RTE 29 NBL/SBL OVER NS RR (JUMBOS)
RTE 29 NBL OVER NS RR (AIRPORT)

VTCA - Lynchburg District Dialogue April 2023

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April 20, 2023

OVERVIEW

- Jumbos
  - Purpose and Need
  - Design Considerations/Stakeholders
  - Advertisement
  - Construction

- Airport
  - Purpose and Need
  - Design Considerations/Stakeholders
  - Advertisement
  - Construction

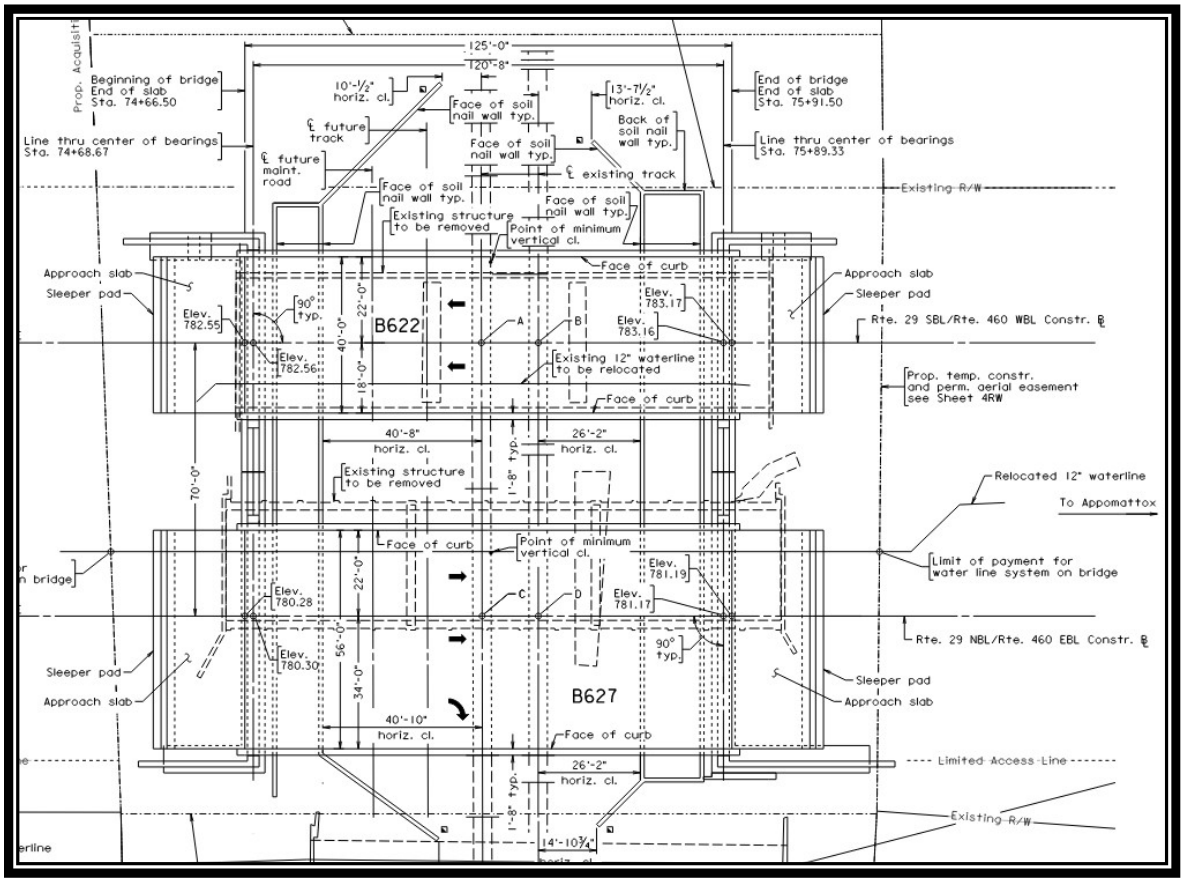
Jumbos – Purpose and Need

- Replace the existing structures on Route 29 NBL and SBL over NS Railroad
- With necessary approach work and without added capacity.
- Both structures were in an advancing state of deterioration and carry a significant amount of traffic. The Average Daily Traffic (ADT) at the time of development for this section of Route 29 was 35,779 (2016) vehicles per day with 8.63% trucks and the projected Design ADT is 45,082 (2042).
- The SBL structure, which originally was built in 1936, was in poor condition with a sufficiency rating of 58.0 and was structurally deficient
- The NBL structure, was originally built in 1953, was in fair condition with a sufficiency rating of 54.2 and was functionally obsolete
- Considering the age, condition, geometrics, and type of structure the only practical and cost effective solution was to totally replace both structures

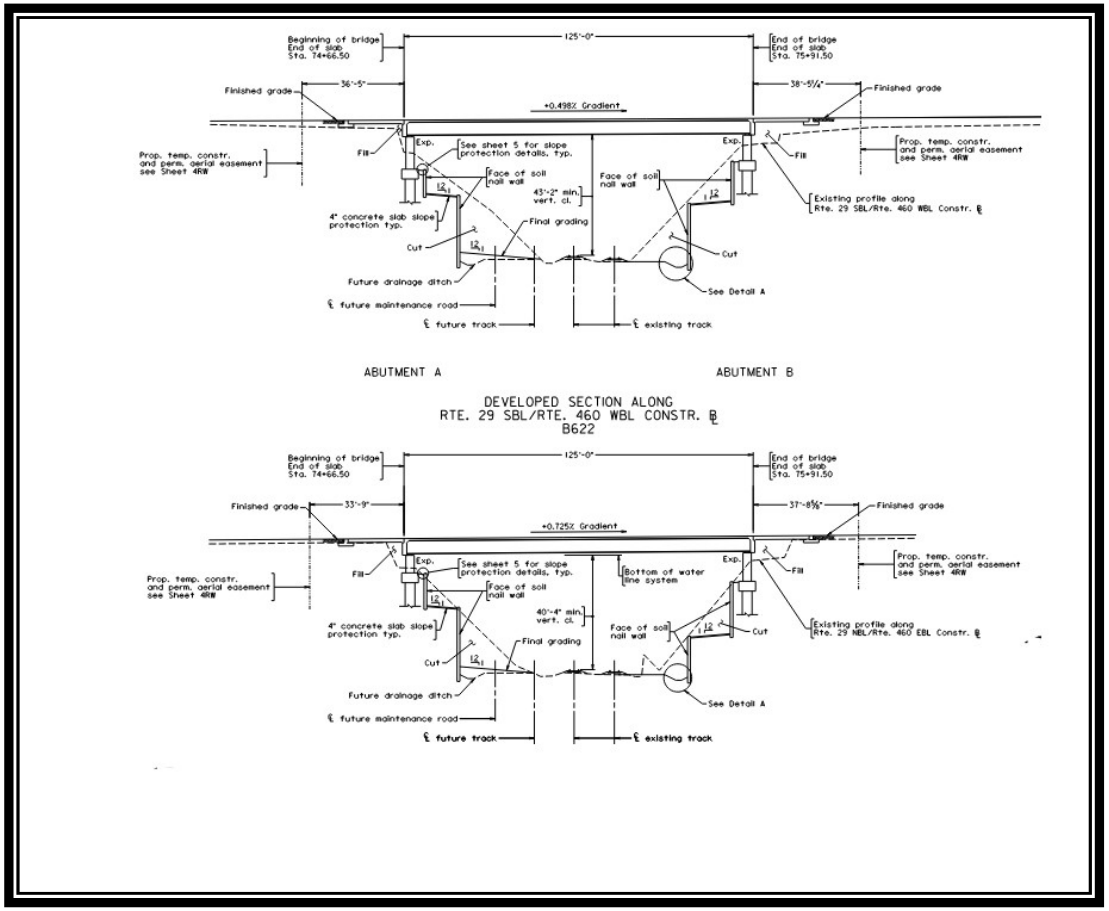
Jumbos – Design Considerations/Stakeholders

- **MOT – High ADT; Heavy emphasis on the ability to maintain 2 lanes in each direction**
  - Staged construction of new NBL Structure
- **Norfolk Southern Railway**
  - Considerations for future track and future maintenance road
  - Soil nail walls and drilled shaft foundations to limit span length
- **City of Lynchburg – Multiple waterlines in the project vicinity**
  - Waterline carried by new NBL Structure
  - Waterline structure to the right of new NBL Structure
- **AEP – High voltage overhead power line**
  - Required advance relocation

Jumbos – Plans



Jumbos – Plans



Jumbos – Advertisement

- Project Scoped September 2015
- ROW Phase began April 2018
- Advertised January 13, 2020
- Bids Read March 25, 2020
  - Received 5 bids on the project
  - W.C. English, Inc. read as low bid
  - $16,926,303.04

Jumbos – Construction

Jumbos – Construction Facts

- Two Bridges each a single span 125ft long, steel girders with a concrete deck
- The Permanent Soil Nail Walls and Temporary Retaining Structure bid for $4,397,082.00 or 26% of the project
- 4 Phase Construction
- Project 0.6 miles long

Jumbos – Construction Challenges

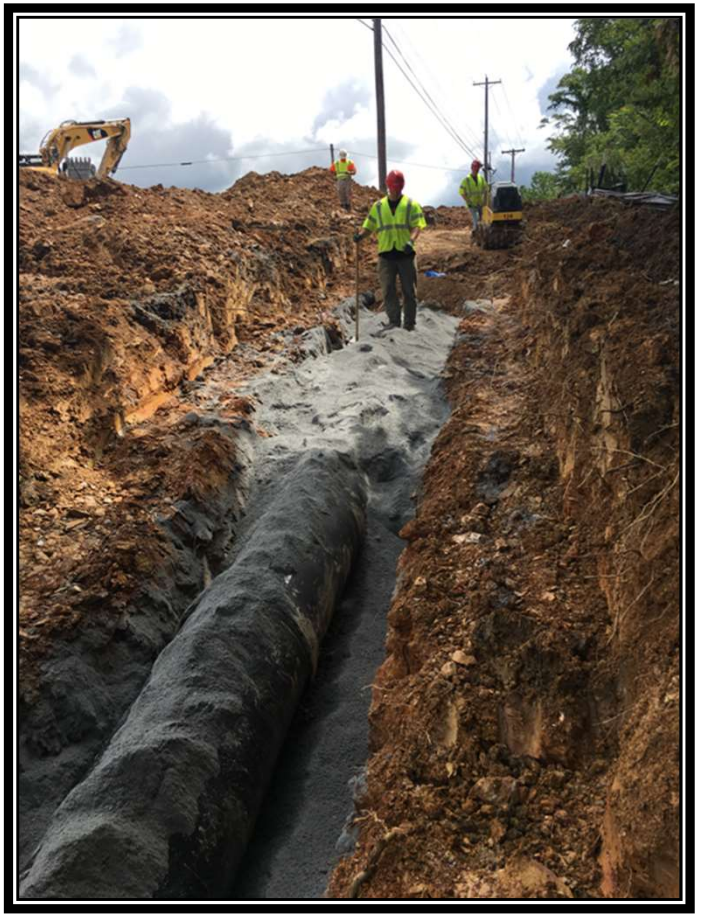
- 24 “ Waterline relocation by 7/4/2021
- Access
- Permanent Soil Nail Walls
- Temporary Shoring
- Phased Construction
- Drilled Shafts
- Demolition
- Norfolk Southern Railroad

24” Waterline Construction “The pressure is on”

THE SHUT DOWN AND CONNECTION TO THE 24"WATER MAIN REQUIRES CAREFUL COORDINATION AND ADVANCE NOTICE 12 WEEKS) TO THE CIT Y OF L YNCHBURG, AND **MUST BE PERFORMED DURING A 7-DAY WINDOW CORREL ATING TO THE PLANET SHUTDOWN AT BWXT. THE EXAC T DATES SHALL BE DETERMINED BY THE CONTRACTOR, BUT THESE TWO WEEKS GENERALLY FALL AROUND JUL Y 4 AND DECEMBER 25.** CONTRACTOR SHALL TAKE ALL PROVISIONS TO BE READY FOR THE SHUTDOWN/CONNECTION OF THE 24"WATER RUIN NEAR THE BEGINNINGOF THE BWX T PLANT SHUTDOWN. UNDER NO CIRCLUMSTANCE S SHALL THE EXISTING 12" WATERLINE (BEING RELOCATED AS PARTOF THIS PROJECT) BE OUT OF SERVICEAT THE SAME TIME AS THE 24”WATER LINE IS SHUTDOWN. THE MAXIMUM OUTAGE FOR THE 24" WATERLINE IS 48 HOURS. CONTRACTOR SHALL FURNISH ONE CREW AT EACH CONNECTION POINT TO INSURE THE 24" WATERLINE IS TIED IN AND BACK IN SERVICE WITHIN THE 48 HOUR WINDOW.

Waterline Start Up Issues

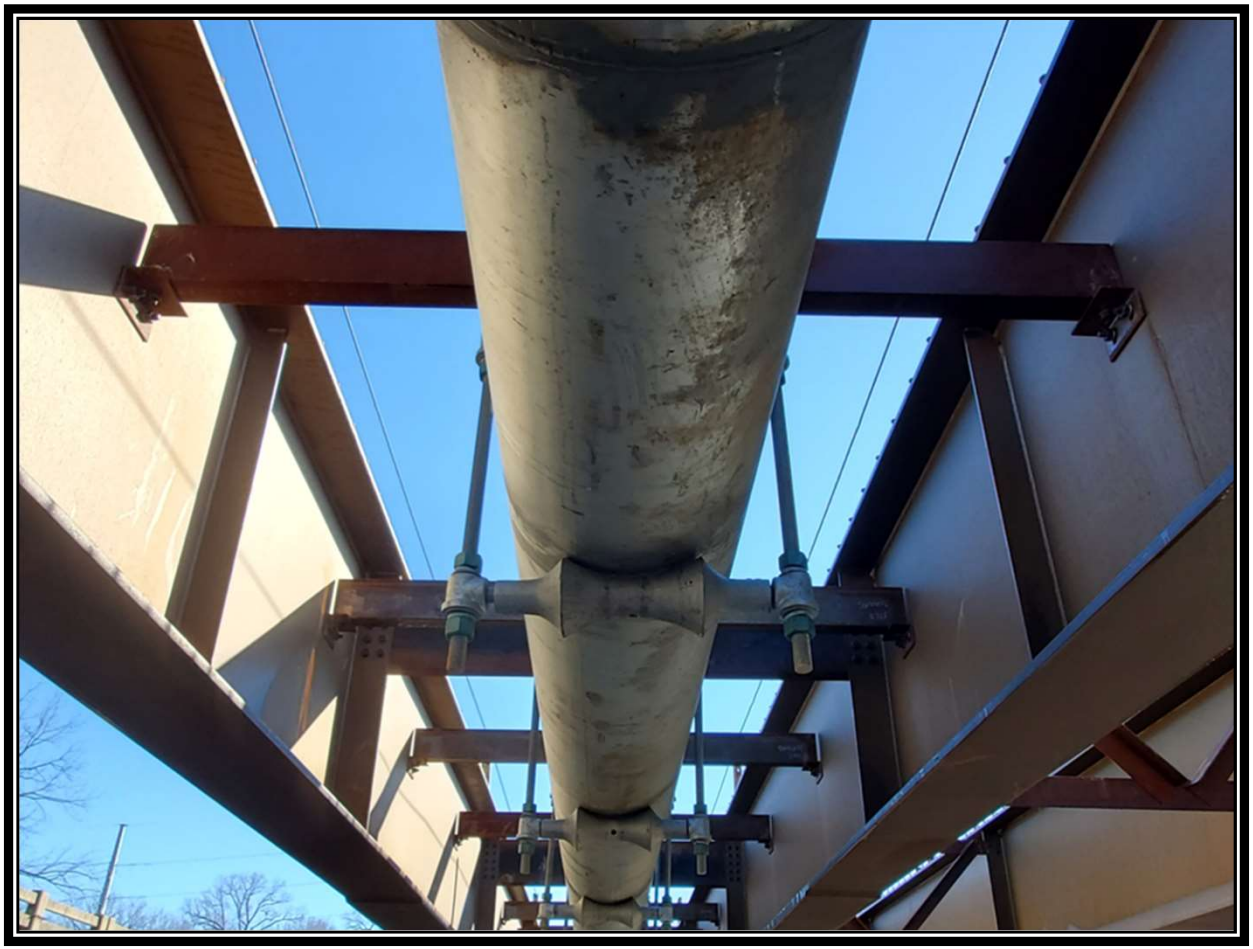
- Notice to proceed June 01-2020
- VDOT changed their system for Utility Materials
- The City of Lynchburg and their Consultant had to also approve Shop Drawings
- The need to get material ordered before the contract has been signed



Challenges in the Field

- 868 LF of 24” Waterline
- Rock Excavation
- Modifying Pipe layout to adjust for field conditions
- Pressure and Bacteria testing
- 4th of July Conflicts with the City’s personnel

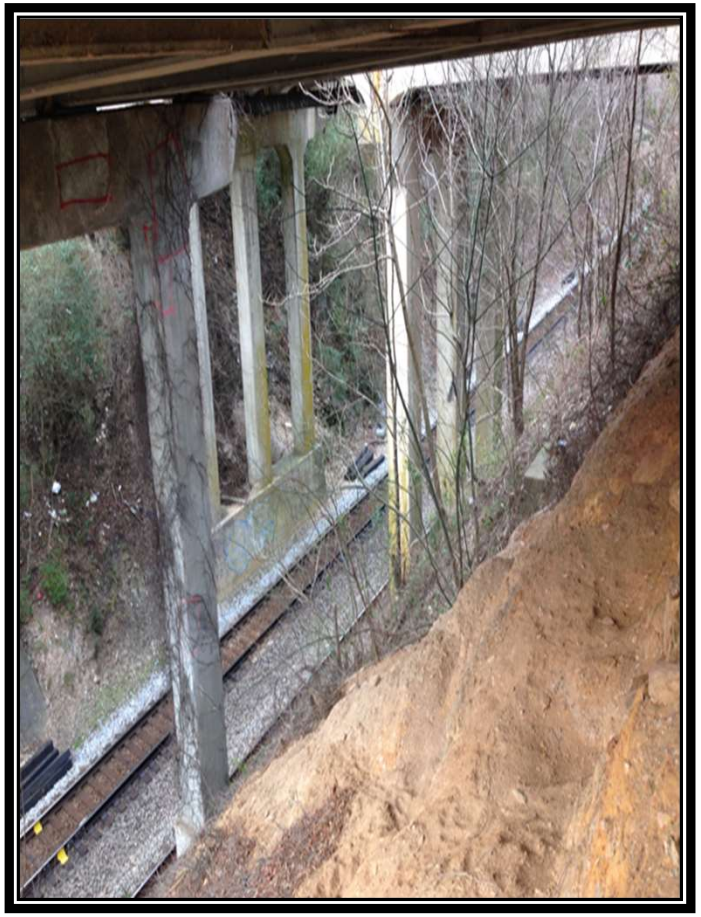
Bridge Waterline



As Bid Site Conditions at Wall

Soil Nail Walls

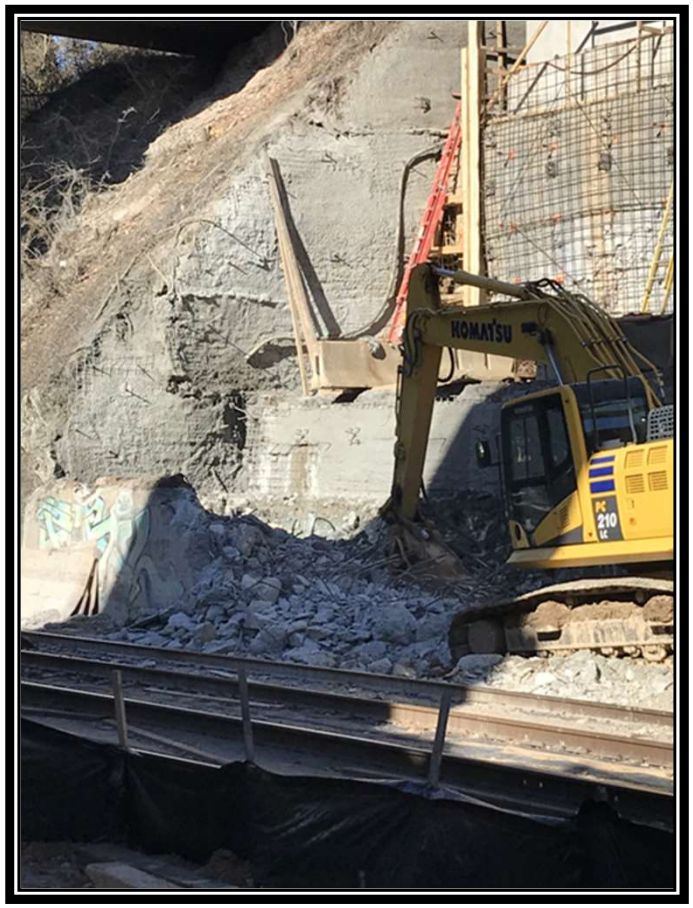
- Stair stepped levels
- Excavation
- Drill Anchors
- Shotcrete wall
- Poured in place concrete walls
- One sided forms



Typical Wall Elevation View

Rock Excavation for Wall

Mini Excavator with hoe ram set on ledge by crane



Excavator with hoe ram accessed from the bottom

Access and Soil Nail Wall

Drilling Soil Anchors

Installing soil nails with Bobcat

Installing soil nails with excavator

Shotcrete

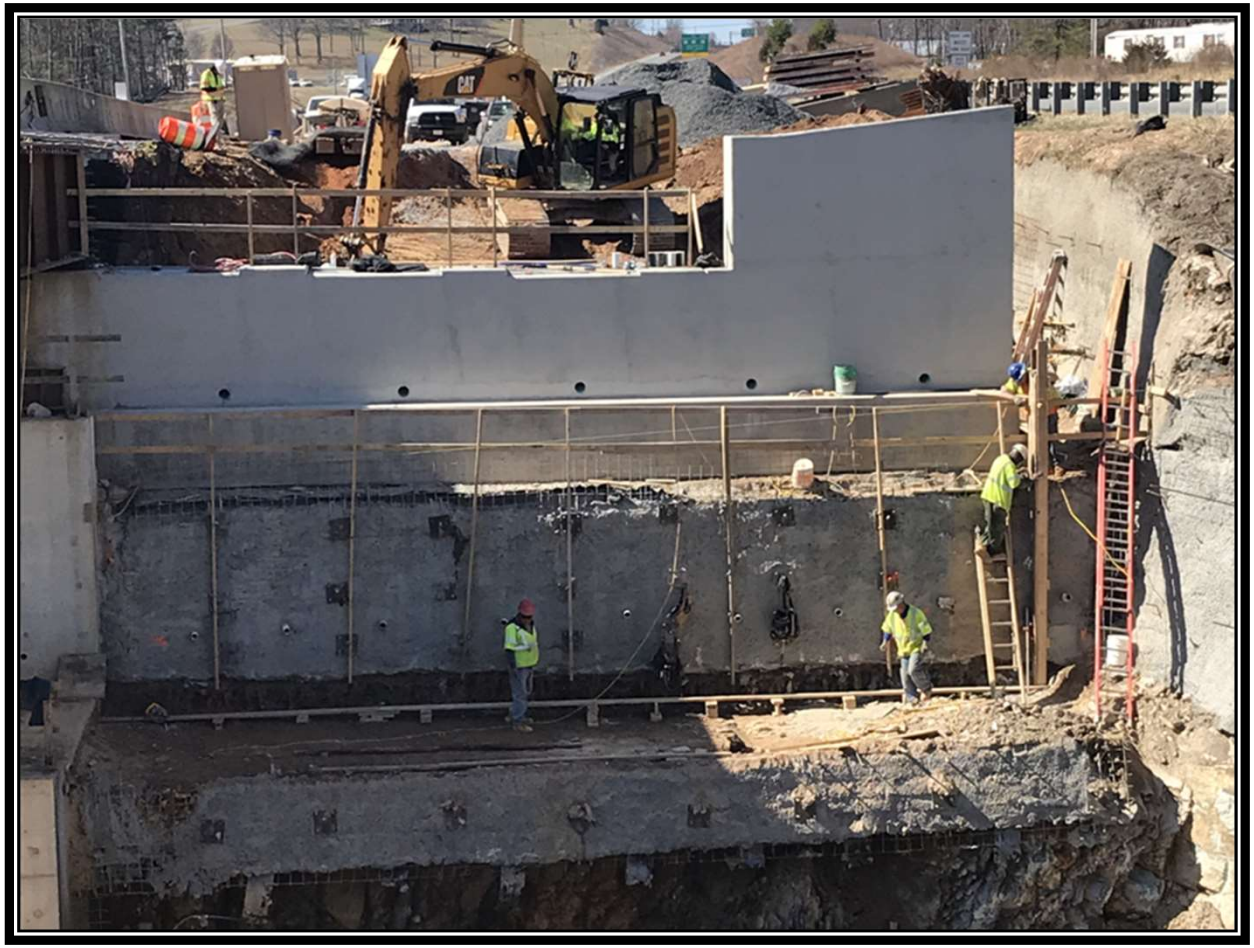
Pouring Cast in place Concrete Portion of Wall

One Sided Forms

Modified Wall

Modified wall layout to protect existing waterline bridge

Wall



Soil-nail wall with shot-crete

Jumbo Walls

Temporary Shoring

Soil nails to the left and Wire Baskets to the right

Soil Nail Shoring

Wire Basket Shoring

Geogrid
Geotextile
Wire Basket and select aggregate fill

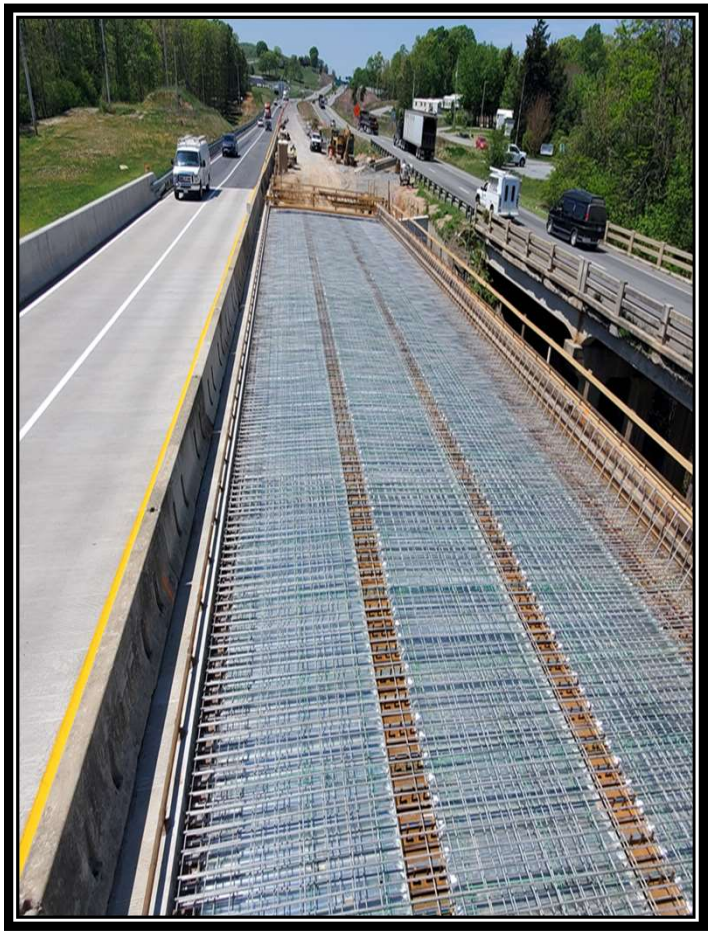
4 Phase Construction

Looking West

Looking East

Phase 1

Phase 2



Phase 2 Deck

Screed support on left side on girder partially loaded in Phase 1

Right side supported by unloaded girder

Phase 3

Phase 3

Drilled Shafts

- 42” Drilled Shafts
- Permanent Steel Casing
- CSL and TIP Testing
- 37 shafts total

Demolition

Rte 29 NBL over NS RR (Airport)

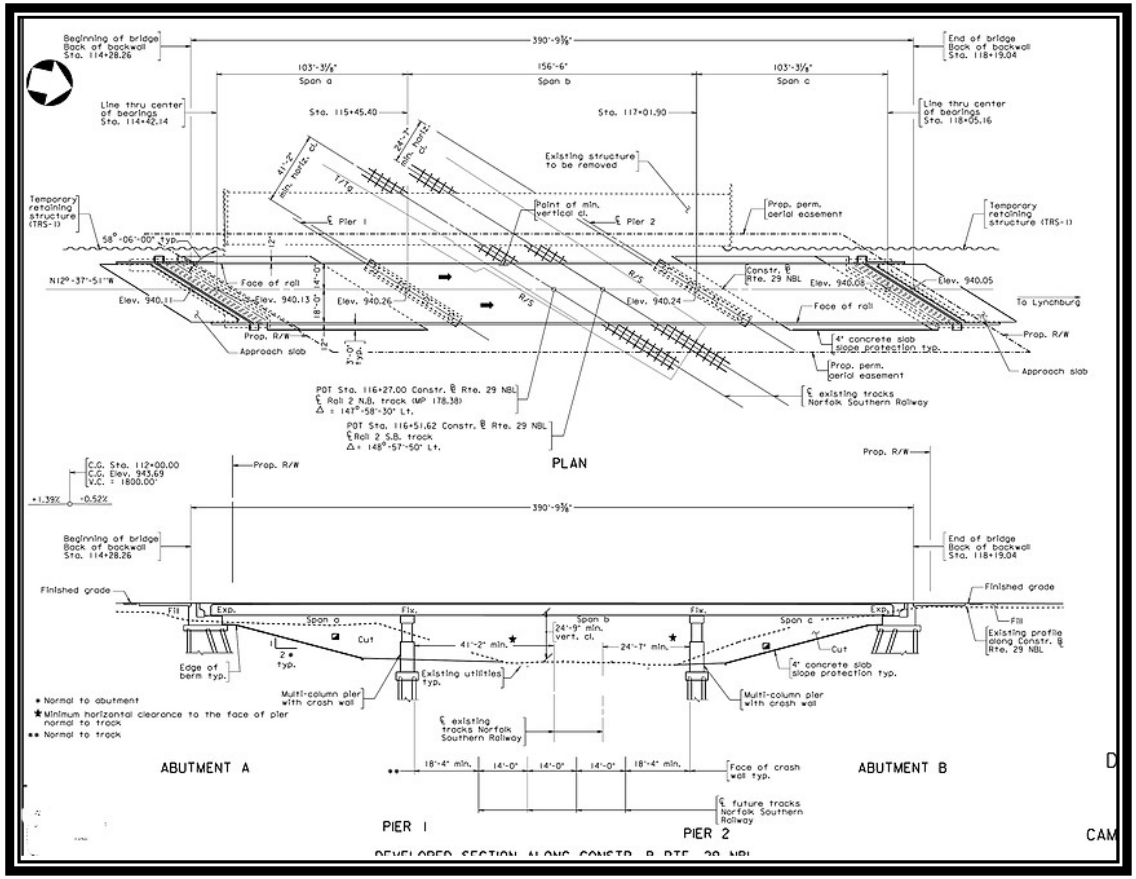
Airport – Purpose and Need

- Replace the existing structure on Route 29 NBL over the Norfolk Southern Railroad
- Necessary approach work without added capacity
- This segment of roadway is on the National Highway System and has a functional classification as an Urban Principal Arterial serving approximately 32,000 vehicles per day with approximately 7% trucks
- Route 29 functions as the economic life line to the greater Lynchburg Region and beyond
- The NBL bridge was a fracture critical structure in an advancing state of deterioration (70 years old) and warranted replacement proactively before having to post the structure for any weight restrictions
- Considering the age, condition, geometrics, and type of structure the only practical and cost effective solution was a total replacement
- The proposed bridge on Route 29 NBL will be built to the east to accommodate NBL traffic during construction

Airport – Design Considerations/Stakeholders

- **MOT – High ADT; Heavy emphasis on the ability to maintain 2 lanes in each direction**
  - Construction on new alignment to the east of existing structure
  - Temporary shoring adjacent to existing structure during construction
- **Severe Skew 58.1 degrees**
- **Major tire clean up from a previous garage within the project limits**
- **Norfolk Southern Railway**
  - Considerations for two future tracks
  - Crash walls on piers
- **Campbell County Utility Service Authority**
  - In plan utility work
- **Lynchburg Regional Airport**
- **Local Business**
  - Maintain access to JMJ Landscape

Airport – Plans



Airport – Advertisement

- Project Scoped March 2016
- ROW Phase began August 2018
- Advertised September 8, 2020
- Bids Read November 18, 2020
  - Received 7 bids on the project
  - W.C. English, Inc. read as low bid
  - $8,280,091.90

Airport – Construction Facts

- One Bridge 390 feet long, 3 spans
- Bridge on 58 deg. skew
- Steel Girders with a concrete deck
- Span over the NSRR tracks 156.5 feet long
- Storm Drain, waterline and sewer line worth $750,000.
- Roadway ½ mile long

Airport – Construction Facts

- Material supply issues
- Utilities
- Geotechnical Challenges
- Extreme Skew

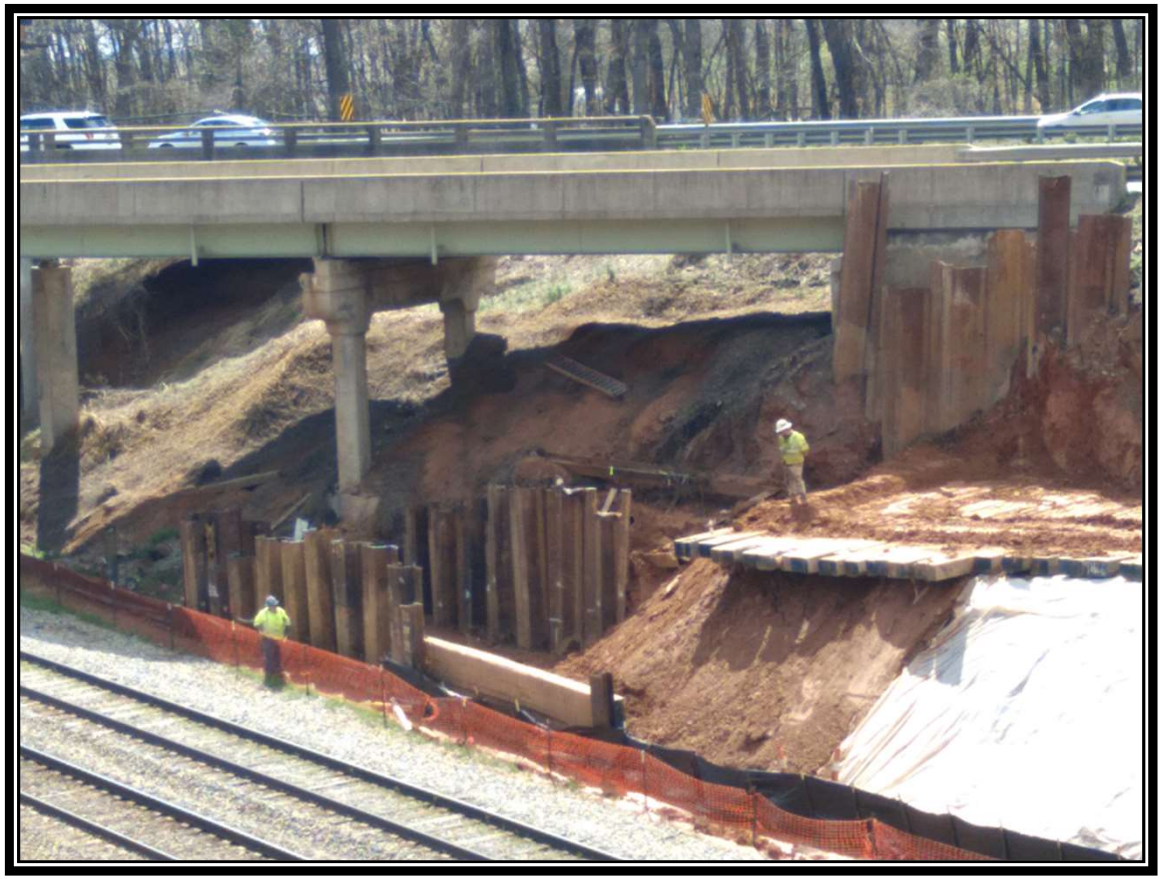
Material Supply Issues

- PVC sewer pipe increased 183% while shop drawings were being approved.
- Ductile Iron Fittings (change and long uncertain lead time)
- H pile increased 20 % in the month after project bid.

Geotechnical Challenges

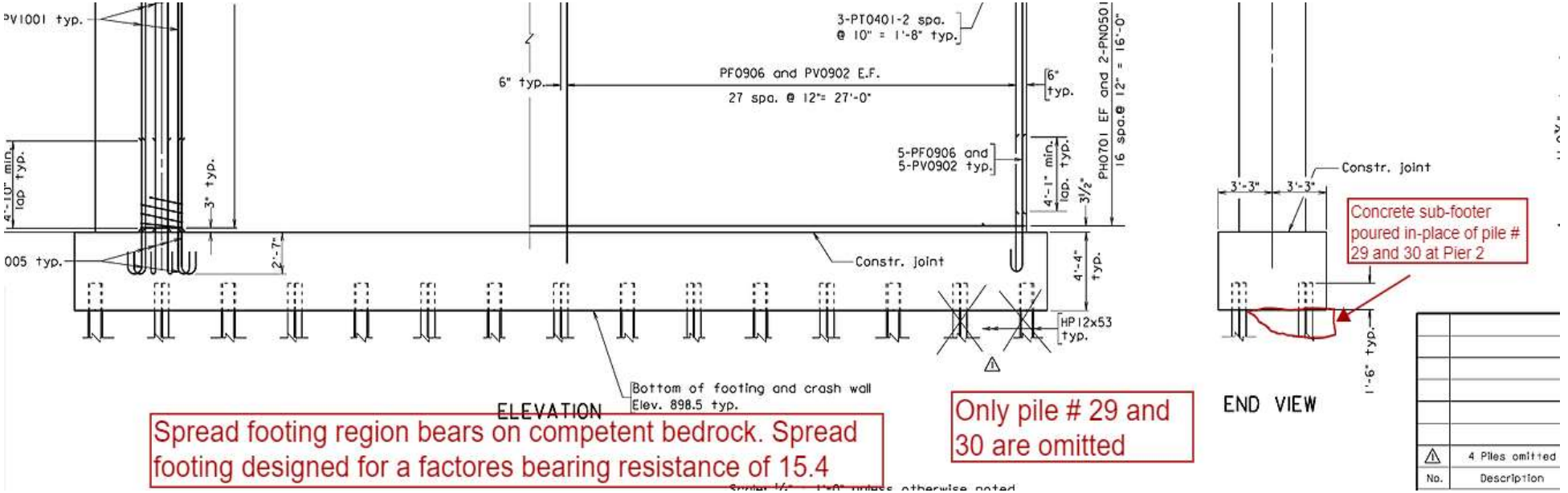
- Bed Rock climbed significantly from west to east
- Pier 2 Shoring and Pile could not be installed per plan
- Pier 1 was proactively drilled by WCE and the same issue was found. The footing was redesigned.

Limit of Pier 2 Shoring to Plans



Pier 2 Foundation redesigned based on site conditions observed in the field.

Pier 2 Revision

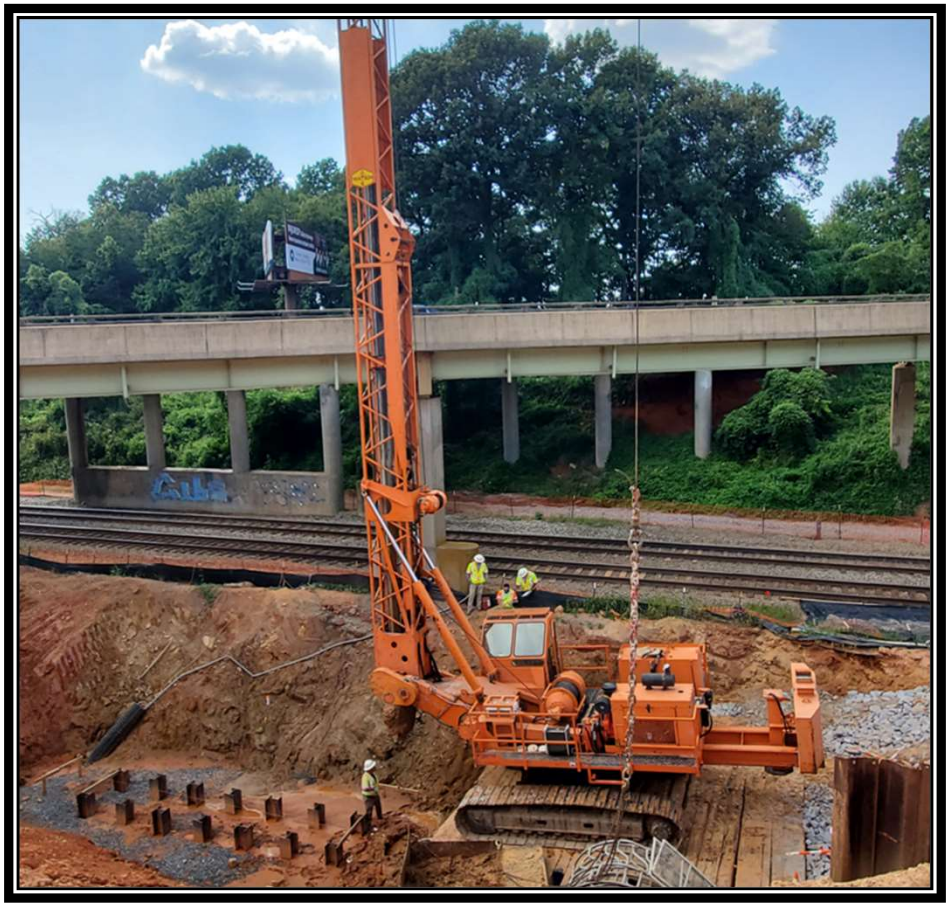


Sheet Pile Driven past refusal

“Yes we are sure we have driven as deep as possible”

Footing for Pier 2 was redesigned

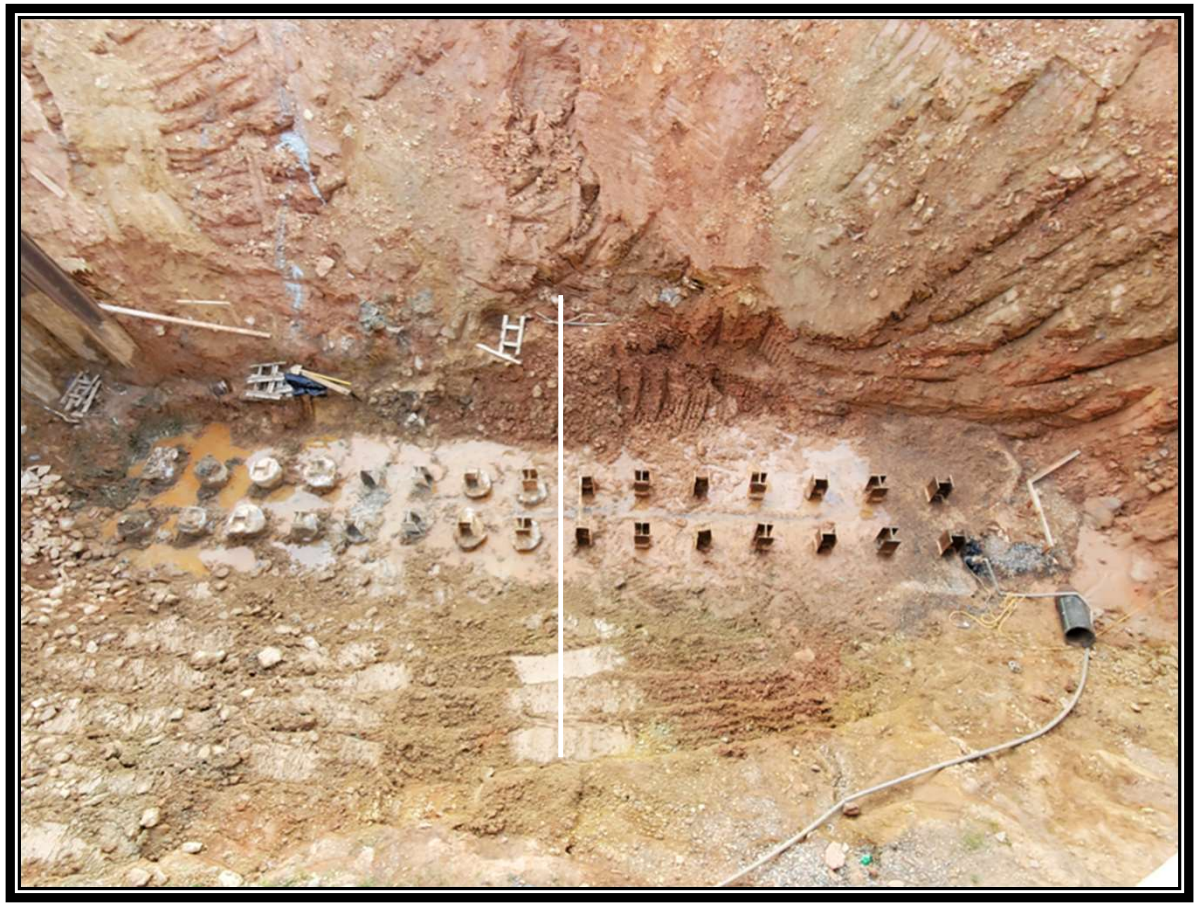
Drilled Piles Pier 1



To avoid the issues at Pier 2 borings were done and pier 1 was redesigned to pre bore for the piles

Pier 1 Piles

Approximately half driven as planned and half pre drilled and grouted in place



Piers

Note: Skew

Shoring With Tiebacks

- Tie back shoring
- Problems with battering pile and conflict with sheetpile and the hammer being over a lane of traffic

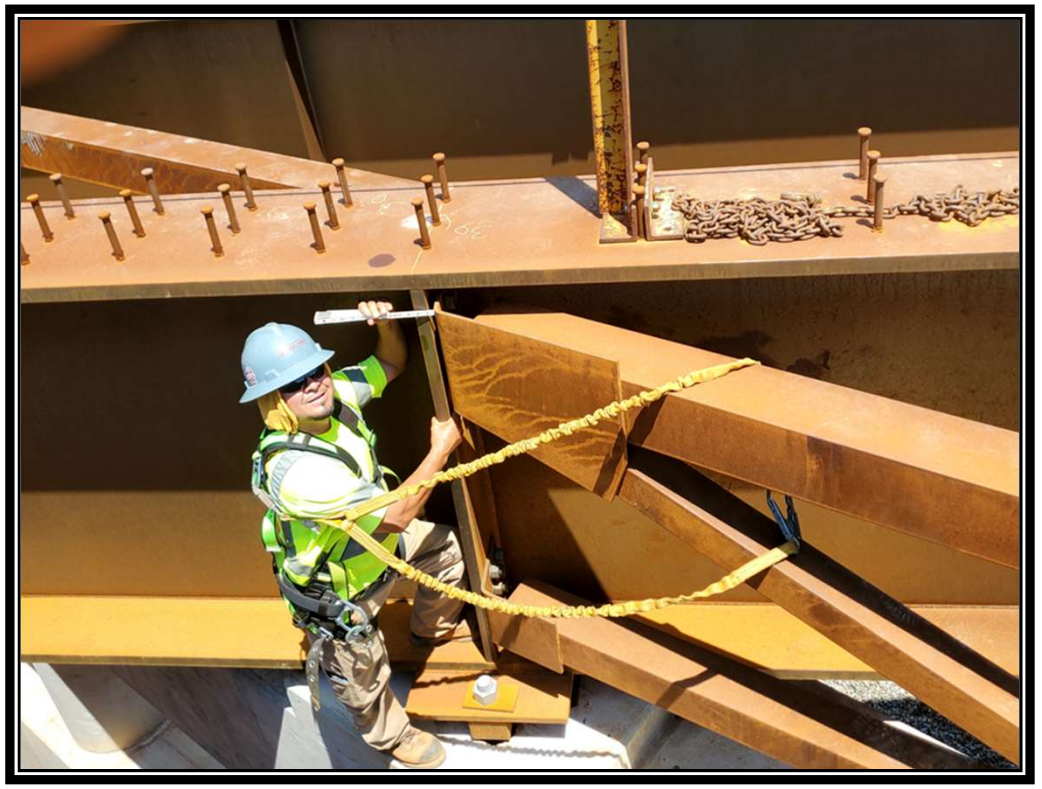
Abutment Footing

- 70 feet long

Temporary Shoring

Setting Structural Steel

Setting Structural Steel



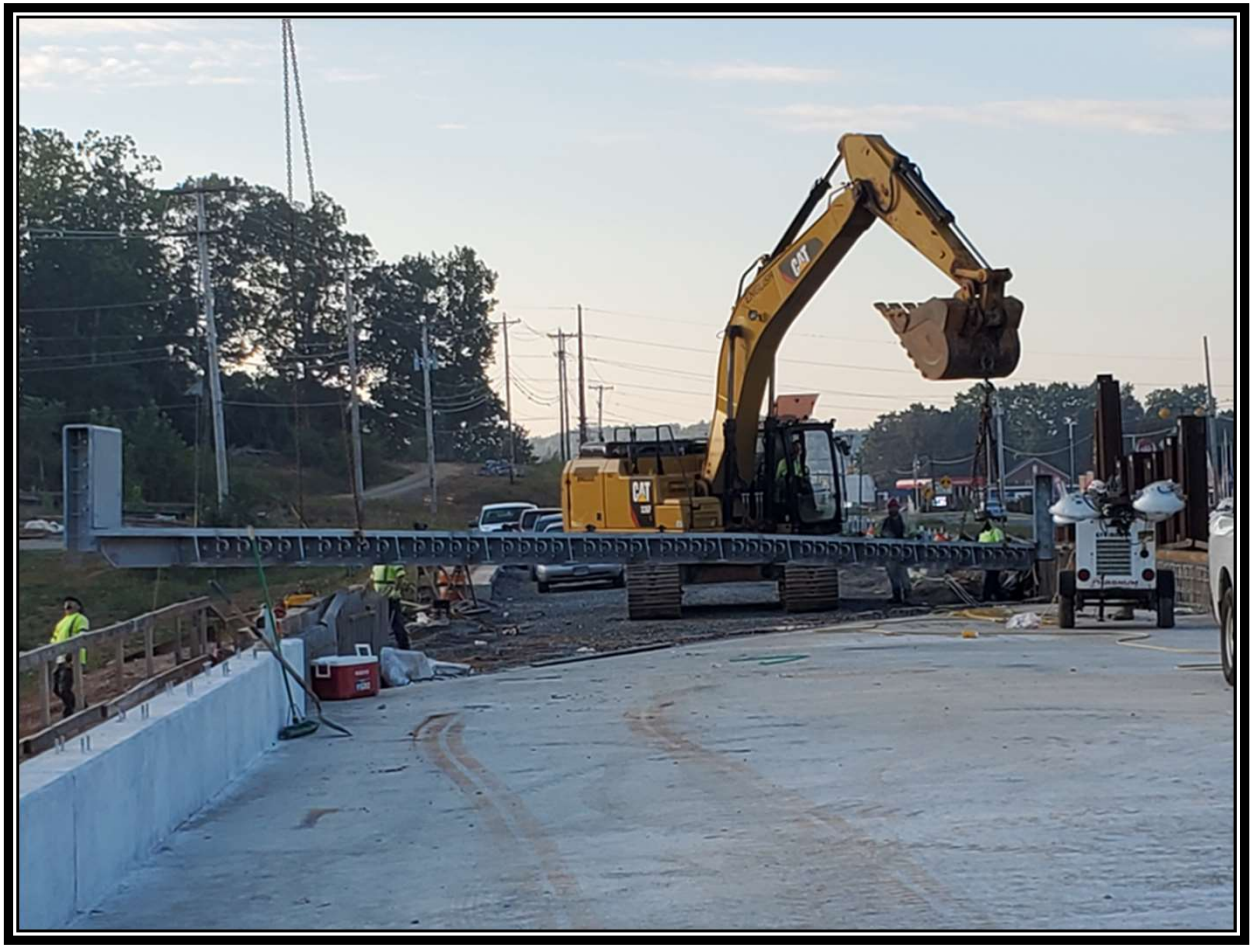
Skew made fit up of diaphragms harder

Deck Poured on Square

- When screed was set up on the skew one side stuck out in traffic so it was poured on the square.
- This makes it more difficult to deal with the end of the screed at a different deflection point that the other side.

Tooth Joint Reinforcing Steel

Installing Finger Joint



Virginia Alternate Abutment

New Bridge Rt. 29 NBL

Looking South

Looking Northwest

THE END