SUNY Downstate Medical Center

REACHING NEW DEPTHS

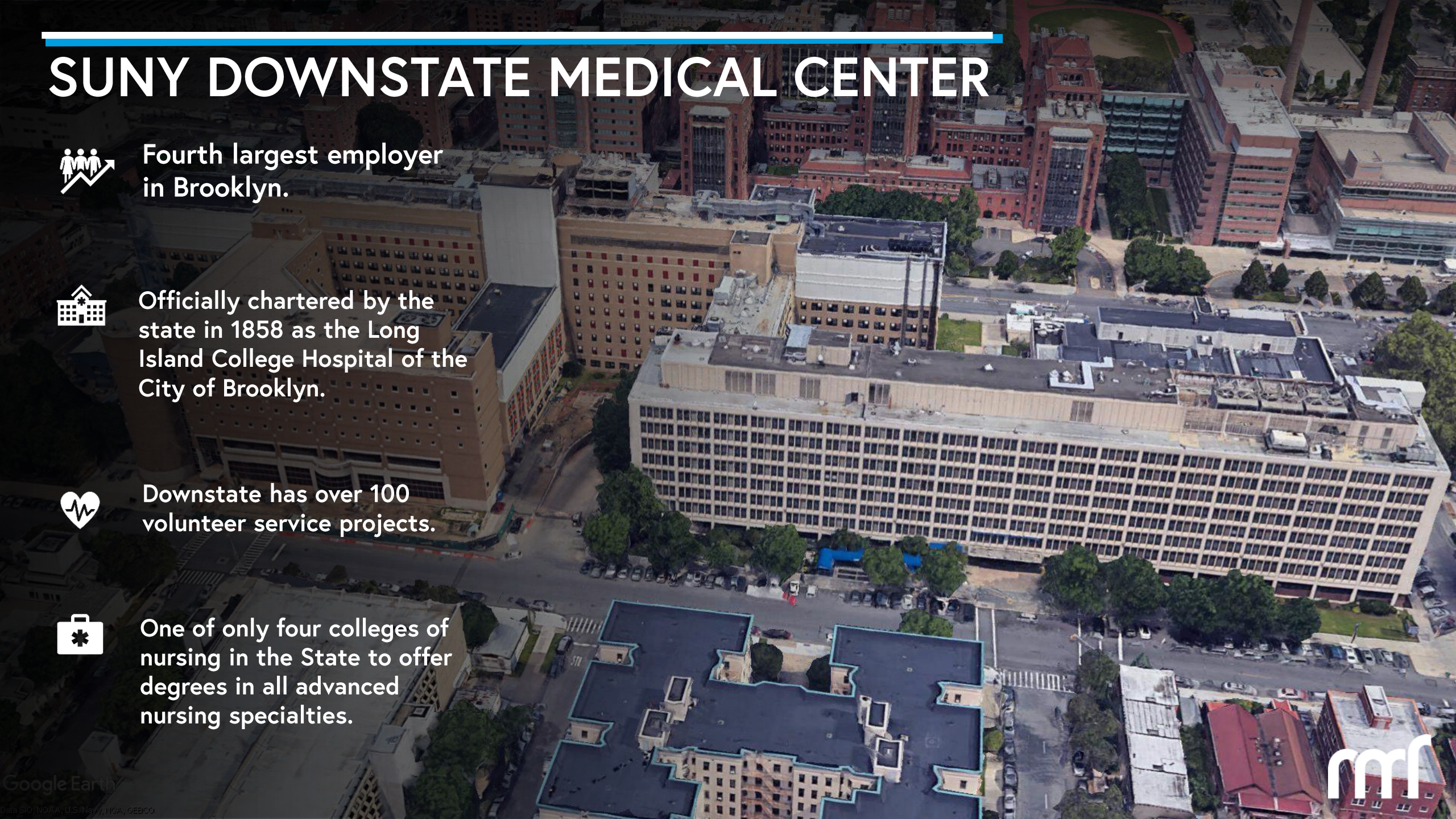
HOW A HOSPITAL MODERNIZED A SUBSURFACE DISTRICT ENERGY PLANT

IDEA Campus Energy 2019 Pittsburgh, PA | Presented by Dave Ohler, PE

RMF Engineering
Reliability. Efficiency. Integrity.

Google Earth
Image Landsat / Copernicus

SUNY DOWNSTATE MEDICAL CENTER



- Fourth largest employer in Brooklyn.
- Officially chartered by the state in 1858 as the Long Island College Hospital of the City of Brooklyn.
- Downstate has over 100 volunteer service projects.
- One of only four colleges of nursing in the State to offer degrees in all advanced nursing specialties.

Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

EXISTING CAMPUS UTILITIES

2 Electric Service Vaults from CON ED,
1 Natural Gas Feed from National Grid

Central Steam Boiler Plant

Maintains 24 hour 140 PSIG saturated steam supply to Campus.
Steam Demand from 20,000 PPH to 100,000 PPH

De-Centralized Chiller Plants

Interconnected De-Centralized Chiller Plants (Absorbers and Electric Chillers)



STEAM GENERATION

CENTRAL BOILER FEEDS

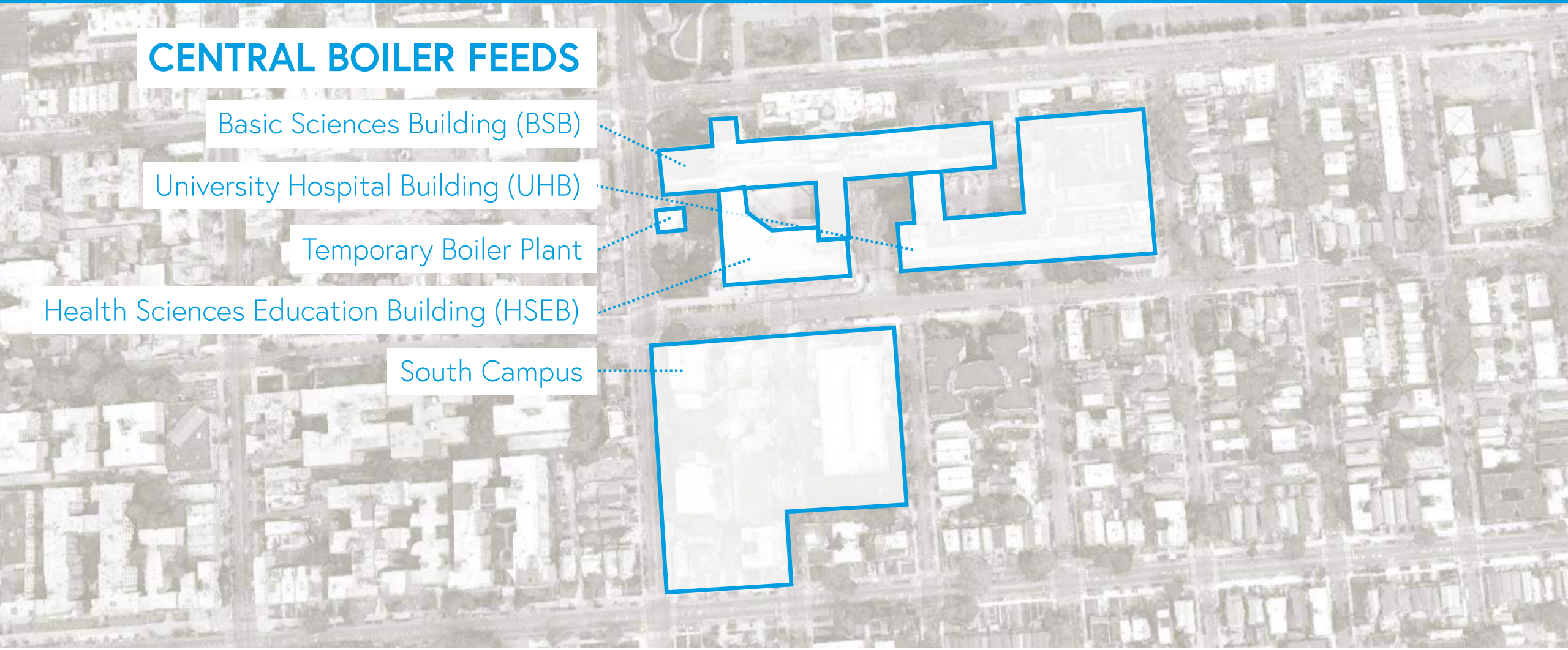
Basic Sciences Building (BSB)

University Hospital Building (UHB)

Temporary Boiler Plant

Health Sciences Education Building (HSEB)

South Campus



PROJECT SCOPE

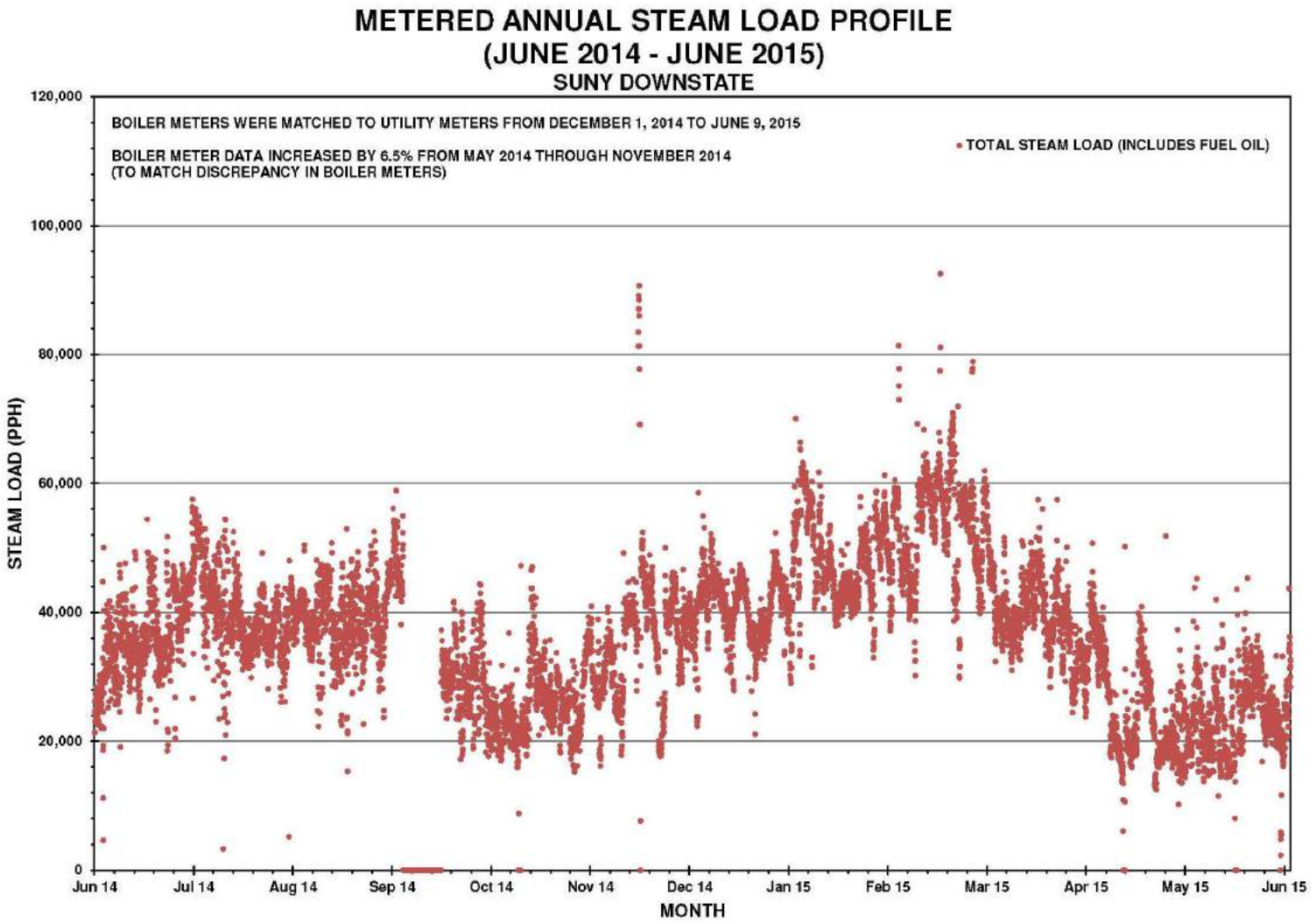
Replace all five boilers
Abate existing boiler plant
Provide new 480 vac electrical system
Replace pressure reducing stations
Replace deaerator
Replace feedwater pumps
Replace fuel oil pumping system
Replace makeup water system
Replace domestic water heaters
Convert fuel oil tanks from No. 6 to No. 2
Provide chimney repairs
Replace sanitary ejector pit
Provide new control system



Maintain continuity of service to end customer in a plant 2 stories below grade, with no access.

STEAM CAPACITY NEEDS

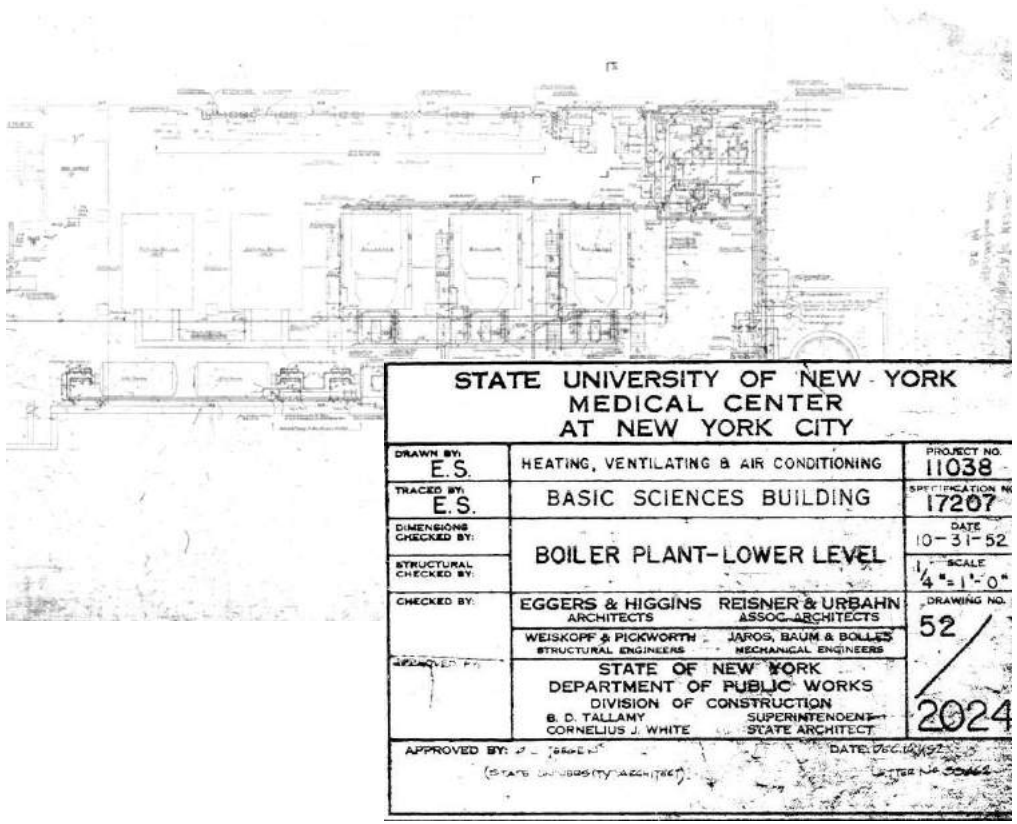
- N+2 reliability goal.
- Unreliable smaller existing boilers.
- Existing: Five boilers, each with nameplate, capacity of 30,000 pph.



BOILER PLANT ORIGINALLY BUILT IN 1950'S





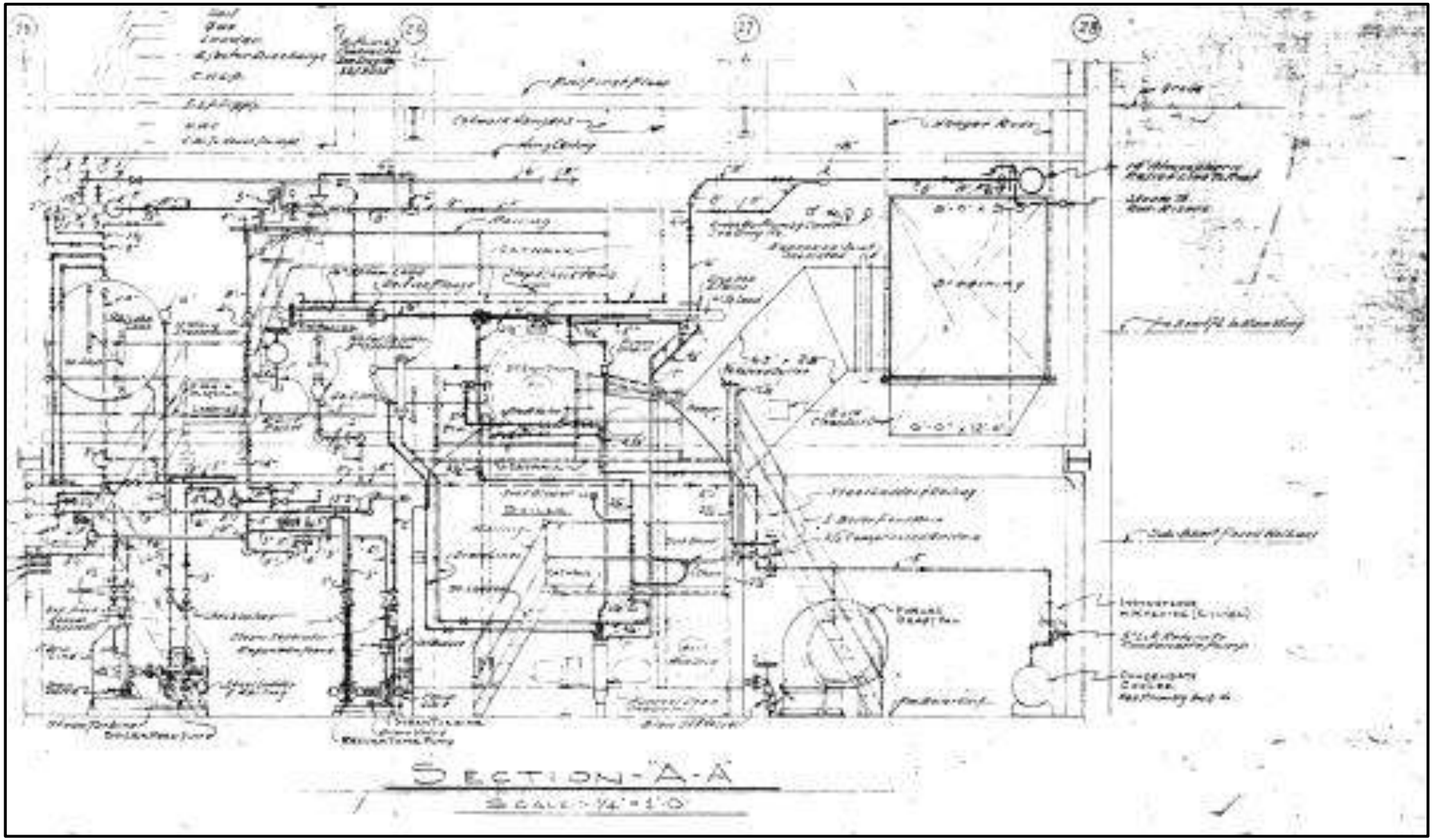


STATE UNIVERSITY OF NEW YORK
MEDICAL CENTER
AT NEW YORK CITY

DRAWN BY: E.S.	HEATING, VENTILATING & AIR CONDITIONING	PROJECT NO. 11038
TRACED BY: E.S.	BASIC SCIENCES BUILDING	SPECIFICATION NO. 17207
DIMENSIONS CHECKED BY:	BOILER PLANT-LOWER LEVEL	DATE 10-31-52
STRUCTURAL CHECKED BY:		SCALE 1/4"=1'-0"
CHECKED BY:	EGGERS & HIGGINS ARCHITECTS; REISNER & URBAHN ASSOC. ARCHITECTS	DRAWING NO. 52
	WEISKOPF & PICKWORTH STRUCTURAL ENGINEERS; JAROS, BAUM & BOLLES MECHANICAL ENGINEERS	
	STATE OF NEW YORK DEPARTMENT OF PUBLIC WORKS DIVISION OF CONSTRUCTION B. D. TALLAMY SUPERINTENDENT CORNELIUS J. WHITE STATE ARCHITECT	2024

APPROVED BY: [illegible] DATE: DEC. 19, 52
(STATE UNIVERSITY ARCHITECT) LETTER NO. 50462

BOILER PLANT ORIGINALLY BUILT IN 1950'S

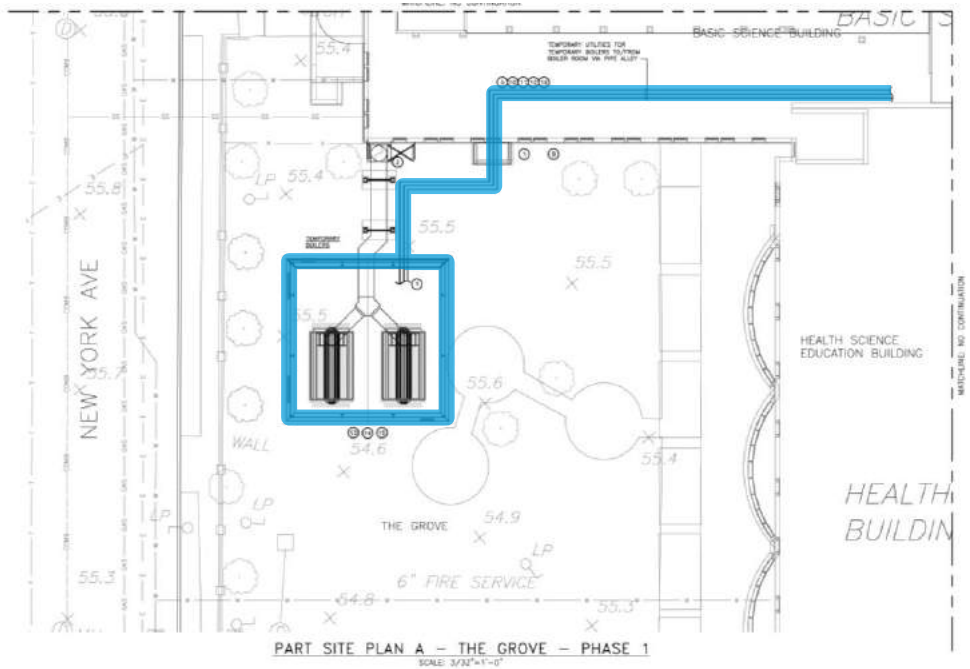


OVERALL PROJECT PHASING

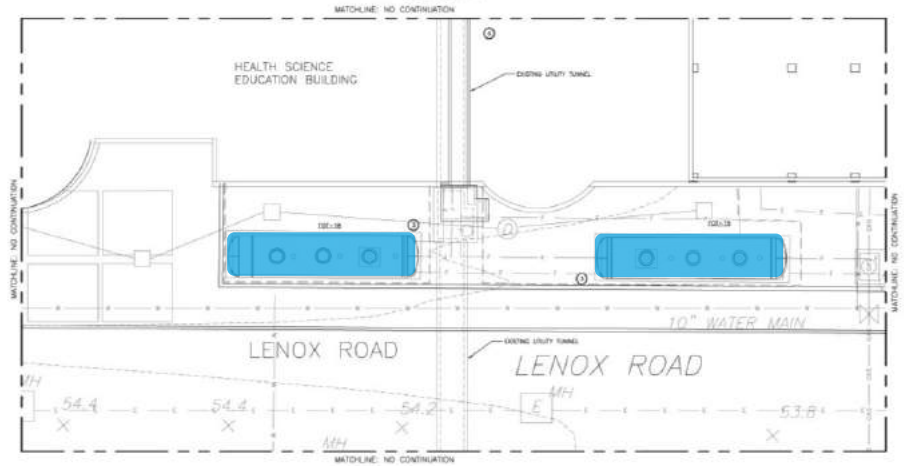
GENERALLY BROKEN INTO 4 PHASES

1. Temporary boiler plant & access
2. Replace boiler 4 & 5
3. Replace boilers 1, 2, 3 & auxiliaries
4. Controls integration

PHASING

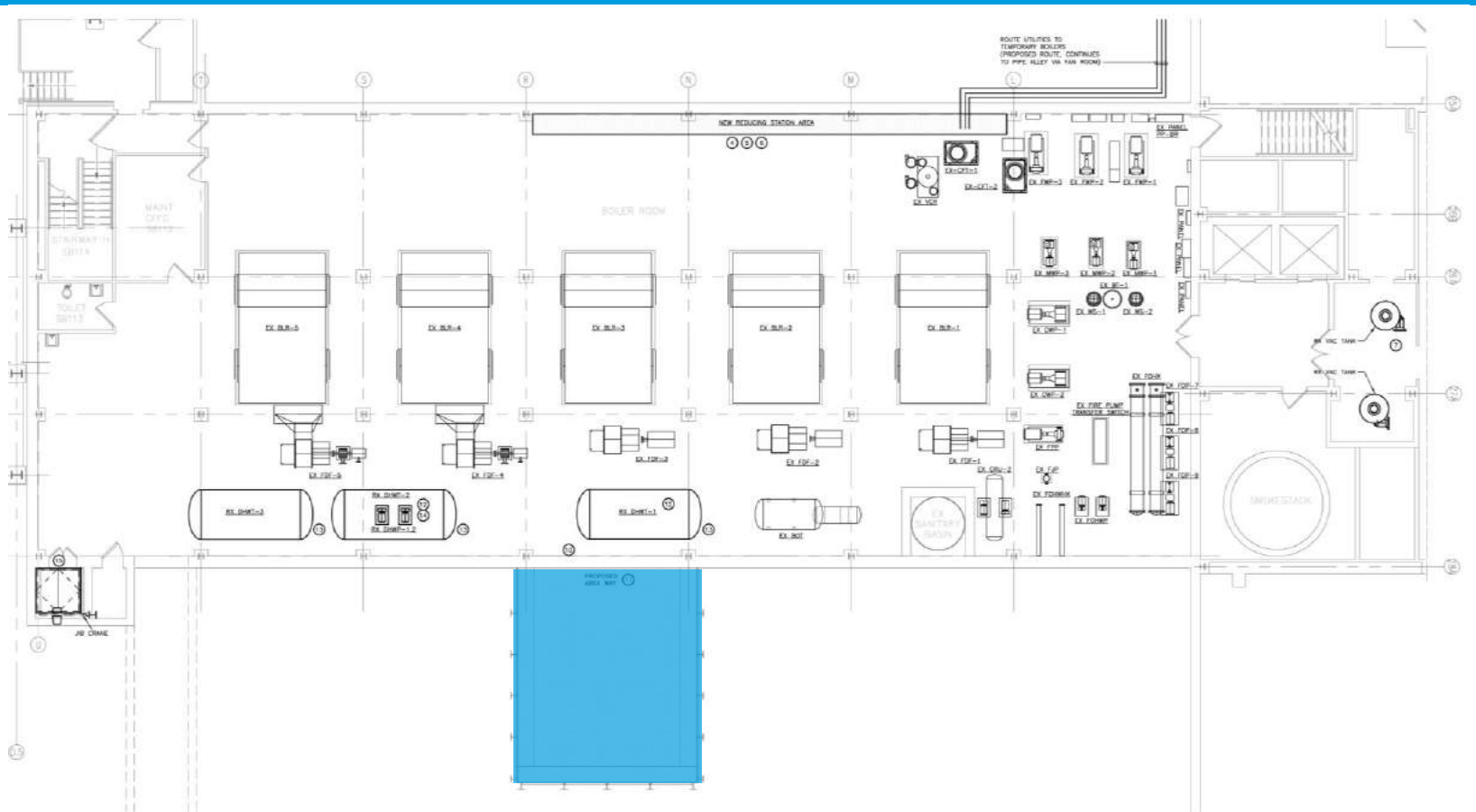


PART SITE PLAN A – THE GROVE – PHASE 1

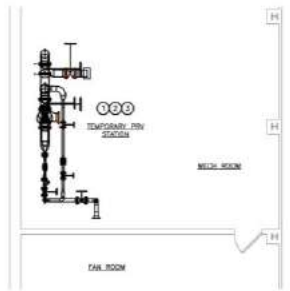


PART SITE PLAN B – FUEL OIL TANKS 18 & 19 – PHASE 1

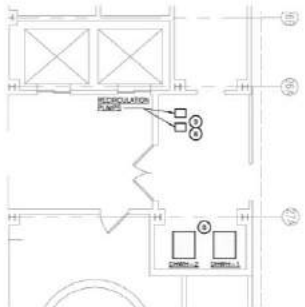
PHASING



PART FLOOR PLAN – PHASE 1A – ENABLING
SCALE: 3/16"=1'-0"

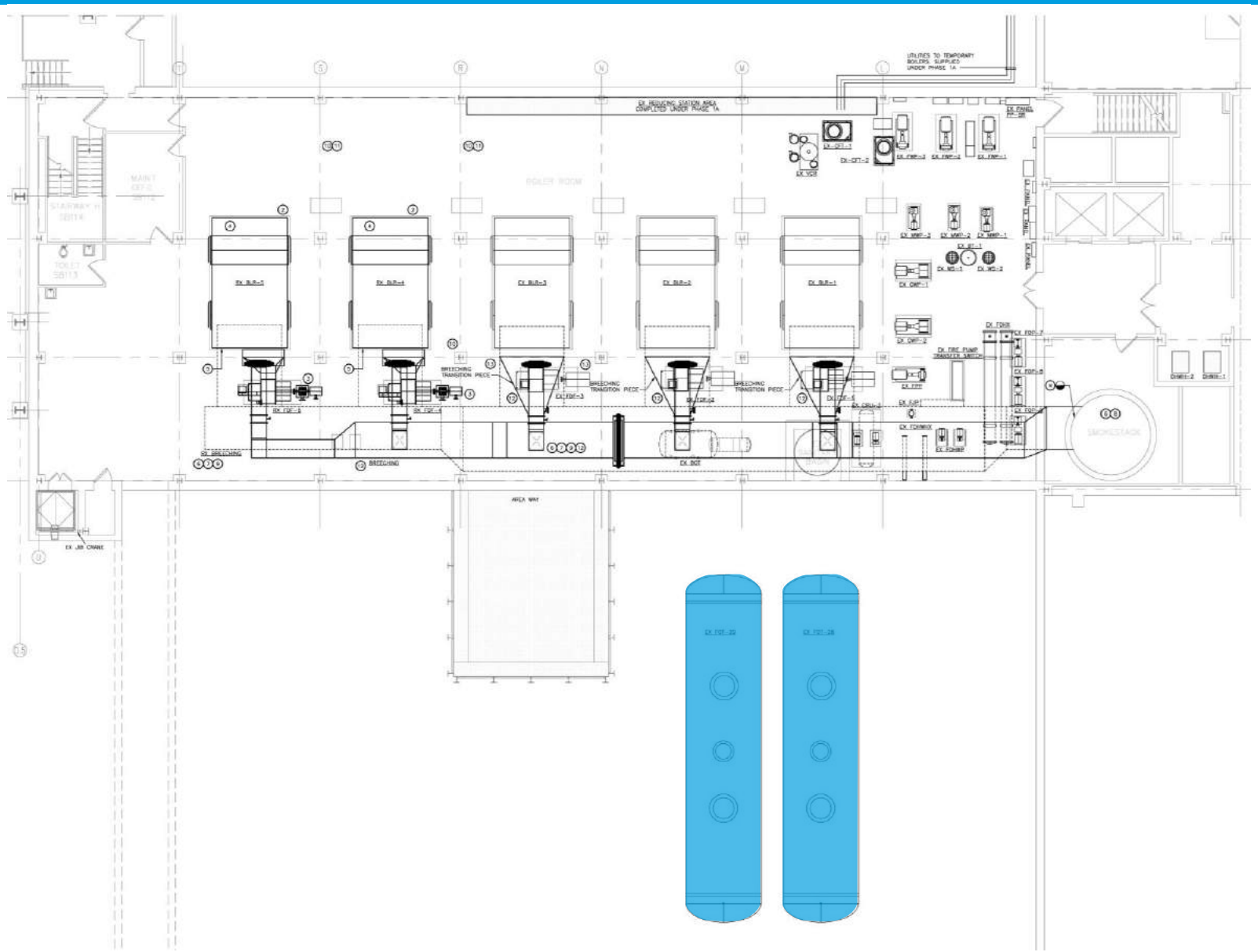


PART FLOOR PLAN – PHASE 1A
SCALE: 3/16"=1'-0"

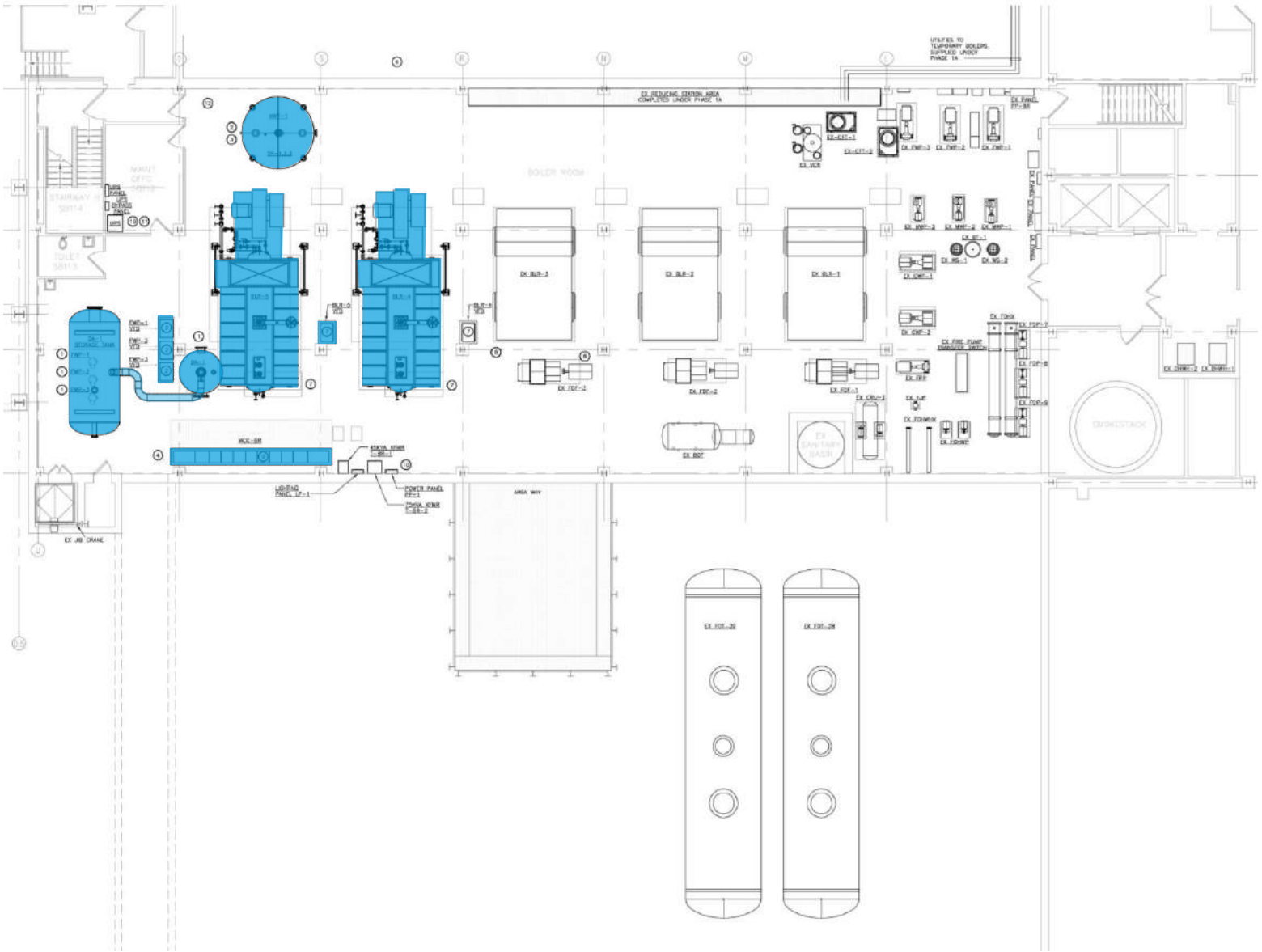


PART FLOOR PLAN – PHASE 1A
SCALE: 3/16"=1'-0"

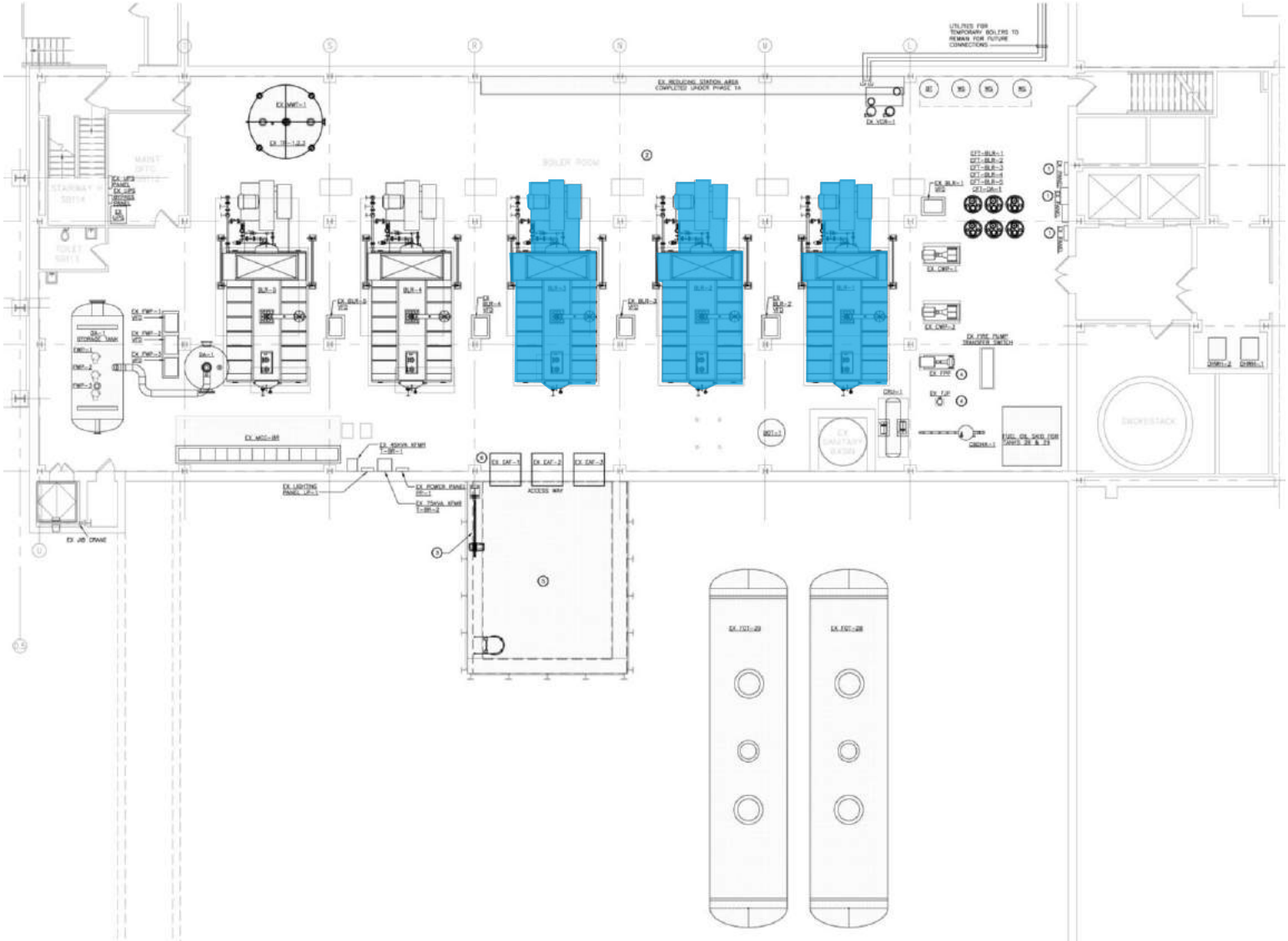
PHASING



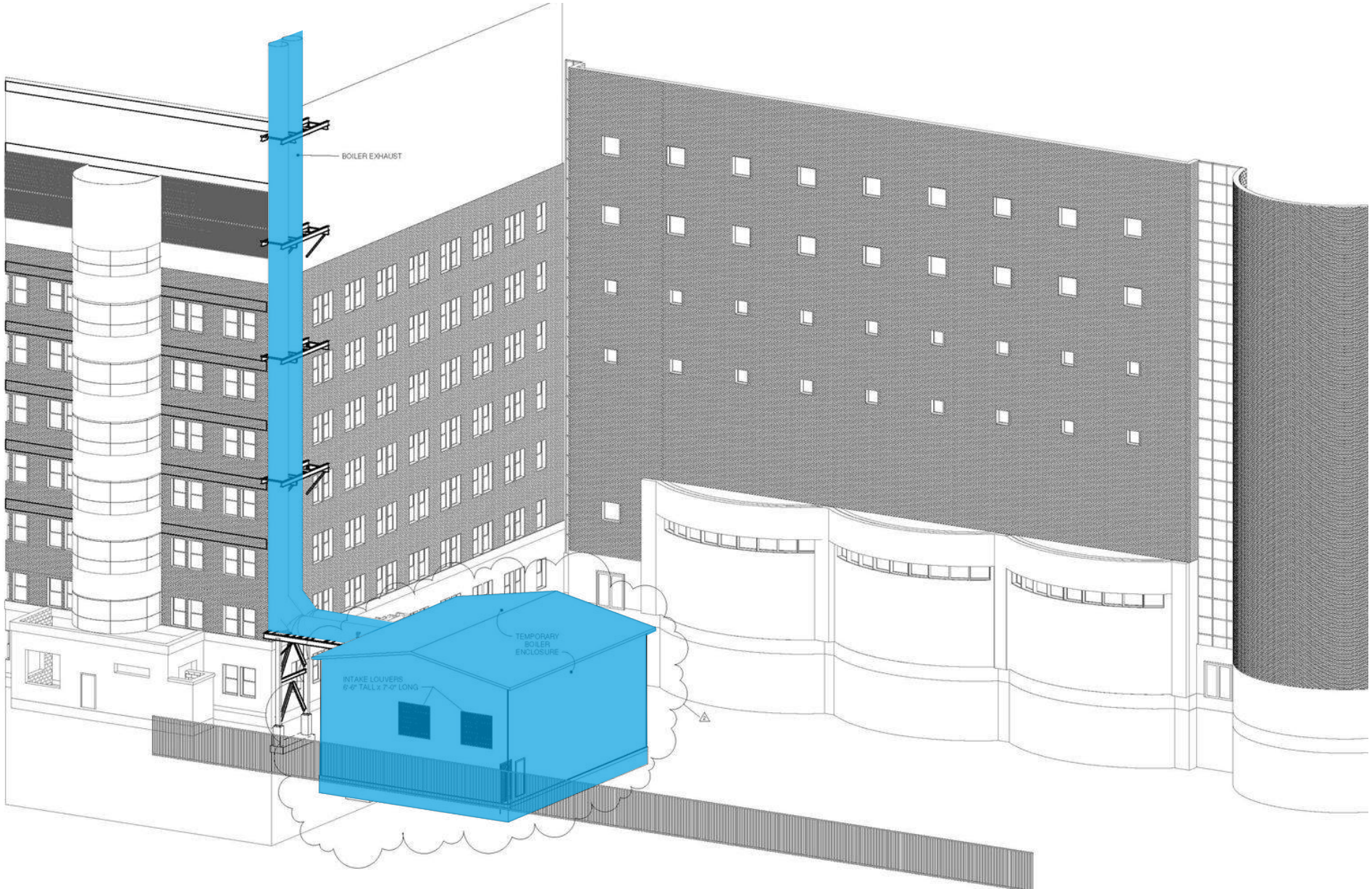
PHASING



PHASING



PHASE 1 TEMPORARY BOILER PLANT



PHASE 1 TEMPORARY BOILER PLANT





PHASE 1 TEMPORARY BOILER PLANT











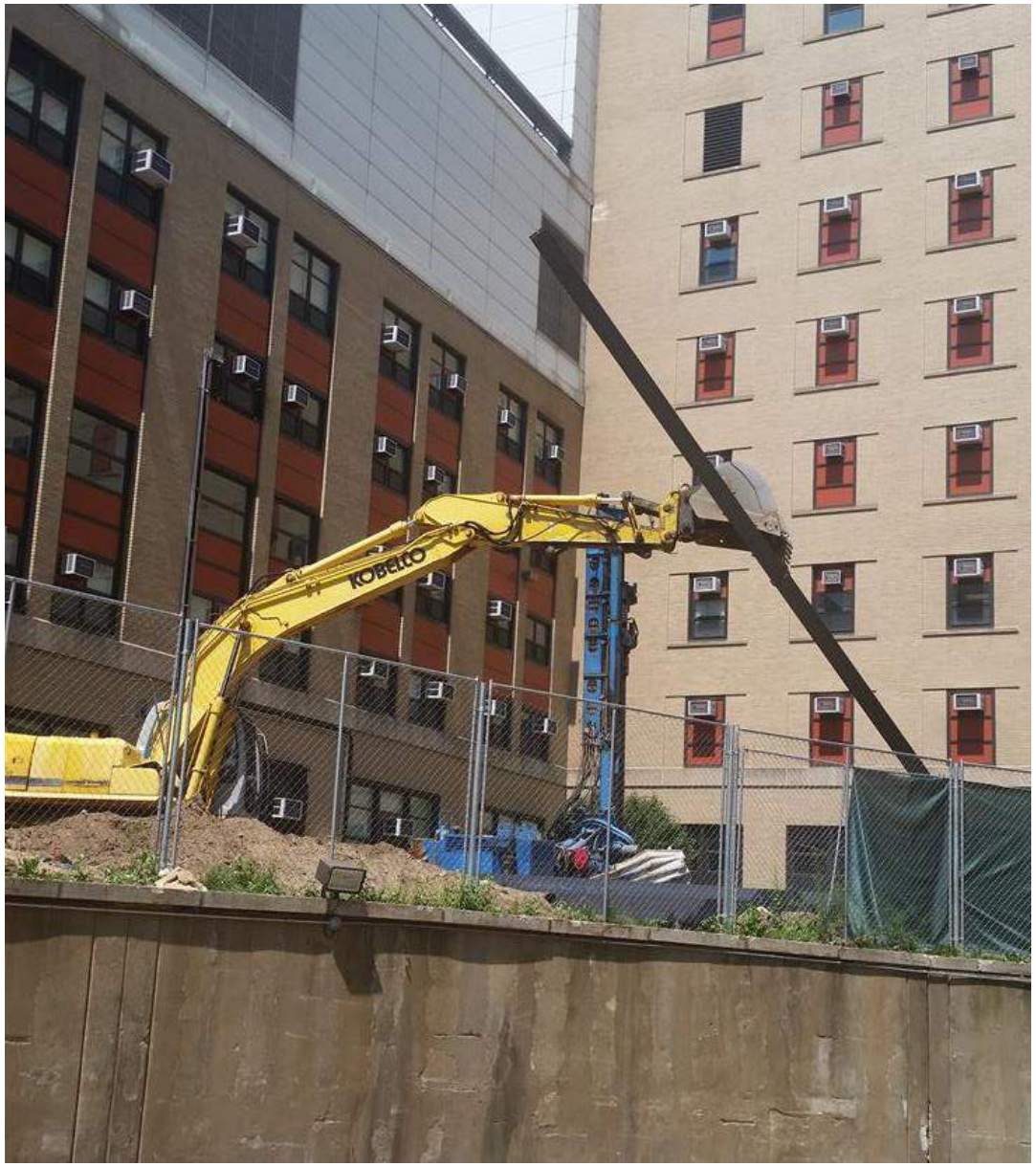
PHASE 1 TEMPORARY BOILER PLANT UTILITIES

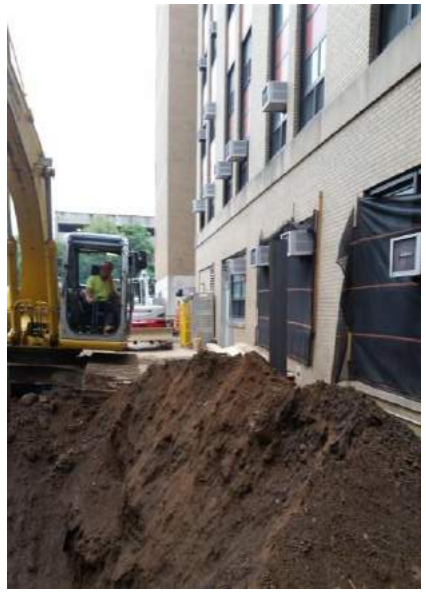






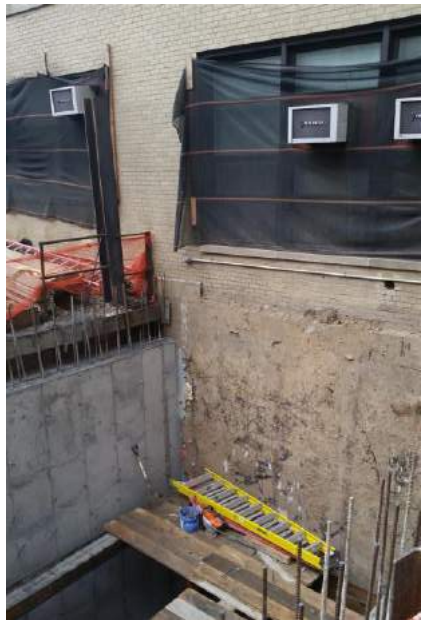
PHASE 1 AREAWAY





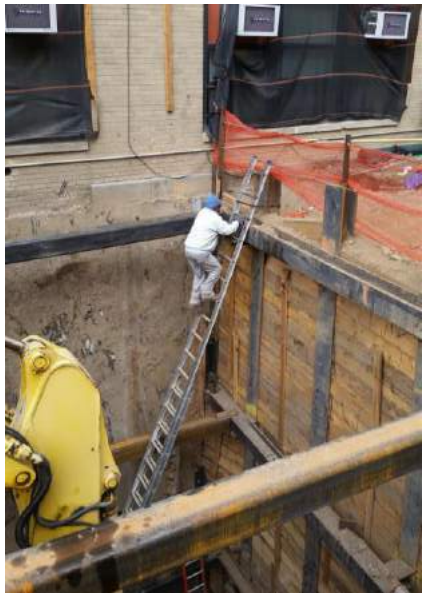


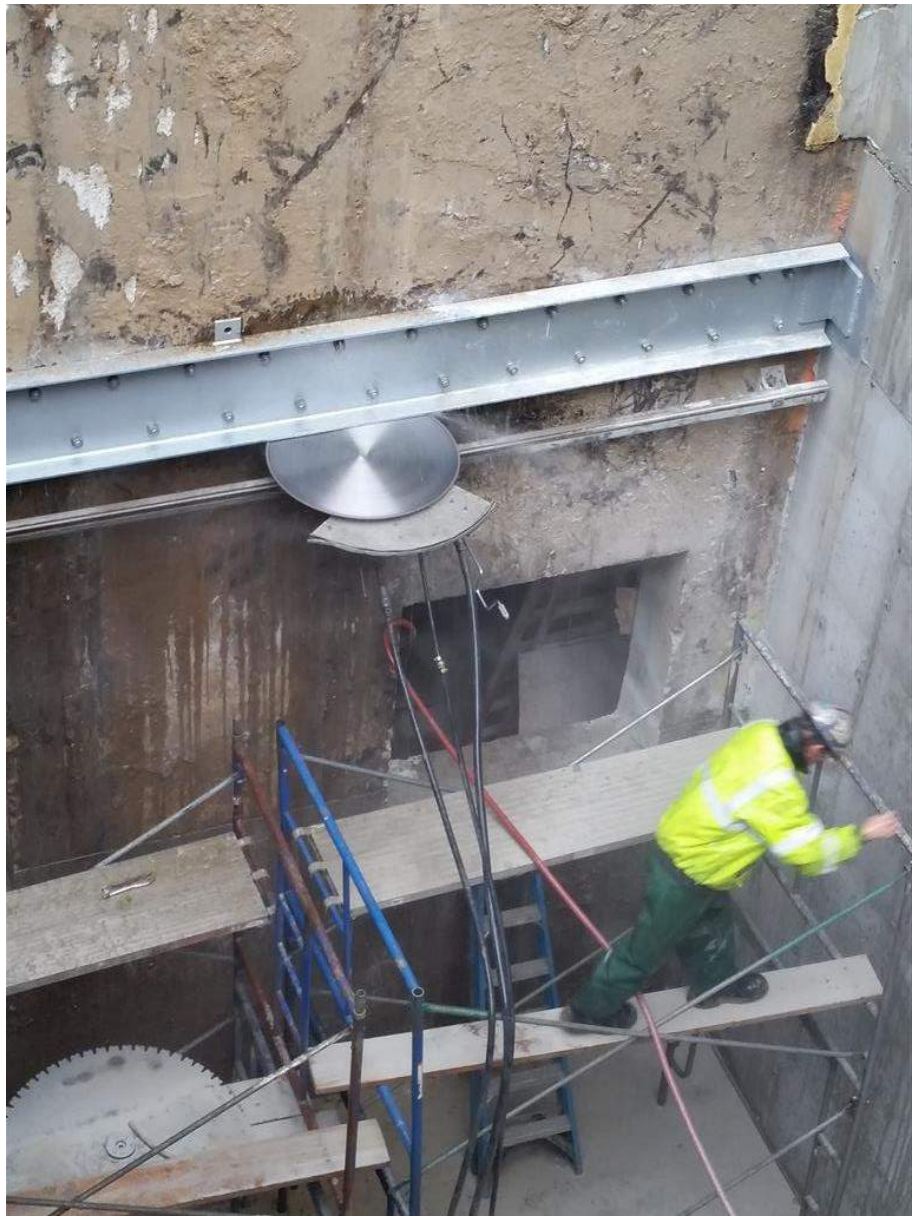






PHASE 1 AREAWAY



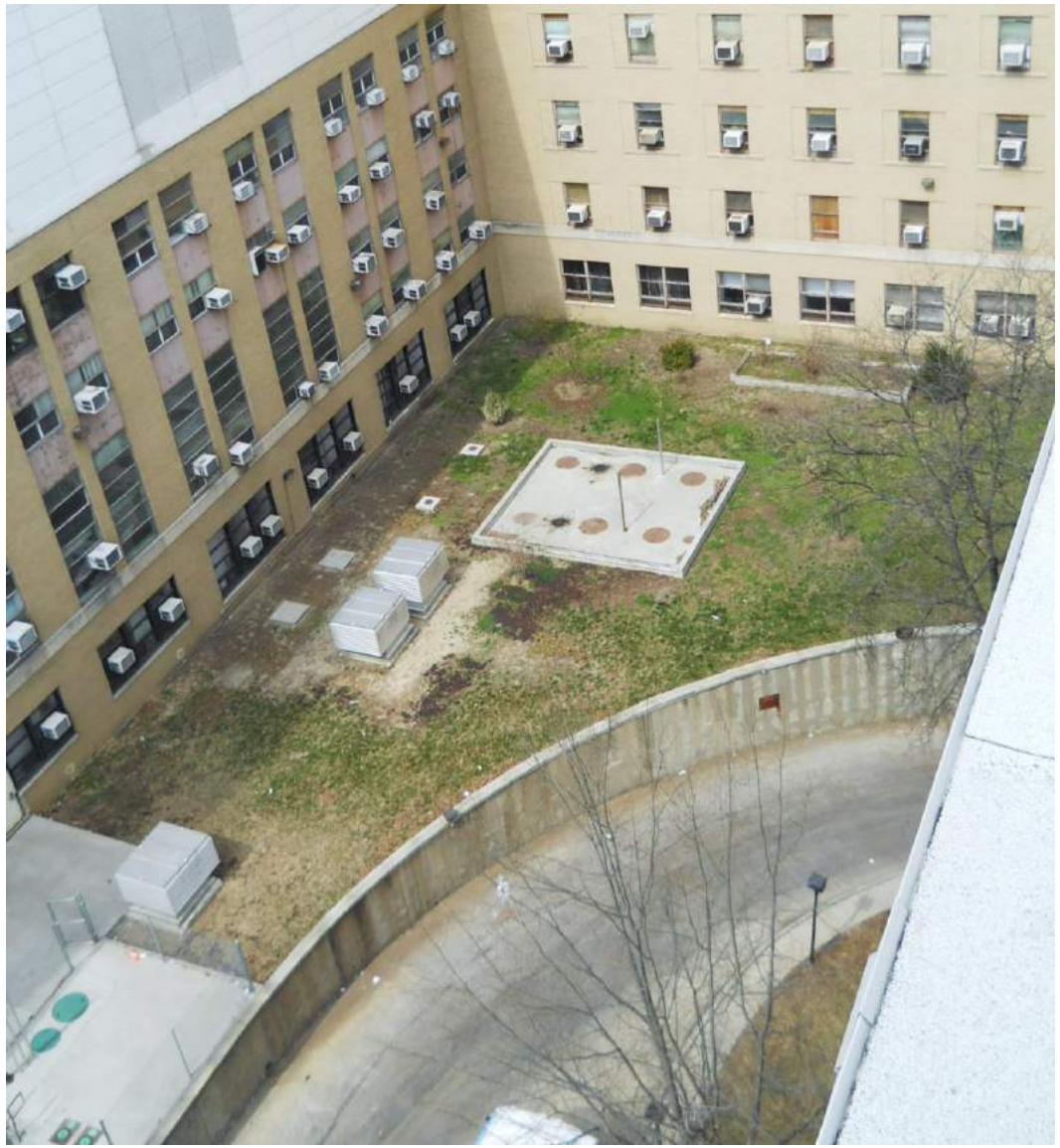


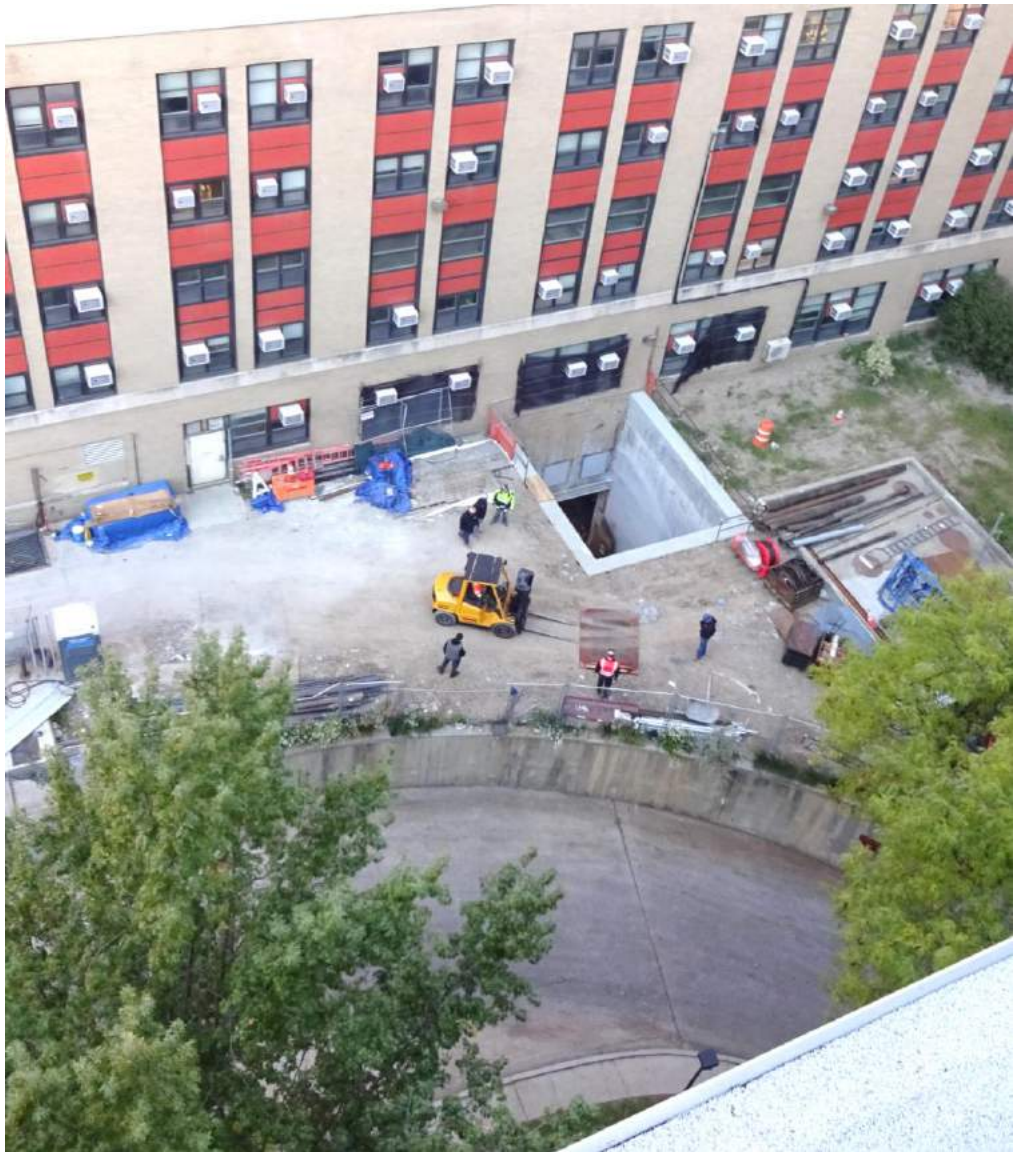






PHASE 1 AREAWAY





PHASE 1 CHIMNEY REPAIR









PHASE 2 NEW FUEL OIL TANKS













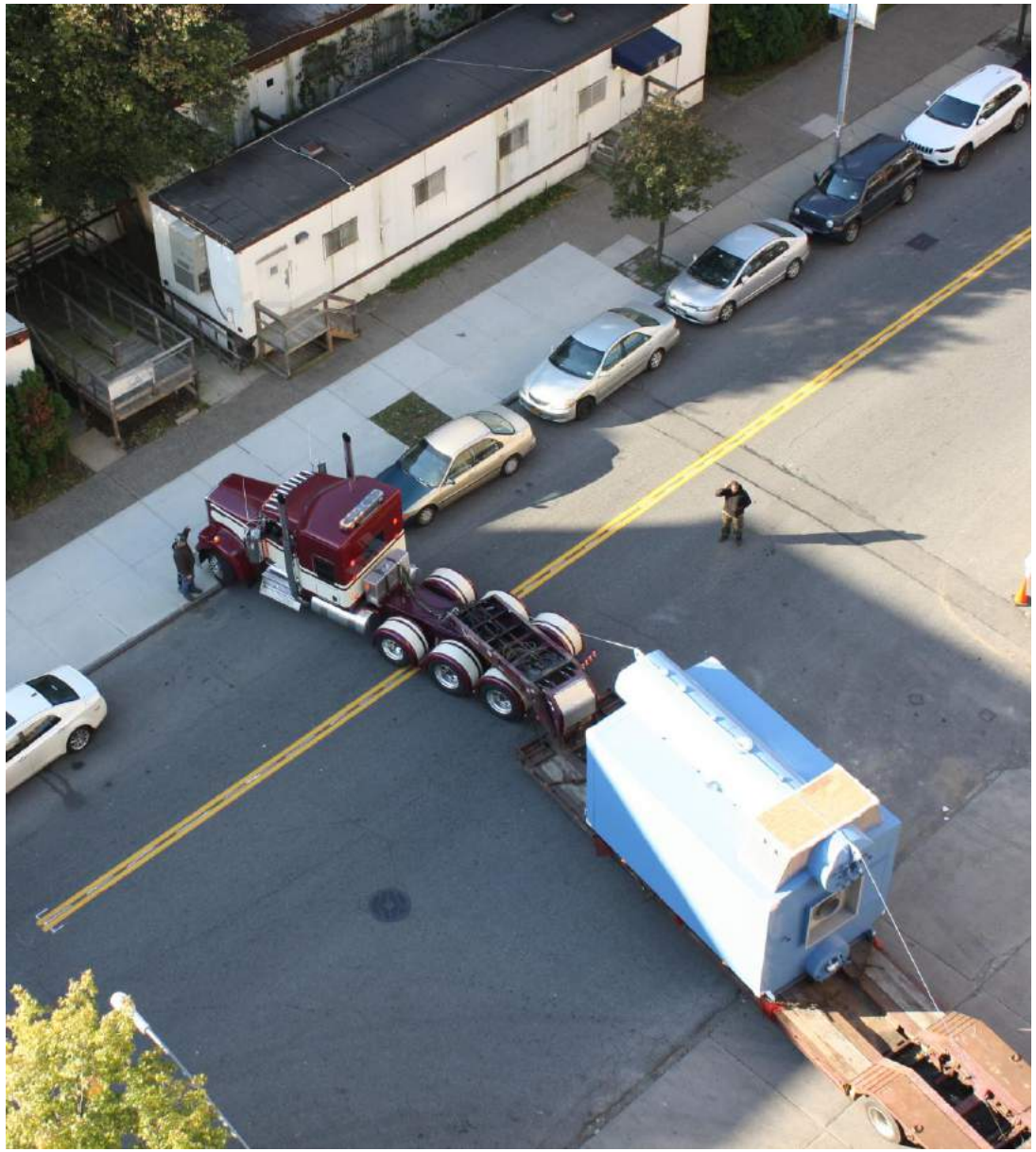
PHASE 3 DEAERATOR & MAKEUP WATER TANK







PHASE 3 BOILER INSTALLATION











PHASE 3 BOILER INSTALLATION









PHASE 3 BOILER INSTALLATION



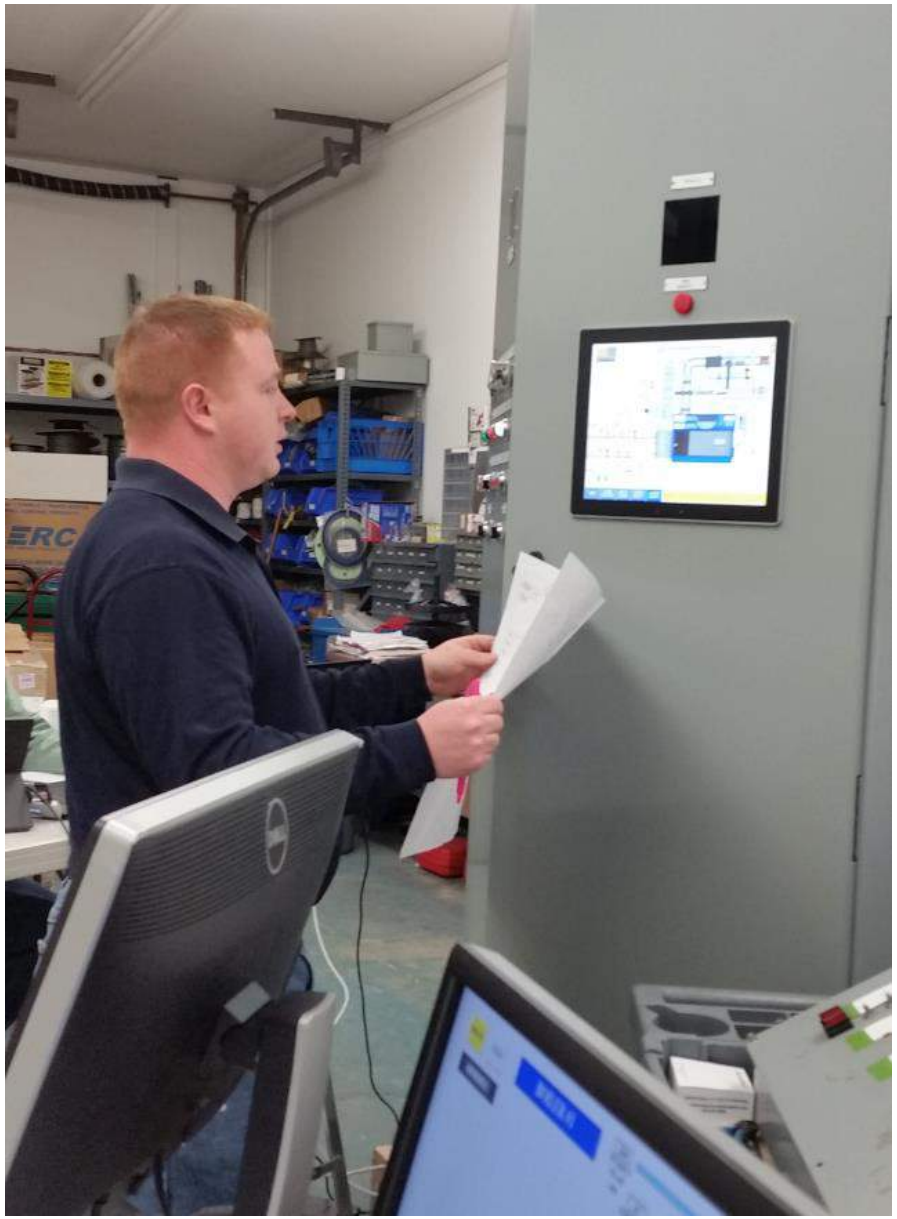


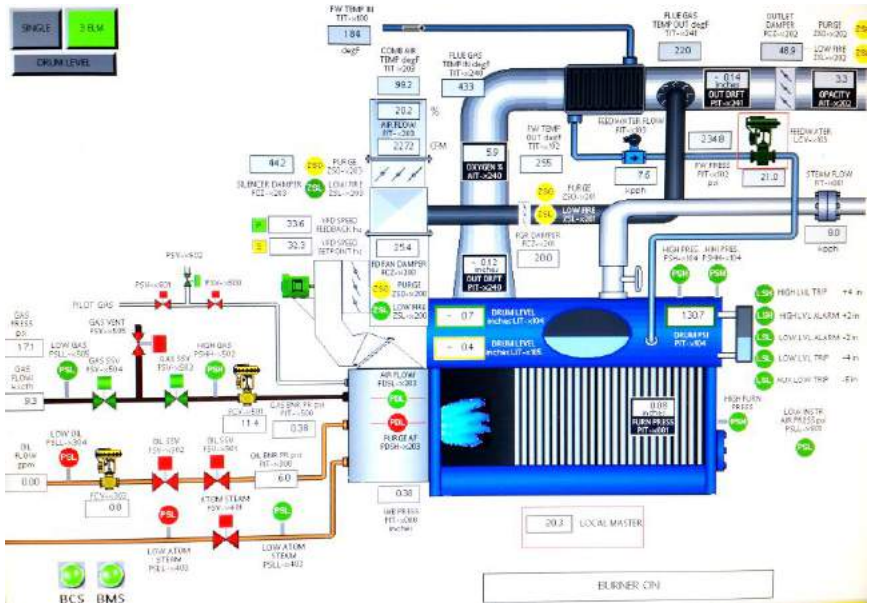




PHASE 4 CONTROLS INTEGRATION







PROJECT RESULTS

Before

~~"Our Boilers are Hard to Start"~~

~~"We don't run our boilers above 60% firing rate"~~

~~"We trip on sudden load changes"~~

~~"We have 600 degree flue gas"~~

~~"We have to be on firm gas"~~

After

- ✓ **Now they start easily from 70 PSIG with mud drum heating coils.**
- ✓ **Boilers can now be operated at full firing rate.**
- ✓ **Boilers can ride through sudden load changes with large diameter steam drum and three element drum control.**
- ✓ **Flue gas temperature of 300 DEG downstream of economizer.**
- ✓ **Confidence to run on No. 2 fuel oil.**

QUESTIONS?

Dave Ohler, PE | david.ohler@rmf.com

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Reliability. Efficiency. Integrity.

Google Earth
Image Landsat / Copernicus