LINCOLN HIGH SCHOOL MODERNIZATION

- Driven Soldier Pile
- Driven 6” Pipe Pile
- Lagging
- Helical Tiebacks
- Underpinning

PRESENTATION BY JEFF KENSINGER

General Contractor: Lydig Construction

Shoring Contractor: McDowell Northwest

Design Build Engineers: Swenson Say Faget

Geotech: Amec Foster Wheeler

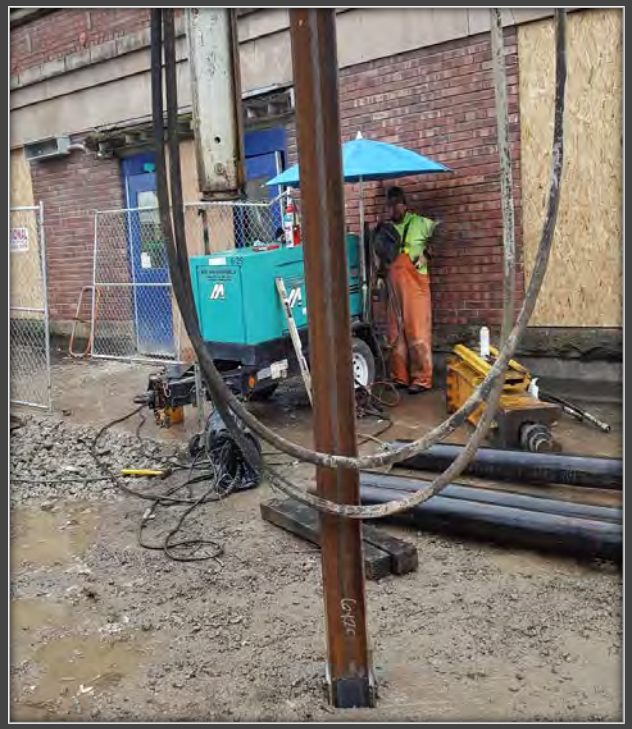
OBJECTIVE: Design a shoring system to support a 4-story wall while excavation occurs below the wall to allow for a lower level addition

Special thanks to Blaze Bresko with
Swenson Say Faget structural engineering

Shoring system to be installed both inside and outside the existing high school

First task, drive test pile

4 piles driven and tested to determine capacity and length



Using a 345 excavator, we jacked against the top of the piles to establish driving criteria

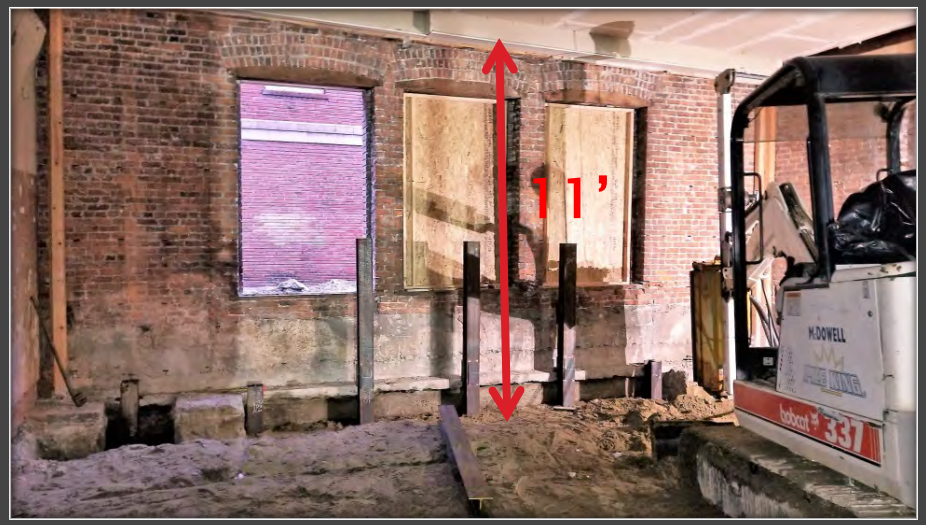
Once testing was complete we had a new challenge
…limited access for the pile driving rig

…and a low overhead ceiling

Once inside, we were limited on the length of soldier piles we could drive due to the low overhead ceiling

SOLDIER PILE INSTALL

Approximately 11’ from the ground elevation to the ceiling



Piles driven with a 2,000 lb hammer

LOW-OVERHEAD SOLDIER PILES

Piles were driven to refusal and then later lagged to shore the excavation needed below the existing footing

Soldier piles were driven in 7’ and 5’ sections to 20’ – 25’ below existing grade with full penetration weld splices

Meanwhile, outside the building
6” pipe piles were installed

6” dimeter pipe piles were driven inside and outside the building to support the spreader beams and foundation clips

Once all of the vertical elements were installed, we started installing spreader beams and foundation brackets

Horizontal spreader beams support the foundation above

Angle bracket and spreader beam

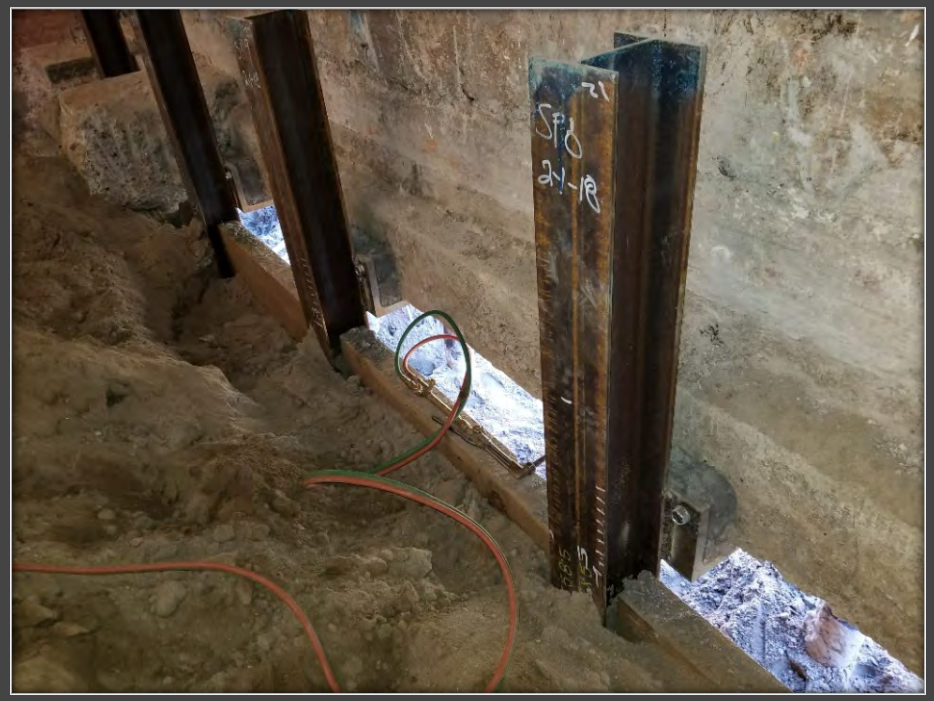
View of spreader beams supporting 3 foundations from inside the building

Spreader beams were shimmed and grouted to minimize foundation settling

Nearly completed underpinning system excavation … demo to follow

Foundation clips installed from inside the building

Once the underpinning elements were completed, we started lagging the soldier pile wall

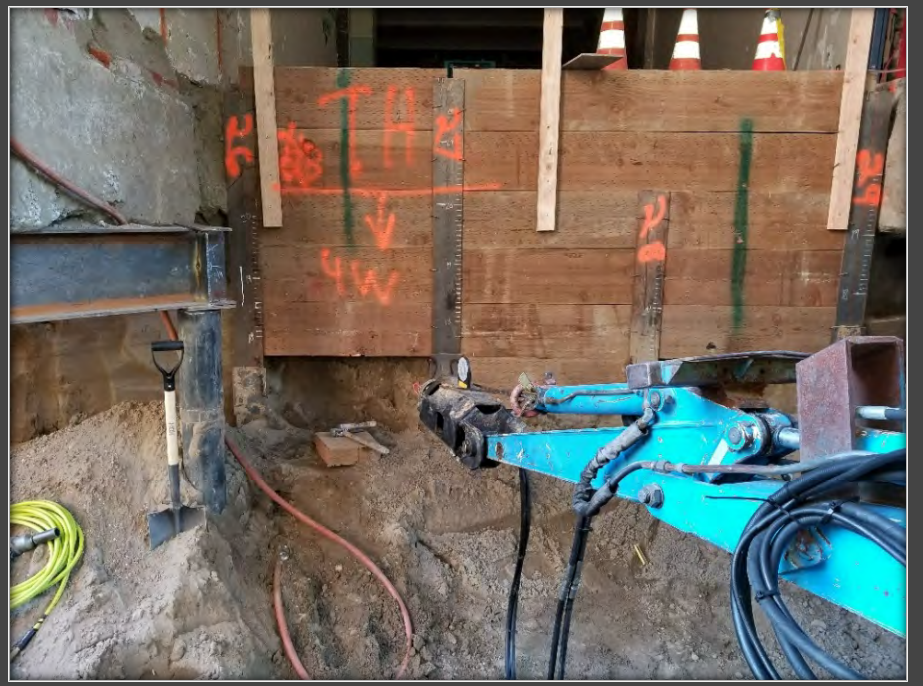


This often required the material to be removed by hand

The excavation proved to be tedious work with limited equipment access

Helical tie-backs were installed with a caterpillar 308 mini excavator and an eskridge model 78 helical motor

Lagging placed in 4 foot lifts and then walers and helical tie-backs were installed



Helical tiebacks were pull tested to 40 kips


6
7
8
9
10
LINCOLN ELECTRIC

Continuing excavation


ASCENDENT
DEMOLITION

Excavation for 2nd lift of lagging

Excavation for 2nd lift of lagging

Working our way down

Shoring system doing exactly what it was designed to do

More helical tiebacks

1st row done

Working on 2nd row

Almost done

Completed shoring system

Completed shoring system

Completed shoring system

Completed shoring system

BEFORE

AFTER

JOB RECAP

Driven piles

1,000+ feet of low-overhead soldier piles installed

1,000+ feet of 6” pipe pile installed

4 compression tests to 60 tons

Shoring / underpinning

Over 2,000 sq. Ft. Of lagging

Over 100 underpinning elements spreader beams, sidewall brackets, clips, etc.

35 helical tiebacks installed with box tubing walers