

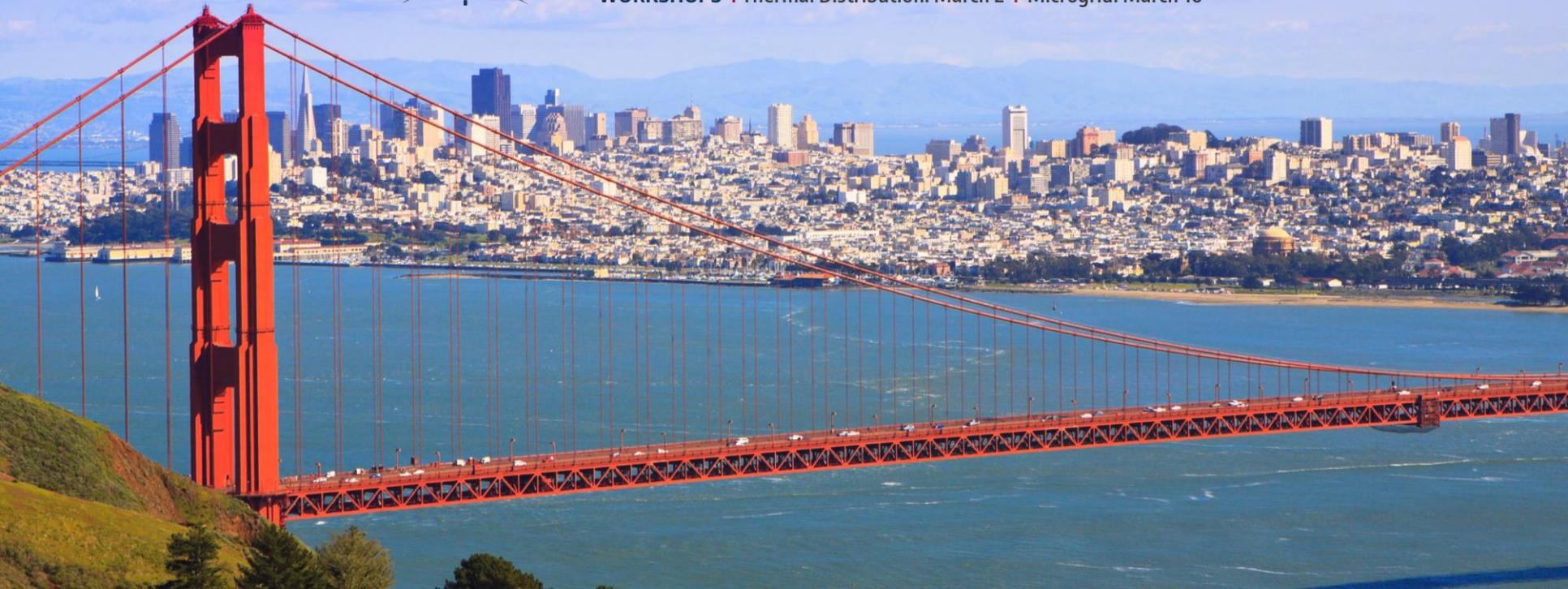


CampusEnergy2021

BRIDGE TO THE FUTURE

Feb. 16-18 | CONNECTING VIRTUALLY

WORKSHOPS | Thermal Distribution: March 2 | Microgrid: March 16





Modernizing Utilities while Expanding a Campus



University of
Pittsburgh

March 2021



CampusEnergy2021

BRIDGE TO THE FUTURE

Feb. 16-18 | CONNECTING VIRTUALLY

WORKSHOPS | Thermal Distribution: March 2 | Microgrid: March 16

AGENDA



University of Pittsburgh

- ▶ Overview
- ▶ Campus Growth
- ▶ Effects of Growth
- ▶ Solutions

OVERVIEW



University of Pittsburgh

► Oakland Campus

- Enrollment: 28,000 Students
- 3 Chilled Water Plants
- Installed CHW Tonnage
 - 33,000 TOTAL

	PLANT	TONS
PITT	POSVAR	12,800
	PETERSEN	5,200
UPMC	BST	15,000

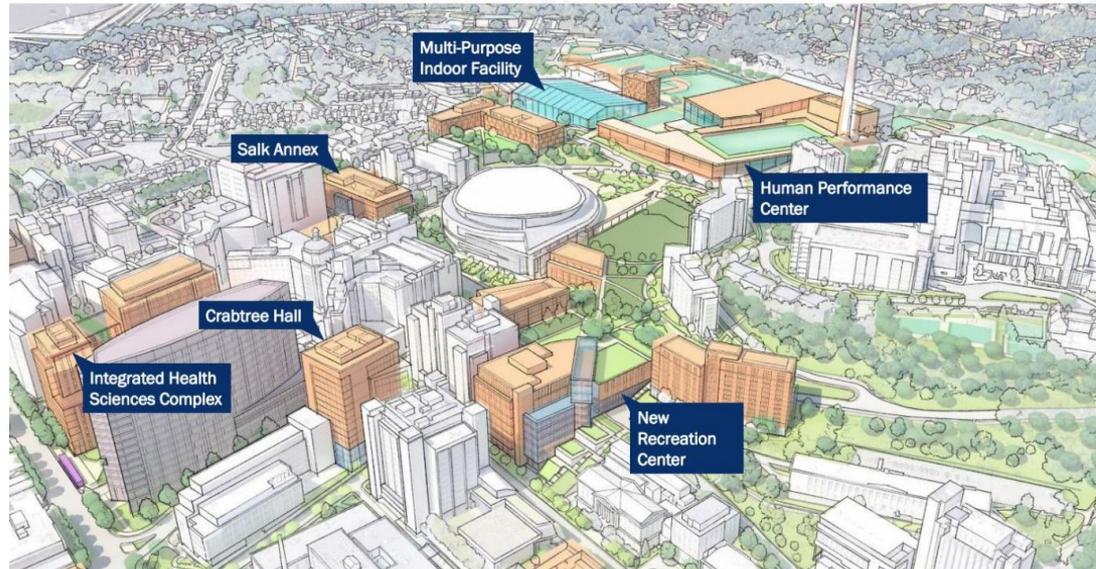
OVERVIEW



University of Pittsburgh

▶ CHW PROGRAM

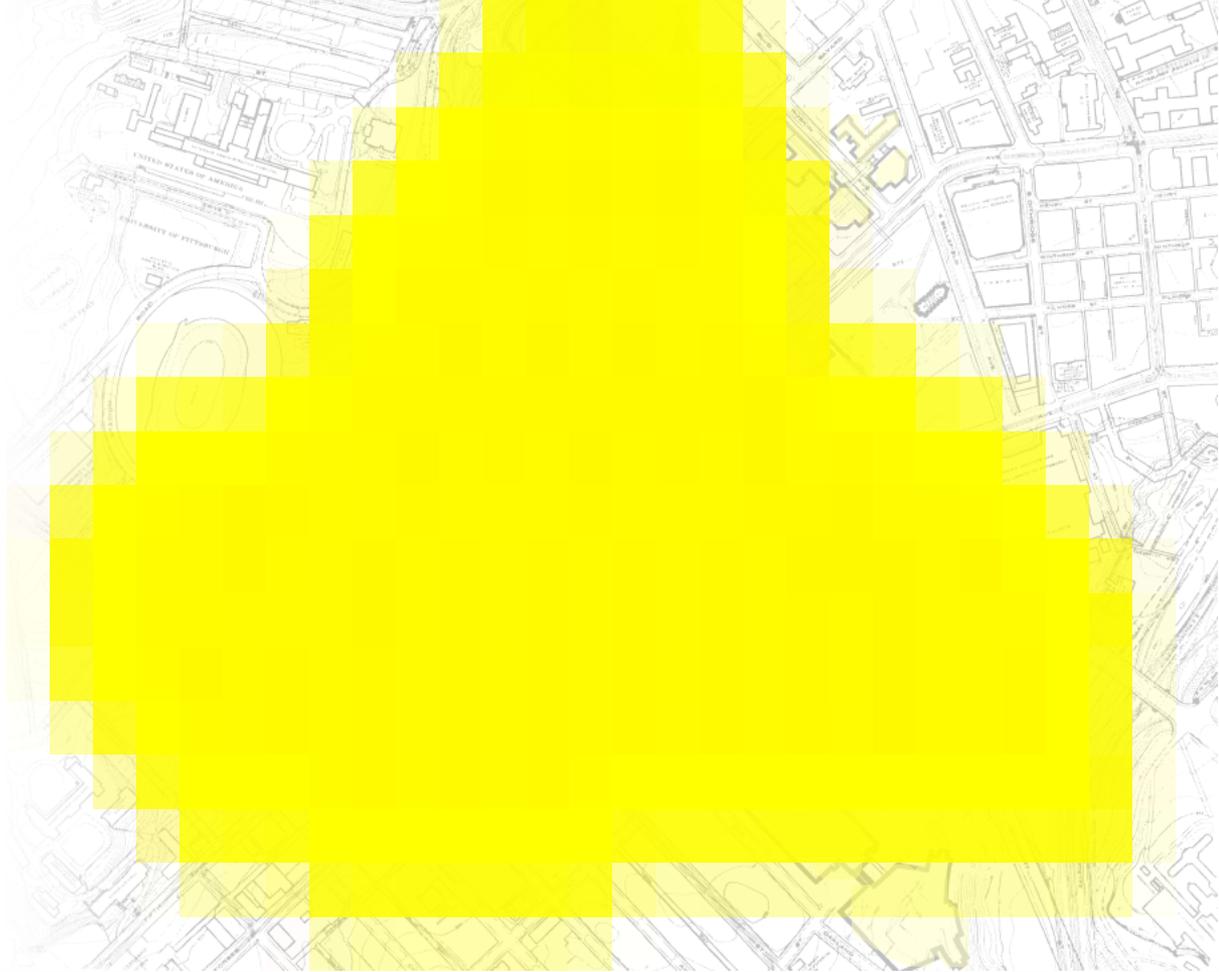
- NEW CHILLED WATER PLANT
 - 15,000 TONS
- RENOVATIONS TO EXISTING CHILLED WATER PLANT
 - OPERATIONAL AND EFFICIENCY IMPROVEMNTS
- EXTENSIVE CHW & RWC
- DISTRIBUTION PIPING



CAMPUS GROWTH

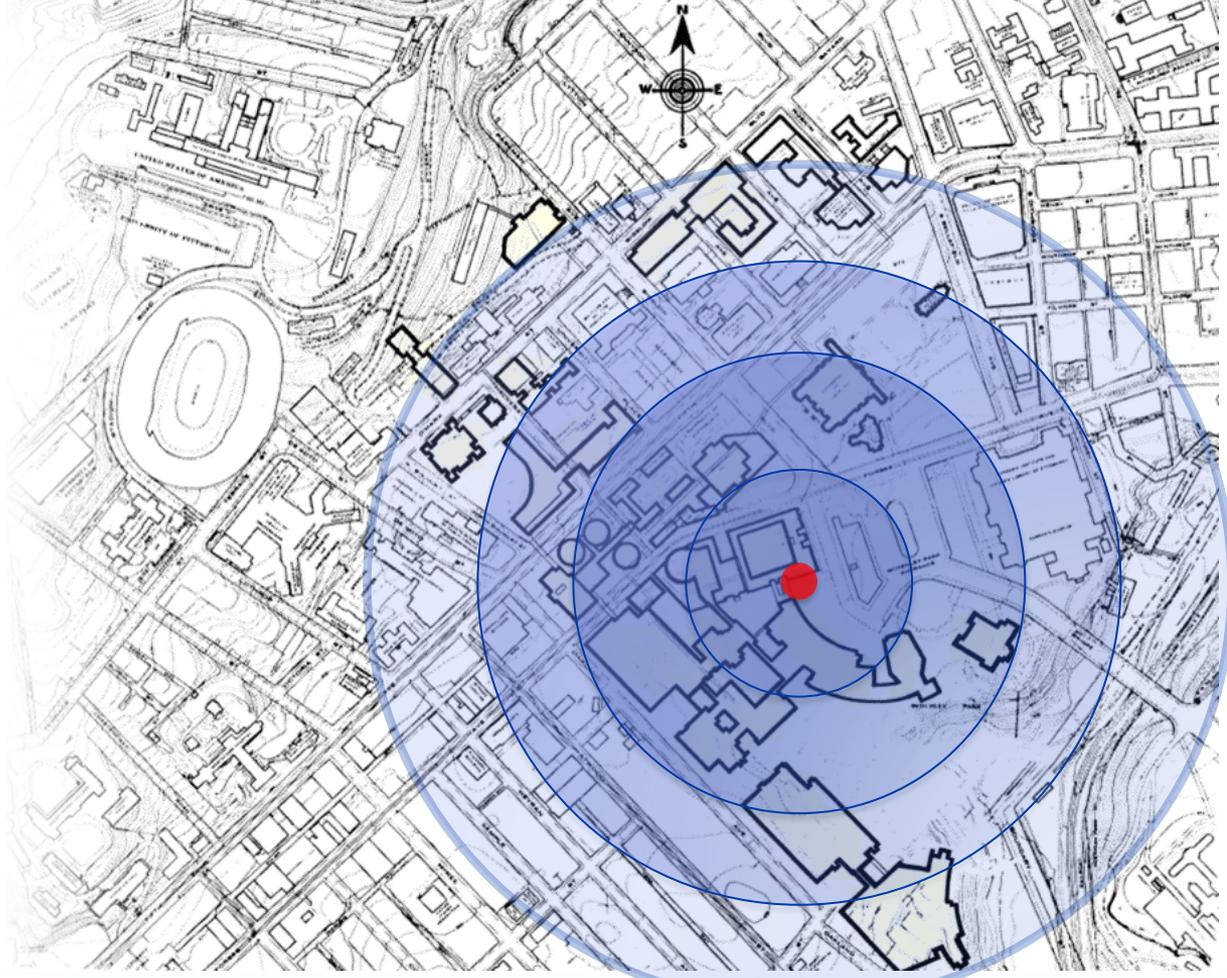
▶ Original Campus CHW Plan

- CHW Plant designed to be in the center of the loads (1962)



CAMPUS GROWTH

- ▶ Original Campus CHW Plan
 - CHW Plant designed to be in the center of the loads (1962)



CAMPUS GROWTH

▶ Original Campus CHW Plan

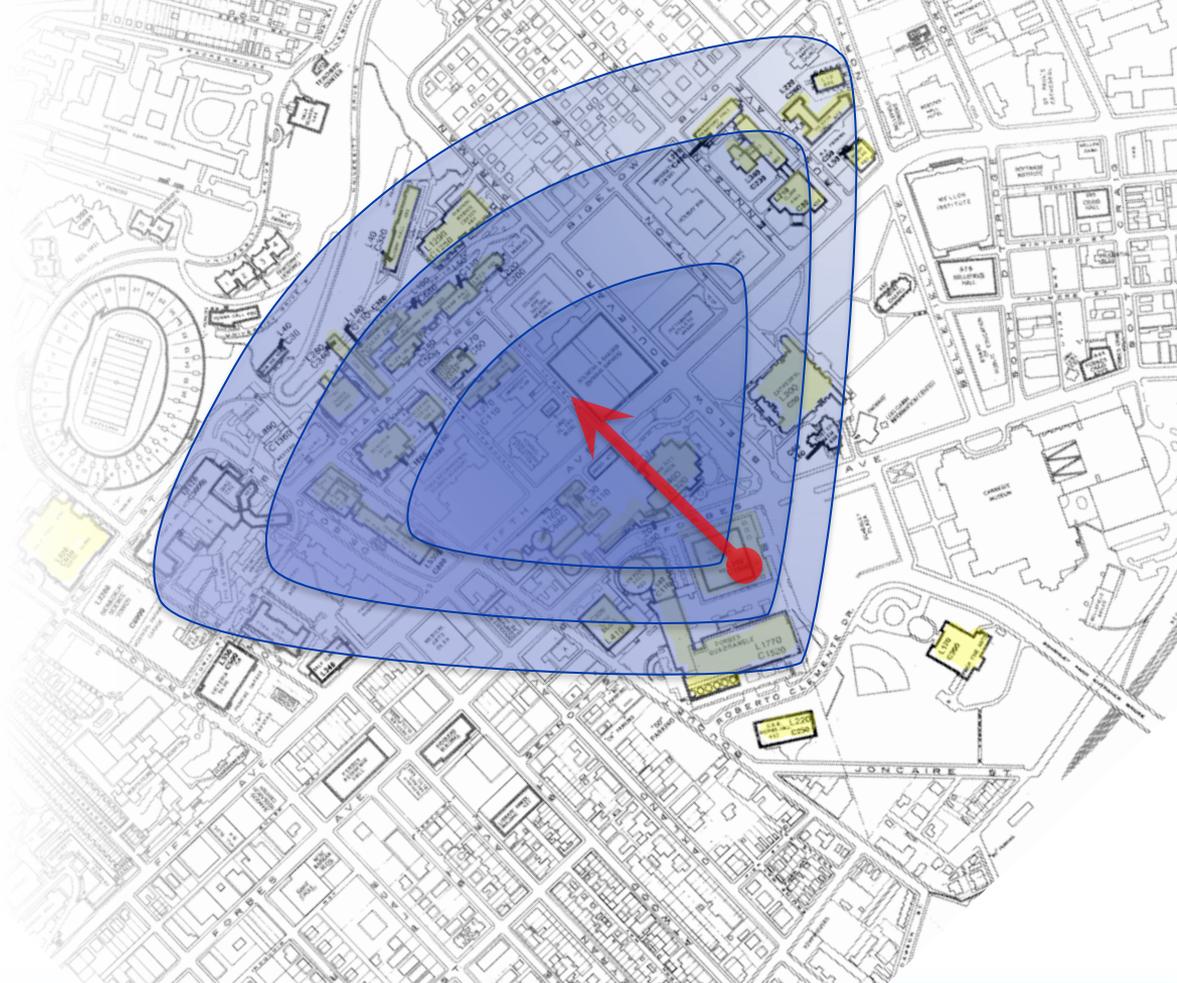
- CHW Plant designed to be in the center of the loads (1962)

▶ 1992 Plan

- CHW density shifted North and East

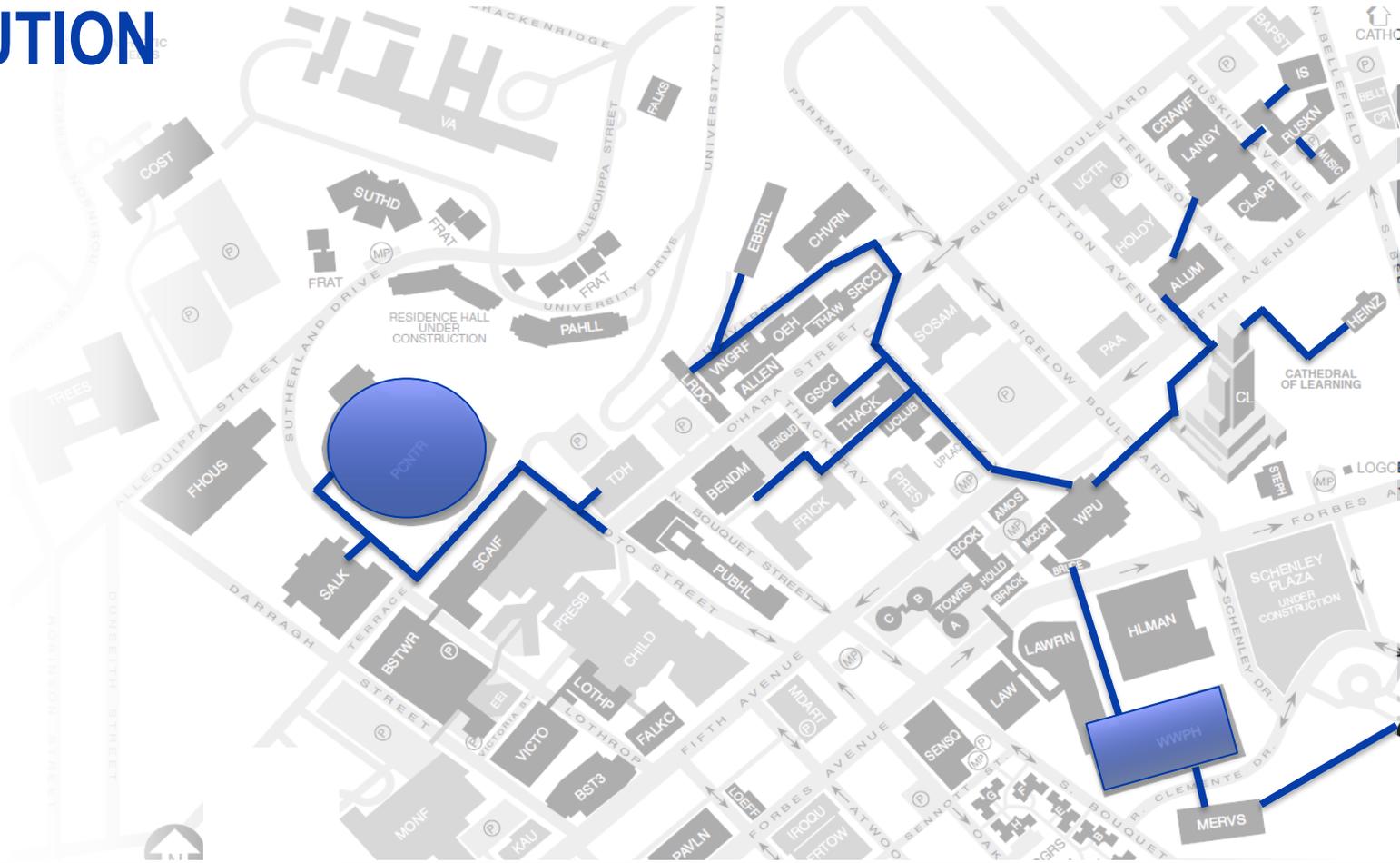
▶ Now & Future

- More Growth toward the North and East



DISTRIBUTION

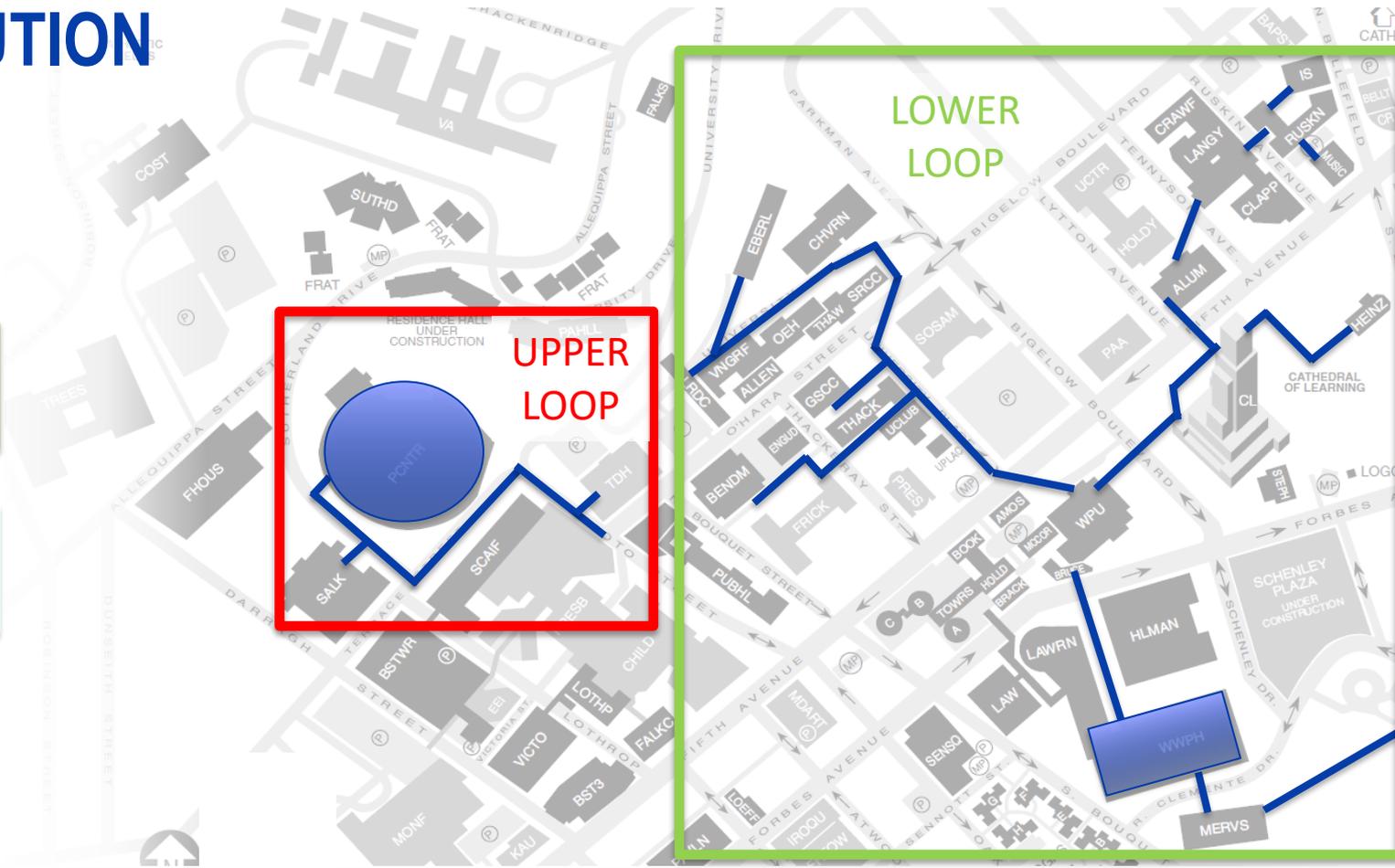
EXISTING



DISTRIBUTION

EXISTING

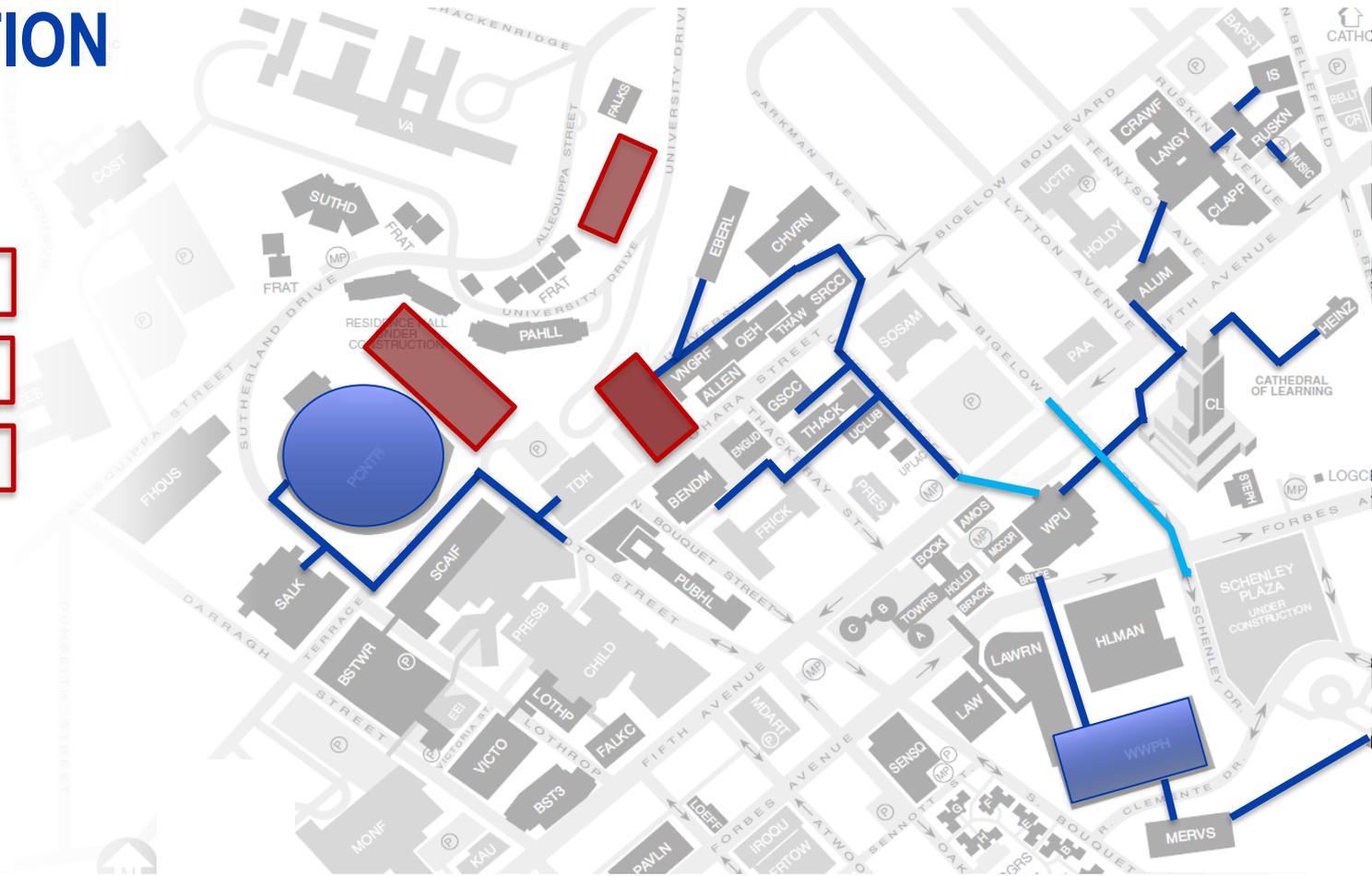
- POSVAR
- PETERSEN



DISTRIBUTION

FUTURE

- NEW REC CENTER
- NEW ARENA
- HOUSING

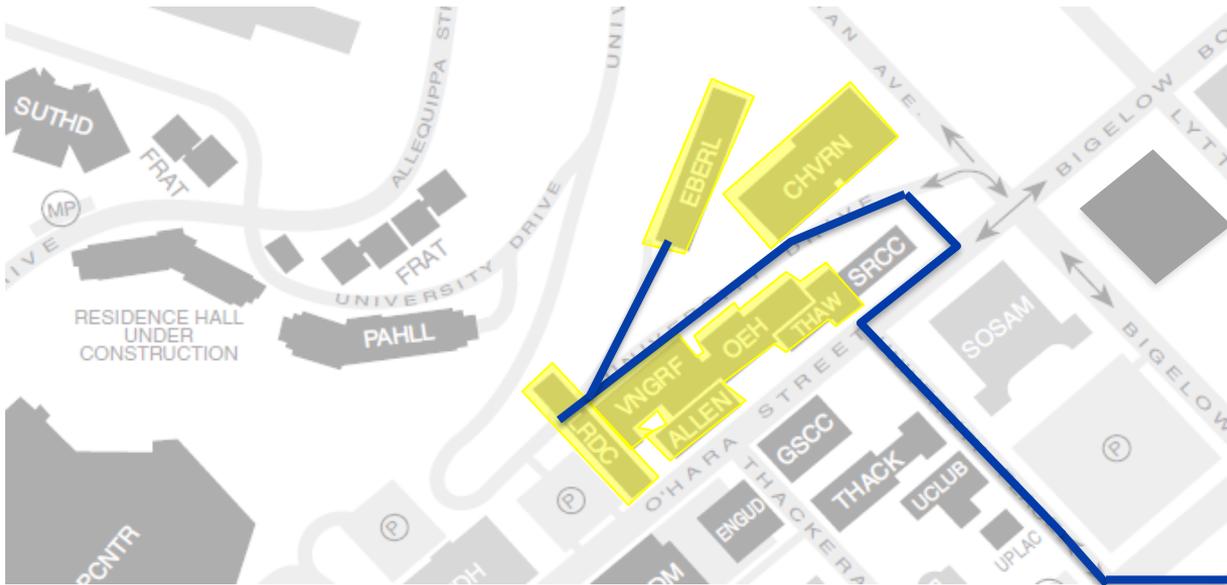


DISTRIBUTION

- MID CAMPUS

EXISTING

- ACCESS VIA UNIVERSITY DR.

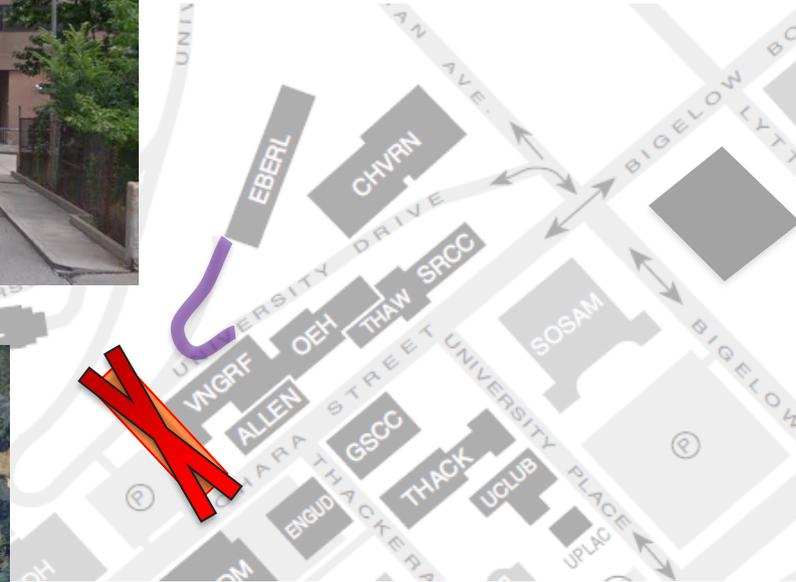


DISTRIBUTION

- MID CAMPUS

NEW REC CENTER

- CONSTRUCTION/
DEMOLITION
- LIMITED
ACCESS
- NEW ROAD
DESIGN



DISTRIBUTION

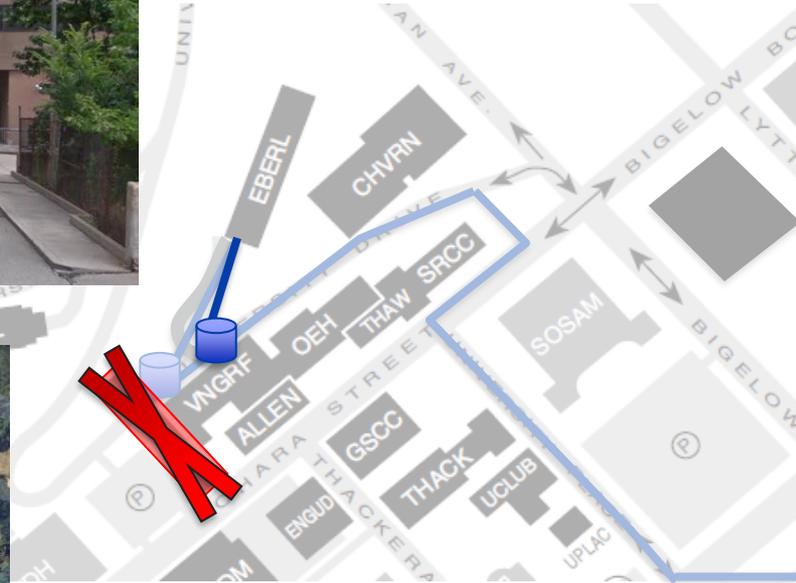
- MID CAMPUS

NEW REC CENTER

- CONSTRUCTION/
DEMOLITION
- LIMITED
ACCESS
- NEW ROAD
DESIGN



RESIDENCE HALL
UNDER



DISTRIBUTION

- MID CAMPUS

EXISTING

SERVED BY

- POSVAR

- PETERSEN
- NEW CHILLER PLANT
- UPMC



DISTRIBUTION

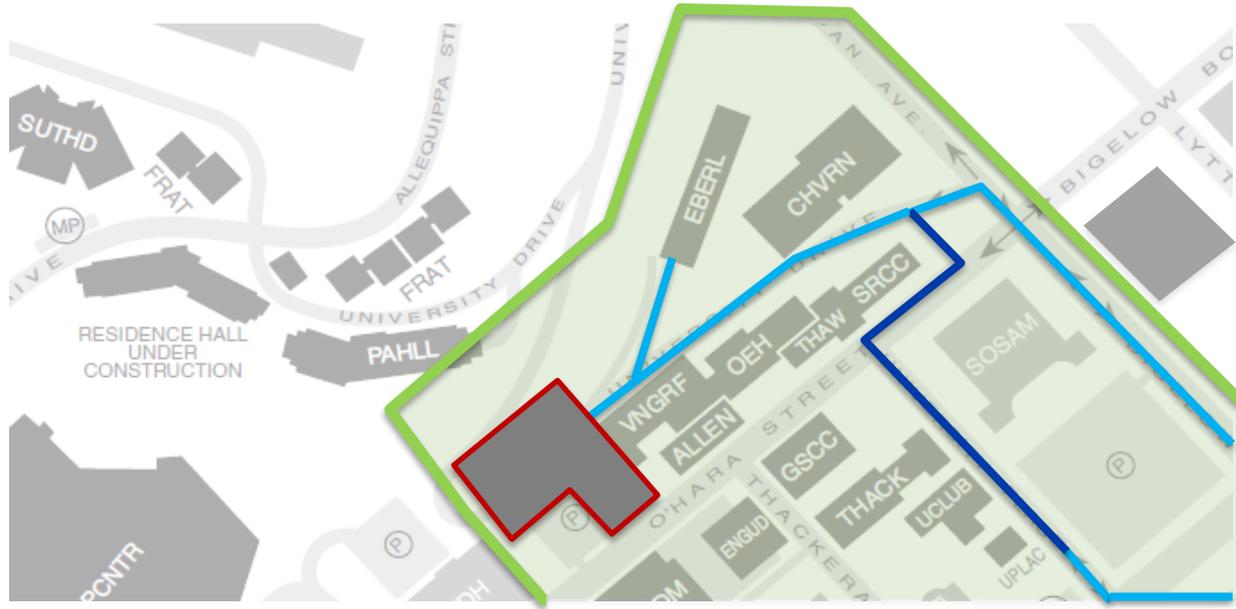
- MID CAMPUS

NEW REC CENTER

SERVED BY

POSVAR

- PETERSEN
- UPPER CAMPUS CHILLED WATER PLANT
- UPMC



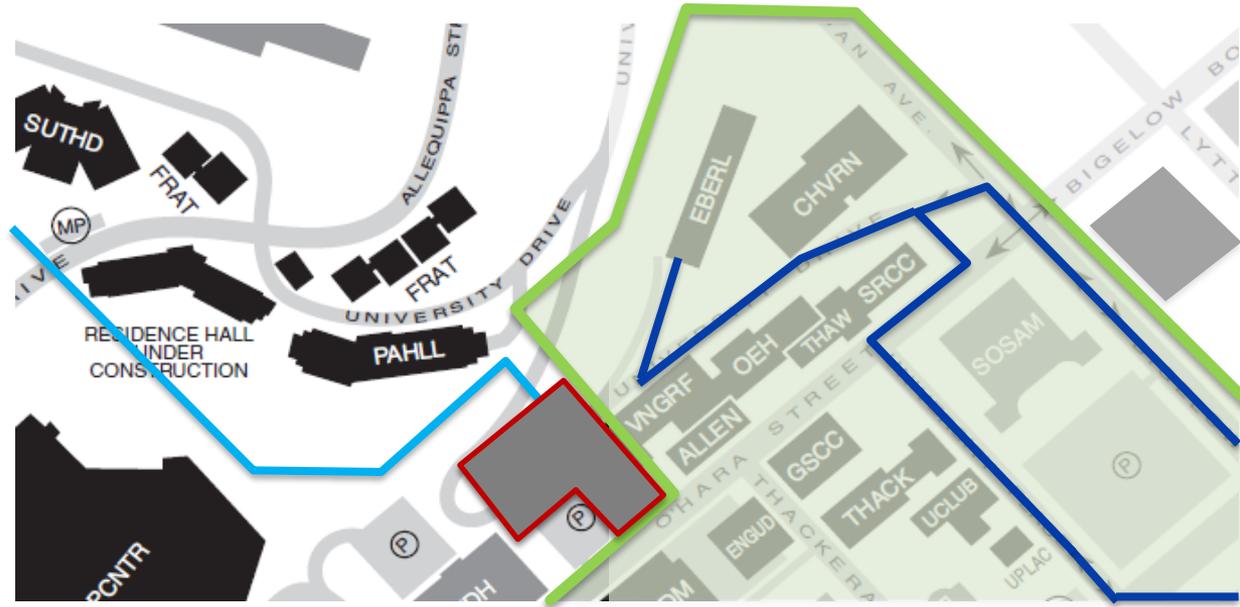
DISTRIBUTION

- MID CAMPUS

NEW REC CENTER

SERVED BY

- POSVAR
- PETERSEN
- UPPER CAMPUS CHILLED WATER PLANT
- UPMC



DISTRIBUTION

- MID CAMPUS

FUTURE

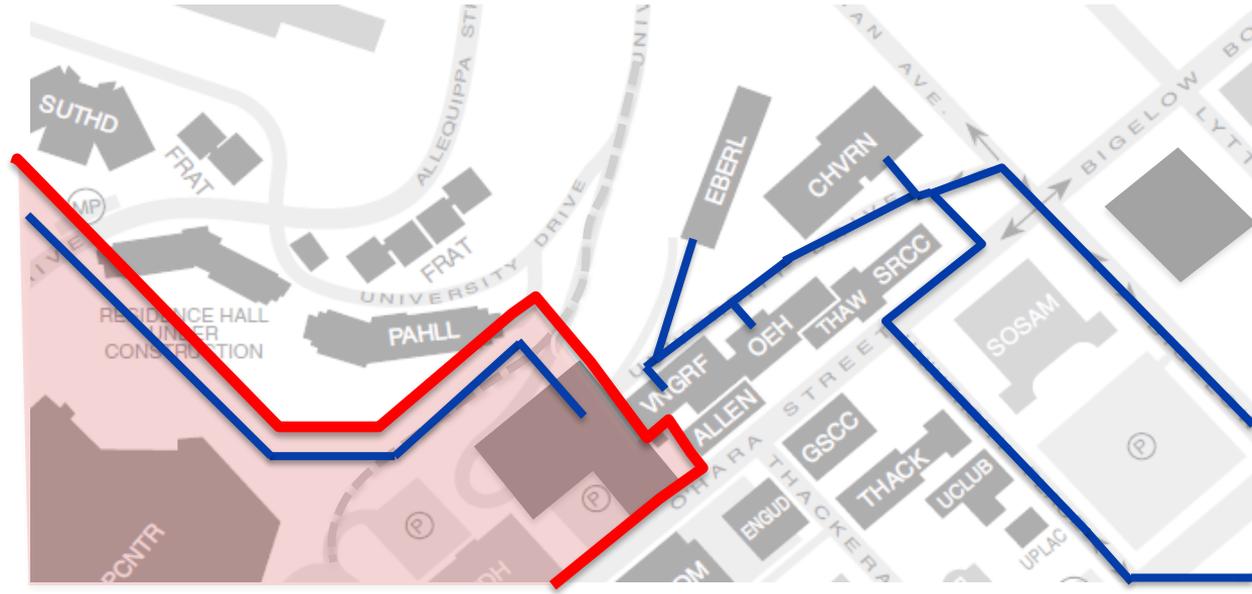
SERVED BY

- POSVAR

- PETERSEN

- UPPER CAMPUS
CHILLED WATER
PLANT

- UPMC



DISTRIBUTION

- MID CAMPUS

FUTURE

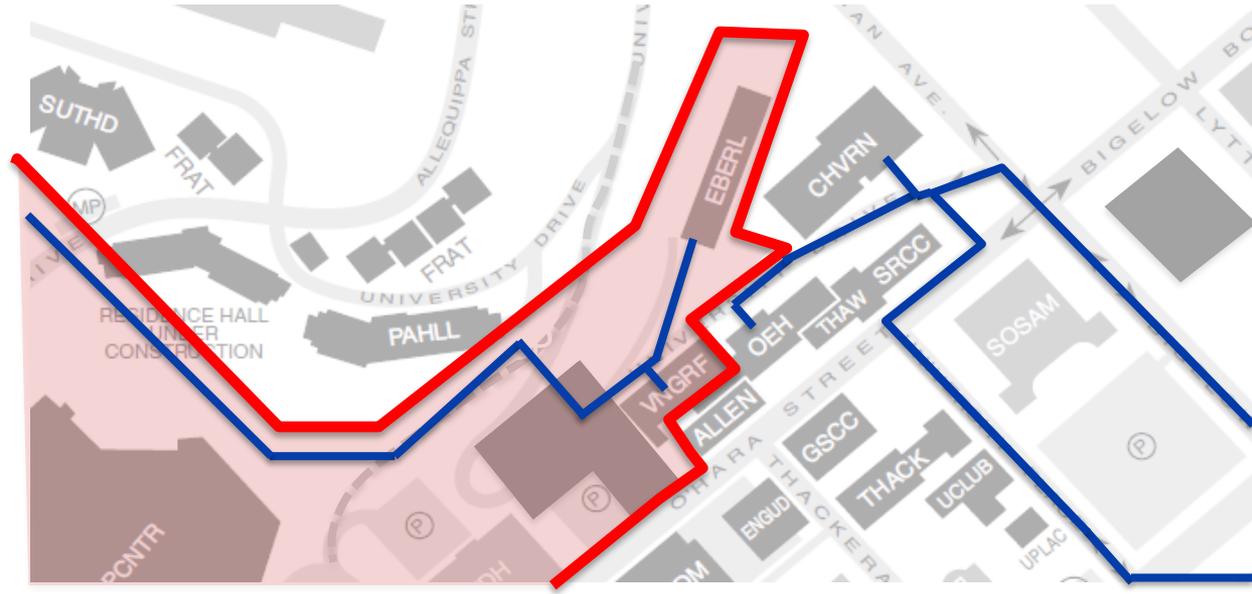
SERVED BY

- POSVAR

- PETERSEN

- UPPER CAMPUS
CHILLED WATER
PLANT

- UPMC



DISTRIBUTION

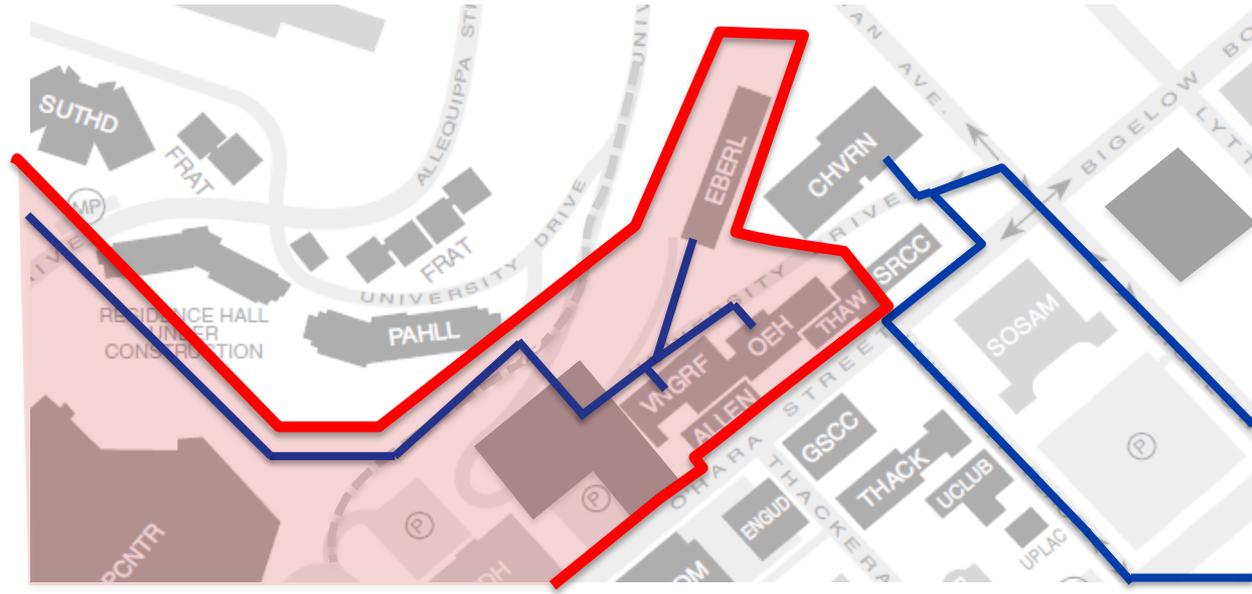
- MID CAMPUS

FUTURE

SERVED BY

- POSVAR

- PETERSEN
- UPPER CAMPUS
CHILLED WATER
PLANT
- UPMC



DISTRIBUTION

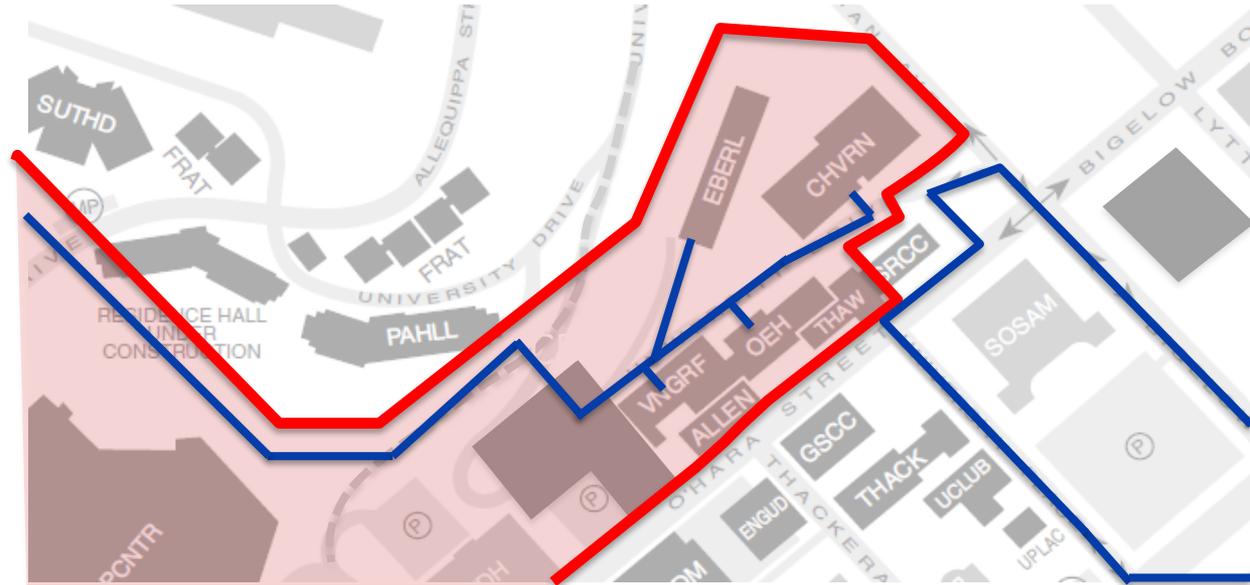
- MID CAMPUS

FUTURE

SERVED BY

- POSVAR

- PETERSEN
- UPPER CAMPUS
CHILLED WATER
PLANT
- UPMC



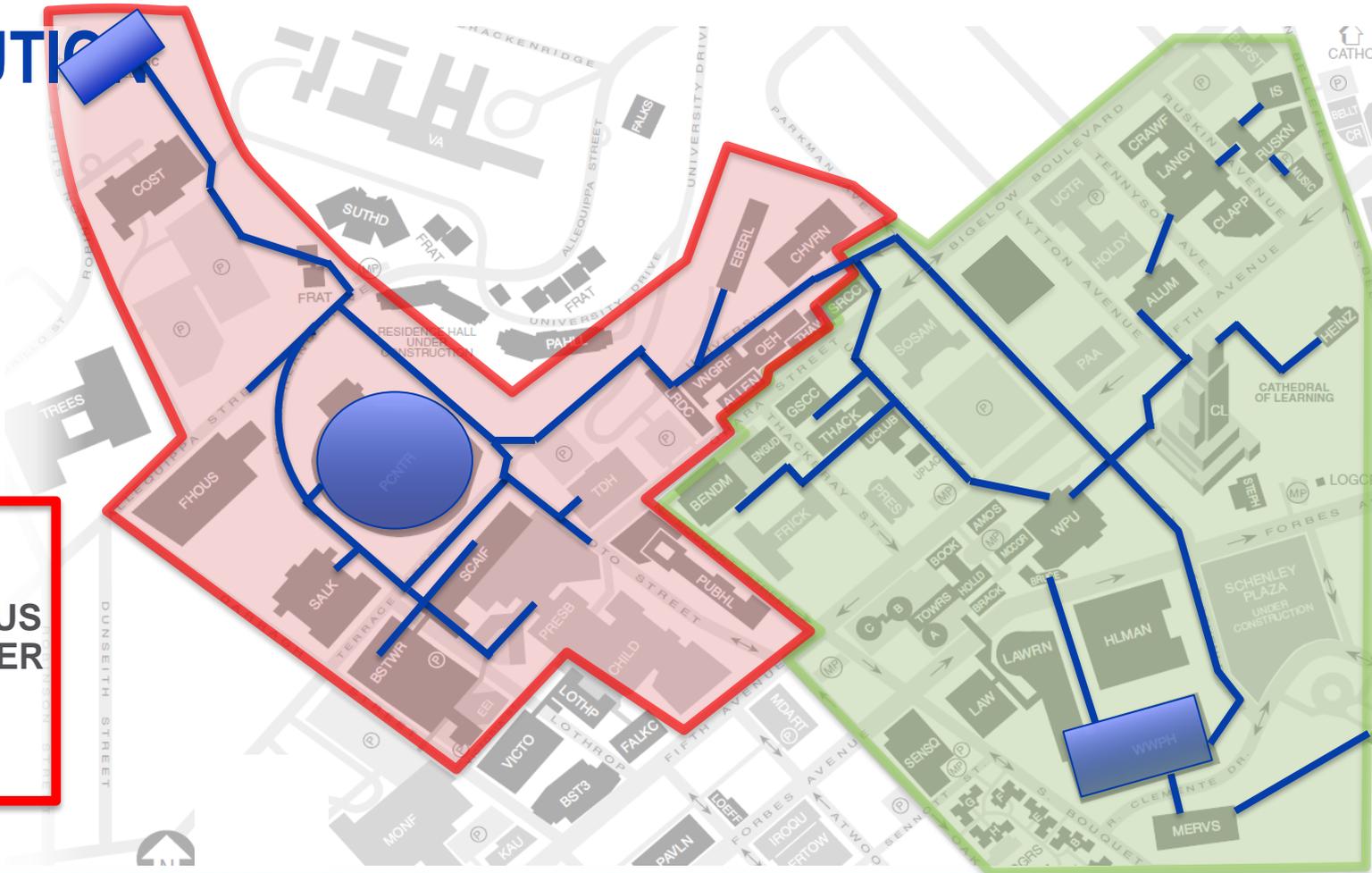
DISTRIBUTION

- MID CAMPUS

FUTURE

SERVED BY

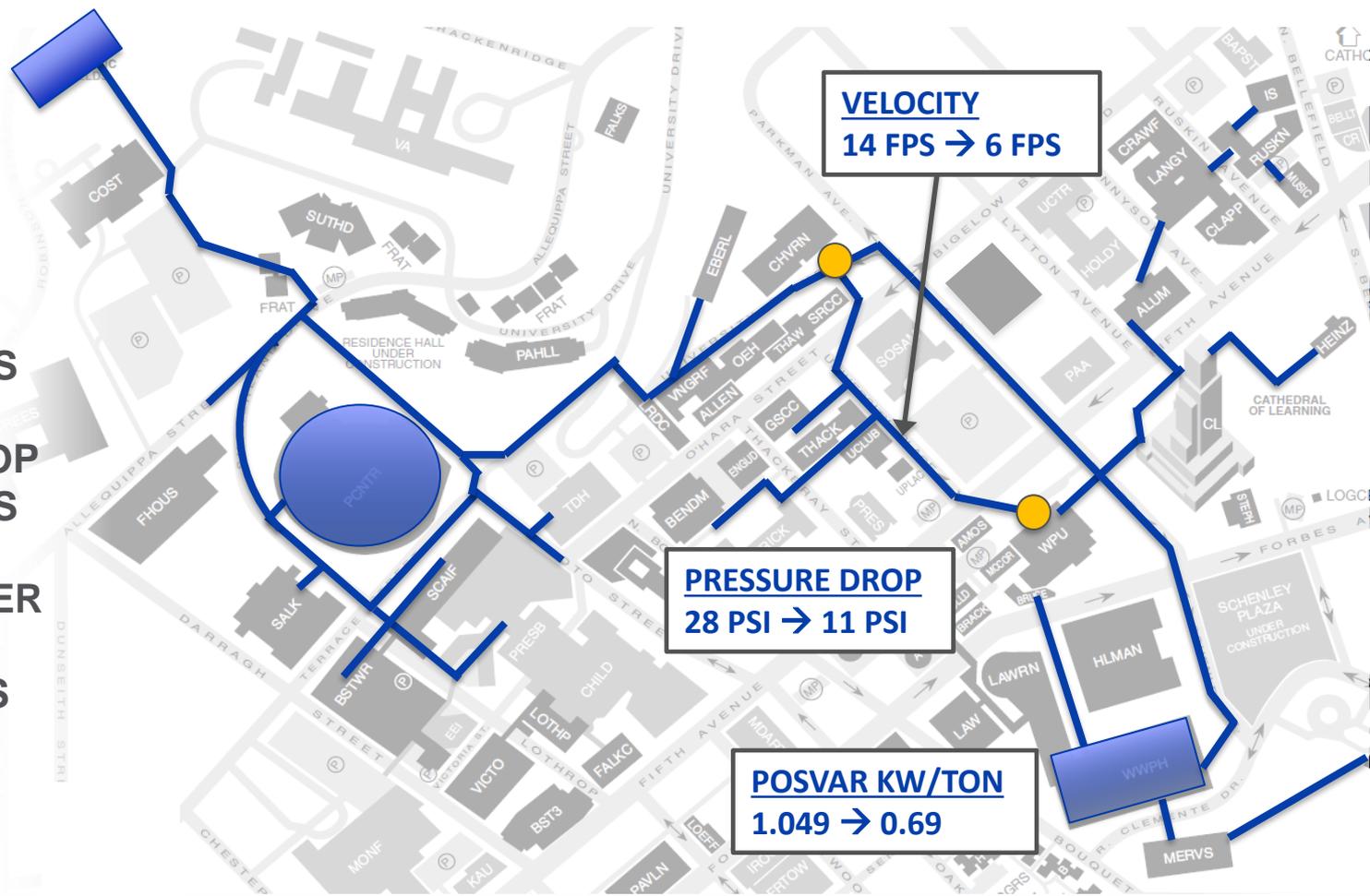
- POSVAR
- PETERSEN
- UPPER CAMPUS CHILLED WATER PLANT
- UPMC



RESULTS

MODELED

- VELOCITY IMPROVEMENTS
- PRESSURE DROP IMPROVEMENTS
- POSVAR CHILLER PLANT MODIFICATIONS



ADDED CAPACITIES

- ▶ UPPER CAMPUS CHILLED WATER PLANT



ADDED CAPACITIES

▶ UPPER CAMPUS CHILLED WATER PLANT

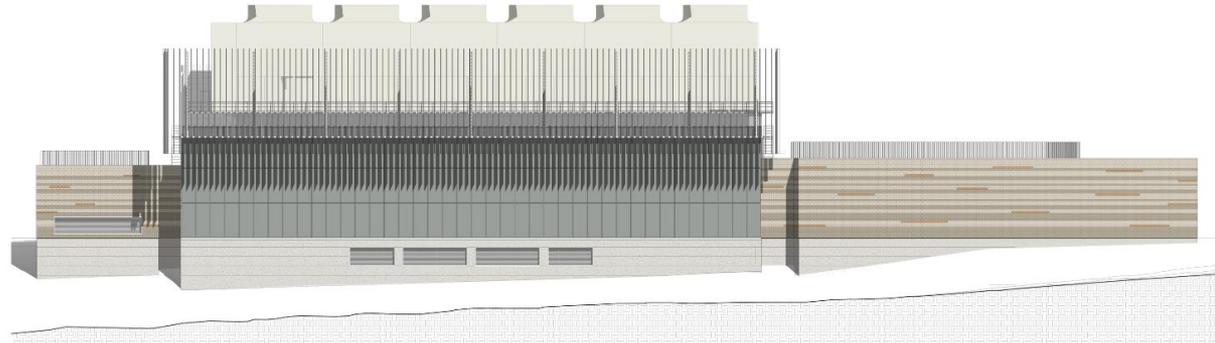
- 15,000 Tons Total
- Variable Primary
- 5 kV Substation



EAST ELEVATION

▶ PLANT AVG KW/TON

- 0.557



WEST ELEVATION

PROGRESS

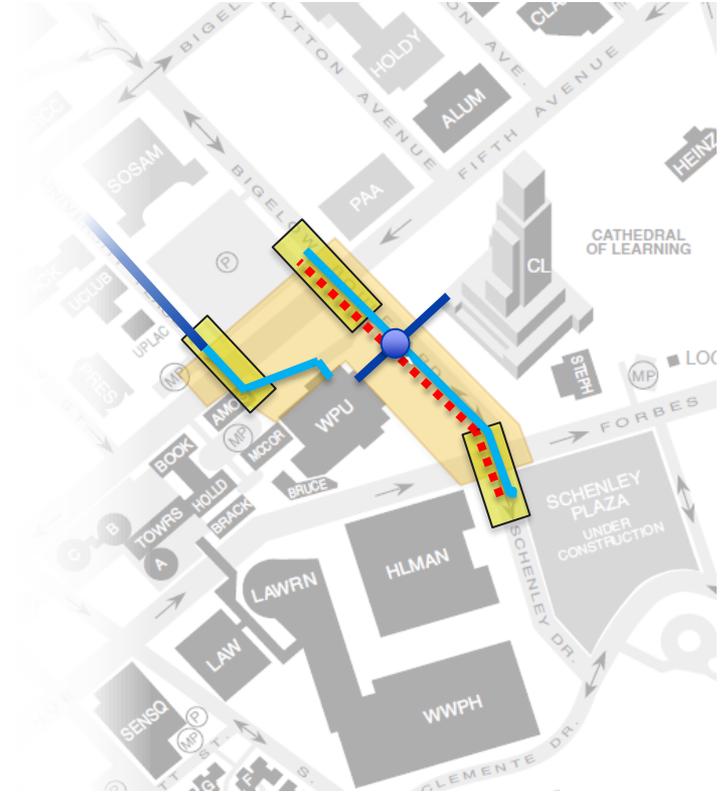
► BIGELOW DISTRIBUTION



PROGRESS

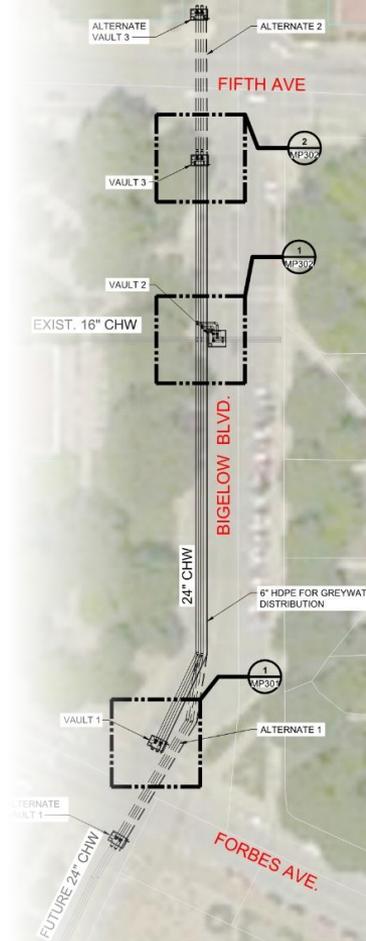
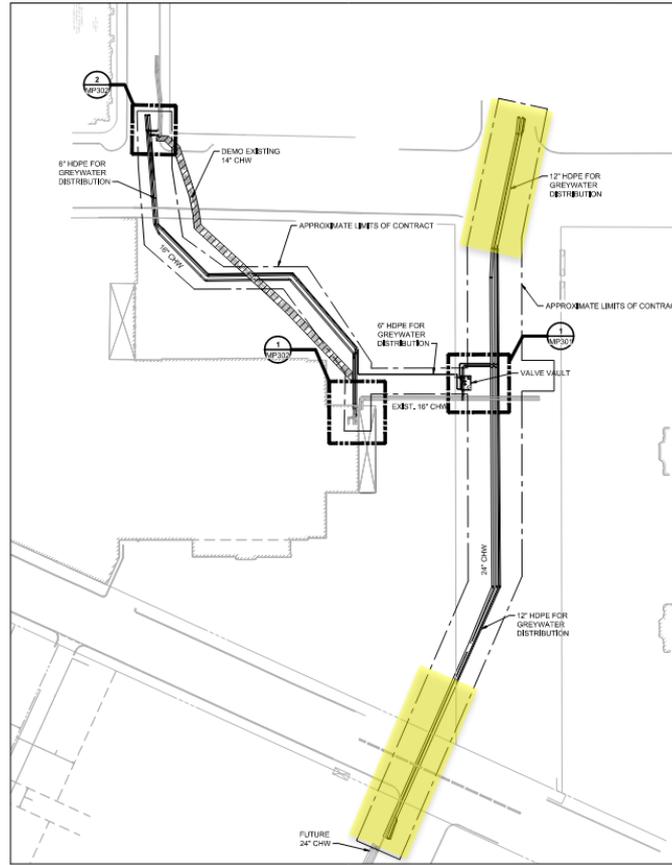
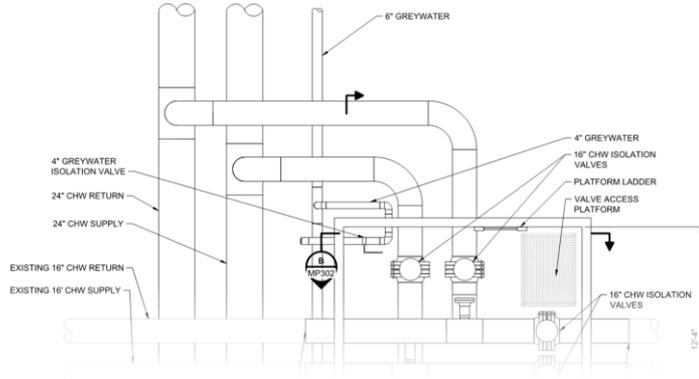
► BIGELOW DISTRIBUTION

- Chilled Water & Greywater Collection
- 5KV Ductbank
- Bores under streets
- CHW Vault



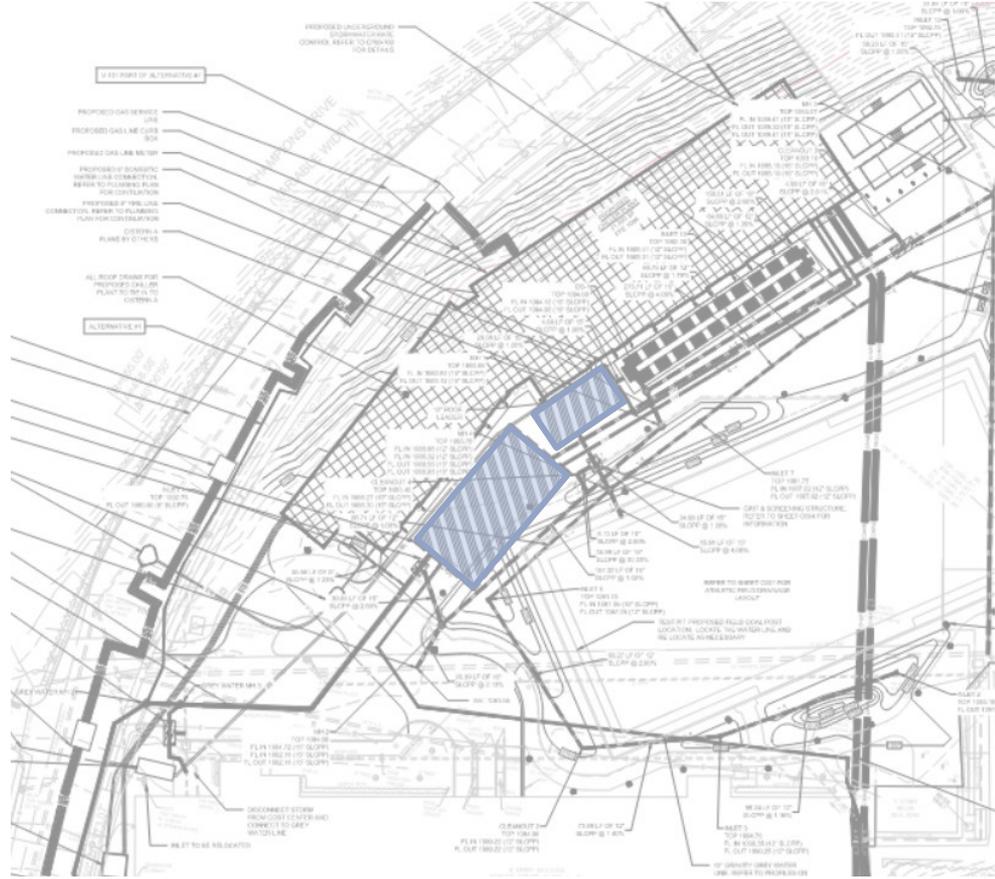
PROGRESS

► BIGELOW DISTRIBUTION



SUSTAINABILITY

► GREYWATER COLLECTION



SUSTAINABILITY

▶ Key Targets from Pitt's **Sustainability Plan**:

- Reduce greenhouse gas (GHG) emissions by 50%
- Produce or procure at least 50% of campus electric energy from renewable sources
- Achieve an **energy use intensity** that is at least 50% below the national average - 120
- Achieve water use intensity that is 50% below the district average



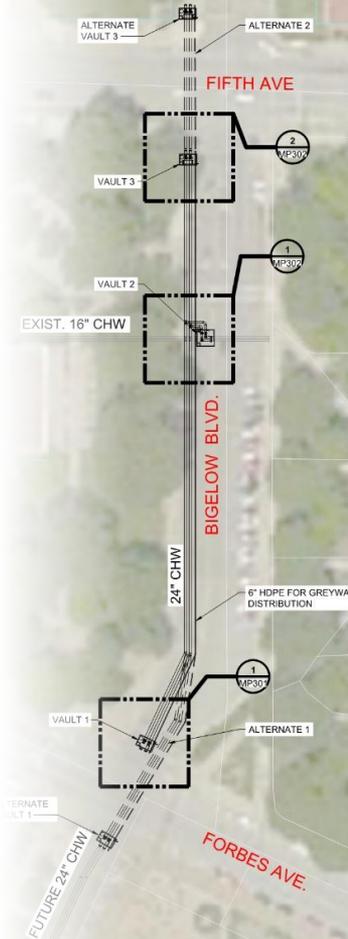
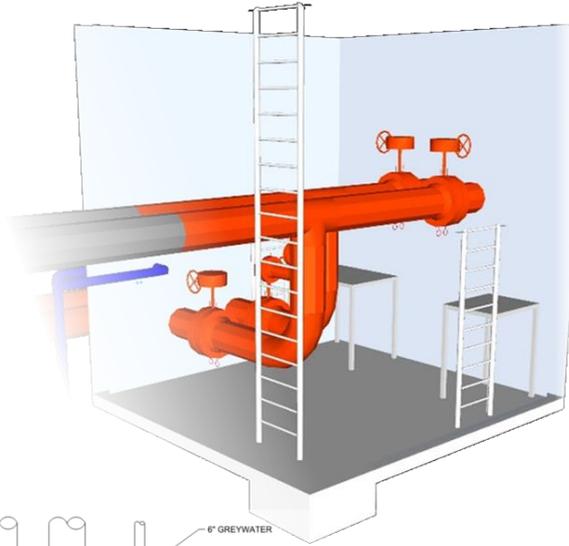
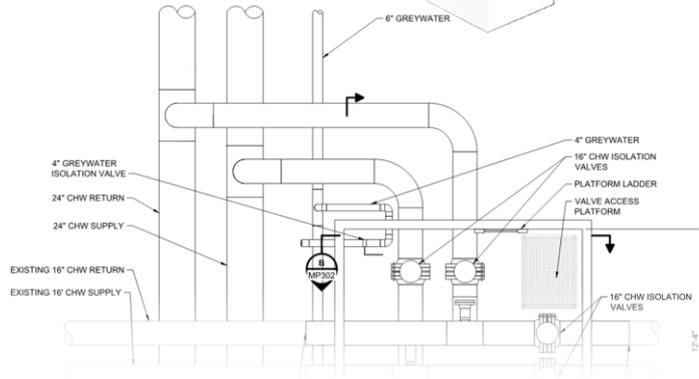
STEWARDSHIP

EXPLORATION

COMMUNITY & CULTURE

COORDINATION

- ▶ Adjacent Properties
- ▶ Internal Departments
- ▶ Understand Limitations



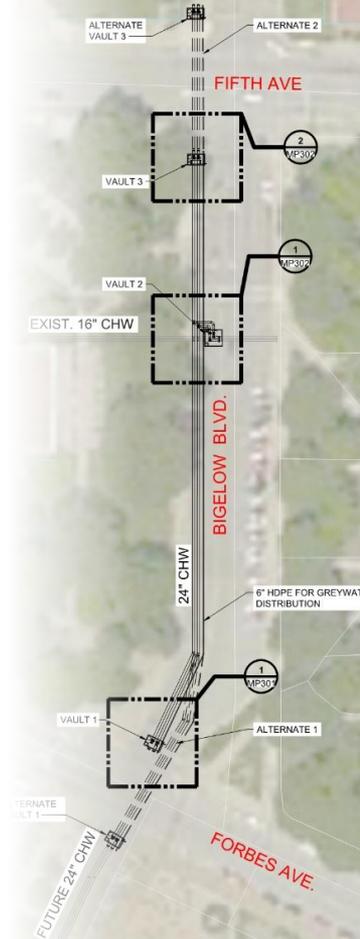
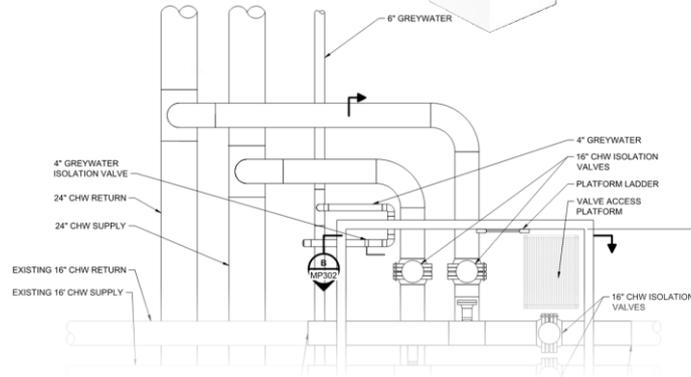
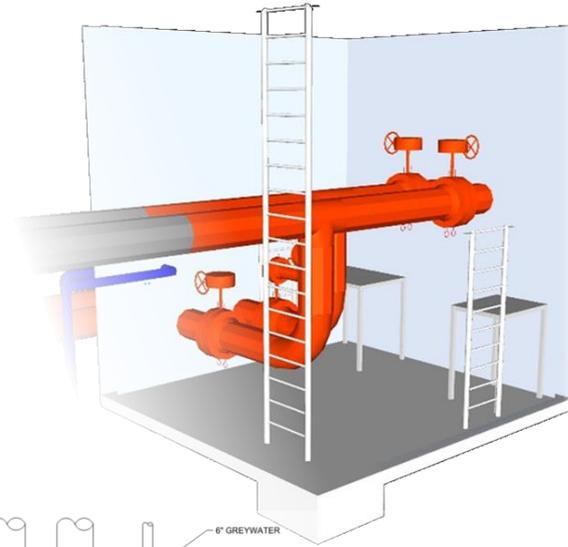
COORDINATION

▶ Adjacent Properties

- Campus & Health Care
 - UPMC Renovations
 - Capacity Study incorporating both Campuses
 - Share N+1 Equipment
 - Taps for future connection

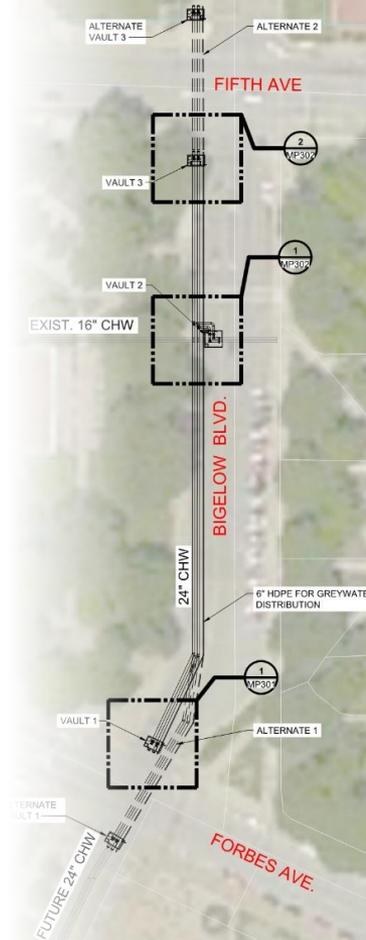
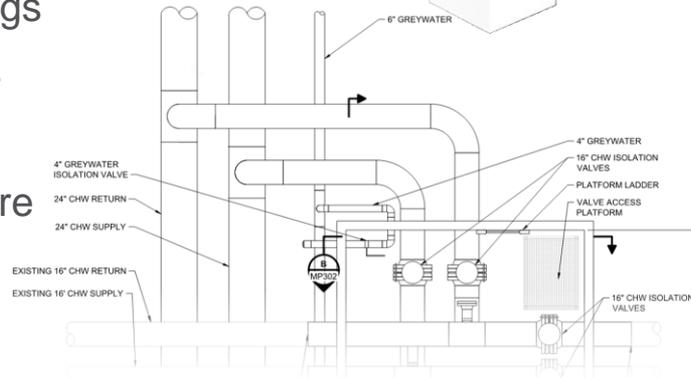
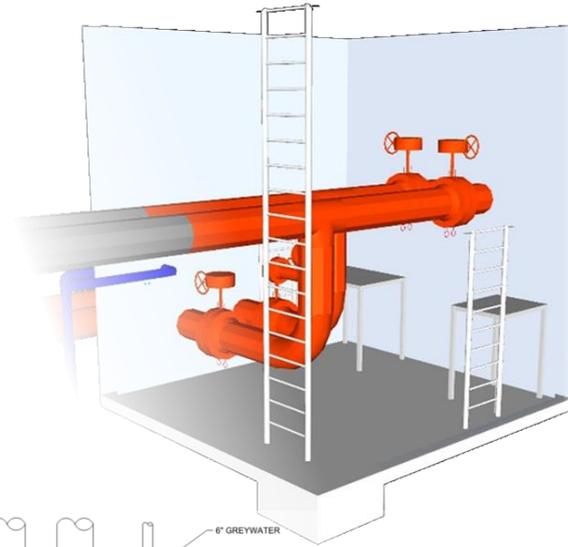
▶ Internal Departments

▶ Understand Limitations



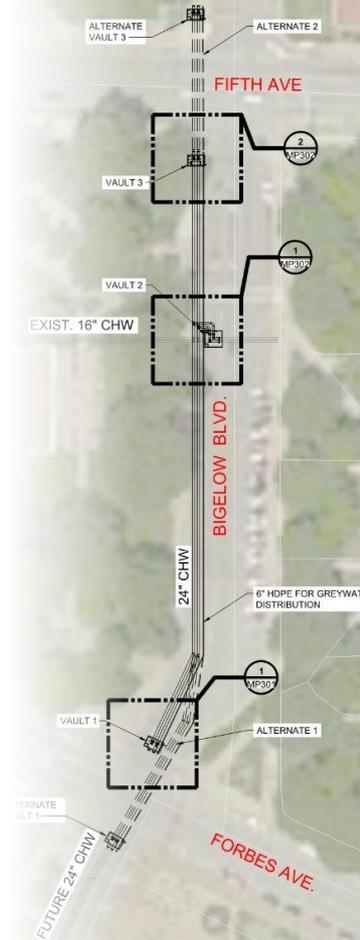
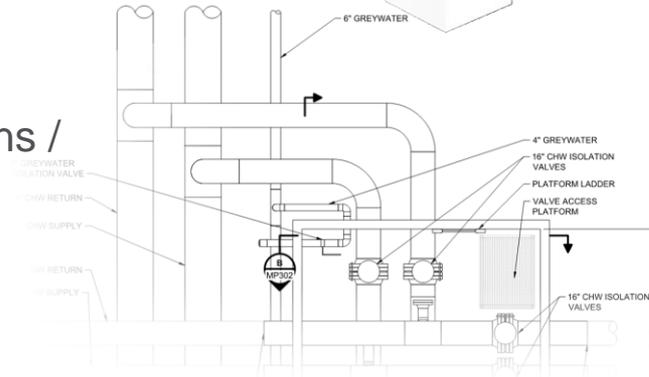
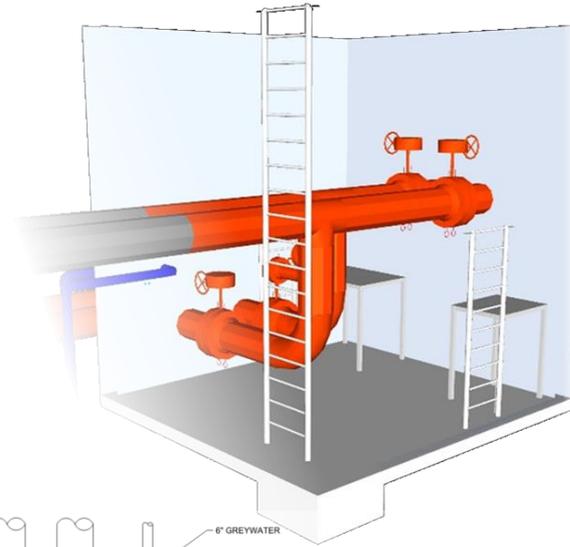
COORDINATION

- ▶ Adjacent Properties
- ▶ Internal Departments
 - Campus Development
 - New building loads / locations
 - Resurfacing roads
 - Electrical
 - 5kV Distribution for future buildings
 - Redundant feeds for major loads
 - Sustainability
 - Rainwater Collection infrastructure
 - EUI, GHG Goals
- ▶ Understand Limitations



COORDINATION

- ▶ Adjacent Properties
- ▶ Internal Departments
- ▶ Understand Limitations
 - Allowable / Scheduled Outages:
 - Labs
 - Hospitals
 - Plan for loops for future shutdowns / redundancy
 - Temporary Chiller Connections
 - Fire Department Access





CREATE AMAZING.