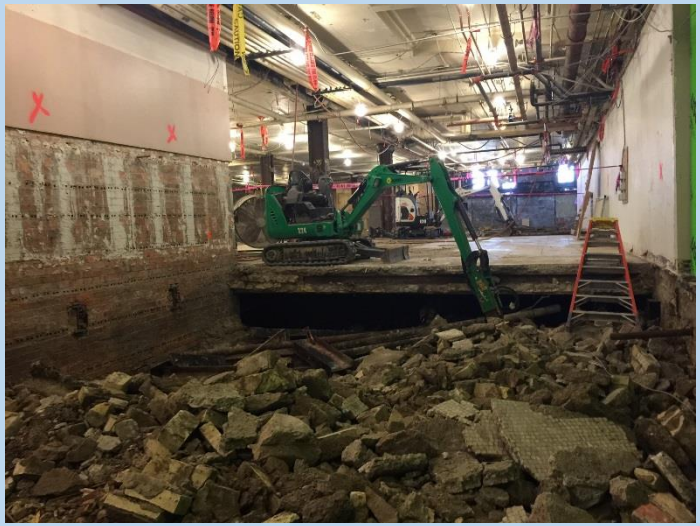
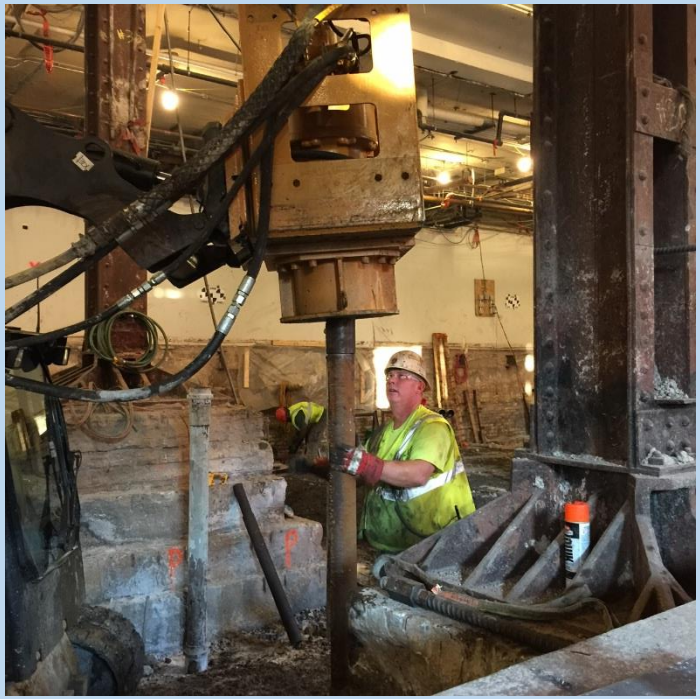


MILWAUKEE CITY HALL FOUNDATION RESTORATION

October 19, 2016

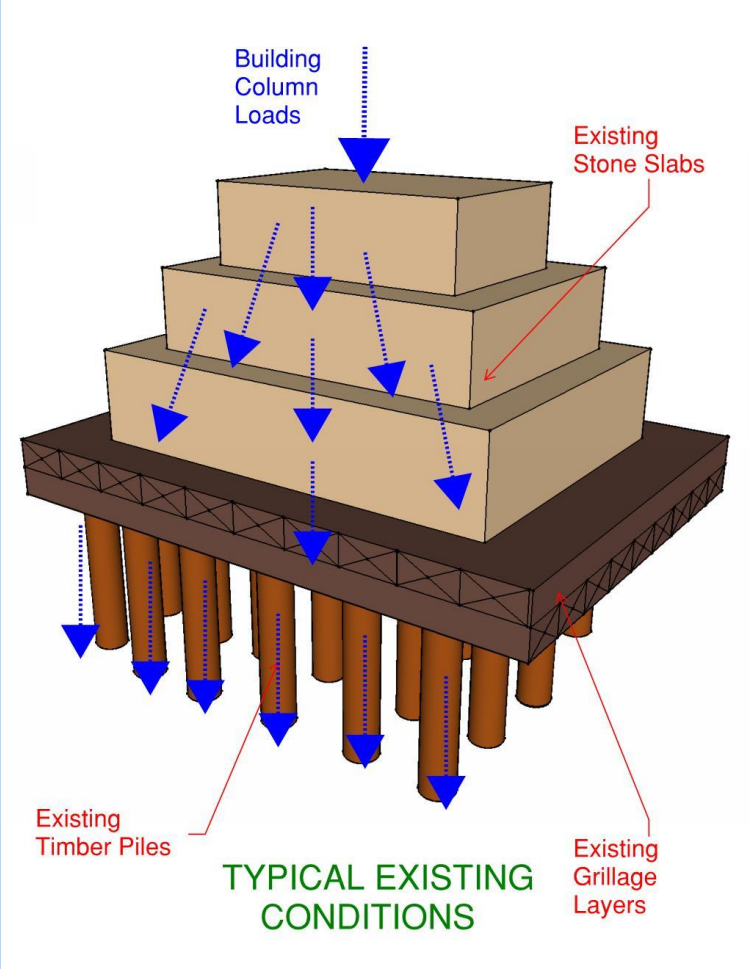
Project Update



Milwaukee City Hall
Building History/Fast Facts

- City Hall is a masonry and iron structure
- Originally constructed from 1893-1896
- At the time it was constructed,City Hall was the second tallest structure in the U.S. after the Washington Monument
- 256,000 Square Feet
- Achieved National Historic Landmark Status (2005)
- Multiple interior renovations and exterior restorations have been conducted over the years

Milwaukee City Hall
Existing Foundation System



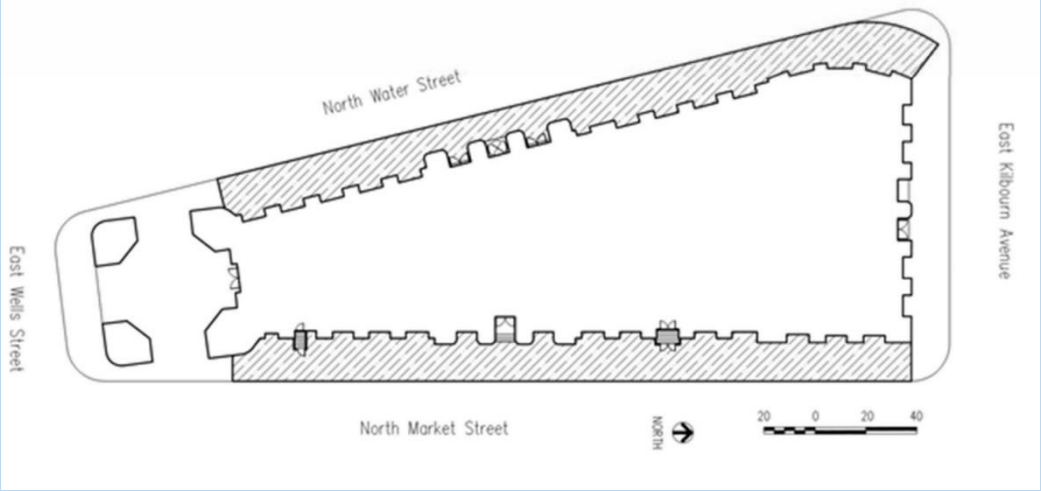
- City Hall is supported by over 2,500 untreated wood piles driven in marshy land adjacent to the Milwaukee River
- Pile lengths are estimated between 23ft and 27ft
- Oak “grillage” layers are placed horizontally in alternating directions directly on top of the wood piles
- The oak grillage supports stone pile caps which in turn support the exterior walls and interior columns/piers of the building
- The building has experienced differential settlement over the years as a result of fungal rot/decay of the grillage and pilings, a process that is difficult to forecast and predict
- The differential settlement is monitored through a series of survey points around the building

Milwaukee City Hall
Water Recharge System Background

- Water recharge system installed in 1950's to aid in submergence of foundation system wood piles and grillage
- The system is a network of perforated pipes run in trenches adjacent to the wood piles
- Wood piles when left exposed are subject to faster fungal rot/decay as oxygen becomes available to accelerate the process
- The system is float-controlled and fed from two water sources with a total typical discharge rate of water of 2.5 gallons per minute (3000-4000 gallons per day)
- Several monitoring wells are located throughout the basement/sub basement to monitor water levels
- Water levels vary across the building and also fluctuate seasonally with groundwater changes
- The current reliability and extent of coverage of the system is marginal/low.

Milwaukee City Hall
Hollow Walk System Background

- City Hall was originally constructed with a hollow access corridor located around the perimeter of the building beneath the street-level sidewalk extending along the east, north, and west sides.
- The north hollow walk area was previously abandoned/filled-in.
- The structural steel, reinforced concrete and structural masonry that support the sidewalk slabs are deteriorating
- Water and moisture intrusion has been an ongoing problem in the hollow walk areas
- The hollow walk areas currently serve as hallways, utility corridors, or back-of-house/storage areas



Foundation Restoration Project Scope

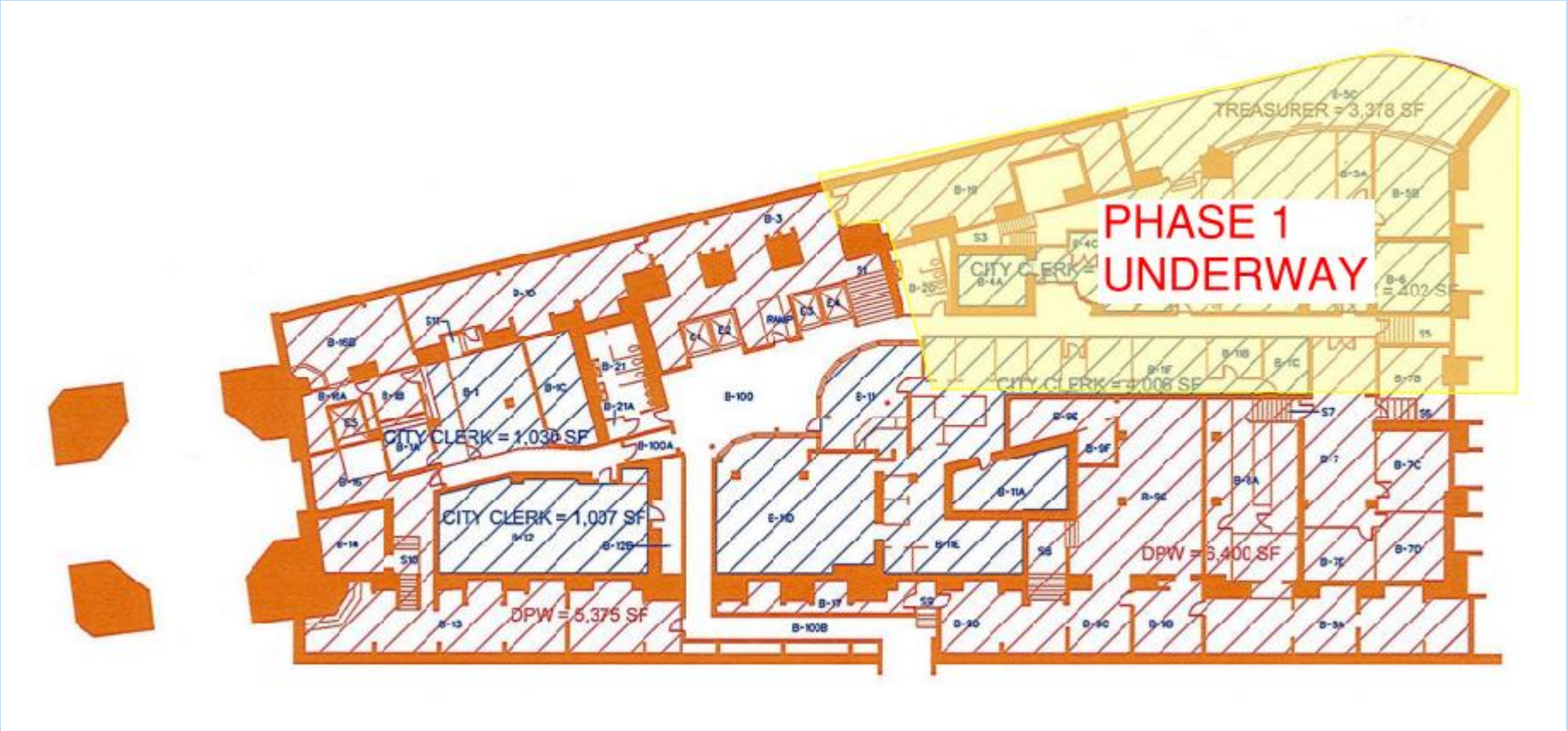
- Design-Build Delivery – Efficiencies and High-Level Responsiveness in Addressing Concealed Conditions
- Task 1- Investigation and Analysis (Previously Completed)
- Tasks 2 and 3- Design and Construction Implementation (Currently Underway)
- Design and Install New Foundations for Passive Load Transfer
- Abandon the Water Recharge System
- Abandon and Backfill the Hollow Walk System
- Upgrade Mechanical and Electrical Building Infrastructure

Foundation Restoration Project Challenges

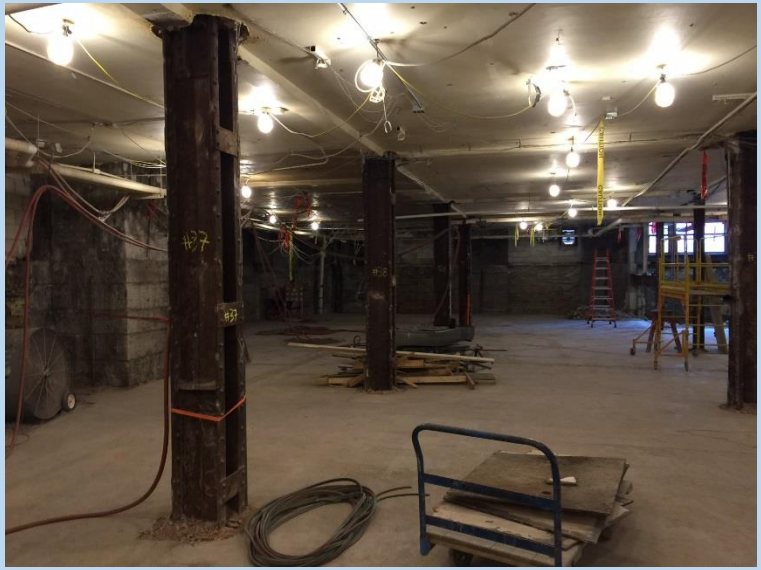
- Overall Site and Building Logistics, Staging and Access to the Work Areas
- Implementation is Occurring in Multiple Phases over Multiple Years
- Work is being Conducted on Second Shift
- Infrastructure Relocations
- Basement Occupant and Functional use Relocations

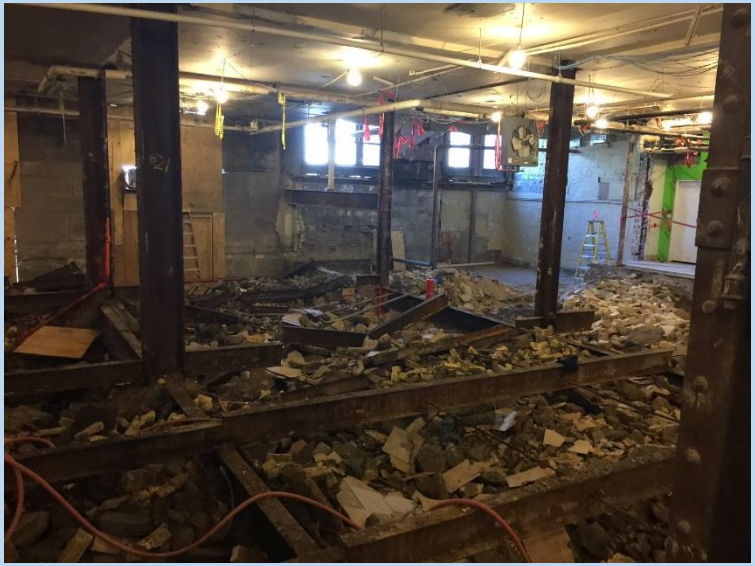
PHASE 1 REPAIR AREA- NW QUADRANT

TIMEFRAME: FEB 2016 – JULY 2017
REPAIR FOUNDATIONS;
CONSTRUCT NEW MECHANICAL AND
ELECTRICAL SERVICE AND EQUIPMENT ROOMS

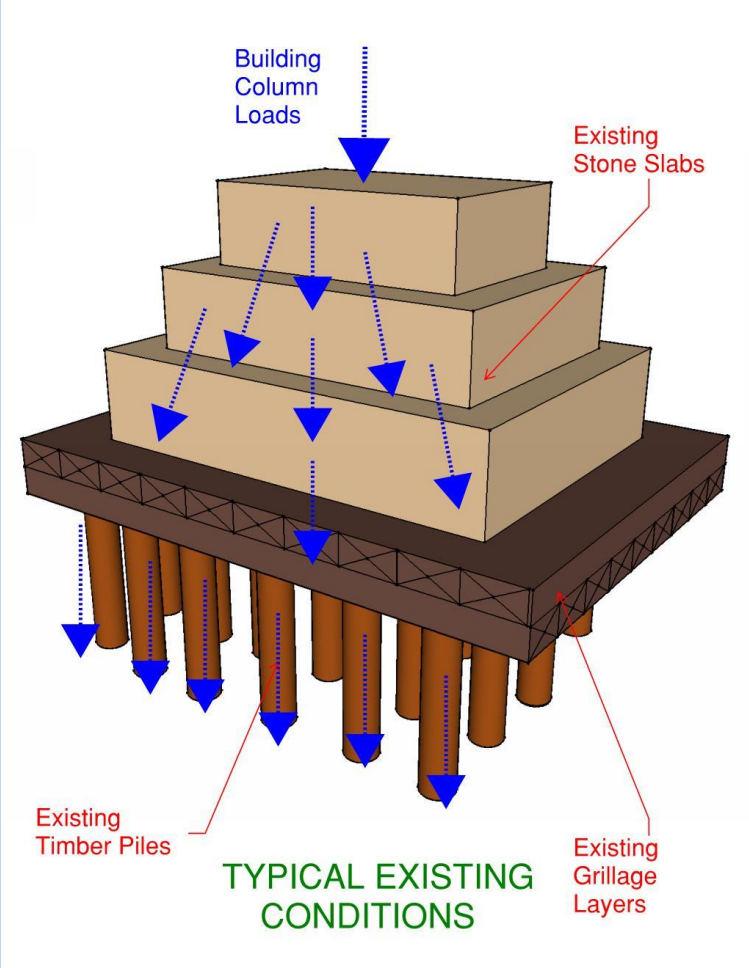


Phase 1 Demolition

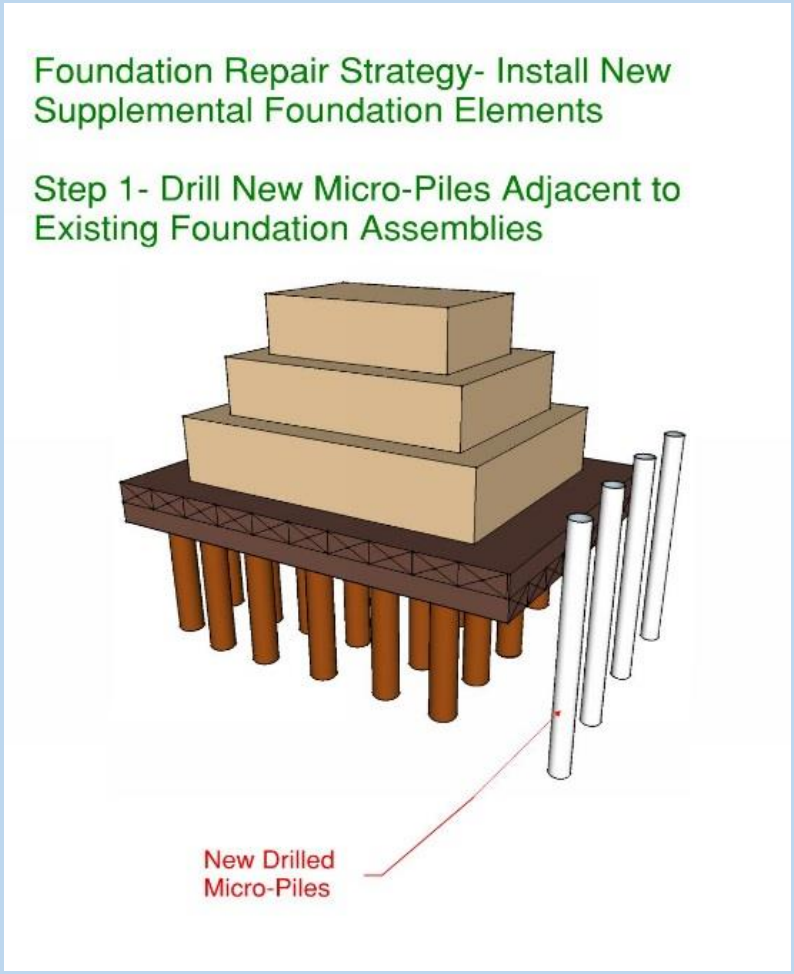


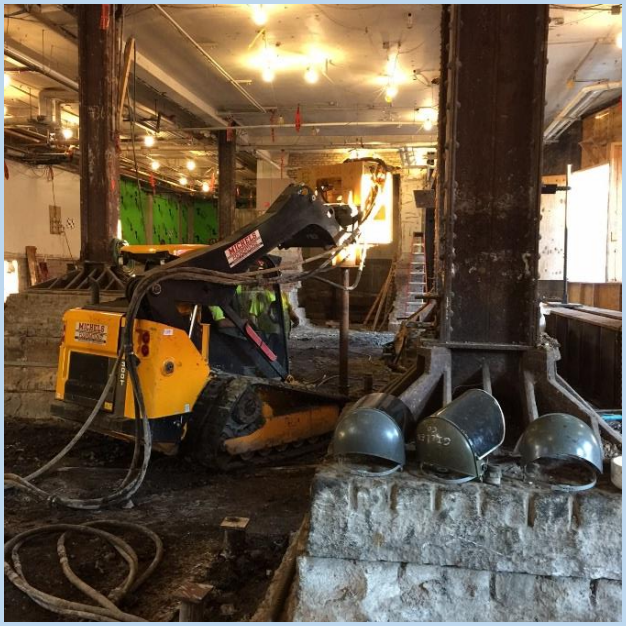


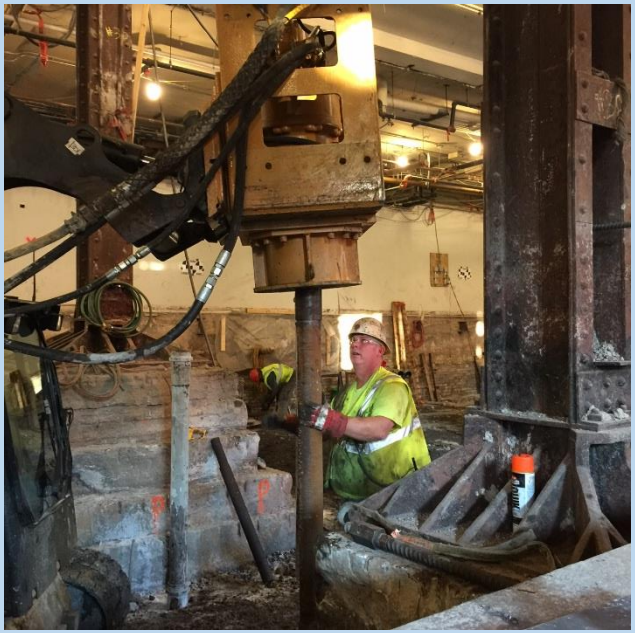
PHASE 1 EXISTING / PRE-REPAIR CONDITIONS



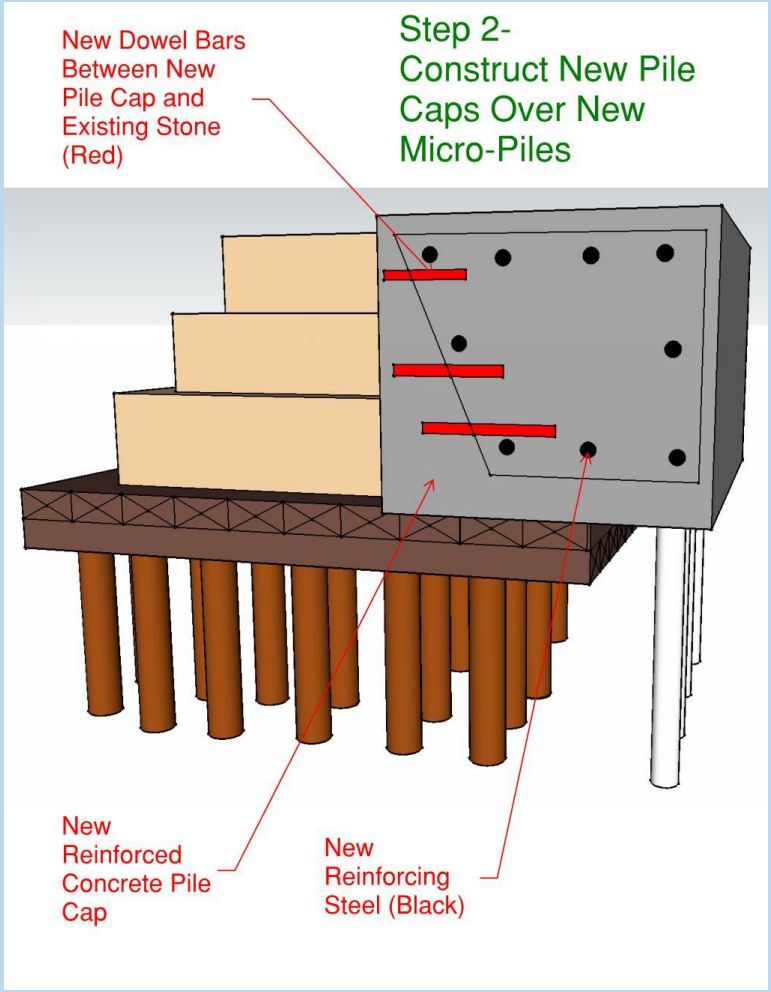
PHASE 1 MICRO PILE INSTALLATION PROCESS
QTY. 213 TOTAL MICRO PILES IN PHASE 1







PHASE 1 PILE CAP EXTENSIONS
QTY. 21 COLUMNS IN PHASE 1

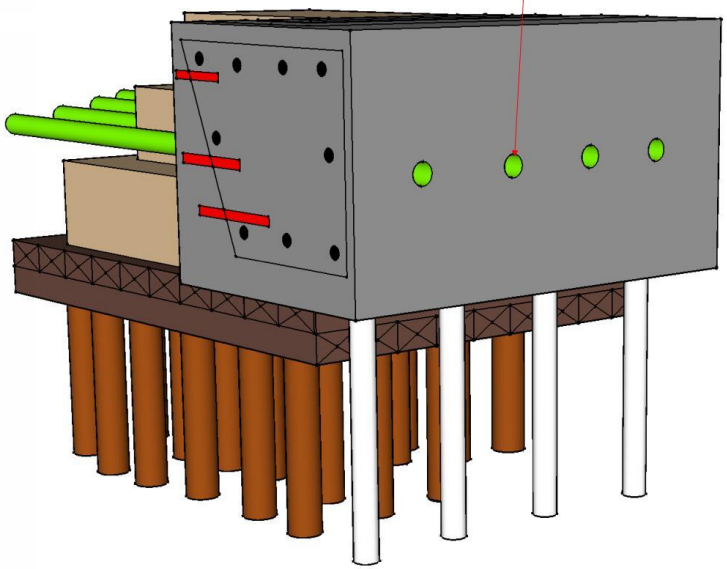


PHASE 1 PILE CAP EXTENSIONS
QTY. 21 COLUMNS IN PHASE 1

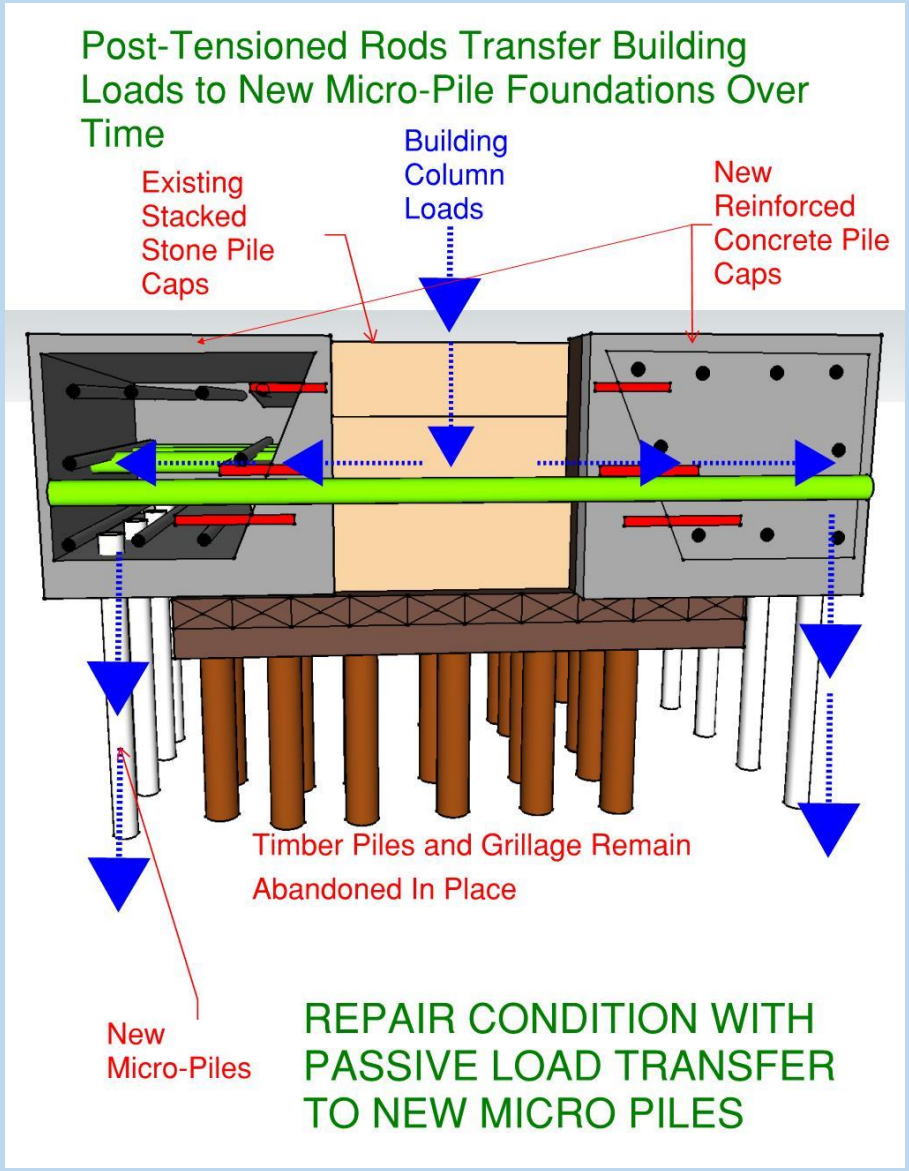
Step 3- Drill Into New Reinforced Concrete Pile Caps and Through Existing Stone Pile Caps

Step 4- Insert and Post-Tension New Steel Rods

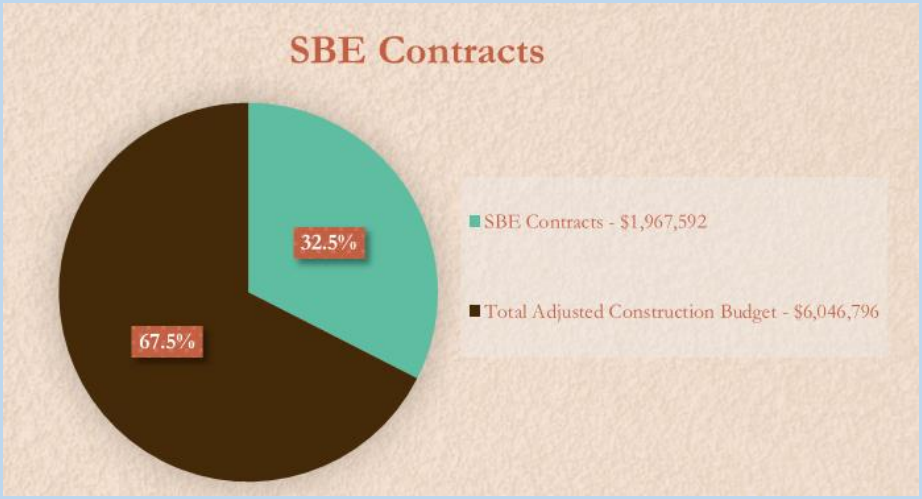
Step 5- Grout New Post-Tensioned Rods in Place



TYPICAL REPAIRED CONDITION

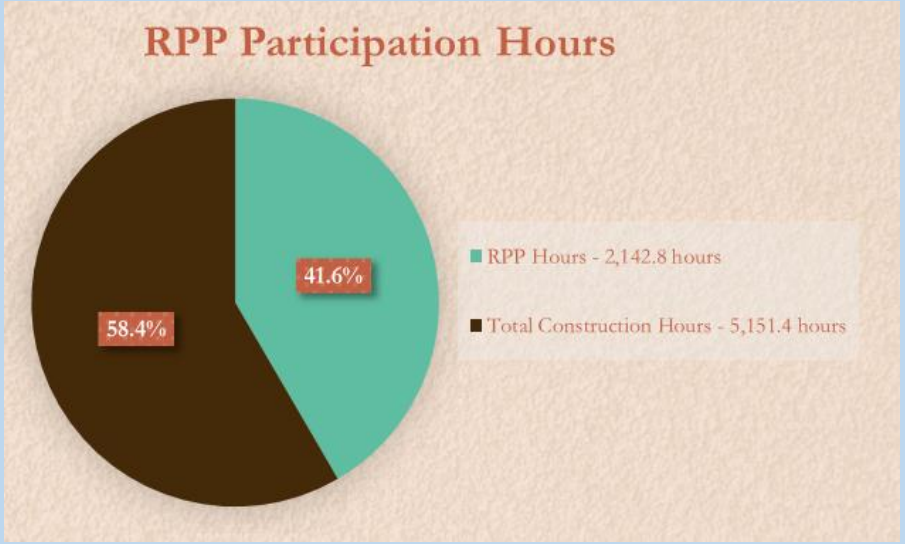


SBE and RPP Goals and Phase 1 Progress Monitoring



SBE Goal: 25%
Current SBE Contracts: 32.5%

RPP Goal: 40%
Current RPP Participation: 41.6%

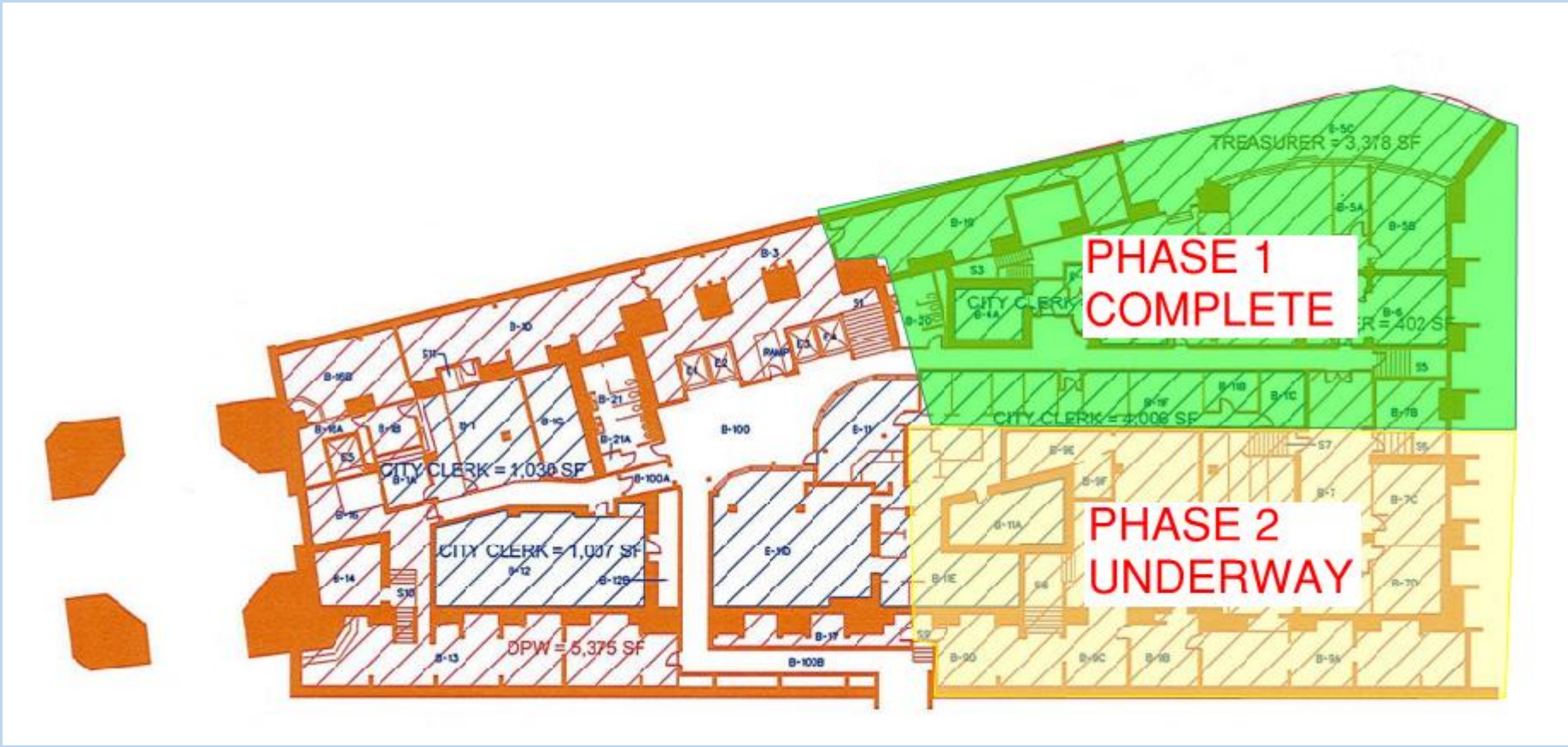


Foundation Restoration Project Next Steps

- Phase 2 Pilot Study is Underway to Validate Feasibility of Two Additional Higher-Capacity Micro Pile Strategies needed at the Vault
- Phase 2 Logistical Implementations
- Phase 2 Demolition / Building Area Decommissioning
- Phase 2 Foundation Repairs / Construction Administration
- Phase 3 and 4 Design
- Phase 3 and 4 Logistics and Sequencing Planning

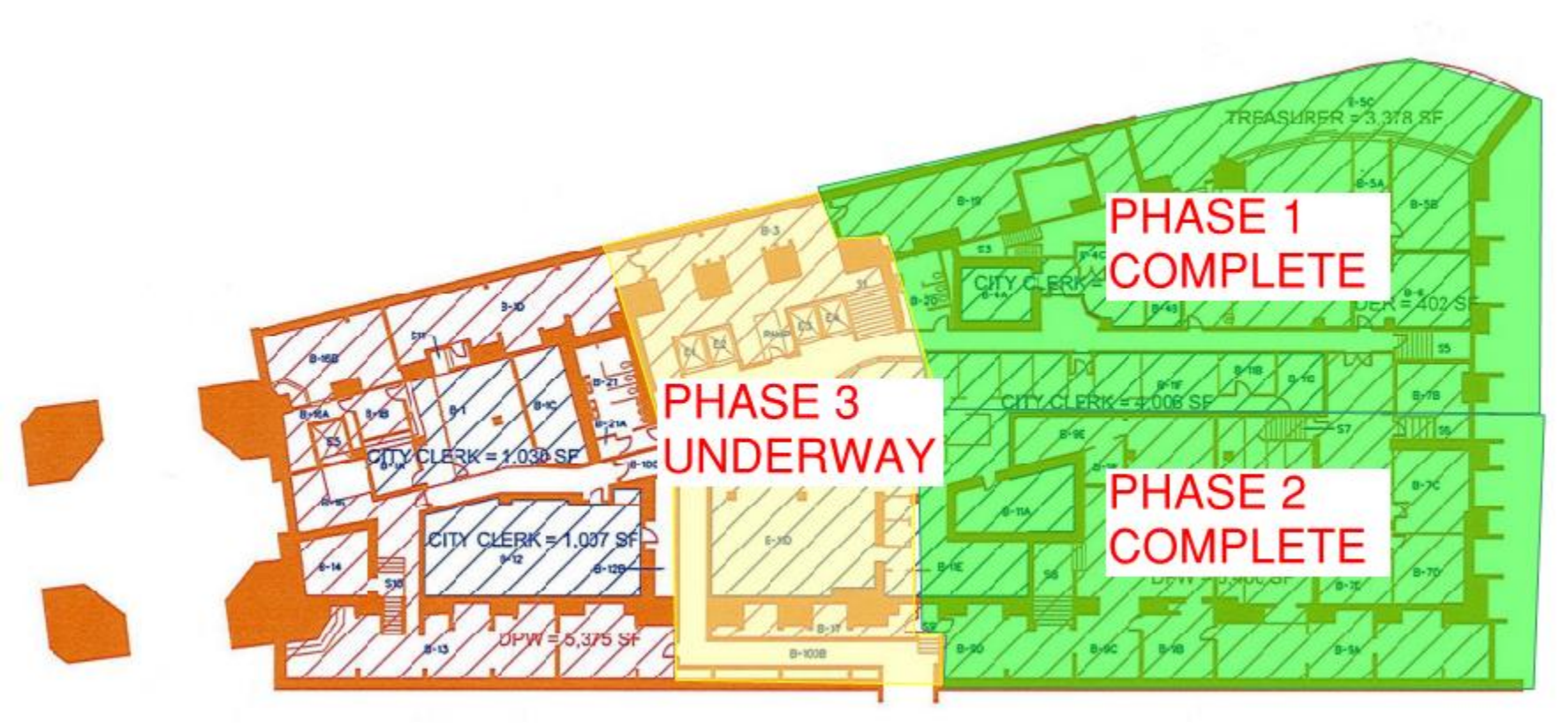
PHASE 2 REPAIR AREA- NE QUADRANT

TIMEFRAME: 2017 - 2018
REPAIR FOUNDATIONS;
DECOMMISSION OLD MECHANICAL AND
ELECTRICAL EQUIPMENT ROOMS



PHASE 3 REPAIR AREA- BUILDING CENTRAL CORE

TIMEFRAME: 2018 – 2019
REPAIR FOUNDATIONS;
REROUTE ZEIDLER ACCESS TUNNEL

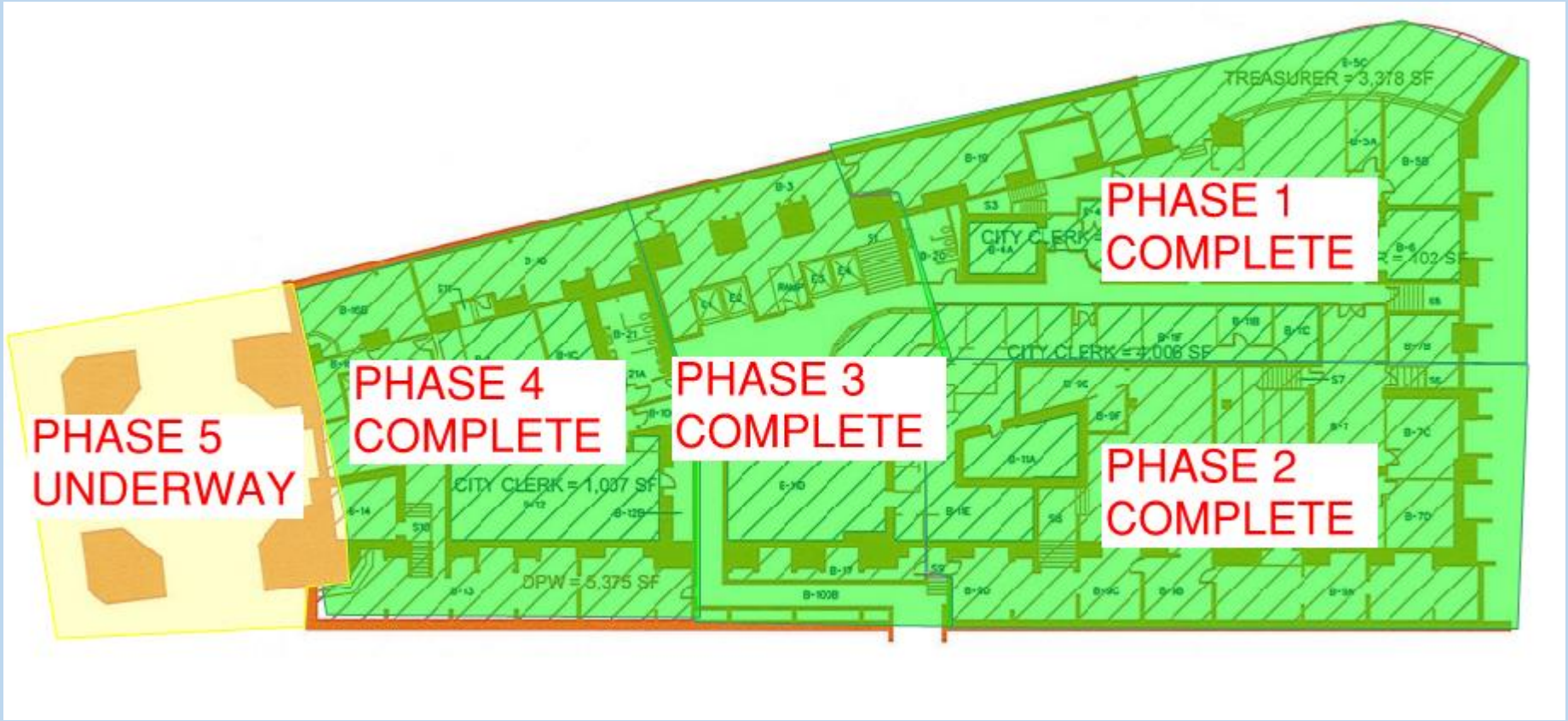


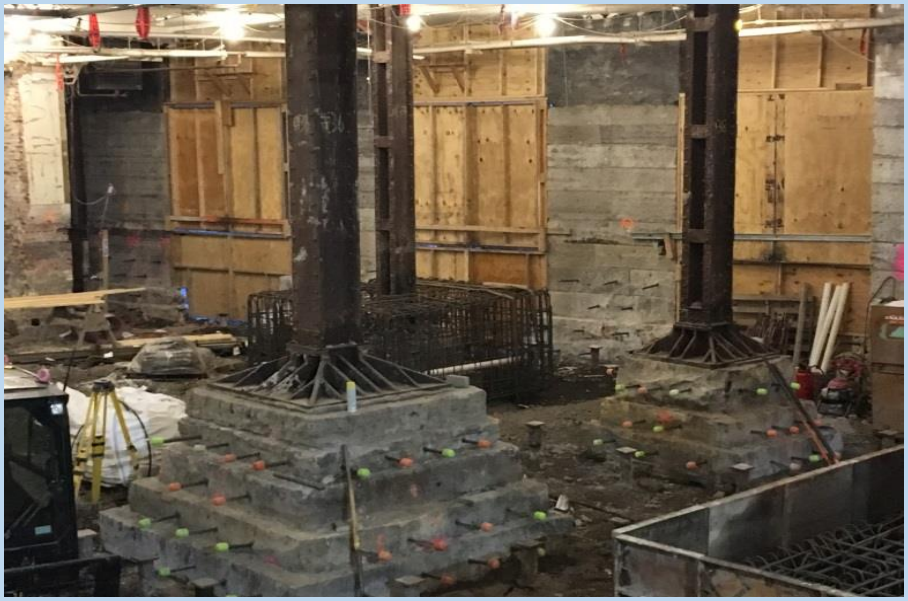
PHASE 4 REPAIR AREA- SOUTH END

TIMEFRAME: 2019 – 2020
REPAIR FOUNDATIONS;
REROUTE TELECOM INFRASTRUCTURE

PHASE 5 REPAIR AREA- SOUTH TOWER

TIMEFRAME: 2020 – 2021
REPAIR FOUNDATIONS





Thank You