

MASTER PLAN—STRATEGY AND VISION



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The cumulative effect of new buildings, campus landscape, and the associated infrastructure will be a completed West Campus — a fully formed campus district — one that, while different, is equal in quality to the best spaces on the University Park Campus.

The Master Plan establishes a long-term vision for the Core Campus that is rooted in valuable existing assets — its historic structures and the quality of the Alumni Garden landscape — while simultaneously setting in motion a radical transformation based on renewal, redevelopment and engagement.

OVERVIEW

SCOPE, GOALS, AND BUDGET

In March 2018, the University engaged a team led by Payette to develop a Master Plan for the College of Engineering. The main goal of this effort was to define an actionable strategy, spanning two 5-year funding cycles (2018-23 and 2023-28) to provide a framework for capital projects to support the College of Engineering's strategic plan. The anticipated allocation of major capital investments by the University is intended to increase the quantity and improve the quality of its space, as well as optimize the distribution and physical organization of its programs, to support the realization of the College's academic vision, as articulated in the Unit Strategic Plan.

The plan sets forth a vision that drives the creation of this Master Plan: "The College is determined to strengthen and broaden its educational programs, modernize its research portfolio, expand the faculty in emerging areas, and hence deepen its impact on society and achieve global preeminence."

The scope of the Master Plan focused on two major strands, which were to be carried out in parallel and in close coordination with each other:

- Programmatic analysis of current and future states, and projection of programmatic strategies and associated space needs for the College of Engineering.

- Actionable physical plan for the development of the West Campus and the transformation of the Core Campus through identification of opportunities for new buildings, renovation of existing buildings, campus infrastructure and systems, and the improvement and creation of major campus spaces.

The University identified two campus sites as major opportunities for development:

Site 1: West Campus: Considering the entire precinct and including the development of available building sites currently used as surface parking lots.

Site 2: Core Campus: Also known as the Core Engineering Sub Campus, focusing primarily on the existing sites of Hammond, Sackett and the Engineering Units, as well as adjacent buildings and open spaces.

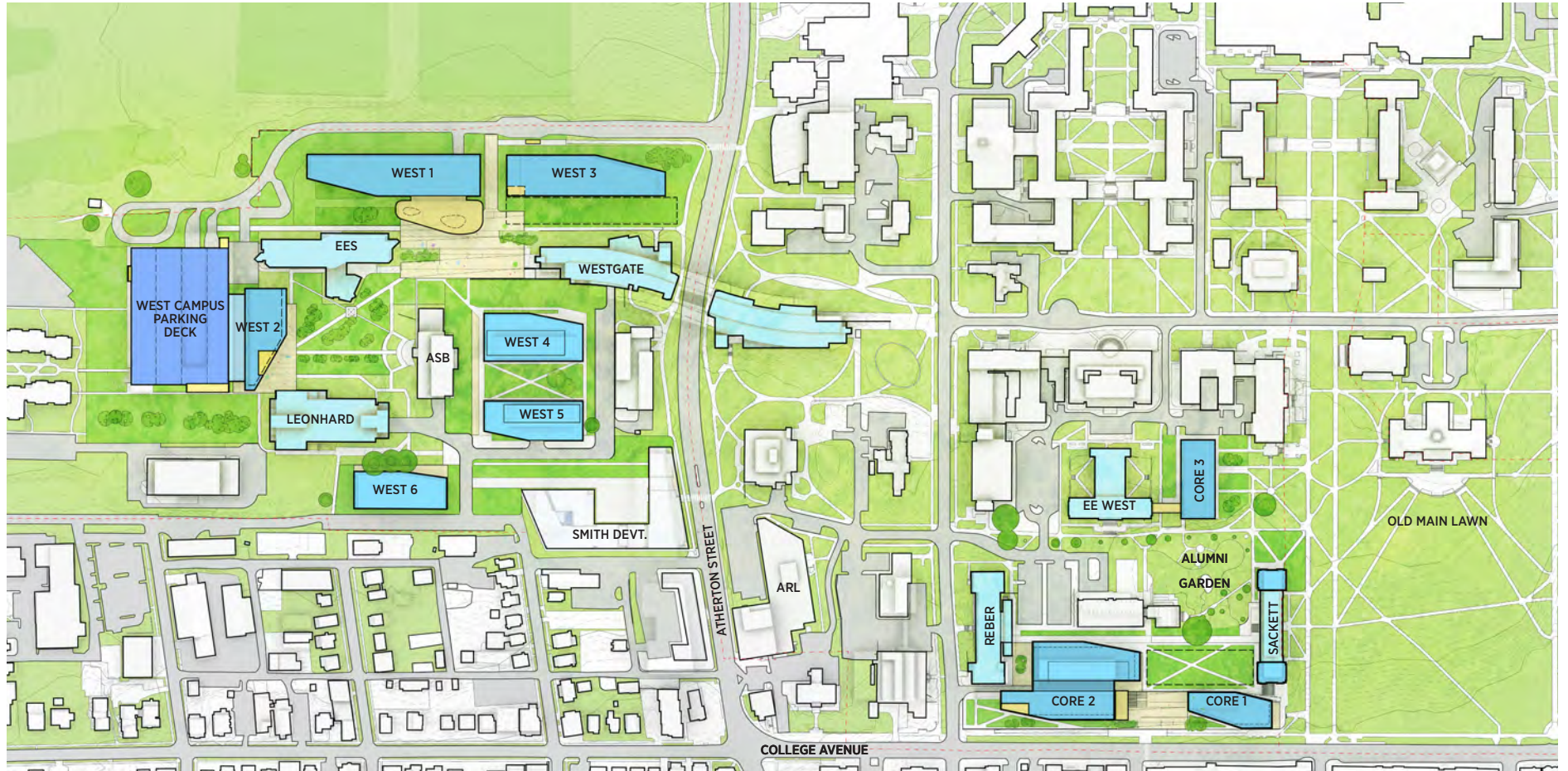
The goals of the Master Plan were:

- **Outline** current and future space needs for the COE.
- **Realize** the West Campus's potential to be a vibrant part of the Penn State campus fabric.
- **Transform** the COE's Core Campus while respecting its historic location near Pattee Mall and Old Main and addressing the campus edge along College Avenue.

- **Determine** the highest and best use of existing facilities and opportunities for redeveloping existing sites with the underlying goal of reducing maintenance backlog.
- **Develop** a plan that supports the COE departments and interdisciplinary thematic research.
- **Strengthen** the physical connectivity between COE's two principal precincts (West Campus and Core Campus).

In addition to the planning goals and drivers above, the University identified specific areas of interest for the Master Plan to take into consideration:

- **Outline** a strategy for sustainable planning and design, including opportunities for net-zero, as promoted by the University leadership.
- **Incorporate** and integrate campus utilities into the implementation—including phasing and cost—of the plan.
- **Define** a plan for addressing stormwater management within the target area of campus.



Illustrated Master Plan



MASTER PLAN VISION

The Master Plan defines a comprehensive capital improvement plan for the College of Engineering and establishes a vision for the development of both the West Campus and Core Campus precincts. The Plan's implementation was organized in three phases:

Phase 1 consists of a series of capital projects that can be implemented within the \$370M budget approved by the University for the funding cycle 2018-2023. This phase includes new building construction, demolition, renovations, infrastructure and campus landscape. Phase 1 is also intended to reduce the backlog of deferred maintenance, especially those associated with Hammond, Sackett and the Engineering Units. In total, Phase 1 consists of the demolition of 304,000 GSF in the Sackett Wings, Kunkle, Engineering Units A,B,C and Hammond, the addition of 393,000 GSF in new construction in the buildings of West 1 and West 2 and a new north addition to the Sackett Building, and the renovation of 48,000 GSF in the historic Sackett Building.

Phase 2 consists of capital projects intended to provide additional space for the College of Engineering to meet its projected space needs identified for the 10-year horizon of the plan. Phase 2 projects will be part of the 2023-2028 funding cycle; therefore, they are provided as a list of opportunities, allowing the University flexibility in managing its precise scope and align it with different funding scenarios. In total, Phase 2 consists of 483,000 GSF in new construction in the buildings of West 3, Core 1, Core 2 and the South Wing of Sackett, and fit-out of 7,000 ASF of space within the North Wing of Sackett.

Phase 3/Future identifies a list of additional opportunities for renovation or replacement of existing buildings, as well as associated campus improvements that could be achieved beyond the horizon of Phase 2.



Aerial Rendering of Future State Master Plan

The Master Plan provides a vision for the development of the two precincts and defines a vision for the space organization and growth strategy for the College of Engineering. The following are the main Planning Drivers used to guide the development of the plan:

- **Improve** the quality and flexibility of College of Engineering space.
- **Create** vibrant campus space on the West Campus.
- **Renovate** the original Sackett Building.
- **Demolish** Hammond, Engineering Units, and Sackett Wings / Kunkle.
- **Significantly** reduce the deferred maintenance backlog.
- **Increase** assignable area to accommodate right-sizing and projected growth of COE.
- **Consolidate** selected COE programs into Core and West Campus.
- **Improve** distribution of COE programs according to thematic alignments.
- **Maintain** a balance of general purpose classrooms between the Core and West Campus.
- **Complete** the transformation of the Core Campus.
- **Enhance** the physical connectivity between the Core and West Campus.

While most of the effort was focused on the redevelopment opportunities in the Core Campus and West Campus, the study analyzed the space and programs currently used by the College of Engineering throughout the campus, as well as off-campus.

The Master Plan is intended to reinforce those specific campus qualities that make University Park unique. These include:

- **Establish** a rich and well-organized hierarchy of open spaces; create a strong, positive visual character by improving the architectural character fronting the key open spaces, including “sacred spaces” such as Alumni Garden, Obelisk Garden, Pattee Mall and University House
- **Protect** the sites’ resources, including heritage trees and groves, historic buildings and open spaces
- **Remove** pedestrian barriers; create pedestrian and vehicular zones where both can operate safely and efficiently
- **Enhance** the pedestrian-centered campus experience by accommodating bicycles, transit and pedestrian paths; consider planting, amenities, and materials as part of the planning palette
- **Place** particular attention on the framing of open spaces through proper massing and creation of definable edges and outdoor rooms



PHASE 1

2018-2023 Capital Funding Cycle

- West 1
- West 2
- Sackett Renovation and North Wing Addition (shelled)

PHASE 2

2023-2028 Capital Funding Cycle

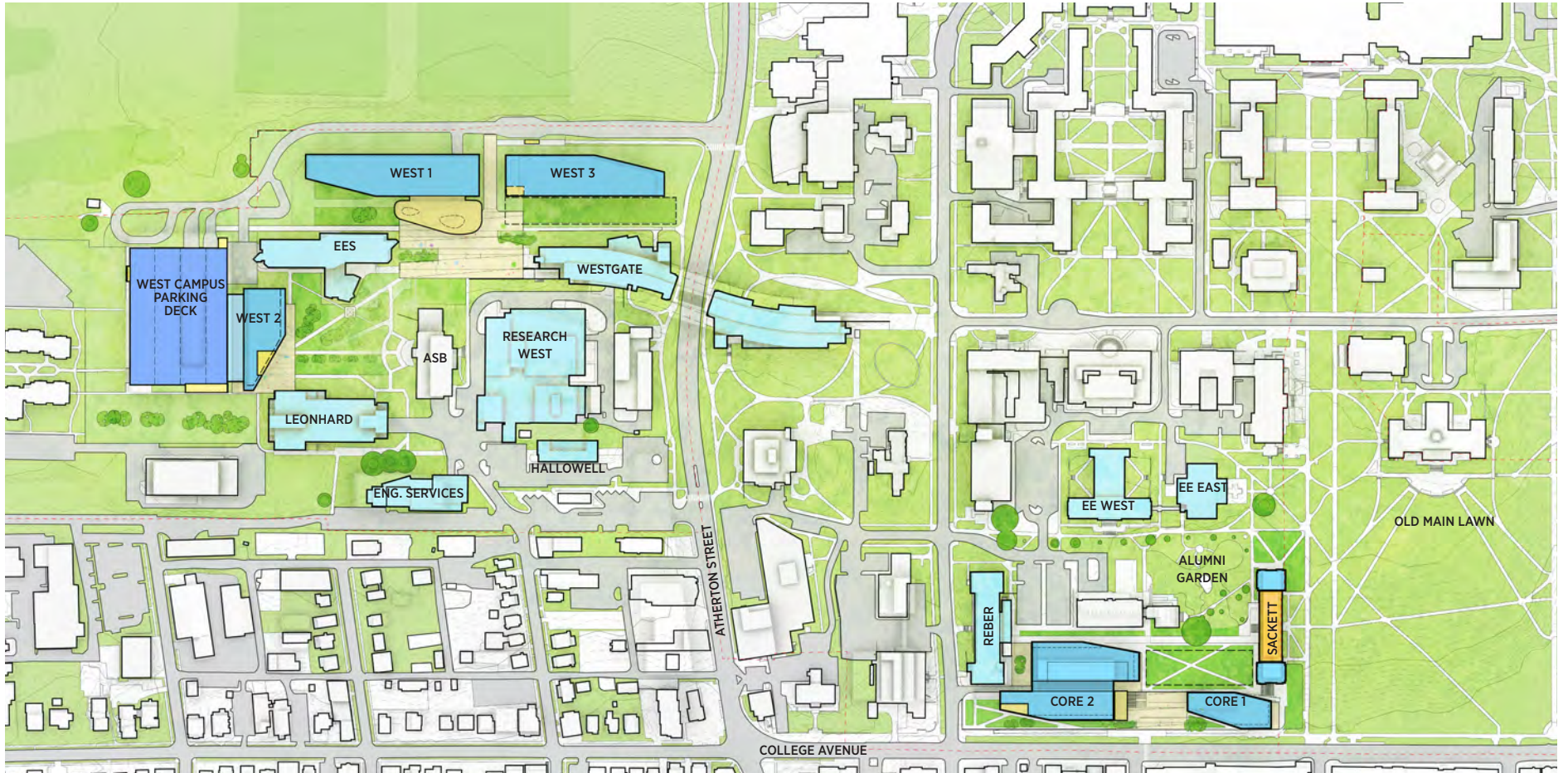
- Sackett South Wing Addition
- Core 1
- Core 2
- West 3

FUTURE

2028 and Beyond

- EE East Replacement
- West 4, 5, and 6

10 YEAR MASTER PLAN VISION



Illustrated Master Plan through Phase 2



PHASE 1

2018-2023 Capital Funding Cycle

- West 1
- West 2
- Sackett Renovation and North Wing Addition (shelled)

PHASE 2

2023-2028 Capital Funding Cycle

- Sackett South Wing Addition
- Core 1
- Core 2
- West 3

CIRCULATION AND TRANSIT

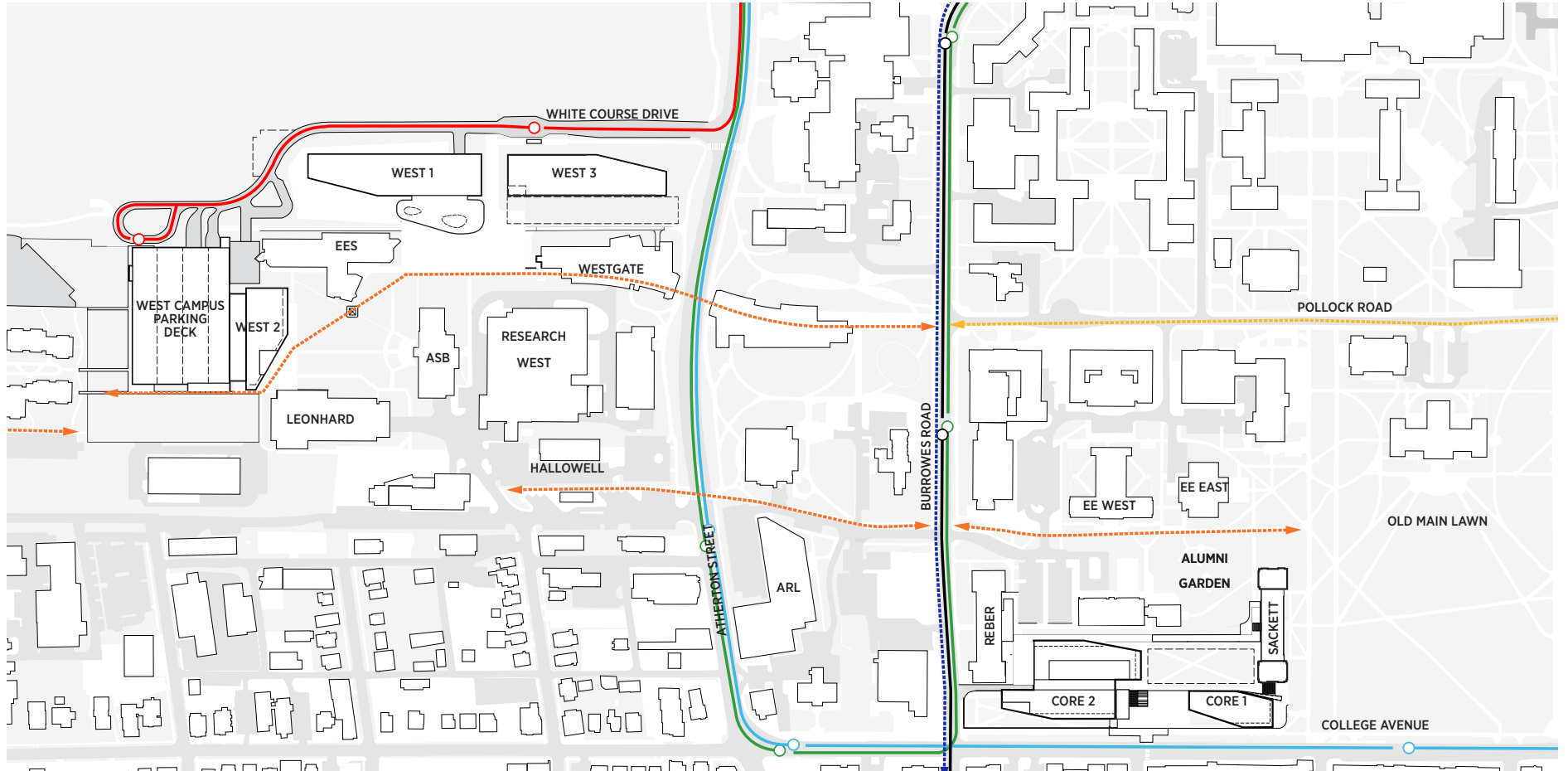
The development of the new parking deck and new major buildings on the West Campus will increase the pedestrian traffic between West and Core Campus considerably. West 1's Hub will connect directly to the Westgate pedestrian bridge, further encouraging bicycle and foot traffic. This strengthens the existing bike friendly route across campus on Pollock Road. However, it is anticipated that foot and bicycle traffic will also increase at the Atherton crosswalk. An improved circulation network for pedestrians and vehicles will support the goals of improving the connectivity and enhancing the experience of moving between the two precincts

It is envisioned that the new parking deck on the West Campus will be used similarly to the other parking decks on campus. It will be used during the day for faculty and staff permit holders as well as paying visitors. Students may be permitted to use the deck after-hours. It will also be used by the public for events. No motorcycle parking will be permitted at any time.

For the first three years when the West Campus Parking Deck is not expected to be full, the University will likely rent spaces to students so the deck can be fully utilized and generate revenue.

A covered bus stop on the Red Link for the campus bus system will be integrated into the design of the parking deck, providing a convenient connection to the greater campus. A second stop on the Red Link will be located at the node between the West 1 and West 3 Buildings as a convenient hop-off point for students and faculty. This secondary bus node will also increase the foot traffic and activity of the new West Campus Plaza.

The amount and location of bicycle and scooter parking on the West Campus will be an important consideration for the design of the plaza and the quad, as the distance of the West Campus to other points on Campus will make biking an attractive means of crossing the campus. Consideration should be given to improving other bike and scooted routes particularly the route from the Engineering Core via Steam Drive, Atherton Crossing and Railroad Ave.



Campus Bus and Bike Paths

N
 BLUE LOOP
 WHITE LOOP
 GREEN LINK
 RED LINK
 BIKE LANE
 SHARED PATH
 BIKE FRIENDLY ROUTE

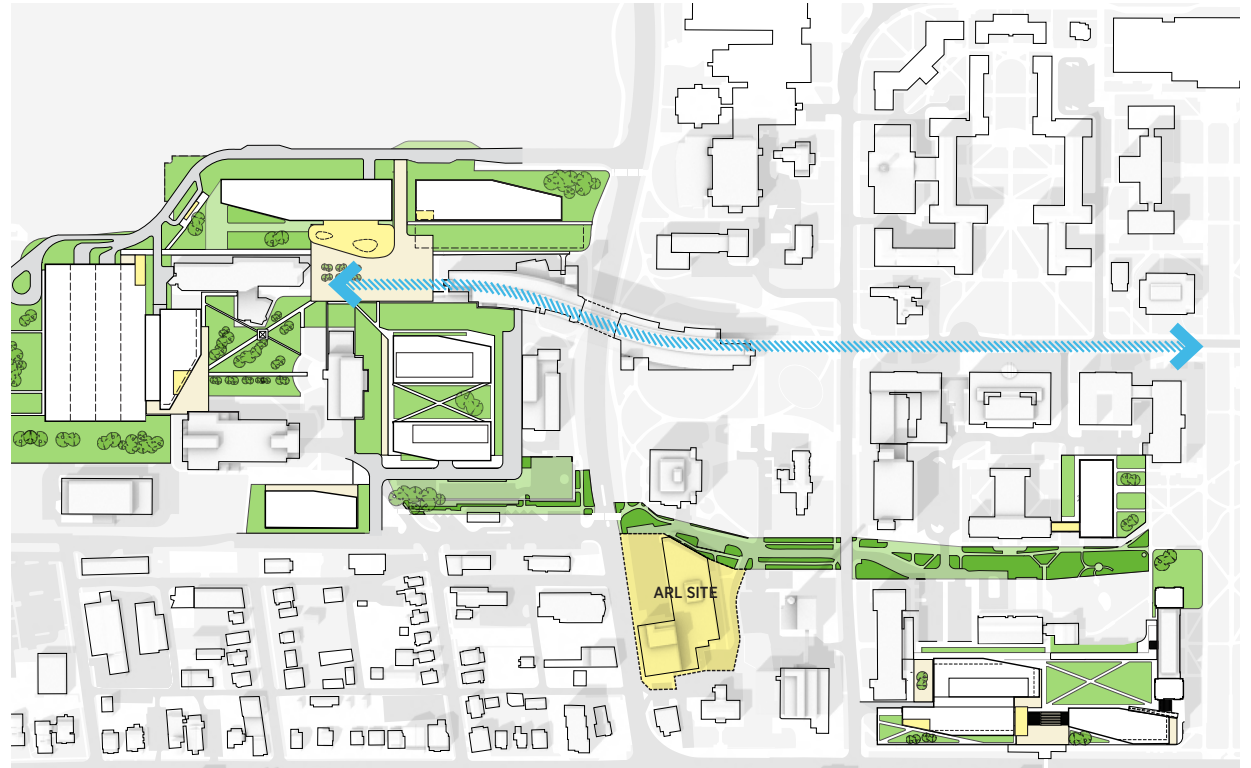
} BUS
 } BIKE

OVERALL PLANNING ISSUES

Connection between the West Campus and Core Campus Precincts:

The physical connection between the Core Campus (east of Atherton) and the West Campus is a key issue affecting the success of the Master Plan. A sense of cohesion and identity for the College of Engineering will depend on a strong physical and functional continuity between the West Campus and Core Campus precincts, the two major areas occupied by COE buildings. The future redevelopment of the ARL site may offer a good opportunity for the College to inhabit a site located in the zone between the two precincts, potentially providing a bridge between them. This building is likely to be vacated in the next five years, and the site provides a development opportunity to link the West and Core Campus Precincts.

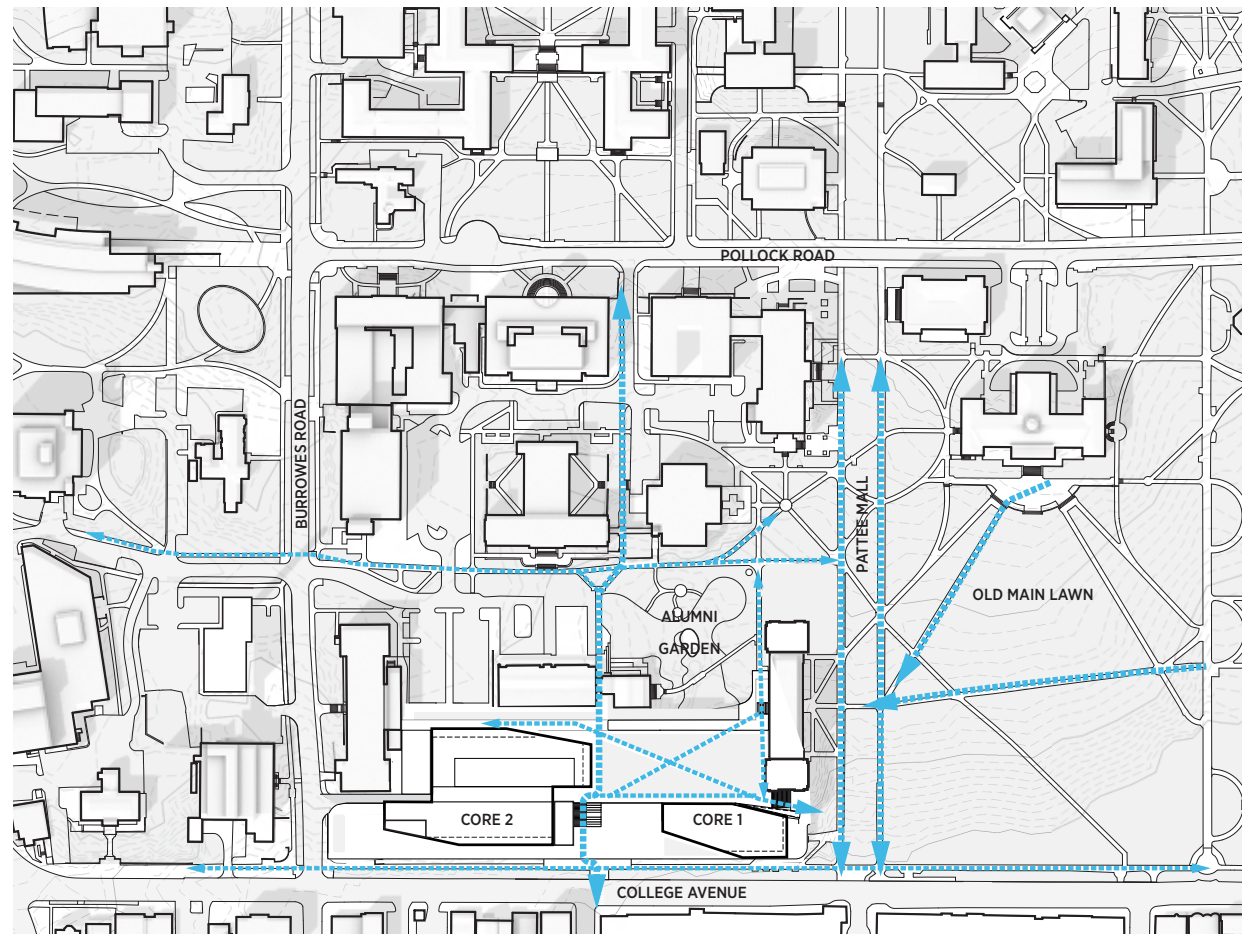
Today, the formal pedestrian link between the two areas across Atherton is provided by Westgate, through its central pedestrian path. However, today there is significant pedestrian traffic that uses the signalized crossing of N Atherton at Railroad Ave. To continue to encourage the safer connection using Westgate, the plan prioritizes construction of West 1, West 2 and West 3, located towards the north side of the West Campus Precinct.



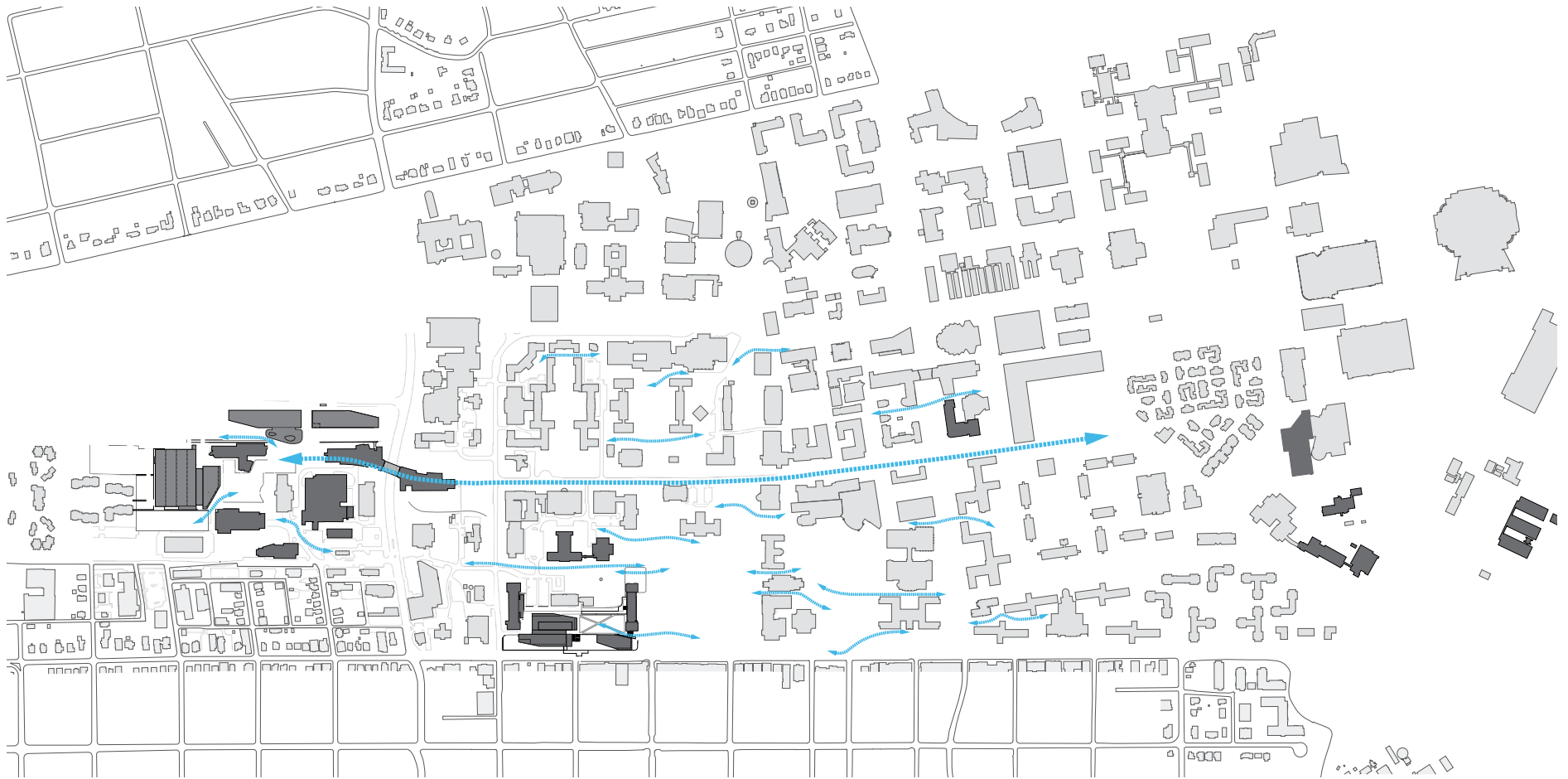
Campus Connectivity and ARL Site as the Critical Junction between the Core Campus and West Campus

While it is expected that this will increase this preferred traffic pattern, the use of the Railroad Ave intersection will most likely continue to be used by pedestrians, especially those coming from and to the White Course Apartments, Leonhard Building, the Learning Factory, and other points west. This issue is likely to intensify once future development of the West Campus occurs on the south side of the precinct, including potential replacement of Research West. With this in mind, the plan identifies a series of site and landscape improvements along the string of parking lots and sidewalks in order to enhance the safety of pedestrians and improve the walking experience.

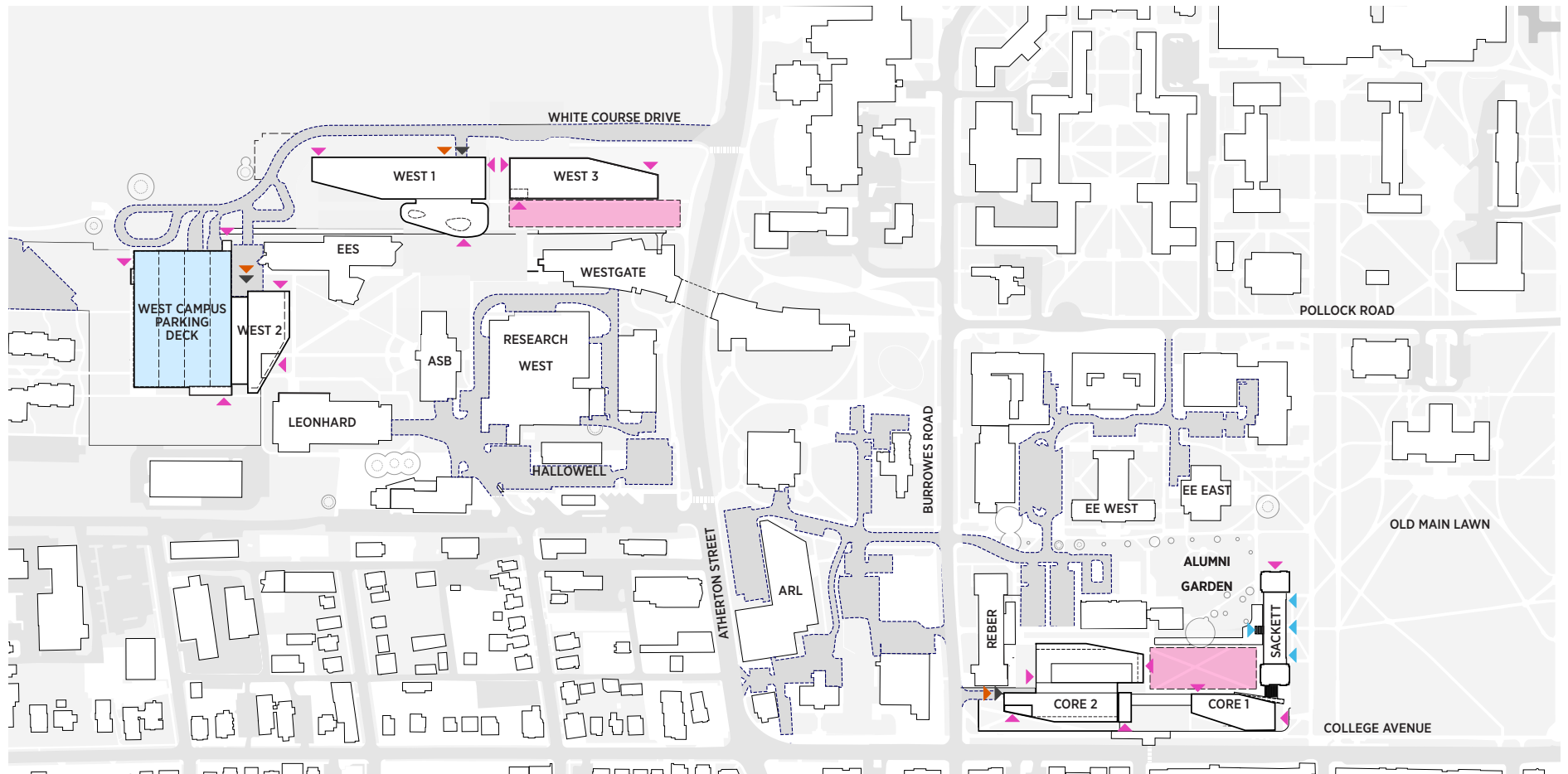
Porosity: Within the core campus, the plan to remove the wings of Sackett and Kunkle and the addition of new wings along with Core 1, an important landscape connection is formed. A space between Sackett and the new Core 1 will enable pedestrians to traverse the Core Campus from the Old Main Lawn and Pattee Mall to the new Engineering Quad and Alumni Garden. This new opening reinforces the porous nature of the campus pedestrian experience and enables new routes to be taken across and through the improved Core Campus, thus contributing to the landscape experience of University Park.










Porosity and Circulation of Core Campus



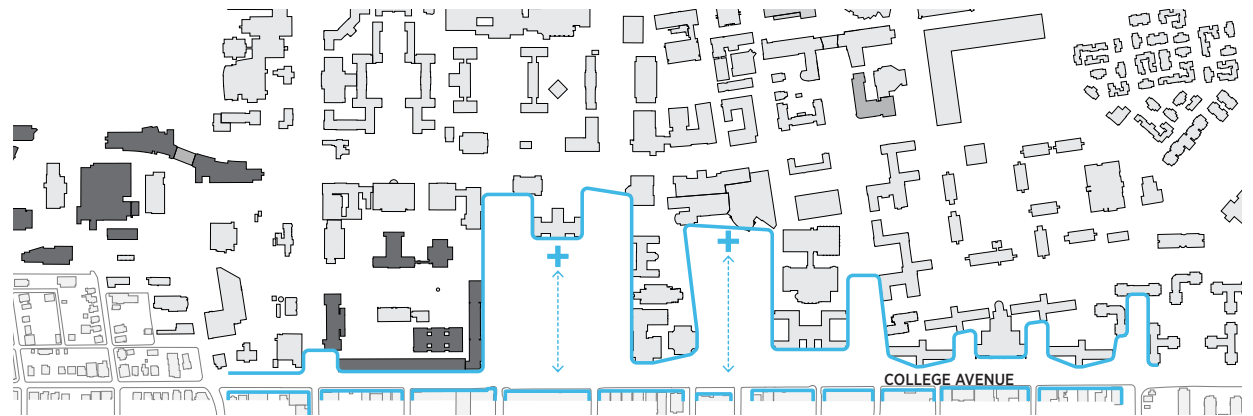
East to West Campus Porosity



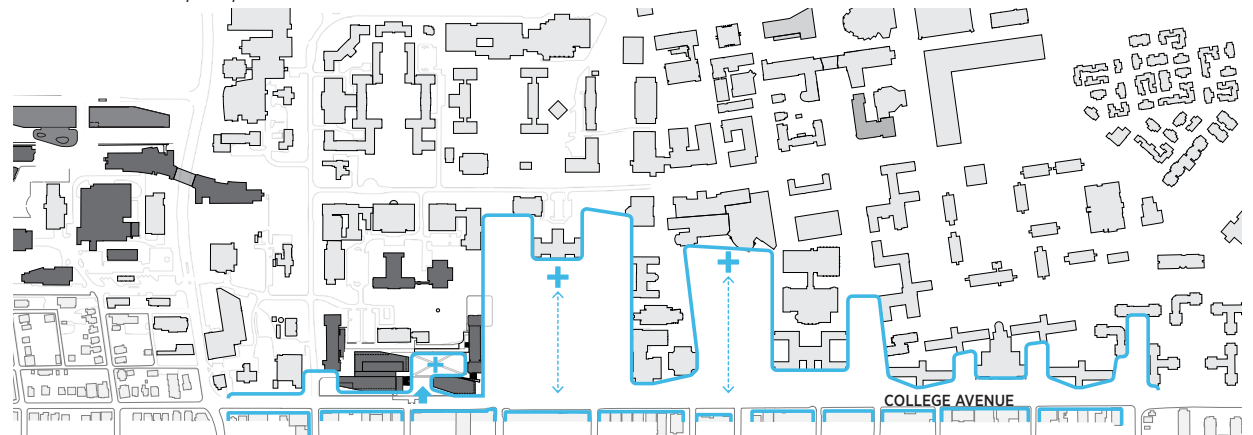
Access, Service, and Stormwater Detention at the End of Phase 2

-  ACCESSIBLE ENTRY
-  ENTRY
-  LOADING DOCK
-  WASTE REMOVAL
-  PARKING
-  VEHICULAR SERVICE ROADS
-  STORMWATER DETENTION

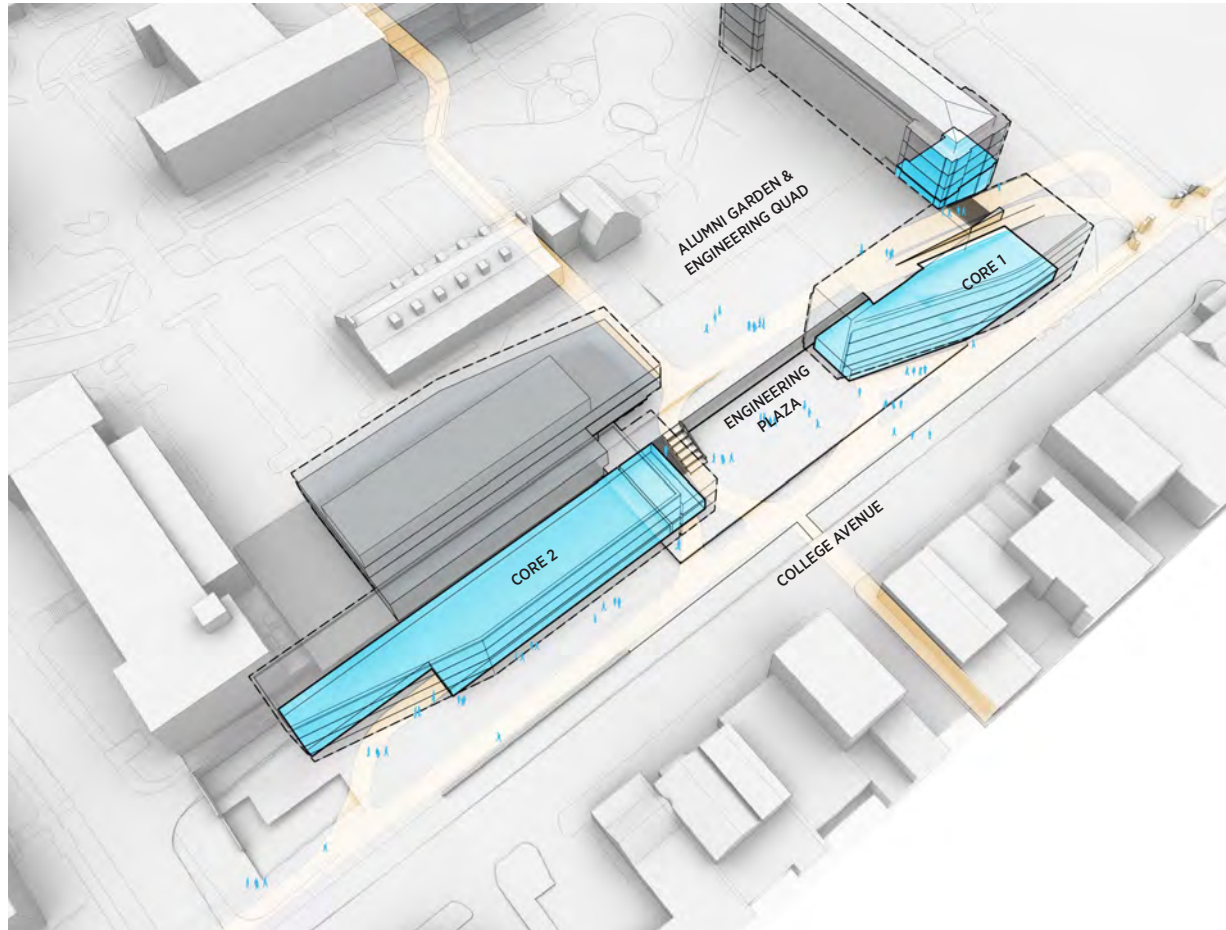
College Avenue Street Edge: The nature of open space along College Ave is defined by a consistent, rhythmic street wall to the south, with retail and street life. To the north side of College Ave., much larger open campus spaces provide relief for the street wall and contribute a large amount of landscaped space for the University, such as Old Main Lawn. By removing Hammond and its unrelenting wall, and replacing it with two more active, lively fronts to College Ave., as well as the large Engineering Plaza, the new plan presents views and pedestrian connection to the new Engineering Quad and Alumni Garden. This relief will be more consistent with the existing landscape morphology, and will be a welcoming space along College Ave., not only for Penn State students, but also for the residents of State College.



Street Wall and Campus Space Before



Street Wall and Campus Space through Phase 2



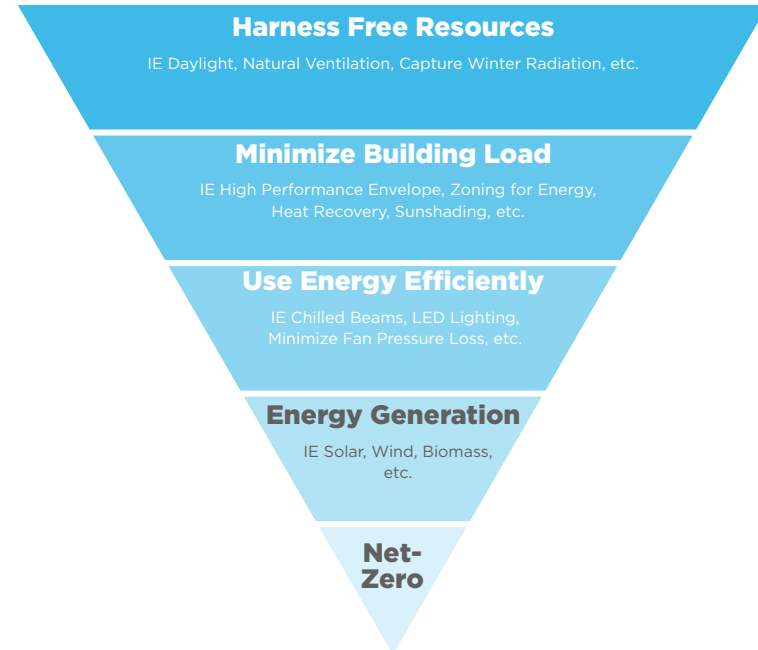
Building Transparency and Engagement at College Avenue

SUSTAINABILITY

Since over 80% of the campus greenhouse gas emissions comes from the operation of buildings, consideration of energy efficiency and the environmental impact of design decisions made at the master planning level are critical to achieving the goal of reducing campus greenhouse gases by 80% from 1990 levels by 2050.

During the COE Master Plan, a Sustainability Workshop was held to understand the vision for sustainability. Two goals for the design of new buildings on the campus are that:

- All new or renovated buildings will achieve LEED Certification
- Buildings should be designed to minimize energy use, and be as “near net-zero” as possible.



Energy Priorities

Net-Zero Potential

In order to support Penn State's greenhouse gas emission reduction goals, the potential for net-zero energy buildings was studied. For the purpose of this analysis, net-zero energy was defined as the annual energy consumption being equal to the energy produced by renewables. The first step in achieving a net-zero building is to focus on energy efficiency to reduce energy usage and loads as much as possible.

Focusing first on harnessing free resources—such as daylight, natural ventilation, or solar radiation in the winter—can eliminate energy that would otherwise be needed to meet those needs. Minimizing building loads, which drive mechanical system sizing and cost, through strategies like high performance envelope, sunshading, zoning labs for energy intensity, optimizing building massing and orientation, and heat recovery can further reduce the building's energy usage. Lastly, where energy using systems are needed, it is important to use the most energy efficient systems as possible with strategies like chilled beams, LED lighting, and minimizing fan pressure losses. The University strategy is to address energy generation at a campus level and share the benefits across all building. In the short term Penn State will have approximately 72MW of off-site solar generation dedicated

to the University, constituting approximately 25% of the electricity use on campus. Local generation opportunities shall be evaluated based LCCA to understand the best value to the campus overall net-zero goals. New building shall be designed as PV ready, to allow future changes in the technology.

PROGRAM

The vision for the distribution of programs across the two precincts was to accommodate the anticipated growth of the faculty and graduate student body in state-of-the-art facilities, consolidating departmental space, especially research labs and offices, where possible. It was envisioned that the Master Plan will allow the College of Engineering to create strong departmental homes for the administration of the departments while strengthening the collaboration and interdisciplinary exchange between departments and researchers by co-locating researchers in shared facilities.

The key drivers of the growth on the Core and West Campus include:

- **Tenure** track faculty anticipated growth from 300 to 375
- **Graduate** student body growth from 4:1 ratio to 6:1 ratio
- **Satellite** locations of some COE space consolidating back to the main campus

THEMATIC PROGRAM ALIGNMENT

The overarching vision for the distribution of the departmental homes and primary research hubs for the departments is that the West and Core Campuses will promote thematic research groupings aligned with the Strategic Plan for the COE. The strategic plan outlines five themes that the College wants to emphasize in its research and curriculum. These are:

- Innovative Engineering Education
- Optimal and Secure Cyberenvironments
- Advanced Manufacturing
- Resilient Infrastructure Systems
- Sustainable Water / Energy Food Nexus

The matrix on the facing page illustrates the connection between these strategic themes with existing and proposed research and teaching cores and hubs. The requested cores and hubs list was generated in a series of departmental conversations with the COE, as well as in conversations with the IPAC of each department. These cores and hubs do not exist today, but could be designed as part of future buildings and spaces to align with the opportunity of building significant new space within the vision of the COE Strategic Plan.

STRATEGIC PLAN	EXISTING CORES / HUBS	REQUESTED CORES / HUBS	RELATED DEPARTMENTS
INNOVATIVE ENGINEERING EDUCATION	<ul style="list-style-type: none"> • Learning Factory • SEDTAPP Classrooms • Knowledge Commons 	<ul style="list-style-type: none"> • Learning Factory • Dynamic Classrooms • Student Project / Study • Digital Visualization Facility • Global Virtual Teaming Facilities • Expanded Distance Learning 	<ul style="list-style-type: none"> • SEDTAPP • ESM
OPTIMAL & SECURE CYBERENVIRONMENTS	<ul style="list-style-type: none"> • Cleanroom • Nano Facility 	<ul style="list-style-type: none"> • Quantum Engineering (Optics, Computing, Informatics) 	<ul style="list-style-type: none"> • EE & CSE
ADVANCED MANUFACTURING (BIOMED / ELEC / MECH)	<ul style="list-style-type: none"> • CAV (Anechoic Chambers, Struct. Acoustics) • Fame Lab • Fluid Mechanics Facility 	<ul style="list-style-type: none"> • Sound and Vibration Research • Biomedical Ultrasound Research • Multi-Modal Imaging 	<ul style="list-style-type: none"> • ACOUSTICS • BIOMEDICAL • MECH ENG. • EE & CSE • IME
RESILIENT INFRASTRUCTURE SYSTEMS	<ul style="list-style-type: none"> • UAV (Rovers and Drones) • Indoor Flight Facility • Flight Simulator • Wind Tunnels (research, teaching) • Wave Tank (50') • Structures Lab (Façade testing) • Living Lab (example systems) • IAC / Energy Lab • Icon Lab (3D Visualization) • Structures Lab (Beams/Concrete Printing) 	<ul style="list-style-type: none"> • UAV Design (land, sea, air) • Indoor Flight Facility • Aircraft Fabrication • Additive Manufacturing & Design • Structural Testing • Mechanical Systems Testing • SMART Building Systems • Automated Construction 	<ul style="list-style-type: none"> • AERO • AE • MECH ENG. • NUCLEAR ENG. • CIVIL & ENVIRO
SUSTAINABLE WATER / ENERGY FOOD NEXUS		<ul style="list-style-type: none"> • Chemical Analysis & Instrumentation 	<ul style="list-style-type: none"> • CHEM-E • CIVIL & ENVIRO • AG & BIO

THEMATIC RESEARCH BUILDINGS

On the Core and West Campus, three main building types are envisioned for the COE:

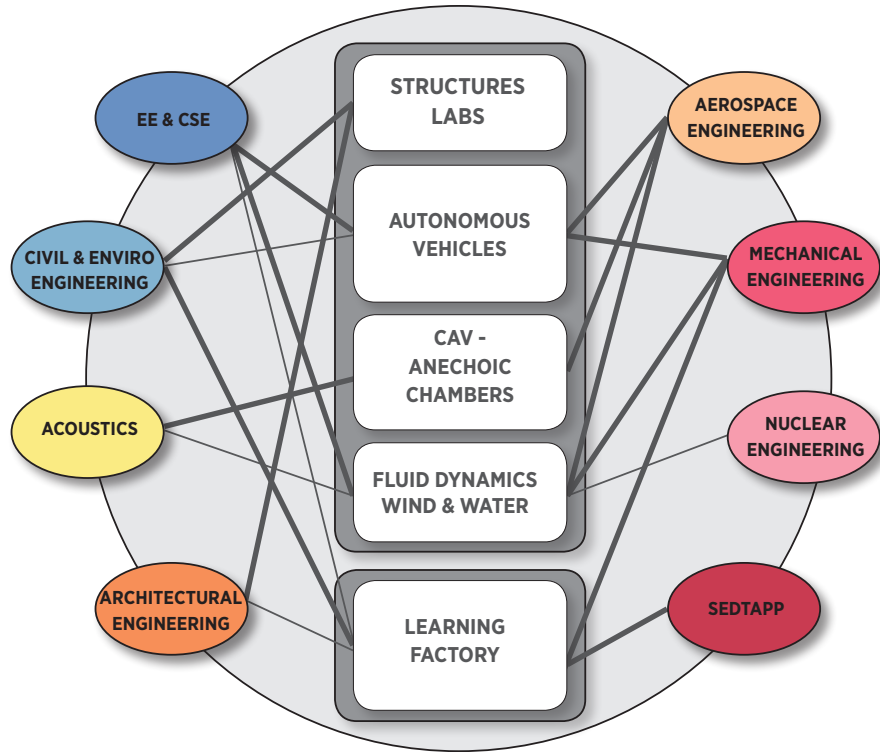
Core Centric Research Center: An interdisciplinary building centered on shared research core resources with research and teaching space related to the core resources located in the building

Thematic Interdisciplinary Research Center:

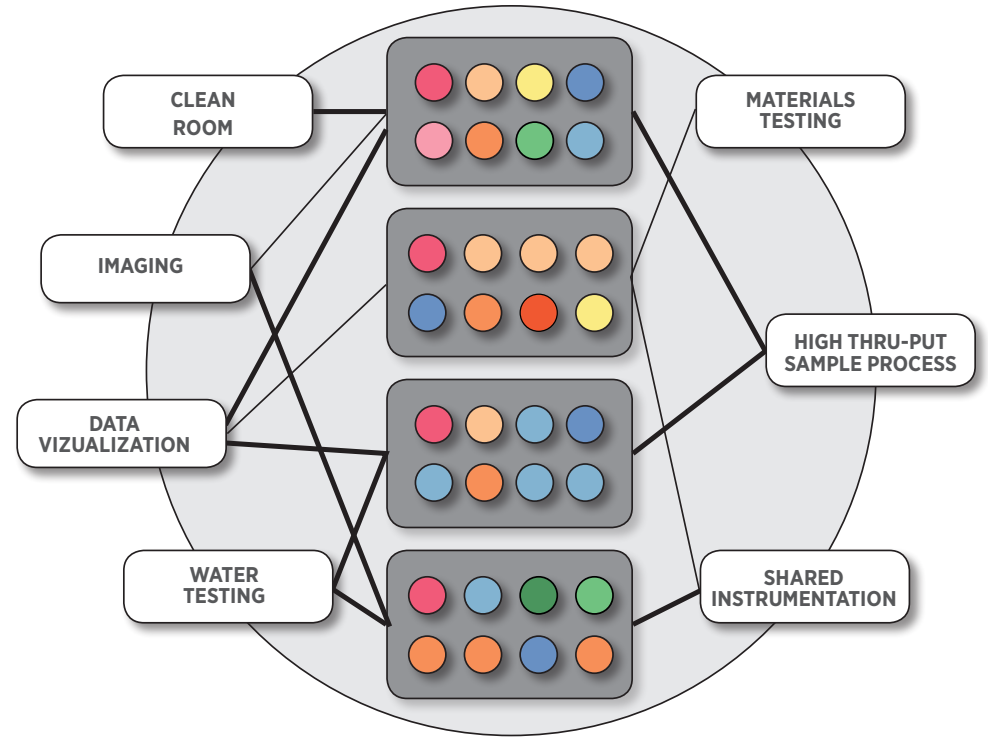
Research building with different interdisciplinary research groups, co-locating researchers from different departments with shared research techniques or interests.

Dry Teaching and Research Building: Classroom and office building with administrative functions, classrooms, offices, student space and dry research programs with space needs of offices and computational labs

Each building is imagined as a hub of activity, bringing faculty with common research interests and methods together around shared resources, and bringing the undergraduate students into closer contact to the research programs by locating classrooms and student spaces throughout the facilities. All buildings will contain classroom space although no building will be a dedicated classroom building. Key programs such as the Learning Factory will be co-located with research and teaching functions. Significant student collaboration space will be included in each building and is envisioned to be used by both undergraduate and graduate students



Core Centric Research Model



Thematic Interdisciplinary Research Model

WEST CAMPUS

The built infrastructure in place on the West Campus today—a handful of academic buildings, the crossing of Atherton through the Westgate complex, the open space and associated landscape—have not yet produced a cohesive, vibrant and attractive campus precinct. Existing buildings do not relate effectively to each other, and do not engage the campus spaces that surround them. A key goal of the Master Plan is the establishment of a vibrant, engaging, attractive, strong campus precinct. Anticipating the addition of three large academic buildings, a parking deck and redevelopment of the site and landscape, the West Campus is poised to realize this potential. These four structures, along with the landscape areas that surround them, will have different roles in the shaping of the West Campus and will present different challenges. However, this Master Plan establishes a single vision for the Precinct that will allow the University to achieve this unique vision and capitalize on this once-in-a-generation opportunity.

As the West Campus precinct includes several un-built sites, it represents the best and most cost-effective opportunity to acquire the square footage increase needed to support the programs and growth of the College of Engineering. The addition of large academic buildings also presents a unique opportunity to complete the unfinished development of the precinct, and the definition of significant open space. The cumulative effect of new buildings, their landscape and associated infrastructure, will be to complete the West Campus as a fully formed campus district, one that, while different, is equal in quality to the best spaces on the University Park Campus.

A Landscape-Driven Precinct: Considering the variety of buildings and spatial conditions, existing and planned, the character of the West Campus cannot rely exclusively on the new buildings' architecture. As has always been the case at University Park, the role of the landscape in creating a strong and cohesive precinct is essential. Despite the variety of open space types in the area, a consistent approach to landscape design will be required to establish a unified environment, one that maintains a clear identity and integrity among an unequal array of buildings. It is critical that a unified landscape strategy be developed early for the whole precinct, so that it can be gradually implemented as part of each building project.

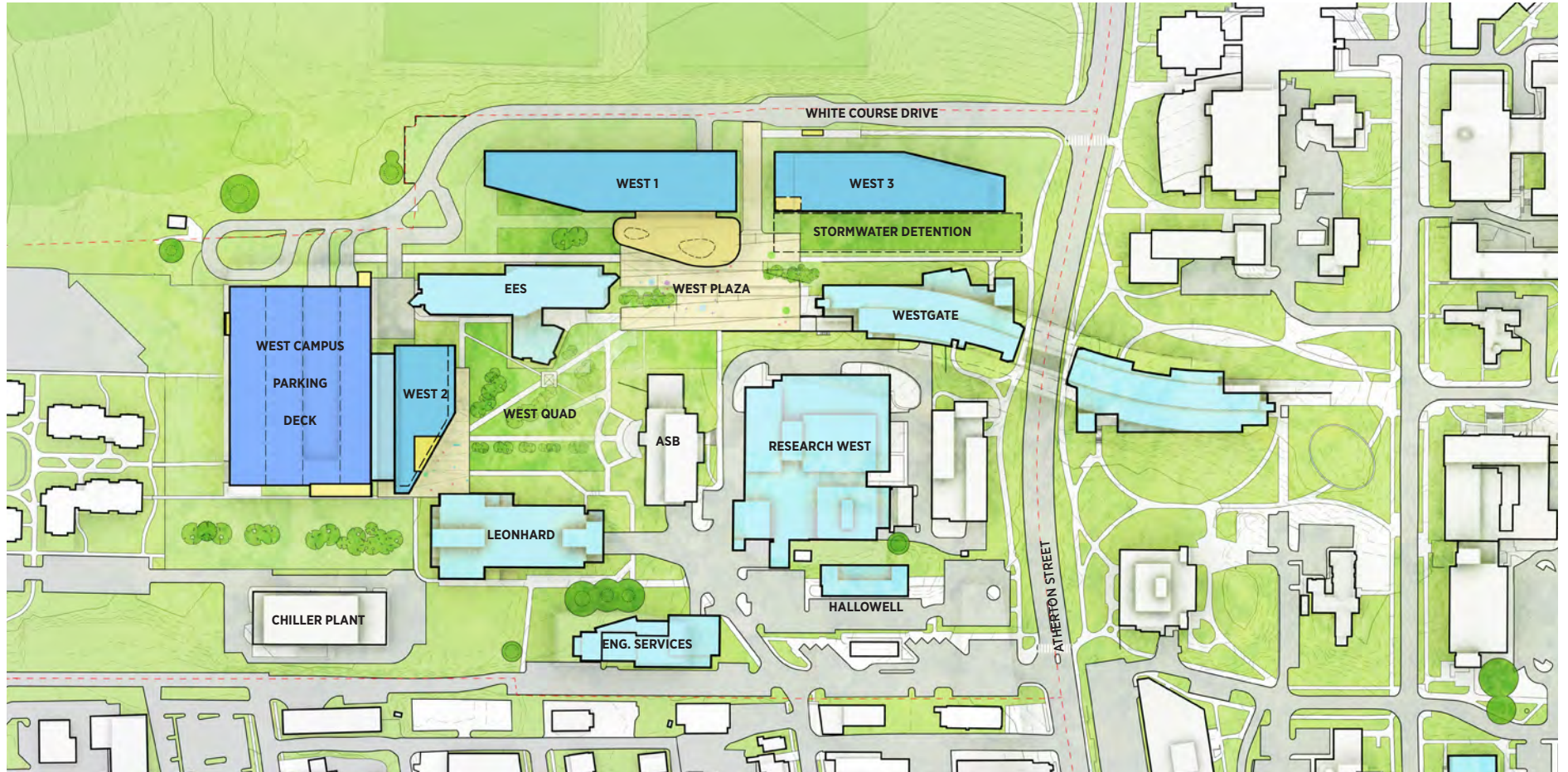
Establishing Key Campus Spaces: The West Campus precinct will feature two new signature open spaces, the Plaza and the West Quad, framed and defined by the planned new buildings as well as existing buildings. The new buildings and new open spaces will reinforce the character and identity of the precinct by engaging and strongly interacting with each other. It is critical that the ground floor programs in the new buildings are organized with this goal in mind, including the distribution of access and service, as well as design features such as materials, form and transparency. Forming the Plaza at the west end of the Westgate crossing is a critical driver of the Master Plan; together with the Mini-Hub—the south portion of West 1 housing many of its most active and vibrant functions—the Plaza is intended to become a landmark destination. The coordinated design of these two elements—building and landscape—must provide a unique character to this place, while joining the West Campus precinct with the University Park campus.

Building Character: The new West Campus buildings will respond to very different sets of site forces. They must relate to adjacent buildings, reinforce a proper sense of campus, and fulfill their important role in shaping a new precinct. Additionally, these new buildings will signal the advent of a new era for the College and the future of engineering at Penn State.

As is usual in these types of facilities on well-established campuses, there will be a need to balance the urge to blend into context and the desire to stand out, signaling state-of-the-art programs, pushing towards future horizons. In the past decade, Westgate has introduced a non-traditional entity to the precinct, the use of red brick notwithstanding. Given the magnitude of West 1, West 2 and West 3 in relation to the rest of the existing buildings in the precinct, it is hard to make a case for a fully contextual approach.

Four large new buildings are planned on the West Campus:

West Parking Deck: Situated along the west edge of the precinct, between the academic precinct and the White Course apartments, the West Parking Deck is an important initial project phase to support ongoing growth within the West Campus. This new project will accommodate the pending growth as well as the extension of White Course Drive and a new roadway connection from West College Avenue to the parking structure.



West Campus Master Plan through Phase 2



WEST 1

West 1 is situated along the north edge of the precinct. The 5-story, 279K GSF West 1 will provide research and teaching space for the College of Engineering. The main body of West 1 will run along the north side of the precinct adjacent to the athletic fields and the north access road and is intended to provide efficient floor plates for research programs. The long loft-like bar of West 1 presents a unique opportunity for a large, contiguous and flexible platform for research, housing a broad range of thematic based research typologies.

On the southeast corner, the building will face—and help define—a new Plaza, which will act as an important destination by engaging the main circulation path established by the west ramp of the Westgate Building—a “landing pad.” In order to maximize vibrancy of the plaza, many of the public and most active functions—i.e. food, student social areas, classrooms—will be located in this portion of the building, called the Hub. The Plaza will become an essential catalyst for the success of the new West Campus precinct, and thus it must be established early in the implementation process as part of the landscape scope of West 1.

West 1 must engage the campus by addressing very different conditions on each orientation. Beyond the obvious need to create a memorable, supercharged and dynamic Hub facing the Plaza to the south, the large building “loft” portion will face the fields to the north, and a new key pedestrian path to the south. The short east side will need to resolve the connection between the Plaza and the fields to the north, as well as anticipate the relationship with the future West 3. And yet, as a freestanding building, West 1 must establish its own unmistakable identity as a great new building for engineering, one that can anchor the new West Precinct with pride and clarity.

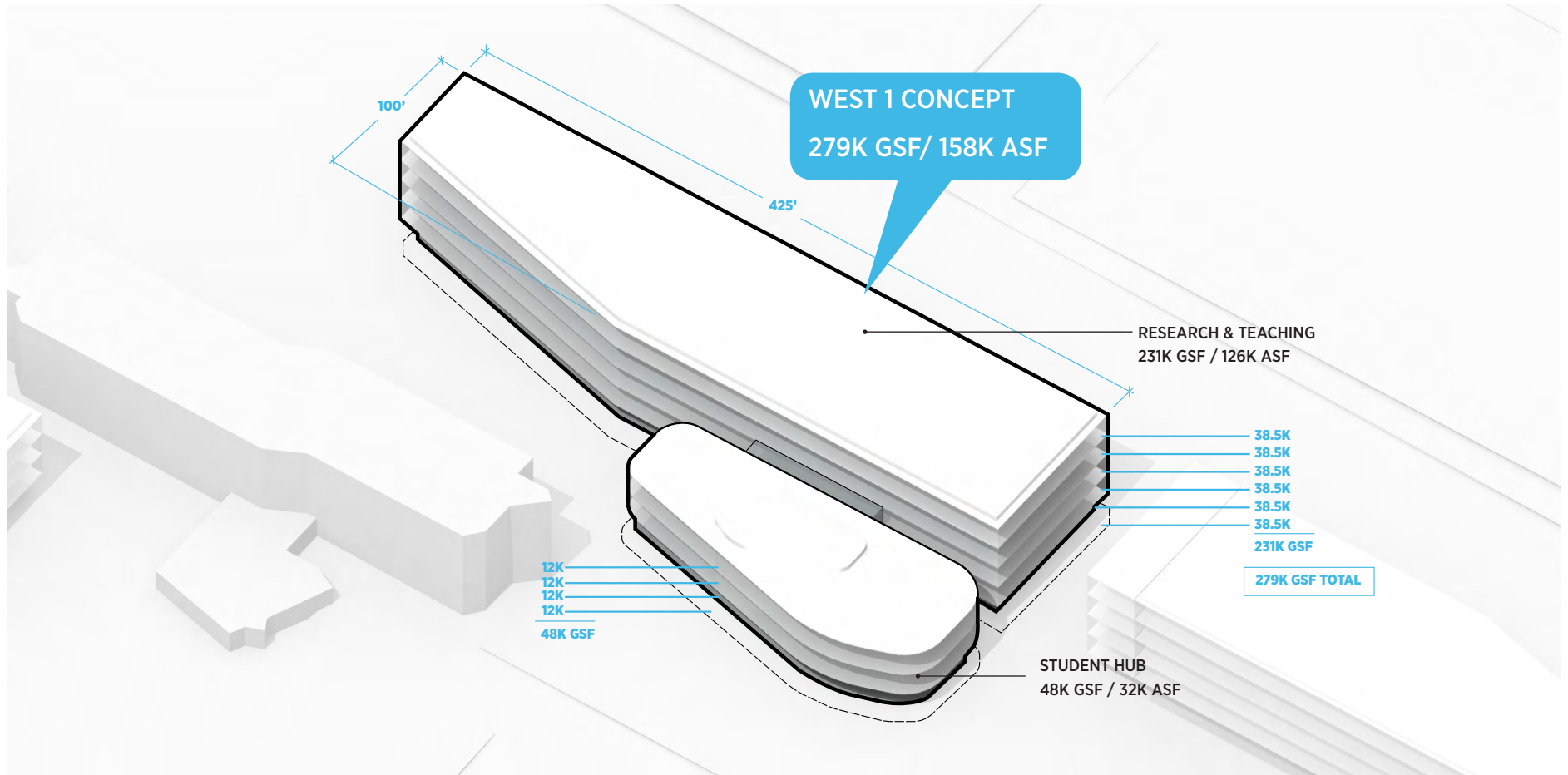
Two bus stops will be adjacent to the West 1 Building: the terminus bus stop will be located on the west side, adjacent to the north vehicular entrance of the Parking Deck. A second by-pass stop will be located along the north access road, between West 1 and the future West 3. Therefore, there will be a key pedestrian path running along the south side of the long “loft” volume, between EES and West 1. This path will land directly on the Plaza and will provide the main connector for pedestrians and bikes between the bus stops, precinct buildings, and the rest of the campus across Atherton.

WEST 1 PRELIMINARY PROGRAM

158,100	TOTAL ASF
23,300	Classroom and Studio
24,900	Library and Student Commons
22,500	Office, Conference, and Support
12,300	Teaching Lab
62,400	Research Labs and Support
2,000	General Support
10,700	General Purpose Classrooms

TARGET EUI: 90 kBtu/SF-yr

50% lab space, not fume hood driven, equipment intensive



PHASE 1

PHASE 2

FUTURE

2018-2023 Capital Funding Cycle

- West 1
- West 2
- Sackett Renovation and North Wing Addition (shelled)

WEST 2

West 2 will be located along the east façade of the parking deck. The 98,000 GSF West 2 will also provide academic research teaching and office space for the College of Engineering, including high bay research and teaching spaces. Since West 2 will define the western edge of a new West Quad, the signature open space on this precinct, the building's east façade must create a suitable terminus for the Quad. The east-facing ground floor of West 2 must energize the new West Quad with intense and highly lively functions. These dynamic and vibrant program components will help West 2 act as a magnet and an important campus destination, projecting intense academic and social campus life.

West 2 will be attached to the West Parking Deck. This location is intended to achieve two goals:

Optimize the area and proportions of the West Quad, while preserving the exposure of the two adjacent existing buildings—Leonhard and Earth Engineering Sciences—to the quadrangle. It was also important to maintain the flow of pedestrian paths running in the east/west direction, connecting the precinct to the White Course Apartments to the west. In order to achieve this, West 2 will be shaped to open up the southwest corner of the Quad.

West 2 will also provide an appropriate visual frame on the west edge of the West Quad by an academic building, avoiding the direct exposure of the Parking Deck to the Quad. The east façade of West 2 must be designed with this primary exposure on mind.

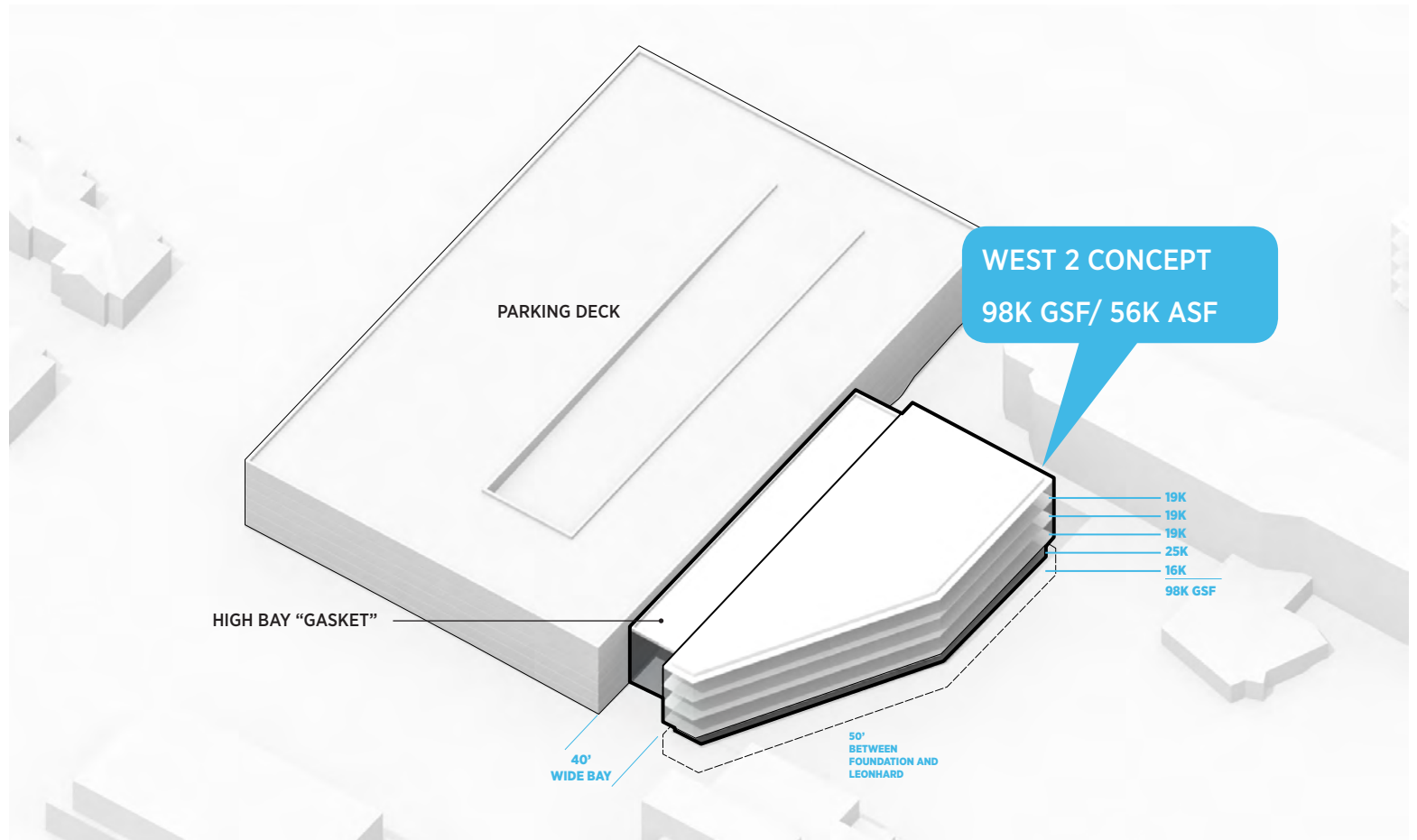
West 2's attachment to the Deck includes the potential for a large scale high bay facility right in the heart of the new West Campus precinct. This core facility will serve as a magnet for teaching and research from a broad range of disciplines. Additional research, teaching, and support spaces will find a logical home adjacent to the high bay space.

WEST 2 PRELIMINARY PROGRAM

56,000	TOTAL ASF
11,000	Classroom and Studio
4,000	Library and Student Commons
10,000	Office, Conference, and Support
5,000	Teaching Lab
20,000	Research Labs and Support
2,000	General Support
4,000	General Purpose Classrooms

TARGET EUI: 90 kBtu/SF-yr

50% lab space, not fume hood driven, equipment intensive



PHASE 1

PHASE 2

FUTURE

2018-2023 Capital Funding Cycle

- West 1
- West 2
- Sackett Renovation and North Wing Addition (shelled)

WEST 3

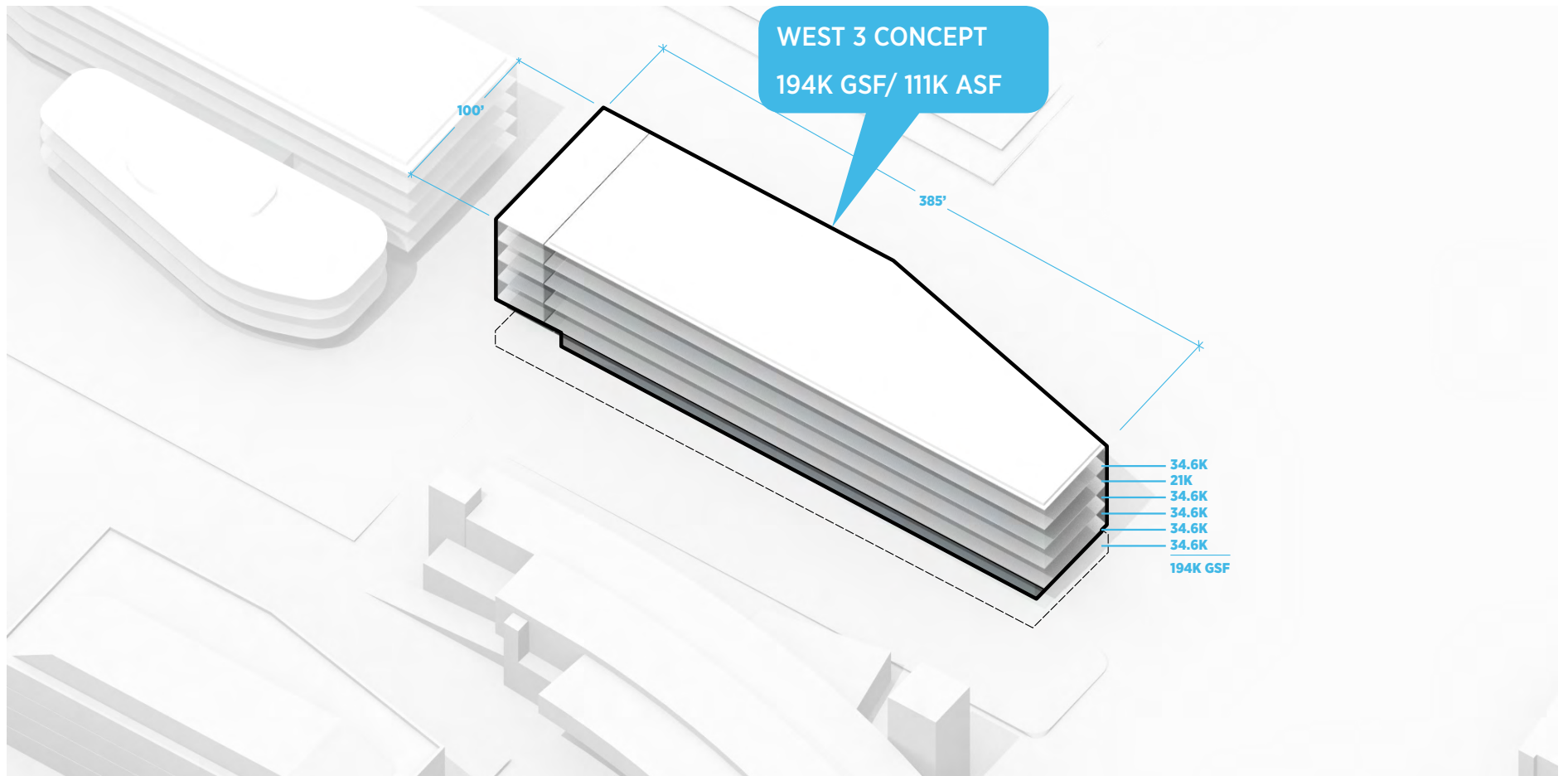
West 3 will extend the north edge of the precinct. The 6-story 194,000 GSF building will provide additional growth opportunity for the College of Engineering. The building will provide a flexible, robust floorplate for research and teaching programs. West 3 will have its primary entrance on the west side, directly off the Plaza. Its east end will have direct exposure to Atherton, providing a strong identity for both the building and the Precinct. There is a potential for a direct underground or overhead pedestrian connection between West 1 and West 3. The scope of this project will include the construction of a 2.5 ac-ft stormwater storage facility adjacent to the building to the south. The location of the stormwater detention tank requires a pervious landscape to the south of the building between the new façade and Westgate. This can be viewed as an opportunity to contribute to the entry sequence and offer another tertiary, yet complementary, campus space to the West Campus. Its footprint, entry, and southern wall should be considered an urban counterpart to West 1, aligning its entry with the plaza and enhancing the landscaped path which connects bus stops and precinct buildings.

WEST 3 PRELIMINARY PROGRAM

110,000	TOTAL ASF
5,000	Classroom and Studio
9,000	Library and Student Commons
17,000	Office, Conference, and Support
10,000	Teaching Lab
65,000	Research Labs and Support
4,000	General Support

TARGET EUI: 110 kBtu/SF-yr

75% lab space, not fume hood driven, equipment intensive



PHASE 1 | PHASE 2 | FUTURE

2023-2028 Capital Funding Cycle

- Sackett South Wing Addition
- Core 1
- Core 2
- West 3

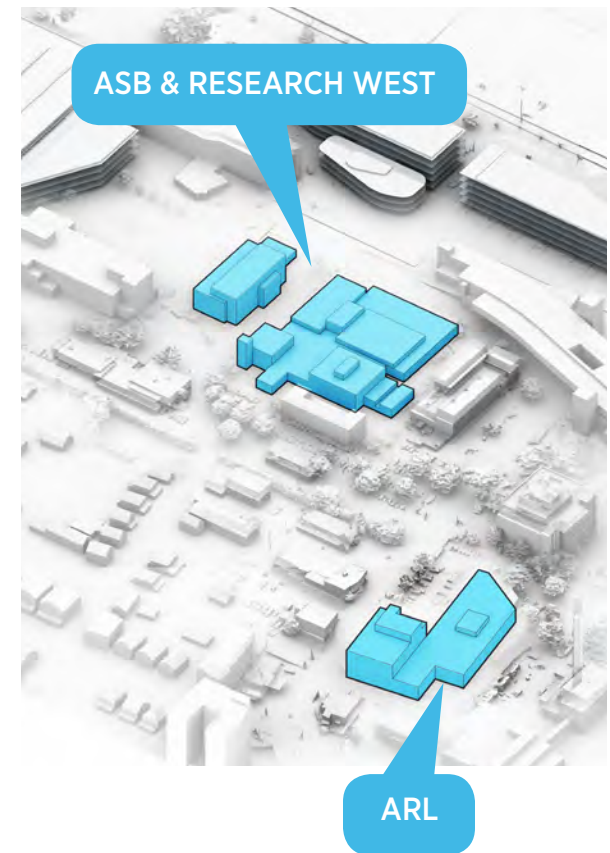
The Hallowell Building, currently occupied by the Biomedical Engineering Department will be vacated when this group moves into the CBEB Building, currently under construction on the main campus. The College of Engineering plans to backfill this facility with the newly created Nuclear Engineering Department. In the interim period, while the Nuclear Engineering department is growing, Hallowell can also provide additional strategic research growth space for the COE.

West Campus Programs: On the West Campus, the COE will accommodate a range of programmatic needs, including research laboratories with extreme levels of technical requirements, next generation teaching space and the associated support spaces for faculty, administration and students. West 1, West 2 and West 3 also present an opportunity that few other peer institutions can imagine: the ability to reconsider research space into strategic thematic groupings and focus on the shared use of space to increase utilization at a significant scale that will change the culture of the College of Engineering for decades. As the University moves on with the programming and program verification phases for West 1 and West 2, additional opportunities will emerge to further leverage the potential that these buildings have to meet the upcoming growth of the College.

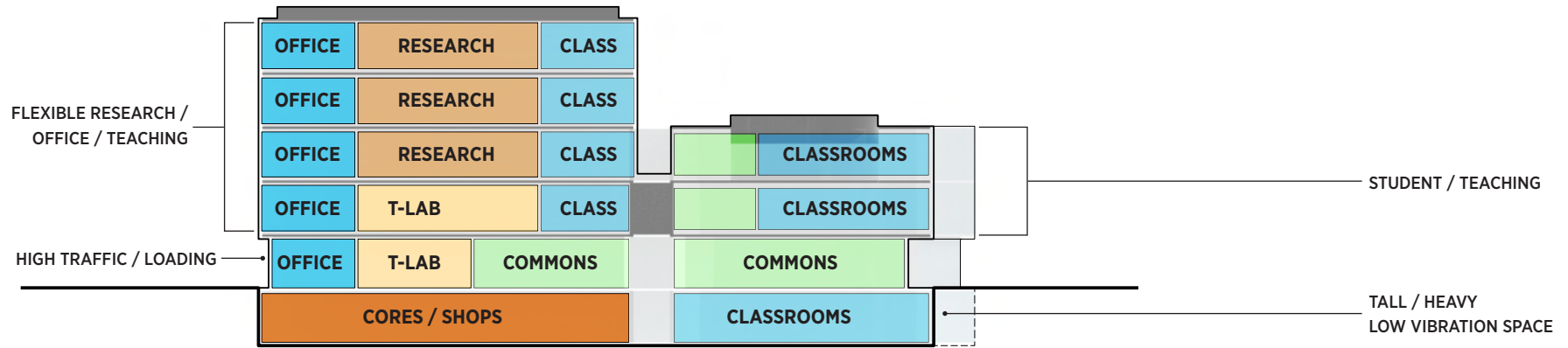
Taking advantage of the site's physical characteristics—its size, grading, orientation, access—the buildings proposed for the West Campus are envisioned to have large footprints and simple geometries. This will allow building designers great flexibility to accommodate a variety of program configurations with maximum efficiency.

Departmental homes for Civil Engineering, Architectural Engineering, SEDTAPP and Aerospace Engineering will be located in West 1 and West 2 with future growth space for the departments planned for the West 3 Building. The buildings will contain flexible research lab and teaching space prioritizing classrooms, studios, and student space on the first floor to provide vibrant student-centered activities on the entry level.

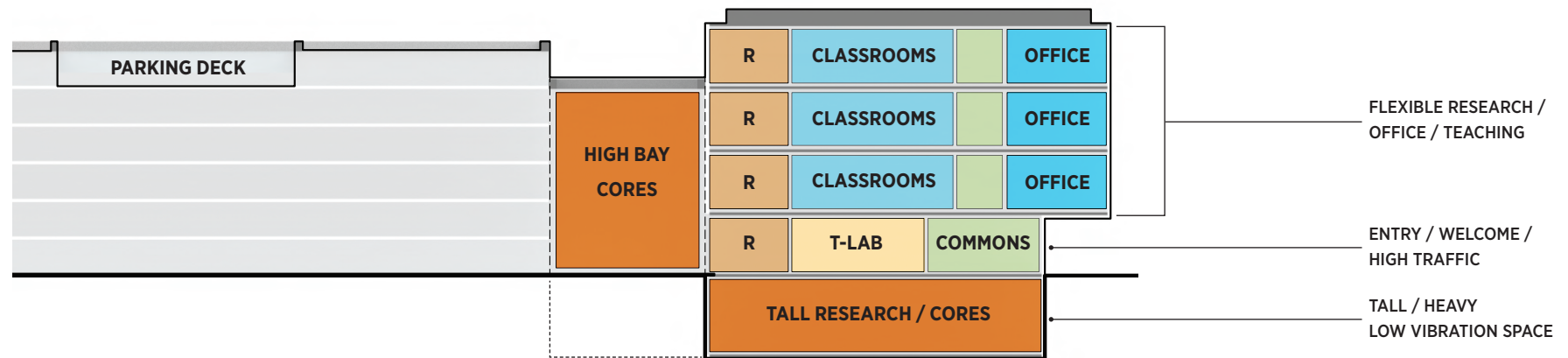
The ARL is planning to vacate spaces in Research West and the ASB Building on the West campus, in the next 10 years. When this occurs, the COE plans to occupy their spaces in the ASB Building on the West Campus and in Research West.



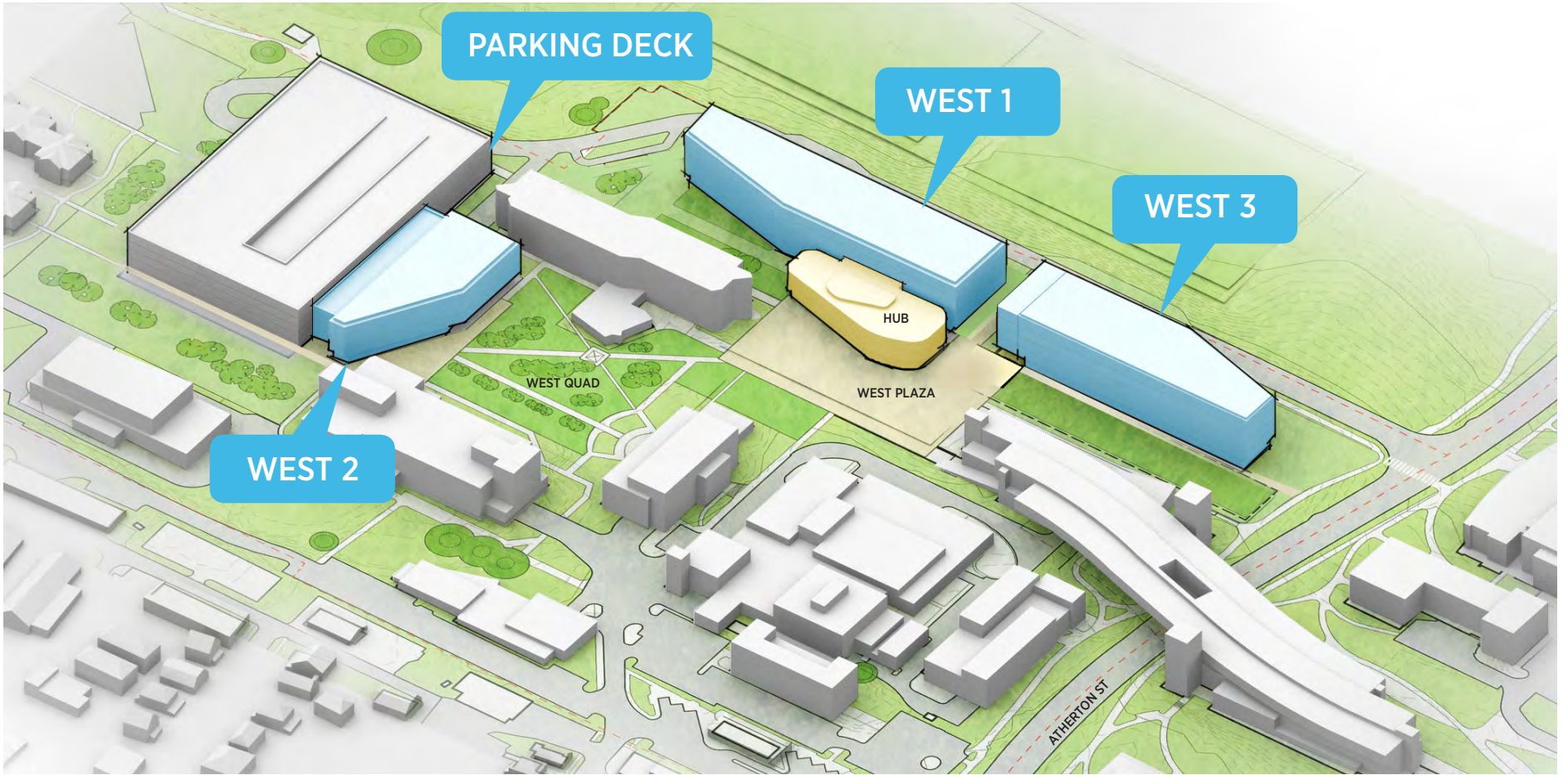
When ARL vacates the ASB and Research West, the COE plans to occupy their spaces on the West Campus



West 1 Stacking Diagram



West 2 Stacking Diagram

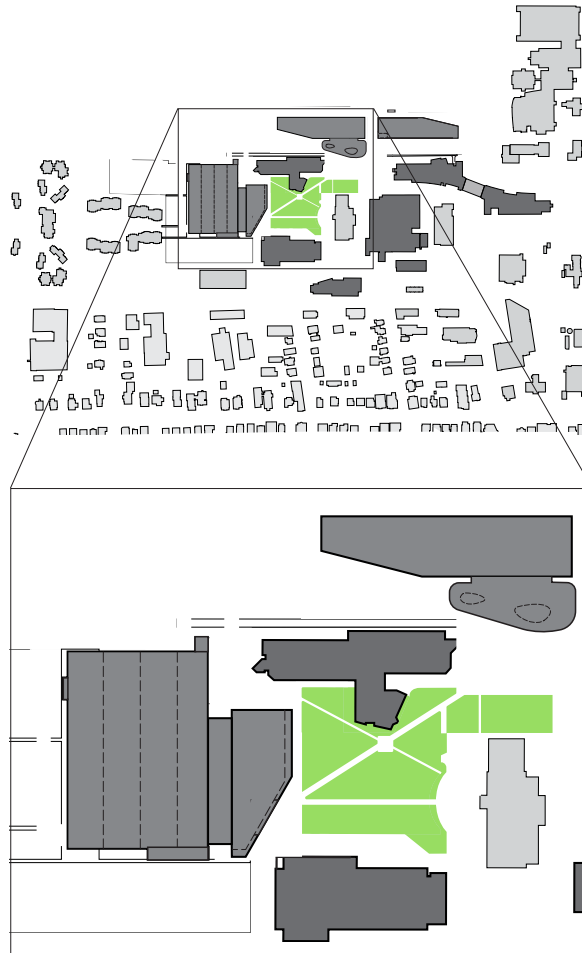


Isometric View of West Campus through Phase 2



West Campus Plaza and Student Hub Looking West from Westgate Ramp

Mapping a Comprehensive Network: The addition of large buildings and their associated open spaces offers a rare opportunity to plan a comprehensive network of access and circulation—with modes including vehicular and pedestrian, bike paths, service, etc.—and implement it as part of a single, multi-phase project. These primary circulation networks should have a strong impact on the design of the West Campus' buildings and open spaces, along with the parking deck currently under design, directly impacting issues such as building shape and footprint, organization of functions on ground levels, location and operation of vertical circulation cores, service systems, fenestration, etc. as well as the way they all relate to each other and the buildings they connect.



Major Green Space within the West Campus

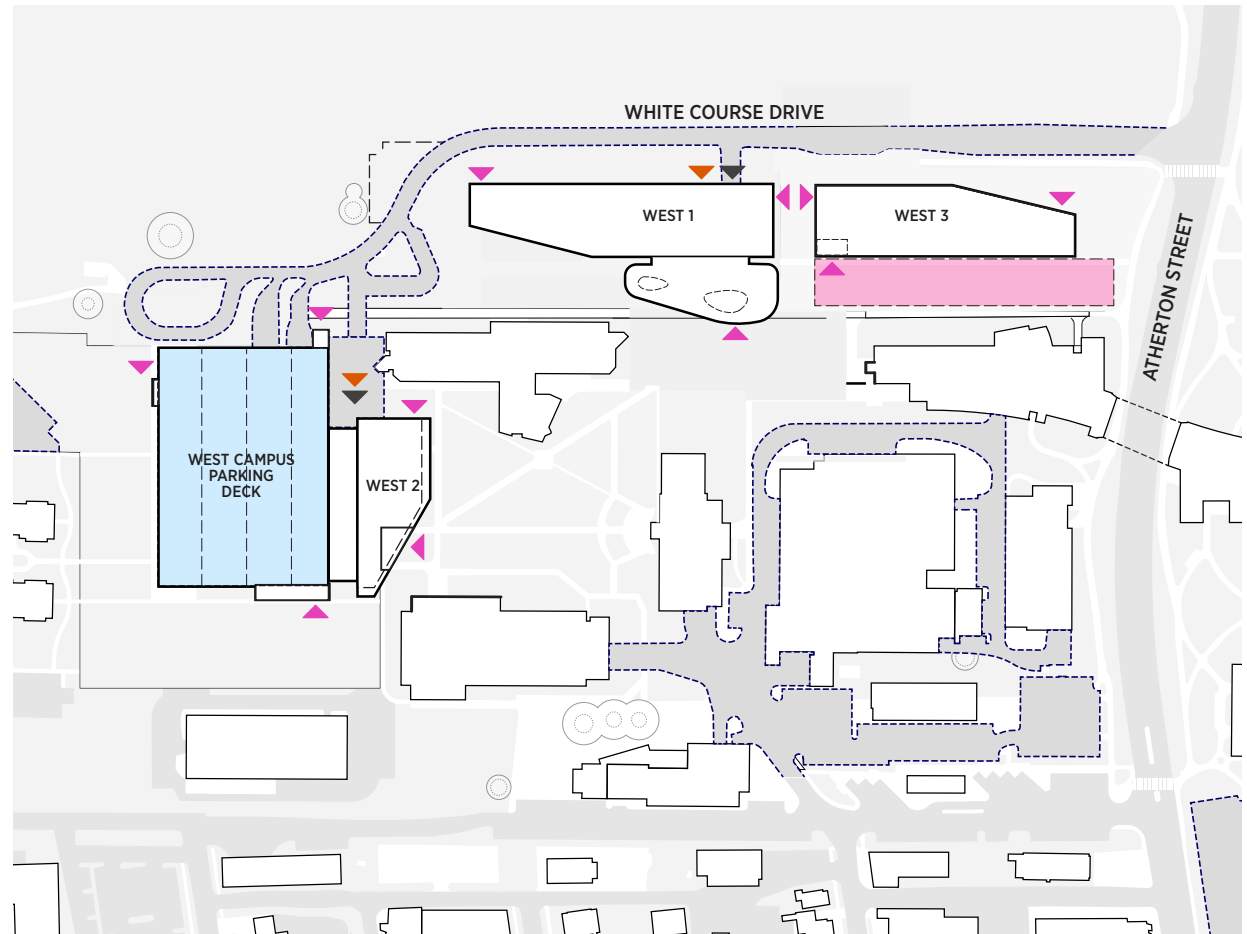


University of Washington, COE Space Assessment










Tufts University, Science and Engineering Complex

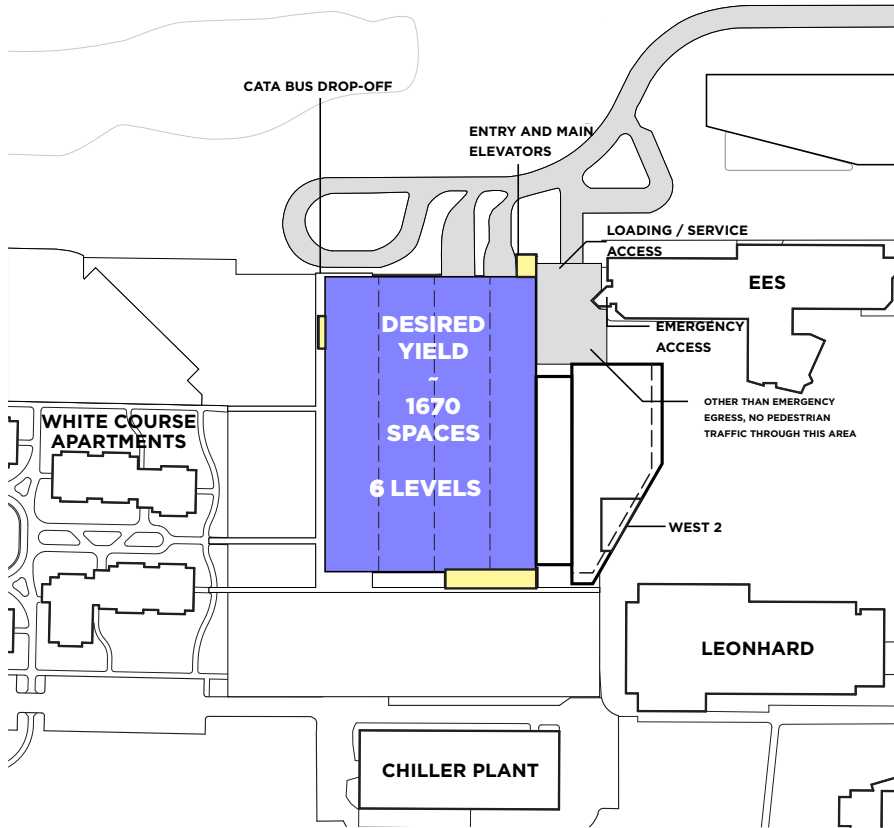
Service and Access: The main pedestrian entry of West 2 will be located directly on the West Quad. The building will be served from the north side, sharing the existing service drive with EES, which will be extended and expanded to create a service yard. This service location will provide a loading area for truck deliveries, a parking point for Penn State service vehicles, and the waste collection point for the three buildings (West 1, West 2, and EES) including collection of waste, recycling, and compost. West 2 will not have a loading dock, but materials will be walked on-grade into service entries on the north side of the building. This service area will also accommodate the space needed for the crane to load equipment into the upper floors of the EES Building. Considering the desired separation of service and pedestrian flows, this service area will interrupt a potential pedestrian connection between the West Quad and the north entrance of the West Parking Deck and the bus stop also planned at that location. Pedestrians exiting the north side of the deck will flow to the north of the service drive, along the north side of EES into the West Campus Plaza.



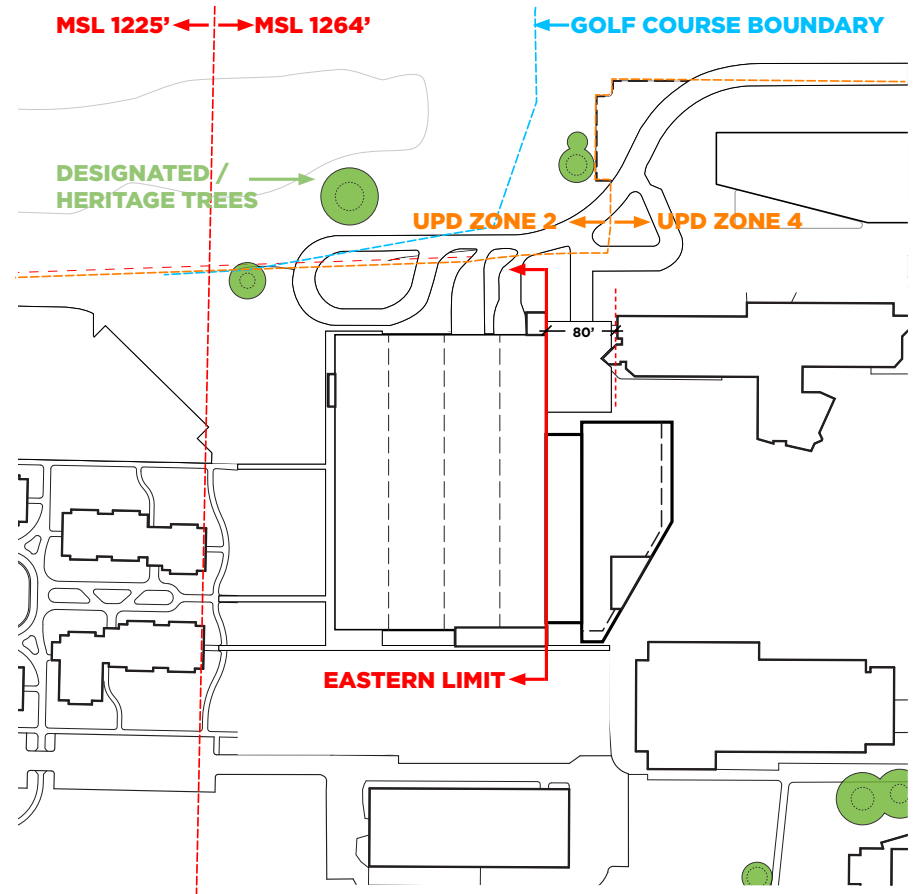
West Campus Access and Service at the End of Phase 2

-  ACCESSIBLE ENTRY
-  ENTRY
-  LOADING DOCK
-  WASTE REMOVAL
-  PARKING
-  VEHICULAR SERVICE ROADS
-  STORMWATER DETENTION

PARKING DECK PLANNING GUIDELINES



Capacity and Configuration



Boundaries and Site Constraints

FUTURE DEVELOPMENT OPPORTUNITIES

Beyond the addition of the four structures identified in this plan, and the backfilling of Hallowell, other development opportunities can be considered, which will involve the replacement or the renovation of existing structures.

Research West: One opportunity is the replacement of Research West. Research West currently occupies a disproportionately large footprint on the West Campus, and its associated access and services disrupt the connection from the Core Campus to the West Campus. Although recently retrofitted with infrastructural upgrades, the site should be viewed as a very large potential asset to the Campus for both the College and University. By building one or two significant academic buildings on this site following Research West's demolition and upgrading and enhancing the landscape adjacent, the physical center of gravity of the College of Engineering could shift to the West Campus, bolstering the vision of the College as a preeminent force in engineering research and innovation.

Engineering Services Building: In addition, the replacement of the Engineering Services Building, which currently houses the Learning Factory, could further breathe life into this precinct. The building site is located northwest of the Smith site and occupies a unique space on the southernmost border of Subdistrict 4. A new building here can provide space for the College along Railroad Avenue and the foreseen landscaped path which further connects the Core with the West Campus.

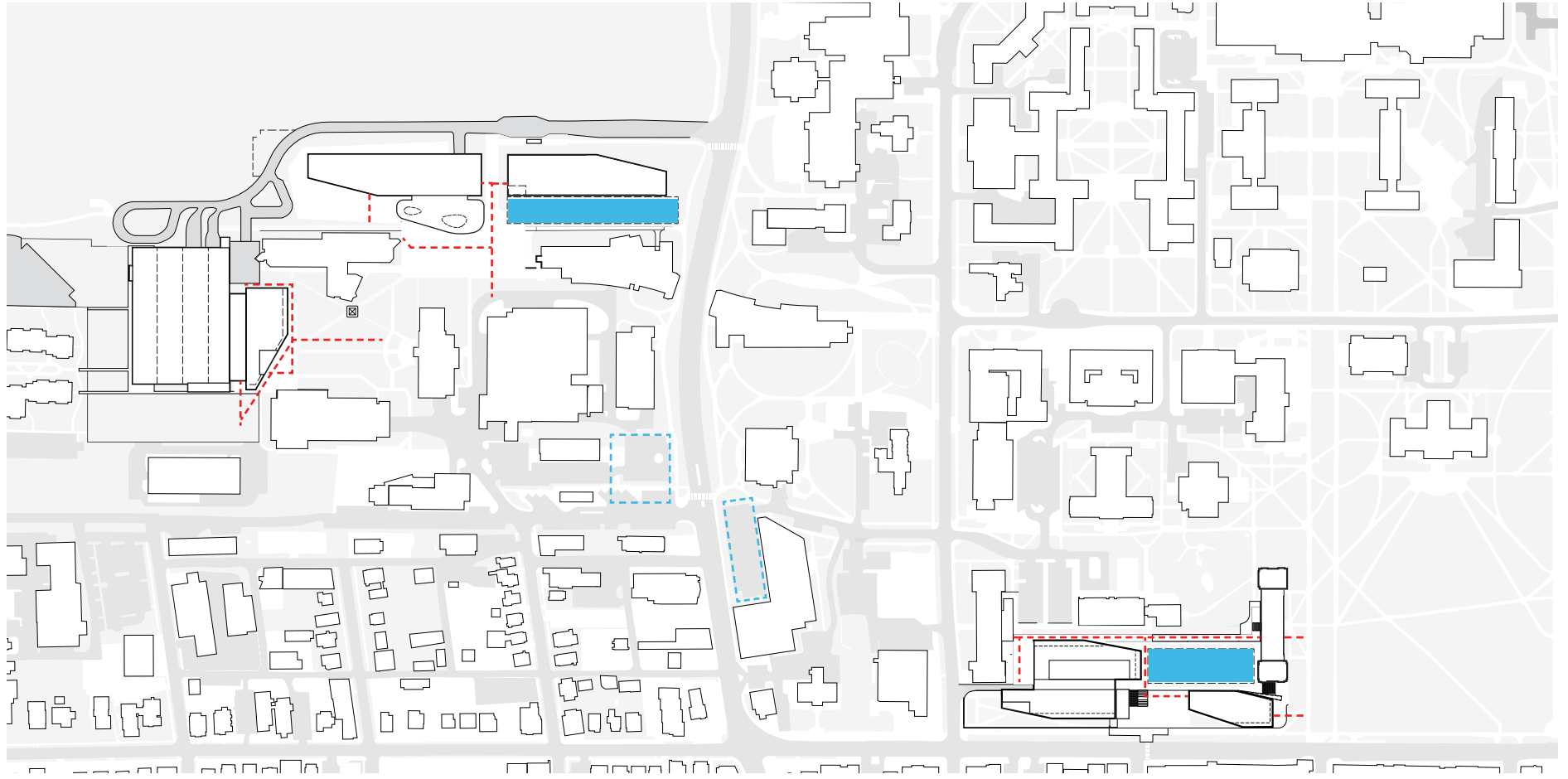
Applied Sciences Building (ASB): Another potential opportunity is to backfill the existing ASB Building (on the east side of the West Campus Quad) with COE programs after the ARL vacates the space. The ASB is currently occupied by the Applied Research Lab (ARL) group, which is planning to relocate the bulk of its programs to an off-campus location in the next 5-10 years. The ARL is considering vacating the ASB Building in about 10 years time, making it available for the COE to expand its research space on the West Campus.

UTILITIES AND STORMWATER





Utilities: New utilities service corridors to bundle utilities below paved areas are planned on the West Campus between the new West 2 Building and the existing Leonhard Building and between the new West 1 and West 3 Buildings. Some existing utilities services need to be upgraded or extended to serve the new buildings. The 12" existing chilled water line coming from the West Campus Chiller, which serves the West Campus buildings, should be replaced by a new 24" chilled water line to serve both the existing and new buildings. New steam lines will be extended to the new buildings from existing locations. The existing low pressure main crossing Atherton through Westgate will be converted to high pressure to increase the capacity. The high pressure pipes shall serve all buildings currently connected to this line, located in Tunnel B, and both West 1 and 2. This service can also be extended to serve West 3. Pressure reducing stations (PRV) will be required in each building to serve heating and hot water systems. HPS could also be used for process demands such as autoclaves and sterilizers, however electric back-up would be required for summer operation when the campus system switches to LPS.

Stormwater: The West 3 Building will be located within the Main Campus drainage area which means that sub-surface stormwater detention is required. A 1.5 acre-feet stormwater storage facility will be provided directly south of the West 3 Building and will capture its calculated run-off as well as the run-off from surrounding impervious area and the redirection of Westgate downspouts. A future 2 acre-foot stormwater storage facility is recommended to be located in the vicinity of Atherton Street to aid with relieving flooding in the area, although it is not required as part of Phase 2. Potential locations for the facility are under the bus station parking area, or in the vicinity of the ARL.

See Chapter 5 for more detailed information on the utilities and stormwater improvements on the West Campus.



Utilities and Stormwater

-  N
-  NEW UTILITY CORRIDOR
-  POTENTIAL PHASE 2 STW DETENTION
-  STORMWATER DETENTION TANK

CORE CAMPUS

The Master Plan establishes a long-term vision for the Core Campus rooted in the valuable existing assets of its historic structures and the quality of the Alumni Garden landscape. At the same time, the plan sets into motion a radical transformation of the Core Campus based on renewal, redevelopment and engagement. The plan starts with the replacement of structures that no longer perform well and represent a high deferred maintenance liability: the Hammond Building, Engineering Units A, B, C and the mid-century additions to Sackett including the wings and Kunkle Lounge. These aging building are replaced by two new facilities and a renovation and addition to the historic Sackett Building as well as two new major new landscape spaces: the Engineering Green and the Engineering Plaza. These transformations are complemented by the upgrade and replacement of aging infrastructure.

By separating the Sackett Building from the new buildings along College Avenue, east-west openings will connect the new landscape spaces within the Core Campus with Pattee Mall and Old Main to the east. The Core Precinct will present a new face to College Avenue to the South. By replacing the relentless wall of the Hammond Building with two smaller buildings separated by a generous plaza, the Precinct will create engagement between the campus and downtown. This will be reinforced by the active and engaging programs along College Avenue, as well as opening views from College Avenue into the core of the precinct.

The plan for Core Campus achieves the following:

Provides new facilities and infrastructure to support the academic vision of the College of Engineering, replacing old and deficient structures that no longer serve their purpose and are costly to maintain.

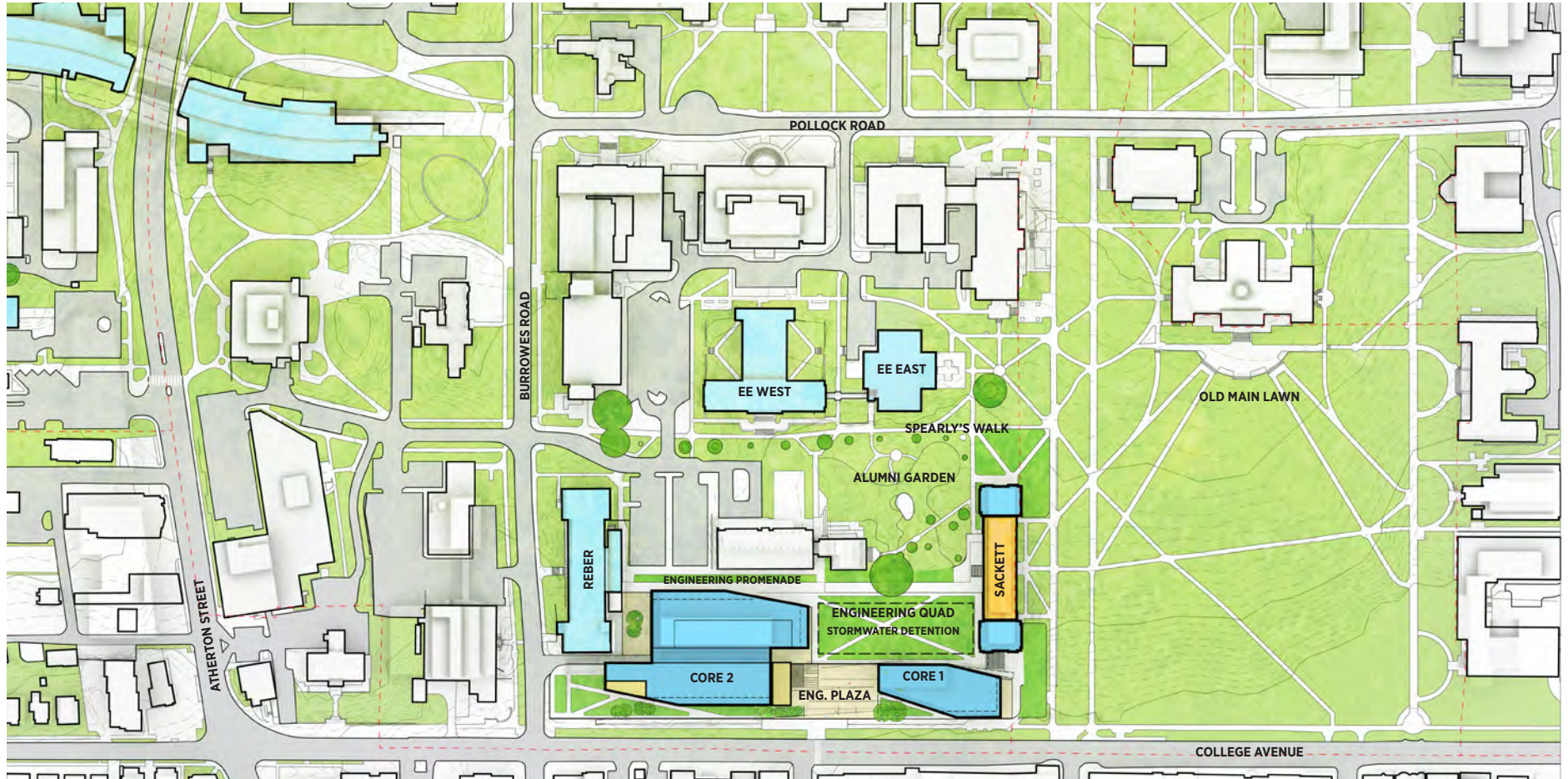
Transforms the precinct by creating a new series of signature open spaces, connecting to new and existing buildings and pathways, and integrating with some of the campus's most valuable open spaces.

Re-establishes connections between the precinct and the rest of the campus, and between campus and downtown by opening the Hammond/Kunkle/Sackett wall that today blocks the precinct and constricts and inhibits the flow of pedestrians through the campus.

Brings new life to Sackett as a valuable historic structure that can serve the College and anchor the Core Campus precinct at one of the most critical locations on campus.

Addresses the current accessibility challenges on the Core Campus by providing accessible entries to all buildings, and accessible routes throughout the site at multiple points.

A Landscape-Driven Precinct: The Core Campus precinct includes very significant open spaces today, such as Obelisk Garden, Alumni Garden and Foundry Park. The precinct is also surrounded by important linear landscapes: Pattee Mall and Old Main Lawn to the east, College Avenue sidewalks to the south, and Burrowes Street sidewalk to the west. To the north is Speary's Walk, an important pedestrian walk with several heritage trees that runs along the south entries of the EE East and EE West Buildings. Additional heritage trees and groves are located throughout the precinct.



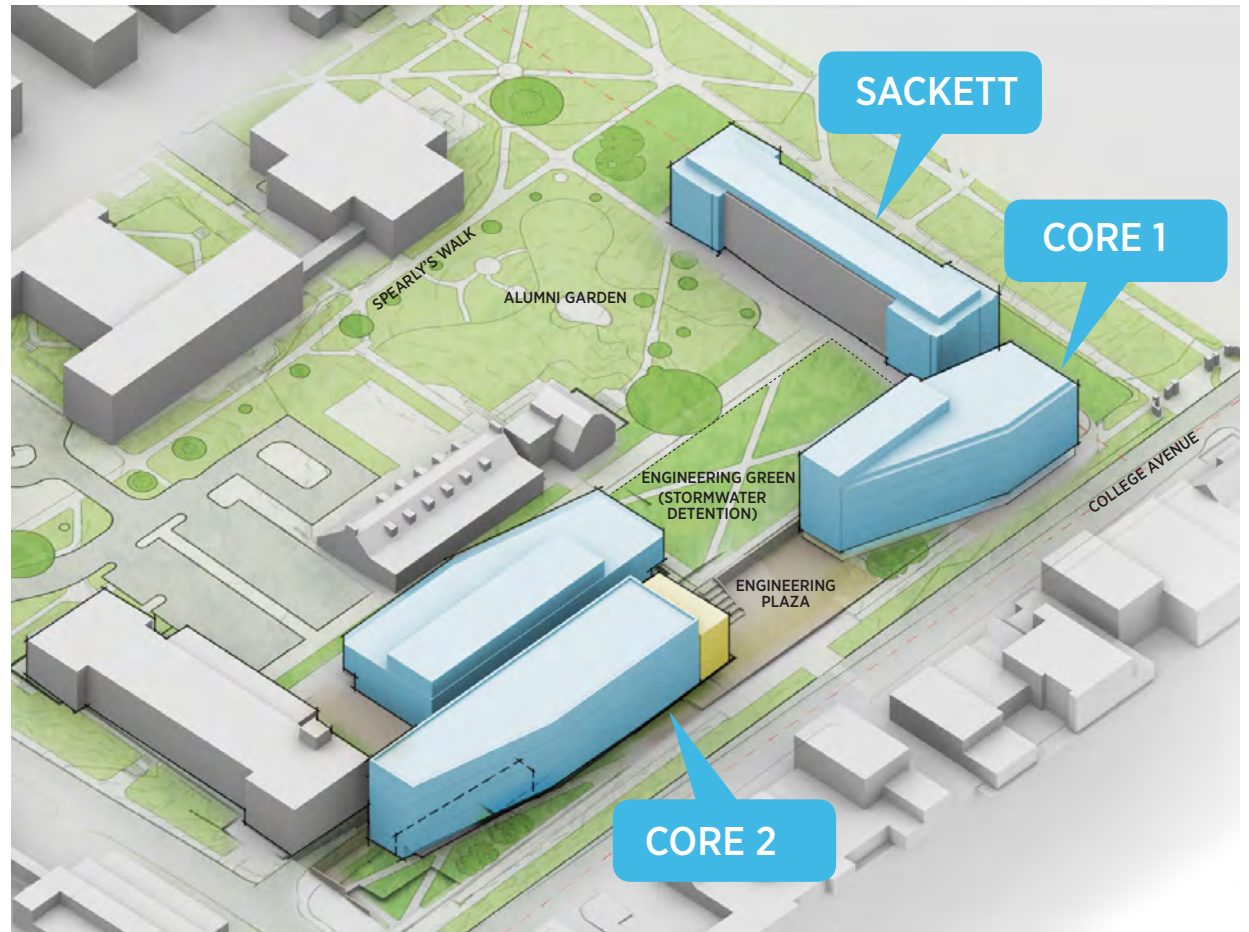
Core Campus Master Plan through Phase 2



This Master Plan envisions a placemaking strategy for this precinct that incorporates, integrates and enhances these assets by setting up a system of interconnected open spaces, circulation networks and buildings. The plan proposes the addition of three new landscape spaces:

Engineering Green: This landscape space will form the core of the precinct, framed by Sackett to the east, Reber and Core 2 to the west, and Core 1 to the south. The north of the green will be separated from the Alumni Garden by the Engineering Promenade, described below. The University House will be a prominent presence on the northwest corner of the Green. While smaller in scale than other formal quadrangles on campus, it will measure approximately 280' by 130'. The Engineering Green is intended to provide order amongst a complex array of buildings and spaces, as well as create a formal forecourt for many of the precinct's buildings. The Green will also function as a piece of infrastructure, sitting atop a 1.9 ac-ft stormwater storage facility, which will be part of the Core 1 Building project.

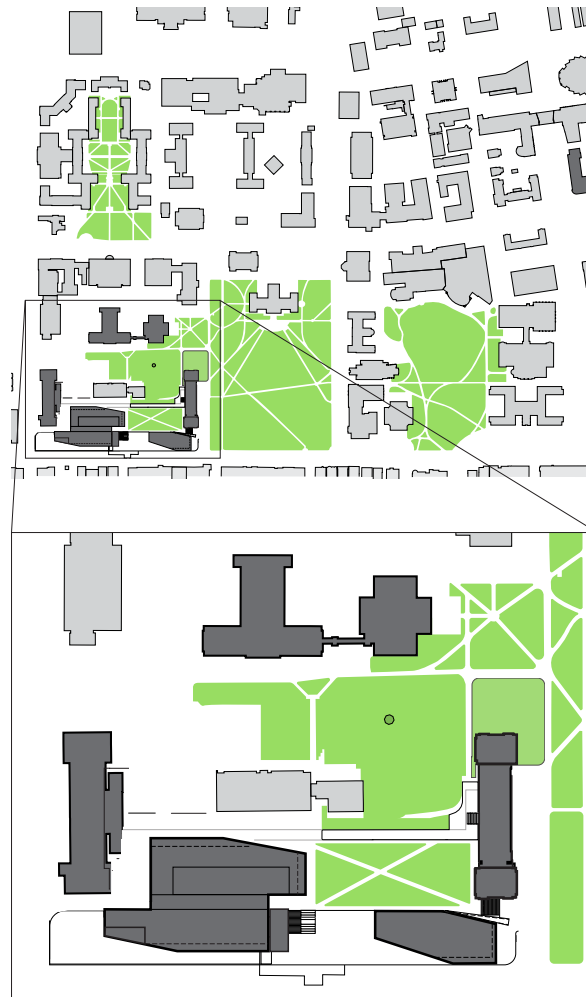
Engineering Promenade: A new pedestrian path runs across the site in the east-west direction, connecting the east entrance of Reber to the west entrance of Sackett.



Isometric View of Core Campus

This path—partially following the alignment of the current path—will run along the south edges of the Alumni Garden, the Hintz Family Alumni Center, University House, and surface parking lot, which will be reconfigured and reduced in area—providing 50 spaces. To the south, the Promenade will run along the north face of Core 2, the major new academic building planned for the Core Campus precinct.

Engineering Plaza: Placed between the Core 1 and Core 2 Buildings will be the Engineering Plaza. While the Engineering Green and Engineering Promenade will sit on the upper grade—close to the elevation of today’s Foundry Park and Alumni Garden—the Engineering Plaza will sit about 13 feet lower, at the same level as the College Ave. sidewalk. The Plaza will primarily be a street-front amenity, a paved space adjacent and open to the sidewalk. As such, it will provide a key point of contact between the campus and the town, a connection that has been missing for the past six decades since the Hammond Building was constructed in the early 1960s. The Plaza will also provide an entry court for Core 1 and Core 2, which will have front doors and exposure to the Plaza on the College Avenue level. Exterior stairs will negotiate the grade difference on the north side of the Plaza, re-establishing the pedestrian entry into the precinct from College Avenue, and an internal accessible connection will be provided in Core 2 via an elevator.



Major Green Space within the Core Campus



Amherst College, New Science Center



Tufts University, Science and Engineering Complex

UTILITIES AND STORMWATER

Utilities: A new utility corridor is planned to run east from the Reber Building to the Sackett Building, primarily serving Sackett and the future Core 2 Building. The Core 1 Building is envisioned to be served primarily from existing mains to the southeast of the building, however the chilled water will be sourced from the new chilled water service extending to Sackett. Critical deflections have been noted in the 48 inch CMP storm line that runs immediately north of the Sackett Building, and the state of this pipe should be considered when demolishing or using heavy equipment in this area.

Currently the steam condensate pumps for the Core Campus steam lines are located under the Kunkle Lounge. A new condensate pump room will be constructed in the sub-basement of Sackett as part of the Sackett renovation, and the existing pumps will be taken off line at the completion of the Sackett Building, allowing the demolition of the Kunkle Basement.

Stormwater: The planned construction for the Core Campus will require approximately 1.9 acre-feet of underground stormwater detention which will be installed under the Engineering Quad.

Heritage Trees: Care should be taken to avoid or minimize damage to the heritage trees in the Core Campus during the construction of the new utility corridor. Using a portion of the footprint of Units A, B, C for the utility corridor or the future stormwater detention facility will minimize the impact to the existing tree roots. For more information on utilities and stormwater, please see Chapter 5, Master Plan Implementation.

New Precinct Buildings: The new buildings planned for this precinct will take advantage of the open space created by demolishing existing structures. This is also an opportunity to re-envision the layout of the entire precinct. When planning these new buildings, it was important to avoid the replication of the “Hammond wall,” currently facing south towards College Ave. This was addressed by massing configurations—volumes shortened and shaped to interrupt the continuity of the wall—as well as by prescribing the creation of a 24/7 active edge along the lower levels of Core 1 and Core 2, the new buildings facing College Ave. New buildings are sited to frame and define key open spaces as well as maximize the contiguous area in order to achieve efficient and flexible floor plates.



Core Campus (left) looking east down College Avenue, at the end of Phase 2

The planned demolition of Hammond, Kunkle, Engineering Units and the Sackett wings will enable the implementation of three major building projects:

SACKETT

Sackett Renovation/Additions: Under this plan, the Sackett Building will undergo a gut renovation, including a complete renovation of its interior, strategic improvements and updates to its envelope, and the replacement of the entire level 4 and roof structure. The mid-century south and north wings will be removed. Furthermore, two additions will be built on either side of the original structure, following the spirit of the original design intent of Charles Klauder which, while never built, was represented in original drawings by the architect.

The renovated Sackett Building will restore the integrity of a precious, unique and highly significant group of historic structures and spaces, in one of the most sensitive places on the University Park campus. The new Sackett complex—main building plus the twin additions—will reinstate its historic status as a freestanding building facing Pattee Mall and Old Main Lawn to the east, Alumni Garden and University House to the west, and the Obelisk Garden and Spearly’s Walk to the north.

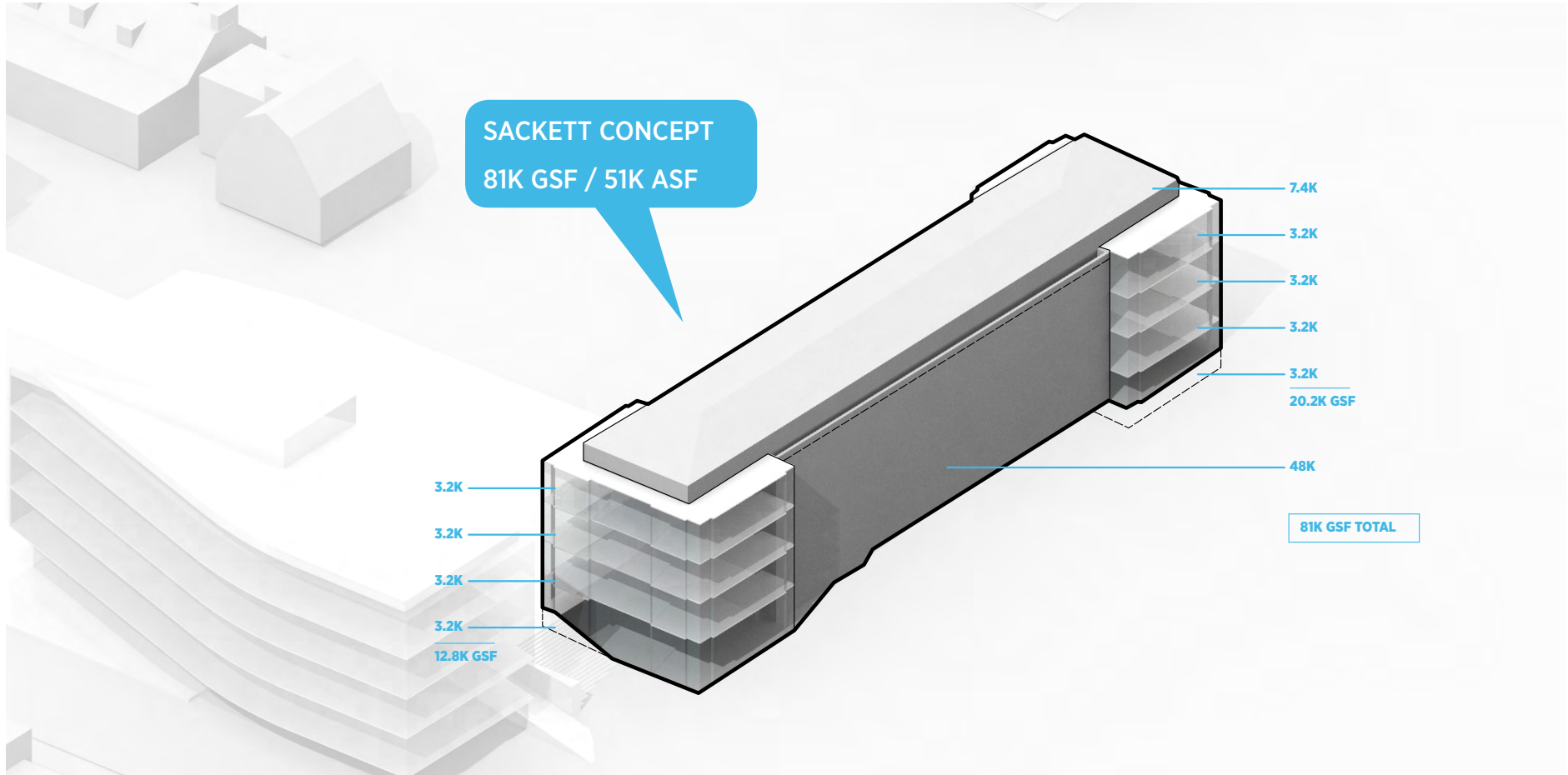
Significant site work, regrading and utility infrastructure work will be part of this multi-phase transformation of Sackett. As part of this scope, the steam condensate pump room currently located in the vault below the Kunkle Building will be replaced by a new pump room located in the basement of the historic Sackett Building. For more details on the Sackett Renovation and Addition projects, see Chapter 5 Master Plan Implementation.

SACKETT PRELIMINARY PROGRAM

50,000	TOTAL ASF
3,000	Library and Student Commons
27,500	Office, Conference, and Support
500	General Support
19,000	General Purpose Classrooms

TARGET EUI: 50 kBtu/SF-yr

100% non-lab space, existing building



PHASE 1

2018-2023 Capital Funding Cycle

- West 1
- West 2
- Sackett Renovation and North Wing Addition (shelled)

PHASE 2

2023-2028 Capital Funding Cycle

- Sackett South Wing Addition
- Core 1
- Core 2
- West 3

PHASE 3/FUTURE

CORE 1

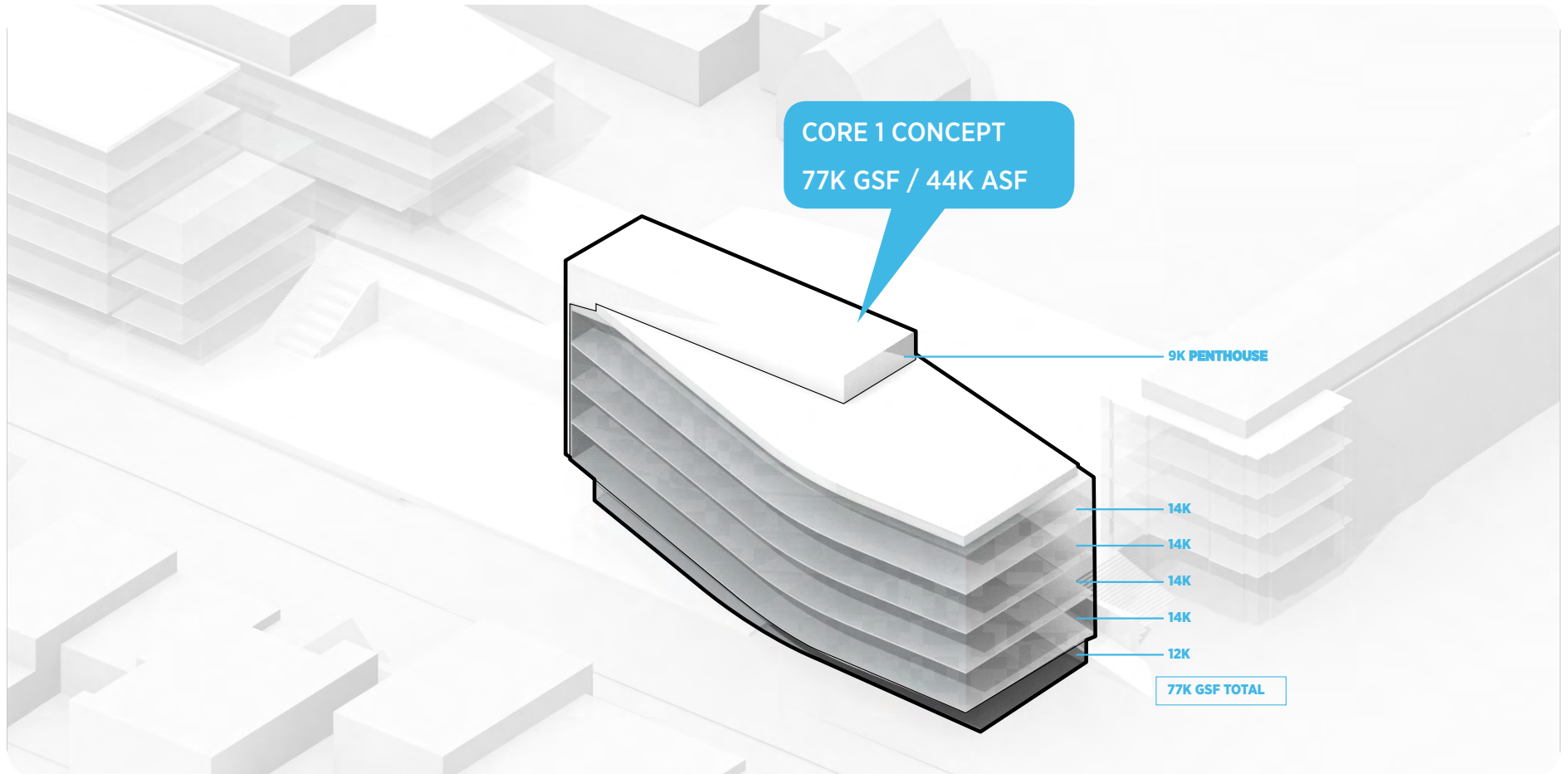
Core 1: Located on the key southeast corner of the precinct, facing Pattee Mall and College Avenue, this building will house academic programs for the College of Engineering, including offices and dry research and teaching functions as well as general purpose classrooms. The 5-story, 77,000 GSF building will face the new Engineering Green to the north, College Avenue to the south, and the Engineering Plaza to the west. Physical connections underground or overhead are possible between the building and the South Wing of Sackett. Additionally, a functional connection can be created to the Core 2 building to the west at the College Avenue level along the north face of the Plaza. Core 1 includes the construction of a stormwater storage facility beneath the Engineering Green as well as associated utilities. For more information on the utilities in the Core Campus, see Chapter 5.

CORE 1 PRELIMINARY PROGRAM

44,000	TOTAL ASF
2,700	Classroom and Studio
4,000	Library and Student Commons
20,000	Office, Conference, and Support
4,000	Research Labs and Support
1,500	General Support
11,800	General Purpose Classrooms

TARGET EUI: 70 kBtu/SF-yr

25% lab space, not fume hood driven, equipment intensive



PHASE 1

PHASE 2

PHASE 3/FUTURE

2023-2028 Capital Funding Cycle

- Sackett South Wing Addition
- Core 1
- Core 2
- West 3

CORE 2

Core 2: A major academic building for the College of Engineering located on the southwest corner of the precinct, the Core 2 Building will negotiate a complex series of site conditions between existing buildings and future spaces. On the west side, the building will provide a direct connection to Reber, directly adjacent to it on the basement level. A central logistics area, service and waste management area will be located here, accessed off Burrowes Street, also serving multiple buildings. Core 2 will also face the “upper level” of the precinct towards the north on level 1 facing the Hintz Alumni Center. To the east, the building will negotiate a grade transition between the Engineering Green and the Plaza located on the lower level, matching the sidewalk elevation along College Avenue. A signature entrance feature can face this direction, facing both College Avenue and the Engineering Plaza, as well as providing a key point of engagement with the town.

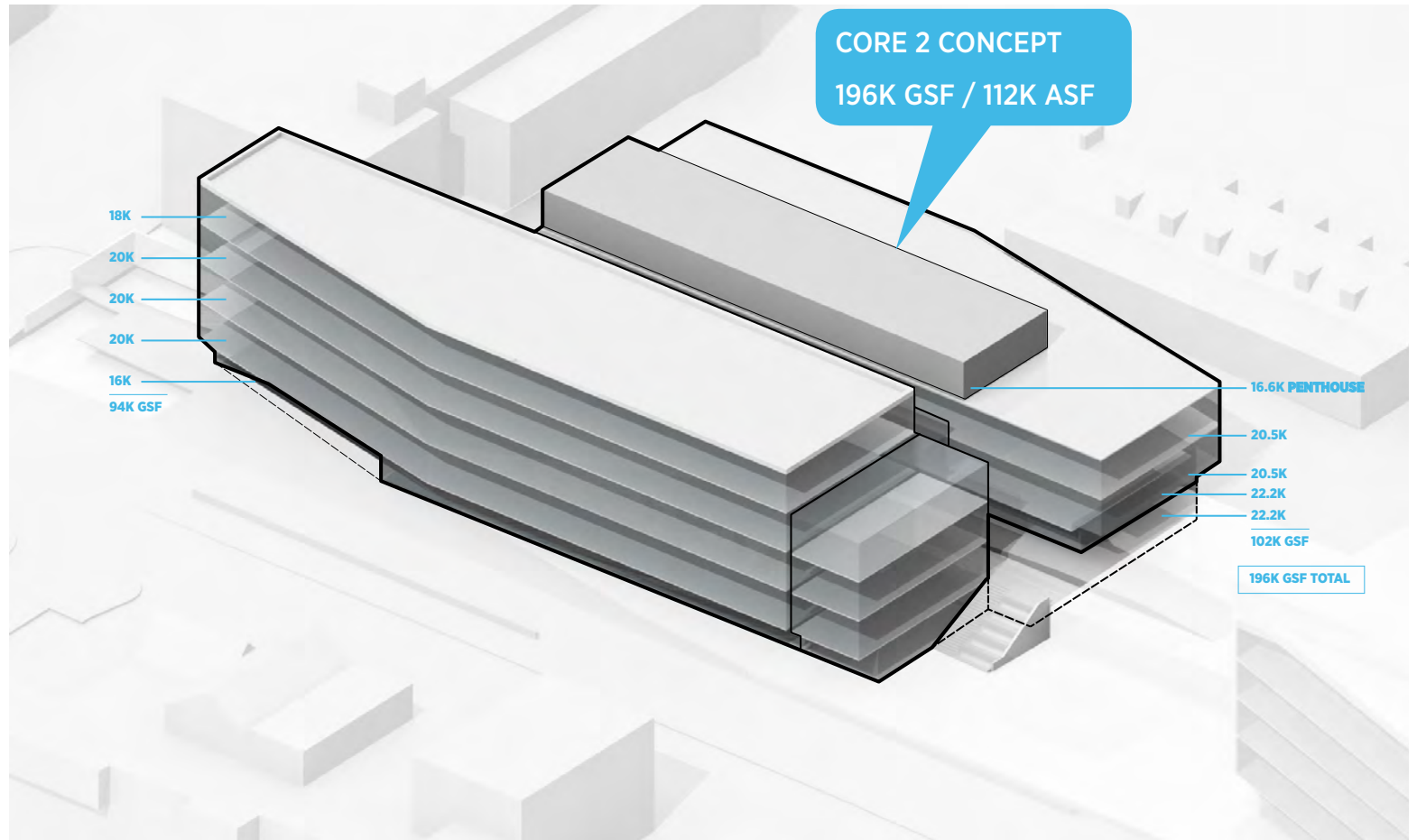
Core 2 will feature a 5-story, long façade to the south facing College Ave. It will be important to articulate the composition of this façade so that it creates an appropriate engagement with College Avenue and the town, while avoiding today’s opaque, relentless south wall of Hammond. The Engineering Plaza will provide a wide gap along the south side of the precinct, approximately 150 feet wide in a vibrant place where student activity is visible and transparent.

CORE 2 PRELIMINARY PROGRAM

112,000	TOTAL ASF
3,000	Classroom and Studio
9,000	Library and Student Commons
17,000	Office, Conference, and Support
9,000	Teaching Labs
69,000	Research Labs and Support
5,000	General Support

TARGET EUI: 110 kBtu/SF-yr

75% lab space, not fume hood driven, equipment intensive



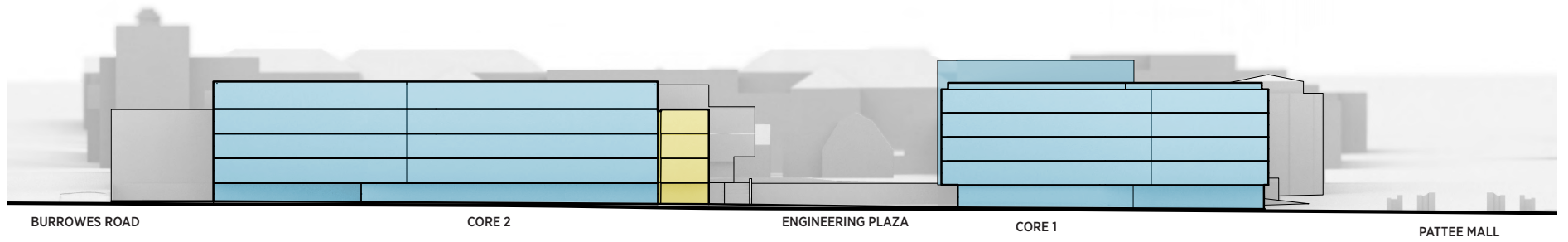
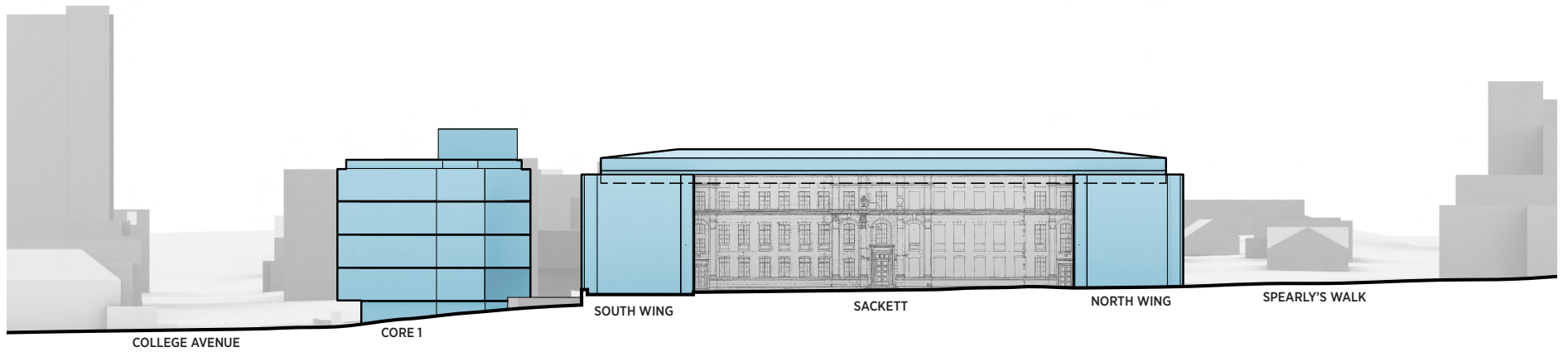
PHASE 1

PHASE 2

PHASE 3/FUTURE

2023-2028 Capital Funding Cycle

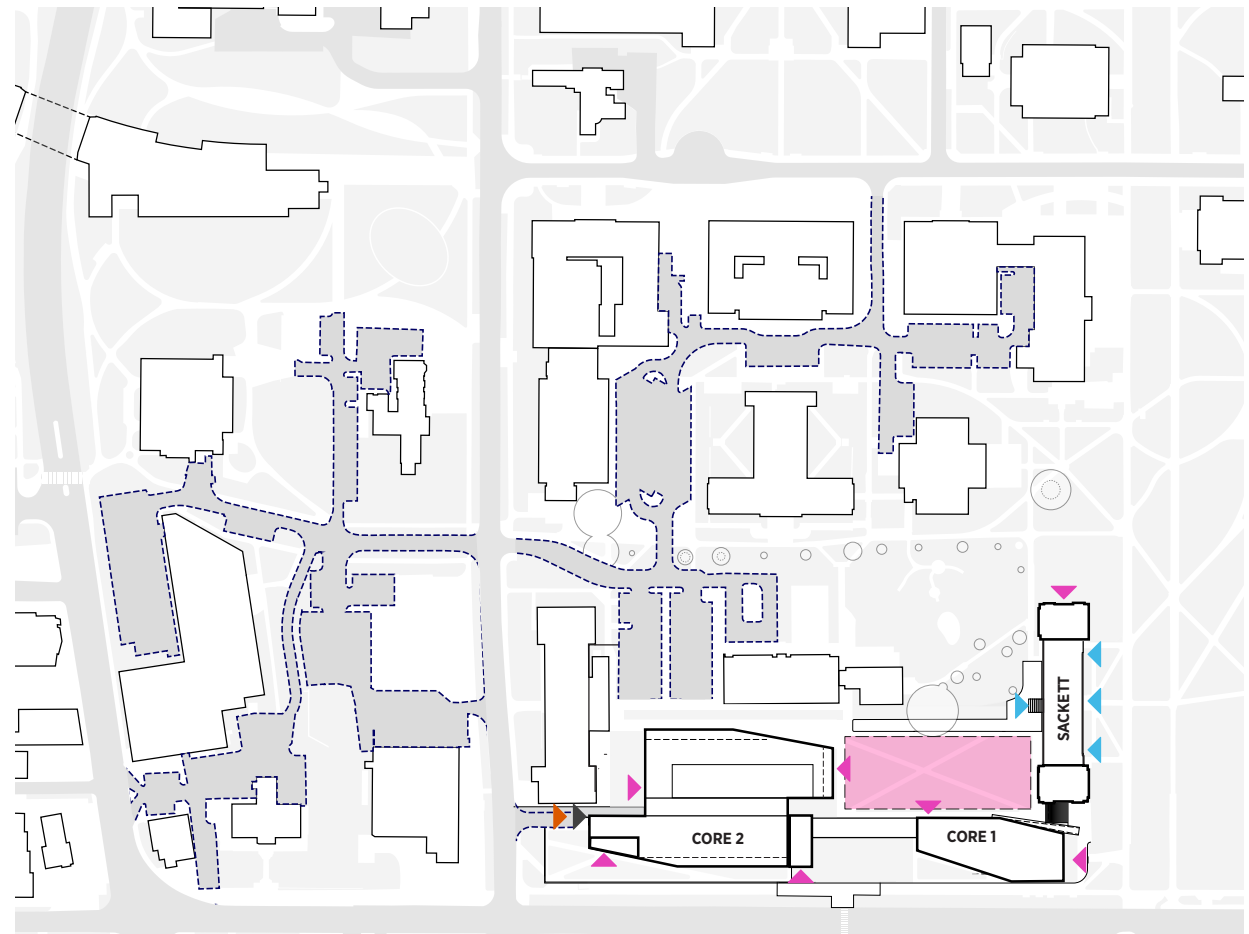
- Sackett South Wing Addition
- Core 1
- Core 2
- West 3










Core Campus Massing Elevation Studies

Pedestrian flow and building access will be organized along multiple locations around each of the new and existing buildings. Accessible entrances will be provided on several different sides of each new building. See the diagram to the right for the location of accessible entrances. Service and waste management for the Core Campus Precinct will be provided in one central location, maintaining the current access off Burrowes Street. The service and waste management area will be located on the basement level of Core 2, at the northwestern corner of the building, adjacent to the Reber Building. A direct basement connection will serve Reber and Core 2. From this central location, the following buildings will be served: Core 1, Sackett, Deike, Hosler, Steidle, Willard, Electrical Engineering East and West. An Area Shop for OPP will be in the basement areas as well.

Service and Access: Today, a vehicular service road with a steep ramp runs behind the north face of Hammond and provides service access to Sackett, the Engineering Units and the Hintz Alumni Center. This depressed section of the road, often referred to as “the moat,” presents a major obstacle to the flow of pedestrian circulation across the precinct. As the Engineering Units and Hammond are replaced with new buildings, this feature will be removed, and service, loading and waste management for Reber, the Core 1 and Core 2 buildings will be located in a single facility on the lower level of Core 2, on the west side of the Core Campus precinct. Service to Sackett will be achieved via an on-grade pedestrian entry located on the pathway connecting Sackett to Reber south of the Alumni Garden. No loading dock will be provided as Sackett will be an office and classroom building and will not require high levels of deliveries or service.



West Campus Access and Service at the End of Phase 2

-  ACCESSIBLE ENTRY
-  ENTRY
-  LOADING DOCK
-  WASTE REMOVAL
-  PARKING
-  VEHICULAR SERVICE ROADS
-  STORMWATER DETENTION

FUTURE DEVELOPMENT OPPORTUNITIES

Additional development opportunities can be considered on the Core Campus, which will involve the replacement or the renovation of existing structures.

Electrical Engineering East (EEE) is located to the north of the Alumni Garden and to the west of Old Main Lawn. This 1964 building with modernist architecture typical of its era is out of step with the general historic period of many of the other buildings located in the vicinity. Many view this building as an eyesore, and its appearance is most egregious as a backdrop to the scenic alumni garden. Additionally the building does not have central air-conditioning, and supports dry academic functions such as offices, classrooms, and dry research labs, but does not support more robust research programs. An upgrade to the building to remove the air-conditioning window units and connect the building to the campus chilled water system to provide central air is recommended. The programs in this building could be re-located to the Core 1 and 2 Buildings allowing a demolition of the existing building and a re-development of the site with a building more sensitive to its campus location. However, a replacement of this building would yield a marginal amount of new assignable square feet of space due to the limits of the site.

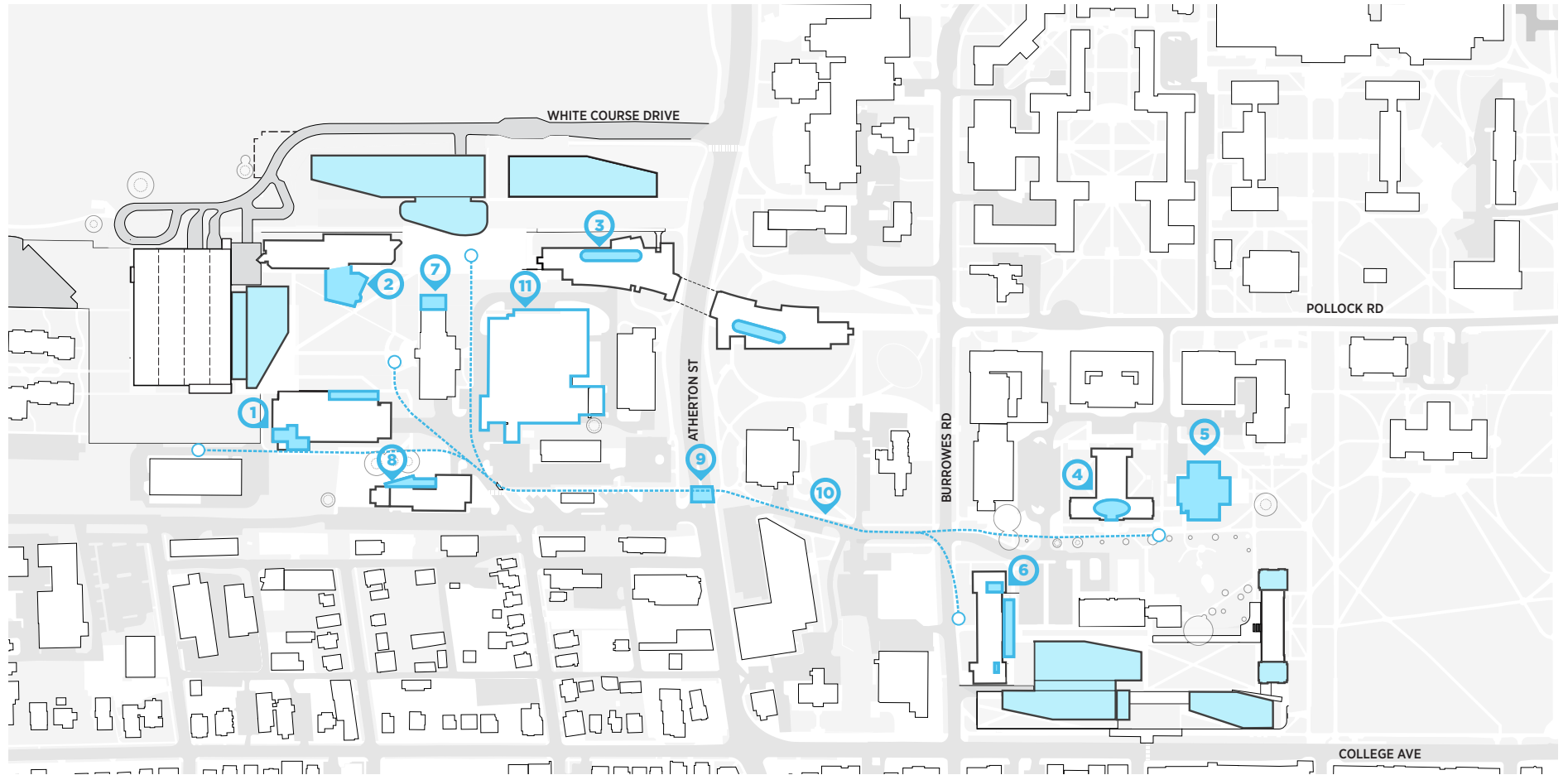


Aerial Rendering of the Core Campus' Future Opportunities

TACTICAL INTERVENTIONS

There are several tactical interventions that the College of Engineering and Penn State might consider in the next 10 years as a complement to the larger moves of the Master Plan. These are small scale interventions that are not included in the budget of the Master Plan and would need to be funded through other channels.

1. **Leonhard:** Knowledge commons in existing lobby, with renovation of lighting, finishes and furniture; 1 story glass student commons addition on north side of building adjacent to West Quad.
2. **EES:** Improve the façade on the lecture hall wing—make it a living green wall or perhaps introduce more transparency/glazing—structural study required to understand cost/impact. Alternatively, there is a possibility of demolishing and removing the lecture hall wing to improve landscape along the West Quad.
3. **Westgate:** Improve first floor study/student areas to create more e-commons like space, perhaps enclose some “rooms” on that lobby space.
4. **EE-West:** Improve the lighting and furnishings to create a mini e-Commons in the existing lobby. New glazed entrance doors will make the lobby’s presence more apparent from Spearly’s Walk.
5. **EE-East:** HVAC upgrade to eliminate air conditioning window units via use of recent chilled water connection.
6. **Reber:** Gut renovate the toilet rooms throughout the building.
7. **ASB Building:** Improve and integrate the second-floor terrace of the building into the public experience.
8. **Engineering Services:** If the Phase 2 work is anticipated to be delayed, some near-term investment in the building is recommended: Convert the entry/lobby into student design/exhibit/work space with modular design stations that could be converted to pin-up areas for exhibitions/display; replace rooftop units that are in poor condition.
9. **Atherton Crossing:** Improve pedestrian and bike crossings at Atherton.
10. **Improve the cross-campus connection** along Burrowes to connect the Core and West Campus
11. **Research West:** Construct roof screening to conceal the rooftop mechanical equipment visible from the Westgate ramp



Tactical Interventions

