



# Jet Grout Earth Retention at Chicago Subway

Shane Farr, SE, PE

**PURDUE**  
UNIVERSITY

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# Project Background

- ◆ Chicago Subway system constructed in the 40's and 50's
- ◆ Station at intersection of Grand Avenue and State Street
- ◆ Maintenance and renovation project included a major ADA upgrade

# Site Location

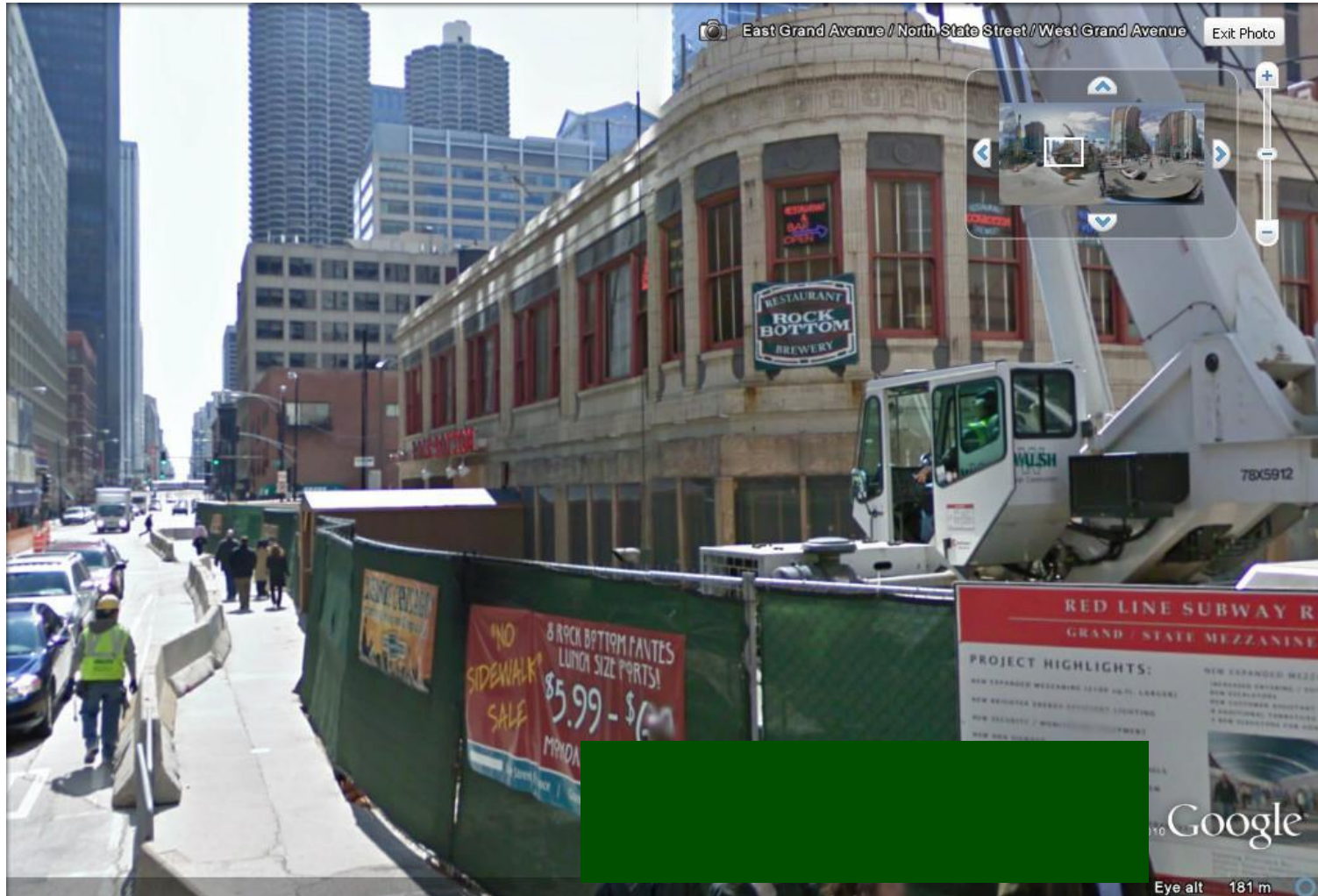
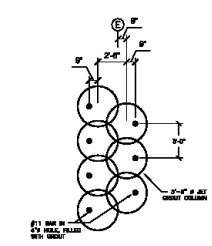
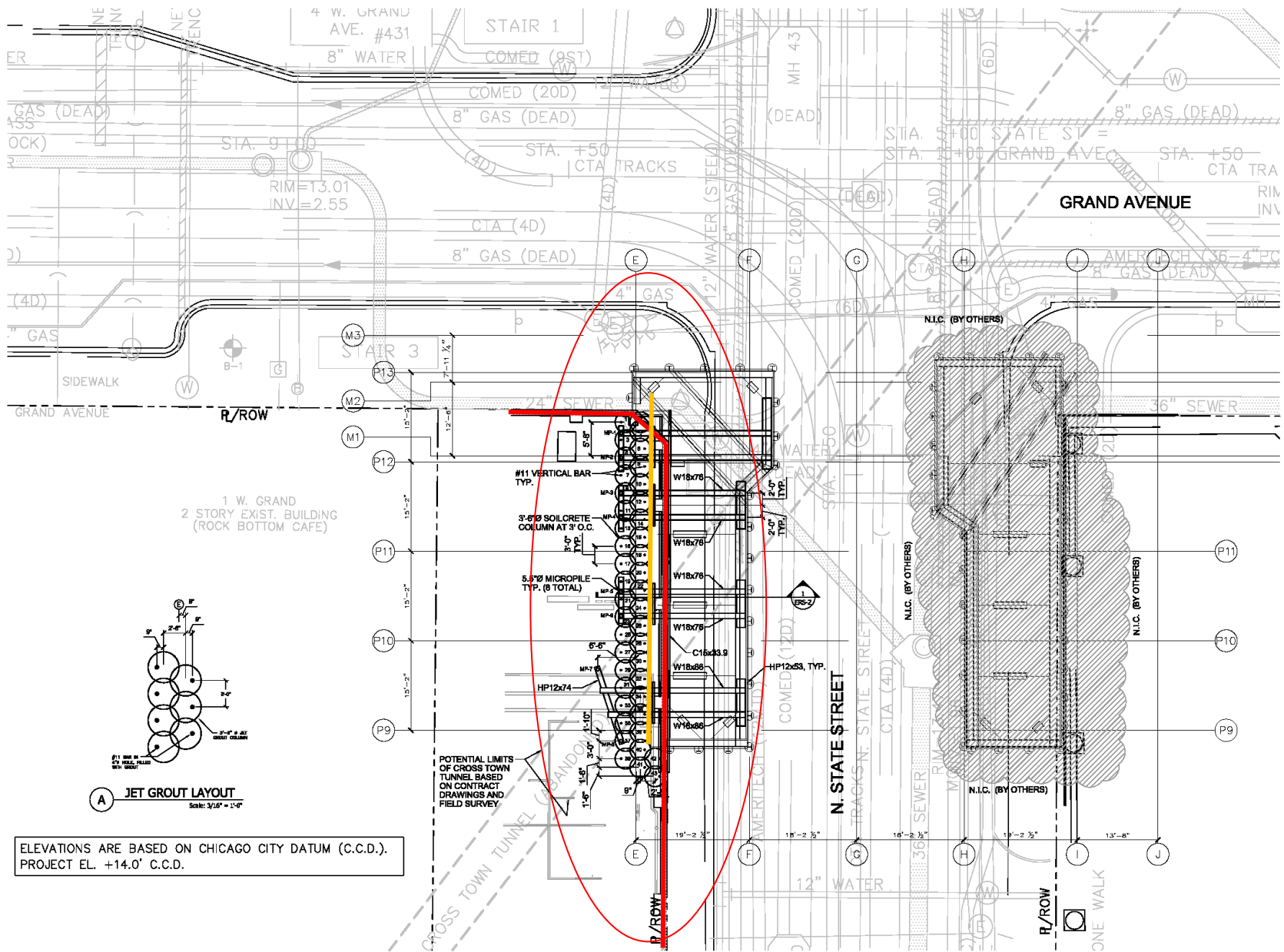


Photo facing south along State Street



**A JET GROUT LAYOUT**  
Scale: 3/16" = 1'-0"

ELEVATIONS ARE BASED ON CHICAGO CITY DATUM (C.C.D.).  
PROJECT EL. +14.0' C.C.D.

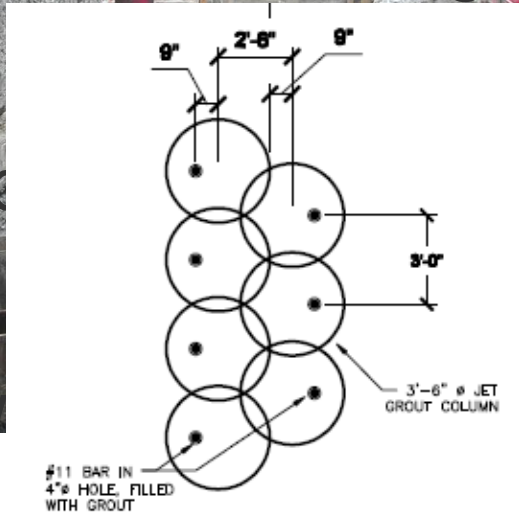
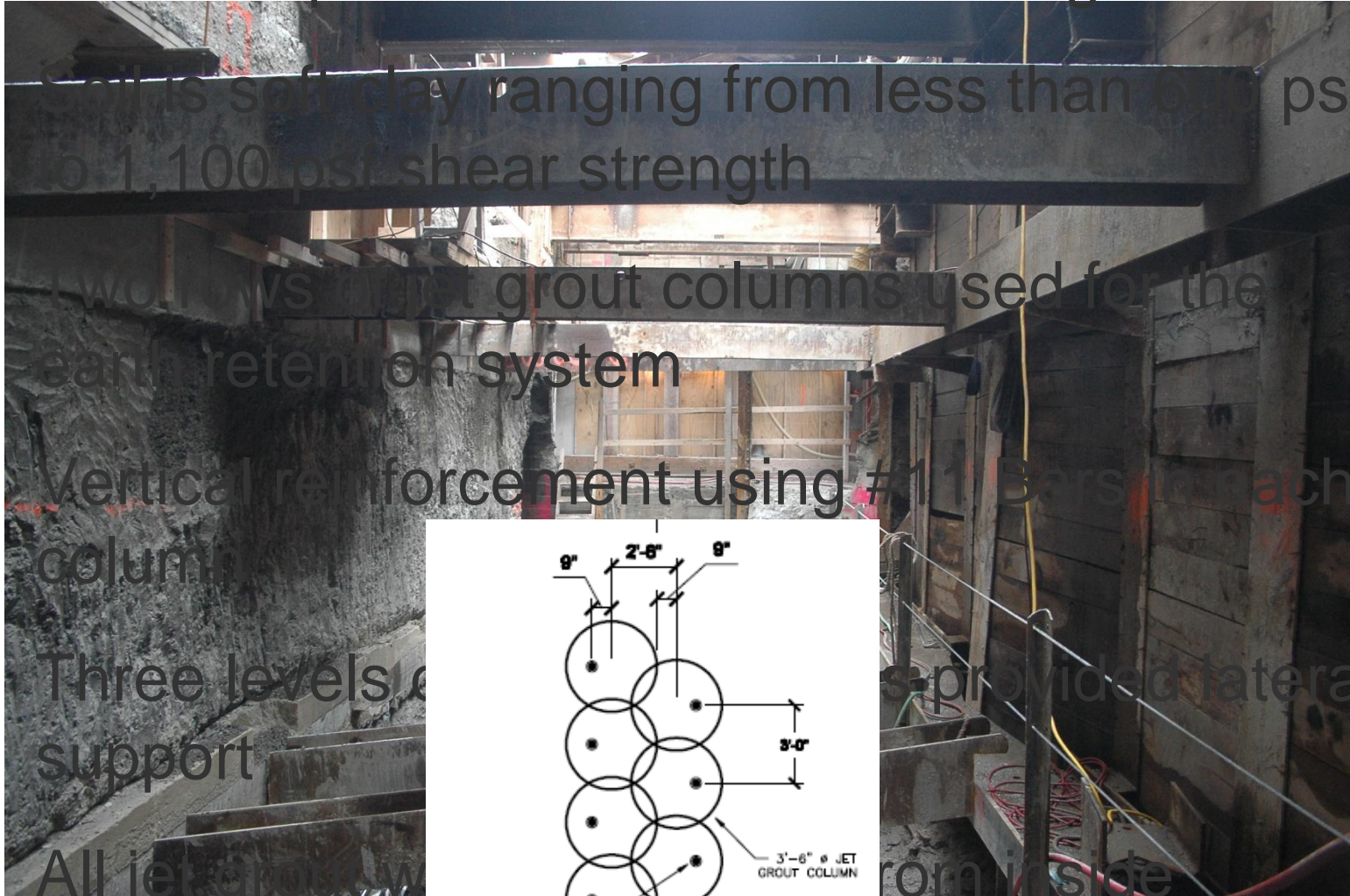
POTENTIAL LIMITS  
OF CROSS TOWN  
TUNNEL BASED  
ON CONTRACT  
DRAWINGS AND  
FIELD SURVEY

CROSS TOWN TUNNEL (GRAND)



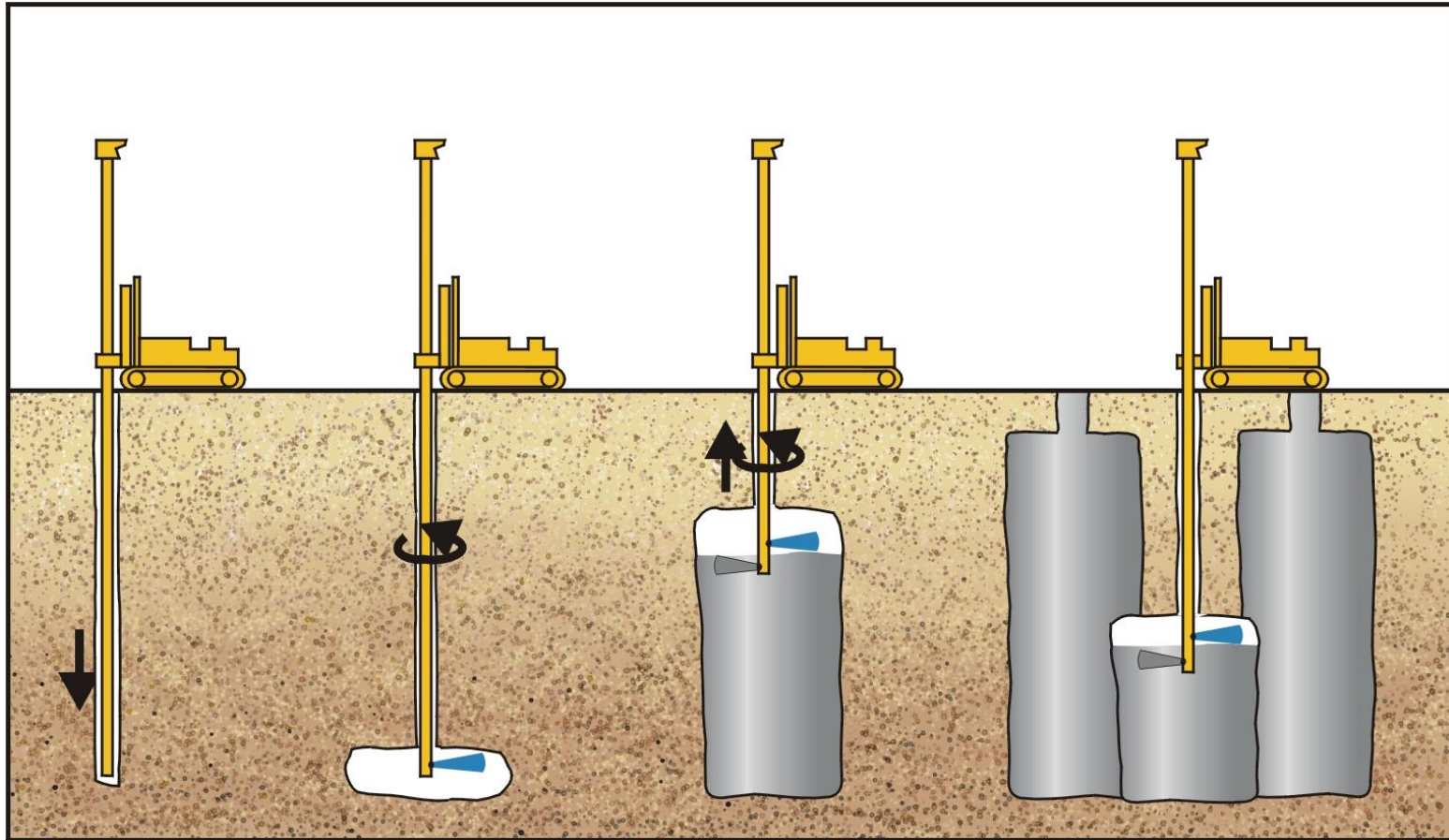
# Earth Retention

- ◆ 40 ft. deep excavation below street grade
- ◆ Soil is soft clay ranging from less than 600 psf to 1,100 psf shear strength
- ◆ Two rows of jet grout columns used for the earth retention system
- ◆ Vertical reinforcement using #11 Bars in each column
- ◆ Three levels of support
- ◆ All jet grout walls provided lateral support from inside



basement

# Jet Grout Process



# Existing Basement





# Limited Headroom Access



# Spoil Management



# Excavation of Jet Grout



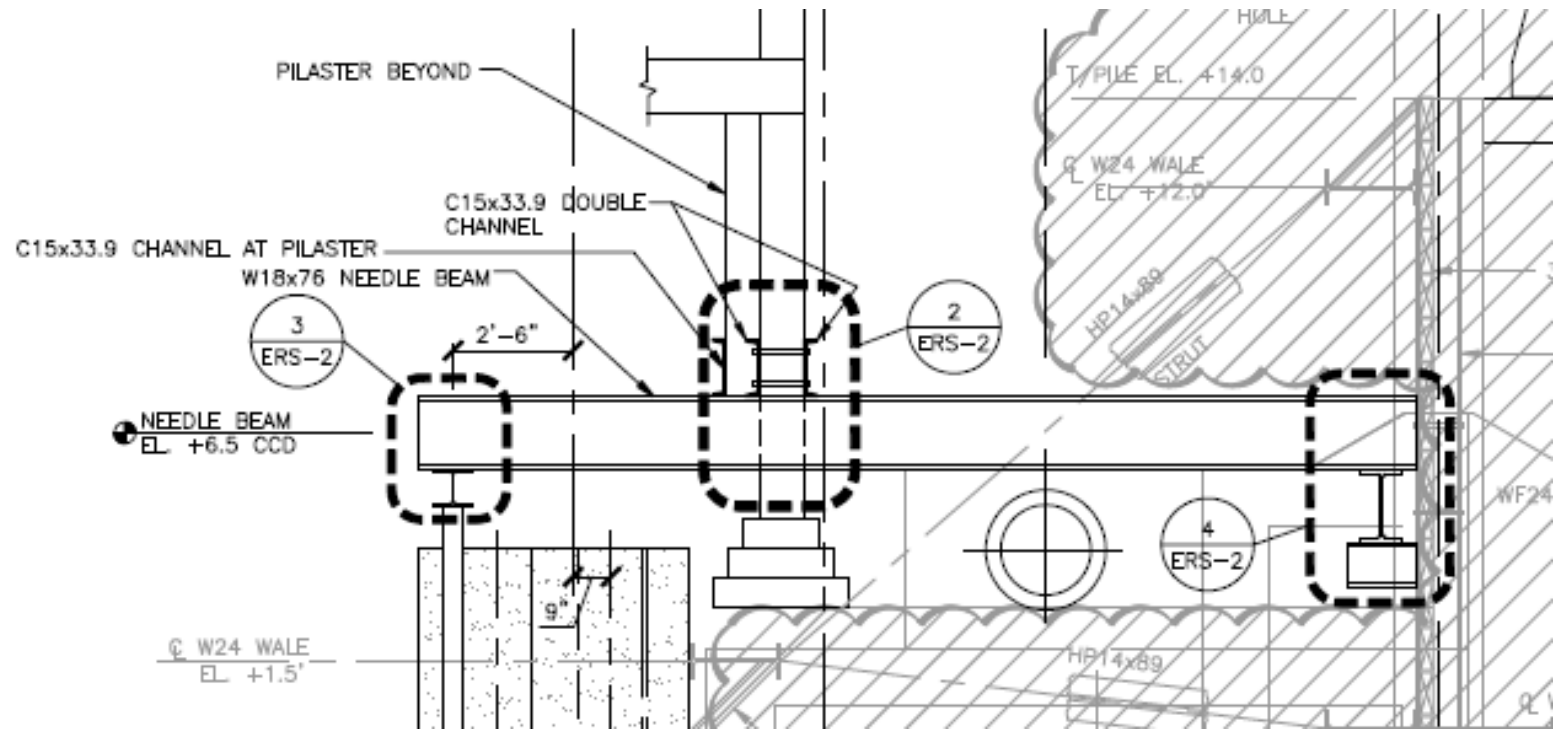
# Internal Bracing System



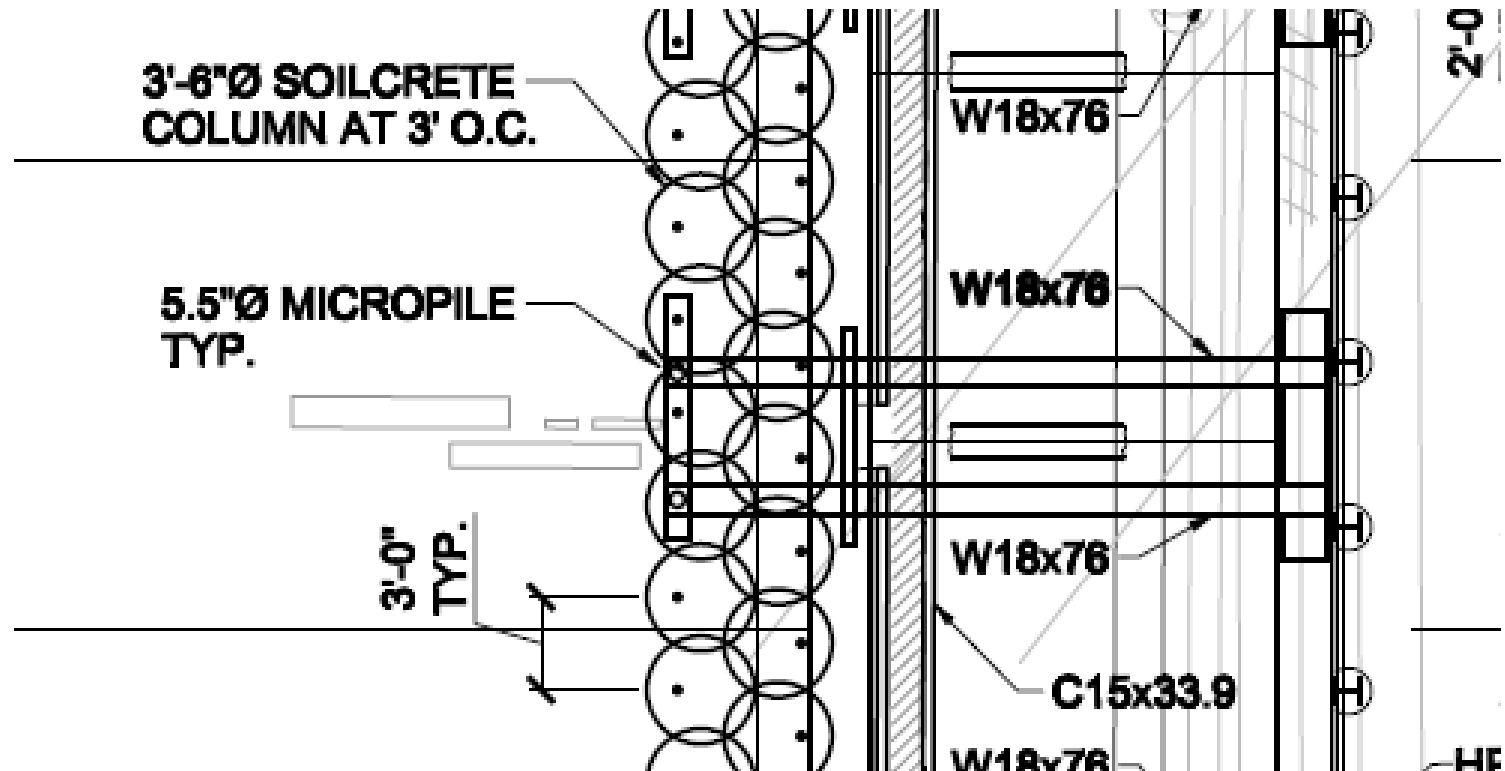
# Underpinning System

- ◆ Needed to support the foundation of the Rock Bottom Brewery
- ◆ Underpinning support had to allow for excavation beneath the footing
- ◆ Needle beams supported by micropiles were used to support the wall

# Needle Beam Support



# Plan View of Needle Beam Support







# Preload Needle Beams



# Underpinning successful



# Project Performance

- ◆ Inclinometers and settlement surveys used to monitor movement of the system
- ◆ Inclinometer readings showed about 1 inch of horizontal movement of the jet grout system (~0.3% of the height)
- ◆ Settlement of underpinned wall about 1/2 inch.



# Thank You!

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