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EXECUTIVE SUMMARY

The College of Engineering of 2036 will appear dramatically different than the college today, with a projected population growth of 67% requiring an 80% larger footprint. The college will be more inclusive and collaborative, more innovative and adaptable than it is today. And the experience the college provides to its students, faculty and visitors will be unparalleled, with facilities rivaling or exceeding those of its peer institutions. The 2016 College of Engineering Space Assessment & Academic Facilities Plan is the road map to fulfilling this vision.

This plan lays out a series of strategic moves (Figures 1 & 2) fulfilling the teaching and research goals of the College of Engineering. It projects the college’s anticipated needs twenty years into the future and focuses its attention on the needs of the college in the coming decade. The menu of renovations, additions and new construction this plan describes allows the college to capitalize on any type of funding opportunities and greater utilize its many existing facilities. The Space Assessment & Academic Facilities Plan does all of this in service of both the college’s mission, “to develop outstanding engineers and ideas that change the world,” and the vision, “to be known as a world leader in engineering education, in discovery, and in the innovations that benefit the region, nation and world.”
This 2016 College of Engineering Space Assessment and Academic Facilities Plan describes a prioritized program of strategic opportunities designed to:

- Carry out the mission and vision of the college
- Address current and anticipated space needs for the next 20 years, with an emphasis on the next 10 years.
- Promote innovation and collaboration among the college, university and community

Maximize the efficiency and appropriate use of existing facilities, while capitalizing on the inherent value of existing facilities’ structural and mechanical integrity.

This plan quantifies the amount of assignable square foot growth associated with this projected need and recommends opportunities to accommodate this growth, addressing critically needed research, teaching and student space.

It does so in a series of bold moves linking existing and new buildings, identifying major and minor capital projects, suggesting maintenance and re-purposing projects, strategically varied in size and cost, able to be completed independently of one another or in varied combinations.

**EXISTING FACILITIES**

The College of Engineering’s Seattle campus facilities are dispersed among four distinct geographic areas:

- Central Campus
- South Campus
- West Campus, and
- The University District

The majority of these buildings occupied by the college are concentrated on Stevens Way, between Rainier Vista and Wahkaikum Lane (Figure 3 Circle A). This cluster contains many of the oldest buildings in the university’s inventory, with core lab facilities expensive to replace and
core departments critically under served. College of Engineering buildings in the intervening years were built more opportunistically or out of necessity than strategically and often far from the college’s core facilities (Figure 3 Circles B & C). Projects currently under construction, CSEII and NanoES are much closer to core college facilities.

EXISTING CONDITIONS

The building conditions of college facilities were most recently evaluated in the Facilities Inventory System condition matrix of the WA Office of Financial Management Annual Building Report. Facilities are ranked from 1-5 (1 being a superior or new building and 5 being a building in need of improvement or with marginal functionality) and mapped (Figure 3) One CoE facility rated a 4, ‘Needs Improvement’: Sieg Hall. But even a 3, ‘fair condition,’ still represents a facility approaching the end of its expected life cycle. In addition, the level of outstanding deferred maintenance was considered for each CoE facility, on a dollars per square foot basis. These analyses provided a more quantified understanding of college facilities conditions and informed potential site selections.

PRESSURES

The College of Engineering is experiencing three types of pressure on its existing facilities, each implying some level of additional space need:

1. A current space deficit due to recent growth of the student population
2. A near-term planned increase in the underclassman population directly admitted into the college and requiring student study, project and organization spaces among others
3. Anticipated future growth of both the graduate and undergraduate programs projecting 29% student growth in ten years, increasing degree productions to 1,400 undergraduate and 1,000 graduate degrees, and triggering an increase of Tenure Track Faculty (TTF) to 350 TTF in 2026. This represents:
   - An anticipated growth rate of 2.6% per year (next 20 years)
   - 252,800 additional assignable square feet (ASF) to support faculty and planned attendant growth in both students and programs by 2026, or;
   - 459,600 additional gross square feet (GSF) of need, using a net to gross (ASF to GSF) ratio of 55%.

The College of Engineering’s projected growth is an aggregate of these three streams: its current space deficits and the projected increases in both undergraduate and total enrollment. Recent building projects, including the NanoES and CSEII projects, will accommodate only some of this growth.

The projections presented herein are based on materials (see Appendix D, page 89) supplied and verified by the College of Engineering, the Office of the University Architect and others. These projections assumed the following

GROWTH TARGETS by 2026:

- 350 Tenure Track Faculty (from 271 TTF in 2016)
- 1,400 Undergraduate Degrees (from 1,000 degrees in 2016)
- 1,000 Graduate Degrees (from 728 degrees in 2016)

These projections also include space associated with the initiative of Direct Freshman Admissions to the College and current deficits in research, lab core, makerspace, teaching, office and support space, when College space is benchmarked against peer institutions (Table 6, page 26).
BENCHMARKING BY PROGRAMMATIC TYPE

In order to create the most targeted and effective solution to the needs of the college, the projections of ASF growth by programmatic type and the distribution of programmed space in existing facilities were studied and benchmarked against that of peer institutions. This analysis gave the college greater insight into the best possible locations and distribution for their future programmed space.

Benchmarking data from R1 research institutions similar to the University of Washington (per the Carnegie Classification) was used to determine metrics for the Plan. These metrics included allocations of ASF per faculty and sizes of individual space types (see Table 6). This data provided a reference guide for a comparison to the college’s space allocations and future growth projections. A detailed list of metrics and institutions follows in the report on page 26.

ADJUSTED NEED

The initial need projections were reduced to take into account projects in design or currently under construction for the College of Engineering. This reduced projected need, the total need for additional space addressed by this study (assuming the construction of NanoES and CSE II), is:

- 175,000 ASF
- 318,200 GSF, using a net to gross ratio of 55%.

DISTRIBUTION OF NEED

The study analyzed where new programmable space would best serve the college and the university. Though analyzed, it was ultimately determined that this study was too high-level to consider specific additions to every unit in every building. Instead, this plan imagines the projected need as college-wide and suggests a solution more integrated into many facilities, an approach which supports the flexibility and increasingly interdisciplinary nature of the college.

POTENTIAL BUILDING SITES

Identifying potential near and long term development sites began with a tour of existing facilities and an evaluation of their structures and mechanical systems, floor plans and circulation, occupancies and utilization. The sites suggested in the 2018 Campus Master Plan (still unpublished during the formulation of this study) were considered, as well as conditions and maintenance, previously mentioned here.

Sites occupied by buildings recently constructed or renovated were removed from the list of potential development sites. Sites occupied by the college’s multiple core facilities and/or shared research facilities, which are highly utilized and very costly to replace, were also removed. The remaining sites formed the basis of this study’s potential new construction/renovation schemes. These sites represent the greatest potential opportunities for reasonable costs. The potential sites cluster around Stevens Way. They are some of the earliest constructed buildings among the college’s inventory and contain many of the core units of the college (Figure 4).

CAPACITY

The 2018 Campus Master Plan identifies sites and building envelopes for potential development but does not detail specific new structures, assign sites to particular projects or users, or propose development sequencing (Figure 4).

The facilities located on Central Campus and mostly clustered around Stevens Way were analyzed for potential growth. This analysis showed that, by utilizing the 2018 CMP sites in this area, the overall assignable area of the College of Engineering could grow to 939,657 ASF (existing 650,700 ASF + 288,957 ASF new). This would be achieved through replacing existing buildings, adding on to existing buildings and leveraging sites directly adjacent to college buildings.

This maximum permissible development envelope 939,657 ASF, providing 288,957 new ASF, far exceeds the College’s net residual need of 175,000 ASF.

Therefore, the anticipated space demands of the College of Engineering in the next 10-20 years can be accommodated in this area of the Central Campus.

EXECUTIVE SUMMARY
THE PLAN

The Plan is a phased, prioritized framework to address college space deficiencies and projected future growth due to enrollment growth and new initiatives. It identifies both major and minor capital projects, strategically varied in size and cost, in a framework shaped by the vision and goals of the college. Projects can be completed independently or in combination. Future maintenance and re-purposing projects can be aligned with this vision to make subsequent moves and investments more purposeful. The plan is structured with a rational funding strategy, which makes it nimble and flexible, acknowledging the many and varied potential capital project funding streams, as state funding is currently extremely limited.

Organized as a menu of potential moves, the Plan refrains from all-or-nothing scenarios and mandatory sequencing. There is a suggested sequencing, one that front-loads new construction (Growth in Figure 5) to more easily enable projects in existing and decanted space; but, this sequencing is not required.

The Plan organizes new space along a circulation spine through existing college buildings, integrates that space into clarified, more open floor plans and makes it all more accessible to the college and the university.

Figures 5 & 6 illustrate the scheme that offers opportunities for new space in the bookending projects of GROWTH & EXPANSION, suggests a center for the college (HEART) at Loew Hall and a complex of maker spaces, student spaces and clubs in what are now Mechanical Engineering and Engineering Annex (STUDENT HIVE). More Hall is given a gut remodel and new face and entry on Stevens Way (RENEWAL).

EXECUTIVE SUMMARY

GROWTH creates desperately needed new space. Units that move into this space will leave space available for surge or backfill throughout existing facilities.

THE WEST GROWTH BUILDING: Teaching Labs, Research, Classrooms and Science on Display: approximately 32,000 ASF (58,000 GSF) new construction, with a project cost range of $58M-$75M.

THE EAST GROWTH BUILDING: Interdisciplinary Research, Core Facilities and High Bay: approximately 72,000 ASF (130,000 GSF) with a project cost range of $130M-$170M.

HEART creates a center for undergraduate studies, including student spaces, teaching spaces and office/meeting spaces at Loew Hall.

The function of this space will be amplified by the renovation of the first two floors of the adjacent Engineering Library (see the 2016 Strategic Space Plan for UW Libraries) as collaborative space. The renovation would add 15,891 ASF of CoE growth (with no increase of GSF) and renovate 58,747 GSF of existing space, with a project cost range of $21M-$38M. Several spaces, including general classrooms (at 14,591 ASF) will require replacement elsewhere.

STUDENT HIVE creates a center of student project space embedded among research and teaching spaces in renovated and expanded Mechanical Engineering and Engineering Annex, by constructing an atrium to enclose the currently exterior space connecting them.

The study utilizes a site identified for development in the UW 2018 Campus Master Plan, restores the Engineering Annex (a building from the 1909 Alaskan Yukon Pacific Exposition) and includes a variety of makerspaces, student shops, research, teaching labs and offices/meeting rooms. The proposed project would add 12,020 ASF (8,000 GSF) of new space and renovate 125,896 GSF of existing, opening both buildings to the new communal space at a project cost range of $77M-$115M.
The five projects listed here enable subsequent moves to be initiated, for future development in an implementation plan. One such move is the Sieg Hall redevelopment, which will be possible after the opening of the new CSEII facility in 2019. With the completion of CSEII, space currently occupied by Computer Sciences in Sieg Hall (approx. 8,000 ASF) will be vacated and moved to CSEII (A). This move enables several potential moves, including the remaining occupants of Sieg Hall expanding into the vacated space (B) or University Classroom Services relocating classrooms removed from other CoE buildings in this plan into Sieg. This project should be considered for an energy efficient retrofit and new HVAC.

For more information about each of these components can be found in The Plan Section, page 30.
NEXT STEPS

IMPLEMENTATION PLAN

Following this College of Engineering Space Assessment and Academic Facilities Plan, the College intends to develop a Strategic Implementation Plan (SIP) to organize and further prioritize all facilities planning efforts. The SIP will develop each project scenario suggested by this plan in concert with other University planning studies and initiatives. Future capital projects will be focused on simultaneously best utilizing the College’s academic facilities while also rehabilitating older structures and removing aging infrastructure that is beyond its service life. The SIP will consider not only the College’s need for space to serve its projected growth, but also its space utilization and its sense of identity for undergraduates. The Strategic Implementation Plan will also outline a streamlined decision-making process which produces a strategic framework for reaching the goals and vision of the college.

The College of Engineering Strategic Implementation Plan, based on detailed input from Steering and Executive Committees, coordinated and implemented with University Capital Planning & Development, will verify the assumptions of, develop costing for, and determine a schedule of necessary actions for the Space Assessment and Academic Facilities Plan. This will happen through the University of Washington’s budget process.

To fulfill its capital project program, the College of Engineering will pursue several alternative funding streams, such as public-private partnerships and donor funds.

In September of 2016, the Regents approved the One Capital Plan, a widely-vetted and strategic plan, a single integrated effort representing the University’s priorities toward achieving the strategic initiatives outlined by the President. The goal is to complete as many of the projects listed in the One Capital Plan as is possible in the OCP’s six year time frame.

The One Capital Plan is the University of Washington’s capital planning road map. Several College of Engineering projects appear on the One Capital Plan (See Table 39, page 76). Not all projects on the list are guaranteed funding. Though projects are identified on the One Capital Plan and may have project funding of some kind (State, Debt, Donor, Local or Other) listed, this does not guarantee the State’s or donors’ commitment to, or the completion of, the project. The amount of funding estimated in each funding type is insufficient to fully fund the full list of One Capital Plan projects.

There are many smaller streams of funding coming into the College. And while some, like maintenance and operations funds, cannot be redirected or prioritized, others may be. The list of deferred maintenance projects is long. The SIP should use its capital funds in concert with all incoming funds in reaching the College’s vision and goals.
GUIDING VISION

The Vision of the University of Washington College of Engineering is to be known as a world leader in engineering education, in discovery, and in innovation that benefits the region, nation and the world. Its Mission is to develop outstanding engineers and ideas that change the world by:

- Providing an educational experience that prepares students to be leaders
- Increasing diversity, inclusion and access to foster excellence
- Building interdisciplinary collaborations that inspire innovation
- Creating industry and community partnerships
- Focusing on key global challenges where we can achieve the greatest impact and excellence
- Making a significant and visible societal impact

The swiftly changing landscape of engineering education and fundamental shifts occurring in technology and society demand constant reevaluation of the roles engineers will play in the future and how best to prepare engineering students to lead and succeed.

The role of the College of Engineering is to ensure that the next generation of engineers is primed to address the coming century’s challenges of meeting the needs for clean and sustainable energy sources, improved urban infrastructure, advanced manufacturing, affordable health care delivery, cyber security and other challenges recognized by the National Academy of Engineering’s “Grand Challenges of the 21st Century.” To do so, the College of Engineering must provide access to a world-class engineering education, retain top faculty to educate and engage students in breakthrough research, and offer contemporary facilities in which their work will flourish.

In carrying out the mission and vision of the College of Engineering, the 2016 College of Engineering Space Assessment and Academic Facilities Plan aims to:

SOLVE CURRENT AND FUTURE SPACE NEEDS -

- Solve current space deficiencies
- Address projected growth needs of the next 20 YEARS
- Increase research space and create a more dynamic connection between teaching and research.
- Create room to enable future moves, expansion or reconfiguring of existing units
- Provide opportunities for new collaboration and innovation spaces
- Configure its new space so the student experience is strengthened
- Breathe new life into robust existing buildings

ESTABLISH a PUBLIC REALM FRAMEWORK that -

- Integrates the College of Engineering within its larger campus context utilizing landscape, circulation and place-making strategies
- Clarifies the identity of, and defines a sense of place for, the College of Engineering
- Activates ground floors with student amenities, teaching spaces and science on display
- Improves entrances and interrelationships among College buildings
- Increases accessibility
- Provides a student heart at the crossroads of College buildings

Figure 7: Some of the College of Engineering Space Assessment & Academic Facilities Plan’s Attributes

GUIDING VISION

Figure 7: Some of the College of Engineering Space Assessment & Academic Facilities Plan’s Attributes

PROVIDES collaboration spaces and enables futures moves in existing bldgs

PROVIDES a student heart at the crossroads of College bldgs

STUDENT HIVE

Breathes new life into robust existing bldgs

RENEWAL

Establishes an entry point to the College off of Rainier Vista

EXPANSION

Figure 7: Some of the College of Engineering Space Assessment & Academic Facilities Plan’s Attributes

GUIDING VISION
CLARIFYING PROGRAM DISTRIBUTION

Each existing building in the College of Engineering’s inventory has a range of programs distributed throughout it. Over many years of renovations and ad hoc interventions to meet the needs of research and teaching, the organizations of several buildings have lost the original coherence of their programmatic distribution. The cumulative effect of this muddying of programs is a confusion about building functions.

The introduction of large numbers of registrar classrooms for general courses (that have no relationship to the College of Engineering) has further diluted the coherence of activities within these facilities. The programmatic heterogeneity within buildings (Figures 8 & 10) reduces the overall efficiency of their functioning and makes future renovations costly and difficult to execute. In addition the ground levels of these existing buildings miss the opportunity of locating programs which would benefit from high student traffic and public access.

Clarity in the organization of each building’s program is crucial in developing a better organized and connected group of College facilities. This clarity, which might ultimately come to be realized through a gut remodel or incrementally over time, should occur both in plan (Figure 9) and section (Figure 11).

Figure 8: Existing Program Distribution
Figure 9: Proposed Program Distribution
Figure 10: Existing Program Distribution in Section (Engineering Library to CSE II)
Figure 11: Proposed Program Distribution in Section (Engineering Library to CSE II)
The College of Engineering Space Assessment & Academic Facilities Plan clarifies the identity of the college and activates ground floors with student amenities. Functions will be grouped, activating the ground floors of the facilities with public functions such as student amenities, teaching spaces and ‘science on display.’

The current organization of programming can be seen in Figure 8, the suggested reorganization and clarification of plans in Figure 9. In Figures 10 & 11, a similar reorganization is suggested vertically through the buildings, locating public functions on or near the ground plane for better public access.

**WELCOMING AND OPEN**

During this study, a regional light rail station opened at Montlake Blvd and Pacific in 2016. Instantly the Rainier Vista became a new pedestrian entry to Central Campus. The College of Engineering can play a new role in welcoming students by relating more directly to the Rainier Vista traffic. The idea is a new quad, just off of Rainier Vista, welcoming the increase in pedestrians from the new Sound Transit University of Washington station. This welcoming area could involve expansion in addition to the ‘Renewal’ (previously referred to as “Connection”), “Heart” and “Student Hive” and “Growth” developments. This series of connected moves to add communal space throughout the college, alleviating many of the accessibility issues, and opening facilities that might seem isolated now to the surrounding campus.

**RECOMMENDATIONS**

The College of Engineering vision focuses on a series of strategic moves east of Stevens Way. These moves directly address the College’s programmatic needs while simultaneously enhancing the student experience with campus place-making. These moves are considered in terms of their individual potential to address specific needs and as a system of interconnected spaces that function as a cohesive network.

**KEY DEVELOPMENT OPPORTUNITIES/RECOMMENDATIONS [FIGURE 12]:**

**GROWTH:** The best opportunity to address the upcoming research, teaching and specialized research needs of the College of Engineering is in a new building complex on the site north of Loew Hall, where the Facilities buildings currently sit. The project is envisioned to be completed in 2 phases, leveraging the potential of the hillside and establishing a campus space connection to Fluke Hall. This project also creates swing space to enable renovation projects in adjacent buildings.

**HEART:** The College of Engineering will directly admit freshman into the College starting in 2017-2018. This creates a need for new student advising, academic and gathering spaces within the College. Loew Hall and the Engineering Library sit at an ideally central location for meeting these needs.

**STUDENT HIVE:** Innovation is often messy, busy and noisy. Allowing students to congregate and build demands access to resources and mentors, workshops and flexible utility space. Mechanical Engineering, with its robust structure and mechanical systems, and the Engineering Annex, the historic shed-like building currently home to student competition work, seem perfectly suited to meet the College’s needs for student project and maker spaces, bringing these activities together in one location, a student project ‘hive.’

**RENEWAL:** More Hall presents an opportunity to address engineering research needs with a renewal of its infrastructure and programmatic redistribution. More’s disconnect from adjacent landscapes will be corrected in conjunction with a new entry on Stevens Way.

**EXPANSION:** The site adjacent to Mueller Hall presents an opportunity to add a new building to the College of Engineering and create a new front door to the College on Rainier Vista. A proposed new building for this site can establish a significant new campus space for the College.

**OTHER PROJECTS:** These five opportunities enable subsequent projects to later be developed in a College of Engineering strategic implementation plan (SIP).
Alternative schemes were developed to find the best approach. These focus on how best to realize the guiding vision and goals of the College in the clearest, most flexible and cost-effective way. The most important of these goals, arguably, is cost effectively addressing space needs. But the strategic location of this new space has the potential of improving not only the College’s identity but pedestrian circulation through the facilities. The main difference between the schemes is whether Stevens Way or an internal connector serves to connect the College’s buildings.
EXISTING CONDITIONS

BUILDING LOCATION AND DISTRIBUTION

The University of Washington College of Engineering, with over 650,000 assignable square feet (ASF), occupies the 23 UW-owned campus buildings and several on-campus leased properties, dispersed among four distinct geographic areas:

- Central Campus
- South Campus
- West Campus
- The University District

The majority of these buildings are concentrated on Stevens Way between Rainier Vista and NE Wahkiakum Lane as it runs north/south along the eastern edge of historic Central Campus (Figure 15, circle A). This cluster contains some of the oldest buildings in the university’s inventory, lab facilities expensive to replace and departments critically under served. Other CoE space is close to this cluster (Figure 15, circle B) on the Central Campus.

In recent decades, the College of Engineering has expanded to the West Campus, leveraging interdisciplinary research activities, and to the South Campus, to utilize unique amenities (Figure 15, Circle C). The University District area offered the College the opportunity to create facilities with an outreach to startup companies.

NOTE: Specialized research labs located off campus are not included in this tally, nor included in the growth scenario of this plan.
BUILDING CONDITIONS

The College of Engineering’s facilities were analyzed by several standards in order to evaluate their condition, with data provided by the University of Washington’s Facilities Services (building conditions, Figure 16) and UW Facilities Services Campus Engineering & Operations (deferred maintenance, Figure 17).

The building conditions of CoE facilities were most recently evaluated in the Facilities Inventory System condition matrix of the WA Office of Financial Management Annual Building Report. Facilities are ranked from 1-5 (1 being a superior or new building and 5 being a building in need of improvement or with marginal functionality) and mapped (Figure 16) by the UW Facilities group. Sieg Hall received a 4 (Needs Improvement). Despite the potential of Sieg Hall’s robust structural system, it is often cited as a facility needing major mechanical systems upgrades and repairs to its facades. Several CoE facilities rated as 3 (Fair Condition), an assessment number which still represents a facility approaching the end of its expected life cycle.

In this study, these ‘limited functionality’ ratings were reconsidered. This study found that, re-programming some buildings would be a cost-effective option. The Mechanical Engineering Building’s robust structure and mechanical system and the Engineering Annex’s historic value make these buildings worth repurposing for the benefit of both the College and the University.

Figure 16: CoE Buildings Conditions from Campus Building Condition Survey Ratings - 2016

Figure 17: Deferred Maintenance in $ per SF (GSF)
**DEFERRED MAINTENANCE**

In 2016 the UW spent $15.7 million on maintenance and $13 million on minor capital renewal projects. A backlog of major maintenance projects (replacing roofs, updating entire heating and electrical systems, etc.) remains. A recent report by Sightlines noted a U.S. college backlog of $30 billion in deferred maintenance, due partly to massive construction programs 50 years ago. This 2016 facility assessment report also identified a $1 billion backlog in deferred maintenance at UW. A systematic plan to reduce this backlog is currently in development. The major and minor capital projects recommended by this Space Assessment and Academic Facilities Plan will be done in concert with the university’s deferred maintenance plan and will help guide College of Engineering facilities projects.

The level of outstanding deferred maintenance, in $/SF, was considered for each CoE facility (see Figure 17). This analysis provided a more quantified understanding of each facility’s condition and informed this study’s development strategy, suggesting where future funds might best be spent. After this study, the College of Engineering and Office of the University Architect will develop an in-depth study of future projects (Strategic Implementation Plan), addressing the worst of the deferred maintenance, while organizing and further prioritizing future projects.

**BUILDING UTILIZATION**

Facilities occupied by the College of Engineering are often shared with other Colleges, other academic units or general university spaces. An analysis of the College’s occupancy, as a percentage of each building’s assignable square feet (ASF), is shown in Table 1.

Better building utilization is recommended by this study to consolidate College units selectively. Utilization is measured by how fully the College occupies that building. This study recommends that several buildings be renovated and programmed to maximize the amount of space the College occupies in each facility. Specific relocations for the dislocated occupants of spaces the College moves into must be addressed. Opportunities to increase occupancy in Loew Hall, the Engineering Library and Mueller Hall will be discussed in subsequent sections. See further discussion beginning on pages 44 (Heart component) and 49 (Student Hive component).

Such consolidation is not desired where the cohabitation of multiple groups supports collaboration or other goals. In these locations no further modification is recommended.
PUBLIC REALM

The public realm is the space between buildings that creates the campus setting. It’s space to which the general public has access, including streets and pathways, parks and public open spaces, civic buildings and other public facilities. It is both a physical space, with dimensions and limits, and a relational space, allowing social exchange and non-academic education for those sharing it.

Today’s students and faculties expect space that is open and adaptable, accessible and inclusive, a reflection of how we relate to one another via modern media. There is a rise in demand for buildings with informal learning spaces, social spaces and dining components, programming that works best with easy, open access to the space between buildings. The public realm is an extension of the academic experience, of student life.

The configuration of the buildings reflects both natural and man-made forces. The terrain surrounding Stevens Way slopes up to the north and west and down to the east and south. There is a 65’ drop between Stevens Way and Mason Road and more than a 70’ drop between Drumheller Fountain (Figure 18) and Montlake Blvd. The natural bluff between Stevens Way and Montlake Boulevard is heavily wooded and is traversed by the Burke Gilman Trail, once the path of the Lake Shore and Eastern Railway (Figures 19 and 20).

The public realm in which the College of Engineering facilities reside includes both intentional and residual landscapes, created over a hundred years. Figure 21 illustrates how its buildings are situated on plazas.
(Loew Hall and Mechanical Engineering), courtyards (CSE) and interstitial/buffer space (behind many buildings), including service and parking.

The majority of these facilities are densely packed on small courts with planting beds and an occasional lawn. Stevens Way, the major campus thoroughfare, cuts right through the core of the College’s facilities in Central Campus.

The College surrounds the student union (Husky Union Building) and is not far from Red Square, the crossroads of the University of Washington. These are crucial campus focal points that should be augmented, as the College develops a cohesive network of spaces enhancing the student experience. This array of spaces which allows interaction and collaboration, both inside and outside buildings, and should be strengthened, expanded and connected. Considering the potential for enhanced student life, a fully functional public realm must be developed.

ENHANCE THE PUBLIC REALM

The University of Washington’s recent Campus Landscape Framework (CLF) establishes strategies for preserving and enhancing the outdoor environment. Figure 21 is an excerpt from the CLF illustrating the range of existing spaces shared along Stevens Way. There are many fringe or throwaway spaces.

The majority of the college’s public realm context are passages, with some mixed Campus Green/Woodland Groves and many utility spaces such as service and parking. The most formal or planned landscape feature is the plaza flanked by Loew Hall and the Engineering Library (Figure 21), and directly across the street from the Husky Union Building.

PLAZA: The plaza provides an opportunity to create a College of Engineering center, a heart. The CLF defines a plaza/town square (illustrated in Figure 22) as a confluence of student activity and circulation, a locus for events and activities that require a supporting pavement. This plaza could be improved as a place for meeting, orientation, events and student activities.

The CLF suggests that the plaza should remain flexible and large enough to host a variety of simultaneous student activities without hampering pedestrian traffic or compromising emergency vehicle clearances. The plaza should provide ample, comfortable outdoor seating and also be capable of accommodating an event with tables and chairs without encumbering pedestrian movement.

Activities might include club organizations, recruitment drives, festival events and informal congregation and meeting. The plan for the plaza provides expanded and shared spaces for ground floor regional programs in surrounding buildings. It accommodates bike parking and a small grove of deciduous trees for shade.
Wherever possible interior and exterior passages through the College of Engineering, supporting landscapes (Figure 23), should be enhanced as connections within the Central Campus. Stevens Way must allow multi-modal movement with well-designed mixing zones and pedestrian crossings. Passages with Green, those adjacent to traditional lawns and canopy trees, can be used to form forecourts for the entries of College of Engineering buildings and can be used for student gathering. Their lawns should be maintained to allow places for students to sit and congregate. Refer to the Campus Landscape Framework for further information regarding the creation of desirable public realms.

BUILDINGS AND PUBLIC REALM

The building sites of the College of Engineering were organized without a master plan. The earliest of these, now known as the Engineering Annex, on Jefferson Road and adjacent to the power plant (Figure 24), was originally built as the foundry for the Alaska-Yukon Pacific Exposition in 1909, with horse stables.

More than a century of building finds the College’s facilities collected for the most part along Stevens Way and relating to the area around Drumheller Fountain, an area known as the Science Quad (Figure 24).
CIRCULATION PATTERNS

Circulation to and from the buildings is not integrated as a network, unlike the heart of the Central Campus. Most pedestrian and mass transit circulation happens on Stevens Way, biking on Stevens Way and the Burke Gilman Trail, and service traffic on Jefferson Road and into service yards. The Plan’s organization augments and amplifies these circulation patterns.

Figures 25-27 are ‘heat maps’ (data-driven illustrations in which data values are represented as colors) taken from the Myplaces Survey of the 2015 UW Campus Landscape Framework in which students, faculty and staff mapped their routes through campus. These maps illustrate some of the most obvious circulation flows through this area of campus (in the vicinity of Stevens Way and Snohomish Lane).

Figure 25 shows the dominance of Stevens Way as a pedestrian thoroughfare ringing the Central Campus, the importance of the HUB (Husky Union Building) as a student gathering place, and Snohomish Lane/Bridge as the dominant route to the East Campus. Rainier Vista can be expected to have only increases in pedestrian use, with the opening of the University of Washington Light Rail Station (opened in March 2016).

Figure 26 shows that, although bicycle activity occurs across the majority of the Campus, the Burke-Gilman Trail is the most significant bicycle route. The trail also serves as a regional bike connector.

The University provides extensive transit coverage. Figure 27 illustrates that the main transit artery in this area of campus is Stevens Way.
BUILDING ENTRIES

Figure 28 shows how the entrances of buildings are often off-street, across courtyards and, very often, directly opposite one another on these courtyards. This arrangement of entrances leads to students and faculty, administration and visitors often taking a route through one building to get to another.

The buildings are on very steep terrain so that entrances, appearing directly across a courtyard from one another (Figure 28) may be at different heights, half-levels or full floors apart (Figure 29). Main floors of facilities often are either raised or lowered by several feet compared to adjacent buildings. Nevertheless the desire to go from building to building is strong, especially during times of inclement weather. The Plan addresses improving this experience by emphasizing the paths through several core College facilities.

POTENTIAL DEVELOPMENT SITES

Identifying potential near and long term development sites began with a tour of existing facilities and an evaluation of their structures and mechanical systems, floor plans and circulation, occupancies and utilization. The sites suggested in the 2018 Campus Master Plan (still unpublished during the formulation of this study) were considered, as well as conditions and maintenance, previously mentioned here.

Sites occupied by buildings recently constructed or renovated were removed from the list of potential development sites. Sites occupied by the college’s multiple core facilities and/or shared research facilities, which are highly utilized and very costly to replace, were also removed. The remaining sites formed the basis of this study’s potential new construction/renovation schemes. These sites represent the greatest potential opportunities for reasonable costs.

The potential sites cluster around Stevens Way. They are some of the earliest constructed buildings among the college’s inventory (Figure 30).

The following are the development sites in the College of Engineering Space Assessment and Academic Facilities Plan focus area, as described in the Draft 2018 UW Seattle Campus Master Plan (See Figure 30):

- C11 Facility Admin Bldg/University Facilities Bldg and Annex 1
- C13 Sieg Hall Replacement
- C14 Mechanical Engineering/Eng Annex/C15 Parking Lot
- C15 CSE II Building/More Annex/Plant Op Annex 7
- C16 Wilcox Hall/Wilson Ceramics Lab Site/Wilson Annex
- C17 Benson Hall/ C7 Parking Lot
Table 2: Potential Development Sites, Central Campus, 2018 CMP, Development Height Limits

<table>
<thead>
<tr>
<th>SITE</th>
<th>Max Height</th>
<th>Max Envelope</th>
</tr>
</thead>
<tbody>
<tr>
<td>C11</td>
<td>105’</td>
<td>90,000 GSF</td>
</tr>
<tr>
<td>C12</td>
<td>105’</td>
<td>115,000 GSF</td>
</tr>
<tr>
<td>C13</td>
<td>105’</td>
<td>130,000 GSF</td>
</tr>
<tr>
<td>C14</td>
<td>105’</td>
<td>225,000 GSF</td>
</tr>
<tr>
<td>C15</td>
<td>65’</td>
<td>60,000 GSF</td>
</tr>
<tr>
<td>C16</td>
<td>105’</td>
<td>230,000 GSF</td>
</tr>
<tr>
<td>C17</td>
<td>105’</td>
<td>150,000 GSF</td>
</tr>
</tbody>
</table>

Figure 30: Development Capacity Sites, Central Campus, from the 2018 UW Seattle Campus Master Plan
The Draft 2018 Campus Master Plan identifies sites and building envelopes for potential development but does not detail specific new structures, assign sites to particular projects or users, or propose development sequencing. The 2018 CMP was used to consider specific areas which might best accommodate the College’s potential growth. In particular, facilities located on Central Campus and mostly clustered around Stevens Way were analyzed for potential growth.

EXISTING CENTRAL CAMPUS FOOTPRINT

Existing College of Engineering facilities are mostly clustered around Stevens Way (Figure 32) and account for 1,215,492 gross square feet (GSF) and 494,683 of the College’s current assignable square feet (ASF). Adding projects currently in development or under construction (CSE II & NanoES, respectively), those numbers grow to 1,432,132 GSF and 589,344 CoE ASF.

CAPACITY

The analysis ultimately showed that, by utilizing the 2018 CMP sites in this vicinity with CoE presence (Figure 32 & Table 3), the assignable area could increase CoE’s footprint in the Central Campus to 878,301 ASF (1,933,472 GSF), adding 288,957 ASF (501,340 GSF). The College of Engineering’s total footprint would grow from 939,657 ASF (existing 650,700 ASF + 288,957 new). This would be achieved through replacing existing buildings, adding on to existing buildings and leveraging sites directly adjacent to college buildings.

This maximum permissible development envelope of 501,340 GSF in this area far exceeds the College’s net residual need of 318,200 GSF. The development envelope of 288,957 ASF exceeds the College’s net residual need of 175,000 ASF. See SPACE NEED, page 24 for more information.

The anticipated space demands of the College of Engineering in the next 10-20 years can be accommodated around the cluster of Stevens Way buildings on Central Campus.

Note: Central Campus Development Site C17, Chem Library, has no CoE presence and is not included in other totals. Its existing space (Fig 31) is:
GSF: 39,363
CoE ASF: 23,068

EXISTING CENTRAL CAMPUS with CoE Presence
GSF: 1,215,492
CoE ASF: 494,683

CURRENT NEW DEVELOPMENT
Nano GSF: 78,374
Nano CoE ASF: 35,680
CSE II GSF: 138,166
CSE II CoE ASF: 58,981

OVERALL AREA TOTAL
GSF: 1,432,132
CoE ASF: 589,344
### Table 3: Potential Development Sites GSF/ASF

<table>
<thead>
<tr>
<th>Site</th>
<th>Description</th>
<th>GSF</th>
<th>ASF (@55%)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>C11</td>
<td>Facility Admin Bldg/ University Facilities Bdg and Annex 1</td>
<td>90,000 GSF (49,500 ASF)</td>
<td>-20,125 GSF (-11,069 ASF) Buildings Demo</td>
<td>69,875 GSF (38,341 ASF)</td>
</tr>
<tr>
<td>C12</td>
<td>Plant Op Annexes 2-6/ University Facilities Annex 2/ C 23 Parking</td>
<td>115,000 GSF (63,250 ASF)</td>
<td>-18,860 GSF (-10,370 ASF) Buildings Demo</td>
<td>96,140 GSF (56,870 ASF)</td>
</tr>
<tr>
<td>C13</td>
<td>Sieg Hall Replacement</td>
<td>130,000 GSF (71,500 ASF)</td>
<td>-57,180 GSF (-27,630 ASF) Sieg Demo</td>
<td>72,820 GSF (43,870 ASF)++</td>
</tr>
<tr>
<td>C15</td>
<td>Wilcox Hall/ Wilson Ceramics Lab/ Wilson Annex</td>
<td>60,000 GSF (33,000 ASF)</td>
<td>-50,328 GSF (-31,796 CoE ASF) Wilcox/ Wilson Ceramics Lab/ Wilson Annex Demo</td>
<td>9,672 GSF (1,204 ASF)++</td>
</tr>
<tr>
<td>C16</td>
<td>Benson Hall/ C7 Parking Lot</td>
<td>230,000 GSF (126,500 ASF)</td>
<td>-76,271 GSF (-36,185 CoE ASF) Benson Demo</td>
<td>153,729 GSF (90,315 ASF)++</td>
</tr>
</tbody>
</table>

**2018 MASTER PLAN SITES**

GSF Growth: 501,340
ASF (@55%) Growth: 288,957++

**OVERALL AREA TOTAL**

GSF: 1,933,472
CoE ASF: 878,301

Note: All ASF listed in existing buildings is the College of Engineering’s space in that building. ASF is calculated at 55% of GSF for new construction and actual (++) where CoE ASF is listed for existing buildings.
The University of Washington’s College of Engineering is experiencing three types of pressure on its existing facilities:

- **A current space deficit** due to recent growth of the student population
- **A near-term planned increase** in the underclassman population, associated with space needs
- **Anticipated future growth** of both the graduate and undergraduate programs and the attendant increase in space needs

### The Current Space Deficit

Since 2007 the College of Engineering’s student population has increased 41%. But in the same time frame, the college’s assignable square footage (ASF) has grown only 2%. While the quality of its education and its reputation has continued to ascend, its ASF/student ratio has plummeted 28% in only eight years.

### Planned Increase in Underclassmen

In 2017 the College of Engineering will begin admitting freshman directly into the College, which will cause commensurate increases in tenure-track faculty positions, administrators and a need for space to support these students, staff and faculty. This initiative has implications in strengthening the identity of the college and clarifying the organization of its facilities.

### Anticipated Future Growth

In the next ten years, the College anticipates 29% student growth, with an increased degree production from 1,000 to 1,400 undergraduate and from 728 to 1,000 graduate degrees. This increase also requires a commensurate increase of Tenure Track Faculty (TTF) from 271 to 350 TTF.

To accommodate these three growth streams, the College needs to build state-of-the-art research and teaching space, and general support space. Recent projects, including the NanoES and Computer Science and Engineering II projects, will only accommodate a fraction of the anticipated needed assignable square feet of space.

In the past eight years (from 2007-2015), the FTE of all College of Engineering has grown from 5,121 students to 7,209.

The increase in degree production and increase in TTF represent:

- **An anticipated growth rate of 2.6% per year over the next 20 years**
- **252,800 additional assignable square feet (ASF) or 459,600 additional gross square feet (GSF) needed**

The residual need, to be addressed after the construction of both Nano ES and Computer Science and Engineering II facilities, will be:

- 175,000 ASF
- 318,200 GSF (using a net to gross ratio of 55%)
### 2016 CoE Current Population

<table>
<thead>
<tr>
<th>Category</th>
<th>2016 Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>TT Faculty</td>
<td>271</td>
</tr>
<tr>
<td>Research Faculty</td>
<td>40</td>
</tr>
<tr>
<td>Lecturer</td>
<td>31</td>
</tr>
<tr>
<td>Post-Doc</td>
<td>181</td>
</tr>
<tr>
<td>Staff- Professional</td>
<td>303</td>
</tr>
<tr>
<td>Staff- Classified</td>
<td>140</td>
</tr>
<tr>
<td>Graduate Student</td>
<td>2,146</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,112</strong></td>
</tr>
</tbody>
</table>

Undergraduate Student* 461

#### Breakdown of 2026 Total CoE ASF

*The number of undergraduate students shown is the count of payroll positions and therefore assumed to need some work area other than academic space.

CoE Faculty Population shows the current counts for each of the population categories within the College, as provided by the CoE. Source for population counts: “20160526 CoE_appointments by category” and “2016_0616 rev Fac lab count” June 2016 email memo from UW.

### 2016 CoE Current ASF

<table>
<thead>
<tr>
<th>Components</th>
<th>2016 Total ASF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Lab*</td>
<td>306,300</td>
</tr>
<tr>
<td>Lab Cores</td>
<td>36,000</td>
</tr>
<tr>
<td>Teaching Space</td>
<td>68,200</td>
</tr>
<tr>
<td>Office</td>
<td>198,900</td>
</tr>
<tr>
<td>Meeting Rooms</td>
<td>35,200</td>
</tr>
<tr>
<td>Circulation**</td>
<td>6,100</td>
</tr>
<tr>
<td><strong>Total (sf)</strong></td>
<td><strong>650,700</strong>*</td>
</tr>
</tbody>
</table>

* GeoSiMS “Research” category subdivided into “Research Labs” and “Lab Cores.”

** Circulation = research and teaching miscellaneous general support.

*** Values from GeoSiMS have been rounded to the nearest hundred.

#### Table 5: 2016 CoE Current ASF

### CURRENT SPACE

Original statements of current population and space assigned to CoE shown in Tables 4 and 5 were based on information in the University of Washington’s GeoSiMS system.

After further discussion with the study committee, the numbers were adjusted to reflect a more accurate representation of the space utilization (for example, much of the BioEngineering department is located in School of Medicine assigned space). The source for current CoE space is “20160513 CoE SIMS data” file from UW (see Appendix). The space components listed on the Table 5 are categories used by GeoSiMS. Student space, a component important to the student experience, is not a separate category in GeoSiMS.

### PROJECTED GROWTH BY PROGRAMMATIC TYPE

SPACE NEED is an aggregate of the college’s current space deficits and projected increases in both duration and total number of enrollment, based on materials supplied and verified by the College of Engineering, the Office of the University Architect and others. The projections assumed growth from current population (Table 4) the following:

#### GROWTH TARGETS

- 350 Tenure Track Faculty
- 1,400 Undergraduate Degrees
- 1,000 Graduate Degrees

These projections include space associated with the initiative of Direct Freshman Admissions to College and current deficits in research, lab, makerspace, teaching, office and support space, when College space is benchmarked against peer institutions (Table 6, page 26).

Note about Lab Cores and Student Space: An assumption was made that growth in lab cores and student space would occur faster than the projected 2.6% overall growth rate per year for 20 years. The majority of growth in these areas is assumed as primarily in the first 10 years. As a result, the first decade of overall growth is higher than the 2.6% annual rate. Years 10-20 assume no growth in these two components.
## Current Space Deficit

### Benchmarking and Metrics

In order to create the most targeted and effective solution to the needs of the College, the projections of ASF growth by programmatic type and the existing distribution of programmed space in existing facilities were studied and benchmarked against that of peer institutions (R1 research institutions similar to UW, per the Carnegie Classification, Table 6). Institutions from which the space standards originated are engineering schools at both private and public universities, including Cornell, Columbia, Stanford, University of Texas at Austin and University of California at San Diego. Benchmark data was used to determine metrics, including: allocations of ASF space per faculty, sizes of individual space types such as research labs, teaching labs, faculty offices and graduate student workstations. This data provided a reference guide for comparison to the CoE current space allocations and future growth projections.

The planning team applied these benchmark metrics of research lab and office components, based on current and projected population and distribution of lab types for research, to determine any College ASF deficiencies. Current deficiencies are listed in Table 7.

### Table 6: List of Metrics Used for Benchmarking CoE Space

<table>
<thead>
<tr>
<th>Components Type</th>
<th>Space Standards (ASF)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Lab</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computational</td>
<td>600</td>
<td>Lab size = 6 + visitors + write up space (WUS)</td>
</tr>
<tr>
<td>Bench Type (dry + wet)</td>
<td>1,200</td>
<td>Lab size = 6 + visitors + write up space</td>
</tr>
<tr>
<td>Large Equipment</td>
<td>1,600</td>
<td>Accommodates large equipment, support write up space</td>
</tr>
<tr>
<td>Lab Cores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Bay Research</td>
<td>1,500</td>
<td>1,200 high bay, 300 for support</td>
</tr>
<tr>
<td>Composites</td>
<td>10,000</td>
<td>Based on Boeing Lab model</td>
</tr>
<tr>
<td>Teaching Spaces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Lab</td>
<td>1,500</td>
<td>1,200 for lab, 300 for support</td>
</tr>
<tr>
<td>Maker Space</td>
<td>1,400</td>
<td>1,000 for workshop, 400 for support</td>
</tr>
<tr>
<td>Student Space</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study/Lecture/Break area</td>
<td>500</td>
<td>based on a room for 15-20 students</td>
</tr>
<tr>
<td>Computer/Work Space</td>
<td>400</td>
<td>15 stations</td>
</tr>
<tr>
<td>Student Project Space</td>
<td>1,400</td>
<td>1,000 for project room, 400 for support</td>
</tr>
<tr>
<td>Advising Space</td>
<td>500</td>
<td>based on a room for 15-20 students</td>
</tr>
<tr>
<td>Student Organizations/Office</td>
<td>100</td>
<td>based on generic staff office size</td>
</tr>
<tr>
<td>Office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TT + Research Faculty</td>
<td>140</td>
<td>based on guidelines from recent projects at UW, similar to other R1 Institutions</td>
</tr>
<tr>
<td>Lecturer</td>
<td>70</td>
<td>based on shared office - 2 persons</td>
</tr>
<tr>
<td>Post-Doc</td>
<td>70</td>
<td>based on shared office - 2 persons</td>
</tr>
<tr>
<td>Staff - Professional</td>
<td>100</td>
<td>UW typical allocation</td>
</tr>
<tr>
<td>Staff - Classified</td>
<td>42</td>
<td>UW typical allocation</td>
</tr>
<tr>
<td>Graduate Student</td>
<td>35</td>
<td>based on shared office - 4 persons</td>
</tr>
<tr>
<td>Undergraduate Student</td>
<td>18</td>
<td>based on shared desk in a 4-person office</td>
</tr>
<tr>
<td>Meeting Rooms</td>
<td>2.6%/year</td>
<td>CoE advised to use growth rate</td>
</tr>
<tr>
<td>Research/Teaching General Support</td>
<td>2.6%/year</td>
<td>CoE advised to use growth rate</td>
</tr>
</tbody>
</table>

### Table 7: Current CoE Space Deficits

<table>
<thead>
<tr>
<th>Components</th>
<th>2016 Total ASF</th>
<th>2016 Deficiency ASF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Labs</td>
<td>306,300</td>
<td>8,800</td>
</tr>
<tr>
<td>Lab Cores</td>
<td>36,000</td>
<td>-</td>
</tr>
<tr>
<td>Teaching Space</td>
<td>68,200</td>
<td>5,000</td>
</tr>
<tr>
<td>Student Space</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Office</td>
<td>198,900</td>
<td>2,300</td>
</tr>
<tr>
<td>Meeting Room</td>
<td>35,200</td>
<td>-</td>
</tr>
<tr>
<td>Research/Teaching Support</td>
<td>6,100</td>
<td>-</td>
</tr>
<tr>
<td>Total (ASF)</td>
<td>650,700</td>
<td>16,100</td>
</tr>
<tr>
<td>Total (GSF)</td>
<td>1,183,100</td>
<td>29,272</td>
</tr>
</tbody>
</table>

Current Deficiency Notes:

1. Research - based on current quantities of lab types and metrics for each type, See Appendix A
2. Teaching - current shortage of makerspaces and support
3. Office - based on office types and metrics for each type. See Appendix A
4. Student Space - not specified clearly in GeoSIMS but considered with planned increase of underclassmen
The College of Engineering has the following growth targets for 2026:

- 350 Tenure Track Faculty (TTF)
- 1,400 Undergraduate Degrees
- 1,000 Graduate Degrees

The projected increase of TTF from 271 to 350 in the next ten years was provided by the College of Engineering in May 2016. This projection sets an annual growth rate of 2.6%, a growth rate used to predict growth in head counts, including undergraduate students with payroll positions and student space needed due to an initiative to admit freshman directly into the College of Engineering (effective in 2017).

• The first scenario continues the 2.6% growth rate for all space components except for lab cores and student spaces which are not anticipated to grow significantly in the 10-20 year period following an initial “one-time” increase.

• The second scenario reduces the growth rate in the 10-20 year period to 1% per year

**FOCUS ON TEN YEAR GROWTH TARGETS AND GROWTH RATE**

**PLANNED INCREASE IN UNDERCLASSMEN**

An increase in student spaces is needed because of a new College initiative (effective in 2017) to directly admit freshmen into the College of Engineering. For this initiative to be successful, it is suggested that the College create a more welcoming environment for these underclassmen. Though general classes for freshman are assumed to continue being held in their current, non-CoE spaces (with no accompanying growth to CoE teaching space), other spaces (See Appendix A) have been added to the College’s anticipated growth and attributed to this initiative. The approximate need projected for this initiative is 35,000 ASF (or 63,600 GSF) in 2017-2018.

**ANTICIPATED FUTURE GROWTH METHODOLOGY**

The space projections are based on a number of factors, including the primary growth rate as established in the population projections. The total College of Engineering program is broken out into several components, versions of the GeoSIMS categories, in order to provide greater definition for the range of spaces within the CoE. Each component is projected separately because some components are anticipated to follow the annual growth rate closely while others are anticipated to have a single increase in growth, with little to no incremental annual growth after that single increase.

**TEN YEAR AND TWENTY YEAR PROJECTIONS**

This study makes general projections for growth in the next 20 years (Table 8) and detailed growth projections for the first 10 years. The study does this because projections beyond ten years may be highly variable and dependent on factors difficult to quantify. Figure 8 illustrates two possible CoE growth scenarios beyond the 10-year mark. Note: these initial, constant growth rates were soon amended, but began:
2026 GROWTH PROJECTIONS

Initial Projected Space Need & Existing Deficiencies

Table 10 adds the College of Engineering's existing space deficiencies to its projected space needs. Column a is the college’s current inventory of assignable space (ASF) by space type. Columns (b) and (c) list the college’s current space deficiencies from Table 7 and its space needs to accommodate projected CoE population growth from Table 9. These needs are tallied in the projected need, adjusted to include current deficiency, in column (d). Column e is the projected CoE inventory in 2026, if all projected needs column (d) are fulfilled in 2026, that ASF added to the college’s current inventory column (a).

Final Projected Space Need for 2026 (Includes NanoES & CSEII)

Table 11 repeats the college’s projected inventory and projected need (adjusted) from Table 10 and lists the assignable square footage per space type to be added by college projects currently in design or construction (NanoES & CSEII), columns (c) & (d). It removes the new square footage of these current projects from the college’s Projected Need but also introduces additional ASF column (e) to offset a disproportionate concentration of some space types in the new CSEII Building. Column (f) is the final adjusted college need in total and by space type. Column (g) lists the final projected inventory of the College of Engineering in 2026, if all of its projected needs are fulfilled. Please note:

- The "Teaching Space" category includes only specialized instructional space dedicated to specific CoE departments.
- General Assignment Classroom space, often suggested to be reassigned as College of Engineering space in this study, is still assumed by the Plan to be assigned as UW space, outside of the College. The quantification and recommendation for relocation of General Assignment Classroom space will be determined by a separate study.
- Research/Teaching General Support, which is included in the “Circulation” category in GeoSIMS reporting, represents miscellaneous areas supporting adjacent lab functions. This Support space has been identified and renamed here, so its growth can be projected. The remainder of Circulation space is not identified in the ASF but is included in the GSF.
- Projects Under Construction: Two new facilities underway—the Nano ES and CSEII buildings—will add program space and therefore decrease the total projected 10-year need. The total projected need of ASF was adjusted (reduced) to accommodate these projects. However, for some components, the space anticipated to be provided exceeds the assumed...
Based on a 55% ASF to GSF Ratio

PROJECTED 2026 GROWTH ASF/ GSF
(Including Current Projects)*

175,000 ASF
318,200 GSF
Based on a 55% ASF to GSF Ratio

*These figures account for the completion of Nano ES & CSE II

DISTRIBUTION OF NEED

Table 11, The Final Projected Space Need for 2026 (Includes NanoES & CSEII), provides a total need for the CoE (Column f) without consideration of actual distribution of the spaces throughout the campus and assumes that the location of new space is idealized to serve the needs uniformly.

This analysis gave the college greater insight into the best possible locations and distribution for their future programmed space.

This report quantifies the amount of assignable square foot growth associated with this described need and recommends opportunities to accommodate this growth. It suggests what to build and where, in a series of bold moves, strategically varied in size and cost, able to be completed independently of one another or in combination.

Final Projected Space Need for 2026 (Includes NanoES and CSEII)

Table 11: The Final Projected Space Need for 2026 (Includes NanoES & CSEII)

Note: For detailed projections for the individual components, see Appendix A (Pages 79-85).
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OVERVIEW

The Plan is a phased, prioritized framework to address college space deficiencies and projected growth due to enrollment growth and new initiatives. It identifies major capital projects, strategically varied in size and cost, in a framework shaped by the vision and goals of the college. Projects can be completed independently or in combination. Future maintenance and re-purposing projects can be aligned with this vision to make subsequent moves and investments more purposeful.

The Plan is structured with a rational funding strategy: breaking down the Plan into manageable and more easily fundable sub-components. Each component can be done without the others or in combination. Components can be re-prioritized without affecting the Plan. This strategy makes the Plan nimble and flexible, acknowledging the many and varied potential capital project funding streams, as state funding is currently extremely limited. See Table 12 for the projected costs for each component.

Organized as a menu of potential moves, the Plan refrains from all-or-nothing scenarios and mandatory sequencing.

There is a suggested sequencing, one that front-loads new construction (GROWTH in Figure 35) to more easily enable projects in existing and decanted space; but, this sequencing is not required.

The Plan organizes new space along a circulation spine through existing college buildings, integrates that space into clarified, more open floor plans and makes it all more accessible to the college and the university.

It suggests a center for the college (HEART in Figure 35) at Loew Hall and a complex of maker spaces, student spaces and club space in between Mechanical Engineering and the Engineering Annex (STUDENT HIVE, Figure 35). More Hall is given a gut remodel and new face and entry on Stevens Way (RENEWAL), Figure 35. In the final of the five bold moves, subterranean Mueller Hall is expanded and is joined by a building adjacent to Rainier Vista, creating a new welcoming point for the college and a new quadrangle for Roberts and More Halls (EXPANSION, Figure 35).

This study provides the basis for the College of Engineering’s Strategic Implementation Plan (SIP), which will direct its repurposing and maintenance projects toward The Plan’s goals and vision, making every effort and dollar of funding most effective.

The Plan addresses the most pressing research needs while simultaneously supporting an enhanced student experience and strengthening the campus landscape. It addresses the three growth pressures on the College:

- The Current CoE Space Deficit (See Table 7), by adding ASF to adjust the current CoE space inventory to match peer institutions (benchmarking metrics from Table 6)
- Planned Increase in Underclassmen with HEART and STUDENT HIVE components of the Plan (Figure 36) which renovate existing facilities (Loew Hall, Mechanical Engineering and Engineering Annex) into centers for undergraduate studies and student project spaces, club areas and innovation spaces.
The Plan amplifies the continuity of pedestrian paths through college facilities (Figure 38), better connecting College buildings with their surrounding landscapes and creating more usable and accessible facilities by reorganizing the programs of buildings to increase occupancy of College of Engineering space and locate public functions closer to the ground plane and building entries (Figure 39).

The Plan promotes innovation and collaboration among the college, university and community with the STUDENT HIVE and RENEWAL components. It strives to maximize the efficiency and appropriate use of existing facilities, capitalizing on the inherent value of existing facilities’ structural and mechanical integrity.

This plan recommends a preferred scheme to achieve all of this, with opportunities to foster the increasingly interdisciplinary nature of engineering education. Its opportunities are a series of bold moves, through both existing and new facilities, to provide critically needed research, teaching and student space.

- Anticipated Future Growth by creating strategically located buildings, the GROWTH and EXPANSION components of the Plan (Figure 37) in the cluster of College buildings on Stevens Way.
Figure 40: The 2016 College of Engineering Space Assessment and Academic Facilities Plan

*ASF is greater than GSF because CoE would take over General Classroom Space in existing footprint.

Decanted general classrooms have not been accommodated into CoE facilities in this study.
### Project Component Summary

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Assignable &amp; Gross Square Feet Added</th>
<th>Project Cost/GSF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GROWTH</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GROWTH creates desperately needed expansion space. Units that move into this space will leave existing space available for surge or backfill throughout existing facilities. NEW CONSTRUCTION</td>
<td>WEST BUILDING 31,900 ASF EAST BUILDING 71,775 ASF BOTH 103,675 ASF</td>
<td>WEST BUILDING $58M-$75M EAST BUILDING $130M-$170M</td>
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<tr>
<td>The WEST GROWTH BUILDING will feature Teaching Labs, Research, Classrooms and Science on Display. Several small and temporary existing buildings will be razed to create the site</td>
<td></td>
<td>$188M-$245M</td>
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<tr>
<td>The EAST GROWTH BUILDING will feature Interdisciplinary Research, Core Facilities and High Bay</td>
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<td></td>
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<tr>
<td><strong>HEART</strong></td>
<td></td>
<td></td>
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<tr>
<td>HEART creates a center for undergraduate studies, including student spaces, teaching spaces and office/meeting spaces at Loew Hall. The function of this space will be amplified by the renovation of the first two floors of the adjacent Engineering Library (see the 2016 Strategic Space Plan for UW Libraries) as collaborative space. Several spaces (including general classrooms) will be occupied by CoE. RENOVATION</td>
<td>58,747 GSF</td>
<td>$21M-$38M</td>
</tr>
<tr>
<td><strong>STUDENT HIVE</strong></td>
<td></td>
<td></td>
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<tr>
<td>STUDENT HIVE creates a center of student project space embedded among research and teaching spaces in renovated and expanded Mechanical Engineering and Engineering Annex, by constructing an atrium to enclose the currently exterior space connecting them. STUDENT HIVE adds 12,020 ASF, including 9,648 ASF of General Classroom space (not currently reassigned to CoE). The study utilizes a site identified for development in the UW 2018 Campus Master Plan, restores the Engineering Annex (a building from the 1909 Alaska Yukon Pacific Exposition) and includes a variety of makerspaces, student shops, research labs, teaching labs and offices/meeting rooms. RENOVATION &amp; NEW CONSTRUCTION</td>
<td>125,896 GSF</td>
<td>$77M-$115M</td>
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<td><strong>RENEWAL</strong></td>
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<tr>
<td>RENEWAL creates new or replacement state-of-the-art engineering space in a renovated More Hall, adds to its entry and improves More Hall’s relationships to site topography. RENOVATION &amp; NEW CONSTRUCTION. Two renovation options were scoped and estimated: Option 1: a renovation within More Hall’s current footprint improves its relationship with adjacent topography, provides a new entry facade and adds (reassigning 6,403 general classroom space) approximately 4,000 ASF of CoE growth, with a project cost range of $38M-$58M. Option 2: a new headhouse (see Figure 40) corrects all relationships with adjacent topography, creates a new facade, entry and several interior spaces, adding approximately 13,000 ASF (including 6,403 ASF of reassigned general classroom space) for CoE Growth, with a project cost range of $51M-$75M.</td>
<td>OPTION ONE 67,287 GSF OPTION ONE 3,981 ASF</td>
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<tr>
<td><strong>EXPANSION</strong></td>
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<tr>
<td>EXPANSION adds to Mueller Hall, fills in the adjacent amphitheater with new skylighted subterranean lab space, and creates a new quadrangle for Mueller Hall and Roberts Hall at grade. EXPANSION adds a new building to the south. It encloses a new quad (to varying degrees in options 1 &amp; 2) with Roberts and More Halls, and would house teaching labs, offices and meeting rooms. RENOVATION &amp; NEW CONSTRUCTION</td>
<td>OPTION ONE 17,000 GSF OPTION ONE 55,000 GSF</td>
<td>OPTION ONE $65M-$85M</td>
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<tr>
<td>Option 1: creates a loosely enclosed quad and constructs less ASF/GSF</td>
<td>OPTION ONE 17,000 GSF OPTION TWO 43,450 ASF</td>
<td>OPTION TWO $89M-$116M</td>
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<td>Option 2: creates a more enclosed quad and constructs more ASF/GSF</td>
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<td><strong>TOTAL</strong></td>
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<td>TOTAL GSF 268,930</td>
<td>TOTAL ASF 165,817-188,086</td>
<td>TOTAL GSF 251,500-293,220</td>
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GROWTH COMPONENT

The highest priority for the College of Engineering moving forward is the expansion of research space and highly specialized shared research spaces. The parcel to the north of Loew Hall is the best opportunity to meet this need in proximity to existing College facilities.

EXISTING CONDITIONS

The site is bounded by Stevens Way and Mason Road to west and east, with the Engineering Library, Loew Hall and The University Plant Operations and Power Plant buildings to the south and Fluke Hall to the north. The existing buildings on the proposed site are the Facilities Services Administration Building, the University Facilities Buildings, University Facilities Annexes 1 and 2, and Plant Operations Annexes 2-6 (Figure 43). These buildings are mostly temporary structures. Though the University Facilities Annexes 1 & 2 and Plant Operations Annex 6 were built recently (1990, 2003 & 1990 respectively), others are over 50 years old, with the Facilities Services Administration Building the oldest.
Services Administration Building having been built for the Alaska Yukon Pacific Exposition in 1909 but modified many times since.

SITE

The site slopes from Stevens Way down to Mason Road, with another drop from the Burke Gilman Trail down to Montlake Boulevard. The drop is a minimum of 65-feet and slightly more at the north end (Figure 46).
DEVELOPMENT CAPACITY

The Growth site is in Sites C11 and C12 in the Draft 2018 Campus Master Plan (Figures 47, 48 & 49). Each site’s development envelope has a maximum height of 105 feet (Table 13).

As per 2018 CMP, the TOTAL DEVELOPMENT CAPACITY of both sites C11 and C12: 205,000 GSF (112,750 ASF)

CIRCULATION

The Growth site is serviced by multiple modes of transportation, with transit and major cycling access (Figure 54) on Stevens Way and Mason Road, service (Figure 53) on those and some intervening roads (like Jefferson Road) and pedestrian access (Figure 55) across the site, affected particularly by building entrances located off the street and often oriented 90-degrees to the nearby streets.

This site has several qualities making it an obvious choice for the College of Engineering’s GROWTH site:

• The site is occupied with temporary buildings, parking and paving
• Close proximity to pedestrian thoroughfares, transit lines and bike paths
• Minimal existing structures to be demolished
• Under-utilized site with potential for significant GS/ASF increases
• Site currently has minimal landscape/public realm amenities due to dramatic slope, so few public amenities lost.

Table 13: Height and Max Development Envelope

<table>
<thead>
<tr>
<th>SITE</th>
<th>Max Height</th>
<th>Max Envelope</th>
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<tbody>
<tr>
<td>C11</td>
<td>105’</td>
<td>90,000 GSF</td>
</tr>
<tr>
<td>C12</td>
<td>105’</td>
<td>115,000 GSF</td>
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</tbody>
</table>

2018 DRAFT CAMPUS MASTER PLAN POTENTIAL GROWTH:

Combined GSF: 205,000
Combined ASF @ 55%: 112,750
Combined Demo: 38,985 GSF

COMBINED NEW: 166,015 GSF

Table 14: 2018 Campus Master Plan Allowable Development Sites C11 & C12
Figure 50: GROWTH Site Bounded by Service Roads
Figure 51: Transit and Cycle Routes around GROWTH Site
Figure 52: Pedestrian Paths and Building Entries around Site

Figure 53: GROWTH Site Bounded by Service Roads
Figure 54: Transit and Cycle Routes around GROWTH Site
Figure 55: Pedestrian Paths and Building Entries around Site
SITE CONCEPT

The north/south connection from the Engineering Library and Loew Hall to Fluke Hall, in consideration with the circulation patterns around the site and the program space needs, formed the concept for the Growth site. The project will locate teaching and research spaces on Stevens Way, across from the student union (Husky Union Building), and locate research, including high-bay research, on the east side of the site and adjacent to service roads and loading docks.

Topography works in this plan’s favor, to create an upper and lower building with a level space between the two buildings, allowing a landscaped path, perhaps even a quadrangle, to make a formal connection to Fluke Hall and a communal open space for College gatherings (Figure 57).

VIEW CORRIDORS FROM THE UNIVERSITY OF WASHINGTON CLUB

The University of Washington Club is a historic mid-century building. The Club is surrounded by large old growth trees that protect the boundary of the building and frame iconic views to Union Bay. The Growth plan maintains the surrounding landscape and establishes a site boundary that protects views that characterize the UW Club’s design. By working with the dramatic topography of the site, new building massing can be tucked into the hill where necessary to maintain view corridors from the UW Club.

Figure 56: Site Analysis

Figure 57: GROWTH Programming

Figure 58: Important View Corridors from University of Washington Club (looking south and southeast) must remain unobstructed
Three factors keep the GROWTH scheme from negatively affecting the views from the University of Washington Club (Figure 59):

- The development site is outside the view range of the University of Washington Club
- The new massing steps down the hill similarly to other existing massing
- The trees east of the University Club (focusing views from inside the club) will remain
GROWTH CONCEPT

Though the College of Engineering Space Assessment and Academic Facilities Plan is a menu of potential moves, with no mandatory sequencing, the GROWTH component is the suggested first big move. The new construction provided by the GROWTH component enables subsequent projects in existing, decanted space. This swing space will enable renovation projects in adjacent buildings and will substantially aid in accomplishing the College’s ultimate goals and vision.

GROWTH is the best opportunity to address new research, teaching and specialized research needs of the College. The project is envisioned to be completed in two phases, leveraging the topography of the hillside and establishing a new campus complex that better connects other CoE buildings to Fluke Hall with a new outdoor space.

To best utilize the site, two buildings comprise this component. One building has a smaller footprint, is set across Stevens Way from the Husky Union Building (West Building) and contains more active, public and student functions. The other building is larger, has high-bay research and is situated on the service lane, Mason Road, for easy loading (East Building). See Figures 62-64.

WEST BUILDING

The scheme envisions the West Building at the height of adjacent buildings on Stevens Way - the Engineering Library and Loew Hall. The West Building will be programmed with interdisciplinary research space, ‘science on display,’ teaching labs and classrooms. It will be adjacent to the Engineering Library’s planned collaborative learning spaces on its first two floors.

EAST BUILDING

The scheme tucks the East Building’s greater mass into the hill, allowing for views from the University Club and the new West Building. Large floor plates, appropriate for large-scale engineering research, are tucked into the hillside. The building’s form steps down the hill, minimizing the apparent mass of the building, as seen from the uphill campus side. Though massive, the building hugs the landscape and keeps a low profile. Its landscaped north end roof terrace is a story below the roof line of nearby Fluke Hall. It fits high bay space into the landscape and allows service road access to large research floor plates.

NEW LANDSCAPE/PUBLIC REALM

Between the two proposed buildings and stretching from the Engineering Library and Loew Hall (to the south) up to Fluke Hall (to the north) is a long landscaped courtyard, of a scale and enclosed enough to be considered a new university quadrangle (Figure 62), a feature providing relief from a massive series of buildings. The existing site’s grade change (approximately 55’ from west to east) allows multiple entries to outdoor spaces from both proposed new buildings and existing Fluke Hall (See Figures 56 & 61).

CONCEPTUAL COST

Assumptions include that this is all new construction, that a connection to the central utility plant already exists. Escalation and phasing costs are not included.
**GROWTH CONCEPT**

**WEST BUILDING**
- Total GSF: 58,000
- Demo GSF: 20,125
- ASF @ 55%: 31,900
- Proposed Building Height: 4 floors (below maximum allowable)

**Conceptual Cost Range**
- Construction: ($700-$900/GSF)
- $40.6 M - $52.2M
- Project Cost (70/30): $58 M - $75 M

**EAST BUILDING**
- Total GSF: 130,000
- Demo GSF: 18,860
- ASF @ 55%: 71,775
- Proposed Building Height: 5 floors (below maximum allowable)

**Conceptual Cost Range**
- Construction: ($700-$900/GSF)
- $91.4 M - $117.5M
- Project (70/30): $130 M - $170 M

Table 15 is an estimate of new construction costs for the GROWTH project. The assumed cost of construction is given as a range ($700-$900 per GSF) due to the high elevation of this study. Whenever the GROWTH component becomes a project, that effort might surface conditions significantly adding to the project cost. Specific projects based on the Plan’s components, will be planned in conjunction with the Strategic Implementation Plan (SIP).

Table 15: Growth Concept Summary
PREcedent: Janelia Research Campus of Howard Hughes Medical Institute

The concept for the GROWTH site builds upon recent precedents such as the Janelia Research Campus, a 760,000 gross square foot facility on a 689-acre parcel of land in Ashburn, Virginia. It is a scientific community created by the Howard Hughes Medical Institute (HHMI), an environment where leading scientists can pursue long-term, high-risk, high-reward research in a campus specially designed to bring together researchers from disparate disciplines. The Plan’s GROWTH Component tucks its large research floor plates (East Building) into the hillside and pushes its public elements to the surface (West Building) as does the Janelia Campus. The size of the East Building is reduced and views east remain unobstructed for both West and East Buildings.

The main research facility on the campus, features an undulating, terraced design, five acres of green roof and one of the world’s largest installations of structural glass. The campus organization, aimed at achieving Janelia’s central objectives of collaboration and flexibility and promoting productive “collisions,” was designed by Rafael Vinoly Architects, PC.

The 1000-foot-long ‘landscape building’ of the complex features highly flexible laboratory space and blends into the natural surroundings, literally built into the gentle slope in the form of three descending planted terraces. Standing behind the landscape building, one has a clear, unobstructed view across the Potomac River into the verdant Maryland countryside. The terraces of the landscape building become an indistinguishable part of the sloping meadow below.

Labs, support areas, offices, meeting rooms, and communal spaces are arranged in a three-level stack that is horizontally offset to follow the slope of the site. Floor-to-ceiling glazing on the northern boundary of the laboratories separates them from a circulation corridor running the length of the building and connecting to stairs and elevator banks that provide vertical circulation. The corridor’s fully glazed walls and ceiling allow light to penetrate the labs and establish a visual connection to the landscape, while also providing access to office clusters and the open terraces that alternate along the length of the plan opposite the labs. The third level is identical to the second, although it is once again shifted further south.
EAST RECEIVING STATION EXPANSION

The College of Engineering precinct abuts the University’s main Power Plant (Figures 69,70), located at this site since 1921 and hub for major utilities supplying most of the buildings on the Seattle Campus.

Future development for the College of Engineering in this precinct will need to account for issues related to the operation and maintenance of the University of Washington Power Plant, for which an expansion study is in its early stages. The project is slated for funding on the Regent-approved One Capital Plan (2017-2023).

Further analysis and design are required as to how the Plant Expansion and the Growth West building can coexist. The East Receiving Station study and the College of Engineering study must be reconciled, looking for opportunities to integrate the needs of both projects

Potential conflicts between the East Receiving Station Expansion project and the East GROWTH building include:

• The site currently occupied by Plant Operations Building Annex 6 and Annex 2 must be reserved for a major expansion of the East Receiving Station. The Seattle Campus receives electrical power from Seattle City Light through the West and East Receiving Stations. Most of the power currently is received at the larger capacity West Receiving Station on 15th Avenue NE. However, the West Receiving Station is nearing capacity. Future campus electrical growth will be accommodated by expanding the East Receiving Station and then balancing the distribution circuits on campus equally between the two stations. With current technology, this will require expanding the footprint of the East Receiving Station to a size that is similar to the West Receiving Station. The most feasible location identified at this time is the current site of Annex 6 and Annex 2, as it has the best adjacency to the incoming Seattle City Light system and to the UW underground tunnel network. Using this site will also require modification to the roadway access to the north end of the Power Plant, such that it would encroach on the site currently occupied by Annex 4 and parking lot C23. Further study will be required to determine the exact layout and technology of the expanded East Receiving Station.

• Large components such as chillers, transformers, and pressure vessels will be moved in and out of the plant expansion through the high-bay door at the North end of the plant. Large cranes, tractor-trailer rigs, and other large vehicles and equipment must have room for ingress and egress at the north end. This include the need for large vehicles to “head-in” to the existing driveway between Plant Operations Annex 4 and Annex 6 in order to back-up through the alley between the Plant Operations Building and the East Receiving Station.

• Any College of Engineering buildings adjacent to the Power Plant site needs to be designed to mitigate noise generated by the cooling towers, emergency diesel generators (intermittent, also diesel exhaust), safety valve operations (intermittent), and other similar activities require to operate the plant.
The College of Engineering will directly admit freshman into the College starting in 2018. This creates greater need for new student advising, academic and gathering spaces within the College. Loew Hall, the Engineering Library and the plaza between them, across Stevens Way from the University’s student union, is an obvious choice as the heart of the College of Engineering.

Loew Hall sits at a pivot point between Mechanical Engineering and Engineering Annex to the south, and future growth to the north towards Fluke Hall. Multiple programs can be collocated at this location to reinforce its importance as the epicenter of the undergraduate experience for engineers and others at the university. The function of this space will be amplified by the renovation of the first two floors of the adjacent Engineering Library (see the 2016 Strategic Space Plan for UW Libraries) as collaborative space.

The Heart Component would feature student advising, commons, workrooms, study spaces, informal meeting areas and the Dean’s office. Loew Hall would be given greater transparency. Though not a part of this study or CoE inventory of space, the Engineering Library’s first two floors being redesigned as collaboration space will help serve CoE

<table>
<thead>
<tr>
<th></th>
<th>LOEW HALL</th>
<th>ENGINEERING LIBRARY</th>
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<tbody>
<tr>
<td>Existing GSF</td>
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<td>Existing CoE ASF</td>
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</tr>
<tr>
<td>Other ASF</td>
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</tr>
</tbody>
</table>

Table 16: Existing Programmed Space at HEART Development Site
student needs and reinforce the HEART component’s goals.

The goals of the HEART concept are to define a center for undergraduate College of Engineering life, provide the student-centered resources that go along with that life, enliven the adjoining exterior space, create a gateway to all of the engineering unit ‘spokes,’ and create a more open circulation through these buildings by modifying their sectional relationship.

EXISTING CONDITIONS

SITE

The HEART site is bounded by Stevens Way to the west and Jefferson Way to both north and east. The southern border of the site is flanked by Mechanical Engineering and the Engineering Annex. Loew Hall and the Engineering Library make use of the dramatic grade surrounding them by accessing grade at many points and different elevations (see Figure 77).

SITE CONCEPT

Reinforcing the plaza between the two buildings (Figure 76) as an active, vital HEART for the college is primary to the Heart Concept. The plaza’s development should follow the suggestions of The Campus Landscape Framework (CLF), which defines a plaza/town square (Figure 74) as a confluence of student activity and circulation, providing access to regional and local student services and facilities, as well as providing a locus for events and activities that require a supporting pavement. The plaza should be a heavily trafficked point of meeting, orientation, events and other student activities.
The CLF suggests that, in the future, the plaza should remain flexible and large enough to host a variety of simultaneous student activities without hampering the influx of pedestrian traffic or compromising emergency vehicle clearances. The plaza should provide ample, comfortable seating and also be capable of accommodating an event with tables and chairs without encumbering pedestrian movement. The Heart project suggests that the plaza provide expanded and shared space for some ground floor functions in surrounding buildings.

BUILDING CONCEPT

Loew Hall was constructed in 1969 and is a formidable structure. The Heart Project opens it up to its plaza, the nearby engineering library, student union, transit lines and pedestrian pathways (Figure 76). The renovation of Loew Hall will improve the building’s tight entries and better integrate the building into its surroundings (Figures 73, 76) by modifying existing stairs and lobbies.

Similarly to the way the 2016 Strategic Space Plan for UW Libraries suggests that the Engineering Library’s lower two floors become collaborative learning space, this Plan suggests that Loew Hall increase its transparency (especially at the ground floor) and accessibility to the plaza, with programming to create a collaborative, undergraduate-welcoming zone. This programming includes social spaces (Figure 78), collaboration spaces (Figures 79, 81) and focus space (Figure 82).
STRATEGIC MASTER PLAN FOR THE UNIVERSITY OF WASHINGTON LIBRARIES

A concurrent study, the Strategic Master Plan for the University of Washington Libraries 2018, indicates the Engineering Library ‘offers an opportunity to enhance the learning experience of a growing student population.’ It suggests moving most of the bound books to off-site shelving and consolidating the remaining volumes on the 2nd and 3rd floors, allowing a major renovation of building systems and opening up space for user seating and services. The study suggests the library play a role in developing programming in partnership with the College of Engineering to create a first floor commons with ‘group work areas, interactive displays and a hub for library research consultation together with student academic advising.’ It recommends an Engineering Library Research Commons, a Data/GIS Services Consulting Hub and new multipurpose co-working space, a Project Studio.

The College of Engineering has an opportunity to meet some of its assignable square footage (ASF) needs in the Engineering Library’s future commons and collaborative learning areas, an opportunity which would save both College of Engineering funds and existing CoE space for other uses.
CONCEPTUAL COST

Assumptions include that this is a full gut renovation and that a connection to the central utility plant already exists. Escalation and phasing costs are not included.

Table 17 is a cost estimate of renovation and new construction costs for the HEART project. The assumed cost of renovation/new construction is given as a range ($250-$450 per GSF) due to the high elevation of this study. Whenever the HEART component becomes a project, that effort might surface conditions significantly adding to the project cost. Specific projects based on the Plan’s components, will be planned in conjunction with the Strategic Implementation Plan (SIP).

<table>
<thead>
<tr>
<th>HEART</th>
<th>Program Concept</th>
<th>Existing</th>
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Conceptual Cost Range

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<th>Reno GSF</th>
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<th>Construction Cost ($450)</th>
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Table 17: Heart Concept Program and Cost
STUDENT HIVE COMPONENT

Innovation is often messy, busy and noisy. Allowing students to interact and create requires access to resources and mentors, workshops and flexible utility space. One of the primary needs of the College of Engineering is student project spaces, maker spaces and space for student clubs. With a gut remodel of the Mechanical Engineering Building, a restoration of the Engineering Annex and an expansive new atrium connecting them, The STUDENT HIVE component embeds innovation space among renovated research and teaching spaces.

Mechanical Engineering, with its robust structure and mechanical systems, and the Engineering Annex, the historic shed-like building currently home to student competition work, seem perfectly suited to meet the College’s needs for student project and maker spaces, bringing these activities together in one location, a student project ‘hive.’ The STUDENT HIVE will serve as a central gathering area but more importantly allow extensions of the adjacent student spaces.

Options 1 and 2 represent alternate internal program organizations and have the same ASF and GSF. Option 1 uses the current circulation in the building, which makes the new atrium more private. Option 2 uses the new atrium as a public circulation and gathering space but changes the main entries to the complex.

NOTE: This study recommends reusing the Mechanical Engineering Building and the Engineering Annex. The Engineering Annex is historically significant and the Mechanical Engineering Building has great “bones” that will serve the College of Engineering for years to come.
EXISTING CONDITIONS

SITE

The STUDENT HIVE site is bounded by Stevens Way to the west and Jefferson Road to east. The northern border of the site is the courtyard/service area south of Loew Hall and the southern border is the site of the Computer Science and Engineering II building. Mechanical Engineering and Engineering Annex are accessed primarily from the north and south and through the courtyard/service access areas.

DEVELOPMENT CAPACITY

Mechanical Engineering and the Engineering Annex (Figure 85) are a development site, Site C14, in the Draft 2018 Draft Campus Master Plan (see Figures 86 & 87). The intention at this development site was to raze both existing buildings (a demolition of 125,896 existing GSF) and create a new facility in an allowable development envelope of 8 stories and 225,000 GSF (Table 18).

The Plan reuses the existing Mechanical Engineering and the Engineering Annex facilities and encloses the court between them (currently open air), using 8,000 GSF of the approximately 100,000 remaining development capacity (Table 19).

SITE OPPORTUNITIES

The STUDENT HIVE component provides opportunities to increase the porosity of buildings, which currently have little transparency, to help create welcoming throughway to both Loew Hall and Computer Science and Engineering II.

SITE C14:
Total GSF: 225,000
ASF @ 55%: 123,750
Demo GSF: 125,896
[NET NEW CMP GROSS: 99,104]

PROPOSED BUILDING HEIGHT:
8 floors
Maximum Building Height: 105 feet

2018 CAMPUS MASTER PLAN POTENTIAL GROWTH:
GSF: 225,000
ASF @ 55%: 123,750

Table 18: 2018 Draft CMP Allowable Development Site C14
Note: The Floor designations in Figure 97 are new. For existing building floor naming, see note on page 51.

Table 19: Existing Buildings and Remaining 2018 CMP Development Capacity

Note: Floors listed in Figure 88 are not the current floor names in Mechanical Engineering and the Engineering Annex. The new Level G is MEB’s basement level and Eng Annex’s first floor. New Level 1 is MEB’s first floor and Eng Annex’s second. New Level 2 is MEB’s second floor and the Annex’s third. New Level 3 is MEB’s third floor.
STUDENT HIVE CONCEPT

The complex of Mechanical Engineering and Engineering Annex, adjacent to what will be the new ‘heart’ of the college at Loew Hall and the Engineering Library, will be leveraged into an extension of those core ‘heart’ functions (student advising, commons, workrooms, study spaces, informal meeting areas and the Dean’s office) by providing the next level of student activity: student project spaces, maker spaces and space for student clubs. The reorganization of each floor’s programming would allow greater clarity to the complex, easier access to more public functions from grade and potentially more privacy for research functions, where needed. The gut remodel and addition of an enclosed court (currently the yard between buildings), as an expansive new commons space, will allow collaboration among the many units and clubs housed in, not to mention visitors to and through, the complex.

OPTIONS 1 & 2

There are two options to the Student Hive component, which vary, not in general scheme but in where the major circulation cuts through the buildings (Figures 89 & 91). Though it sounds like a simple change, the location of the major circulation through the complex has dramatic effects on the programming optimization for the complex. Both options reinforce the circulation spine through the College of Engineering core facilities in different ways. The relocation of the south entrance to the Student Hive (Figures 90 & 92) will have an impact on the courtyard between the STUDENT Hive and Computer Science and Engineering II.
ADVANTAGES OF OPTIONS 1 & 2

The STUDENT HIVE options share the advantages of leveraging existing locations of Annex shops and makerspaces into an innovation area (the atrium hive, Figure 93) between them. Both schemes provide a clarity of programming to the buildings, loading the public functions to the lower floors and locating active student spaces adjacent to the Heart component, Loew Hall.

The Options differ in how effectively they carry out goals of The Plan: creating better circulation through and between College buildings, by modifying their sectional relationships and providing more intentional public realm transitions.

Figure 93: STUDENT HIVE Concept Programming Cross-Section A (See Figures 89 & 91 for Reference)

Figure 94: Service Area between Loew Hall (left) and Mechanical Engineering (right) looking east

Figure 95: Mech Eng and Eng Annex Looking East

Figure 96: Existing Maker Space
STUDENT HIVE: OPTION 1

Option 1 creates the 'hive' between Mechanical Engineering and Engineering Annex, opening that atrium up to adjacent spaces but keeps the current circulation paths, utilizing the existing semi-public circulation spine within the Mechanical Engineering Building. The use of the existing circulation is less expensive but not as ideal a thoroughway (when compared to Option 2 circulation).

Option 1:

- Relocates existing university classrooms to allow for more efficient and programmatically coherent space in Mechanical Engineering
- Utilizes the basement space for student clubs, shops and makerspaces, using the Hive as an extension of these functions

But Option 1 also:

- Maintains awkward entries at north and south ends of Mechanical Engineering Level 1 (See Figure 98)
- Reduces the chances of easy, obvious through paths being created between and through the existing facilities
- Makes its new atrium 'privatized' due to its not being on the main thoroughfare, reducing the possibility of the atrium being a collaborative space for spontaneous interactions with passersby
- Does not let the new atrium connect Teaching and Research Labs on Level 1 directly with the Annex floors, as Option 2 does

<table>
<thead>
<tr>
<th>OPTION 1:</th>
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</thead>
<tbody>
<tr>
<td>EXISTING SITE TOTAL</td>
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<tr>
<td><strong>GSF/ASF:</strong></td>
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<tr>
<td>GSF: 125,896</td>
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<td>ASF: 74,490</td>
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<td>GSF: 8,000</td>
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<tr>
<td>ASF: 12,020</td>
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<td>PROPOSED SITE GSF/ASF:</td>
</tr>
<tr>
<td><strong>TOTAL GSF:</strong> 133,896</td>
</tr>
<tr>
<td><strong>TOTAL ASF:</strong> 86,510</td>
</tr>
</tbody>
</table>

Table 20: Student Hive Option 1

Note: The Floor designations in Figure 97 are new. For existing building floor naming, see note on page 51.
Option 2, the PREFERRED option, creates the ‘hive’ between the two buildings and opens that atrium up to adjacent spaces. However, it reorients the main circulation path through that atrium, a move that activates the new atrium space and moves complex entries even farther from Stevens Way. This potentially costly move might be mitigated by many benefits to moving the circulation spine and the fact that this is a gut remodel. Option 2:

- Moves north and south entries to the east and through the atrium, the north entry moving directly across from the lower entry of Loew Hall
- Creates easy, obvious paths between and through the existing facilities
- Makes the atrium more public, drawing attention to student collaboration and creation
- Gives through-building accessibility on both Level G and Level 1
- Connects the teaching and Research Labs on Level 1 directly to the Annex through the atrium (no bridges)
- Relocates existing university classrooms to allow for more efficient and programmatically coherent space in Mechanical Engineering
- Utilizes lower level space for student clubs, shops and makerspaces, using the Hive as an extension of these functions

**EXISTING SITE TOTAL GSF/ASF:**
- GSF: 125,896
- ASF: 74,490

**ADDITION**
- GSF: 8,000
- ASF: 12,020

**PROPOSED SITE GSF/ASF:**
- TOTAL GSF: 133,896
- TOTAL ASF: 86,510

**Table 21: Student Hive Option 2**

**Figure 100: STUDENT HIVE OPTION 2 Concept Longitudinal Section B (See Figures 89 & 91 for Reference)**

**Figure 99: STUDENT HIVE OPTION 2 Plans**

**Figure 98: STUDENT HIVE OPTION 2 Longitudinal Section B**

**Note:** The Floor designations in Figure 97 are new. For existing building floor naming, see note on page 51.
• Utilizes the upper floor of Mechanical Engineering for dry and hybrid research labs
• The atrium can feature a massive stair/amphitheater (Figure 101), increasing its potential as a collaborative space for spontaneous interactions with passersby

PRECEDEMENTS
Figure 101 illustrates the character of the proposed renovations of the HIVE project. Student project and makerspaces are key elements of the renovation. The atrium will be a focal point of the complex and can accommodate spillover of student project spaces.

CONCEPTUAL PROGRAMMING AND COST
Assumptions:
• This is a full gut renovation
• A connection to the central utility plant already exists
• Escalation and phasing costs are not included.
### Conceptual Cost Estimate: Existing & Proposed

<table>
<thead>
<tr>
<th>Existing Building</th>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
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<td></td>
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<td>Reno GSF</td>
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<td>Level G</td>
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<td>Level 1</td>
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<td>Level 3</td>
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**New Construction**

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<tr>
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<th>New GSF</th>
<th>Construction Cost ($400)</th>
<th>Construction Cost ($600)</th>
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<tr>
<td>Atrium</td>
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<td>$3,200,000</td>
<td>$4,800,000</td>
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<td><strong>TOTAL</strong></td>
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<td><strong>$53,600,000</strong></td>
<td><strong>$80,300,000</strong></td>
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<td></td>
<td></td>
<td>Project Cost (70/30)</td>
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<tr>
<td></td>
<td></td>
<td><strong>$76,500,000</strong></td>
<td><strong>$114,700,000</strong></td>
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</table>

### Program

Table 22 lays out the programming metrics of the STUDENT HIVE project, comparing the assignable square feet (ASF) currently occupied by the College of Engineering in both Mechanical Engineering Building and Engineering Annex (and combined in both buildings) with the proposed ASF the College would have after the HIVE project. The change in College ASF, tallied here, is considered the same for both Options, but projected costs differ (see below). The General Classroom ASF is noted, in part, because some of the gained ASF in the proposed STUDENT HIVE options is due to the College occupying this classroom, currently not CoE space and requiring space reassignment elsewhere. The relocation of general assignment classrooms is not addressed in the Plan.

### Cost

Table 23 is a cost estimate of renovation and new construction costs for the STUDENT HIVE project. The assumed cost of renovation/new construction differs between Option 1 ($400 per GSF) and Option 2 ($600 per SF), primarily due to the main circulation spine’s relocation and the addition of an amphitheater-like staircase (see Figure 101 for precedent). The quality of renovations in both Options 1 & 2 are assumed equal. The cost range is also due to the high elevation of this study. Whenever the STUDENT HIVE component becomes a project, that effort might surface conditions significantly adding to the project cost. Specific projects based on the Plan’s components, will be planned in conjunction with the Strategic Implementation Plan (SIP).
The RENEWAL component creates new state-of-the-art engineering space in a renovated More Hall, adds to its entry, and improves More Hall’s relationships to site topography. The Structural Research Laboratory is not proposed to be substantially renovated.

Though built in 1946 and hastened by WWII’s engineering needs, the integrity of More Hall’s structure and mechanical systems suggest generations of research are still possible. To achieve the goals and vision of the College of Engineering as quickly and cost-effectively as possible, the Renewal project renovates interior space, clarifies the programming of More Hall.

Two renovation options were scoped and estimated. Option 1 is a renovation within More Hall’s current footprint that improves its relationship with adjacent topography, provides a new entry facade and adds approximately 4,000 ASF of CoE Growth by transferring General Classroom space to College of Engineering use. Option 2’s new headhouse corrects all relationships with adjacent topography, creates a new entry (and identity) and several new interior spaces, moves which add approximately 13,000 ASF of CoE Growth (with the some transfer of General Classroom space over to CoE use).
More Hall is bounded by Stevens Way to the northwest and the terminus of Jefferson Road to northeast. The northeast border is the new Computer Science and Engineering II building site. To the south, a breezeway/pedestrian path separates More Hall from the subterranean Mueller Hall. More Hall’s primary entries are along its northeast and southwest facades, from adjacent courtyard/service access areas (Figure 105).

DEVELOPMENT CAPACITY

More Hall is not a development site in the University of Washington 2018 Draft Seattle Campus Master Plan. The Development Capacity is not identified by the CMP. The RENEWAL project has no significant change in footprint for Option 1; no additional GSF must be accounted for in the 2018 Campus Master Plan zone capacity total. But Option 2’s ‘wrapper’ adds approximately 7,500 GSF, which will have to be accounted for the 2018 Draft CMP Central Campus Development Capacity for the zone.

CIRCULATION

More Hall’s entries along Stevens Way are offset from the surrounding landscape, its main level almost a floor higher than grade. The floor below the main level is closer to grade at the entries but cluttered with accessibility ramps later added to the building. The current entry sequence is confusing and not welcoming.
This is unfortunate because More Hall is near many of the most iconic green spaces on the University of Washington campus, including the new CSE II landscape, Rainier Vista and the Sylvan Grove Theater.

**SITE CONCEPTS**

The RENEWAL concept is an integration of both building concept and site concept. Pedestrians entering the University from the new Sound Transit University of Washington light rail station at the base of Rainier Vista often cross or use Stevens Way. This is an opportunity for the College of Engineering to have a welcoming ‘front door.’ Using the series of new spaces and circulation spine created by The Plan, this entry leads student and visitor alike through the college, through commons and workrooms, informal meeting areas and hives of student activity.

The RENEWAL component will vastly improve the building’s relationship with the public domain, clarify its programming and create a welcoming entry point for the More Hall specifically and College of Engineering in general from Rainier Vista, until the EXPANSION component is realized.
The Renewal Component:

- Reinforces the original building organization for optimized future use
- Encourages a public path through the building, connecting the existing landscapes to north and south of More Hall
- Celebrates the southwest face of More Hall as an entry point for the college, a circulation spine through its facilities and a connection to the Mueller roof plaza
- Is a gut renovation (Core, see Figure 112, excluded)
RENEWAL: OPTION 1

Option 1 (Figure 115) renovates More Hall within its existing envelope. It rectifies More Hall’s 70 years of episodic renovations. The new improved program clarity inside the building will be evident outside in a new, welcoming facade at the south entrance of the building (Figure 114). There will be no additional GSF added. The many problems with More Hall’s entries and how they relate to the public domain may all be addressed; but this will be a challenging renovation; significant internal programs must be required to be removed to enable this renovation. The cumulative effect of these complications may be a costly project with challenging phasing.

This gut renovation does not significantly alter the Core facility in More Hall, the Structural Research Lab (completed in 1948 for nearly $1 Million dollars at the time). The Option 1 Renewal renovation:

- Reorganizes and clarifies all programming but the Core facility.
- Expands Shared Facilities Space

But it:

- Maintains an awkward entry to the west and with More Hall’s adjacent landscapes, with minimal resolution.

| OPTION 1: |
| EXISTING SITE TOTAL GSF/ASF: |
| GSF: 81,173 |
| ASF: 46,708 |

| NO ADDITION |
| GSF: 0 |
| ASF: 3,981 |

| PROPOSED SITE GSF/ASF: |
| TOTAL GSF: 81,173 |
| TOTAL ASF: 50,689 |

Table 25: Renewal Option 1

Figure 114: RENEWAL Concept Proposed Entry Rendering - Option 1

Figure 115: RENEWAL Concept Programming - Option 1
OPTION 2:

EXISTING SITE TOTAL GSF/ASF:
GSF: 81,173
ASF: 46,708

ADDITION
GSF: 17,720
(3 floors @ 3,600 GSF)
ASF: 13,050

PROPOSED SITE GSF/ASF:
TOTAL GSF: 98,893
TOTAL ASF: 59,758

Table 26: Renewal Option 2

Figure 117: RENEWAL Concept Proposed Entry Rendering - Option 2

RENEWAL: OPTION 2

Option 2 (Figure 116) adds more square feet to the building than Option 1 and creates an Entrance Wrapper around the entry alleviating all of the awkwardness to the greens surrounding More Hall. Completely rectifying More Hall’s 70 years of episodic renovations and its relationship with the surrounding landscape within the building’s existing envelope will be accomplished with the addition to the West site of the More Hall. This renovation will be much less challenging than that of Option 1.

The transparent Entrance Wrapper would surround the west end of the building and have multiple benefits including a new identity along Stevens Way. New space created between the existing building perimeter and the new facade will more easily accommodate the changes in existing grade and create a vibrant series of meeting, study and office spaces.

The Option 2 Renewal renovation:
• Creates a new identity
• Adds another Core Space
• Reduces Shared Facilities
• Creates additional space between the existing building perimeter and the new facade
• More easily accommodates the changes in existing grade around the building
• Increases chances of easy, obvious paths being created
between and through the existing facilities.

- Creates a vibrant series of spaces for meetings, study spaces and office areas.
- Consolidates engineering teaching labs on the first floor
- Utilizes the upper floors of More Hall for research labs

CONCEPTUAL PROGRAMMING AND COST

Assumptions
- this is a full gut renovation, but for the Core
- a connection to the central utility plant already exists
- Escalation and phasing costs are not included.

KEY: PROGRAMMING USE

- Research
- Civil Dept
- Office
- Teaching
- Circulation

RENEWAL

Figure 118: RENEWAL Concept Site Plan - Option 2

Figure 119: RENEWAL Concept Site Plan - Option 2

Figure 120: RENEWAL Concept Site Plan - Option 2 - Exploded Axonometric - (Basement not shown)
The new construction proposed to wrap around More Hall along Stevens Way (Figure 122) is based on a series of successful recent precedents, including the Hespeler Public Library in Cambridge, Ontario designed by Kongats Architects (Figure 121) and MIT’s Physics, Department of Material Sciences Engineering (DMSE), Spectroscopy, and Infrastructure (PDSI) project in Boston, MA (Figure 123), designed by Payette Associates (which also furnished the precedent project photos). These projects create new ‘infill’ space which clarifies previously confusing circulation and creates new collaborative spaces within both existing facilities and new construction.
**Program Comparison: Existing & Proposed**

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<th>Existing</th>
<th>Proposed</th>
<th>Change</th>
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<tr>
<td>CoE ASF</td>
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<td></td>
<td></td>
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<tr>
<td>Research</td>
<td>13,393</td>
<td>17,298</td>
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<tr>
<td>Core</td>
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<tr>
<td>Gen Support Res / Teaching</td>
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<td>(199)</td>
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<td>CoE TOTAL ASF</td>
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<td>Classroom ASF</td>
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</table>

**Notes:**

(1) No Renovation to More Hall Mechanical Room

(2) No Renovation to Core Facility and its associated Mechanical Room

---

**Conceptual Cost Estimate: Existing & Proposed**

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<th>Existing Building</th>
<th>Renov</th>
<th>New Construction / GSF</th>
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<td>Reno GSF</td>
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<tr>
<td>Level B1</td>
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<td>(2) 16,294</td>
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</tr>
<tr>
<td>Level 1</td>
<td>17,193</td>
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</tr>
<tr>
<td>Level 2</td>
<td>16,900</td>
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<tr>
<td>Level 3</td>
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<tr>
<td>TOTAL</td>
<td>81,173</td>
<td>67,287</td>
<td>$26,900,000</td>
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</table>

Project Cost (70/30) $38,400,000 $57,700,000

---

**Assumptions:**

- Assumes connection to central utility plant
- Escalation is not included
- No phasing costs
- Full Gut Renovation

---

**RENEWAL OPTION 1**

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Table 27: RENEWAL OPTION 1 - Program Comparison

Table 28: RENEWAL OPTION 1 - Conceptual Cost
## Program Comparison: Existing & Proposed

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<th></th>
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<tr>
<td>GSF</td>
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<td>17,720</td>
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</table>

### CoE ASF

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<th>Change</th>
</tr>
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<td>Research</td>
<td>13,393</td>
<td>22,440</td>
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<td>Core</td>
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### CoE TOTAL ASF

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### Classroom ASF

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Table 29: RENEWAL OPTION 2 - Program Comparison

## Conceptual Cost Range

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<tr>
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<th>Exst GSF</th>
<th>Reno GSF</th>
<th>Construction Cost ($400)</th>
<th>Construction Cost ($600)</th>
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<td>Level B2</td>
<td>4,039</td>
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<td><strong>TOTAL</strong></td>
<td>81,173</td>
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### New GSF

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<td>Addition</td>
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<td><strong>TOTAL</strong></td>
<td></td>
<td>$35,760,000</td>
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### Project Cost (70/30)

|                | $51,000,000 | $75,400,000 |

Table 30: RENEWAL OPTION 2 - Conceptual Cost

### CONCEPTUAL PROGRAMMING AND COST - OPTION 2

#### PROGRAM

Table 29 lays out the programming metrics for Option 2 of the RENEWAL project. It compares the assignable square feet (ASF) currently occupied by the College of Engineering in More Hall with the proposed ASF the College would have after the RENEWAL project. The General Classroom ASF is noted, in part, because some of the gained ASF in the proposed RENEWAL options is due to the College occupying this classroom, currently not CoE space and requiring replacement elsewhere. The relocation of general assignment classrooms is not addressed in the Plan.

#### COST

Table 30 is a cost estimate of both renovation and new construction costs for Option 2 of the RENEWAL project. The assumed cost ranges of renovation ($400-$600 per GSF) and new construction ($500-$700 per GSF) are due to the high elevation of this study. Whenever the RENEWAL component becomes a project, that effort might surface conditions significantly adding to the project cost. Specific projects based on the Plan’s components, will be planned in conjunction with the Strategic Implementation Plan (SIP).

### Notes:

1. No Renovation to Mechanical Room
2. No Renovation to Existing Core Facility and Associated Mechanical Room
The need required to meet the College of Engineering’s growth and vision for the next 10-20 years cannot be met by the other four projects of the Space Assessment and Academic Facilities Plan alone. The Expansion component fulfills the remaining programmatic needs for the College and creates a welcoming courtyard on heavily-trafficked Stevens Way. The Expansion Component fulfills the College’s need for additional high flexibility research space and creates a welcoming courtyard for the College off of the iconic Rainier Vista.

The EXPANSION component adds to Mueller Hall, fills in the adjacent amphitheater with new skylighted subterranean lab space, and creates a new quadrangle for More Hall and Roberts Hall at grade. This quad is created by adding a new building to the southwest that would, with More Hall, flank Roberts Hall (to varying degrees in options 1 & 2). The Expansion component includes a large floor plate research addition to the subterranean Mueller Hall and new construction above grade with teaching labs, offices and meeting rooms.

Option 1 creates a loosely enclosed quad and constructs 55,000 GSF, adding approximately 30,250 ASF of CoE Growth. Option 2 creates a more enclosed quad and constructs 79,000 GSF, adding 43,430 ASF of CoE Growth.
Figure 128: EXPANSION Site on the 2018 University of Washington Seattle Campus Master Plan [Draft]

Figure 127: Axonometric of EXPANSION Development Site and its Existing Buildings

Figure 129: Development Capacity Zone F from the 2018 University of Washington Seattle Campus Master Plan

EXISTING CONDITIONS

GOALS

The Goals of the EXPANSION Component are to fulfill (with the GROWTH Component) the majority of the new space requirements of the College, directly connect Roberts Hall to Stevens Way once more and create a formal entry court for the College just off of iconic Rainier Vista.

SITE

The Expansion site is bounded by Stevens Way to the northwest and Mason Road to southeast and southwest, respectively. The northeast border of the site is the southwest face of subterranean Mueller Hall (Figure 126), which currently flanks an amphitheater at the site. Pedestrian access to the buildings in this area is truncated by the entries to Mueller Hall and the amphitheater that creates the bowl for Mueller’s main entry. Other entries exist in a breezeway/pedestrian path/service corridor (Figure 125) that surrounds the remainder of Mueller Hall (to the northeast).

DEVELOPMENT CAPACITY

The 2018 Draft Campus Master Plan does not identify a development site at Mueller Hall. There is a development site nearby at Wilcox Hall (C16, See Figures 128 & 129). The development at the EXPANSION site is not to replace the C16 site. But the GSF created in EXPANSION (55,000 GSF for Option 1 or 79,000 GSF for Option 2) would be accounted for by subtracting this amount from the development capacity total of the Central Campus zone.
EXPANSION COMPONENT

Like the RENEWAL component, the EXPANSION component is another integration of a building concept and a site concept. EXPANSION creates a new formal court just off of Rainier Vista on Stevens Way, a green that reestablishes entries to the surrounding buildings, both existing (More Hall and Roberts Hall) and new (the EXPANSION building). It also adds a large floorplate addition to Mueller Hall, which would be entered from the new EXPANSION building.

The grand axis of Rainier Vista was the primary landscape organizing the Alaska Yukon Pacific Exposition of 1909 (landscape design by the Olmsteds). It focuses views on Mount Rainier to the southeast and has, for over 150 years, oriented visitors on the University of Washington’s campus. While Mt. Rainier locks the vista to the southeast, an expansive green with strong edges of historic trees to either side lock the vista looking northwest. These edges focus the view on Drumheller Fountain and, to a certain degree, Red Square beyond that (Figure 130 & 131).

This strong axis and monumental landscaped edge create the illusion of continuity along Rainier Vista (Figure 130) and obscure a visitor’s awareness of the roads crossing the Vista and the courtyards that lie to either side of it. This allows the discovery of the Sylvan Grove (Figure 132) and the pillars of the University’s original building. It also hides the amphitheater built in 1989 with Mueller Hall (designed as a ‘daylight basement’ to allow a view of Roberts Hall’s facade) and intended as a place of repose, much like the Sylvan Grove across Stevens Way.

Figure 130: Lower Rainier Vista

Figure 131: Existing Site Circulation
The College of Engineering Space Assessment & Academic Facilities Plan reconsidered the Mueller amphitheater’s relevance as a contemplative space, considering the increased flow of pedestrians up Rainier Vista from the new Sound Transit UW Station to the south and the increasing traffic along Stevens Way.

The EXPANSION Component normalizes the public realm issues in this area by filling in the sunken landscape and the breezeway/pedestrian path/service corridor surrounding Mueller Hall (Figure 125) to the north and east, and replacing the maze of concrete planters on Mueller Hall’s roof (planters which appear more like hurdles than amenities, Figure 131). These moves reconnect Roberts Hall and the southwest side of More Hall with Stevens Way, dramatically improving this site and stewarding new pedestrians through a level, formal court surrounded by building entries. This new courtyard will encourage coincidental interactions and collaboration among passersby.

The EXPANSION project will have a profound effect on the way the college is perceived. Expansion will be the front door of the College adjacent to Rainier Vista. The new building above grade and its underground connector expanding Mueller Hall’s floorplate will provide a rich set of research spaces and further enable the capability of not only the adjacent facilities but of the complex and the College. The building and the court it flanks provide a welcoming first impression to both the College and this area of the university, as well as the potential for the college to express its innovative identity (dependant on the design of the project the EXPANSION component becomes, after the Strategic Implementation Plan.

The existing landscape around the development site protects views along Rainier Vista and obscures existing surrounding buildings and a potential addition.

Campus topography slopes down from Drumheller Fountain. By working with the grade and treed landscape, an addition to More Hall will not impact views from building to the north.

The potential addition to More Hall (RENEWAL component) can be used to ‘normalize’ the approach to Roberts Hall and direct the pedestrian route to be on-axis with the building’s entry.

Figure 132: EXPANSION Component’s Existing Site Circulation and Elevations

Figure 133: EXPANSION Component Development Site
EXPANSION: OPTION 1

Option 1 (Figure 134) creates a new building with a breezeway at grade so the newly formed courtyard it flanks can be accessed from all sides. An entry/exit from the courtyard is kept at the south corner, limiting the size of the new facility compared to Option 2. This version of EXPANSION:

• Creates a new building to complete the needs of the College for the duration of the Plan (10-20 years)
• Gut renovates Mueller Hall and expands its floorplate to almost three times its current size
• Creates a new quad

PROGRAM

Table 31 lays out the programming metrics for Option 1 of the EXPANSION project. It includes the renovation of Mueller Hall level B and the new construction below and above grade.

COST

Table 32 is a cost estimate of both renovation and new construction costs for Option 1 of the EXPANSION component. The assumed costs of renovation ($400-$600/GSF) and new construction ($700-$900/GSF) are given as ranges, due primarily to the high elevation of this study and the high profile location of this building/addition. Whenever the EXPANSION component becomes a project, that effort might surface conditions significantly adding to the project cost. Specific projects based on the Plan’s components, will be planned in conjunction with the Strategic Implementation Plan (SIP).

NOTES

• The renovation of Mueller Hall is a full gut renovation
• That a connection to the central utility plant already exists is assumed
• Escalation and phasing costs are not included.

![Figure 134: EXPANSION Concept Site Plan - Option 1](image)
**OPTION 2:**

**PROPOSED SITE**

**GSF:**
- Above Grade GSF: (3 floors @ 16,000) 48,000
- Above Grade ASF: 26,400
- Below Grade GSF: 31,000
- Below Grade ASF: 17,050
- TOTAL GSF: 79,000
- TOTAL ASF: 43,450

**EXISTING MUELLER HALL RENOVATION**
- GSF: 17,000
- ASF: 13,554

**TOTAL SITE GSF/ASF:**
- TOTAL GSF: 96,000
- TOTAL ASF: 57,004

---

**EXPANSION OPTION 2**

<table>
<thead>
<tr>
<th>Conceptual Cost Range</th>
<th>New GSF</th>
<th>Construction Cost ($700)</th>
<th>Construction Cost ($900)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level B</td>
<td>31,000</td>
<td>$21,700,000</td>
<td>$27,900,000</td>
</tr>
<tr>
<td>Level 1</td>
<td>16,000</td>
<td>$11,200,000</td>
<td>$14,400,000</td>
</tr>
<tr>
<td>Level 2</td>
<td>16,000</td>
<td>$11,200,000</td>
<td>$14,400,000</td>
</tr>
<tr>
<td>Level 3</td>
<td>16,000</td>
<td>$11,200,000</td>
<td>$14,400,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>79,000</td>
<td><strong>$55,300,000</strong></td>
<td><strong>$71,100,000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reno GSF</th>
<th>Construction Cost ($400)</th>
<th>Construction Cost ($600)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mueller Lvl B</td>
<td>17,000</td>
<td>$6,800,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$62,100,000</strong></td>
<td><strong>$81,300,000</strong></td>
</tr>
</tbody>
</table>

**PROJECT COST (70/30)**
- **$88,700,000**
- **$116,150,000**

---

**EXPANSION: OPTION 2**

Option 2 (Figure 135) creates a new building with a breezeway at grade so the newly formed courtyard it flanks can be accessed from all sides. In Option 2 the new building is significantly longer than in Option 1, which diverts and diminishes the entry/exit from the courtyard at the southeast corner. This version of EXPANSION:

- Creates a LARGER new building to complete the needs of the College for the duration of the Plan (10-20 years)
- Gut renovates Mueller Hall and expands its floorplate to almost three times its current size
- Creates a new quad with Roberts Hall (Figure 135) framed by More Hall and the EXPANSION building

**PROGRAM**

Table 34 lays out the programming metrics for Option 2 of the EXPANSION project. It includes the renovation of Mueller Hall level B, new construction below and above grade, and a rerouting of Mason Road.

**COST**

Table 33 is a cost estimate of both renovation and new construction costs for Option 1 of the EXPANSION component. The assumed costs of renovation ($400-$600/GSF) and new construction ($700-$900/GSF) are given as ranges, due primarily to the high elevation of this study and the high profile location of this building/addition. Whenever the EXPANSION component becomes a project, that effort might surface conditions significantly adding to the project cost. Specific projects based on the Plan’s components, will be planned in conjunction with the Strategic Implementation Plan (SIP).

**NOTES**

- The renovation of Mueller Hall is a full gut renovation
- that a connection to the central utility plant already exists is assumed
- Escalation and phasing costs are not included.
SUMMARY AND OPTIONS MENU

Tables 35-38 summarize the program requirements for the components of the Plan.

These tables list the programmatic needs of the College of Engineering in the next 10-20 years and a menu of possible ways to fulfill those needs. They lay out a breakdown of the ASF/GSF, Construction Cost Range and Project Cost Range for the 5 major components of the College of Engineering Space Assessment and Academic Facilities Plan.

If all projects are completed, the programmatic goals of the College of Engineering can be met within the Central Campus.

The RENEWAL, STUDENT HIVE and HEART components, which propose additions to and renovations of existing buildings (Table 35), are defined first and in greater detail than those projects more programmatically flexible: GROWTH, HEART (Engineering Library portion) and EXPANSION (Table 36), components that have greater programming flexibility or ideally could be leveraged to accommodate the highest technology and most demanding research needs of the college, are less detailed in their table.

The components of the 2016 College of Engineering Space Assessment and Academic Facilities Plan form a balanced approach of new construction and renovation of key existing buildings. Additional renovation and work is assumed within other buildings. The nature of this work is smaller in scale and meets the day-to-day needs of specific faculty members, departments or teaching functions. But these projects will developed with the Strategic Implementation Plan (SIP).

Table 37 lists this study’s suggested non-CoE occupants’ programs and functions to be relocated from primarily CoE-occupied buildings, suggestions which have not been vetted with the units currently scheduled in those spaces, in particular General Assignment Classrooms and the Engineering Library. The Deans and administrators of the departments and units involved will be consulted by the College of Engineering before formal planning studies involving their assigned spaces continue.

<table>
<thead>
<tr>
<th>PROGRAM REQUIREMENTS (ASF)</th>
<th>Research</th>
<th>Core</th>
<th>Teaching</th>
<th>Office / Meeting</th>
<th>Student</th>
<th>General Support Res / Teaching</th>
<th>TOTAL (ASF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewal [Option 2]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More Hall (Entrance Wrapper)</td>
<td>9,047</td>
<td>5,100</td>
<td>40</td>
<td>(938)</td>
<td>0</td>
<td>(199)</td>
<td>13,050</td>
</tr>
<tr>
<td>Student Hive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mech E + Eng Annex</td>
<td>(947)</td>
<td>0</td>
<td>1,247</td>
<td>(7,470)</td>
<td>19,190</td>
<td>0</td>
<td>12,020</td>
</tr>
<tr>
<td>Heart</td>
<td>(158)</td>
<td>0</td>
<td>3,399</td>
<td>1,705</td>
<td>10,944</td>
<td>0</td>
<td>15,880</td>
</tr>
<tr>
<td>REMAINING NEED</td>
<td>65,458</td>
<td>11,900</td>
<td>8,714</td>
<td>54,403</td>
<td>1,566</td>
<td>1,999</td>
<td>134,040</td>
</tr>
</tbody>
</table>

Table 35: Summary of Programming Contributed by Renewal, Hive & Heart [Loew Hall Component] Projects

<table>
<thead>
<tr>
<th>Growth</th>
<th>ASF</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Building</td>
<td>31,900</td>
</tr>
<tr>
<td>East Building</td>
<td>71,775</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heart</th>
<th>Leverage Library for CoE Program Needs*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1</td>
<td>24,852</td>
</tr>
<tr>
<td>Option 2</td>
<td>43,450</td>
</tr>
</tbody>
</table>

| West Campus | TBD |

* NOTE: Engineering Library is only suggested to be leveraged. The idea has not been mutually approved by the Deans of Engineering and Library

Table 36: Summary of Programming Contributed by Growth, Heart [Engineering Library Component] & Expansion Projects

<table>
<thead>
<tr>
<th>DISPLACED PROGRAMS</th>
<th>ASF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Univ Classrooms</td>
<td>30,642</td>
</tr>
<tr>
<td>Food Service</td>
<td>1,813</td>
</tr>
<tr>
<td>GERM</td>
<td>1,162</td>
</tr>
</tbody>
</table>

NOTE: These displaced programs are assumed in Tables 35 & 36

Table 37: Summary of Non-College of Engineering Programs Displaced from Existing Buildings in Proposed Renovations
**CONCEPTUAL COSTS**

The conceptual costs associated with the proposed projects is summarized in Table 38. These costs are shown as ranges, assuming further study will be done to define the projected goals, specific programmatic requirements and site conditions of each project.

<table>
<thead>
<tr>
<th>GROWTH</th>
<th>Construction Cost Range</th>
<th>Project Cost Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Building</td>
<td>$40,600,000 - $52,200,000</td>
<td>$58,000,000 - $74,600,000</td>
</tr>
<tr>
<td>East Building</td>
<td>$91,350,000 - $117,450,000</td>
<td>$130,500,000 - $168,800,000</td>
</tr>
<tr>
<td>HIVE MEB / EGA</td>
<td>$53,600,000 - $80,300,000</td>
<td>$76,500,000 - $114,700,000</td>
</tr>
<tr>
<td>HEART Loew Hall</td>
<td>$14,700,000 - $26,400,000</td>
<td>$21,000,000 - $37,800,000</td>
</tr>
<tr>
<td>RENEWAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 1</td>
<td>$26,900,000 - $40,400,000</td>
<td>$38,400,000 - $57,700,000</td>
</tr>
<tr>
<td>Option 2</td>
<td>$35,760,000 - $52,800,000</td>
<td>$51,000,000 - $75,400,000</td>
</tr>
<tr>
<td>EXPANSION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 1</td>
<td>$45,300,000 - $59,700,000</td>
<td>$64,700,000 - $85,300,000</td>
</tr>
<tr>
<td>Option 2</td>
<td>$62,100,000 - $81,300,000</td>
<td>$88,700,000 - $116,150,000</td>
</tr>
</tbody>
</table>

Table 38: Component Costs

**NEXT STEPS**

**IMPLEMENTATION PLAN**

Following this College of Engineering Space Assessment and Academic Facilities Plan, the College intends to develop a Strategic Implementation Plan (SIP) to organize and prioritize all facilities planning efforts. The SIP will develop each project scenario suggested by this Plan in concert with other University planning studies and initiatives.

Future capital projects ideally will be focused on simultaneously best utilizing the College’s new academic facilities while rehabilitating older structures and removing aging infrastructure that is beyond its service life. The SIP will consider not only the College’s need for space to serve its projected growth, but also its space utilization, and its sense of identity for undergraduates. The Strategic Implementation Plan will outline a series of projects and a streamlined decision-making process which produces a strategic framework for reaching the goals and vision of the college.

The College of Engineering Strategic Implementation Plan, based on detailed input from Steering and Executive Committees, will verify the assumptions of the Space Assessment and Academic Facilities Plan including its buildable zones, density and capacity guidelines, campus character recommendations, important adjacencies, potential conflicts with other plans and suggested phasing, within each campus and university district. All of this will occur through the University’s Capital Budget Process.
The Strategic Implementation Plan will develop costing for the strategies, with these costs being prioritized, phased and sorted by order of magnitude for strategies at least within the current capital plan (see Table 39) of 3 biennia (6 years) and other critical schedule points within the planning window of ten to twenty years. This prioritization should include a planning diagram/schedule identifying project costs, links and triggers (to each project), maintenance assumptions, ASF and GSF among other details.

The SIP should also determine a schedule of prioritized actions necessary to carry out the Space Assessment and Academic Facilities Plan. This includes a list of actions that must be done immediately.

**FUNDING STREAMS**

With state appropriations dwindling, public universities like the University of Washington will pursue several alternative funding streams, such as public-private partnerships and donor funds. They have and will continue turning to the debt market to fund these projects.

The One Capital Plan (OCP) is the University of Washington’s capital planning road map. In September of 2016, the Regents approved the OCP excerpted in Table 39 to show College of Engineering projects. The OCP is a widely-vetted and strategic approach, a single integrated effort representing the University’s priorities toward achieving the strategic initiatives outlined by the President. The goal is to complete as many of these projects as is possible in the OCP’s next six year time frame.

Several College of Engineering projects appear on the One Capital Plan. Please note: NanoES is in construction and no longer appears on this list. The Center for Advanced Materials and Clean Energies Technologies (CAMCET), an initiative of the State of Washington and the UW Clean Energy Institute, has titular College of Engineering oversight and has not been included in this Space Assessment and Academic Facilities Plan.

Not all projects on this list are guaranteed funding. Though projects are identified on the One Capital Plan and may have project funding of some kind (State, Debt, Donor, Local or Other) listed, this does not guarantee the State’s or donor’s commitment to or the completion of any project. Note that the amount of funding listed in each project funding type is insufficient to fully fund the full list of OCP projects.

There are many smaller streams of funding coming into the College. And while some, like maintenance and operations funds, cannot be redirected or prioritized, others may be. The SIP should use its capital funds in concert with all incoming funds in reaching the College’s vision and goals.
ACKNOWLEDGEMENTS

STEERING COMMITTEE MEMBERS

Dr. Michael B. Bragg, Frank & Julie Jungers Dean of Engineering
Dr. Pedro Arduino, Associate Dean of Infrastructure, College of Engineering
Michael Glidden, Director of Infrastructure, College of Engineering
Michael J. McCormick, Associate Vice President, Capital Planning & Development
Rebecca Barnes, University Architect and Associate Vice Provost for Campus & Capital Planning
Robert Puzauskie Senior Planner, Office of the University Architect
James H. Collins Jr., Principle, Payette, Boston MA
Jeffrey DeGregorio, Associate Principle, Payette, Boston MA
Arlen Li, Associate Principle and Director of Lab Planning, Payette, Boston MA

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Stephanie Koltun, Designer, Payette, Boston MA
Abigail Klima, Architect and Planner, Payette, Boston MA
Sonia Honeydew, Facilities Specialist, College of Engineering
APPENDICES

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In order to determine an approximate research lab space need, three general lab types were identified, each with a specific space metric (ASF/lab): Computational, Bench (wet or dry) and Large Equipment (Table 40).

The metric assigned to each of the types assumes an average lab group size of 6 researchers, with the possibility of accommodating one or two additional visiting researchers and/or undergraduate students. Some write-up/collaboration space is included within the allocations of space.

The CoE provided the quantities of each type of lab needed currently, as associated with the research programs of the tenure track faculty and research faculty members. Per the College, the future mix is anticipated to remain roughly the same as the current mix. The future lab totals are therefore based on the quantities of lab types as aligned with the faculty growth model.

Computational Labs: office type environments with support rooms for computer work and equipment (Figure 136).

Bench Type Labs: traditional wet bench arrangements or instrumentation focused spaces that use roughly the same area per researcher as wet labs (Figure 137).

Large Equipment Labs: house equipment or apparatus set-ups that occupy a central open area of the lab and often require generous ceiling clearance (Figure 138).

Dean’s Office Support: general and computational support spaces (for example, server rooms) for start-up or visiting faculty (Figure 139).

Table 40: Research Lab Need

<table>
<thead>
<tr>
<th>Research Labs</th>
<th>2016 Total ASF</th>
<th>2016 # of Research Labs</th>
<th>2016 “Idealized” ASF</th>
<th>2016 ASF Deficiency</th>
<th>2026 # of Research Labs</th>
<th>2026 Total ASF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computational</td>
<td>600</td>
<td>124</td>
<td>74,400</td>
<td>163</td>
<td>97,800</td>
<td></td>
</tr>
<tr>
<td>Bench (dry/wet)</td>
<td>1,200</td>
<td>154</td>
<td>184,800</td>
<td>202</td>
<td>242,400</td>
<td></td>
</tr>
<tr>
<td>Large Equipment</td>
<td>1,600</td>
<td>33</td>
<td>52,800</td>
<td>42</td>
<td>67,200</td>
<td></td>
</tr>
<tr>
<td>Dean’s Office Support</td>
<td></td>
<td></td>
<td>3,100</td>
<td></td>
<td>3,100</td>
<td></td>
</tr>
<tr>
<td><strong>Total (ASF)</strong></td>
<td><strong>306,300</strong></td>
<td></td>
<td><strong>315,100</strong></td>
<td><strong>8,800</strong></td>
<td><strong>410,500</strong></td>
<td></td>
</tr>
</tbody>
</table>

* From GeoSIMS Data
LAB CORES

Future lab core needs comprise additional support space for current cores, 3 high bay research labs (currently not available on campus), and a new Composites Lab modeled on a facility at Boeing.

Once these lab core additions are in place, it is assumed that further growth of lab cores will be in the future beyond the 20-year horizon (Table 41).

Lab Cores: CoE-owned shared research facilities which are available to the College as a whole. For an example, see Figure 140, the existing UW CoE structural testing lab. The teaching labs will be specialized engineering instructional spaces, not general labs for introductory courses. A typical lab at similar institutions would have up to 24 students. The total of 6 new labs provides the capability to serve the 1,000 additional students at a utilization rate of approximately 70%, a typical planning target for instructional space (Table 41).

<table>
<thead>
<tr>
<th>Lab Cores</th>
<th>2016 Total ASF</th>
<th>ASF Growth</th>
<th>2026 Total ASF</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nanofabrication (Fluke Hall) (EE)</td>
<td>7,000*</td>
<td>6,900</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind Tunnels (Kirsten and ADL) (A&amp;A)</td>
<td>7,600</td>
<td>7,600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical Testing (More) (C&amp;EE)</td>
<td>8,300</td>
<td>8,300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave Tanks (Harris Hydraulics) (C&amp;EE)</td>
<td>4,700</td>
<td>4,700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imaging (Mol. E&amp;S)- Molecular Analysis Facility (BioE/EE)</td>
<td>3,200</td>
<td>3,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Motion Analysis Lab (ME/EE/CSE/A&amp;A)</td>
<td>5,200</td>
<td>5,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase size of existing/support</td>
<td>2,500</td>
<td>2,500</td>
<td>Additional support</td>
<td>3 additional high bay @ 1,500 ASF ea</td>
</tr>
<tr>
<td>High Bay - research</td>
<td>4,500</td>
<td>4,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Composites Lab</td>
<td>10,000</td>
<td>10,000</td>
<td></td>
<td>Based on Boeing Lab model</td>
</tr>
<tr>
<td><strong>Total (ASF)</strong></td>
<td><strong>36,000</strong></td>
<td><strong>17,000</strong></td>
<td><strong>52,900</strong></td>
<td></td>
</tr>
</tbody>
</table>

* Values from Geo SIIMS have been rounded to the nearest hundred.

FIGURE 140: Lab Core - UW CoE structural testing lab, Photo: Payette
The teaching labs will be specialized engineering instructional spaces, not general labs for introductory courses. For examples, see Figures 141 and 142. A typical lab at similar institutions would have up to 24 students. The total of 6 new labs provides the capability to serve the 1,000 additional students at a utilization rate of approximately 70%, a typical planning target for instructional space (Table 42).

Enrollment information used as a basis for Table 42 was provided in a memo from UW in May, 2016. Per the memo, based on current data, projected majors enrollment needed would be 3,800 to 3,900 students (2.7/2.8 to 1 ratio of enrollments to majors).

Teaching Space Growth includes additional teaching labs within the Engineering major disciplines needed to support approximately 1,000 additional student majors (juniors and seniors) in order to reach the target of 1,400 undergraduate degrees per year.

### Teaching Spaces

<table>
<thead>
<tr>
<th>Teaching Spaces</th>
<th>2016 Total ASF</th>
<th>ASF Metric</th>
<th>2016 # of Needed Spaces</th>
<th>2016 ASF Deficiency</th>
<th>2026 # of New Spaces</th>
<th>ASF Growth</th>
<th>2016 Total ASF</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Lab + Support</td>
<td>1,500</td>
<td></td>
<td>6</td>
<td>9,000</td>
<td>24 students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maker Space (entry level)</td>
<td>1,400</td>
<td>3</td>
<td>4,200</td>
<td>2</td>
<td>2,800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support</td>
<td>800</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (ASF)</strong></td>
<td><strong>68,200</strong></td>
<td></td>
<td><strong>5,000</strong></td>
<td><strong>11,800</strong></td>
<td><strong>85,000</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 42: Teaching Spaces Need
STUDENT SPACES

Starting in 2017, CoE will begin admitting freshman and sophomores directly into the College. This will create a need for student spaces to support the activities and student experience more directly related to Engineering.

The breakdown of student spaces shows categories ranging from study rooms and break areas to project space and advising space. An example of an informal collaborative space is featured in Figure 143.

This component of the program is assumed to be a one-time addition in the near future that will address the particular circumstance of direct admission to the CoE for underclassmen. See Table 43 for more information.

APPENDIX A: NEED ANALYSIS BY SPACE TYPE

<table>
<thead>
<tr>
<th>Student Space</th>
<th>2016 Total ASF</th>
<th>ASF Metric</th>
<th>2026 # of new spaces</th>
<th>2026 Total ASF</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student study/lecture/break areas</td>
<td>-</td>
<td>500</td>
<td>20</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>Computer/Work space</td>
<td>-</td>
<td>400</td>
<td>10</td>
<td>4,000</td>
<td></td>
</tr>
<tr>
<td>Student project space</td>
<td>-</td>
<td>1,400</td>
<td>15</td>
<td>21,000</td>
<td></td>
</tr>
<tr>
<td>Advising space</td>
<td>-</td>
<td>500</td>
<td>10</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>Student organizations/office</td>
<td>-</td>
<td>100</td>
<td>20</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td><strong>Total (ASF)</strong></td>
<td><strong>-</strong></td>
<td><strong>-</strong></td>
<td><strong>-</strong></td>
<td><strong>42,000</strong></td>
<td></td>
</tr>
</tbody>
</table>

* GeoSIMS data includes student space within other categories, so a value for 2016 is not available.

Figure 143: Informal collaborative space example, University of Massachusetts, Amherst, Photo: Payette

Table 43: Student Spaces Need
OFFICE SPACE

Office space projections (Table 44) are based on the population count for each of the positions and a corresponding space metric (ASF/person). This projection assumes administrative and support space grows at the same aggregate rate as for the College.

The metrics for office space (Table 44) were developed in line with space allocation benchmarks at similar institutions and also considered recent new construction projects on campus. There is currently no official UW standard for office sizes.

Key numbers are the typical faculty office size (140 ASF) and divisions of this module to accommodate other positions such as lecturers, post-docs (each ½ office equivalent – 70 ASF) and graduate students (1/4 office equivalent – 35 ASF).

For an example of an office space, see Figure 144.

### Table 44: Office Space Need

<table>
<thead>
<tr>
<th>Position</th>
<th>2016 Total ASF</th>
<th>2016 ASF Metric</th>
<th>2016 # of People</th>
<th>2016 “Idealized” ASF</th>
<th>2016 ASF Deficiency</th>
<th>2026 # People</th>
<th>2026 Total ASF</th>
</tr>
</thead>
<tbody>
<tr>
<td>TT + Research Faculty</td>
<td>140</td>
<td>311</td>
<td>43,540</td>
<td>400</td>
<td>56,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecturer</td>
<td>70</td>
<td>31</td>
<td>2,170</td>
<td>43</td>
<td>3,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Doc</td>
<td>70</td>
<td>181</td>
<td>12,670</td>
<td>234</td>
<td>16,400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff - Professional</td>
<td>100</td>
<td>303</td>
<td>30,300</td>
<td>391</td>
<td>39,100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff - Classified</td>
<td>42</td>
<td>140</td>
<td>5,880</td>
<td>181</td>
<td>7,600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate Student</td>
<td>35</td>
<td>2,146</td>
<td>75,110</td>
<td>2,769</td>
<td>96,900</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undergraduate Student*</td>
<td>18</td>
<td>461</td>
<td>8,300</td>
<td>595</td>
<td>10,700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared use:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Break/Mail/Copy/Storage</td>
<td>14,240</td>
<td></td>
<td>18,400</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other**</td>
<td>9,000</td>
<td></td>
<td>11,600</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (ASF)</strong></td>
<td><strong>198,900</strong>*</td>
<td></td>
<td><strong>201,200</strong></td>
<td><strong>2,300</strong></td>
<td><strong>259,700</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MEETING ROOM & RESEARCH/TEACHING GENERAL SUPPORT

For an example of a meeting room, Figure 145 shows a typical seminar space. Meeting Room Space and Research/Teaching General Support are assumed to grow at the 2.6% annual rate as established by projected faculty growth (Table 45).

APPENDIX A: NEED ANALYSIS BY SPACE TYPE

<table>
<thead>
<tr>
<th>Space Type</th>
<th>2016 Total ASF</th>
<th>ASF Growth</th>
<th>2026 Total ASF</th>
<th>Basis of projections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting Room</td>
<td>35,200</td>
<td>10,200</td>
<td>45,400</td>
<td>2.6% growth/yr</td>
</tr>
<tr>
<td>Research/Teaching General Support</td>
<td>6,100</td>
<td>1,800</td>
<td>7,900</td>
<td>2.6% growth/yr</td>
</tr>
</tbody>
</table>

Figure 145: Meeting Rooms & Research/Teaching General Support example, seminar space, Photo: Payette

Table 45: Meeting Room and Research/Teaching General Support Need
APPENDIX A: NEED ANALYSIS BY SPACE TYPE: PROJECTED PROGRAMMATIC GROWTH

Table 46 shows projected distribution of space types within the College of Engineering after ten years, according to the summary space projections.

The Teaching Space category (Table 46) includes only specialized instructional space dedicated to specific departments. General classroom space is assumed to be assigned as UW space, outside of the College.

This report acknowledges that general classroom space comprises part of the CoE current and future needs, but the quantification and recommendation for location of these spaces will be determined by a separate study, the Strategic Implementation Plan (SIP).

The Research/Teaching General Support category (Table 46) is miscellaneous space, such as staging and layout space, for research and teaching functions.
APPENDIX B: APPROACH & PROCESS

APPROACH

The Academic Facilities Plan for the College of Engineering is intended to be a flexible and strategic legacy document that provides a menu of opportunities without a preconceived order of construction to reach the College’s end goal and vision. The goals of this study were to determine the amount and type of space that the College of Engineering (CoE) should have in order to meet specific growth targets, and then to identify opportunities in the near term to renovate or add new facilities in accordance with a guiding vision for the College’s expansion. The Plan includes approximate construction and project costs in 2016 values for each opportunity.

The analysis and recommendations in this study are based on Payette’s communications and engagements with leadership and staff from the College of Engineering and the Office of the University Architect, and are also based on materials provided by the College of Engineering, UW Capital Planning and Design and others.

The metrics used to calculate the programmatic growth outlined in this study are based on benchmark comparisons with peer Tier 1 Institutions.

The planning process of the study, which included an intensive series of teleconferences among the study’s Project Committee and workshops with the Executive committee, was organized around the following phased requirements:

- Assess existing space and recent CoE/OUA studies
- Verify, validate and update this information to compile a current and accurate space profile for the college
- Create a base space and population inventory
- Determine current space deficiencies by applying benchmarking metrics
- Compile and verify the college’s needs and vision
- Articulate a series of feasible and strategic, prioritized and phased scenarios Develop a strategic plan and an implementation strategy to achieve that plan
- Document that plan

PROCESS

The plan was created through a series of workshops among Payette, the College of Engineering, and the Office of the University Architect, in University of Washington Capital Planning and Development.

The workshops were led by Payette as a Planning Committee, with a review by the Executive Committee, which included not only the Planning Committee but also Michael Bragg, Dean of UW College of Engineering, and Michael McCormick, the AVP of Capital Planning and Development. These committees helped form and guide the process.

In order to establish consensus data for current and future CoE space, the planning committee went through a process that included the following steps:

- Establish a baseline for current CoE population and space
- Determine current space deficiencies by applying benchmark metrics to calculate idealized space allocations
- Determine future growth needs for population and space
- Adjust the future space need accounting for new space provided by buildings currently in design and construction

BASELINE ASSUMPTIONS

The program effort was initiated by researching current CoE population and space assignments. All participants agreed that for the purposes of the study, consensus baseline numbers for current population and assigned CoE space should be established, not necessarily duplicating the precise numbers from the listed sources (as in many cases the numbers differed from study to study) but instead using current information vetted and verified by the study committee. These consensus baseline numbers provided the basis for determining space needs for future growth.

Information from previous reports, including the 2010-2030 Precinct Plan in particular, was gleaned and updated for incorporation in the study. DETERMINE FUTURE GROWTH

Payette aggregated and updated the information provided them and compiled a current, accurate profile of College space and utilization, projected degree production and student enrollment, and projected faculty growth and attrition. They depended on the Planning and Executive Committees to verify the metrics (both existing and projected) gathered from previous plans and studies.

The projected CoE growth over the next decade continues the upward trend that the College has experienced in recent years.

Payette considered current faculty, staff and student sizes; current building conditions and relevant space metrics (by department and College-wide); room types and utilization (by building and department); program renewal and preservation plans & practices, including funding history. They quantified and verified the College’s space needs overall and by type and department, currently and within the study’s time frame.
The planning process for The College of Engineering Space Assessment and Academic Facilities Plan, completed in October 2016, was organized around four phases:

**Phase 1 - The Discovery Phase**

The first phase involved aggregating, quantifying and qualifying the College of Engineering’s current facilities and its projected demands for space and facilities at a high level. It included an understanding of existing conditions: of faculty, staff and student sizes, of current building conditions and relevant space metrics (by department and College-wide), of room types and their utilization (by building and department), of established priorities (which including the current College capital plan and the UW One Capital Plan), and potential funding sources (based on historical data and recent trends). It also included an overview of projected demands: of College of Engineering growth and attrition projections with associated policies and practices, of space needs (overall and by type and department, in what time frames), of College of Engineering growth, of facilities priorities and aspirations. This understanding was all based on materials provided by the College of Engineering, UW Planning and Management, and others.

**Phase 2 - The Analysis Phase**

The second phase of the study focused on the assessment of the data collected in Phase 1. The analysis also considered alternate assessments of current facilities’ value, assessments such as the inherent value of an existing building’s structure if it might be reprogrammed for greater utility. The analysis not only identified potential opportunities and complementary strategies to those of previous College of Engineering studies, but also conflicts and barriers to addressing College demands in terms of physical, programmatic and funding solutions.

**Phase 3 - The Scenario Development and Coordination Phase**

The third phase included the development of potential approaches to addressing College demands within the campus-wide context. The scenarios developed were defined in terms of key variables and assessed in terms of scenario strengths and weaknesses, including how well the College’s needs were addressed. This phase included outlining an Implementation Plan per scheme.

**Phase 4 - The Communications and Engagement Phase**

Phase four included orchestrating and implementing, with the assistance of the appropriate College and OUA staff and leadership, sufficient communications and engagement activities to inform the study contents and recommendations, as well as prepare the stakeholders to support and carry out study recommendations.
APPENDIX C: REFERENCE DOCUMENTS

Reference Documents

Following is a list of sources reviewed as background information for this study.

Sources

2018 Draft University of Washington Campus Master Plan
2003 University of Washington Seattle Campus Master Plan
2015 University of Washington Tri-Campus STEM Engineering Capital Planning Study
2016 University of Washington South Campus Study
2015 University of Washington College of Engineering Library Visioning Report
2015 West Campus Development Framework
2015 Campus Landscape Framework and its My Places Survey
2014 University of Washington Learning Space Assessment
2010-2030 College of Engineering Precinct Plan
2014-2019 College of Engineering Strategic Plan
2014 University of Washington Computer Science & Engineering II Feasibility Study
2013 University of Washington Electrical Engineering Building Space Study
University of Washington Prioritized 6-year One Capital Plan, 2017-2023
2017-2019 University of Washington Capital Budget Request
2017-2019 University of Washington 10 Year Capital Plan