services Report. We can provide consultation to the project team regarding dewatering, as requested.

Permanent Cut and Fill Slopes

We recommend permanent cut and fill slopes be constructed at a maximum inclination of 2H:1V. Where 2H:1V permanent slopes are not feasible, protective facings and/or retaining structures should be considered. Exposed areas on slopes should be re-vegetated as soon as practical to reduce the surface erosion and sloughing. Temporary protection should be used until permanent protection is established. In order to achieve uniform compaction, we recommend that fill slopes be overbuilt and subsequently cut back to expose well-compacted fill. Fill placement on slopes steeper than 5H:1V should be benched into the slope face. The configuration of the bench will depend on the equipment being used and the slope geometry.

Subgrade Preparation and Evaluation

Subgrades that will support slabs-on-grade, parking areas and driveways should be thoroughly compacted to a uniformly firm and unyielding condition on completion of stripping and before placing structural fill. We

recommend that subgrades be evaluated to identify areas of yielding or soft soil. Evaluation methods such as probing with a steel probe rod or proof-rolling with a heavy piece of wheeled construction equipment are appropriate methods of evaluation.

If soft or otherwise unsuitable subgrade areas are revealed during evaluation that cannot be compacted to a stable and uniformly firm condition, we recommend that: (1) the unsuitable soils be scarified (e.g., with a ripper or farmer's disc), aerated and recompacted, if practical; or (2) the unsuitable soils be removed and replaced with compacted structural fill, as needed.

Subgrade Protection and Wet Weather Considerations

The wet weather season generally begins in October and continues through May in western Washington; however, periods of wet weather can occur during any month of the year. The near-surface soils described on the reviewed explorations logs contain a significant amount of fines. Soil with high fines content is very sensitive to small changes in moisture and is susceptible to disturbance from construction traffic when wet or if earthwork is performed during wet weather. Wet weather earthwork can affect project costs and impact schedule if not planned for. Additional considerations for wet weather construction may include:

- Using crushed rock or select granular fill as defined below for fill material.
- Designing grading plans so water is directed away from the work area. This may require establishing a temporary grade around the site to control water during construction and then completing final grading at a later date.
- Shutting down earthwork activities during periods of heavy precipitation.
- Covering slopes with temporary plastic sheeting or hydroseeding.
- Protecting stockpiled or exposed onsite soils from becoming wet or unstable. This may require the use of plastic sheeting and controlling surface water with sumps with pumps and grading.
- Establishing an area where wet soils can be wind-rowed and dried out during periods of dry weather.
- Limiting or preventing construction traffic from operating on exposed native soils. Areas that will receive regular construction traffic should be surfaced with working pad materials not susceptible to wet weather disturbance.
- Accelerating schedule during periods of dry weather when conditions are favorable for earthwork activities.
- Limiting exposure of foundation or other subgrade surfaces to wet weather conditions. Prepared surfaces may need to be protected by constructing a working pad or pouring a lean concrete mat if structural concrete will not be placed immediately. Water in excavations must be removed prior to pacing structural steel or concrete.

Fill Material, Placement and Compaction

Existing On-Site Material

Reuse of site soils must consider criteria outlined in our Environmental Services Report. On-site soil will likely contain a significant percentage of fines and may be removed at moisture contents above optimum for compaction as a structural fill. The on-site soil is expected to be sensitive to small changes in moisture content and may be difficult, if not impossible, to work and compact. Also, when placed properly but

exposed, it will be susceptible to disturbance from construction traffic and wet weather and may require additional effort to re-compact or overexcavation and replacement.

In general, we recommend avoiding the use of on-site material; however, it is possible to use the existing soil provided it can be moisture conditioned and placed and compacted as recommended. Additional considerations such as time of year, availability of drying and screening operations, and soil disposal requirements will need to be considered prior to determining if on-site material can be used. We recommend that we be consulted if on-site material will be considered for re-use.

Structural Fill

Material used for structural fill should be free of debris, organic contaminants and rock fragments larger than 6 inches. We recommend that structural fill material consist of material similar to "Select Borrow" or "Gravel Borrow" as described in Section 9-03.14 of the Washington State Department of Transportation (WSDOT) Standard Specifications.

During the rainy season or periods of wet weather we recommend that imported structural fill consist of crushed rock or select granular fill consisting of well-graded sand and gravel or crushed rock with a maximum particle size of 6 inches and less than 5 percent fines, by weight, based on the minus ¾-inch fraction be used for structural fill.

Placement and Compaction

Structural fill placed in building areas must be compacted to at least 95 percent of the maximum dry density (MDD) determined by ASTM International (ASTM) Test Method D 1557 (modified Proctor). In pavement areas, structural fill placed more than 2 feet below subgrade should be compacted to at least 90 percent of the MDD and to at least 95 percent of the MDD for fill placed within 2 feet of planned pavement subgrade elevation.

Backfill behind retaining walls and below-grade structures should be compacted to between 90 and 92 percent of the MDD. Overcompaction of fill placed directly behind retaining walls or below-grade structures should be avoided. We recommend use of hand-operated compaction equipment and maximum 6-inch loose lift thickness when compacting fill within about 5 feet behind retaining walls or below-grade structures.

RECOMMENDATIONS FOR FURTHER STUDY

The geotechnical recommendations in this report are preliminary and may need to be revised depending on the proposed building design. Additional explorations are, in our opinion, not necessary for preliminary design. However, additional explorations at targeted areas of the site should be considered and, in our opinion, will prove beneficial as design progresses. We envision between two to six boring explorations will be likely. We recommend they be focused in the following areas for geotechnical purposes.

- Near the locations of proposed retaining structures and/or temporary shoring to better define soil conditions of soil to be retained, for tie-back/soil nail adhesion values, to investigate areas where deeper shoring wall design (i.e., soldier pile walls) is required, to refine soil design parameters, and to gauge the potential for difficult drilling and installation during construction.

- Within the building footprint to evaluate the suitability and thickness of existing fill for foundation bearing support and suitability for reuse as structural fill. Depending on conditions encountered, it may be possible that some of the existing fill may remain in place below foundations.
- In areas of heavy or larger foundation elements such as core mat footings, shear walls, or large moment frames.
- In locations of any planned deep excavations, such as elevator pits or deep utility trenches, to evaluate soil and groundwater conditions and to determine if dewatering will be necessary for excavation.

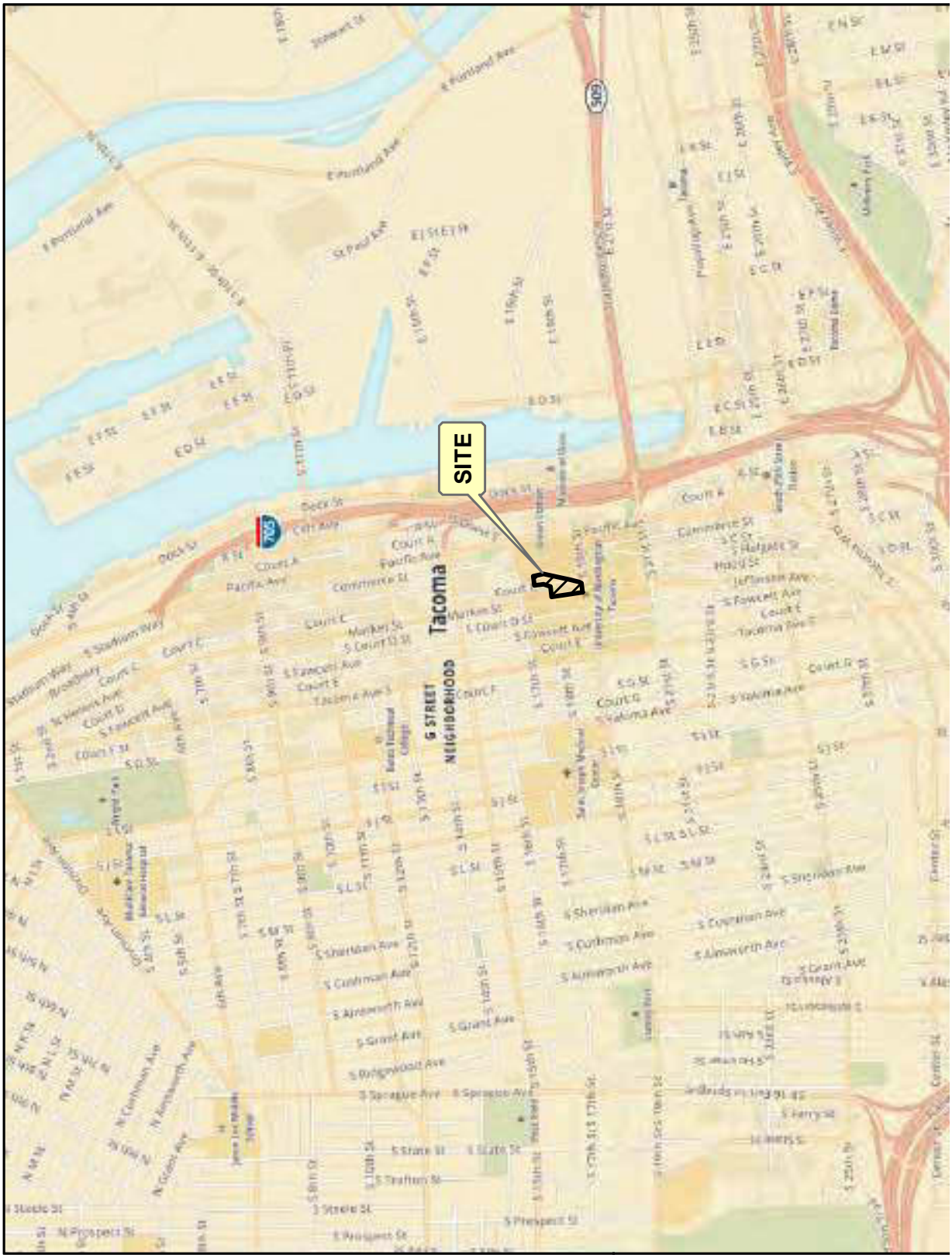
LIMITATIONS

We have prepared this report for the University of Washington, for the Proposed Academic Building, University of Washington Tacoma. The University of Washington may distribute copies of this report to owner's authorized agents and regulatory agencies as may be required for the Project.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices for geotechnical engineering services in this area at the time this report was prepared. The conclusions, recommendations, and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty, express or implied, applies to the services or this report.

Please refer to Appendix B titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

Appendix A6: GEOTECHNICAL REPORT




Summary of Existing Environmental Conditions
Proposed Academic Building
South 19th Street and Market Street
University of Washington- Tacoma
for
University of Washington - Tacoma
June 21, 2018
GeoEngineers
Earth Science + Technology

Summary of Existing Environmental Conditions

Proposed Academic Building
South 19th Street and Market Street
University of Washington- Tacoma

for
University of Washington - Tacoma

June 21, 2018

GeoEngineers

1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

Summary of Existing Environmental Conditions

Proposed Academic Building
South 19th Street and Market Street
University of Washington- Tacoma

File No. 0183-130-00

June 21, 2018

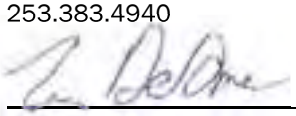
Prepared for:

University of Washington Tacoma
Capital Project Office
1900 Commerce Street, Box 358490
Tacoma, Washington 98402

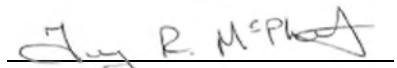
Attention: Elizabeth Hyun

Prepared by:

GeoEngineers, Inc.
1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940



Tricia S. DeOme, LG
Senior Environmental Geologist



Terry R. McPhetridge, LG, LHG
Principal

TSD:TRM:ch

GeoEngineers

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APPENDICES

1.0 INTRODUCTION

This report presents a summary of the existing environmental data collected during previous subsurface investigations within the area of the proposed Academic Building at the University of Washington (UW)-Tacoma Campus (UWT). The area of the proposed Academic Building is generally bound by Market Street to the west, the Court 17 apartment building and the Pinkerton building to the north, Jefferson Avenue to the east and South 19th Street to the south. Our understanding of the project is based on our discussions with UWT representatives and our experience working on the UWT campus.

The proposed area encompasses the existing Court C including the former operations known as former Sound Care facility, Jefferson Street Parcel/Former Service Station and the existing Transit Turnaround site. The proposed Academic Building area is herein referred as the "site". The site is located within the UWT Campus as shown on the Vicinity Map, Figure 1. The layout of the site in relation to adjacent properties is provided on Figure 2.

Conceptual plans for the proposed multistory building have not been developed at this time as the project is currently in a preliminary stage to evaluate costs and overall layout. We understand UWT plans to deliver the building via a design-build contract.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of additional investigation and mitigation measures.

1.1. Regulatory Background

UW entered into an Agreed Order (No. DE 97HW-S238) with the Washington State Department of Ecology (Ecology) in 1997 for known contaminated soil and groundwater on the Campus. The current Agreed Order (#DE 11081) was negotiated between UW and Ecology for the UWT Campus pursuant to the authority of the Model Toxics Control Act (MTCA) and Revised Code of Washington (RCW) 70.105D.050(1). The Agreed Order was signed on May 12, 2016. The UW is the only entity bound by the Agreed Order. UW will be required to perform a Remedial Investigation (RI) Work Plan, RI, Feasibility Study (FS) and draft Cleanup Action Plan (CAP) under the Agreed Order. The Remedial Investigation Work Plan was developed in July 2016 that identified the specific remedial investigation field activities to be performed in future years. UW(T) is in the process of implementing the 2016 RI Work Plan.

1.1.1. Areas of Concern (AOCs)

Twelve areas of concern (AOCs) were identified on the UWT Campus by UW and Ecology under the new Agreed Order. The AOCs are grouped either as site-specific or area-wide contamination sources. AOCs 1 through 10 have been categorized as site-specific potential contaminant source areas. The site-specific AOCs were identified as areas where releases of dangerous wastes and dangerous constituents potentially

occurred from historic operations or areas with known contaminated soil. The Jefferson Street Parcel/Former Service Station has been identified as AOC 4.

AOC 11 and 12 are categorized as area-wide contaminated media where the source(s) is unknown at this time. AOC 11 includes the contaminated groundwater on a Campus-wide basis related to tetrachloroethene (PCE), trichloroethene TCE), cis-1,2-dichloroethene (DCE), trans-1,2-DCE, 1,1-DCE, vinyl chloride, 1,1,1-trichloroethane (TCA), 1,1-dichloroethane (DCA), petroleum products and other potential on-Campus and off-Campus sources. AOC 12 includes contaminated soil (metals, petroleum, and carcinogenic polycyclic aromatic hydrocarbons [cPAHs]) on a Campus-wide basis.

2.0 PREVIOUS INVESTIGATIONS

Historical research and subsurface investigations were completed on the site between 1998 and 2016. This report should be used in context with the larger subsurface investigation reports. Excerpts from reports are included in Appendix A, historical information is included in Appendix B and borings logs are provided in Appendix C. The relevant chemical analytical data is summarized in Tables 1 and 2. The boring locations are shown on Figures 3 and 4. The following reports were reviewed to evaluate soil and groundwater conditions at the site. Relevant information obtained from these reports are summarized in this document.

- *Jefferson Street Association Parcel – UST Closure and Remediation, University of Washington Tacoma Agreed Order (#DE97HW-S238) 1742 Jefferson Street Tacoma, Washington,* dated March 14, 2013.
- *Report Supplemental Soil Investigation and Voluntary Cleanup University of Washington Tacoma Garage and Housing Project Tacoma, Washington,* dated October 17, 2005.
- *Underground Storage Tank Site Assessment Report for University of Washington Tacoma Campus, Phase 2A North Complex, Former Sound Care Nursing Home, 1748 Jefferson Way Tacoma, Washington,* dated December 6, 2000.
- *2013 Environmental Subsurface Investigation – University of Washington-Tacoma, Tacoma, Washington*, dated December 19, 2014.
- *Agreed Order Remediation Investigation 2016 Data Summary Report*, dated December 20, 2017.

We also reviewed Sanborn fire insurance maps and historical photographs obtained during the initial stages of the 2013 investigation (see Appendix A).

3.0 SITE CONDITIONS

Site conditions including existing and historic site use(s) and existing surface features are discussed in the following subsections.

3.1. Historical and Current Site Use

Three primary site uses located within the site boundary are described in the following subsections. The location of the three areas is shown on Figure 2.

3.1.1. Sound Care Facility

Single family homes and associated sheds/stables were noted on the site from at least 1888 to the 1940s. A mattress factory was located on the central portion of the site along Court C early in the site development. A Japanese hand-laundry facility operated on the southeast corner of the site in 1912 followed by a barber shop from 1921 to 1942 including a marble/stone company adjacent to the barber shop. A shoe and umbrella repair business and residence were present on the southwest portion of the site from 1912 to 1936. These buildings were demolished in the 1940s when the Jefferson House/Sound Care (nursing home) was constructed in 1945. The nursing home operated until 2000 when it was demolished. The removal and potential presence of USTs associated with the former Sound Care facility are discussed in Section 5.0.

The site was vacant or utilized as a lay down yard for construction activities completed on the UWT campus between 2000 and 2013. The site was redeveloped into a park in late 2013 and currently in use today. Park development included regrading and placement of fill, installation of light posts and planting grass and trees. The 2013 environmental subsurface explorations described in this report were completed prior to development of the park. Exploration locations and elevations are described relative to the site conditions that existed at the time of the 2013 subsurface investigation.

3.1.2. Jefferson Street Parcel/Former Service Station

Single family homes were present within the site boundary from 1888 to 1912. The residences were demolished by 1932.

A Standard Oil fuel station and tire repair facility operated on the southern portion of the site from 1932 until 1973. One pump island with fuel dispensers, three underground storage tanks (USTs) a repair/service area with hydraulic lift and floor drain/sump were located on the southern corner of the site. The former service station and fuel dispenser island were demolished by at least 1973. The property has been used as a parking lot since 1973.

The former USTs were removed in 2012 including associated remedial excavation of contaminated soil. See Section 5.0 for additional information.

3.1.3. Transit Turnaround

Single family homes were present within the site boundary from 1888 to 1912. A portion of the residences were demolished and stores (of unknown use) were constructed by 1912. The residences were demolished by 1950. A transit turnaround and restaurant operated from 1942 to 1993. The property has been used as a parking lot since 1993 with a small building in the center of the turnaround.

3.2. Surface Features

The project site is situated on a hillside that grades downward from the western site boundary (Market Street) to the eastern site boundary (Jefferson Avenue). The existing ground surface elevation is around

Elevation 124 feet[1] along the Market Street site boundary. The site boundary grades between about Elevation 105 in the southeast corner of the site to Elevation 89 feet in the northeast corner of the site.

Market Street is a two-lane roadway with a center turn lane and parallel curb parking. Market Street is surfaced with asphalt concrete. The grade separation between Market Street and Court C is accommodated by a cut slope graded at between 2H:1V (horizontal to vertical) and 1.5H:1V. Court C is a two-lane road paved with bricks. The portion of the site between Court C and Jefferson Street is currently used as parking. Some sections of the parking areas have been paved and others are surfaced with gravel. Grade change between the elevation of Court C and Jefferson Street is accommodated by an approximately 4- to 8-foot-tall cast-in-place retaining wall and by cut slopes graded at around 1.5H:1V. Jefferson Avenue is a two-lane roadway with angle in parking on the east side of the street.

Other improvements around the site include sidewalks, landscaping, hardscaping, trees and streetlights.

4.0 GEOLOGY AND HYDROGEOLOGY SUMMARY

This section describes the geologic and hydrogeologic conditions based on literature review and observations noted during previous investigations near the site.

4.1. Geologic Summary

The project site is underlain by ice-contact deposits based on our review of the Geologic Map of the Tacoma South Quadrant (Troost in and Booth in review). This material was deposited during glaciation that occurred about 10,000 to 15,000 years ago. Ice-contact deposits are described in the literature as interbedded outwash (sand and gravel), lacustrine beds (fine-grained sand and silts) and glacial till. Locally, the ice-contact deposits are generally comprised of sand and gravel in a silt matrix.

General subsurface conditions at the site consist of (stratigraphic order from the surface) fill, ice-contact deposits, silt layer (semi-confining to confining) and advance outwash. The fill consists of silt and sand (silt with sand and/or sand with silt) to gravel with silt from approximately the ground surface to 8 feet below ground surface (bgs). Glacially consolidated ice-contact deposits were observed below the fill consisting of silt with sand to sand with gravel and silt. A unit of gray silt (semi-confining to confining) was observed beneath the ice-contact deposits in the following wells located at the site based on information provided on the applicable boring logs completed by GeoEngineers and by others: UG-MW3, UG-MW4, UG-MW7, UG-MW8, UG-MW13, JS-MW7A, and A11-MW10D.

The semi-confining to confining silt layer typically separates the ice-contact deposits and the advance outwash. The advance outwash soils are typically comprised of sand with variable silt and gravel content. The glacially consolidated soils in the area can vary over relatively minimal distances and can contain coarse gravel, cobbles, and boulders.

[1] Vertical datum NGVD 29

The typical geology is present on majority of the site except for the southern portion near South 19th Street and Jefferson Avenue. The geology in the southern portion may have two silt layers and former drainage channel maybe present as shown on Figures 2 and 3 and further described below.

Former Drainage Channel. A thick sand and gravel seam was observed in wells A11-MW11D, UG-MW14, UG-MW31, DD-MW1 and BA-MW1. The sand and gravel seam was observed on the site in well A11-MW11D from depths between 13 and 30 feet bgs. The upper portion of the sand and gravel seam was observed at approximately 20 to 25 feet bgs upgradient of the site with a thickness between 15 and 20 feet. However, the bottom of the sand and gravel seam was not observed in wells UG-MW14 and UG-MW31. The sand and gravel seams are potentially related to a former glaciation drainage channel within the ice-contact deposits as shown on Figures 2 and 3.

Two semi-confining layers or "silt" layers. Two silt layers were potentially observed in borings A11-MW11D and UG-MW4S/UG-MW4 based on a decrease in moisture content observed during drilling. However, both silt layers in A11-MW11D contained gravel indicating the layers are likely not indicative of providing confining conditions. The depth of the upper silt layer was observed at depths between 8 and 9 feet bgs consisting of a sandy silt with gravel. The upper silt layer was similar to soil conditions observed in nearby well JS-MW7A. The lower silt layer and associated transition zone was observed from approximately 30 and 45 feet bgs consisting of silt with sand and gravel to silt with sand. The two silt layers appear to be present above and below the sand and gravel seam/former drainage channel discussed above.

The ice-contact deposits are interpreted to extend to the lower silt layer for purposes of this report. The well screen is located above the upper silt layer in wells A11-MW1S, UG-MW4S and JS-MW7A. The well screen is screened below the lower silt layer in wells A11-MW11D and UG-MW4.

4.2. Hydrogeologic Summary

The general hydrogeology consists of two main water-bearing zones beneath the UWT Campus based on information obtained during previous subsurface investigations. The two water-bearing zones are herein referred to as the shallow/perched and deep aquifers. The shallow aquifer is present within the fill/ice-contact deposits and the deep aquifer is located within the advance outwash.

Shallow Aquifer/Perched Aquifers - Perched aquifers may be present on the site, particularly above the upper silt layers as discussed in Section 4.1. The connection between the shallow aquifer and perched aquifer is not known regarding contaminate fate and transport. The shallow and perched aquifers are interpreted to be one connected aquifer in this report based on available information to date. However, additional investigation will be necessary to further evaluate if the perched aquifer is a third contaminant transport pathway.

We anticipate the elevation of the shallow groundwater aquifer will likely vary between Elevation 105 feet on the west side to around Elevation 75 feet on the east side of the site based on our previous groundwater studies in the project vicinity. The general direction of the groundwater flow within the shallow aquifer trends topographically downgradient towards the east. Groundwater within the shallow aquifer likely flows through sand seams and interbedded gravel within the ice-contact deposits. Groundwater flow within the shallow aquifer may also be influenced by underground utilities in the area as a preferential pathway.

Deep Aquifer - The groundwater flow direction is generally to the east/northeast within the deep aquifer. The deep aquifer can be under confined conditions with artesian/subartesian conditions (based on the depth to groundwater observed during drilling as compared to the depth to groundwater observed in the wells). The level of the deep aquifer is expected to vary between about Elevation 95 feet on the west side of the site and around Elevation 55 feet on the east side of the site.

Connection Between Aquifers - A thick sand and gravel seam was observed within the ice-contact deposits near South 19th Street between Fawcett Avenue and Jefferson Avenue. The sand and gravel seam appear to possibly connect the shallow and deep aquifers near Market Street. However, additional investigation is necessary to further evaluate this potential connection of the shallow and deep aquifers.

The connection between the shallow aquifer and perched aquifer is not known regarding contaminate fate and transport as mentioned above.

5.0 UST EVALUATION AND DECOMMISSIONING

5.1. UST Decommissioning

USTs were removed on the Sound Care facility and Jefferson Street parcel as described below.

Sound Care Building. One 300-gallon diesel underground storage tank (UST) used as a backup generator was removed from the Sound Care facility in 2000. The initial UST excavation was completed to a depth of approximately 7.5 feet bgs in May 2000. Five soil samples were collected from the initial UST excavation from the base (one) and sidewalls (4) each at approximately 5 feet bgs. The approximate location of the USTs and lateral extent of the excavations are shown on Figures 2 and 4.

Chemical analytical results indicated that diesel- and heavy oil-range petroleum hydrocarbons were not detected in the confirmation soil samples. A total of approximately 72 tons of soil was transported to TPS Technologies for treatment.

Jefferson Street Parcel/Former Services Station. Two underground storage tanks (USTs) and service station components were removed including excavation of approximately 447 tons of petroleum-contaminated soil in 2012. It appears a third UST present along Jefferson Avenue was previously removed and backfilled with concrete. The concrete debris was excavated in 2012 to complete the remedial excavation of petroleum-contaminated soil. The depth of the excavations ranged between 5 and 12 feet bgs. The approximate location of the USTs and extent of the excavations are shown on Figures 2 and 4.

Gasoline-range petroleum hydrocarbons and benzene were detected at concentrations greater than the respective MTCA cleanup levels in one sidewall confirmation soil sample collected along Jefferson Avenue at a depth of approximately 6 feet bgs. Gasoline-range petroleum hydrocarbons and benzene were either not detected or were detected at concentrations less than the respective MTCA cleanup levels in the remaining analyzed confirmation samples. The location of the contaminated soil sample is shown on Figure 4. Other chemicals of concern were either not detected or were detected at concentrations less than the respective RISSL in the remaining analyzed confirmation soil samples.

5.2. Geophysical Survey and Test Pits

Historic research completed in 2013 indicated the potential for USTs to be present at the site given the age of the former buildings and a source of oil heat typically used during these time periods. In addition, heating conversion permits (heating oil to gas) were listed in some of the permit records. A geophysical survey consisting of a magnetic and ground penetrating radar (M/GPR) was performed around the footprint of historic buildings in June 2013 (as accessible).

Two magnetic anomalies were identified near the Sound Care facility (designated 2A-A1 and 2A-A2) and four magnetic anomalies were identified near the northeast corner of the site (designated 2B-A1 through 2B-A4) as shown on Figure 2.

Sound Care Facility. Test pits were completed near the magnetic anomalies 2A-A1 and 2A-A2 in June 2013. Native soil was observed at a depth of approximately 0.5 feet below ground surface (bgs) in the test pit completed at magnetic anomaly 2A-A1. No metal debris or structures were observed indicative of USTs and the source of the magnetic anomaly is not known. Metal fence debris was observed to a depth of approximately 0.5 feet bgs in the test pit located at magnetic anomaly 2A-A2. The metal debris was likely the source of the magnetic anomaly.

A heating oil UST may still be present near the former Sound Care building that was not identified by the M/GPR. The heat source was a broiler at the Sound Care facility. It appears a heater conversion permit (typically oil to gas) was issued in 1961 indicating the building was likely heated with oil prior to 1961. It is unknown if the potential heating oil UST was removed from the site.

Jefferson Street Parcel and Transit Turnaround. Four magnetic anomalies (2B-A1 through 2B-A4) were identified on the Jefferson Street Parcel and Transit Turnaround. Test pit explorations were not completed due to underground utilities and concrete near the anomalies. Magnetic anomalies 2B-A1 through 2B-A3 were likely related to the presence of underground utilities (duct bank area). Magnetic anomaly 2B-A4 was located within a concrete area where a test pit was not practical. Boring (2B-B3) was completed near magnetic anomaly 2B-A4 and the chemical analytical results are described in Section 7.0.

6.0 PREVIOUS SUBSURFACE EXPLORATIONS

Environmental subsurface investigations completed on the site consisted of soil borings using direct-push and sonic-core drilling methods, installation of monitoring wells and groundwater sampling of new and existing monitoring wells. The investigation activities were completed between 1998 and 2016.

6.1. Soil Borings/Monitoring Wells

Nine direct-push borings (JS-B1 through JS-B3 and JS-B5 through JS-B10) were completed to depths up to 12 feet bgs[2] on the Jefferson Street parcel in 1998. Nine direct-push borings (2A-B1 through 2A-B7, 2B-B2 and 2B-B3) were completed to depths ranging between 5 and 12 feet bgs throughout the site in June 2013. The borings were terminated when practical refusal was encountered.

[2] Boring locations are not shown in Figure 3 because the majority of the borings were excavated in 2012. See Appendix A for additional information.

Twelve monitoring wells present within the site were installed between 1998 and 2016. The monitoring wells range in depth from 6 to 60 feet bgs. Boring and monitoring well locations are shown on Figures 4 and 5.

The general location of the monitoring wells in relation to the site and the aquifer (perched, shallow, or deep) of each well screen interval are described in the table below.

Location of Monitoring Well	Well Screened within Perched Aquifer	Well Screened within Shallow Aquifer	Well Screened within Deep Aquifer	Well Screened within Unconfirmed Aquifer
Within Site Boundary	UG-MW4S, A11-MW11S, JS-MW7A	A11-MW10S	UG-MW3, UG-MW4, A11-MW10D, A11-MW11D, JS-MW1, JS-MW2	None
Upgradient of Site Boundary	None	UG-MW13, UG-MW27S, UG-MW31	BA-MW2, DD-MW1, UG-MW8, UG-MW9, UG-MW27, UG-MW7	UG-MW14,
Downgradient the Site Boundary	None	JS-MW3S	JS-MW3 and JS-MW4	None

6.2. Groundwater Sampling

Groundwater samples were recently collected from the monitoring wells within and near the site in June 2013 and December 2016. A groundwater sample was also collected from well JS-MW7A on January 22, 2014. Previous groundwater sampling was completed but not included in this report because of the age of the chemical analytical results.

7.0 CHEMICAL ANALYTICAL PROGRAM

Soil and groundwater samples were submitted to a UW-approved analytical laboratory for chemical analysis during the subsurface investigations. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

Chemical analytical results are compared to relative criteria and screening levels as described in Appendix D.

7.1. Soil

7.1.1. Petroleum Hydrocarbons

Lube oil-range petroleum hydrocarbons were detected at concentrations greater than the Reuse Criteria (200 milligrams per kilogram [mg/kg]) but less than the MTCA Method A Unrestricted Land Use (ULU) cleanup level (2,000 mg/kg), and the RISSL (2,000 mg/kg) in soil samples JS-MW7A-0-1 (210 mg/kg) and UG-MW4S-0-1 (290 mg/kg). Both samples were collected from 0 to 1 feet bgs.

Lube oil-range petroleum hydrocarbons were not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, the RISSL and the Reuse Criteria in the remaining analyzed soil samples.

Gasoline- and diesel-range petroleum hydrocarbons were not detected in the analyzed soil samples.

7.1.2. VOCs

TCE was detected at a concentration greater than the MTCA Method A ULU cleanup level (0.03 milligrams per kilogram [mg/kg]), RISSL (0.0001 mg/kg), and Reuse Criteria (detected) in soil sample 2A-B5-7-8 (0.11 mg/kg) collected from 7 to 8 feet bgs. TCE was detected at concentrations less than the MTCA Method A ULU cleanup level but greater than the RISSL and Reuse Criteria in the following soil samples with the concentrations (in mg/kg) detected identified in parenthesis.

- **2A-B3-10-11 (0.013).** Sample collected from 10 to 11 feet bgs.
- **2A-B4-5-6 (0.0012).** Sample collected from 5 to 6 feet bgs.
- **2A-B4-7-8 (0.0066).** Sample collected from 7 to 8 feet bgs.
- **UG-MW4S-9-10 (0.0029).** Sample collected from 9 to 10 feet bgs.
- **A11-MW11D-19-20 (0.001).** Sample collected from 19 to 20 feet bgs.
- **A11-MW11D-54-55 (0.0049).** Sample collected from 54 to 55 feet bgs.
- **A11-MW11D-59-60 (0.005).** Sample collected from 59 to 60 feet bgs.

TCE was not detected in the remaining analyzed soil samples.

Cis-1,2-dichloroethene was detected at a concentration less than the RISSL (0.004 mg/kg) but greater than the Reuse Criteria (detected) in soil sample 2A-B5-7-8 (0.00085 mg/kg) collected from 7 to 8 feet bgs. Cis-1,2-dichloroethene was not detected in the remaining analyzed soil samples.

Other VOCs were either not detected or were detected at concentrations less than their respective MTCA Method A cleanup levels and the RISSL in the analyzed soil samples.

7.1.3. PAHs

cPAHs were detected at concentrations (total toxicity equivalent concentration [TTEC]) greater than the MTCA Method A ULU cleanup level (0.1 mg/kg), the RISSL (0.14 mg/kg) and the Reuse Criteria (detected) in four soil samples at depths ranging between the ground surface and 4 feet bgs. PAHs and cPAHs were detected at concentrations less than the RISSL but greater than the Reuse Criteria in soil samples at depths ranging from between the ground surface and 4 feet bgs. Detected cPAH/PAH concentrations are summarized in the following table. cPAHs and PAHs were not detected in the remaining analyzed soil samples.

Sample Location	Depth (feet bgs)	cPAH (TTEC) Concentration (mg/kg)	Greater then RISSL (0.14 mg/kg)	Greater than Reuse Criteria (Detected)
2A-B1	1 to 2	0.23	Yes	Yes
2A-B7	2.5 to 3.5	0.64	Yes	Yes
JS-MW7A	0 to 1	3.49	Yes	Yes
A11-MW11D	0 to 4	29.6	Yes	Yes
2A-B2	0.5 to 1.5	See Table 1 for detected concentrations of individual PAHs	No	Yes
2A-B3	0 to 1		No	Yes
	2 to 3		No	Yes
2A-B6-	1 to 2		No	Yes
2B-B2	1 to 2		No	Yes
UG-MW4S	0 to 1		No	Yes
	3 to 4		No	Yes
A11-MW10D	1 to 2		No	Yes
	2 to 3		No	Yes
A11-MW10S	1 to 2		No	Yes

7.1.4. Resource Conservation and Recovery Act (RCRA) Metals

Lead was detected at a concentration greater than the MTCA Method A ULU cleanup level (250 mg/kg), the RISSL (250 mg/kg) and the Reuse Criteria (50 mg/kg) in soil sample JS-MW7A-0-1 (1,100 mg/kg).

Lead was detected at concentrations greater than the Reuse Criteria but less than the MTCA Method A ULU cleanup level and the RISSL in the following soil samples with the concentrations (in mg/kg) detected identified in parenthesis.

- **2A-B1-1-2 (59)**. Sample collected from 1 to 2 feet bgs.
- **2A-B7-2.5-3.5 (200)**. Sample collected from 2.5 to 3.5 feet bgs.
- **A11-MW10D-2-3 (53)**. Sample collected from 2 to 3 feet bgs.

Lead was either not detected or was detected at concentrations less than the MTCA Method A ULU cleanup level, the RISSL and the Reuse Criteria in the remaining analyzed soil samples.

Mercury was detected at a concentration greater than the Reuse Criteria (0.07 mg/kg or detected) but less than the MTCA Method A ULU cleanup level (2 mg/kg) and the RISSL (24 mg/kg) in following soil samples with the concentrations (in mg/kg) detected identified in parenthesis.

- **JS-MW7A-0-1 (0.44)**. Sample collected from 0 to 1 feet bgs.
- **A11-MW11D-0-4 COMP (0.49)**. Sample collected from 0 to 4 feet bgs.

Mercury was either not detected or was detected at concentrations less than the MTCA Method A ULU cleanup level, the RISSL and the Reuse Criteria in the remaining analyzed soil samples.

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, the RISSL or the Reuse Criteria in the analyzed soil samples.

7.2. Groundwater

Groundwater samples were collected from the seventeen monitoring wells for chemical analysis. The groundwater samples were submitted for analysis of HVOCs by EPA method 8260C. The groundwater results are summarized on Figure 5 and Table 2. Groundwater data from other wells near the site are shown on Figure 5 and Table 2 but only the chemical analytical results for wells on the site are discussed below.

7.2.1. Shallow Aquifer

TCE was detected at concentrations greater than the RIGSL (1.6 micrograms per liter [µg/L]) in groundwater samples collected between 2013 and 2016 from the following wells listed below. TCE concentration is shown with sample year identified in parenthesis.

- UG-MW4S. 4.2 µg/L (2016).
- JS-MW7A. 1.8 µg/L (2014) - TCE was detected at a concentration less than the RIGSL in 2016.

TCE was either not detected or was detected at concentrations less than the RIGSL in the remaining analyzed groundwater samples collected within the shallow aquifer. Other VOCs were either not detected or were detected at concentrations less than the RIGSL in the remaining analyzed groundwater samples collected within shallow aquifer.

7.2.2. Deep Aquifer

TCE was detected at a concentration greater than the RIGSL in groundwater samples collected between 2013 and 2016 from the following wells listed below. TCE concentration shown with sample year identified in parenthesis.

- UG-MW3. 13 µg/L (2013) and 19 µg/L (2016).
- JS-MW2. 14 µg/L (2013) and 12 µg/L (2016).
- A11-MW11D. 31 µg/L (2016).
- JS-MW1. 2.8 µg/L (2016). TCE was detected at a concentration less than the RIGSL in 2013.

TCE was either not detected or was detected at concentrations less than the RIGSL in the remaining analyzed groundwater samples collected within deep aquifer. Other VOCs were either not detected or were detected at concentrations less than the RIGSL in the remaining analyzed groundwater samples collected within deep aquifer.

8.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

General impacts and potential mitigation measures are provided in this report that will be employed in design and construction. It is important to recognize that additional environmental investigations may be

necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with Ecology for review and approval of additional investigation and mitigation measures. We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site.

Potential impacts to the design and construction that should be considered during predesign include the following:

- Potential presence of USTs.
- The connection between the perched, shallow and deep aquifers is not known and construction of the building may connect the aquifers and spread contamination.
- Groundwater in the perched/shallow and deep aquifer are contaminated with TCE, but the extent of the contaminated groundwater is not known.
- Soil is contaminated with chemicals of concern (TCE, lead and cPAHs).
- Soil is impacted with chemicals of concern (metals, petroleum hydrocarbons and cPAHs/PAHs).

Potential long-term impacts include:

- Long-term disposal of underslab/perimeter footing drain TCE-impacted groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.
- TCE-contaminated or TCE-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections described potential impacts, mitigation measures and estimated costs to design and construction.

8.1. Potential UST

Two USTs may be present on the site based on magnetic anomalies identified during previous GPR studies. A magnetic anomaly was identified on the Transit Turnaround property in 2013 but further investigation of this anomaly was not performed because of concrete in the area. We also could not locate records for removal of the heating oil UST on the Sound Care facility.

We recommend UWT assume two USTs will be encountered during construction for budgeting purposes based on this information. The typical cost to remove one UST ranges between $15,000 and $30,000 depending on the size of the UST, access to the USTs, etc. Additional cost will need to be included to perform remedial excavation activities if contaminated soil is encountered during the UST removal process. The typical cost to perform a remedial excavation (excavation, loading, transportation and disposal at Subtitle D landfill) ranges between $80 and $120 per ton.

8.2. TCE-Contaminated Groundwater and Unknown Connection Between the Aquifers

The presence of contaminated groundwater in the perched, shallow, and deep aquifers is anticipated based on the TCE detections in the soil on the site and TCE-contaminated groundwater encountered upgradient and at the site. TCE-contaminated groundwater within the shallow aquifer will likely be encountered during construction throughout the site. TCE-contaminated groundwater within the deep aquifer may be encountered during excavation of the footings depending on the design of the building.

Furthermore, it is not known if the perched, shallow and deep aquifers are hydraulically connected and if the building design and construction should include mitigation measures to reduce cross contamination between the aquifers.

The additional investigation and potential mitigation measures and estimated costs are described below.

Additional Investigation. Additional investigation is recommended to evaluate data gaps as described in the impacts above. The range of the costs is based on the final layout of the building and the extent of investigation necessary. We recommend the additional investigation include:

- Additional wells to evaluate the vertical and lateral limits of the TCE-impacted soil and/or groundwater at the site. The typical cost to install additional monitoring wells can range between $12,000 and $18,000 per well. The number of wells necessary will be based on the final layout of the building but we anticipate four to six wells will be necessary.
- Groundwater pumping test should be completed to evaluate the presence of the former drainage channel and the connection between the perched, shallow and deep aquifers. The typical cost to perform a groundwater pumping test can range between $20,000 and $30,000.
- Soil vapor sampling and/or modeling with the Johnson and Ettinger vapor intrusion model is recommended to evaluate if a potential vapor intrusion pathway exists (see vapor mitigation section). The typical cost to complete soil vapor sampling and modeling can range between $15,000 and $30,000.
- UWT may consider developing a 3D rendering of the subsurface relative to the proposed building designs to evaluate if the building will encounter groundwater or penetrate the silt layers. The typical cost to develop the 3D rendering can range between $5,000 and $10,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor intrusion are VOCs including TCE and PCE, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. TCE was detected at a concentration that exceeds the RIGSL which is protective of indoor air in the groundwater samples collected in the deep and shallow aquifers on the site. TCE-contaminated groundwater in the shallow and deep aquifers could be in contact with the portions of the proposed building depending on the design. TCE detected in the deeper aquifer may represent a lesser concern for vapor intrusion because of the presence of the silt layer and shallow aquifer. However, if the proposed building penetrates through the silt layer or if the aquifers are not connected the TCE in the deep aquifer is greater threat to vapor intrusion.

Soil vapor sampling was not completed as part of the previous investigations. Additional on-site characterization may be necessary to evaluate the vertical and lateral limits of the soil vapors. Soil vapor sampling is recommended near the elevation of the future subgrade to evaluate if a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Typical mitigation includes as vapor barrier and venting systems as described below:

- Passive vapor barrier beneath the building. We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will add to the cost of construction.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.

The typical cost for design and installation of indoor air mitigation system ranges from $8 per square foot to $15 per square foot of building space based on phasing of construction. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate whether the system is operating properly following construction of the building. The estimated cost for long-term monitoring is unknown.

Underslab/Footing Drainage. Underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system depending on the building design. The water will likely need to be directed to the City of Tacoma sanitary sewer. A long-term cost may be associated with discharge of the water to the City sanitary sewer system.

Construction Water Management. TCE-contaminated groundwater encountered during construction will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. It is anticipated the construction dewatering water will be suitable for discharge into the sanitary sewer based on the concentrations detected in the existing wells at and near the site during the previous subsurface investigations. The City of Tacoma charges $0.0021074 per gallon of discharged per Tacoma Municipal code 12.08.365. The estimated volume of water generated will be based on construction methods and final design. Sampling and chemical analysis is typically required prior to discharge. The cost of sampling and chemical analysis is based on the chemical analysis required in the discharge permit but can typically range between $1,500 and $2,000 per sample. The number of samples required is based on the volume of water discharged and the length of construction.

Cross-Contamination. TCE-contaminated groundwater appears to be present in the perched, shallow and deep aquifers at varying concentrations. The extent of the silt layers and connections between the aquifers is not known across the site. The potential for cross-contamination will need to be addressed if it is identified the building structure or footings will penetrate the silt layer between the shallow and deep aquifers and it is evaluated that the aquifers are not already connected. Additional investigation will be necessary to evaluate the potential for cross-contamination between the two aquifers as discussed above.

Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, Hazardous Waste Operations, which indicates that on-site

personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The cost for the contractor to be HAZWOPER trained and have appropriate liability insurance will depend on the number of subcontractors that require training and the contractor markup.

8.3. Impacted and Contaminated Soil

Contaminated soil (cPAHs) and impacted soil (TCE, metals and cPAHs) will likely be generated during construction activities. We recommend UW implement the following actions.

- **Additional Investigation.** In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of contaminated and impacted soil. The cost of the additional investigation will be based on the final volume of soil to be excavated and disposed off-site.
- **TCE-Impacted and Contaminated Soil.** When TCE and breakdown products are detected in soil, UW EH&S will work with Ecology on obtaining a "contained-in determination" for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a Toxicity Characteristic Leaching Procedure (TCLP) analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Our past experience has demonstrated that it is fairly likely that the "contained-in determination" will be granted by Ecology. Therefore, our cost ranges are based on this assumption.

  Typical cost to transport and dispose (not including excavation and loading) soil at a Subtitle D landfill with a contained-in determination is typically between $90 to $120 per ton. The typical cost for transportation and disposal (not including excavation and loading) of soil at a RCRA Subtitle C Landfill is $300 to $375 per ton.
- **cPAH- and Metal-Contaminated Soil.** The contaminated soil will be removed as necessary for construction or as required by Ecology. cPAH- and metal-contaminated soil will be disposed at an UW-approved RCRA permitted Subtitle D landfill. The typical cost for transportation and disposal at a RCRA-subtitle D facility is $55 to $70 per ton.
- **Metal-, Petroleum Hydrocarbon-, and cPAH-Impacted Soil.** Metal- and cPAH-impacted soil is present throughout most of the site to a depth of approximately 4 to 8 feet bgs. For budgeting purposes, we recommend UWT assume the impacted soil will be disposed as a Subtitle D landfill. The typical cost for transportation and disposal of the metals-, petroleum hydrocarbon, and cPAH-impacted soil is generally between $55 and $70 per ton.
- **Health and Safety.** Washington State requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site.

9.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the proposed Academic Building at Market Street and South 19th Street located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix E titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

10.0 REFERENCES

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Table 1

Summary of Chemical Analytical Results[1] - Soil Within Proposed Academic Building Footprint

Proposed Academic Building - South 19th Street and Market Street
University of Washington Tacoma Campus
Tacoma, Washington

Boring/Test Pit Identification	2A-B1		2A-B2		2A-B3			2A-B4			2A-B5		2A-B6					
Sample Identification[2]	2A-B1-1-2	2A-B1-6-7	2A-B2-0.5-1.5	2A-B2-7-8	2A-B3-0-1	2A-B3-2-3	2A-B3-10-11	2A-B4-0.5-1.5	2A-B4-5-6	2A-B4-7-8	2A-B5-1-2	2A-B5-7-8	2A-B6-1-2	2A-B6-4-5	RISSL (Vadose Zone) (mg/kg)[11]	RISSL (Saturated) (mg/kg)[11]	MTCA Method A ULU Cleanup Levels[12]	Reuse Criteria[15]
Sample Depth (feet bgs)	1 to 2	6 to 7	0.5 to 1.5	7 to 8	0 to 1	2 to 3	10 to 11	0.5 to 1.5	5 to 6	7 to 8	1 to 2	7 to 8	1 to 2	4 to 5				
Interpreted Soil Type	Fill	Qvi	Fill	Qvi	Fill	Fill	Qvi	Fill	Qvi	Qvi	Fill	Qvi	Fill	Qvi				
NWTPH-HCID[3] (mg/kg)																		
Gasoline-Range	23 U	23 U	21 U	22 U	22 U	22 U	--	22 U	22 U	–	22 U	22 U	21 U	–	30	30	30/100[13]	30
Diesel-Range	57 U	58 U	53 U	55 U	56 U	56 U	--	55 U	55 U	–	55 U	55 U	53 U	–	2,000	2,000	2,000	200
Lube Oil-Range	110 U	120 U	DET	110 U	110 U	110 U	--	110 U	110 U	–	DET	110 U	110 U	–	2,000	2,000	2,000	200
NWTPH-Gx[4] (mg/kg)																		
Gasoline-Range Petroleum Hydrocarbons	–	–	–	–	–	–	–	–	–	–	–	–	–	–	30	30	30/100[13]	30
NWTPH-Dx[5] (mg/kg)																		
Diesel-Range Petroleum Hydrocarbons	–	–	27 U	–	–	–	–	–	–	–	27 U	–	–	–	2,000	2,000	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	–	–	140	–	–	–	--	–	–	–	91	–	–	–	2,000	2,000	2,000	200
VOCs[6] (mg/kg)																		
Tetrachloroethene (PCE)	0.00095 U	0.00081 U	0.0013 U	0.00079 U	0.0010 U	0.00097 U	0.00087 U	0.00088 U	0.00080 U	0.00080 U	0.00076 U	0.00078 U	0.00076 U	0.00095 U	0.054	0.0027	0.05	DET
Trichloroethene (TCE)	0.00095 U	0.00081 U	0.0013 U	0.00079 U	0.0010 U	0.00097 U	0.013	0.00088 U	0.0012	0.0066	0.00076 U	0.11	0.00076 U	0.00095 U	0.001	0.0001	0.03	DET
(cis) 1,2-Dichloroethene	0.00095 U	0.00081 U	0.0013 U	0.00079 U	0.0010 U	0.00097 U	0.00087 U	0.00088 U	0.00080 U	0.00080 U	0.00076 U	0.00085	0.00076 U	0.00095 U	0.08	0.004	NE	DET
(trans) 1,2-Dichloroethene	0.00095 U	0.00081 U	0.0013 U	0.00079 U	0.0010 U	0.00097 U	0.00087 U	0.00088 U	0.00080 U	0.00080 U	0.00076 U	0.00078 U	0.00076 U	0.00095 U	0.54	0.027	NE	DET
Vinyl Chloride	0.00095 U	0.00081 U	0.0013 U	0.00079 U	0.0010 U	0.00097 U	0.00087 U	0.00088 U	0.00080 U	0.00080 U	0.00076 U	0.00078 U	0.00076 U	0.00095 U	0.0018	0.001	NE	DET
Acetone[6]	0.0048 U	0.0041 U	0.0063 U	0.0039 U	0.0052 U	0.0048 U	0.0044 U	0.0044 U	0.0040 U	0.0040 U	0.0038 U	0.0059	0.0038 U	0.0064	29	1.5	NE	NE
Trichlorofluoromethane (CFC-11)[7]	0.00095 U	0.00081 U	0.0013 U	0.00079 U	0.0010 U	0.00097 U	0.00087 U	0.00088 U	0.00080 U	0.00080 U	0.00076 U	0.00078 U	0.00076 U	0.00095 U	1.4	0.07	NE	NE
Xylene[8]	0.0019 U	0.0016 U	0.0025 U	0.0016 U	0.0021 U	0.0019 U	0.0017 U	0.0018 U	0.0016 U	0.0016 U	0.0017	0.0016 U	0.0015 U	0.0019 U	2.7	0.14	9	NE
Metals[9] (mg/kg)																		
Arsenic	11 U	12 U	11 U	11 U	11 U	11 U	--	11 U	11 U	–	11 U	11 U	11 U	–	20	20	20	7
Barium	93	42	50	55	69	140	–	48	42	–	40	56	42	–	16,000	16,000	NE	NE
Cadmium	0.57 U	0.58 U	0.53 U	0.55 U	0.56 U	0.56 U	--	0.54 U	0.55 U	–	0.55 U	0.55 U	0.53 U	–	80	80	2.0	1
Chromium	35	27	29	45	48	59	–	30	27	–	25	49	33	–	120,000	120,000	2,000[14]	48
Lead	59	5.8 U	8.0	5.5 U	21	37	--	7.9	5.5 U	–	5.5 U	5.5 U	5.3 U	–	250	250	250	50
Mercury	0.29 U	0.29 U	0.27 U	0.27 U	0.28 U	0.28 U	--	0.27 U	0.27 U	–	0.27 U	0.28 U	0.27 U	–	24	24	2.0	0.07 or DET
Selenium	11 U	12 U	11 U	11 U	11 U	11 U	–	11 U	11 U	--	11 U	11 U	11 U	–	400	400	NE	NE
Silver	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.1 U	–	1.1 U	1.1 U	–	1.1 U	1.1 U	1.1 U	–	400	400	NE	NE

Boring/Test Pit Identification	2A-B1		2A-B2		2A-B3			2A-B4			2A-B5		2A-B6					
Sample Identification[2]	2A-B1-1-2	2A-B1-6-7	2A-B2-0.5-1.5	2A-B2-7-8	2A-B3-0-1	2A-B3-2-3	2A-B3-10-11	2A-B4-0.5-1.5	2A-B4-5-6	2A-B4-7-8	2A-B5-1-2	2A-B5-7-8	2A-B6-1-2	2A-B6-4-5	RISSL (Vadose Zone) (mg/kg)[11]	RISSL (Saturated) (mg/kg)[11]	MTCA Method A ULU Cleanup Levels[12]	Reuse Criteria[15]
Sample Depth (feet bgs)	1 to 2	6 to 7	0.5 to 1.5	7 to 8	0 to 1	2 to 3	10 to 11	0.5 to 1.5	5 to 6	7 to 8	1 to 2	7 to 8	1 to 2	4 to 5				
Interpreted Soil Type	Fill	Qvi	Fill	Qvi	Fill	Fill	Qvi	Fill	Qvi	Qvi	Fill	Qvi	Fill	Qvi				
PAHs[10] (mg/kg)																		
1-Methylnaphthalene	0.015	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	34	34	NE	DET
2-Methylnaphthalene	0.016	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	320	320	NE	DET
Acenaphthene	0.040	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	4,800	4,800	NE	DET
Acenaphthylene	0.012	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	NE	NE	NE	DET
Anthracene	0.074	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	24,000	24,000	NE	DET
Benzo[g,h,i]perylene	0.093	0.0078 U	0.023	0.0073 U	0.012	0.021	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.013	--	NE	NE	NE	DET
Fluoranthene	0.33	0.0078 U	0.066	0.0073 U	0.025	0.051	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.035	--	3,200	3,200	NE	DET
Fluorene	0.036	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	3,200	3,200	NE	DET
Naphthalene	0.035	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.016	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	1,600	1,600	5	DET
Phenanthrene	0.39	0.0078 U	0.038	0.0073 U	0.015	0.029	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.036	--	NE	NE	NE	DET
Pyrene	0.37	0.0078 U	0.054	0.0073 U	0.024	0.054	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.044	--	2,400	2,400	NE	DET
cPAHs[10] (mg/kg)																		
Benzo (a) anthracene (TEF 0.1)	0.15	0.0078 U	0.025	0.0073 U	0.016	0.027	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.016	--	RISSL for the Sum of TTEC cPAHs is 0.14 mg/kg	RISSL for the Sum of TTEC cPAHs is 0.14 mg/kg	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	DET
Benzo (a) pyrene (TEF 1)	0.18	0.0078 U	0.029	0.0073 U	0.018	0.031	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.018	--				DET
Benzo (b) fluoranthene (TEF 0.1)	0.17	0.0078 U	0.040	0.0073 U	0.023	0.041	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.019	--				DET
Benzo (J,k) fluoranthene (TEF 0.1)	0.058	0.0078 U	0.011	0.0073 U	0.0075 U	0.011	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--				DET
Chrysene (TEF 0.01)	0.17	0.0078 U	0.030	0.0073 U	0.016	0.034	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.018	--				DET
Dibenz (a,h) anthracene (TEF 0.1)	0.025	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--				DET
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.079	0.0078 U	0.017	0.0073 U	0.0093	0.018	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0091	--				DET
Total TTEC of cPAHs (detect only)	0.23	N/A	0.039	N/A	0.023	0.041	--	N/A	N/A	--	N/A	N/A	0.023	--	0.14	0.14	0.1	DET

Boring/Test Pit Identification	2A-B7			2B-B2		2B-B3	JS-MW7						JS-MW7A		RISSL (Vadose Zone) (mg/kg)[11]	RISSL (Saturated) (mg/kg)[11]	MTCA Method A ULU Cleanup Levels[12]	Reuse Criteria[15]
Sample Identification[2]	2A-B7-2.5-3.5	2A-B7-4-5	2A-B7-8-9	2B-B2-1-2	2B-B2-5-6	2B-B3-1-2	JS-MW7-7-8	JS-MW7-8-9	JS-MW7-11-12	JS-MW7-18-19	JS-MW7-22-23	JS-MW7-24-25	JS-MW7A-0-1	JS-MW7A-1-2				
Sample Depth (feet bgs)	2.5 to 3.5	4 to 5	8 to 9	1 to 2	5 to 6	1 to 2	7 to 8	8 to 9	11 to 12	18 to 19	22 to 23	24 to 25	0 to 1	1 to 2				
Interpreted Soil Type	Fill	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Outwash	Outwash	Fill	Fill				
NWTPH-HCID[3] (mg/kg)																		
Gasoline-Range	26 U	24 U	–	23 U	22 U	22 U	–	–	–	–	–	–	23 U	26 U	30	30	30/100[13]	30
Diesel-Range	65 U	59 U	–	57 U	55 U	56 U	–	–	–	–	–	–	DET	65 U	2,000	2,000	2,000	200
Lube Oil-Range	130 U	120 U	–	110 U	110 U	110 U	--	–	–	–	–	–	DET	130 U	2,000	2,000	2,000	200
NWTPH-Gx[4] (mg/kg)																		
Gasoline-Range Petroleum Hydrocarbons	–	–	–	–	–	–	–	–	–	–	–	–	–	–	30	30	30/100[13]	30
NWTPH-Dx[5] (mg/kg)																		
Diesel-Range Petroleum Hydrocarbons	–	–	–	–	–	–	–	–	–	–	–	–	29 U	–	2,000	2,000	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	–	–	–	–	–	–	–	–	–	–	–	–	210	–	2,000	2,000	2,000	200
VOCs[6] (mg/kg)																		
Tetrachloroethene (PCE)	0.00096 U	0.00094 U	0.0011 U	0.00093 U	0.00084 U	0.00098 U	0.00080 U	0.00099 U	0.00081 U	0.00073 U	0.00080 U	0.00085 U	0.00097 U	0.0011 U	0.054	0.0027	0.05	DET
Trichloroethene (TCE)	0.00096 U	0.00094 U	0.0011 U	0.00093 U	0.00084 U	0.00098 U	0.00080 U	0.00099 U	0.00081 U	0.00073 U	0.00080 U	0.00085 U	0.00097 U	0.0011 U	0.001	0.0001	0.03	DET
(cis) 1,2-Dichloroethene	0.00096 U	0.00094 U	0.0011 U	0.00093 U	0.00084 U	0.00098 U	0.00080 U	0.00099 U	0.00081 U	0.00073 U	0.00080 U	0.00085 U	0.00097 U	0.0011 U	0.08	0.004	NE	DET
(trans) 1,2-Dichloroethene	0.00096 U	0.00094 U	0.0011 U	0.00093 U	0.00084 U	0.00098 U	0.00080 U	0.00099 U	0.00081 U	0.00073 U	0.00080 U	0.00085 U	0.00097 U	0.0011 U	0.54	0.027	NE	DET
Vinyl Chloride	0.00096 U	0.00094 U	0.0011 U	0.00093 U	0.00084 U	0.00098 U	0.00080 U	0.00099 U	0.00081 U	0.00073 U	0.00080 U	0.00085 U	0.00097 U	0.0011 U	0.0018	0.001	NE	DET
Acetone[6]	0.0048 U	0.0047 U	0.0054 U	0.0047 U	0.0042 U	0.0049 U	0.0040 U	0.0049 U	0.0040 U	0.0037 U	0.0040 U	0.0042 U	0.021	0.0055 U	29	1.5	NE	NE
Trichlorofluoromethane (CFC-11)[7]	0.00096 U	0.00094 U	0.0011 U	0.00093 U	0.00084 U	0.00098 U	0.0032	0.0055	0.0013	0.0027	0.0026	0.0032	0.00097 U	0.0011 U	1.4	0.07	NE	NE
Xylene[8]	0.0019 U	0.0019 U	0.0022 U	0.0019 U	0.0017 U	0.0012 U	0.0016 U	0.0020 U	0.0016 U	0.0015 U	0.0016 U	0.0017 U	0.0019 U	0.0011 U	2.7	0.14	9	NE
Metals[9] (mg/kg)																		
Arsenic	13 U	12 U	–	11 U	11 U	11 U	–	–	–	–	–	–	11 U	13 U	20	20	20	7
Barium	310	45	–	70	54	52	–	–	–	–	–	–	240	140	16,000	16,000	NE	NE
Cadmium	0.71	0.59 U	–	0.57 U	0.55 U	0.56 U	--	–	–	--	–	–	0.65	0.65 U	80	80	2.0	1
Chromium	37	24	–	71	33	38	--	–	–	--	–	–	55 J	70 J	120,000	120,000	2,000[14]	48
Lead	200	5.9 U	–	30	5.5 U	5.6 U	–	–	–	–	–	–	1,100	6.5 U	250	250	250	50
Mercury	0.32 U	0.29 U	–	0.28 U	0.27 U	0.28 U	–	–	–	–	–	–	0.44	0.32 U	24	24	2.0	0.07 or DET
Selenium	13 U	12 U	–	11 U	11 U	11 U	--	–	–	–	–	–	11 U	13 U	400	400	NE	NE
Silver	1.3 U	1.2 U	–	1.1 U	1.1 U	1.1 U	--	–	–	--	–	–	1.1 U	1.3 U	400	400	NE	NE

Boring/Test Pit Identification	2A-B7			2B-B2		2B-B3	JS-MW7						JS-MW7A		RISSL (Vadose Zone) (mg/kg)[11]	RISSL (Saturated) (mg/kg)[11]	MTCA Method A ULU Cleanup Levels[12]	Reuse Criteria[15]
Sample Identification[2]	2A-B7-2.5-3.5	2A-B7-4-5	2A-B7-8-9	2B-B2-1-2	2B-B2-5-6	2B-B3-1-2	JS-MW7-7-8	JS-MW7-8-9	JS-MW7-11-12	JS-MW7-18-19	JS-MW7-22-23	JS-MW7-24-25	JS-MW7A-0-1	JS-MW7A-1-2				
Sample Depth (feet bgs)	2.5 to 3.5	4 to 5	8 to 9	1 to 2	5 to 6	1 to 2	7 to 8	8 to 9	11 to 12	18 to 19	22 to 23	24 to 25	0 to 1	1 to 2				
Interpreted Soil Type	Fill	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Outwash	Outwash	Fill	Fill				
PAHs[10] (mg/kg)																		
1-Methylnaphthalene	0.045	0.0078 U	--	0.0076 U	0.0073 U	0.0075 U	--	--	--	--	--	--	0.21	0.0086 U	34	34	NE	DET
2-Methylnaphthalene	0.048	0.0078 U	--	0.0076 U	0.0073 U	0.0075 U	--	--	--	--	--	--	0.22	0.0086 U	320	320	NE	DET
Acenaphthene	0.012	0.0078 U	--	0.0076 U	0.0073 U	0.0075 U	--	--	--	--	--	--	0.21	0.0086 U	4,800	4,800	NE	DET
Acenaphthylene	0.097	0.0078 U	--	0.0085	0.0073 U	0.0075 U	--	--	--	--	--	--	0.59	0.0086 U	NE	NE	NE	DET
Anthracene	0.078	0.0078 U	--	0.011	0.0073 U	0.0075 U	--	--	--	--	--	--	0.74	0.0086 U	24,000	24,000	NE	DET
Benzo[g,h,i]perylene	0.32	0.0078 U	--	0.035	0.0073 U	0.0075 U	--	--	--	--	--	--	1.3	0.0086 U	NE	NE	NE	DET
Fluoranthene	0.74	0.0078 U	--	0.064	0.0073 U	0.0075 U	--	--	--	--	--	--	6.4	0.0086 U	3,200	3,200	NE	DET
Fluorene	0.018	0.0078 U	--	0.0076 U	0.0073 U	0.0075 U	--	--	--	--	--	--	0.38	0.0086 U	3,200	3,200	NE	DET
Naphthalene	0.063	0.0078 U	--	0.014	0.0073 U	0.0075 U	--	--	--	--	--	--	0.36	0.0086 U	1,600	1,600	5	DET
Phenanthrene	0.26	0.0078 U	--	0.020	0.0073 U	0.0075 U	--	--	--	--	--	--	6.4	0.0086 U	NE	NE	NE	DET
Pyrene	0.91	0.0078 U	--	0.083	0.0073 U	0.0075 U	--	--	--	--	--	--	6.1	0.0086 U	2,400	2,400	NE	DET
cPAHs[10] (mg/kg)																		
Benzo (a) anthracene (TEF 0.1)	0.37	0.0078 U	--	0.044	0.0073 U	0.0075 U	--	--	--	--	--	--	2.3	0.0086 U	RISSL for the Sum of TTEC cPAHs is 0.14 mg/kg	RISSL for the Sum of TTEC cPAHs is 0.14 mg/kg	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	DET
Benzo (a) pyrene (TEF 1)	0.50	0.0078 U	--	0.058	0.0073 U	0.0075 U	--	--	--	--	--	--	2.7	0.0086 U				DET
Benzo (b) fluoranthene (TEF 0.1)	0.51	0.0078 U	--	0.055	0.0073 U	0.0075 U	--	--	--	--	--	--	3.1	0.0086 U				DET
Benzo (J,k) fluoranthene (TEF 0.1)	0.14	0.0078 U	--	0.018	0.0073 U	0.0075 U	--	--	--	--	--	--	0.76	0.0086 U				DET
Chrysene (TEF 0.01)	0.39	0.0078 U	--	0.051	0.0073 U	0.0075 U	--	--	--	--	--	--	2.5	0.0086 U				DET
Dibenz (a,h) anthracene (TEF 0.1)	0.068	0.0078 U	--	0.0082	0.0073 U	0.0075 U	--	--	--	--	--	--	0.36	0.0086 U				DET
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.27	0.0078 U	--	0.028	0.0073 U	0.0075 U	--	--	--	--	--	--	1.1	0.0086 U				DET
Total TTEC of cPAHs (detect only)	0.64	N/A	--	0.074	N/A	N/A	--	--	--	--	--	--	3.49	N/A	0.14	0.14	0.1	DET

Boring/Test Pit Identification	UG-MW4S				A11-MW10D					A11-MW10S	All-MW11D						
Sample Identification[2]	UG-MW4S-0-1	UG-MW4S-3-4	UG-MW4S-5-6	UG-MW4S-9-10	A11-MW10D-1-2	A11-MW10D-2-3	A11-MW10D-12-13	A11-MW10D-20-21	A11-MW10D-24-25	A11-MW10S-1-2	A11-MW11D-0-4 Comp	A11-MW11D-3-4	A11-MW11D-7-8	RISSL (Vadose Zone) (mg/kg)[11]	RISSL (Saturated) (mg/kg)[11]	MTCA Method A ULU Cleanup Levels[12]	Reuse Criteria[15]
Sample Depth (feet bgs)	0 to 1	3 to 4	5 to 6	9 to 10	1 to 2	2 to 3	12 to 13	20 to 21	24 to 25	1 to 2	0 to 4	3 to 4	7 to 8				
Interpreted Soil Type	Fill	Fill	Qvi	Qvi	Fill	Fill	Qva	Qva	Qva	Qvi	Fill	Fill	Fill				
NWTPH-HCID[3] (mg/kg)																	
Gasoline-Range	–	–	–	–	–	–	–	--	–	–	–	–	–	30	30	30/100[13]	30
Diesel-Range	–	–	–	–	–	–	–	--	–	–	--	–	–	2,000	2,000	2,000	200
Lube Oil-Range	–	–	–	–	–	–	–	--	–	–	--	–	–	2,000	2,000	2,000	200
NWTPH-Gx[4] (mg/kg)																	
Gasoline-Range Petroleum Hydrocarbons	22 U	23 U	–	–	22 U	24 U	–	–	–	22 U	23 U	–	22U	30	30	30/100[13]	30
NWTPH-Dx[5] (mg/kg)																	
Diesel-Range Petroleum Hydrocarbons	31 U	57 U	–	–	56 U	59 U	–	–	–	–	58 U	–	54 U	2,000	2,000	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	290	110 U	–	–	110 U	120 U	–	–	–	–	120 U	–	110 U	2,000	2,000	2,000	200
VOCs[6] (mg/kg)																	
Tetrachloroethene (PCE)	–	0.0011 U	0.00087 U	0.00094 U	–	–	--	–	–	–	–	0.00096 U	0.00077 U	0.054	0.0027	0.05	DET
Trichloroethene (TCE)	–	0.0011 U	0.00087 U	0.0029	–	–	–	–	–	–	–	0.00096 U	0.00077 U	0.001	0.0001	0.03	DET
(cis) 1,2-Dichloroethene	–	0.0011 U	0.00087 U	0.00094 U	–	–	–	–	–	–	–	0.00096 U	0.00077 U	0.08	0.004	NE	DET
(trans) 1,2-Dichloroethene	–	0.0011 U	0.00087 U	0.00094 U	–	–	–	–	–	–	–	0.00096 U	0.00077 U	0.54	0.027	NE	DET
Vinyl Chloride	–	0.0011 U	0.00087 U	0.00094 U	–	–	–	–	–	–	–	0.00096 U	0.00077 U	0.0018	0.001	NE	DET
Acetone[6]	–	–	–	–	–	–	–	--	–	–	–	–	–	29	1.5	NE	NE
Trichlorofluoromethane (CFC-11)[7]	–	0.0011 U	0.00087 U	0.00094 U	–	–	–	–	–	–	–			1.4	0.07	NE	NE
Xylene[8]	–	–	–	–	–	–	–	--	–	–	--	–	–	2.7	0.14	9	NE
Metals[9] (mg/kg)																	
Arsenic	11 U	11 U	–	–	11 U	12 U	13 U	11 U	11 U	11 U	12 U	11 U	–	20	20	20	7
Barium	–	–	–	–	66	95	120	46	50	57	91	43	–	16,000	16,000	NE	NE
Cadmium	0.54 U	0.57 U	–	–	0.56 U	0.59 U	0.64 U	0.55 U	0.53 U	0.54 U	0.58 U	0.54 U	–	80	80	2.0	1
Chromium	24	40	–	–	32	42	49	21	21	24	38	44	–	120,000	120,000	2,000[14]	48
Lead	9.6	26	–	–	9.2	53	6.4 U	5.5 U	5.3 U	6.5	160	5.4 U	–	250	250	250	50
Mercury	0.27 U	0.28 U	–	–	0.28 U	0.30 U	0.32 U	0.27 U	0.26 U	0.27 U	0.49	0.27 U	–	24	24	2.0	0.07 or DET
Selenium	–	–	–	–	11 U	12 U	13 U	11 U	11U	11 U	12 U	11 U	–	400	400	NE	NE
Silver	–	–	–	–	1.1 U	1.2 U	1.3 U	1.1 U	1.1 U	1.1 U	1.2 U	1.1 U	–	400	400	NE	NE

Boring/Test Pit Identification	UG-MW4S				A11-MW10D					A11-MW10S	All-MW11D			RISSL (Vadose Zone) (mg/kg)[11]	RISSL (Saturated) (mg/kg)[11]	MTCA Method A ULU Cleanup Levels[12]	Reuse Criteria[15]
Sample Identification[2]	UG-MW4S-0-1	UG-MW4S-3-4	UG-MW4S-5-6	UG-MW4S-9-10	A11-MW10D-1-2	A11-MW10D-2-3	A11-MW10D-12-13	A11-MW10D-20-21	A11-MW10D-24-25	A11-MW10S-1-2	A11-MW11D-0-4 Comp	A11-MW11D-3-4	A11-MW11D-7-8				
Sample Depth (feet bgs)	0 to 1	3 to 4	5 to 6	9 to 10	1 to 2	2 to 3	12 to 13	20 to 21	24 to 25	1 to 2	0 to 4	3 to 4	7 to 8				
Interpreted Soil Type	Fill	Fill	Qvi	Qvi	Fill	Fill	Qva	Qva	Qva	Qvi	Fill	Fill	Fill				
PAHs[10] (mg/kg)																	
1-Methylnaphthalene	0.0072 U	0.0076 U	--	--	0.0074 U	0.013	--	--	--	0.0072 U	0.85	0.0072 U	--	34	34	NE	DET
2-Methylnaphthalene	0.0072 U	0.0076 U	--	--	0.0074 U	0.019	--	--	--	0.0072 U	0.79	0.0072 U	--	320	320	NE	DET
Acenaphthene	0.0072 U	0.0076 U	--	--	0.0074 U	0.013	--	--	--	0.0072 U	2.4	0.0072 U	--	4,800	4,800	NE	DET
Acenaphthylene	0.0072 U	0.0076 U	--	--	0.0074 U	0.012	--	--	--	0.0072 U	5.1	0.0072 U	--	NE	NE	NE	DET
Anthracene	0.0072 U	0.0076 U	--	--	0.0074 U	0.020	--	--	--	0.0072 U	15	0.0072 U	--	24,000	24,000	NE	DET
Benzo[g,h,i]perylene	0.017	0.0076 U	--	--	0.015	0.038	--	--	--	0.0072 U	11	0.0072 U	--	NE	NE	NE	DET
Fluoranthene	0.015 J	0.0082	--	--	0.027	0.093	--	--	--	0.015	46	0.0072 U	--	3,200	3,200	NE	DET
Fluorene	0.0072 U	0.0076 U	--	--	0.0074 U	0.011	--	--	--	0.0072 U	5.2	0.0072 U	--	3,200	3,200	NE	DET
Naphthalene	0.0072 U	0.0076 U	--	--	0.0074 U	0.050	--	--	--	0.0072 U	1.6	0.0072 U	--	1,600	1,600	5	DET
Phenanthrene	0.0099	0.0076 U	--	--	0.017	0.077	--	--	--	0.011	43	0.0072 U	--	NE	NE	NE	DET
Pyrene	0.015 J	0.0090	--	--	0.0035	0.11	--	--	--	0.017	41	0.0072 U	--	2,400	2,400	NE	DET
cPAHs[10] (mg/kg)																	
Benzo (a) anthracene (TEF 0.1)	0.011	0.0076 U	--	--	0.017	0.043	--	--	--	0.0089	23	0.0072 U	--	RISSL for the Sum of TTEC cPAHs is 0.14 mg/kg	RISSL for the Sum of TTEC cPAHs is 0.14 mg/kg	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	DET
Benzo (a) pyrene (TEF 1)	0.013	0.0076 U	--	--	0.016	0.037	--	--	--	0.0072 U	23	0.0072 U	--				DET
Benzo (b) fluoranthene (TEF 0.1)	0.017	0.0076 U	--	--	0.017	0.042	--	--	--	0.0072 U	19	0.0072 U	--				DET
Benzo (J,k) fluoranthene (TEF 0.1)	0.0072 U	0.0076 U	--	--	0.0074 U	0.014	--	--	--	0.0072 U	8	0.0072 U	--				DET
Chrysene (TEF 0.01)	0.014	0.0076 U	--	--	0.017	0.046	--	--	--	0.0083	21	0.0072 U	--				DET
Dibenz (a,h) anthracene (TEF 0.1)	0.0072 U	0.0076 U	--	--	0.0074 U	0.0079 U	--	--	--	0.0072 U	2.9	0.0072 U	--				DET
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.013	0.0076 U	--	--	0.011	0.027	--	--	--	0.0072 U	11	0.0072 U	--				DET
Total TTEC of cPAHs (detect only)	0.017	N/A	--	--	0.021	0.050	--	--	--	0.0010	29.6	N/A	--	0.14	0.14	0.1	DET

Boring/Test Pit Identification	All-MW11D (continued)													
Sample Identification[2]	A11-MW11D-8-9	A11-MW11D-9-10	A11-MW11D-14-15	A11-MW11D-19-20	A11-MW11D-29-30	A11-MW11D-31-32	A11-MW11D-39-40	A11-MW11D-49-50	A11-MW11D-54-55	A11-MW11D-59-60	RISSL (Vadose Zone) (mg/kg)[11]	RISSL (Saturated) (mg/kg)[11]	MTCA Method A ULU Cleanup Levels[12]	Reuse Criteria[15]
Sample Depth (feet bgs)	8 to 9	9 to 10	14 to 15	19 to 20	29 to 30	31 to 32	39 to 40	49 to 50	54 to 55	59 to 60				
Interpreted Soil Type	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qva	Qva	Qva				
NWTPH-HCID[3] (mg/kg)														
Gasoline-Range	–	–	–	–	–	–	--	–	–	–	30	30	30/100[13]	30
Diesel-Range	–	–	–	–	–	–	--	–	–	–	2,000	2,000	2,000	200
Lube Oil-Range	–	–	–	–	–	–	--	–	–	–	2,000	2,000	2,000	200
NWTPH-Gx[4] (mg/kg)														
Gasoline-Range Petroleum Hydrocarbons	–	–	–	–	–	–	–	–	–	–	30	30	30/100[13]	30
NWTPH-Dx[5] (mg/kg)														
Diesel-Range Petroleum Hydrocarbons	–	–	–	–	–	–	--	–	–	–	2,000	2,000	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	–	–	–	–	–	–	--	–	–	–	2,000	2,000	2,000	200
VOCs[6] (mg/kg)														
Tetrachloroethene (PCE)	0.00092 U	0.0011 U	0.0013 UJ	0.00095 U	0.0011 U	0.00095 U	0.0010 U	0.00089 U	0.00082 U	0.00083 U	0.054	0.0027	0.05	DET
Trichloroethene (TCE)	0.00092 U	0.0011 U	0.0013 UJ	0.001	0.0011 U	0.00095 U	0.0010 U	0.00089 U	0.0049	0.005	0.001	0.0001	0.03	DET
(cis) 1,2-Dichloroethene	0.00092 U	0.0011 U	0.0013 UJ	0.00095 U	0.0011 U	0.00095 U	0.0010 U	0.00089 U	0.00082 U	0.00083 U	0.08	0.004	NE	DET
(trans) 1,2-Dichloroethene	0.00092 U	0.0011 U	0.0013 UJ	0.00095 U	0.0011 U	0.00095 U	0.0010 U	0.00089 U	0.00082 U	0.00083 U	0.54	0.027	NE	DET
Vinyl Chloride	0.00092 U	0.0011 U	0.0013 UJ	0.00095 U	0.0011 U	0.00095 U	0.0010 U	0.00089 U	0.00082 U	0.00083 U	0.0018	0.001	NE	DET
Acetone[6]	–	–	–	–	–	–	–	–	–	–	29	1.5	NE	NE
Trichlorofluoromethane (CFC-11)[7]											1.4	0.07	NE	NE
Xylene[8]	–	–	–	–	–	–	–	–	–	–	2.7	0.14	9	NE
Metals[9] (mg/kg)														
Arsenic	–	–	–	–	–	–	–	–	–	–	20	20	20	7
Barium	–	–	–	–	–	–	–	--	–	–	16,000	16,000	NE	NE
Cadmium	–	–	–	–	–	–	–	–	–	–	80	80	2.0	1
Chromium	–	–	–	–	–	–	–	--	–	–	120,000	120,000	2,000[14]	48
Lead	–	–	–	–	–	–	–	–	–	–	250	250	250	50
Mercury	–	–	–	–	–	–	–	–	–	–	24	24	2.0	0.07 or DET
Selenium	–	–	–	–	–	–	–	–	–	–	400	400	NE	NE
Silver	–	–	–	–	–	–	–	–	–	–	400	400	NE	NE

Boring/Test Pit Identification	All-MW11D (continued)										RISSL (Vadose Zone) (mg/kg)[11]	RISSL (Saturated) (mg/kg)[11]	MTCA Method A ULU Cleanup Levels[12]	Reuse Criteria[15]
Sample Identification[2]	A11-MW11D-8-9	A11-MW11D-9-10	A11-MW11D-14-15	A11-MW11D-19-20	A11-MW11D-29-30	A11-MW11D-31-32	A11-MW11D-39-40	A11-MW11D-49-50	A11-MW11D-54-55	A11-MW11D-59-60				
Sample Depth (feet bgs)	8 to 9	9 to 10	14 to 15	19 to 20	29 to 30	31 to 32	39 to 40	49 to 50	54 to 55	59 to 60				
Interpreted Soil Type	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qva	Qva	Qva				
PAHs[10] (mg/kg)														
1-Methylnaphthalene	--	--	--	--	--	--	--	--	--	--	34	34	NE	DET
2-Methylnaphthalene	--	--	--	--	--	--	--	--	--	--	320	320	NE	DET
Acenaphthene	--	--	--	--	--	--	--	--	--	--	4,800	4,800	NE	DET
Acenaphthylene	--	--	--	--	--	--	--	--	--	--	NE	NE	NE	DET
Anthracene	--	--	--	--	--	--	--	--	--	--	24,000	24,000	NE	DET
Benzo[g,h,i]perylene	--	--	--	--	--	--	--	--	--	--	NE	NE	NE	DET
Fluoranthene	--	--	--	--	--	--	--	--	--	--	3,200	3,200	NE	DET
Fluorene	--	--	--	--	--	--	--	--	--	--	3,200	3,200	NE	DET
Naphthalene	--	--	--	--	--	--	--	--	--	--	1,600	1,600	5	DET
Phenanthrene	--	--	--	--	--	--	--	--	--	--	NE	NE	NE	DET
Pyrene	--	--	--	--	--	--	--	--	--	--	2,400	2,400	NE	DET
cPAHs[10] (mg/kg)														
Benzo (a) anthracene (TEF 0.1)	--	--	--	--	--	--	--	--	--	--	RISSL for the Sum of TTEC cPAHs is 0.14 mg/kg	RISSL for the Sum of TTEC cPAHs is 0.14 mg/kg	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	DET
Benzo (a) pyrene (TEF 1)	--	--	--	--	--	--	--	--	--	--				DET
Benzo (b) fluoranthene (TEF 0.1)	--	--	--	--	--	--	--	--	--	--				DET
Benzo (J,k) fluoranthene (TEF 0.1)	--	--	--	--	--	--	--	--	--	--				DET
Chrysene (TEF 0.01)	--	--	--	--	--	--	--	--	--	--				DET
Dibenz (a,h) anthracene (TEF 0.1)	--	--	--	--	--	--	--	--	--	--				DET
Indeno (1,2,3-cd) pyrene (TEF 0.1)	--	--	--	--	--	--	--	--	--	--				DET
Total TTEC of cPAHs (detect only)	--	--	--	--	--	--	--	--	--	--	0.14	0.14	0.1	DET

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 2A Boring 1 collected 1-2 feet bgs = 2A-B1-1-2.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] Ecology-approved method NWTPH-Gx.

[5] Ecology-approved method NWTPH-Dx.

[6] Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260B. Other VOCs were analyzed but not detected.

[7] Acetone is a common laboratory contaminant.

[8] Total xylenes consists of m,p- and o- xylenes. The higher detection limit is shown.

[9] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[10] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by EPA method 8270D/SIM. Other PAHs were analyzed but not detected.

[11] Remedial Investigation Soil Screening Level per the 2106 RI Work Plan.

[12] MTCA Method A cleanup level for unrestricted land use.

[13] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[14] MTCA Method A cleanup level for Trivalent Chromium. Previous testing indicates hexavalent chromium is not a chemical of concern on the UWT campus.

[15] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

mg/kg = milligram per kilogram

-- = sample not analyzed

N/A = not applicable

MTCA = Model Toxics Control Act

bgs = below ground surface

DET = Detected at concentrations greater than laboratory reporting limit

U = Analyte was not detected at or greater than the listed reporting limit

Qvi = Ice-contact deposit

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Qva = advance outwash deposits

TTEC = Total Toxic Equivalent Concentration is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

NE = not established

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective the respective RISSL.

Appendix A7: ENVIRONMENTAL REPORT

Table 2

Summary of Chemical Analytical Results[1] - Groundwater
Proposed Academic Building - South 19th Street and Market Street
University of Washington Tacoma Campus
Tacoma, Washington

							VOCs[5] (µg/L)						
Boring Identification	Well Located Within Proposed Building Footprint	Sample ID[2]	Sample Date	Approximate Depth to Groundwater (feet btoc)[3]	Approximate Elevation of Groundwater[4]	Lithology At Well Screen	Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	(cis) 1,2-Dichloro-ethene	(trans) 1,2-Dichloro-ethene	Vinyl Chloride	1,1,1-Trichloro-ethane	1,1-Dichloro-ethane
A11-MW10D	Yes	A11-MW10D-161212	12/12/2016	30.79	56.18	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
A11-MW10S		A11-MW10S-161212	12/12/2016	4.81	82.56	Qvi	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
A11-MW11D		A11-MW11D-161214	12/14/2016	45.26	59.56	Qva	0.40	31	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
A11-MW11S		A11-MW11S-161214	12/14/2016	3.71	97.14	Qvi	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
BA-MW2	No	BA-MW2-130617	06/17/2013	27.98	95.84	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U
		BA-MW2-161206	12/06/2016	28.07	96.21	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
DD-MW1		DD-MW1-130619	6/19/2013	20.33	101.79	Qva	1.2	130	1.0 U	1.0 U	0.50 U	1.0 U	1.0 U
		DD-MW1-161213	12/13/2016	17.63	104.49	Qva	1.0 U	100	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
JS-MW1	Yes	JS-MW1-130618	6/18/2013	34.81	55.34	Qva	0.20 U	1.4	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U
		JS-MW1-161215	12/15/2016	33.39	56.76	Qva	0.20 U	2.8	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JS-MW2		JS-MW2-130618	6/18/2013	34.92	55.41	Qva	0.20 U	14	0.20 U	0.20 U	0.10 U	0.21	0.20 U
		JS-MW2-161215	12/15/2016	33.52	56.81	Qva	0.20 U	12	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JS-MW3	No	JS-MW3-130625	6/25/2013	36.52	52.83	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U
		JS-MW3-141017	10/27/2014	36.47	52.88	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U
		JS-MW3-161215	12/15/2016	34.97	53.79	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U
JS-MW3S		JS-MW3S-130913	9/13/2013	18.81	70.05	Qvi	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
		JS-MW3S-161215	12/15/2016	17.26	71.73	Qvi	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JS-MW4		JS-MW4D-130919	9/19/2013	40.18	53.48	Qva	0.20 U	2.5	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
		JS-MW4D-161219	12/19/2016	38.66	55.00	Qva	0.20 U	3.1	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JS-MW7A		JS-MW7A-140122	1/22/2014	8.84	88.73	Qvi	0.20 U	1.8	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
		JS-MW7A-161214	12/14/2016	4.95	91.8	Qvi	0.20 U	0.29	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW3		UG-MW3-130618	6/18/2013	44.35	55.28	Qva	0.20 U	13	0.20 U	0.20 U	0.10 U	0.20 U	0.25
UG-MW13		UG-MW13-130625	6/25/2013	21.15	101.81	Qvi	1.4	110	1.0 U	1.0 U	0.50 U	1.0 U	1.0 U
		UG-MW13-161216	12/16/2016	17.96	105	Qvi	0.85	93	0.94	1.0 U	0.50 U	1.0 U	1.0 U
UG-MW14		UG-MW14-130617	06/17/2013	21.43	112.34	Unconfirmed	1.2	110	1.0 U	1.0 U	0.50 U	1.0 U	1.0 U
		UG-MW14-161206	12/06/2016	20.30	113.45		1.2	100	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
UG-MW27		UG-MW27-130702	07/02/2013	23.05	125.52	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U
		UG-MW27-161207	12/07/2016	22.70	125.98	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW27S		UG-MW27S-161207	12/07/2016	14.58	134.19	Qvi	0.20 U	22	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW3	Yes	UG-MW3-161213	12/13/2016	42.90	56.73	Qva	0.20 U	19	0.32	0.20 U	0.20 U	0.20 U	0.30
UG-MW31	No	UG-MW31-130904	09/04/2013	5.20	137.72	Qvi	1.3	120	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
		UG-MW31-161206	12/06/2016	5.15	137.77	Qvi	1.0 U	120	1.4	1.0 U	1.0 U	1.0 U	1.0 U
UG-MW4	Yes	UG-MW4-130619	6/19/2013	50.52	55.15	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U
		UG-MW4-161213	12/14/2016	48.36	57.31	Qva	0.20 U	0.42	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW4S		UG-MW4S-161214	12/14/2016	4.75	100.21	Qvi	0.20 U	4.2	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW7	No	UG-MW7-130619	6/19/2013	35.68	88.29	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U
		UG-MW7-161213	12/13/2016	33.54	90.43	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW8		UG-MW8-130619	6/19/2013	33.01	90.49	Qva	0.40 U	56	0.44	0.40 U	0.20 U	0.40 U	0.40 U
		UG-MW8-161213	12/13/2016	30.57	92.93	Qva	0.40 U	55	0.41	0.40 U	0.40 U	0.40 U	0.40 U
UG-MW9		UG-MW9-130617	06/17/2013	29.80	93.74	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U
		UG-MW9-161206	12/06/2016	28.80	95.00	Qva	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Remedial Investigation Groundwater Screening Level (RIGSL)[6]							5	1.6	16	100	0.29	200	3.2

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Area number - Boring number - Date (i.e., a water sample collected from UG-MW35 on January 22, 2014 = UG-MW35-140122).

[3] Groundwater level was measured below the top of well casing on November 8, 2013 and December 27, 2016.

[4] Elevations shown are based on the surveys completed between 1998 and 2016. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal Control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, Elevation 165.15).

[5] Volatile organic compounds (VOCs) were analyzed by United States Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed but not detected.

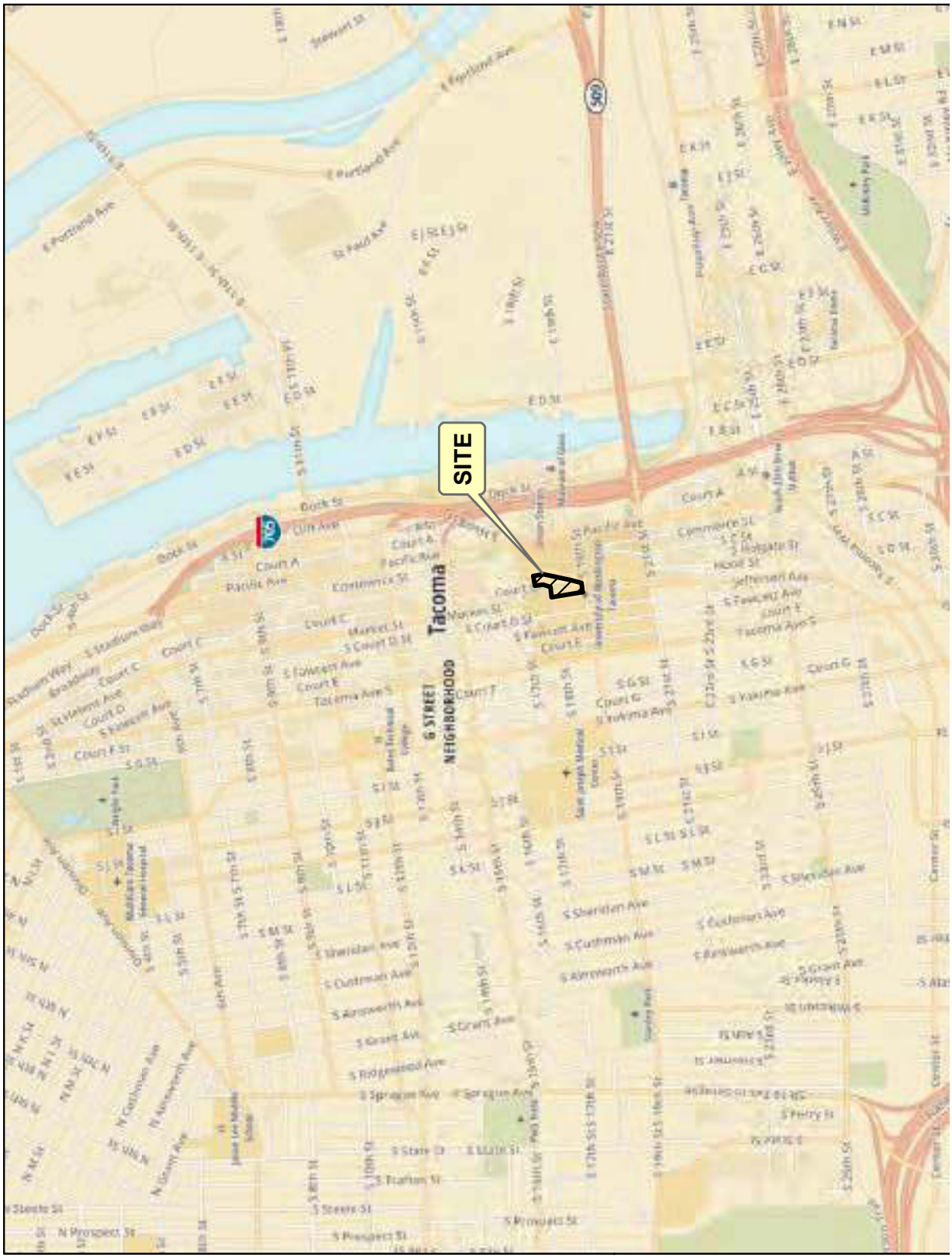
[6] Remedial Investigation Groundwater Screening Level per the 2016 Remedial Investigation Work Plan dated July 7, 2016.

µg/L = microgram per liter
U = Analyte was not detected at or greater than the listed reporting limit
Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.
Bold font type and gray shading indicates that the detected concentration is greater than the RIGSL.

btoc = below top of casing
Qvi = Ice-contact deposit
Qva = advance outwash deposits
VOCs = volatile organic compounds

File No. 0183-130-00
Table 2 | June 21, 2018

Page 1 of 1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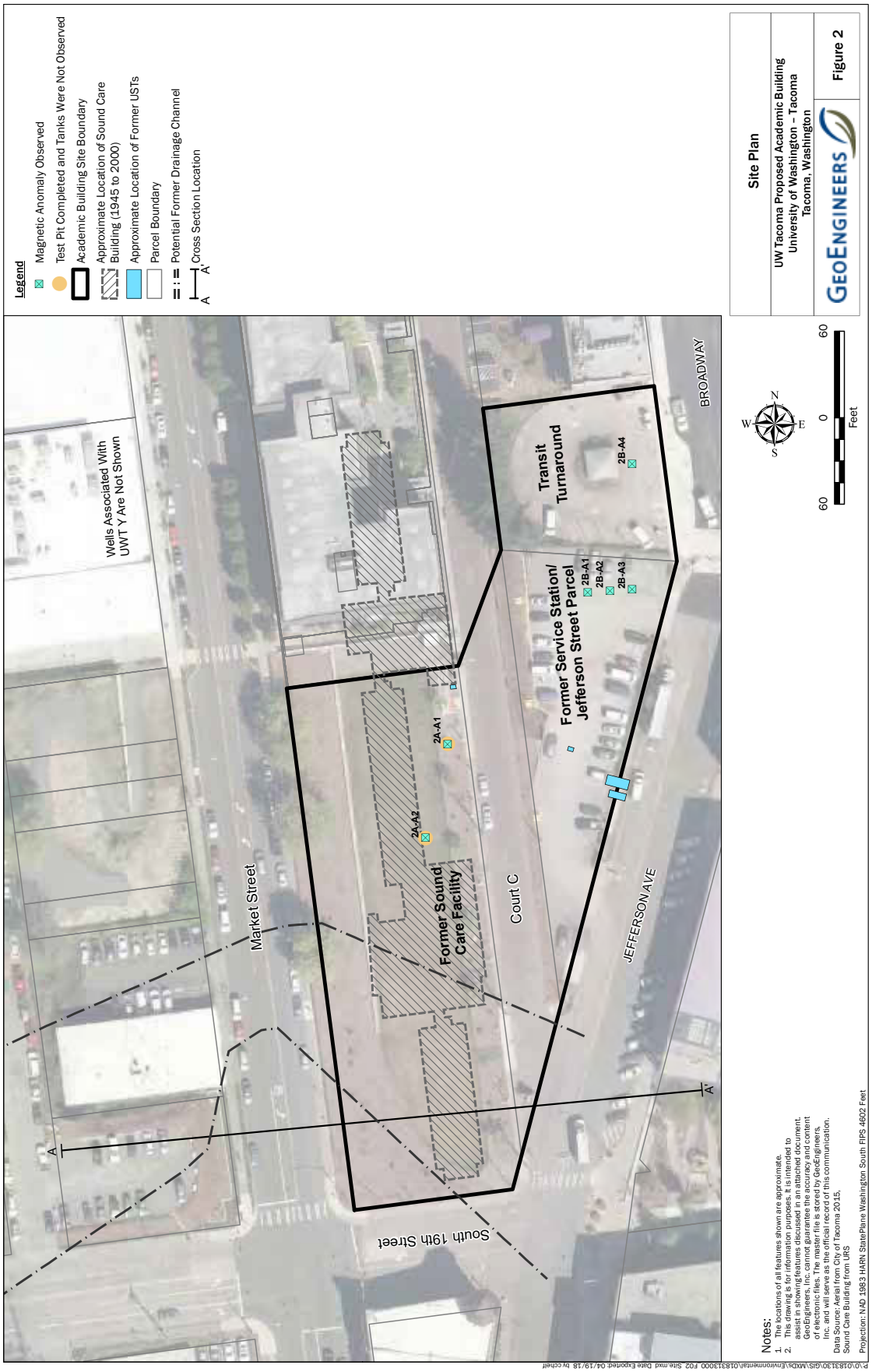
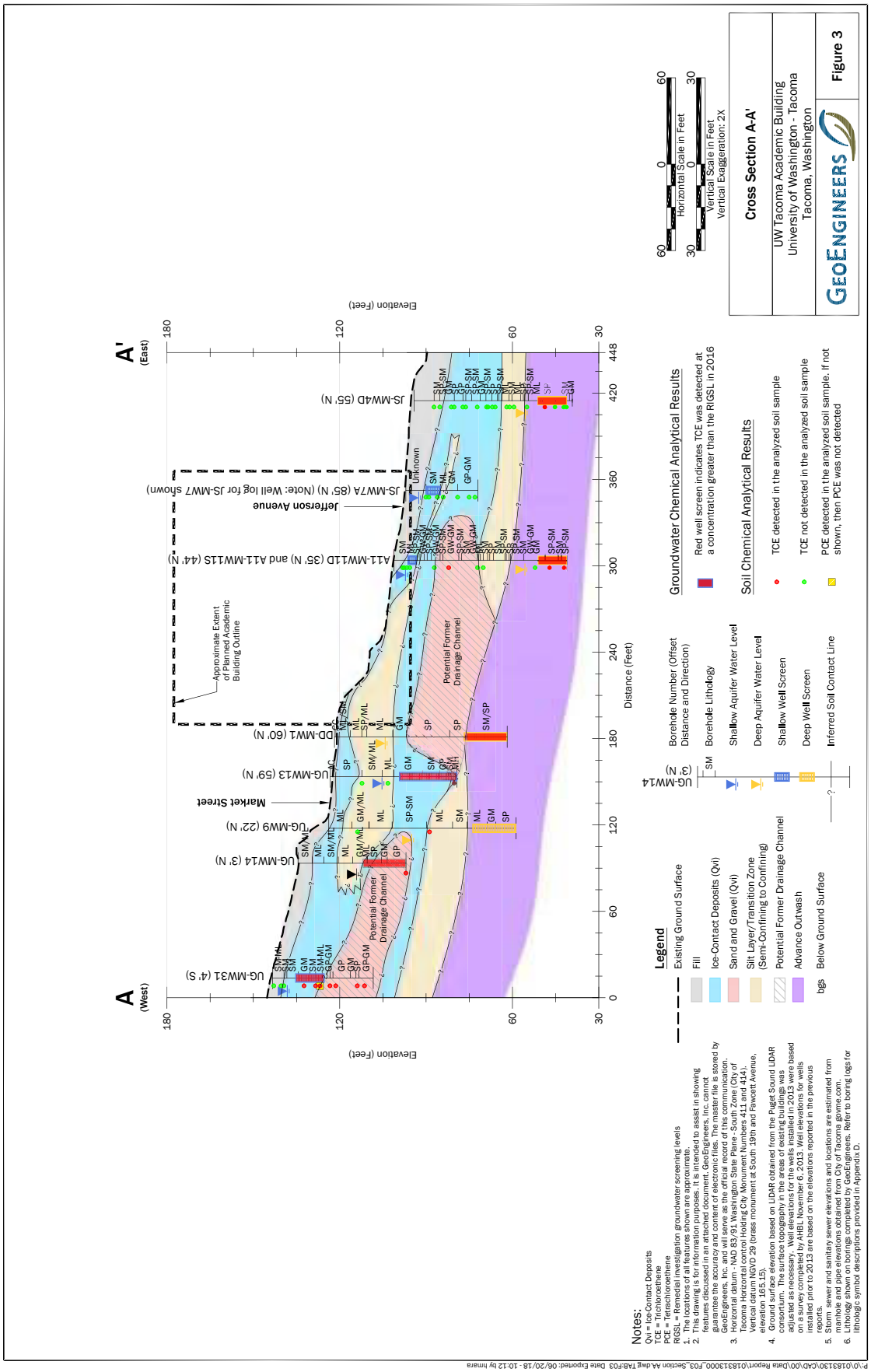
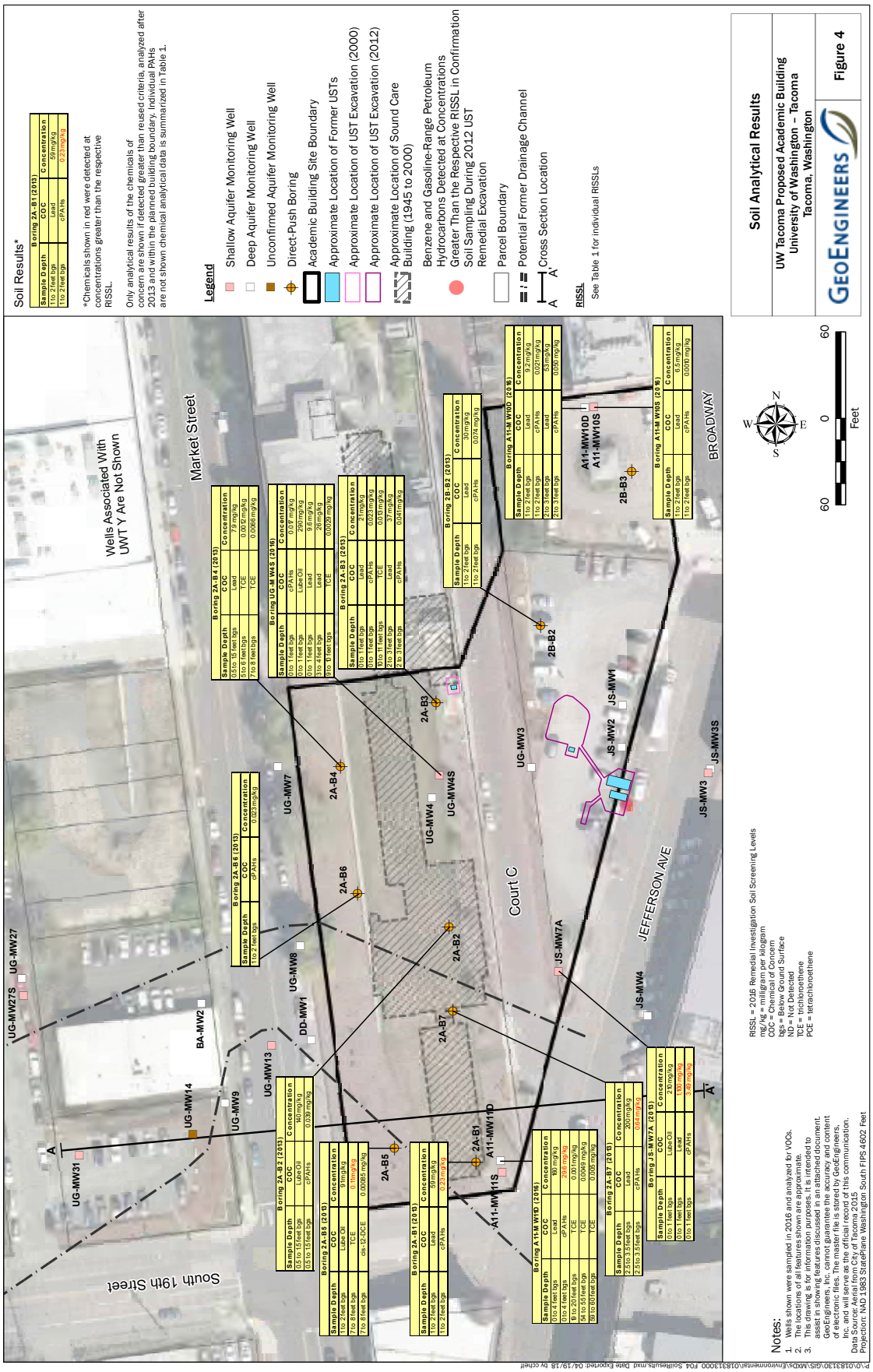
Tacoma
6 STREET
NEIGHBORHOOD


Legend
Magnetic Anomaly Observed
Test Pit Completed and Tanks Were Not Observed
Academic Building Site Boundary
Approximate Location of Sound Care Building (1945 to 2000)
Approximate Location of Former USTs
Parcel Boundary
Potential Former Drainage Channel
Cross Section Location
Wells Associated With UWT Y Are Not Shown
Market Street
Former Sound Care Facility
Court C
Former Service Station/ Jefferson Street Parcel
Transit Turnaround
JEFFERSON AVE
BROADWAY
South 19th Street
2A-A1
2A-A2
2B-A1
2B-A2
2B-A3
2B-A4
A
A'
N
W
E
S
60
0
60
Feet
Site Plan
UW Tacoma Proposed Academic Building
University of Washington – Tacoma
Tacoma, Washington
GeoEngineers
Figure 2
Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Data Source: Aerial from City of Tacoma 2015.
Sound Care Building from DRS
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet
P:\0\0183130\GIS\MXDs\Environmental\0183130 F02 Site.mxd Date Exported: 04/19/18 by cchelf


A (West)
A' (East)
Elevation (Feet)
Distance (Feet)
UG-MW31 (4', S)
UG-MW14 (3', N)
UG-MW9 (22', N)
UG-MW13 (59', N)
DD-MW1 (60', N)
A11-MW11D (35', N) and A11-MW11S (44', N)
JS-MW7A (85', N) (Note: Well log for JS-MW7 shown)
JS-MW4D (55', N)
Jefferson Avenue
Market Street
Approximate Extent of Planned Academic Building Outline
Potential Former Drainage Channel
Legend
Existing Ground Surface
Fill
Ice-Contact Deposits (Qvi)
Sand and Gravel (Qvi)
Silt Layer/Transition Zone (Semi-Confining to Confining)
Potential Former Drainage Channel
Advance Outwash
Below Ground Surface
Borehole Number (Offset Distance and Direction)
Borehole Lithology
Shallow Aquifer Water Level
Deep Aquifer Water Level
Shallow Well Screen
Deep Well Screen
Inferred Soil Contact Line
Groundwater Chemical Analytical Results
Red well screen indicates TCE was detected at a concentration greater than the RIGSL in 2016
Soil Chemical Analytical Results
TCE detected in the analyzed soil sample
TCE not detected in the analyzed soil sample
PCE detected in the analyzed soil sample. If not shown, then PCE was not detected
Horizontal Scale in Feet
Vertical Scale in Feet
Vertical Exaggeration: 2X
Cross Section A-A'
UW Tacoma Academic Building
University of Washington - Tacoma
Tacoma, Washington
GeoEngineers
Figure 3
Notes:
Qvi = Ice-Contact Deposits
TCE = Trichloroethene
PCE = Tetrachloroethene
RIGSL = Remedial investigation groundwater screening levels
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, elevation 165.15).
4. Ground surface elevation based on LIDAR obtained from the Puget Sound LIDAR consortium. The surface topography in the areas of existing buildings was adjusted to the ground surface elevations measured in 2013 and were based on a survey completed by AHBL November 6, 2013. Well elevations for wells installed prior to 2013 are based on the elevations reported in the previous reports.
5. Storm sewer and sanitary sewer elevations and locations are estimated from manhole and pipe elevations obtained from City of Tacoma govme.com.
6. Lithology shown on borings completed by GeoEngineers. Refer to boring logs for lithologic symbol descriptions provided in Appendix D.
P:\0\0183130\0\CAD\00\Data Report\0183130000_F03_Section AA.dwg TAB-F03 Date Exported: 06/20/18 - 10:12 by hmara


Soil Results*
Boring 2A-B1 (2015)
Sample Depth | COC | Concentration
1 to 2 feet bgs | Lead | 38 mg/kg
1 to 2 feet bgs | cPAHs | 0.023 mg/kg
*Chemicals shown in red were detected at concentrations greater than the respective RISSL.
Only analytical results of the chemicals of concern are shown if detected greater than reused criteria, analyzed after 2013 and within the planned building boundary. Individual PAHs are not shown chemical analytical data is summarized in Table 1.
Legend
Shallow Aquifer Monitoring Well
Deep Aquifer Monitoring Well
Unconfirmed Aquifer Monitoring Well
Direct-Push Boring
Academic Building Site Boundary
Approximate Location of Former USTs
Approximate Location of UST Excavation (2000)
Approximate Location of UST Excavation (2012)
Approximate Location of Sound Care Building (1945 to 2000)
Benzene and Gasoline-Range Petroleum Hydrocarbons Detected at Concentrations Greater Than the Respective RISSL in Confirmation Soil Sampling During 2012 UST Remedial Excavation
Parcel Boundary
Potential Former Drainage Channel
Cross Section Location
RISSL
See Table 1 for individual RISSLs
Soil Analytical Results
UW Tacoma Proposed Academic Building
University of Washington – Tacoma
Tacoma, Washington
GeoEngineers
Figure 4
Market Street
South 19th Street
Court C
JEFFERSON AVE
BROADWAY
Wells Associated With UWT Y Are Not Shown
UG-MW31
UG-MW27S
UG-MW27
UG-MW14
BA-MW2
UG-MW9
UG-MW13
DD-MW1
UG-MW8
UG-MW7
UG-MW4
UG-MW4S
UG-MW3
JS-MW1
JS-MW2
JS-MW7A
JS-MW4
JS-MW3
JS-MW3S
2A-B1
A11-MW11S
A11-MW11D
2A-B2
2A-B3
2A-B4
2A-B5
2A-B6
2A-B7
2B-B2
2B-B3
A11-MW10D
A11-MW10S
A
A'
Boring 2A-B7 (2015)
Sample Depth | COC | Concentration
2.5 to 3.5 feet bgs | Lead | 360 mg/kg
2.5 to 3.5 feet bgs | cPAHs | 0.84 mg/kg
Boring 2A-B6 (2015)
Sample Depth | COC | Concentration
1 to 2 feet bgs | Lead | 0.023 mg/kg
Boring 2A-B5 (2015)
Sample Depth | COC | Concentration
1 to 2 feet bgs | Lube Oil | 91 mg/kg
7 to 8 feet bgs | TCE | 0.0085 mg/kg
0.5 to 1.5 feet bgs | cis-1,2-DCE | 0.039 mg/kg
Boring 2A-B4 (2015)
Sample Depth | COC | Concentration
0.5 to 1.5 feet bgs | Lead | 73 mg/kg
5 to 6 feet bgs | TCE | 0.012 mg/kg
7 to 8 feet bgs | TCE | 0.0066 mg/kg
Boring 2A-B3 (2015)
Sample Depth | COC | Concentration
0 to 1 feet bgs | Lead | 21 mg/kg
0 to 1 feet bgs | cPAHs | 0.023 mg/kg
Boring 2B-B2 (2015)
Sample Depth | COC | Concentration
1 to 2 feet bgs | Lead | 30 mg/kg
1 to 2 feet bgs | cPAHs | 0.024 mg/kg
Boring UG-M W4S (2016)
Sample Depth | COC | Concentration
0 to 1 feet bgs | Lube Oil | 290 mg/kg
0 to 1 feet bgs | Lead | 9.6 mg/kg
3 to 4 feet bgs | Lead | 28 mg/kg
9 to 10 feet bgs | TCE | 0.0029 mg/kg
Boring A11-M W10D (2016)
Sample Depth | COC | Concentration
1 to 2 feet bgs | Lead | 92 mg/kg
1 to 2 feet bgs | cPAHs | 0.021 mg/kg
2 to 3 feet bgs | Lead | 53 mg/kg
2 to 3 feet bgs | cPAHs | 0.055 mg/kg
Boring A11-M W10S (2016)
Sample Depth | COC | Concentration
1 to 2 feet bgs | Lead | 6.5 mg/kg
1 to 2 feet bgs | cPAHs | 0.0016 mg/kg
Boring A11-M W11D (2016)
Sample Depth | COC | Concentration
0 to 4 feet bgs | Lead | 80 mg/kg
0 to 4 feet bgs | cPAHs | 0.077 mg/kg
9 to 10 feet bgs | TCE | 0.0011 mg/kg
54 to 55 feet bgs | TCE | 0.0049 mg/kg
59 to 60 feet bgs | TCE | 0.005 mg/kg
Boring JS-M W7A (2015)
Sample Depth | COC | Concentration
0 to 1 feet bgs | Lube Oil | 210 mg/kg
0 to 1 feet bgs | Lead | 130 mg/kg
0 to 1 feet bgs | cPAHs | 1.48 mg/kg
RISSL = 2016 Remedial Investigation Soil Screening Levels
mg/kg = milligram per kilogram
COC = Chemical of Concern
bgs = Below Ground Surface
ND = Not Detected
TCE = trichloroethene
PCE = tetrachloroethene
Notes:
1. Wells shown were sampled in 2016 and analyzed for VOCs.
2. The locations of all features shown are approximate.
3. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The user shall verify the data's accuracy and content. Inc. and will serve as the official record of this communication.
Data Source: Aerial from City of Tacoma 2015
Projection: NAD 1983 StatePlane Washington South FIPS 4602 Feet
N
W
E
S
60
0
60
Feet
P:\0\018330\GIS\MXDs\Environmental\018330000 F04_SoilResults.mxd Date Exported: 04/19/18 by cchelf

Appendix A8: CITY PRE-APP CONFERENCE NOTES

TACOMA PERMITS

747 Market St., 3rd Floor

Tacoma, WA 98402

(253) 591-5030

CITY OF TACOMA

Planning and Development Services

applicationservices@cityoftacoma.org

COMMENT MEMO - Electronic

Review

RECORD # PRE18-0184 - 1740 Jefferson Ave

NEXT STEPS

1. Review all comments provided.
2. If you have any questions or believe any of the review comments should not apply, please contact the appropriate staff reviewer to clarify.
3. If you have remaining questions or concerns regarding the proposal, contact the Project Coordinator indicating if you need to meet with staff to go over any of the comments and include a **list of the specific questions or concerns to be addressed**. With this information, your Project Coordinator can move forward with scheduling a time for you to meet with staff.
4. The following is a list of permits that may be applicable to your project as currently proposed.

Commercial New Building Permit
Commercial Fire Protection Permit
Commercial Mechanical Permit
Commercial Plumbing Permit
Sign Permit
Site Development Permit
Surfacewater Permit
Wastewater Permit
Water Permit
Work Order Permit or Right-of-Way Construction Permit

CONTACTS

For general inquiries or questions about permitting or process, please contact a permit specialist at (253) 591-5030 (option 3) or permitplandesk@cityoftacoma.org. You can also contact the assigned project coordinator directly with their information below. For questions regarding specific review comments or interpretation of code, please contact the appropriate review staff.

Project Coordinator: Patty Costa pcosta@cityoftacoma.org 253-591-5593
Site Review: Larry Criswell LCriswel@cityoftacoma.org 253-591-5787
Solid Waste Review: Lyle Hauenstein lhauenstein@cityoftacoma.org 253-594-7843
Traffic Review: Tyler Daniels tdaniels@cityoftacoma.org 253-591-5554
Streetlighting Review: Vicki Marsten vmarsten@cityoftacoma.org 253-591-5556
Real Property Review: Troy Stevens tstevens@cityoftacoma.org 253-591-5535
Fire Review: Chris Seaman cseaman@cityoftacoma.org 253-591-5503
Land Use: Shanta Frantz sfrantz@cityoftacoma.org 253-591-5388
Historic Preservation Officer: Reuben McKnight reuben.mcknight@cityoftacoma.org 253-591-5220
Tacoma Power Review: Rich Barrutia rbarruti@cityoftacoma.org 253-502-8541 *No Comment yet. Contact directly.*
Tacoma Water Review: Jesse Angel jangel@cityoftacoma.org 253-502-8835

GENERAL COMMENTS

Comment	Reviewer
Larry Criswell Site Development comments 5/10/2018 1) The submitted Site Plan does not label the hatched portion that connects to Jefferson. Is it dedicated ROW in part with the South portion of the alley vacation? If it is a private access only, a turn around meeting Fire requirements is required to be part of the ROW. 2) Alley Vacation - refer to Real Property Services for all requirements and process. **Full comments to follow once a response comes back from UWT.**	Larry Criswell
Please identify garbage and recycling location on site plan.	Lyle Hauenstein
5/10/18 Provide extend for desired vacation. If only a portion of Court C is requested to be vacated, applicant will be required to provide a pubic turnaround. Access location shall meet TMC 10.14 and would not be permitted from Market St. A traffic study will be required as a part of the vacation request. Attention shall be provided to the intersection of S 17th St. & Market St. This intersection was identified in the Brewery District Study for future signalization based on area wide development. Proposal lacks details for access vehicular and pedestrian access points and comments cannot be fully provided until more detail is submitted. The conceptual drawing supplied does not provide detail on what the hatched area is representing and cannot be commented on. The conceptual drawing supplied appears to have S 19th St. shown as vacated ROW. Provide detail on this so that the City can provide comments. If this is proposed, the traffic shall incorporate that as well.	Tyler Daniels
5/10/18 What type and style of streetlighting is being considered? An overall look at the streetlighting in the area should also be reviewed.	Vicki Marsten
5_14_2018 - RPS Comments: 1) RPS needs to know more about what is being proposed in order to comment. There has not been enough information provided. 2) The applicant can Google "City of Tacoma Real Property Services" for more information on street vacations and a petition, which will also have information on process.	Troy Stevens
5/10/2018 - Tacoma Fire will require Court C to remain a fire apparatus access road. From a fire perspective it perspective it could be either public or private.	Chris Seaman
5/10/18 - Land Use Comments: 1) Historic Preservation staff and/or Landmarks Preservation Commission review will be required. 2) Review under the Downtown Tacoma Code (TMC Chapter 13.06A), related section under the LU Regulatory Code (TMC Chapter 13.06) and the South Downtown SubArea Plan and associated EIS will be required.	Shanta Frantz
5/14/2018 - Site is located within the Union Station Conservation District. New construction, additions and demolitions within this district require the review and approval of the Landmarks Preservation Commission. The Union Station Design Guidelines provide the basis for this review. Guidelines are located at http://cms.cityoftacoma.org/Planning/Historic-Preservation/Districts/hp-guidelines-Union-Depot-2008.pdf.	Reuben McKnight

Appendix A8: CITY PRE-APP CONFERENCE NOTES

City ordinance 12.10.045 requires a separate water service and meter for each parcel. Jesse Angel

An existing water meters serve the proposed parcels.

Existing water meter to subject parcels may be utilized by the owner provided size requirements for intended use are adequate, as approved by Tacoma Water. Tacoma Water shall review proposed plans prior to final approval. Contact the Tacoma Water Permit Counter at (253) 502-8247 with any questions.

If fire sprinklering, contact the Tacoma Water Permit Counter at (253) 502-8247 for policies related to combination fire/domestic water service connections.

If required, new water services will be installed by Tacoma Water after payment of the Service Construction Charge and the Water Main Charge. New meters will be installed by Tacoma Water after payment of the System Development Charge.

If a new fire hydrant is required at a location with an existing water main, the hydrant will be installed by Tacoma Water after payment of an installation charge.

If existing water facilities need to be relocated or adjusted due to street improvements for this proposal they will be relocated by Tacoma Water at the owners' expense.

Sanitary sewer mains and side sewers shall maintain a minimum horizontal separation of ten feet from all water mains and water services. When extraordinary circumstances dictate the minimum horizontal separation is not achievable, the methods of protecting water facilities shall be in accordance with the most current State of Washington, Department of Ecology "Criteria For Sewage Works Design".

DOCUMENT REVIEW COMMENTS

Document Name: 205854 UWT Academic COT Pre-App Sections & Plan.pdf

Document Category: SITE PLAN

Page	Comment	Reviewer
4	It is unclear what is happening with S 19th. Indicate whether there will be a proposal to vacate this as well.	Vicki Marsten
4	Indicate whether this will be dedicated ROW or private access.	Larry Criswell

UWT Academic Building | **PRE18-0184**

May 16, 2018 | **1740 Jefferson Ave**

Name	E-Mail	Phone Number	Role/Organization
Patty Costa ✓	pcosta@cityoftacoma.org	253.591-5693	Application Services
Larry Criswell	lcriswel@cityoftacoma.org	253.691.5787	Site Development
Tyler Daniels ✓	tdaniels@cityoftacoma.org	253.591.5664	Traffic
Vicki Marsten VM	vmarsten@cityoftacoma.org	253.591-5555	Traffic/Streetlighting
Lauren Hoogkamer ✓	jangel@cityoftacoma.org	253.591-5254	Historic Preservation
Ronda Comforth ✓	rcomforth@cityoftacoma.org	253.591.5062	Real Property Services
Julie Clarke	Jclarke3@uw.edu	253-[illegible]	UW Capital Planning
Elizabeth Hyun	ekhyun@uw.edu	283-692-4675	UWT
Scott Barton-Smith	sbartonsmith@hackerarchitects.com	503-827-1254	Hacker Architects
Acting Engineer - Chris Seaman	CSEAMAN@CITYOFTACOMA.ORG	253-591-5503	F, BE

Appendix A8: CITY PRE-APP CONFERENCE NOTES

TACOMA PERMITS

747 Market St., 3rd Floor
Tacoma, WA 98402
(253) 591-5030

CITY OF TACOMA

Planning and Development Services

applicationservices@cityoftacoma.org

COMMENT MEMO - Meeting

Follow-Up

RECORD # PRE18-0184 - 1740 Jefferson Ave

NEXT STEPS

1. Review all comments provided.
2. If you have any questions or believe any of the review comments should not apply, please contact the appropriate staff reviewer to clarify.
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Commercial New Building Permit
Commercial Fire Protection Permit
Commercial Mechanical Permit
Commercial Plumbing Permit
Sign Permit
Site Development Permit
Right-of-Way Construction Permit
Surfacewater Permit
Wastewater Permit
Water Permit
Work Order Permit

CONTACTS

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Project Coordinator: Patty Costa pcosta@cityoftacoma.org 253-591-5593

Site Commercial Review: Lyle Hauenstein lhauenstein@cityoftacoma.org 253-594-7843
Power Supervisor: Rich Barrutia rbarruti@cityoftacoma.org 253-502-8541
Historic Preservation: Lauren Hoogkamer lhoogkamer@cityoftacoma.org 253-591-5254
Traffic Review: Tyler Daniels tdaniels@cityoftacoma.org 253-591-5554
Real Property Review: Troy Stevens tstevens@cityoftacoma.org 253-591-5535
Fire Review: Chris Seaman cseaman@cityoftacoma.org 253-591-5503
Land Use: Shanta Frantz sfrantz@cityoftacoma.org 253-591-5388
Historic Preservation Officer: Reuben McKnight reuben.mcknight@cityoftacoma.org 253-591-5220
Site Review: Larry Criswell LCriswel@cityoftacoma.org 253-591-5787

GENERAL COMMENTS

Comment	Reviewer
Larry Criswell Site Development comments 5/16/2018 1) Comments uploaded to ACCELA are preliminary based upon concept discussion and meeting today. 2) full comments to follow with concept design/permit submittal 3) Work Order (WO18-XXXX) required for Soil Nails with ROCC permit for private use of the public rights of way 4) Site Development permit required for onsite grading/filling (SDEV18-XXXX) 5) Work Order required for offsite improvements per TMC 2.19.040 for building permits submitted Offsite will be determined at time of concept/building permit submittal.	Larry Criswell
5/21/18 Provide extent for desired vacation. If only a portion of Court C is requested to be vacated, applicant will be required to provide a pubic turnaround. Access location shall meet TMC 10.14 and would not be permitted from Market St. A traffic study will be required as a part of the vacation request. Attention shall be provided to the intersection of S 17th St. & Market St. This intersection was identified in the Brewery District Study for future signalization based on area wide development. Proposal lacks details for both vehicular and pedestrian access points and comments cannot be fully provided until more detail is submitted. The conceptual drawing supplied does not provide detail on what the hatched area is representing and cannot be commented on. The conceptual drawing supplied appears to have S 19th St. shown as vacated ROW. Provide detail on this so that the City can provide comments. If this is proposed, the traffic shall incorporate that as well. Applicant shall provide details for where Refuse will be granted access. Public Works would support the request for full vacation of Court C.	Tyler Daniels
Tacoma Power has a underground line in an easement across the UWT property. The power line is located near the north boundary of the proposed building site. This line must be located and protected during construction of the proposed building. Tacoma Power has no objections to the building plan. Rich Barrutia 253-502-8541	Rich Barrutia

Environmental Services Pre-Submittal Checklist

Project Name: UW Tacoma Academic Building

Address: 1740 Jefferson
Project Description: Estimated 100,000 GSF of academic space to accommodate new engineering programs and continued growth in Business programs

Anticipated Project Valuation	**$60,000,000.00**
Estimated ICC Building Valuation	
Offsite Improvement Budget (per TMC 2.19.040)	

Date: 5/16/2018
Parcel Number: 2017060030 & 2017070023
Permit Number: PRE18-0164
Reviewer: Larry Criswell

NOTE: The following comments are based on limited information and are subject to change as more information for this project is provided and/or if the project concept changes. This checklist is a supportive document designed to assist the applicant and is NOT a comment letter. This document contains excerpts from Tacoma Municipal Code, Stormwater Management Manual (SWMM), Side Sewer and Sanitary Sewer Availability Manual, and Public Works Design Manual. This checklist may not provide all requirements but is intended to assist the applicant in determining basic stormwater and wastewater requirements. It is the applicant's responsibility to review all applicable codes and manuals to determine all project requirements.

STORMWATER MANAGEMENT

1. All stormwater impacts shall be mitigated in accordance with the 2016 SWMM.
2. This project must comply with the SWMM in effect at time of vesting.
3. It appears this project may disturb one or more acre of land or is part of a larger common plan of development or sale that has disturbed or ultimately will disturb one or more acres of land; and discharge stormwater from the site. Coverage under a Washington State Department of Ecology (Ecology) NPDES Stormwater Construction General Permit (CSWGP) may be required. Contact Ecology at (360) 407-7451 for information and to obtain a permit or use the link to apply for a CSWGP: http://www.ecy.wa.gov/programs/wq/stormwater/construction/enoi.html
   Hard copy applications for the CSWGP are available at:
   https://fortress.wa.gov/ecy/publications/SummaryPages/ECY02085.html
   The Ecology focus sheet outlining this requirement can be found at
   https://fortress.wa.gov/ecy/publications/summarypages/1010077.html
   City approval does not release the applicant from state or other permitting requirements. Please note that to obtain Ecology CSWGP coverage a public notice must be published at least once a week for two consecutive weeks with seven days between publications, in at least a single newspaper of general circulation in the county in which the construction is to take place. Ecology cannot grant permit coverage sooner than the end of the 30-day public comment period, which begins on the date of the second public notice.
4. This project may require Coverage under a Washington State Department of Ecology (Ecology) General Permit to Discharge Stormwater Associated with Industrial Activity. Contact Ecology at

(360) 407-7451 for information and to obtain a permit or use the link to apply for a General Permit to Discharge Stormwater Associated with Industrial Activity (Notice of Intent): https://fortress.wa.gov/ecy/publications/summarypages/ecy02084.html
For Information about the Industrial Stormwater General Permit requirements, refer to Ecology's FAQ at http://www.ecy.wa.gov/programs/wq/stormwater/industrial/indfaq.html.

5. City approval does not release the applicant from state or other permitting requirements.

6. Separate water quality facilities shall be provided for on-site and off-site PGHS.

7. This project is in the Thea Foss watershed. Watershed requirements can be found in Volume 1 Section 3.3.7 of the Stormwater Management Manual (SWMM).

8. A quantitative offsite analysis of the City storm sewer system may need to be submitted to demonstrate the City storm system has adequate capacity to convey storm drainage for fully developed conditions. If the system does not have adequate capacity, on-site detention, infiltration or capacity improvements to the downstream City storm system shall be required.

9. Field and office research indicates this project may have downstream limitations requiring additional analysis. The project proponent is responsible for the mitigation of these conditions. The design must address these downstream limitations and their mitigation. Refer to the Stormwater Management Manual (SWMM) Volume 1 Section 3.4.10 Off-site Analysis for additional guidance.

10. This site is not currently served by the existing City stormwater system, therefore, stormwater must be managed on-site or the stormwater system shall be extended to serve the project area.

11. Bare galvanized metal shall not be used for materials that convey stormwater, such as roofs, canopies, siding, gutters, downspouts, roof drains, and pipes. Any galvanized materials shall have an inert, non-leachable finish, such as baked enamel, fluorocarbon paint (such as Kynar, or Hylar), factory applied epoxy, pure aluminum, or asphalt coating. Acrylic paint, polyester paint, field applied, and part zinc (such as Galvalume) coatings are not acceptable.

WASTEWATER

12. Each new building or townhouse shall have a new, independent connection to the City sanitary sewer.

13. Multiple units and buildings that are under single ownership and located on a single parcel may use shared private side sewers that connect to the public sanitary sewer. In the event that the development is divided into more than one parcel in the future (whether from platting, boundary line adjustments, lot segregations, or any other land use actions), each new parcel shall have an individual side sewer connection to the public sanitary sewer. This may require re-routing the side sewers constructed under this development, or constructing new side sewers in order to individually connect each parcel to the public sanitary sewer. A public sanitary sewer extension may also be required in order to individually connect each parcel. Notice of this requirement will be recorded on title of this parcel.

14. Per Section 3.050 of the Side Sewer and Sanitary Availability Manual, if the existing side sewer is to be re-used for a new building, it shall be television inspected and pressure tested per City standards. If the side sewer is found through television inspection to have any illegal connections

or cannot pass the pressure test, all illegal connections shall be disconnected and the side sewer shall be repaired, replaced, or rehabilitated and retested until the side sewer passes the pressure test to ensure it is watertight. Permits for this work shall be obtained from Planning and Development Services.

15. The site is not currently served by the existing City sanitary sewer system. The City sanitary sewer shall be extended to serve the project site through the City's Work Order Process.

16. A new development or redevelopment will be classified as large if the proposed wastewater flow will be equal to or greater than 10% of the capacity of the public sanitary sewer system serving the development or if the development will include 100 units or more (including restaurants, hotels, motels, apartments, condominiums, townhomes, schools, etc). If a project is classified as large, the Developer shall submit peak daily wastewater flow calculations prepared by a licensed engineer. Peak daily flows shall be calculated based on full site build out in accordance with the Washington State Department of Ecology Criteria for Sewage Works Design (Orange Book). All associated calculations and references used in determining the estimated wastewater flow shall be submitted to Environmental Services for review and approval. The City will review these calculations and determine if the downstream sanitary sewer main and pump stations have adequate capacity. The applicant shall bear the cost of any necessary upgrades to the downstream City sanitary sewer system

17. Pretreatment devices such as a grease interceptor for restaurants or an oil/water separator for covered parking may be required.

18. Dumpsters that will be used for wet or moist trash, and all garbage compactors, shall be on a separate pad that drains to the sanitary sewer system. Cardboard compactors are not required to drain to sanitary.

19. Any discharge to the sanitary sewer that is not domestic waste may require additional approval from Source Control. Projects with such discharges shall submit all requested information. Frequency, flow rates, pH, and MSDS sheets may be required.

EASEMENTS AND OTHER REQUIRED AGREEMENTS

20. Easements shall be granted to the City over public storm and sanitary sewer mains located on private property. Easement widths shall be a minimum of 20 feet. Additional easement width is required for deep and/or large diameter mains.

21. No permanent structures shall be erected within public easement areas.

22. Any private storm drainage system will require a Covenant and Easement Agreement for maintenance and access.

23. A Restrictive Covenant may be required for projects where private storm or sanitary systems cross separate parcels under the same ownership.

OTHER PERMITS AND REVIEWS

24. Work completed in the City right-of-way requires a permit. The City of Tacoma has implemented a new permitting system using ACCELA for new and all subsequent plan submittals.
Site Development Permit - SDEV - Major Site Development - "SDEV18-00XX"
For a how to -
http://tacomapermits.org/wpcontent/uploads/2012/11/GettingStartedTacomaPermitsACA_012116.pdf

To get started - http://tacomapermits.org/

A separate Work Order Permit "WO18-XXXX" can be created as needed for the project.

25. Curb ramp requirements per RCW 35.68.075 and the Tacoma Curb Ramp Matrix. These requirements are for any permit plans.

Curb ramp details provided at 1" = 5' showing dimensions and spot elevations meeting ADA and PROWAG requirements

Note all proposed longitudinal and cross slopes for the ramp and landing areas

Dimension and percent slope must be shown between each location of finished grade to finished grade for all panels

FG DIST FG

% slope

Delineate the landing areas with a call out – 5' x 5' minimum Leader and label for detectable warning surface per SU-05G
Cannot have pedestrian curb if it causes trip hazard or vertical discontinuity

"No ped crossing" signs positioned and called out correctly to preclude crossings as necessary (per Traffic)
Note the stationing, offset, and elevation of each point of intersection of the ramp with the curb return to facilitate staking.
If curb is affected, note the flow line slopes and finished grades as applicable

For any non-compliant feature, include a maximum-extent-feasible statement on the plans. Typically not allowed for new construction.

The following note should appear on any sheet bearing a detailed curb ramp design: "Do not deviate from curb ramp design. Revisions shall be submitted to and approved by the City prior to construction."

APS buttons shall meet ADA minimum requirements

26. Horizontal control requirements - City of Tacoma NAD83-91 (ie: mon. in case, surface brass, etc.) - as published on govME. Reference to the City of Tacoma monument system (NAD 83-91) is required to be shown on the plans. This includes, at a minimum, a tie between two known monuments with bearing and distance, and a description of the monuments with coordinates. All other improvements shall be tied to that known line and shown as part of the horizontal control.

27. This project appears to be proposing work within a street under construction moratorium per the City of Tacoma Public Works Department Right-of-Way Restoration Policy. A waiver process exists to request work in moratorium locations.

Streets, Driveways, and Sidewalks

28. Full offsite requirements will be given at time of permit submittal for buildout.

29. Any Traffic Loop replacement is the responsibly of the developer.

30. All broken, damaged, or hazardous curb and gutter abutting the sites shall be removed, and new cement concrete curb and gutter constructed in its place to the approval of the City Engineer.

31. All damaged or defective sidewalk abutting the sites shall be removed and new cement concrete sidewalk constructed meeting Public Right Of Way Accessible Guidelines (PROWAG) and Americans with Disabilities Act (ADA) requirements, and be installed to the approval of the City

Engineer. Structural evaluation by a Structural Engineer is required for vaulted sidewalk. Removal and replacement of the vaulted walk is required if the sidewalk is determined to be a hazard, broken or not structurally sound.

32. All streets fronting the properties shall be restored in accordance with the Right-of-Way Restoration Policy.

33. The type, width, and location of all driveway approaches serving the sites shall be approved by the City Engineer.

34. Curb ramps at the intersections 19th & Market and 19th & Jefferson may need to be updated meeting current Tacoma & ADA standards. Curb installation shall to be determined at time of building permit submittal.

35. If Court "C" is vacated and does not have a through access, a turn-around shall be designed and constructed per City of Tacoma's Design Manual and Tacoma Fire Department approval. An approved fire turn-around, shall be designed and construction for all dead end streets or private accessways over 150' in length of a T-type or branch turnaround subject to approval by the City Engineer. Dedication of Rights of Way is required.

36. Full comments will come with any vacation requests pending the proposal. Easement determination will follow the request for vacation type.

OTHER

- The information provided is based upon the information presented at this time and the existing codes and requirements in force at the current time. If the project submitted varies from the information presented at this time, the project requirements may be different. Before submission of any documents, please verify that the codes have not changed in a manner that would require different information.

- The City of Tacoma has implemented a new permitting system using ACCELA for new and all subsequent plan submittals.

  All plans (PDF format) shall be flattened when submitted in ACCELA or they will be rejected.

For a how to - http://tacomapermits.org/wp-content/uploads/2012/11/GettingStartedTacomaPermitsACA_012116.pdf
To get started - http://tacomapermits.org/

ELECTRONIC RESOURCES

2016 City of Tacoma Stormwater Management Manual
http://www.cityoftacoma.org/cms/One.aspx?portalId=169&pageId=94957

2016 City of Tacoma Public Works Department Design Manual
Requirements for work order submittals, City standard drawings
http://cms.cityoftacoma.org/PublicWorks/Engineering/DesignManual/DesignManual.pdf

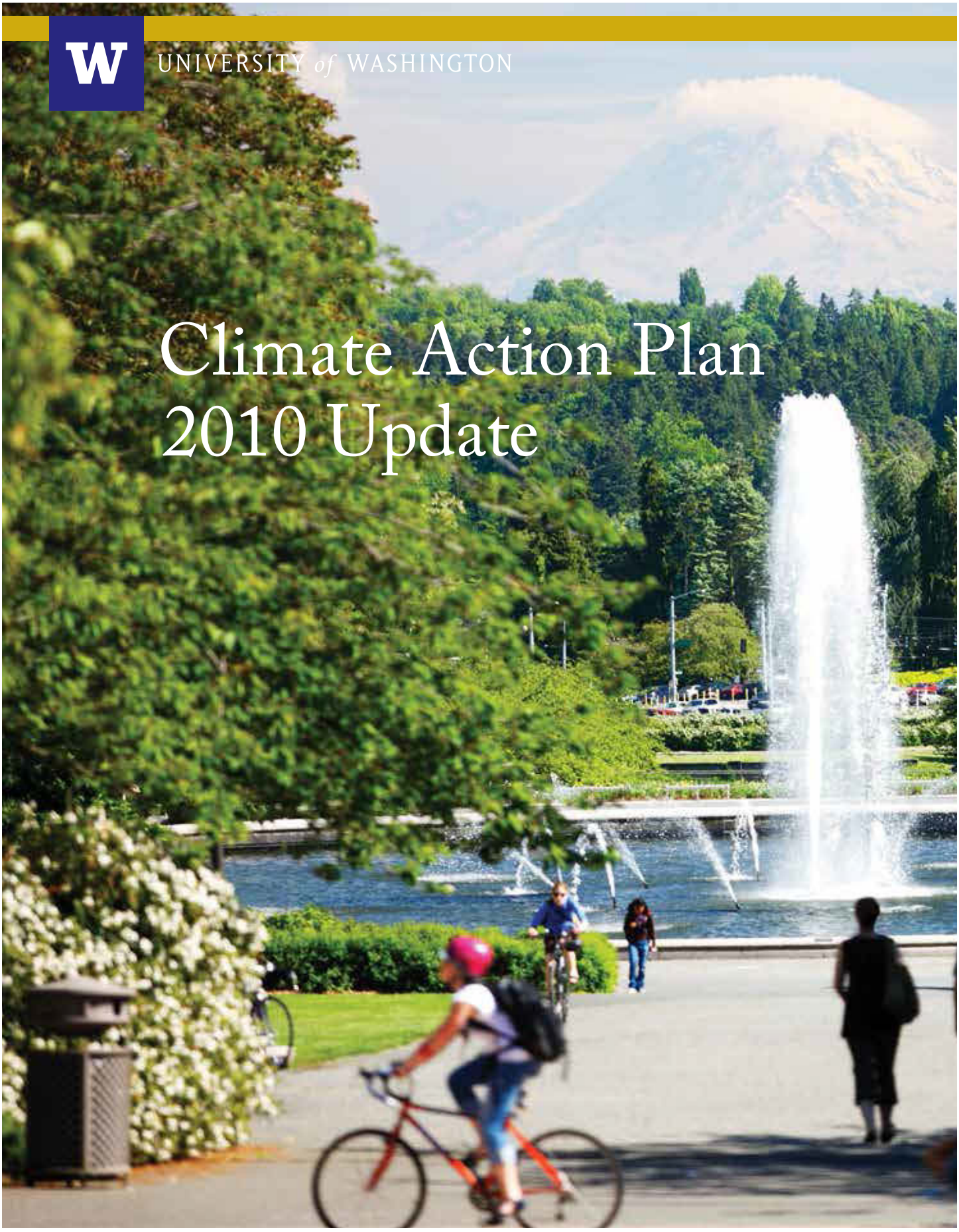
Policy Updates are posted on the City of Tacoma Surface Water website.
http://www.cityoftacoma.org/stormwater

Mapguide Viewer
City record drawings, side sewer cards, utility locations
www.govme.com/map

Ecology NPDES Construction Stormwater General Permit
http://www.ecy.wa.gov/programs/wq/stormwater/construction/

CONTACTS
Larry Criswell
Planning and Development Services – Site Development Group
253-591-5787

General Permit Information, Permit Fees
Planning and Development Services
Permit Counter, (253) 591-5030


UNIVERSITY of WASHINGTON
Climate Action Plan
2010 Update

Contents

UW Climate Action Plan
IMPLEMENTATION PLAN, September 2010

I. Introduction

In September 2009, the University of Washington (UW) published the Climate Action Plan (CAP), which described the commitments being made by the UW to meet its obligations under the American College and University Presidents' Climate Commitment (ACUPCC). The primary focus of that document was to set broad goals and strategies, providing a number of proposed actions, in order to achieve a climate-neutral university having no net greenhouse gas (GHG) emissions. The first carbon reduction target is 15% below 2000 levels by 2020. Considering that the UW is expected to add approximately 2.1 million square feet of space (an increase of 13%) and 8,200 faculty, staff and students (an increase of 11.5%) in that time, the reductions required to fully offset growth and still meet absolute reduction targets require reductions of far more than 15%.

This document was prepared to update the campus-wide actions being taken toward the CAP commitment to reduce GHG emissions. While many of the actions are in early stages and are not yet measurable, they do align with the goals and strategies outlined in CAP, including:

1. Compliance with the No-Net Carbon goal, which presents opportunities for innovation and specifically, for the University of Washington to innovate and lead
2. Ensuring that University processes (teaching, research, administrative, and outreach), and those of its vendors and suppliers, are efficient and sustainable.
3. Designing sustainability into our products (educated students and research) and services we deliver (instruction and outreach)
4. Developing new ways of doing "business" that align with University activities and strategies
5. Creating the future capacity needed to manage sustainably, including skills, values and decision making models

Additionally, the UW is a global leader in environmental science research, education and technology transfer and is recognized nationally as a leader in reducing its carbon footprint, including wise use practices, energy conservation and innovative transportation alternatives. UW researchers are leading authorities on the impact of global warming and are at the forefront of developing new models that refine climate change predictions. In 2009, the UW received an A- on the College Sustainability Report Card and in 2010 received 96/100 on the Princeton Green Rating (highest of all public research universities) and ranked 4th overall on Sierra Club Magazine's Cool Schools list (See Figure 1). UW students recently voted to create a Campus Sustainability Fund, a nearly $340K fund which will be used to finance projects that increase campus sustainability, prioritize student leadership and include outreach and education

components. And the first-ever Green Awards honored noteworthy environmental efforts by students, faculty and staff.

Figure 1

MEASURE 1: Peer comparison report rankings

Our ratings	SEI report card	Princeton Green Rating	Sierra Cool Schools
2008	B	99	9th
2009	A-	99	2nd
2010	? (available in September)	96	4th

GOAL: achieve the highest rankings possible (A+, 99 & 1st place)

	SEI Report Card 2009	Princeton Honor Roll 2010	Sierra Cool Schools 2010
University of Washington	A	96	4th
Arizona State U - Tempe	A-	99	34th
UC San Diego	A-	96	15th
UNC - Chapel Hill	A-	95	40th
Stanford	A-	97	5th
Colorado - Boulder	A-	87	13th
Oregon State U	B+	98	24th
UC Davis	B+	94	18th
University of Michigan	B+	84	47th
UC Berkeley	B	99	32nd
University of Connecticut	B	95	49th
University of Oregon	B	96	NA
Maryland - College Park	B	99	NA
UCLA	B	87	25th
University of Arizona	B	80 * (not sure what * means)	NA

While the primary focus of the Climate Action Plan is substantive carbon reduction, others of these goals are part of a larger, more holistic set of strategies which include:

1. Moving forward toward climate neutrality
2. Engaging faculty and students in conservation and related behavior change
3. Integrating formal and informal learning on sustainability
4. Replacing the campus power plant
5. Moving students, faculty and staff to live near the UW
6. More walking/cycling, less reliance on motorized transportation
7. Becoming energy efficient

II. Summary of Campus Accomplishments, Long Term and Short Term Initiatives

A. Funding

Funding strategies enable and support University program goals, including carbon reduction.

Accomplishments:

1. Funded a series of major planning studies that incorporated key CAP goals.
2. Established the student funded Campus Sustainability Fund.
3. Funded a new university architect position to support integrated capital planning.
4. Funded $100,000 for the Environmental Stewardship and Sustainability Office to support CAP implementation planning efforts.
5. Obtained $5 million DOE Smart Grid Grant with $5 million UW matching funding.

Short term (2 year) Goals:

1. Coordinate the launch of the student funded Campus Sustainability Fund within a wider funding framework for the Climate Action Plan.
2. Develop a Conservation Resource Manager Program.
3. Secure permanent funding for ESS office.
4. Fund more detailed planning studies that follow-up on a series of major planning directions, including Green Streets/Clean storm water technology, and SMART Campus.

Long-term Goals:

1. Normalize Climate Action Plan goals and initiatives into overall UW strategic planning.
2. Include ~$5,000,000 2011-13 capital budget request for development of an Energy Conservation Center.
3. Develop a strategic plan for identifying and funding energy saving projects.
4. Reorient capital funding process from building-centric to program and district-centric.
5. Retool the UW's infrastructure for a non-carbon future.
6. Help the West of 15th neighborhood realize its full potential as eco-district for low–carbon working, living, and recreation.

7. Effectively use life-cycle cost analyses in decision-making. Create an analytical basis for higher investments in CAP reduction initiatives.

B. Academic Engagement in Climate Change

Our goal is to make the UW a sustainable and environmentally friendly institution while incubating interest and excitement for environmental studies in science, social policy, and technology for our students. Not only do attitudes and behaviors need to change, but exciting opportunities for involvement and commitment inside and outside the classroom must be planned and implemented. This will be achieved through:

1. Integrating our students, and faculty in many diverse disciplines traditionally spread across our colleges and campuses in local and campus-wide academic programs and summer research opportunities,
2. Engaging the community at large, through creating awareness,
3. Exploiting our new College of the Environment as the focal point for these activities, and
4. Building bridges of activism that connect our academic and administrative communities in common interests and challenges in the way we operate the University. Examples are as green office practices, spectrum of conservation programs, facilities evaluation and improvements, responsible housing and food service practices, and voluntary public outreach and education.

There are three ways in which to academically engage students in climate change: formal learning, extracurricular/informal learning, and research.

Accomplishments

1. The UW College of the Environment was created in July 2009 in part to enable the University to provide unique, highly regarded, enhanced environmental degree programs that combine academic rigor and advanced learning methodologies. A permanent Dean has been hired and as of July 1, 2010, there are over 1400 majors in the College of the Environment (870 undergraduates, 535 graduate students) and many more majors across campus that have strong ties to sustainability and the natural and built environments.
2. Offered over 500 environmental courses annually.
3. The School of Forest Resources transformed its Paper Science and Engineering (PSE) undergraduate program into a broader Bioresource

Science and Engineering (BSE) program. The first phase of this effort will debut in Fall 2010.

4. The College of the Environment partnered with the Jessie and John Danz and Walker-Ames Lecture Funds administered by the Graduate School, the School of Public Health, the Center for Global Studies, the Jackson School of International Studies, and the UW Alumni Association (UWAA) to produce a public lecture series and a UW course that focuses on food production from the dawn of the human species through to the present from the field to the kitchen, from Seattle to the plains of Africa. (Fall Quarter 2010).
5. Co-hosting (with Oregon State University) the USGS Northwest Regional Climate Science Center. The center will support USGS workforce development through graduate student fellowships to work on regional climate research.
6. Developed new certificate programs in stream restoration, sustainable transportation, low impact development, and decision making for climate change (UW Educational Outreach).

Short-term (2 year) Goals:

1. Pursue new interdisciplinary training opportunities in climate and sustainability science, including increased support for existing and new National Science Foundation Integrative Graduate Education and Research Traineeship (NSF IGERT) programs. (e.g., Bioresource-Based Energy for Sustainable Societies program).
2. Continue planning for an undergraduate leadership minor, sponsored through the colleges of Arts & Sciences, Business, Social Work, Evans School of Public Affairs and the Law School, and designed to provide students with real world experience, as well as a sense of the kind of impact they can have in the future. This program has $2 million dollars in funding, all of which has been raised through donations.
3. Connect with and prepare incoming freshmen and transfer students via continued work with new “Learning Links” advising structure and summer orientation sessions for pre-environment students.
4. Initiate a partnership between Housing and Food Services and the College of the Environment is underway to provide regular academic programming for residents of new undergraduate housing. This is planned to debut in the fall of 2011.
5. Develop a mechanism for connecting faculty and students in research projects of mutual interest, possibly for course credits in the Program on the Environment (PoE) within its new home in the College of the Environment. This will be needed so that students with capstone projects within the PoE and/or summer funding from the Student Green Fund can be

properly supervised and evaluated by faculty, many of whom are new in environmental activism and research themselves.
6. Host Sustainability Summit (see Behavioral Change).
7. Enhance the scope of extra-curricular participatory opportunities for motivated members across our campus community through existing student-led groups. For example, in the short term we are planning to expand the UW Farm, expanding production and increasing the numbers of UW faculty, students and staff who participate in it.
8. Hire and support new faculty who focus on environmental scholarship.

Long-term Goals:

1. Connect with and prepare incoming freshmen and transfer students via autumn "Exploring Environmental Majors Seminar," and events similar to Engineering's bridge programs and "Discovery Days."
2. Spread environmental research and scholarship across its traditional campus boundaries in fields such as law and political science, business and economics, basic science and technology, public policy, and public health and environmental safety by engaging deans and new or existing faculty in new constellations of activity.
3. Develop a tri-campus strategy for hiring, support, promotion and tenure, and merit criteria for faculty who focus on environmental scholarship, but reside in departments outside the environmental sciences.
4. Develop new or expanded course offerings that explore the environmental challenges and opportunities that exist at the boundaries between the many disciplines represented within the University.
5. Garner high-level support for broadening the scope of activities within colleges and campuses through strategic investments in environmental and climate-related hires and centers to be proposed by deans and chancellors.

C. Encouraging Behavior Changes to Reduce Carbon Emissions

Another important feature of creating a sustainable University is to encourage behavioral changes to reduce carbon emissions. Sustainability guidelines and education/outreach programs for faculty, staff and students need to be created and then implemented.

Accomplishments:

1. Created a UW Home Page featuring Sustainability; launched an online sustainability pledge; and utilized social media including Facebook and Twitter as well as an e-mail newsletter.
2. Ranked #4 in Sierra Club "Cool Schools." UW is the leading large public research university in the rankings.

3. Sponsored "Green Bag Networking Lunch" events for staff on voluntary green teams.
4. Co-hosted "Pacific Northwest Sustainability Roundtable" event with U.S. Postal Service (including Starbucks, Boeing, Costco, Nordstrom, 16 other NW companies).
5. Adopted Green Purchasing Policies.
6. Launched first-ever Husky Green Award to recognize efforts on UW sustainability.
7. Received A- on Sustainable Endowment Institute's "2010 College Sustainability Report Card."
8. Included in Princeton Review's Guide to 286 Green Colleges" released in April 2010.
9. Created the Husky Green Fund, a staff, faculty and alumni donor fund for sustainability.

Short term (2 year) Goals:

1. Create and implement guidelines and education/outreach program for faculty, staff and students on sustainability.
2. Engage Certificate Program in Environmental Management Keystone (masters student's final project) to explore options and research what other universities are doing, including a survey/report card to learn about best practices in schools, colleges, units.
3. Launching a network of UW sustainability coordinators.
4. Launch and manage the student-funded Campus Sustainability Fund.
5. Hold a University sustainability summit in Fall 2010.
6. Conduct behavioral audits in buildings as part of the Smart Grid Demonstration Project.
7. Create a robust set of sustainability-related metrics.
8. Create framework for and begin vetting a set of policies for UW decision makers to consider regarding CAP and sustainability, linked to Office of Planning & Budgeting activities.

Long term goals:

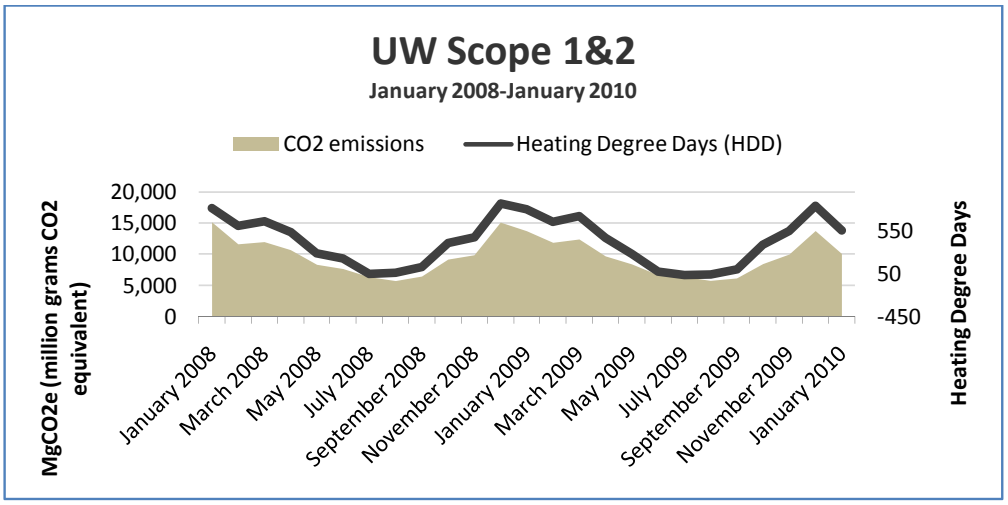
1. Engage students to work with UW Administration on climate reduction behaviors and strategies.
2. Develop a plan to reduce carbon emissions caused by professional travel.
3. Promote sustainable behavior as a cultural norm in Human Resource practices; new student orientation; faculty and staff; and in office and other work environments.

D. Buildings: New Construction & Existing Buildings

In order to achieve zero carbon by 2050, major investments in the infrastructure of the University are required. Analysis is currently underway on existing legacy buildings that will provide information to set broader policies where individual building projects can contribute to overall carbon reduction.

The largest source of Scope I & II emissions comes from the power plant, which heats the buildings on the Seattle campus (see figure 2). While replacing the Central Utility Plant is a long term goal, in the interim the focus should be on heating and cooling buildings more efficiently and sustainably, including reducing energy demand and looking for alternative sources of energy.

Figure 2



Accomplishments:

1. In the process of delivering 20 registered LEED® projects on all three campuses that are in various stages of design, construction and pending certification. Certified USGBC LEED projects include 7 Gold, 3 Silver, and 1 Certified. Recent renovations result in energy efficiency savings of 30% higher than the ASHRAE 90.1 standard.
2. UW Tacoma replaced an inefficient boiler with two energy efficient units to service existing facilities and the new Joy Building, and students installed a prototype Rain Garden.

3. UW Bothell purchased Midwest Independent System Operator Renewable Energy Certificate (MISO REC's) for a total reduction of 4,324 metric tons of CO_2 , in order to reduce Scope 2 emissions.

Figure 3

Short term (2 year) Goals:

1. Manage growth issues and space conservation.
2. Continue implementation of Smart Grid Demonstration Project,[1] which will enable measurement and digital communication of electrical consumption

[1] **Smart Grid Demonstration Project**- the UW-Seattle City Light (SCL) Smart Grid Demonstration Project is one of 12 site-specific subprojects within the "Pacific Northwest Smart Grid Demonstration Project." The project was awarded an American Recovery and Reinvestment Act (ARRA) matching grant by the US Department of Energy (DOE) in November 2009. The project will enable measurement and digital communication of electrical consumption while implementing demand response strategies at various university facilities. This will facilitate the reduction of energy consumption during both peak and off-peak times. It will also deploy smart meters and related electrical infrastructure in campus buildings.

information while implementing demand response strategies at various university facilities.
3. Create a policy for high efficiency energy targets for renovations and new construction.
4. Expand Energy Audits and tune-ups for existing buildings.
5. Continue implementation Solar Photovoltaic (PV) demonstration projects, including a 35 KW roof-top solar PV project on top of the University's central steam plant.
6. Target LEED gold (Silver minimum) for Phase 3A and 3B projects under construction/in design; continue to review ESCO opportunities for development of a geothermal central plant; and work with City of Tacoma on possible storm water collection/purification swale for the Hood Corridor pathway (UW Tacoma).

Long term Goals:

1. Continue the visionary exploration of development scenarios for the West Campus eco-district that aligns with 21st Century green-technology opportunities, such as analyzing alternatives and approaches for replacing the Central Utility Plant and/or exploring alternative energy sources.
2. Connect capital investments with related process improvements that innovatively and aggressively link capital and operating budgets.
3. Develop a prioritized capital investment approach for UW infrastructure as a component of UW's One Capital Plan.

E. Transportation/Commuting

A major source of GHG emissions is transportation. Cutting greenhouse gas emissions will require reductions in emissions related to transportation to, from, and around campus, as well as professional travel.

Accomplishments:

1. Preserved 126 secure bicycle parking stalls displaced by capital projects; added 100 new secure bicycle parking stalls; completed development of secure bicycle parking prototype design; developed concept plan for Burke Gilman Trail improvements.

2. Returned to model of increasing parking rates faster than U-PASS rates in order to encourage the use of public transportation over single occupancy vehicles.
3. Updated Commuter Services (U-PASS) business plan (charting a path for continued financial viability over the next 5 years).
4. Completed pedestrian mode needs assessment and programming plan in conjunction with Feet First.
5. Entered strategic partnership with Cascade Bicycle Club, doubled the number of major cycling events each year, and implemented a regular series of cycling workshops.
6. Increased the cost for parking single occupant vehicles at UW Bothell from $380 per year to $505. Also, decreased pricing for the UWB U-Pass.

Short-term (2 year) Goals:

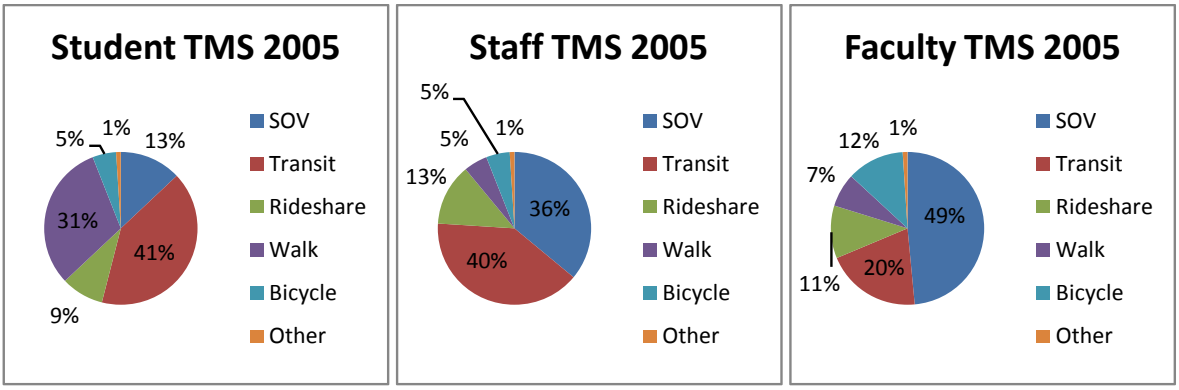
1. Encourage ownership of low-emission vehicles by individual commuters and transit agencies.
2. Establish a clearinghouse with information about greener vehicle purchase incentives and savings.
3. Expand programming, infrastructure and support for walkers and cyclists.
4. Improve off-campus parking management.
5. Identify and implement alternative funding model for U-PASS.
6. Maintain high parking rates as compared to alternatives; suppress transit rates as compared to the cost of driving; increase transit rates, as compared to active transportation.
7. Increase programming and support for ridesharing.
8. Increase use of telework and compressed work weeks; establish a telework toolkit and policy clearinghouse.
9. Prioritize use of fleet vehicles (UCAR) over use of private vehicles for business travel;

Long Term Goals:

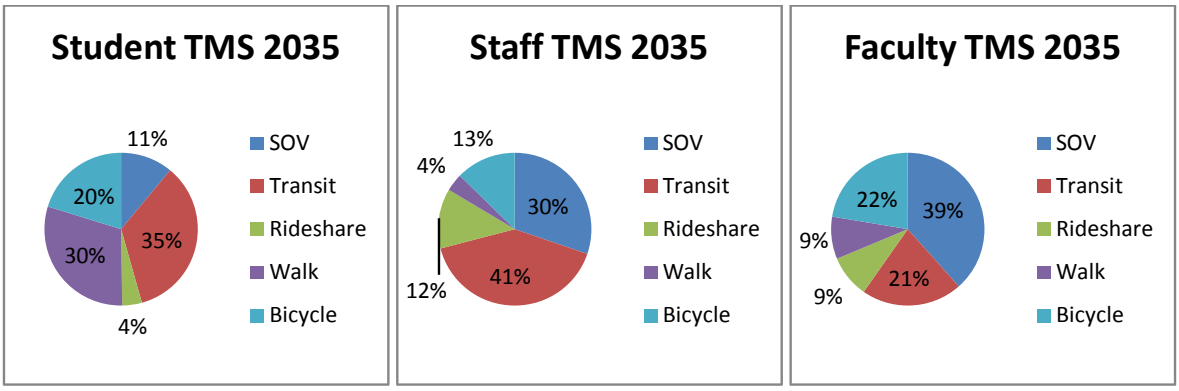
Tactics to address CO2e from commuting attack one of three primary factors, vehicle emission factors, vehicle miles traveled, and transportation mode split. The University's greatest influence and our best opportunity for substantive results over the long term lies in Transportation Mode Split (TMS). Much of our past success has come from shifting commute activity from the highest impact mode (drive alone) to lower impact modes (primarily transit). The UW's future

success will hinge on continued incremental reductions in drive alone rates while shifting significant numbers of commuters from motorized modes (including transit) to active transportation (walking and bicycling). Another long term goal is to develop campus infrastructure to support private electric vehicle charging.

The 2005 baseline UW TMS consists of:



The UW CAP target of a 15% reduction from 2005 emission levels by 2020 has already been exceeded, with a 23% reduction from 2005 levels achieved by 2010. As a result, 2035 behavioral targets are being set to meet the University's goal of a 30% reduction in commuting emissions by that date. To attain a 30% reduction in CO2e from commuting the UW is targeting the following 2030 TMS goals:

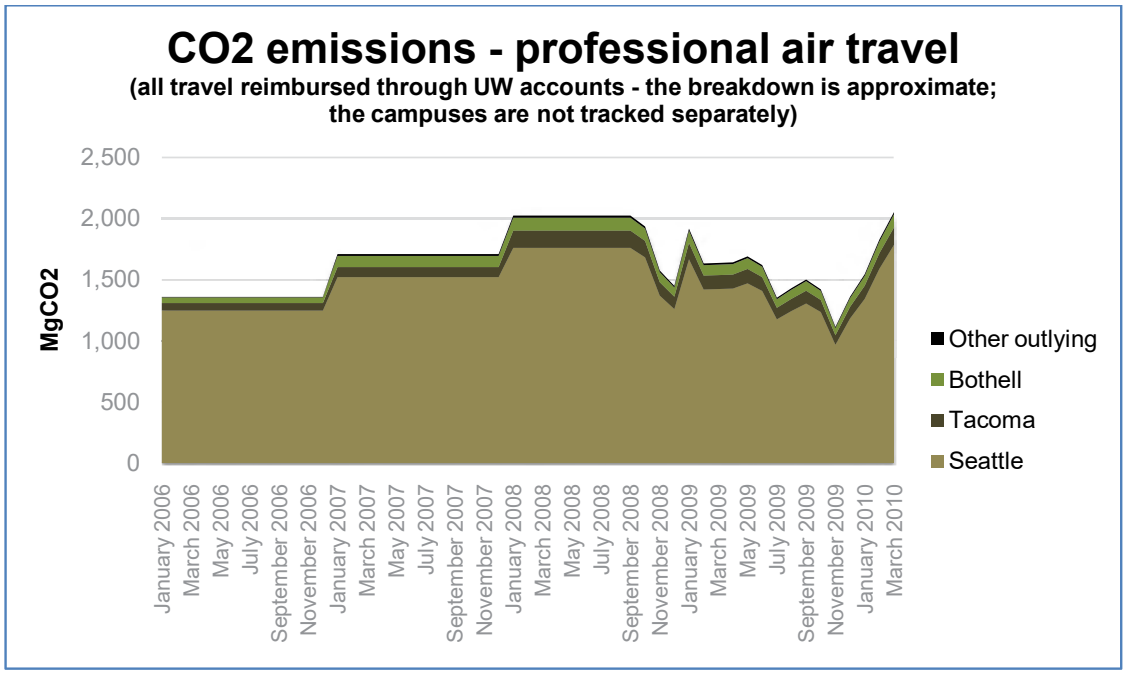


F. Professional Travel

Professional travel, a significant contributor to transportation-related GHG emissions, includes air or vehicle travel to and from conferences, typically a longer distance than commuting to and from work, in addition to being less frequent. That said, such travel also plays a vital role in research, teaching, and

administrative activities at the UW. Professional travel also includes fleet and other local business transportation. Reduction targets will have to be carefully balanced against the UW's research and educational mission. (See Figure 4).

Figure 4



Accomplishments:

1. The UW fleet size has been reduced by 5.9% since September 2009 and seen a .7% increase in fuel economy, resulting in a 4.4% reduction in total fleet emissions.
2. UW Shuttle has seen a 7.6% increase in ridership.

Short-term (2 year) Goals:

1. Enhance tele/videoconference infrastructure and encourage institutional support.
2. Focus fleet purchasing on electric vehicles and partial electric vehicles; centralize management of compliance reporting for fleet and non-fleet UW

vehicles; develop minimum efficiency requirements for department-owned vehicles, prioritize shared vehicles (U-Car, D-Car) over assigned vehicles.
3. Develop efficiency and occupancy incentives tied to mileage reimbursements.
4. Encourage walking for on-campus and campus adjacent travel.

Long term Goals:

1. Improve monitoring of air travel emissions.
2. Develop and implement professional travel policies.
3. Purchase offsets for professionally-funded travel (air and vehicle).
4. Establish department and public bike sharing programs.

G. Information Technology/Computing

Accomplishments:

1. Completed an ESCO Project at the UW's primary on campus data center (4545) to increase use of free cooling and to facilitate heat capture from the data center to heat the office tower of the building. The building is on track to save an estimated 4.2 million kWh of electricity, 601 kW of demand, 529 cubic feet (CCF) of water consumption, and 3,713 CCF of sewer consumption annually.
2. Completed construction of data center in UW Tower to provide opportunities for consolidation of campus computing assets from campus buildings to central conditioned computer space. Construction included installation of energy efficient lighting and lighting controls and enables the use of free cooling during the cooler months to reduce energy cost (both dollars and tons of carbon).
3. Installed Building Management Systems (BMS) in the data centers to control, monitor and measure facilities equipment operation and energy utilization
4. Converted approximately 10% of UW-IT managed servers to virtual servers per year, and migrated older, power-hungry systems to more power-efficient hardware platforms.
5. Identified and completed evaluation of vendors who can provide a scalable and flexible approach to desktop power management.

Short-term (2 year) Goals:

1. Improve data center power utilization efficiency (PUE) by decreasing the ratio between total power delivered and power directed to computing work accomplished. Ideal ratio is 1.0. Current data center PUE in the UW's primary data center is estimated at 2.0. An attractive pricing structure has been created to incentivize relocation of department server equipment into

data centers. Data center clients will be required to replace non-rated server equipment with Energy Star and EPEAT certified equipment.

2. Replace end-of-life servers managed by UW-IT with either a virtual or physical server, depending on the customer's requirements.
3. Investigate a campus-wide approach to provide a way for systems administrators to better understand and manage power usage of desktop computers.

Long term Goals:

1. Install Building Management Systems (BMS) equipment in the remaining data centers and mission critical facilities to control, monitor and measure energy utilization.
2. Install and integrate a power monitoring system to provide metrics and opportunities to perform better power management in all data centers and mission critical facilities.
3. Achieve 50% virtualization over the next 3 years. Currently, about 20% of the servers managed by UW-IT are virtual servers.
4. Utilize a power management software solution to gather power usage statistics on desktop systems, provide reports and customization of power management per desktop and provide a simple way to better manage and reduce desktop power consumption.

H. Select Examples of Other UW Sustainability Efforts

Housing and Food Services (HFS) Accomplishments:

1. Increased the amount of total materials sent to local composting facility to over 600 tons in 2009 (increased from about 500 tons in 2008). Increased the percentage of compostable service ware in HFS restaurants from 89 to 100 percent.
2. Sent 1,100 gallons of cooking oil to be recycled for biofuels.
3. Sent 60+% of all disposables from HFS facilities to recycling or composting facilities.
4. Modified Summer Scram locations for the collection of reusable items during residence hall move-out. At the end of spring quarter 2010, 75 tons of reusable items were diverted from the waste stream.
5. Allotted about 27 percent of food expenditures toward local or sustainable products (organic, fair trade, Monterey Bay Aquarium-approved seafood, etc).

6. Initiated a logistics plan to reduce deliveries from outside vendors as well as on campus.
7. Continued to provide ongoing compost program information to other institutions.
8. Continued to collaborate with local partners such as Cedar Grove Commercial Composting and the City of Seattle in developing local programs, and with national manufacturers, such as International Paper, to develop new products.

Short term (2 year) goals:

1. Improve landfill avoidance from 60 to 65 percent.
2. Complete one LEED Gold-accredited Residence Hall and one LEED Silver-accredited apartment building.

Long term goals:

1. Improve landfill avoidance to 80 percent.
2. Complete ten additional LEED-accredited residence hall projects, adding 2,500 additional beds on campus (impact to transportation carbon).
3. Create a theme community in one residence hall focused on sustainability.
4. UW Bothell: ban all water purchased in plastic bottles.

Paper Reduction Project

This project was undertaken, in part, to comply with the 2009 Washington State Substitute House Bill 2287, which directed state government agencies, including the University to use 100% recycled paper and reduce paper use by 30%.

Short-term (2 year) Goals:

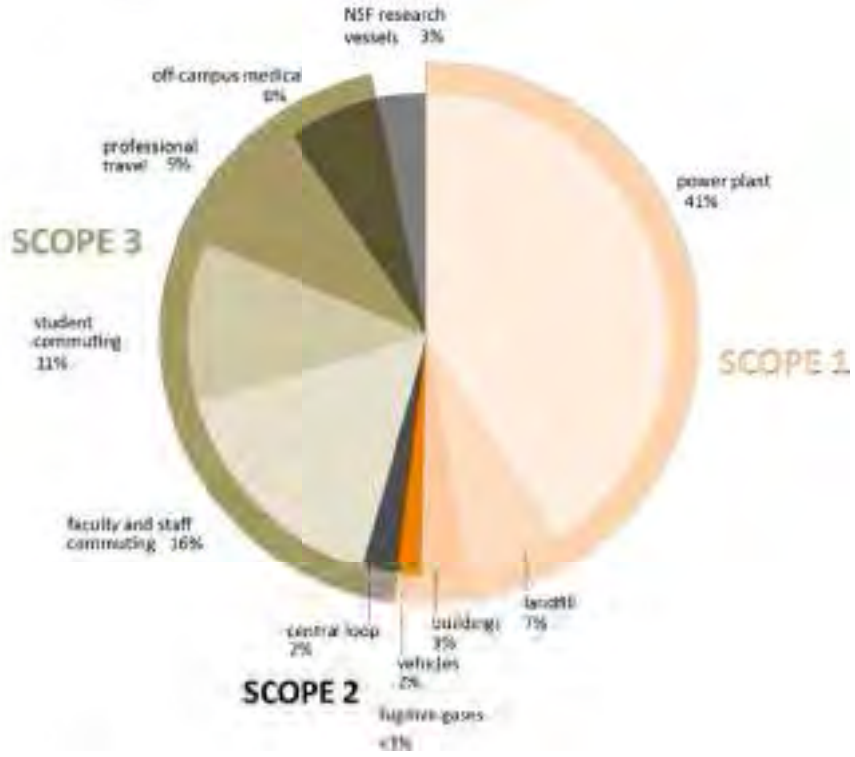
1. Make 100% Post Consumer Recycled Paper the default paper for cut sheet bond paper for copiers and printers
2. Develop and implement a paper conservation program that will reduce cut sheet bond use by 30%
3. Increase recycling of 100% of all copy and print paper
4. Encourage users to print on both sides of the page; to purchase Energy Star equipment with accountability meters; use scan-to-email.
5. Monitor quarterly progression of increase in purchase of 100% recycled paper.

III. APPENDIX

A. Carbon reduction by Scope

15% carbon reduction by 2020

		2005 emissions - MT CO_2e	15% (amount to reduce by 2020)
Scope 1 - direct emissions	power plant	82,700	12,405
	landfill	12,800	1,920
	buildings	6,440	966
	vehicles	1,043	156
Scope 2 - electricity	fugitive gases	130	20
	central loop	4,670	700
Scope 3 - other emissions	faculty/staff commuting	32,700	4,905
	student commuting	21,800	3,270
	professional travel	18,700	2,805
	off-campus medical	12,600	1,890
Optional information	NSF research vessels	6,640	996
	campus waste	(6,240)	
	forest carbon sequestration	(16,400)	
University-wide total		188,000	155,800



B. Gaining Efficiency

The following are more specific ways in which the University has become more efficient with its consumption of energy and use of natural resources. For some of these projects, it is unclear how much carbon reduction these current projects or analyses will provide, given the short time that has passed since the CAP was published. For other projects, the information provided is quite detailed and technical and thus provides further explanation and support of initiatives discussed in the document.

Facilities and New Building Construction

One of the easiest ways to reduce emissions is to make affordable housing available to faculty, staff and students closer to campus.

Savery Hall (Completed)
SUSTAINABLE FEATURES--ENERGY:

1. Through the use of demand control ventilation with CO_2 sensors, the system is able to identify the present occupant needs and adjust the ventilation accordingly.
2. High efficiency glazing on windows prevents daytime glare and reduces cooling needs.
3. Occupancy sensors reduce lighting energy throughout the building and average lighting power density of offices and other occupied spaces.
4. Increased efficiency of insulation contained in the building envelope also further serves to reduce both heating, ventilation, and cooling costs.

INNOVATIONS:

1. Mechanical equipment has improved energy efficiency beyond ASHRAE 90.1. Variable Frequency Drives (VFD) to reduce energy consumption.
2. The Variable Refrigerant Flow System transfers energy through refrigerant which results in significant fan and compressor energy savings.
3. Water use reduction of 30% in water savings achieved through the use of low flow water fixtures, toilets, and shower heads.
4. Pre-existing unusable building materials were diverted as recycled construction waste resulting in 96% construction waste recycling and 32% recycled content in building materials, low VOC material finishes, 40% of materials from within 500 miles.

Clark Hall (Completed)

SUSTAINABLE FEATURES – ENERGY:

1. Energy efficiency rating of 50% better than ASHRAE 90.1-2004 standard.
2. New operable energy efficient windows, ceiling fans, and skylights with rain sensors.
3. Naturally ventilated building, with no additional cooling provided in occupant use spaces and met the 2030 Challenge.

INNOVATIONS:

1. Recycled Building Materials of 28%, regional materials, either produced or constructed within 500 miles, of 50%, and 94% (192 tons) of the pre-existing unusable building materials were diverted as recycled construction waste.
2. Water use reduction of 38.4% was achieved through the use of low flow water fixtures, toilets, and shower heads.

Husky Union Building (Planned)

1. Green roof on the south end of the building.
2. Low flow toilet fixtures and natural ventilation in the atrium and meeting rooms.
3. Air conditioning is limited to part of the kitchen, the bowling alley to preserve the lanes, and the ballrooms and the new multipurpose room, formerly the auditorium.
4. Heating provided by the UW's Central Cooling Water (CCW) loop.

Intramural Activities Building (Planned)

1. Potential for power producing plant to be placed on the roof.

Expanded Energy Audit for Existing Buildings (Planned)

1. Examine existing building's systems and performance
2. Identify possible energy (electrical power and gas), resource conservation (water savings and sustainable concepts), and operation and maintenance measures
3. Quantify each measure's potential benefit and apply measures to reduce campus energy demand and reduce carbon footprint.

IV. Glossary

ABB	Activity Based Budgeting
CO_2	carbon dioxide
CO_2-equivalent	the equivalent mass of CO_2 required to have the same global warming effect as an identical mass of any other greenhouse gas
CO_2e	CO_2-equivalent
ESAC	University of Washington Environmental Stewardship Advisory Committee
GHG	greenhouse gas – the two that are most abundant in the UW inventory are CO_2 and methane; 1 unit of methane has the warming potential of 23 units of CO_2
LEED	Leadership in Energy and Environmental Design, a certification program of the U.S. Green Building Council
Offset	a reduction of GHGs attributable to a particular project that can be sold to a party other than the owner of the project
Submetering	measuring electric, steam or other energy use on a building-by-building basis, even when energy is supplied by a central utility plant
University Advancement	the fundraising arm of the UW administration
UWESS	the UW Environmental Stewardship and Sustainability Office
Virtualization	the practice of executing computing processes that normally require different pieces of equipment on a single piece of equipment, or enabling a computing process that normally requires a specific piece of equipment to operate on multiple pieces of equipment

V. Contact Us

This document was prepared by the University of Washington Climate Action Plan Oversight Team. Please direct any related comments and questions to the UW's Environmental Stewardship and Sustainability Office at smhelp@u.washington.edu.

A10 References List

PLEASE SEE THE FOLLOWING REFERENCE DOCUMENTS FOR FURTHER INFORMATION:

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