

The Transformation of a Hillside

University of Pittsburgh Oakland Campus

- MARY BETH McGREW
- JUNE 22, 2021

Pittsburgh in the Past – The Smoky City



Pittsburgh Today



Incline – Still in Existence



Canton Avenue – Steepest in the US

Pittsburgh –The Steel City

1. The Bessemer Process
2. The Railroads
3. Andrew Carnegie

Bessemer Process

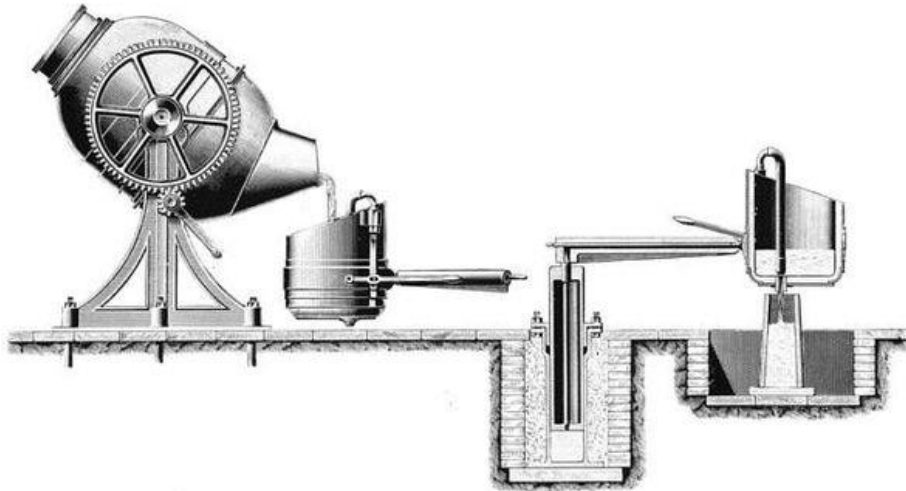
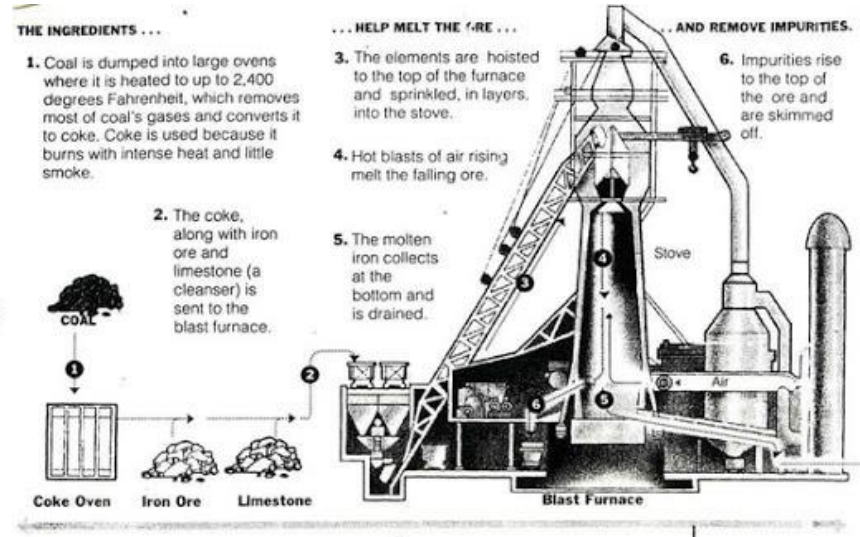
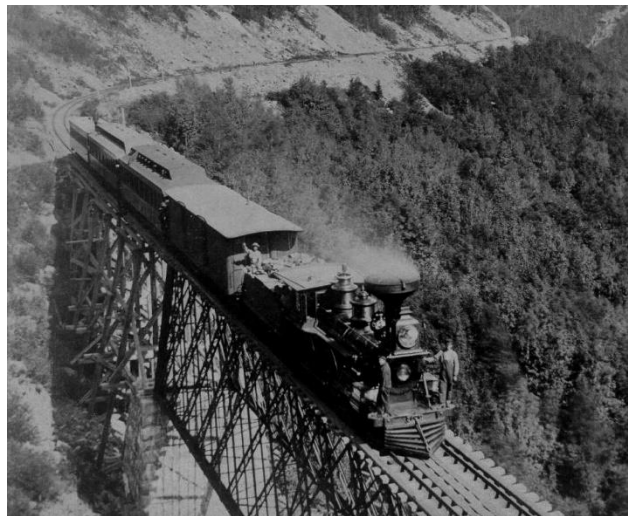


FIG. 44. EARLY FORM OF BESSEMER CONVERTING PLANT AT SHEFFIELD



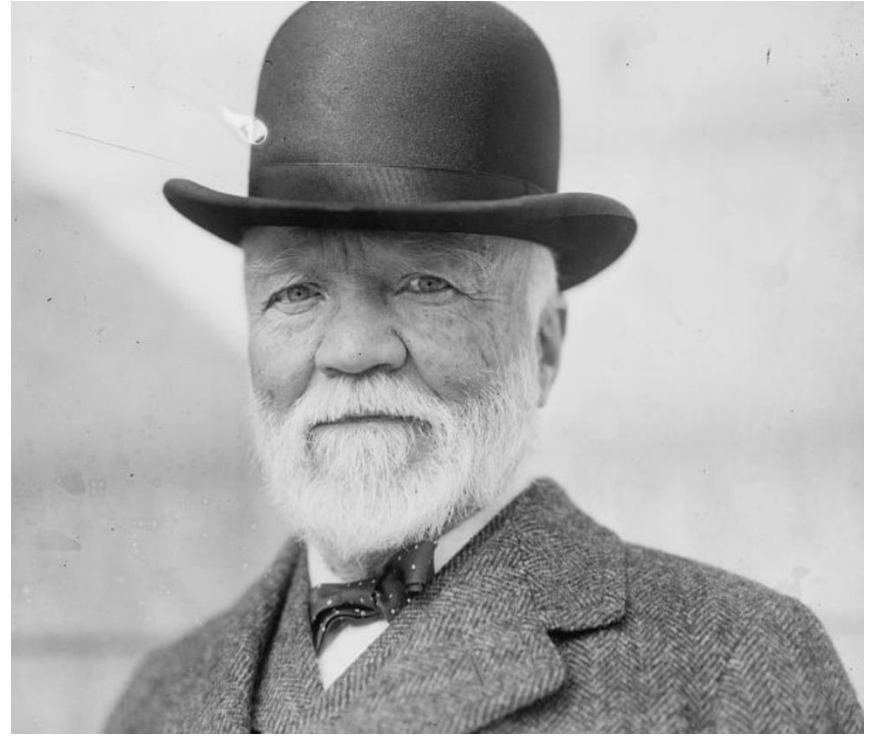
Railroads – Pennsylvania Railroads



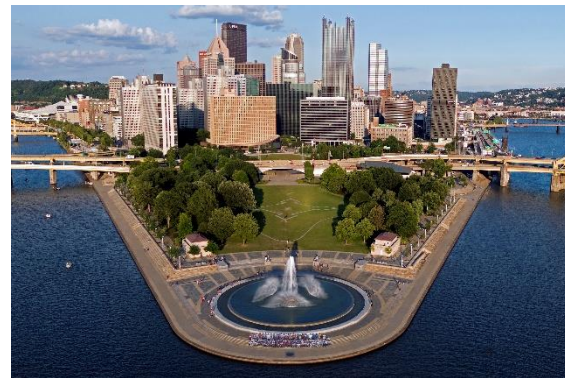
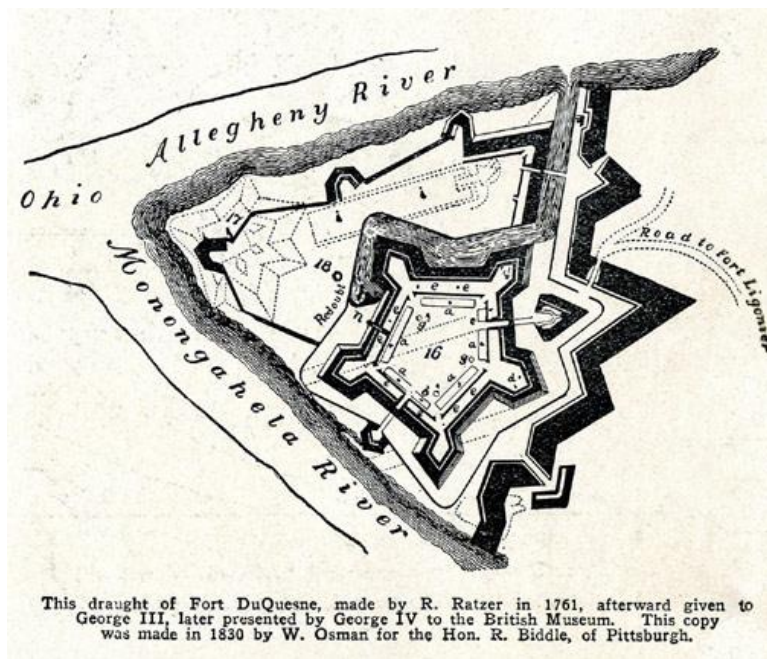
Andrew Carnegie

The Richest Man in the World

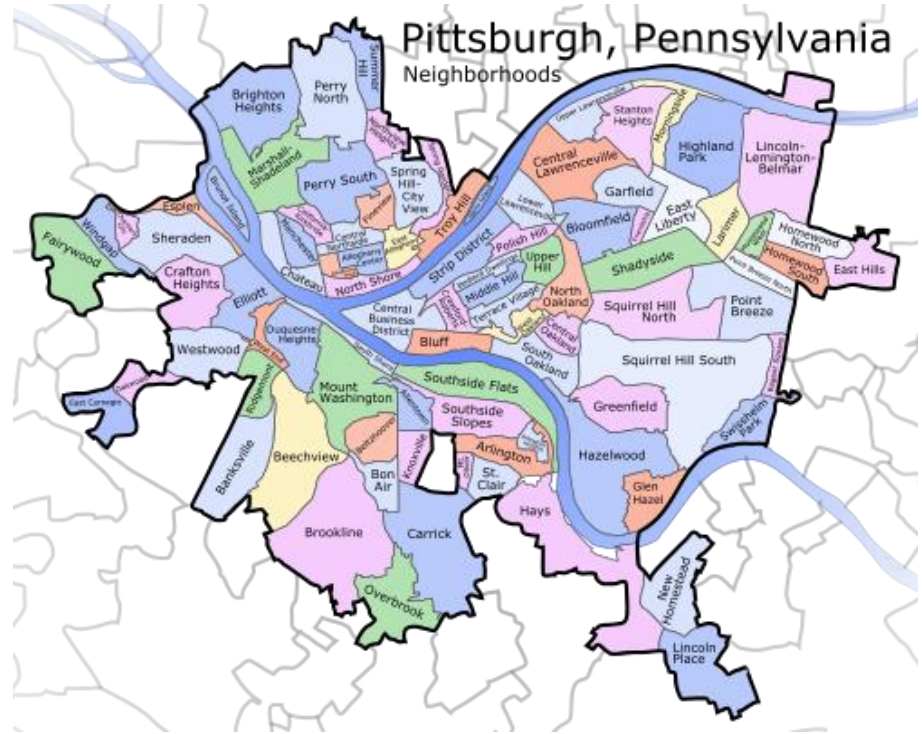
1901 J. P. Morgan, the country's most powerful banker merged Andrew Carnegie's, Carnegie Steel + nine other steel companies formed the world's largest corporation – The United States Steel Corporation



Pittsburgh Point



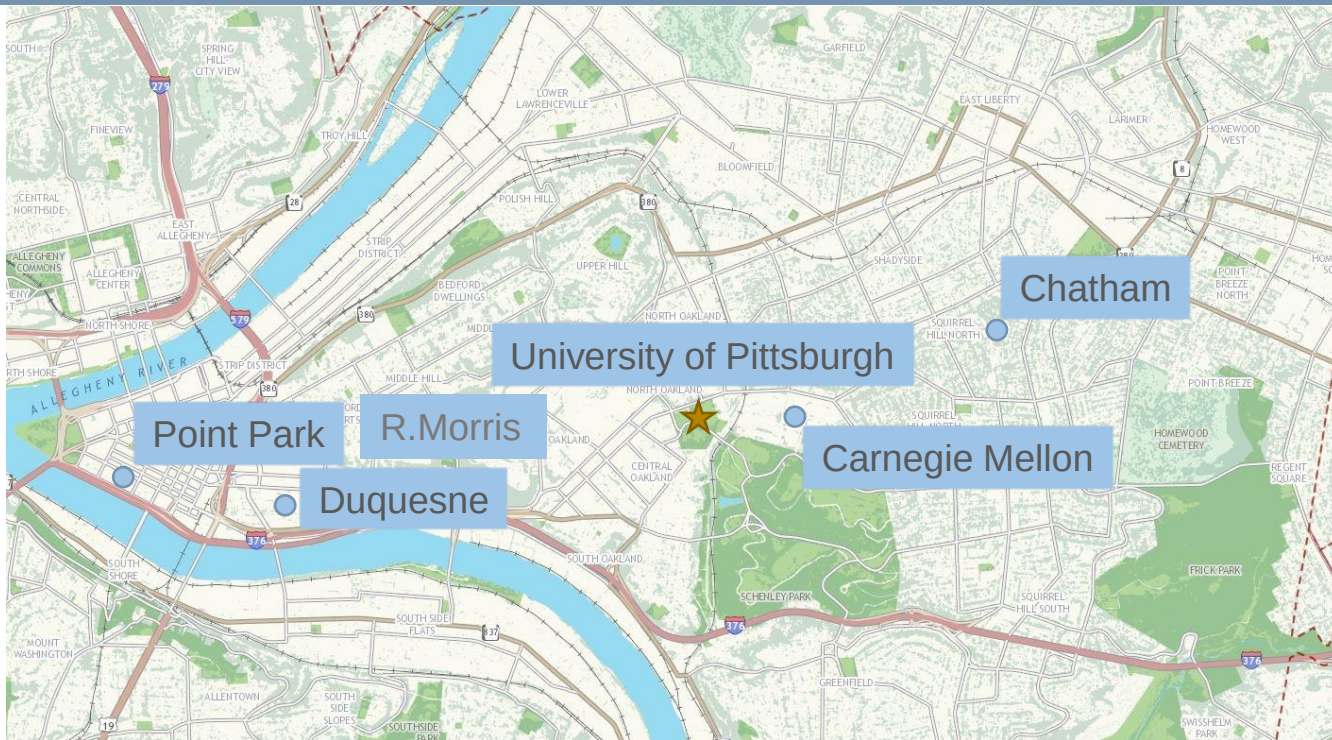
Neighborhoods, Steep Streets, Level Areas



“ The Ugliest Accent in America”

- Yinz – *you guys*
- Yinzer – a native Pittsburger who speaks Pittsburghese
- Dahntahn – downtown
- Stillers – Steelers
- Arns – Iron City Beer
- N’at – and so on
- Redd up your desk – to tidy/clean
- There is no present perfect tense
- All infinitives are split

Four Miles of Universities



The University of Pittsburgh

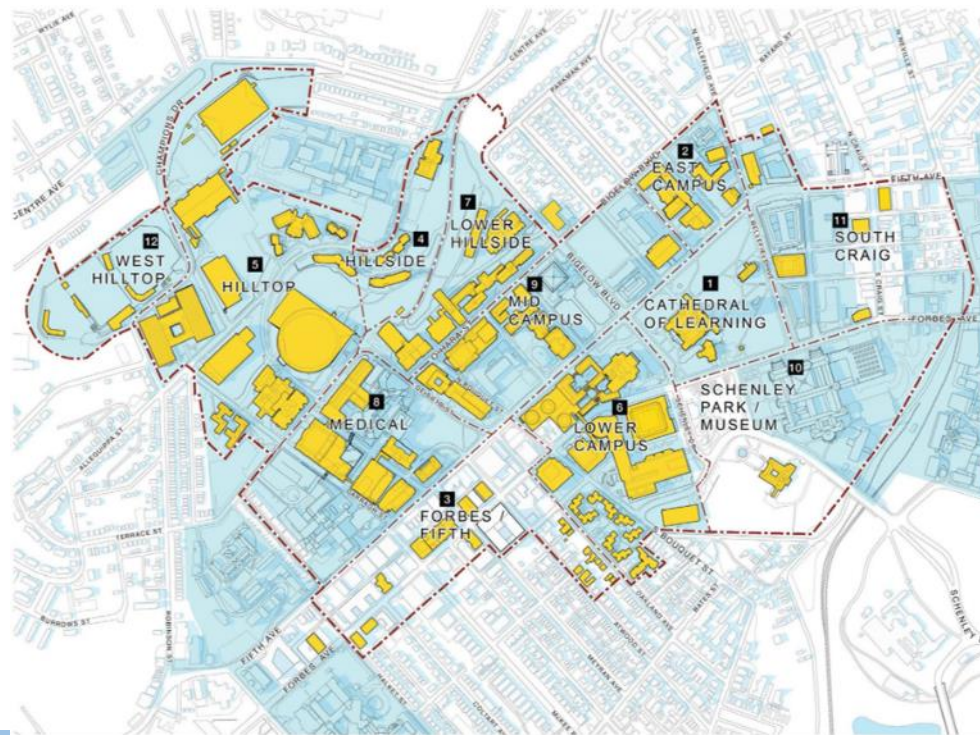


The University of Pittsburgh

PITTSBURGH CAMPUS:

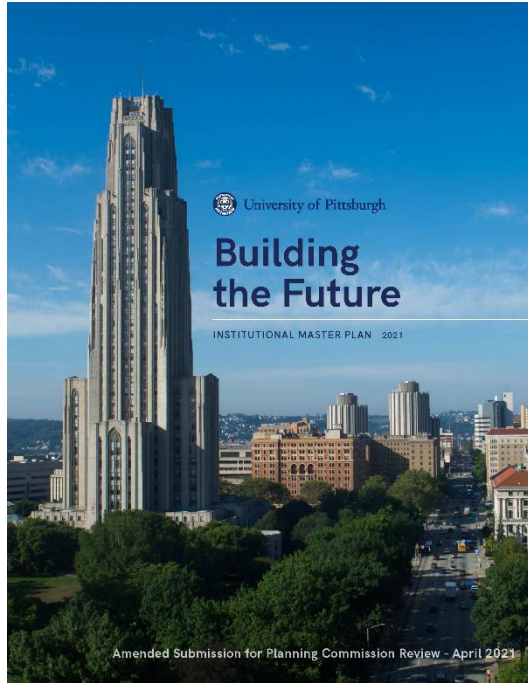
16 SCHOOLS AND COLLEGES **145** ACRES,
131 BUILDINGS

300+ CENTERS,
INSTITUTES, AND
LABORATORIES



18,785 UNDERGRADUATE STUDENTS
8,225 GRADUATES/PROF PRACTICE STUDENTS
5,865 FACULTY/RESEARCH
7,394 STAFF
7,851 BEDS OF STUDENT HOUSING

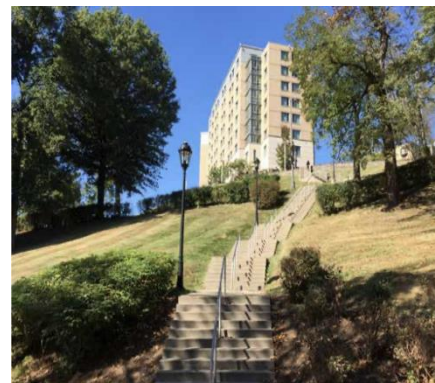
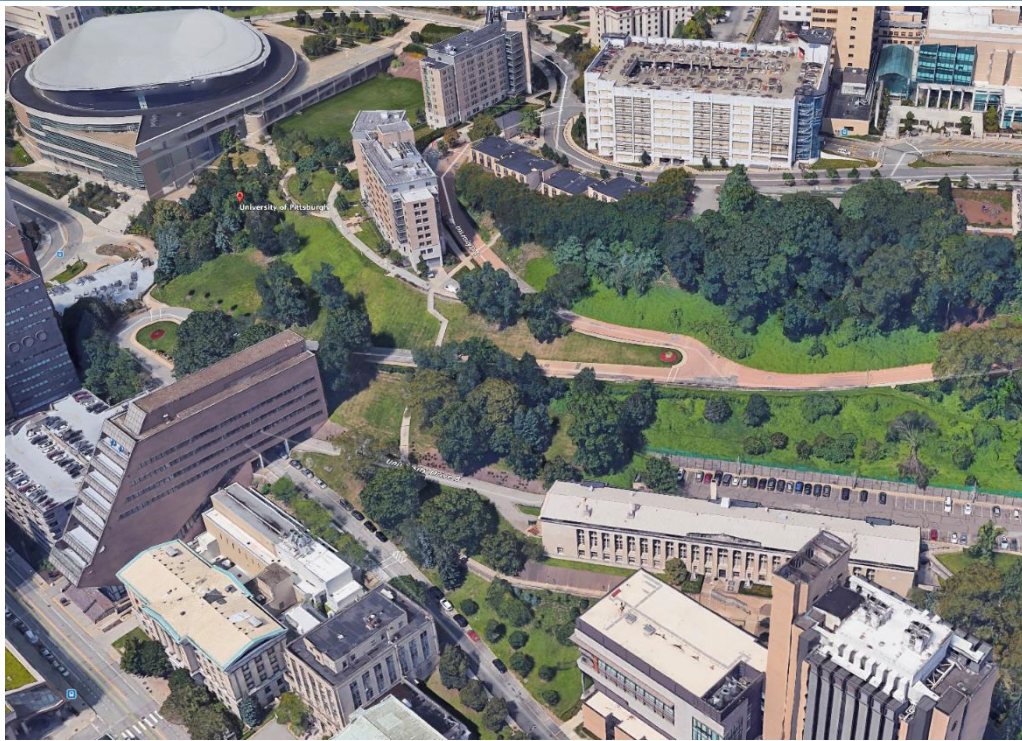
The Master Plan – Four New Buildings on the Hillside



Urban Lower Campus – Complementary Hillside



Hillside Today



Existing Conditions on the Hillside



Little human engagement
Erosion beginning
Weeds held soil
Few native species
Storm water - Downhill



Consent Decree – Region 3

Agreement or settlement that resolves a dispute between two parties without admission of guilt or liability

PHILADELPHIA (Feb. 5, 2021) – The City of Pittsburgh and the Pittsburgh Water and Sewer Authority (PWSA) are required to adhere to a schedule of corrective actions to address stormwater inspection and enforcement violations under a consent agreement announced today by the U.S. Environmental Protection Agency.

Under the agreement, the city and PWSA are required to:
submit an updated stormwater code for approval to the Pittsburgh city council by July 2021;
hire additional inspectors and enforcement staff for 2022; and
put management partnership procedures in place by the end of January 2022.

Hillside Projects

Develop a Sense of
Place

Increase the Quality of
Vegetation

Move part of the campus out of
Central Oakland

Student Amenities



Hillside Projects

Human Engaged Landscapes
Sustainable Re-Forestation
Hillside Stabilization
Storm Water management
Accessible Paths
Connections
Neighborhood Benefit



RE-FORESTATION



Reforestation Plan

CHARACTER ZONES

The **Character Zones** of the Hillside area establish a **landscape vernacular** that transitions from refined, polished spaces near buildings and in other highly trafficked areas, to more naturalized spaces.

The recommendations on the following pages provide a **flexible framework** for material and planting decision-making. By following the guidance of these character zones, a cohesive, yet varied Hillside experience can be created.

Reforestation Plan

CHARACTER ZONES



URBANE



RUSTICATED

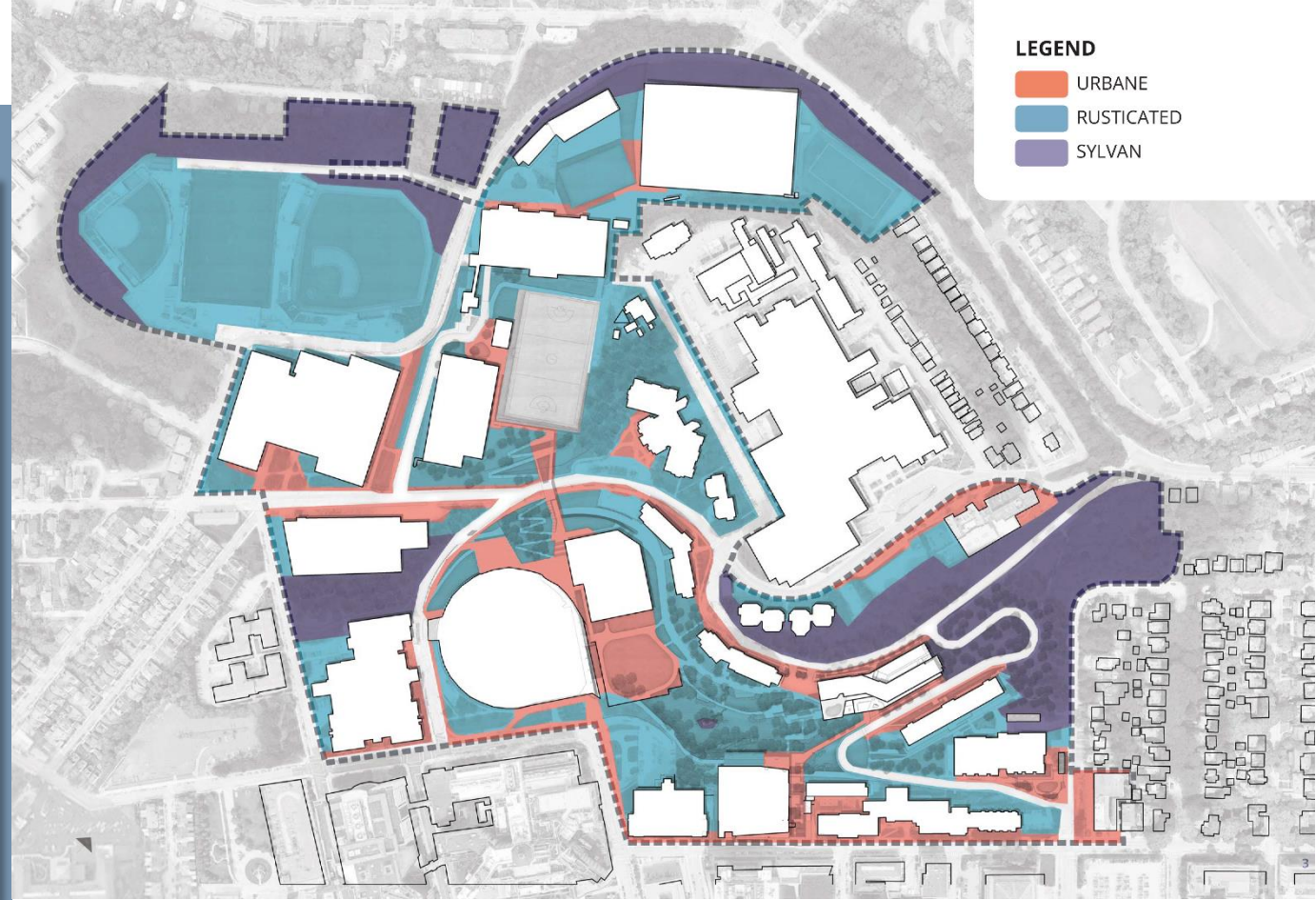


SYLVAN



Formal
Highly-Trafficked
Architectural

Informal
Minimally-Trafficked
Natural



LEGEND

- URBANE
- RUSTICATED
- SYLVAN

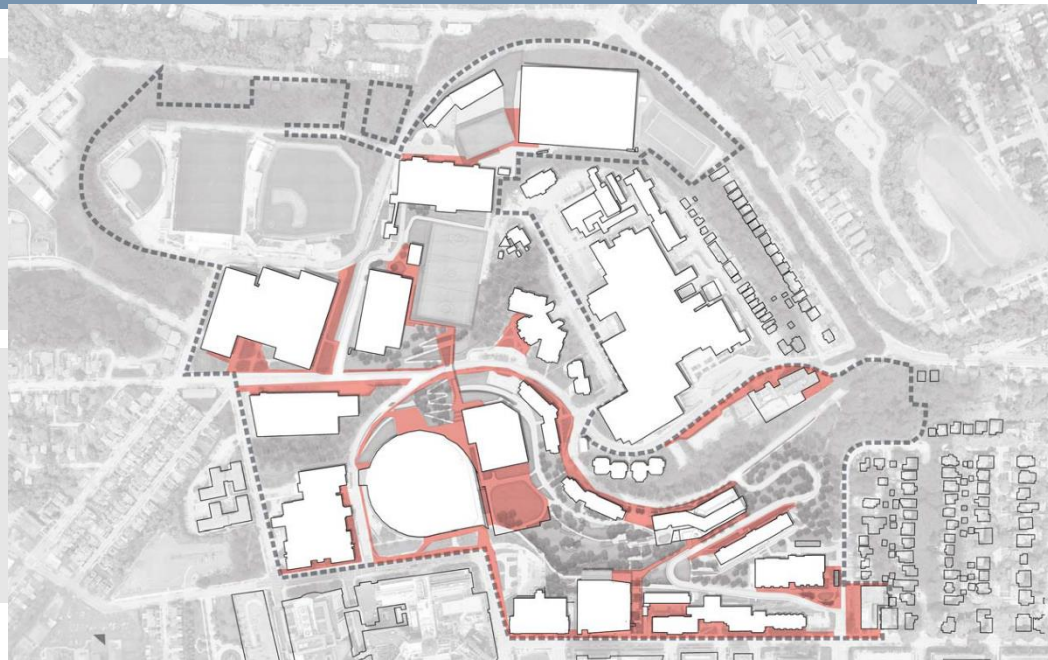
Character Zones

URBANE

The Urbane Character Zone is the most refined of the three zones. The spaces within the Urbane Zone are defined by limited variation in scale and texture of both materials and planting. Color palettes should be restrained to simple combinations of like hues and value. These spaces are the most highly-trafficked of the Hillside, therefore special consideration should be paid to durability and ease of maintenance.

BUILDING ADJACENCY

As these spaces are generally building-adjacent, effort should be taken to ensure coordination of materials with architecture. Consider celebrating entrances and other key building features with material upgrades, such as specialty paving at thresholds, and architectural mass plantings of grasses or perennials.



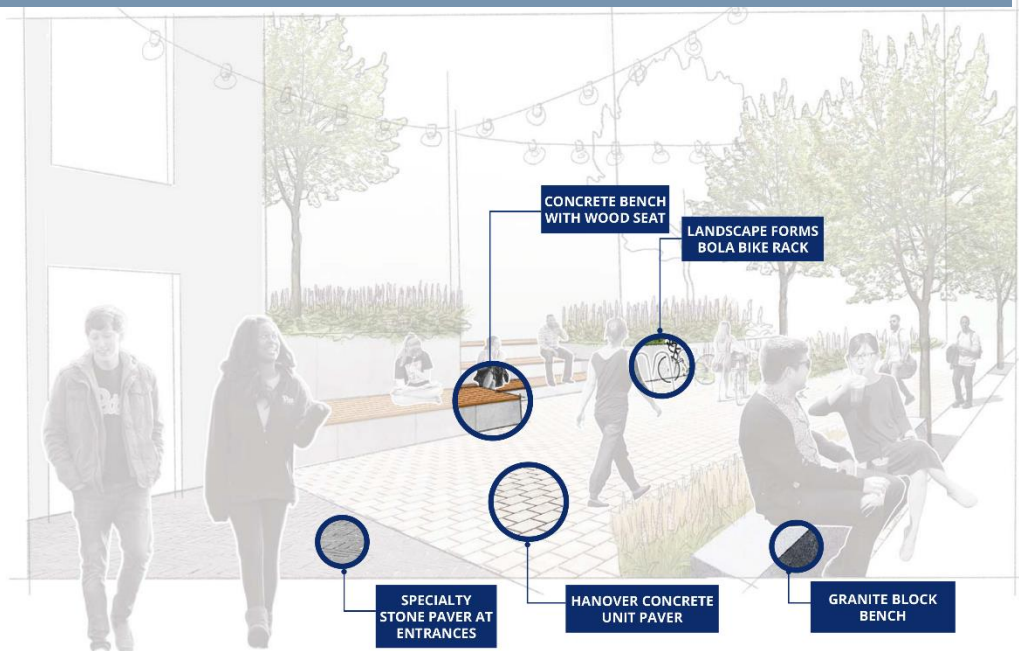
Character Zones

URBANE

The materials palette for the Urbane Character Zone creates a sophisticated and refined visual language to the landscape. Variation in color and texture of material should be used sparingly. Distinct variation in scale of material should be avoided.

CHARACTER-DEFINING ELEMENTS

In the context of the Urbane Character Zone, tiered seating, uniform stone or concrete unit paving, and site walls consistent with adjacent architecture become the most defining elements.



Character Zone: Urbane



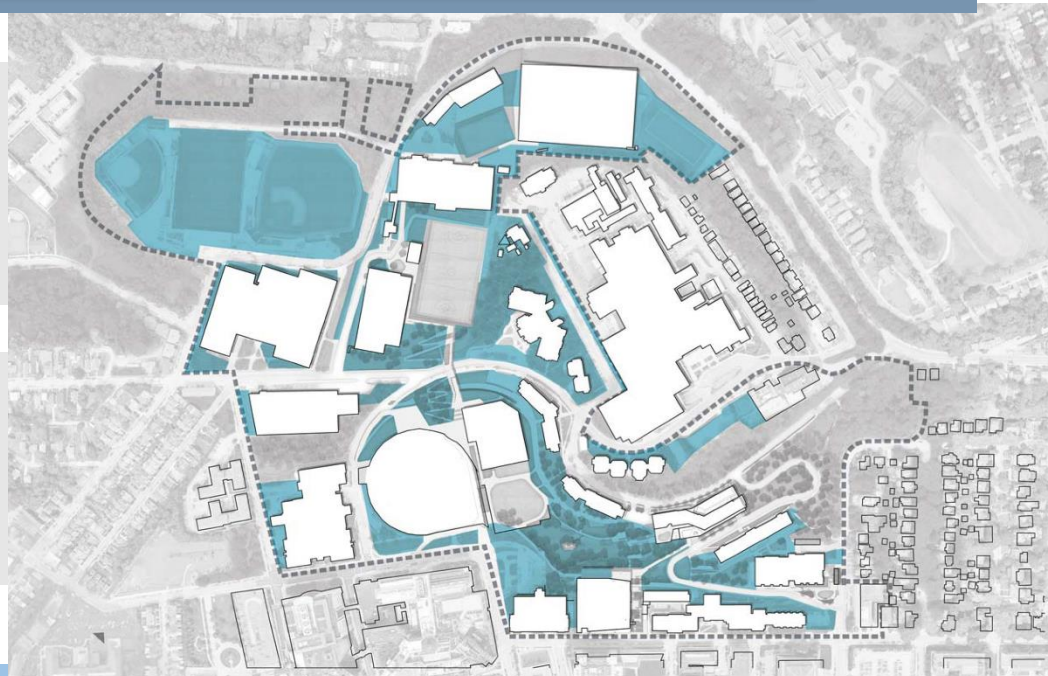
Character Zones

RUSTICATED

The Rusticated Character Zone occupies the interstitial spaces between buildings and naturalized landscape. It pulls its defining features from both ends of the spectrum, blending them together to seamlessly transition between the two while also crafting a unique sense of place. Material and planting strategies should aim to maintain a distinctive, yet softened landscape.

VIEWS + WAYPOINTS

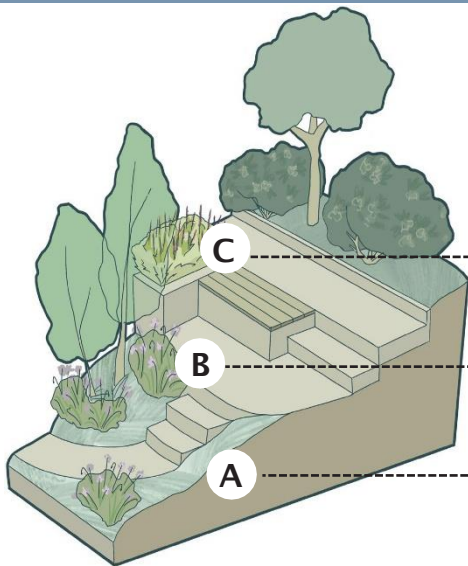
As many key pedestrian journeys cross through this character zone, scenic views and waypoints should be curated to take full advantage of the Hillside's dramatic changes in elevation.



Character Zone: Rusticated



Character Zone: Rusticated



PLANTING PALETTE FOR SOCIAL NODES

Mass plantings of flowering perennials planted within a matrix of grasses create a transition between the architectural plantings of the Urbane character zone and the more naturalized plantings of the Sylvan character zone.

TREE CANOPY

Trees should be varied in scale and species and planting in groupings that allow for curation of scenic views.

UNDERSTORY

Woodland shrubs balance and soften the hard lines of concrete forms and provide opportunity to screen service areas.



A *No-mow grass seed mix*



B *Clumps of perennials*

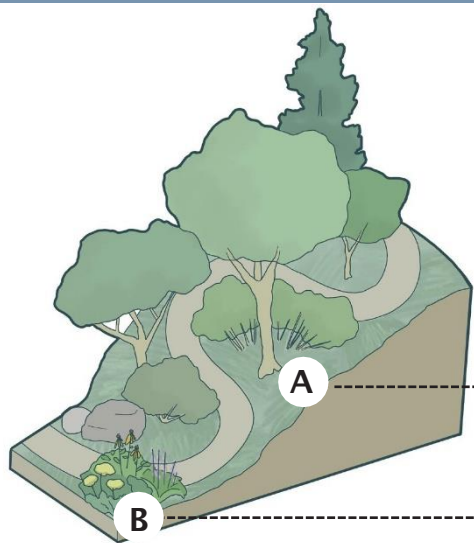


C *Ornamental grasses intermixed with flowering perennials*

Character Zone: Sylvan



Character Zone: Sylvan



TREE CANOPY

Trees should be diverse, with a wide range of both canopy and understory trees. A dense, forested planting strategy will create a sense of discovery as you move throughout the space

UNDERSTORY

A wide diversity of shrubs and woody perennials is recommended

PLANTING PALETTE FOR SOCIAL NODES

At key nodes, strategic opening in the tree canopy will allow for the planting of sun-loving native perennials. The planting strategy for the Sylvan character zone expands the palette to include a greater variety of perennials and grasses



A

Sedge



B

Mixed plantings of a variety of native flowering perennials and grasses

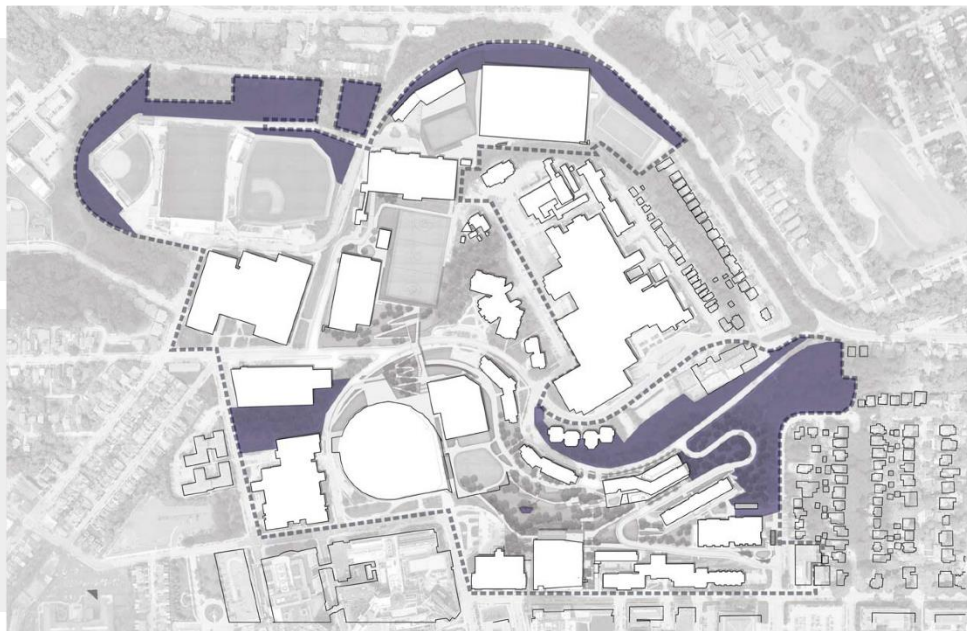
Character Zones

SYLVAN

The Sylvan Character Zone comprises the least trafficked and most naturalized areas of the Hillside. Its heavy canopy, diverse natural elements, winding paths, and discreet seating areas lend to a sense of quietude and discovery in occupiable spaces.

REASSESSING CHARACTER ZONES TO ACCOMMODATE NEW USE

Areas within the Sylvan Character Zone have the least amount of human occupation, and are largely – though not exclusively – removed from buildings. When new buildings are constructed that are not reflected in this diagram, Character Zones should be assessed to determine whether adjustments are needed to accommodate higher intensity of use.



Reforestation Plan

PROPOSAL FOR MEETING TREE REPLACEMENT REQUIREMENTS

Currently Allowed by City

- Inch-to-inch immediate replacement
- Pay into fund for any deficit

University Proposals

1. **Credit for caliper inch equivalents** based on assisted reforestation - grasses, forbs, shrubs, and trees
2. **Reforestation Mitigation Bank**

The University believes its proposal is not only more **flexible**, but also better achieves the City's multiple **tree canopy** and **resiliency/sustainability** objectives.

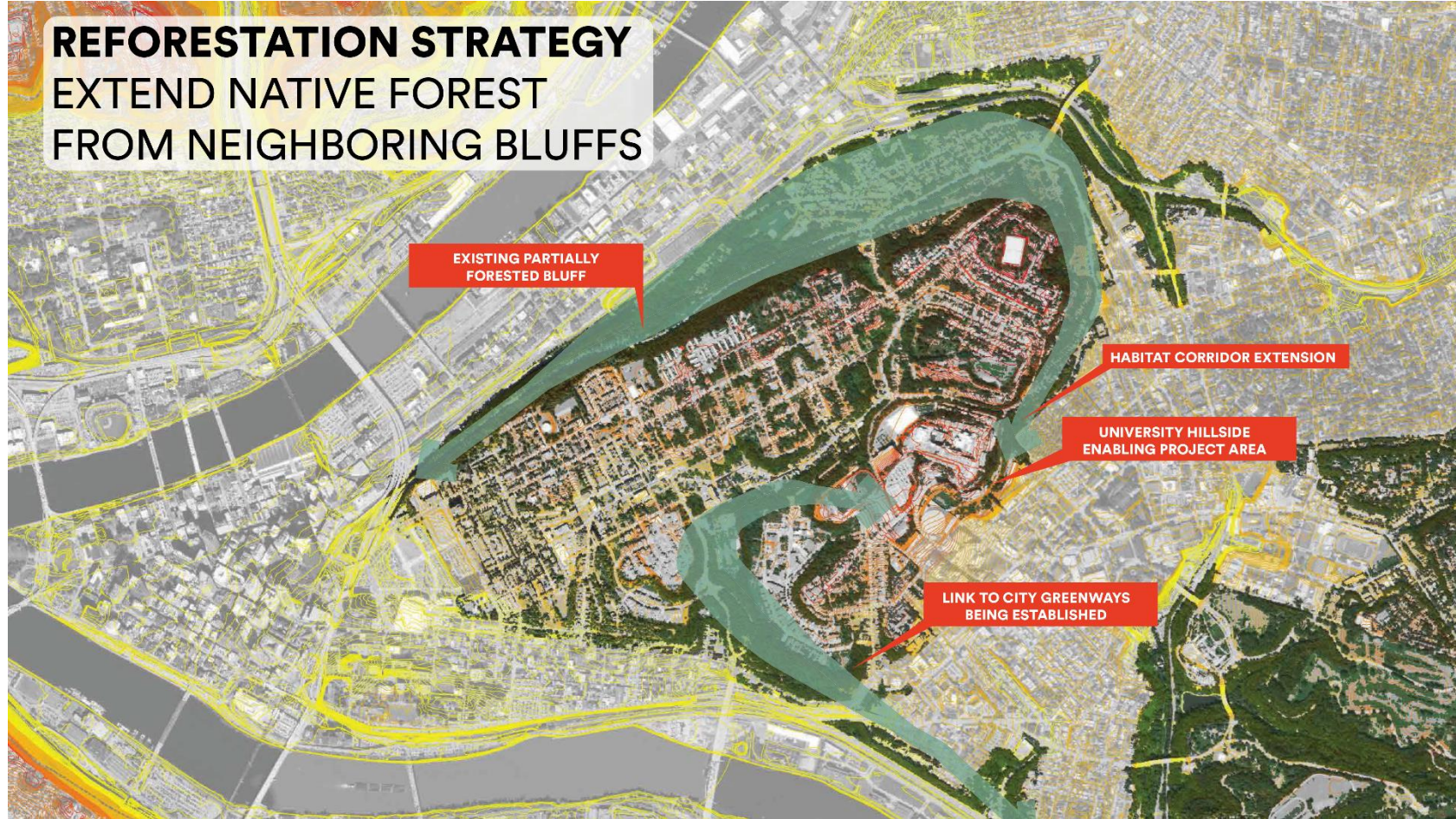
REFORESTATION STRATEGY

EXTEND NATIVE FOREST FROM NEIGHBORING BLUFFS



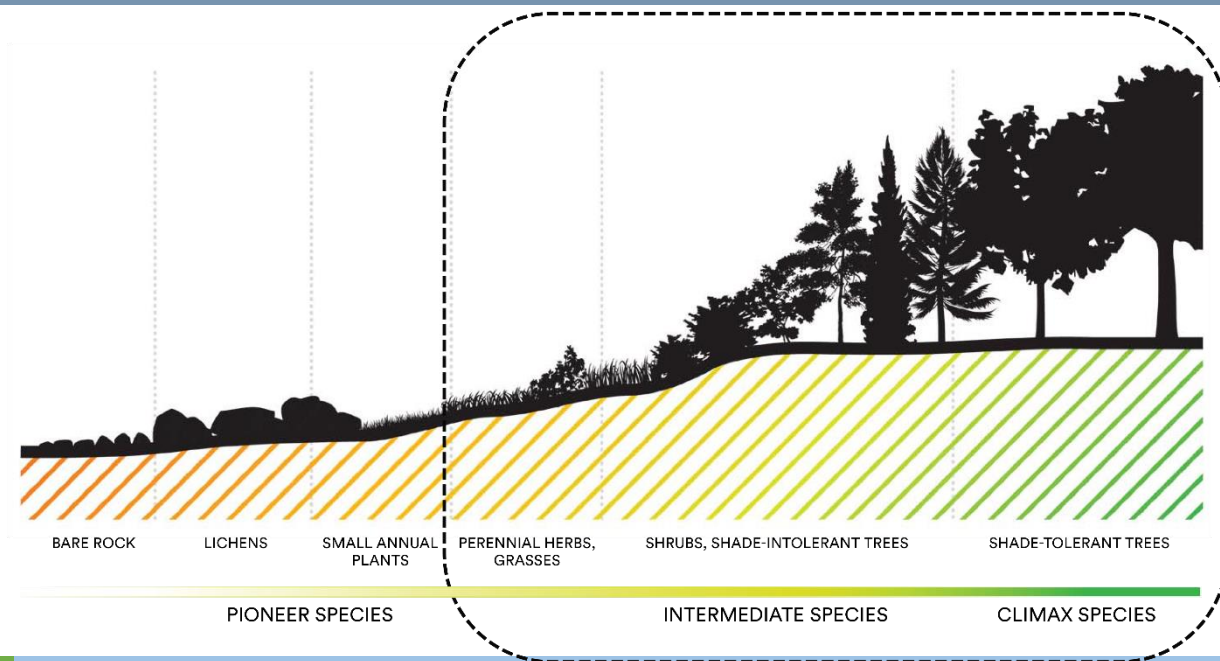
REFORESTATION STRATEGY

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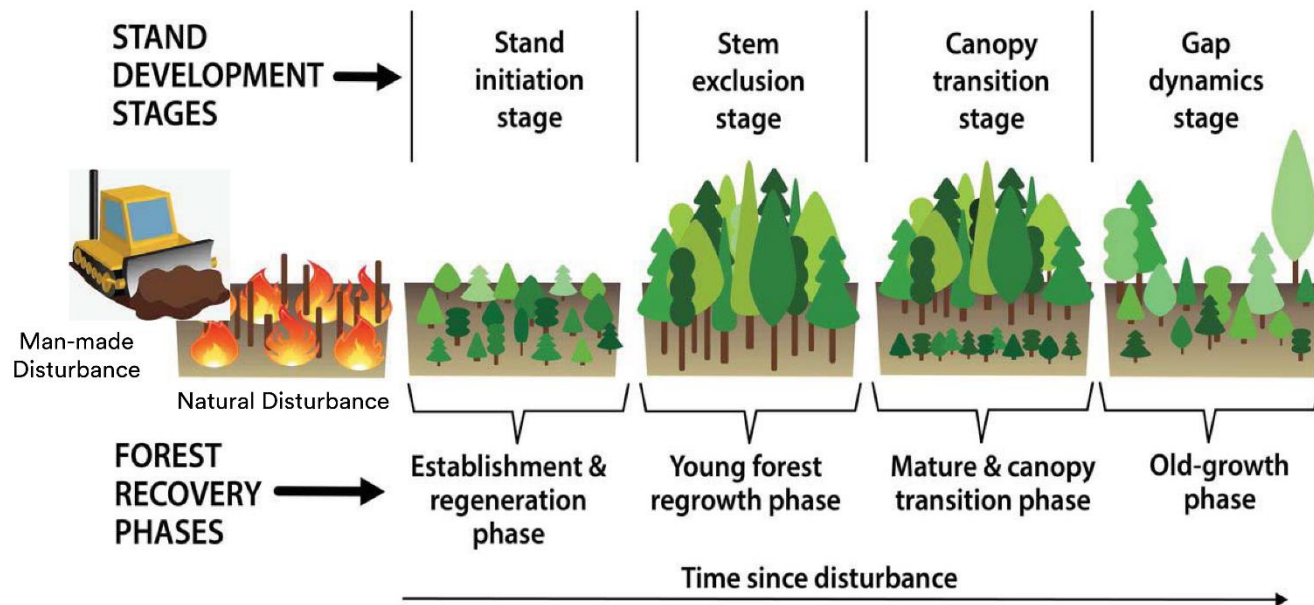
Reforestation Strategy

IMPLEMENT ECOLOGICAL SUCCESSION REFORESTATION



Ecological Succession

FOREST STAND DEVELOPMENT OVER TIME



Proposal

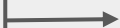
CALIPER-INCH EQUIVALENTS BASED ON ASSISTED REFORESTATION

BASIS OF DESIGN

1. City of Pittsburgh steep slopes vegetation requirements

150 SQ FT (12.25' x 12.25') must include:

1 canopy tree
+ 2 understory trees
+ 2 evergreens
+ 5 shrubs



3 trees/150 SQ FT



Assume each has nominal caliper of 0.25"
10 stems @ 0.25" each = 2.5"
per 150 SQ FT

A 2.5" caliper tree has crown spread of 10-14 FT*
(one 2.5" tree/~150 SQ FT)

* Based on variety of trees of different species measured in Allegheny County



2. Forest restoration science, Appalachian Reforestation Initiative:

Mixed mesophytic forest community
700 bare root/acre (8' spacing) =
2.4 trees/150 SQ FT

OR

500 container trees/acre (9.3' spacing) =
1.7 trees/150 SQ FT

+

Native herbaceous/shrub understory
throughout 150 SQ FT

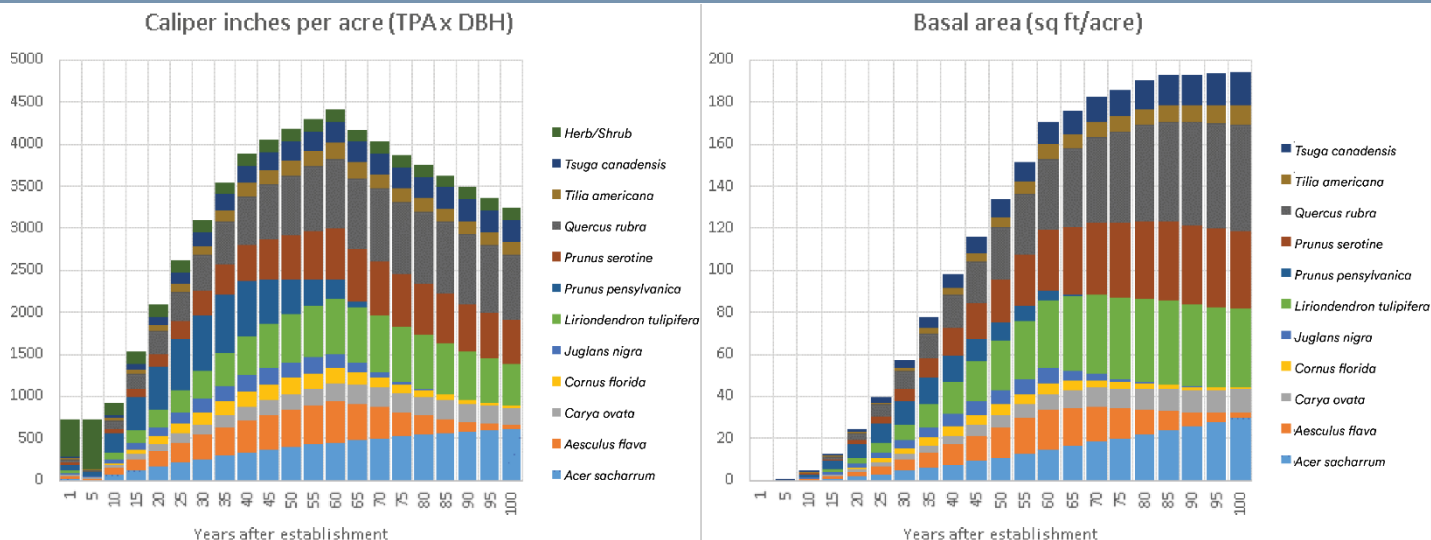


Recommendation

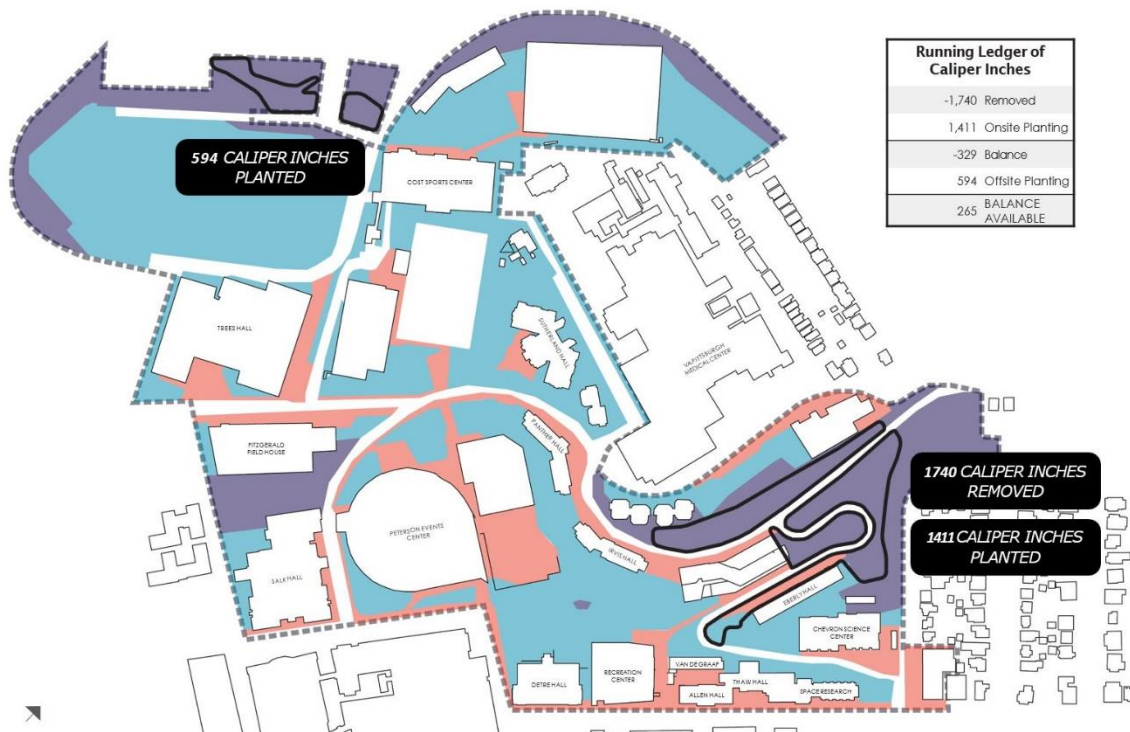
- Each 150-SQ FT planted and maintained according to forest restoration science (above) shall be deemed equivalent to 2.5 caliper inches for tree replacement purposes
- Annual monitoring for 5 years to assess progress toward forest growth
- Adaptive management if necessary to address invasive species, poor survival, etc.

Long-Term Projection

THE FUTURE CONDITION OF NATURALIZED FOREST



Reforestation Summary



Guy Cove 2007



Guy Cove 2019



RE-FORESTATION

Questions



STORMWATER PLAN

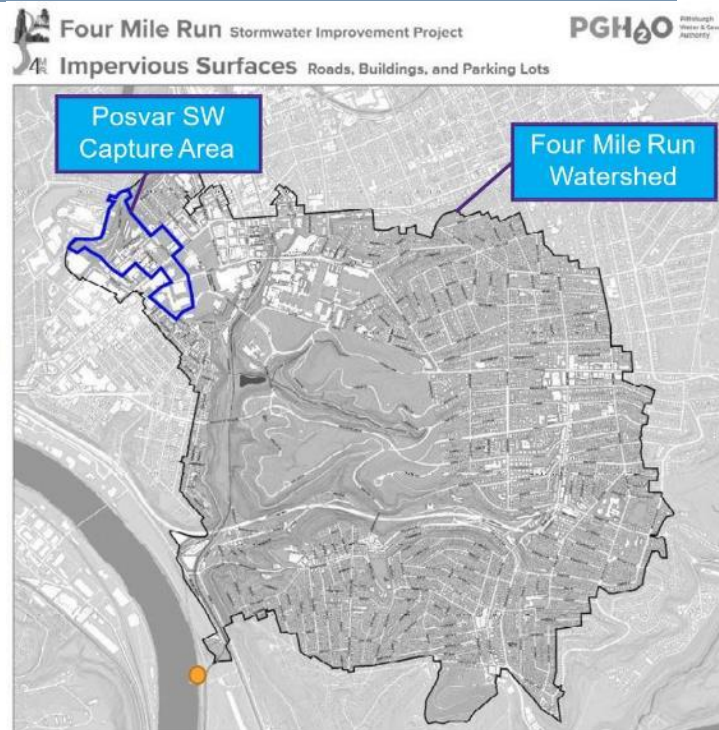


Why Stormwater Reuse?

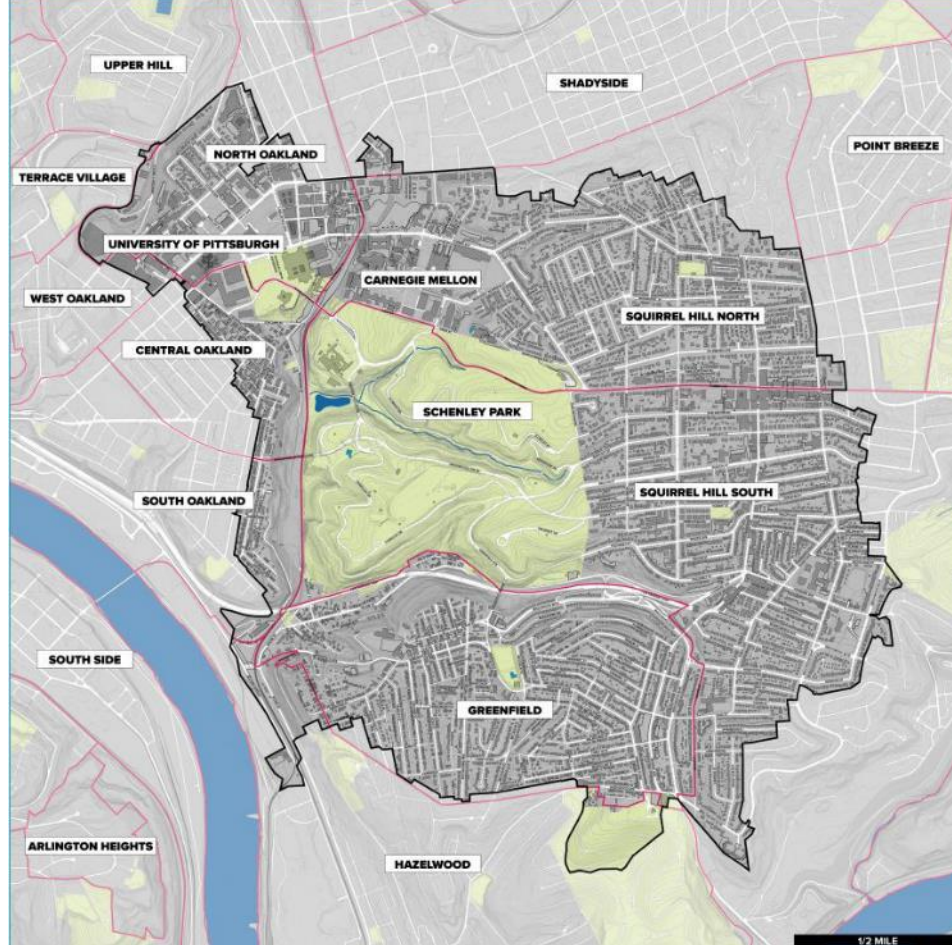


Water Conservation

*Reduces
water use
and SW
Runoff
by at least
6.9 million
gallons per
year**



**Based on 0.7" typical rain event at 50 times / yr*



Local Community Asset



Integrated into existing neighborhood



Research, learning, and education



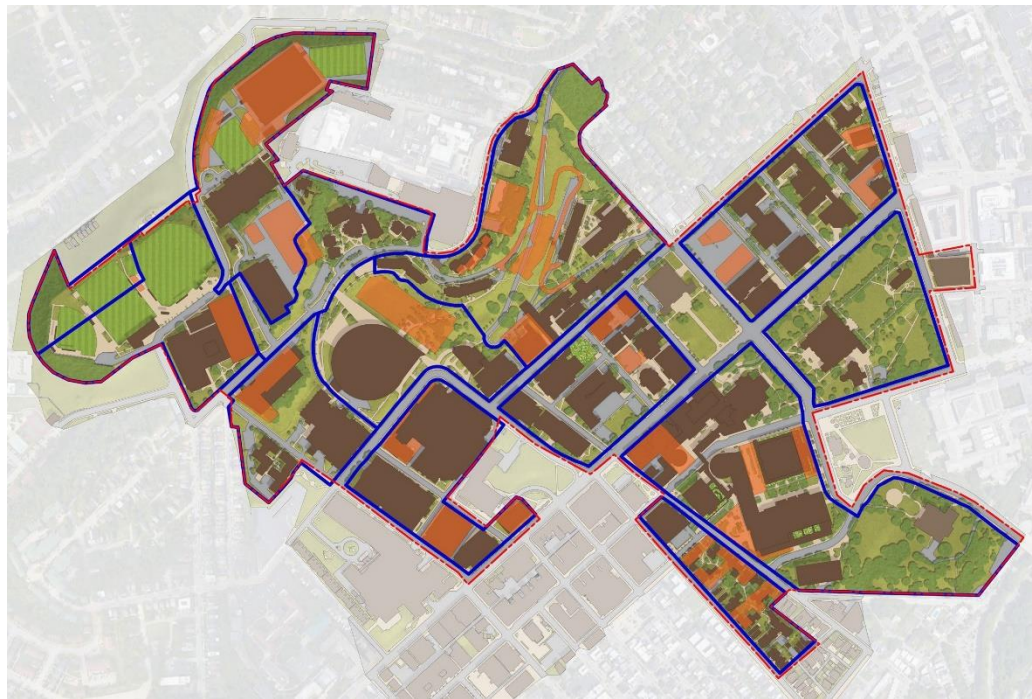
Proposed Improvements on Bigelow Boulevard

Image Source: University of Pittsburgh, Campus Master Plan 2019

Improved stormwater management at campus-wide level

Campus Stormwater Balance

The affect all areas, large and small can have on overall storm water Infrastructure.



Solutions



STORMWATER REQUIRED STORAGEVS.
BMP STORAGE CAPACITY¹

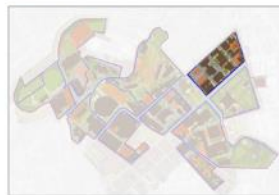


CITY OF PITTSBURGH
STORMWATER MANAGEMENT FEE
REDUCTION⁴



PROJECT IDENTIFIER	PROJECT DESCRIPTION
2A	INFORMATION SCIENCES REDEVELOPMENT
2B	RA LOT SITE
9A	ONE BIGELOW

DISTRICT J



¹Based on coverage condition only. Square feet area and individual BMPs are not necessarily cumulative.

²Underground stormwater detention is shown for space allocation purposes only.

³Street trees only provide credit towards NPDES BMP credits.

⁴Based on anticipated code revision per City of Philadelphia Stormwater Ordinance.

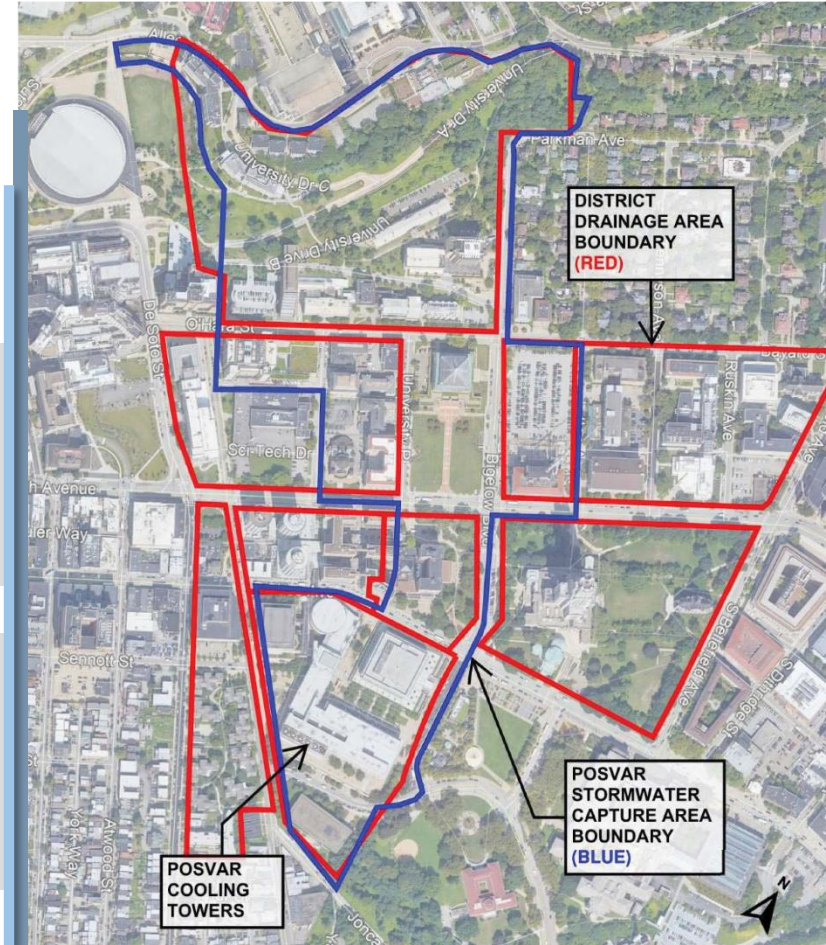
Grey Water Collection & Reuse for Posvar

OBJECTIVE

Provide volume control and obtain stormwater credit by stormwater collection and reuse at the Posvar Cooling Towers.

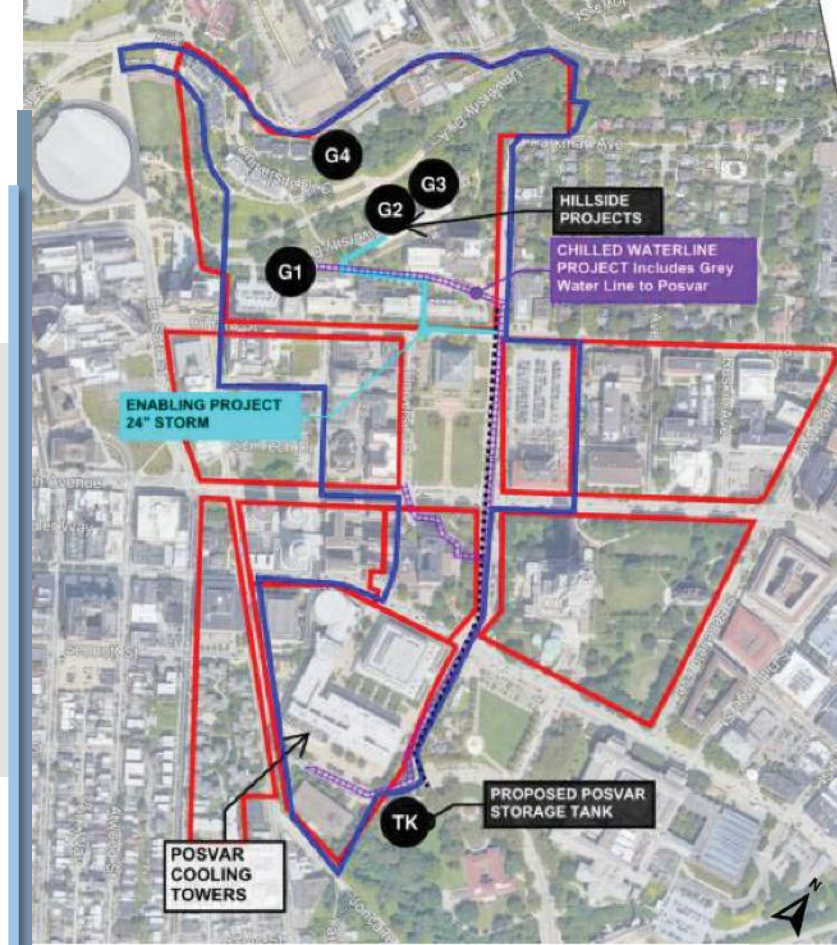
APPROACH

1. Identify areas that can be captured
2. Estimate Runoff Volume
3. Conceptual Collection and Conveyance
4. Posvar Storage Site



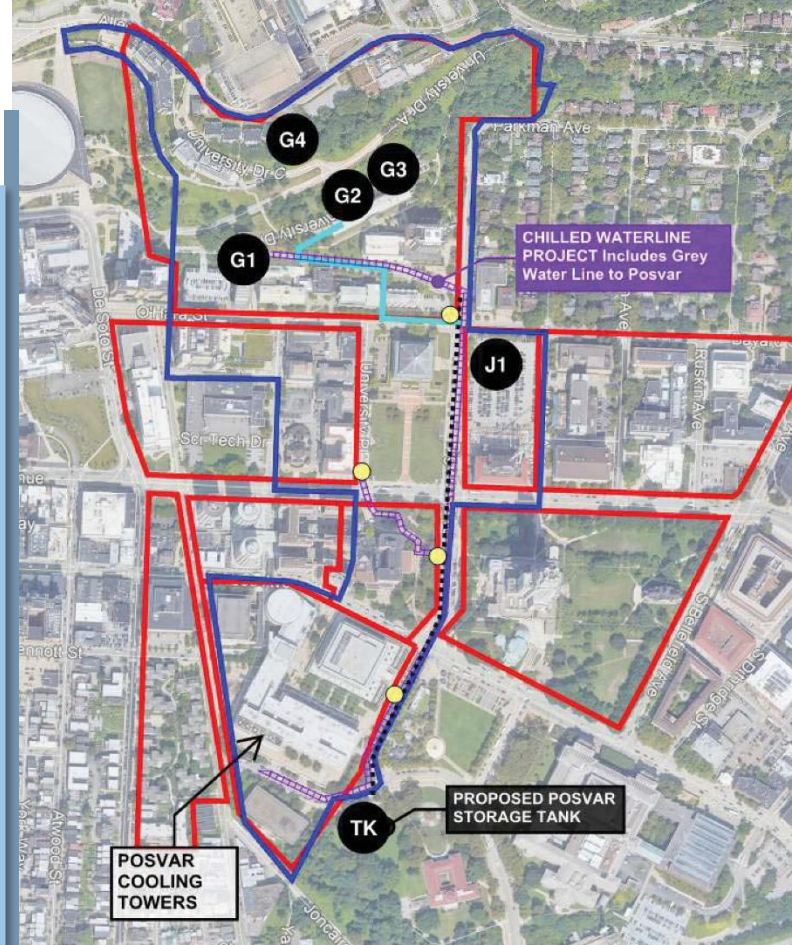
Projects in Progress

- ▶ Chilled Waterline
- ▶ Hillside Projects
 - G1. Recreational Wellness Center (RCW)
 - G2. Housing Hub (Housing)
 - G3. Enabling Projects
 - G4. Fraternity Complex Redev. (Frat)
- ▶ Posvar Storage Tank Siting and Sizing



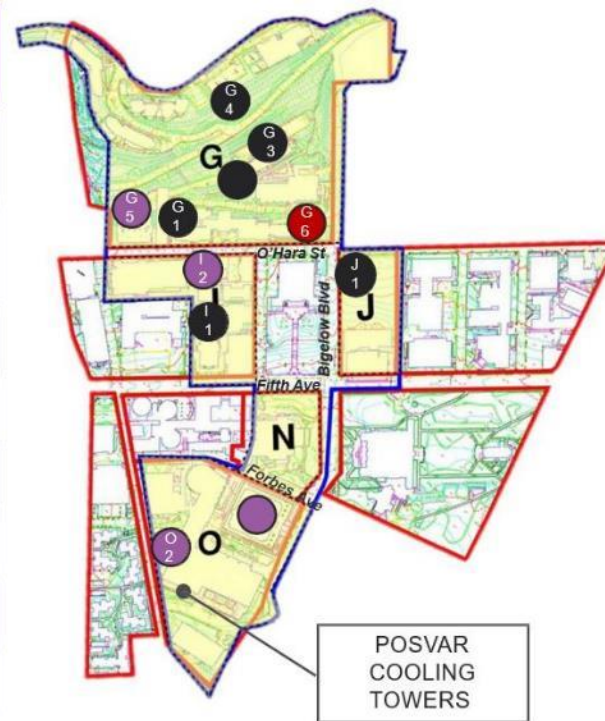
Conceptual Collection and Conveyance

- ▶ Collect and Store of 1" Runoff volume at District G and J Projects
- ▶ Collect and convey from remaining districts
- ▶ Gravity flow through new "grey" waterline to proposed Posvar Storage Site
- ▶ Buried Detention System sized for Maximum Average Daily Demand (210,000 gallon)
- ▶ Inlet debris at collection sites
- ▶ Divert flows greater than the 1" rainfall event to storm or combined sewer lines



Posvar Capture Area

District	ID/ Name	Total Area (acres)	Potential Capture Area
G	Hillside Projects (G1-G4)	11.7	11.2 (95%)
	Remaining G Projects (G5 and G6)	15.3	6.5 (42%)
J	J1 Project	3.8	3.0 (80%)
I	I1/I2 Projects	1.0	0.5 (50%)
	Remaining I	5.1	0.0 (0%)
N	William Pitt Tie-In	4.0	2.0 (50%)
O	O1/O2 Projects	12.2	1.84 (15%)
Total		53.1	25.0 (47%)



Precipitation Events

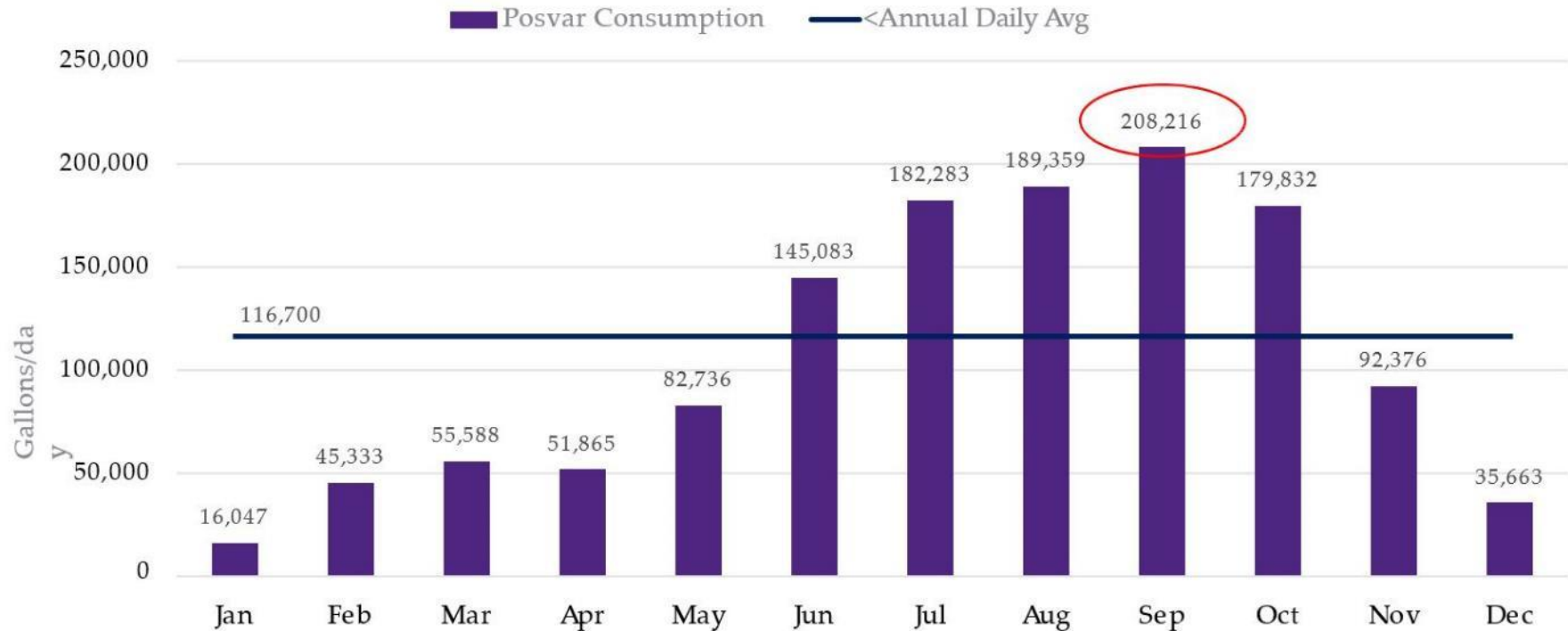
Precipitation Event	Inches	# occurrences/ year
Avg Precipitation per Event	0.7	50
1" Storm (Meets Code Requirement)	1.0	8

Data Source: NOAA Climate Data Dailies, STAUSW00014762
Pittsburgh Allegheny Co Airport, 2014-2019

Estimate Runoff Volume

District	ID/ Name	Potential Capture Area (acres and %)	0.7" Runoff Volume (gal)	1" Runoff Volume (gal)
G	Hillside Projects (G1-G4)*	11.2 (95%)	45,200	97,600
	Remaining G Projects (G5 and G6)	6.5 (42%)	36,100	73,300
J	J1 Project*	3.0 (80%)	10,000	23,200
I	I1/I2 Projects	0.5 (50%)	950	2,700
	Remaining I	0.0 (0%)	0.0	0.0
N	William Pitt Tie-In	2.0 (50%)	6,600	15,500
O	O1/O2 Projects	1.84 (15%)	28,000	44,300
	Remaining O	0.0 (0%)	0.0	0.0
Sub-Total		25.0 (47%)	126,900	256,500
Frick Fine Arts Building		0.5 (100%)	950	2,700
Soldiers & Sailors Garage Sumps (gpd)			360	360

Posvar Consumption Maximum Average Daily Demand



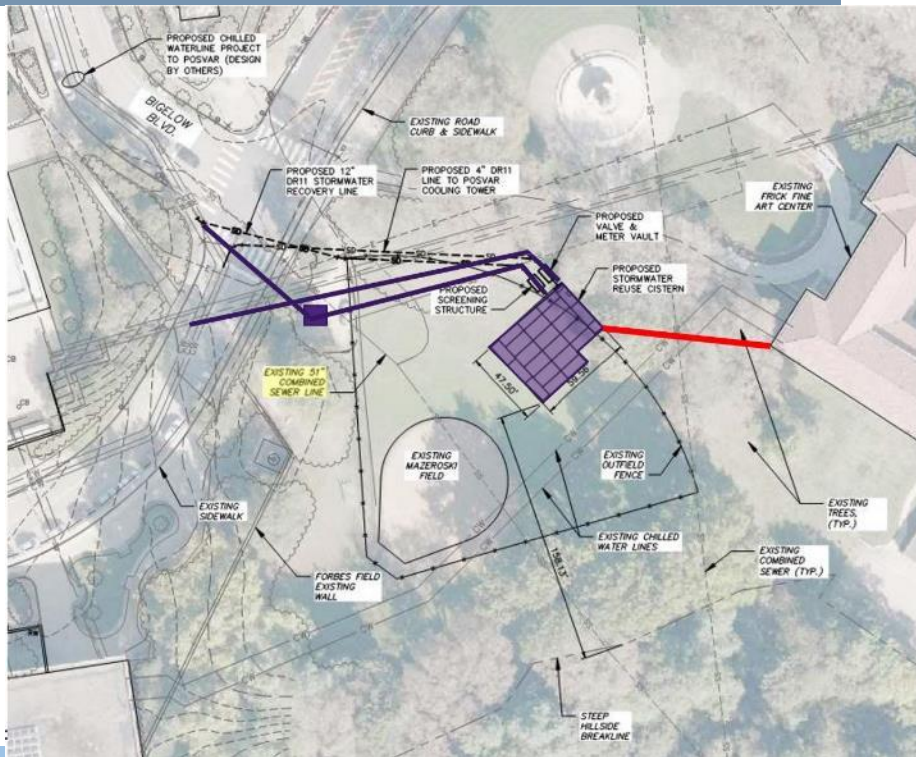
Posvar Storage Tank Concept and Siting

Buried Detention System at Mazeroski Field



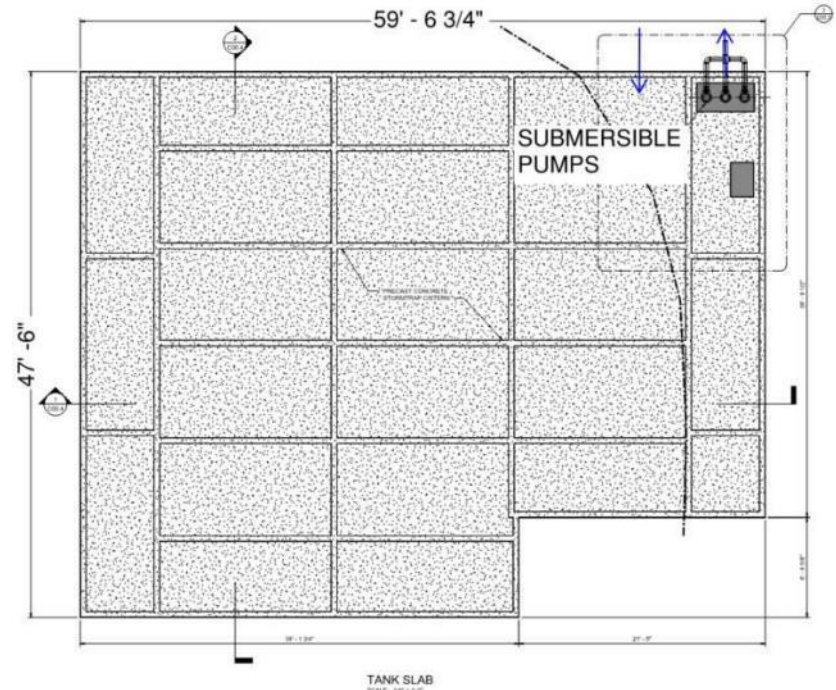
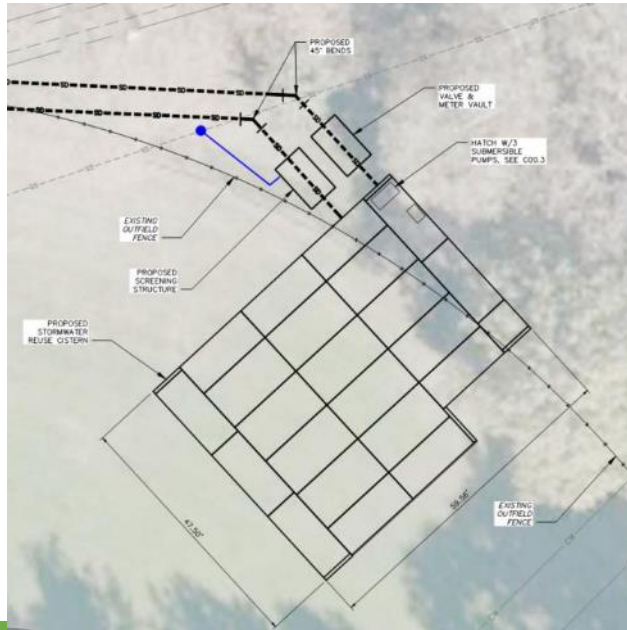
Siting Considerations

- Vicinity to utilities
- Vicinity to Pittsburgh landmarks, property lines, fence line
- Access for regular tank inspections
- Accommodate pumping and treatment
- Vicinity to landslide prone area – Require setback
- Require regular inspection of hillside stability



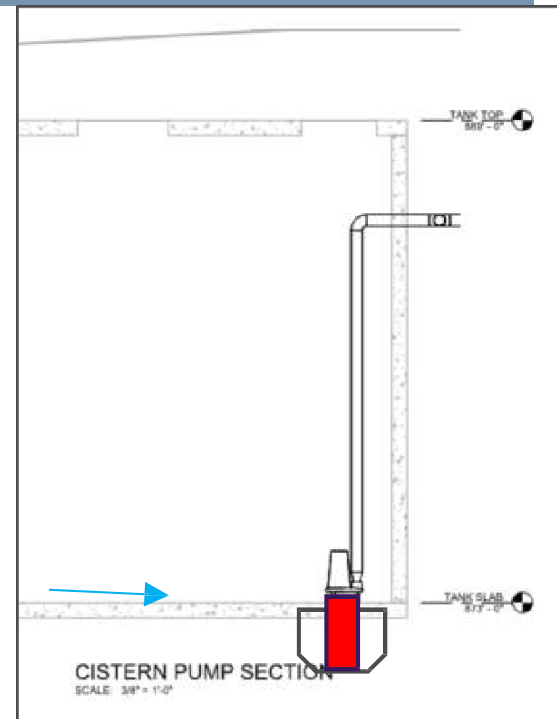
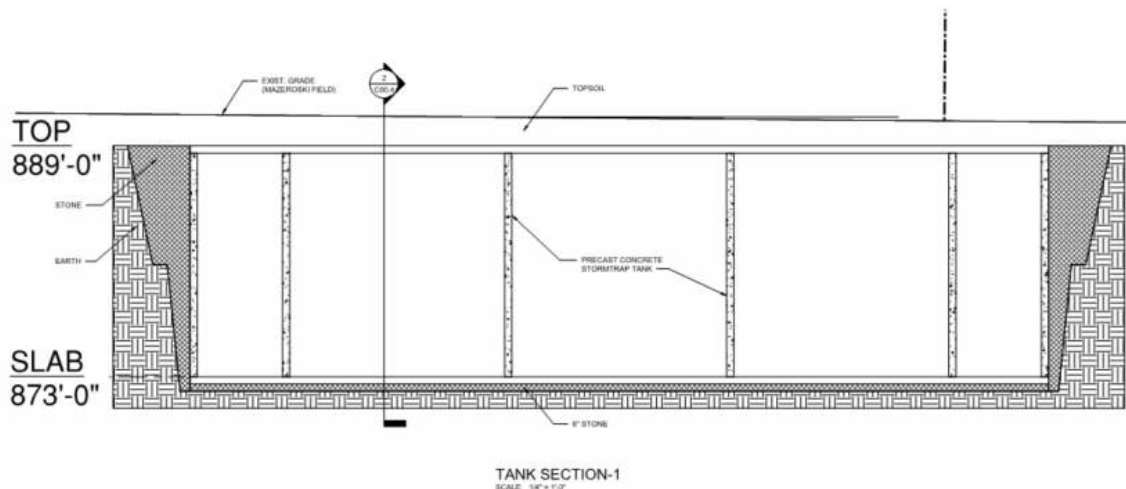
Posvar Storage Plans

- Access Points outside of fence line
- Inlet Screening Structure
- Overflow to existing CS



Posvar Storage Section

- Foundation Design Considerations
- Provide tank draining controls via pump
- Tank underdrain

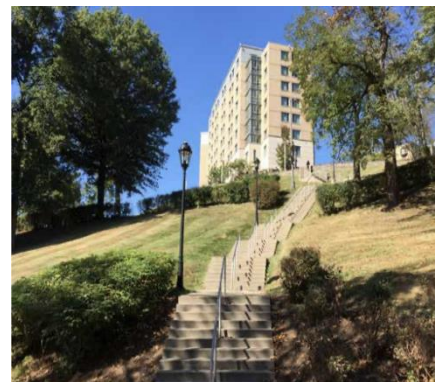
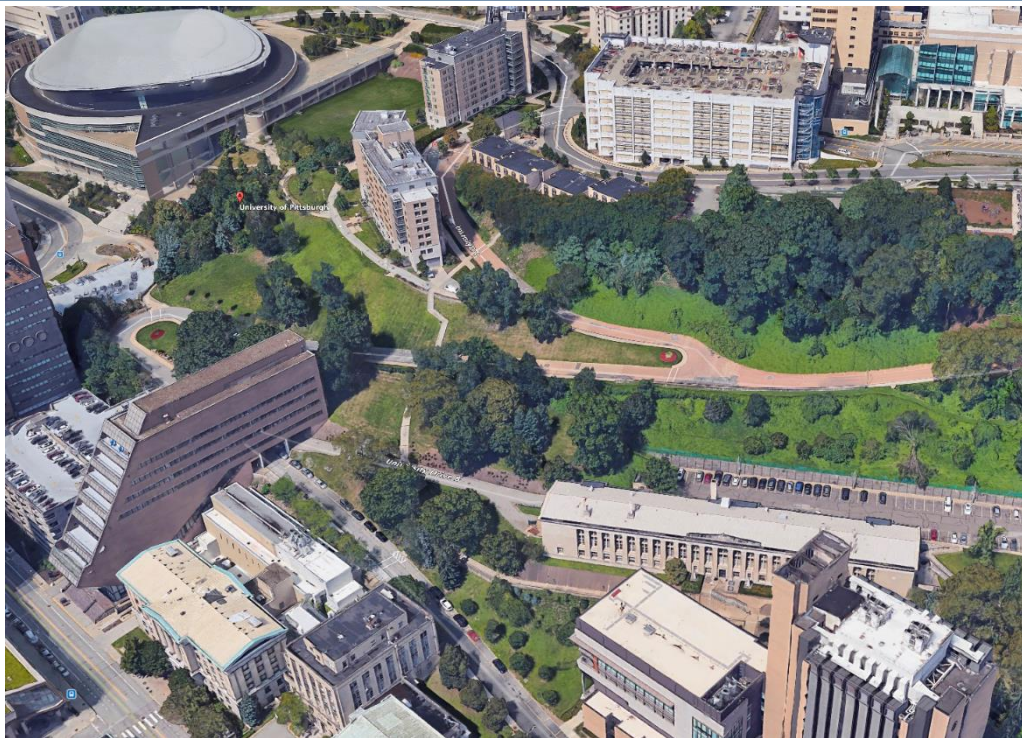


STORMWATER PLAN

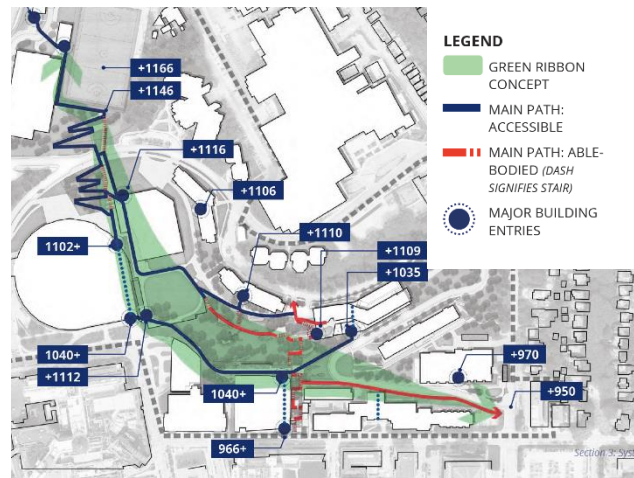
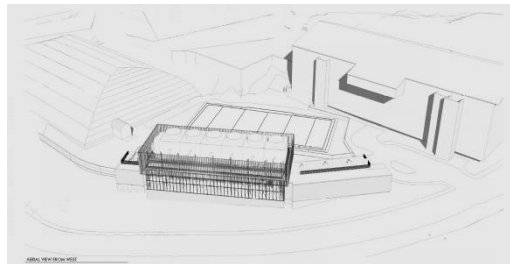
Questions



Hillside Today

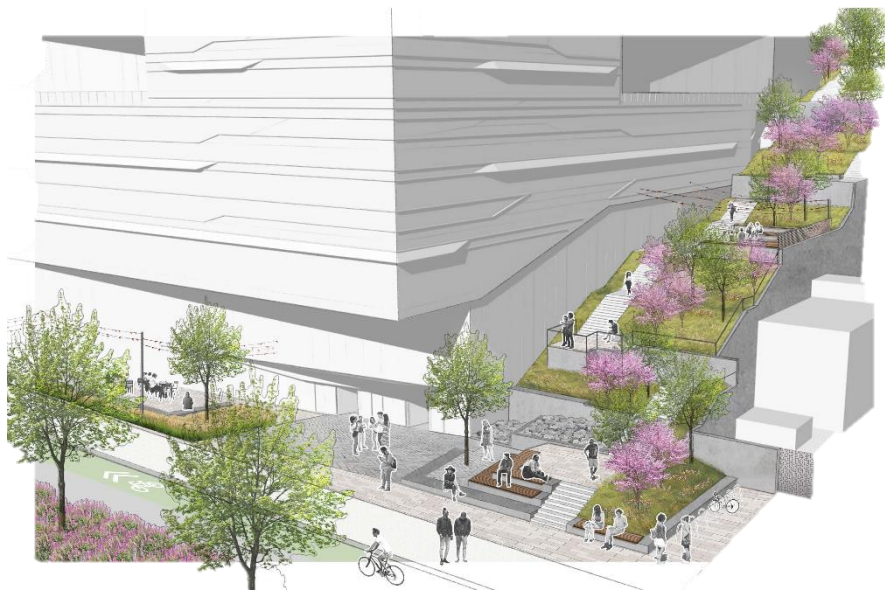


Buildings on the Hillside – Northwest to Southeast



The Hillside Transformed

Human Engaged Landscape – Community and Climate Change



Hillside Tomorrow



