

# **CUY-77-1409**

## **Broadway Avenue over IR 77 CCG6B**

### **The Ohio Transportation Engineering Conference**

Tuesday, October 29, 2019



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# **CUY-77-1409**

## **Broadway Avenue over IR 77 CCG6B**

### **Presenters**

Curtis Wood, Ph.D., P.E. – Senior Structural Engineer  
Grant Whittaker, P.E. – Bridge Engineer



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# Presentation Outline

- Project Description
- Pre-Bid Discussions
- Bridge Design
- Construction



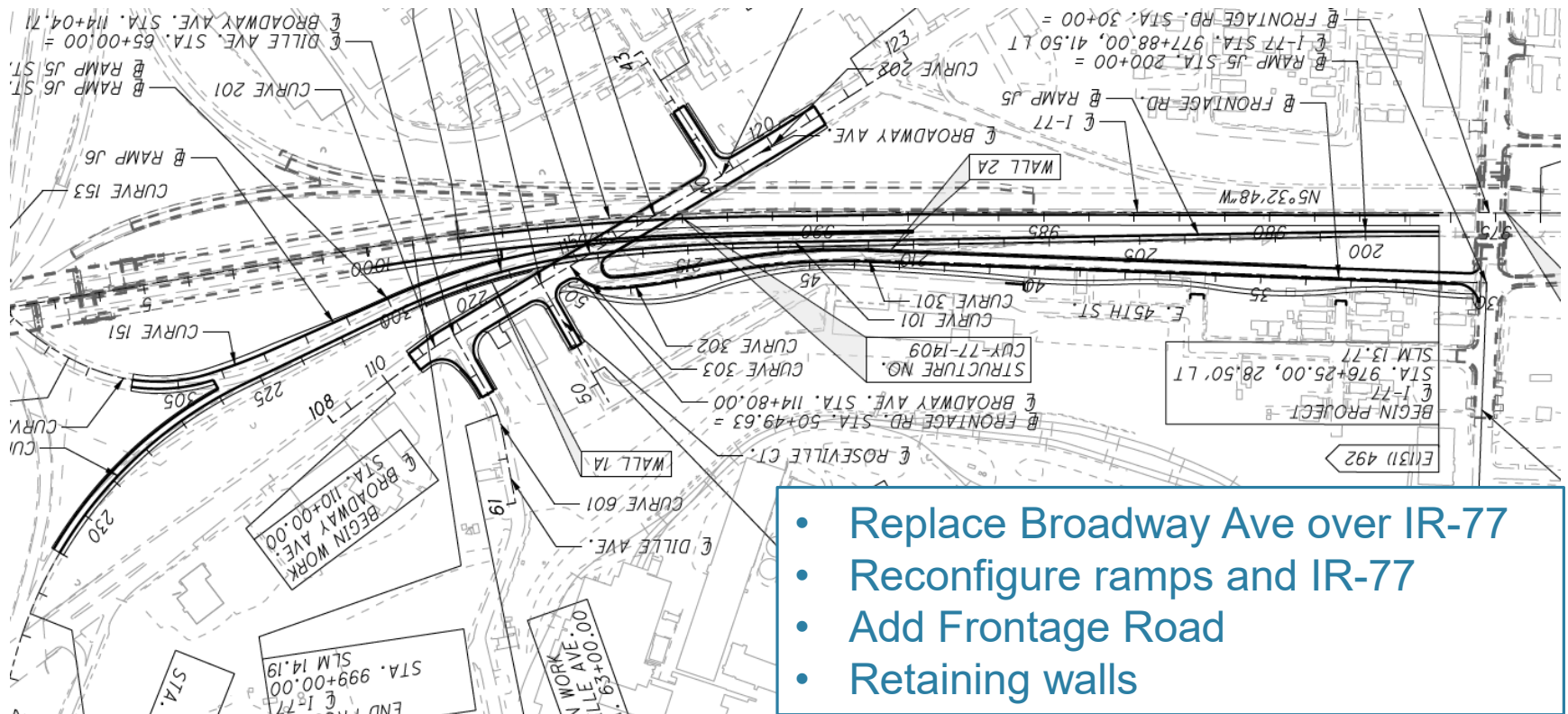
# PROJECT DESCRIPTION



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# Project description



- Replace Broadway Ave over IR-77
- Reconfigure ramps and IR-77
- Add Frontage Road
- Retaining walls



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# Project description



# PREBID DISCUSSIONS

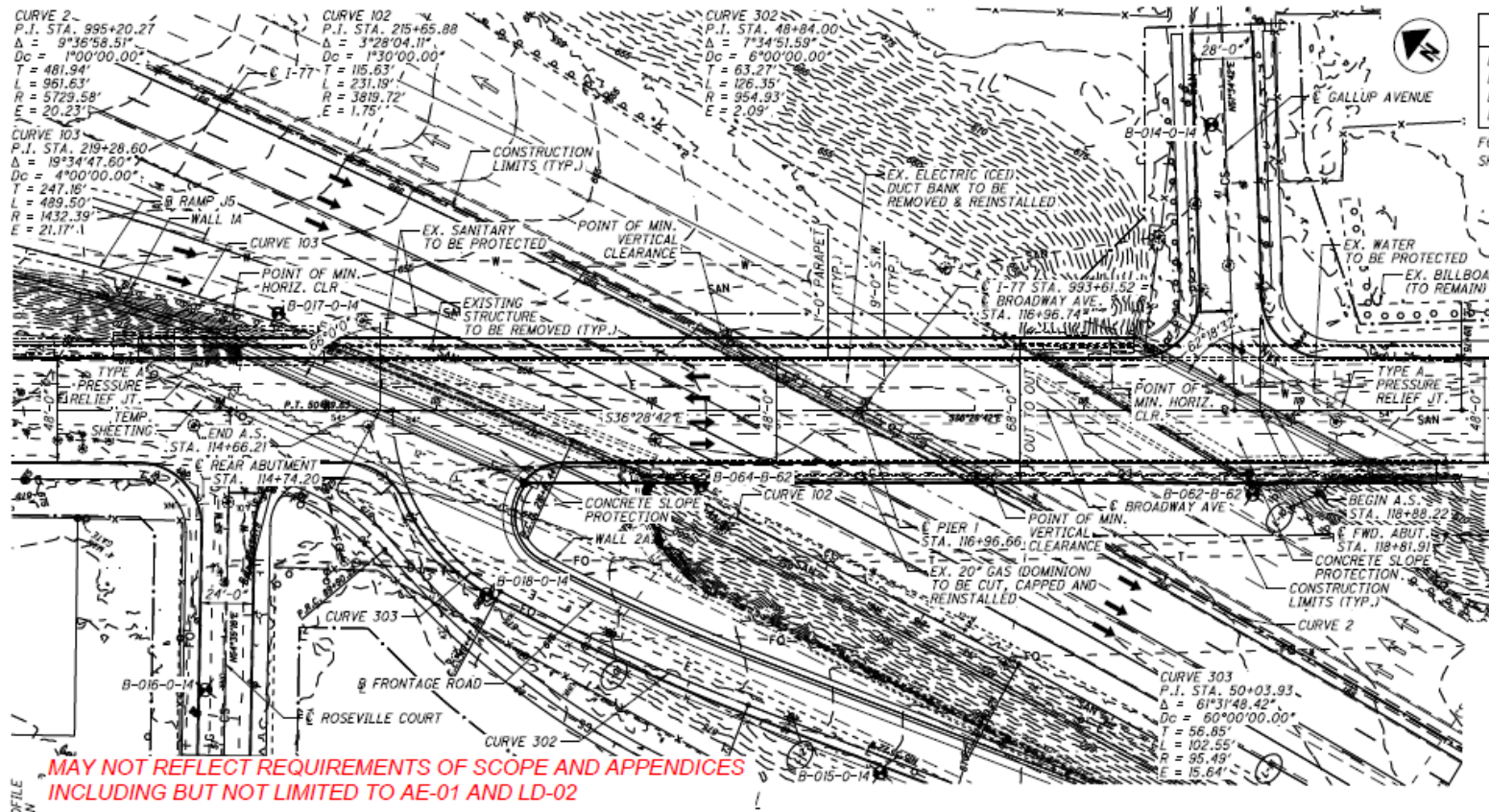


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# Pre-Bid Discussions



**MAY NOT REFLECT REQUIREMENTS OF SCOPE AND APPENDICES  
INCLUDING BUT NOT LIMITED TO AE-01 AND LD-02**

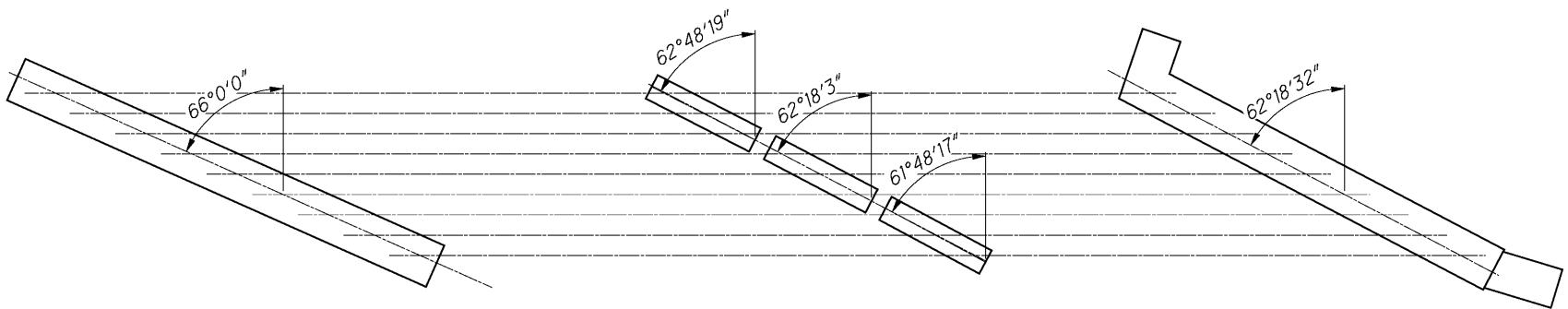


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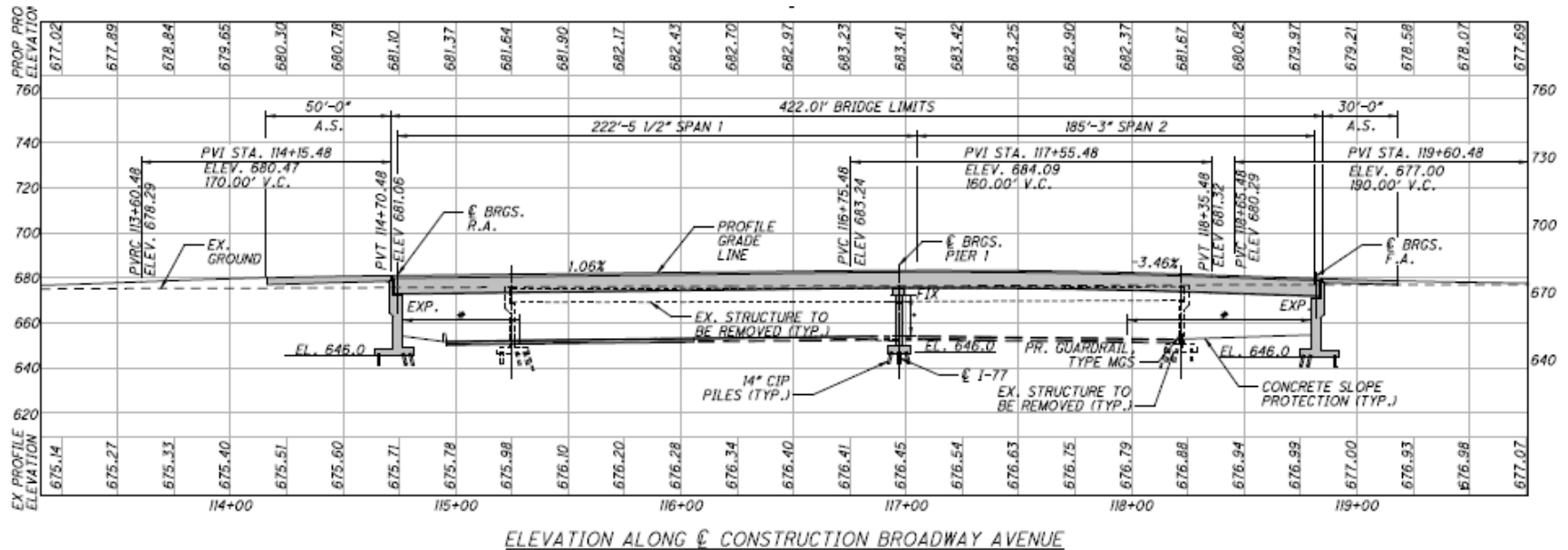
# Pre-Bid Discussions

- Preliminary design had 5 different skews

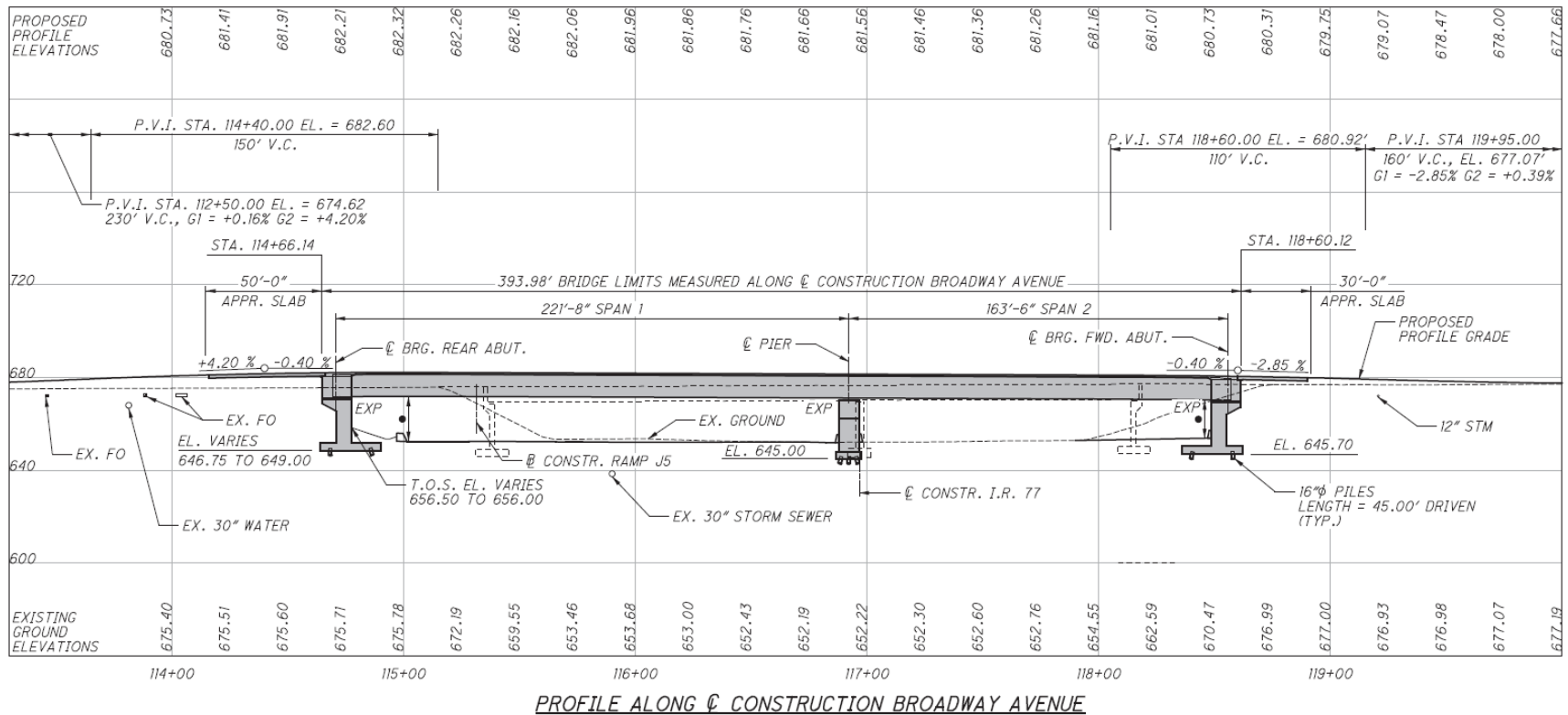
Rear Abutment	= 66° 00' 00"	} 63° 00' 00"
Pier 1, North Segment	= 62° 48' 19"	
Pier 1, Center Segment	= 62° 18' 03"	
Pier 1, South Segment	= 61° 48' 17"	
Forward Abutment	= 62° 18' 32"	



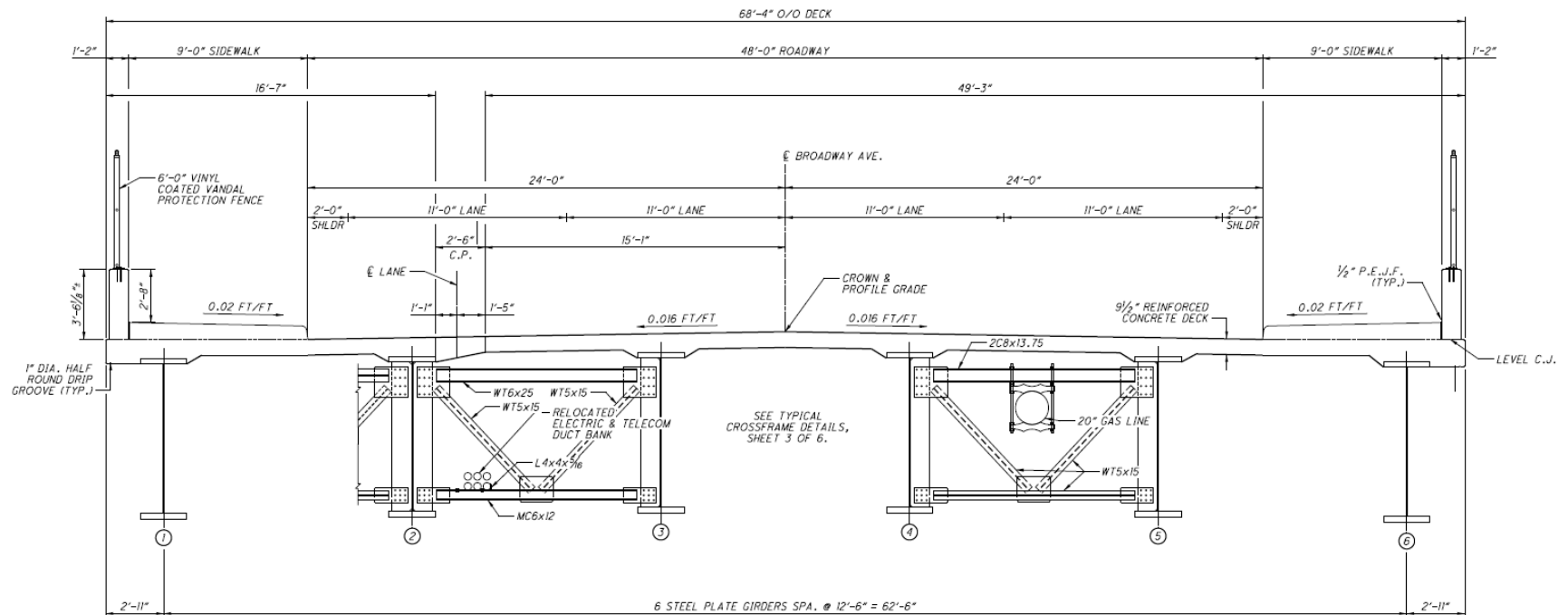
# Pre-Bid Discussions



# Pre-Bid Discussions



# Pre-Bid Discussions



TRANSVERSE SECTION



# Pre-Bid Discussions

- Concerns with Steel
  - High Skew/Longer span erection
  - Large/complicated cross-frames
  - Cost
  - Risk



# Pre-Bid Discussions

- Prestressed Concrete Beams
  - Less expensive
  - Better Stability
  - But.....
    - Really long span for prestressed



# Spliced Precast Beams

- Shipping
- Shoring at splice points
- Design requirements
  - ODOT
  - AASHTO
    - Not all DOT details follow AASHTO
  - Scope





# DESIGN



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# Spliced Precast Beams



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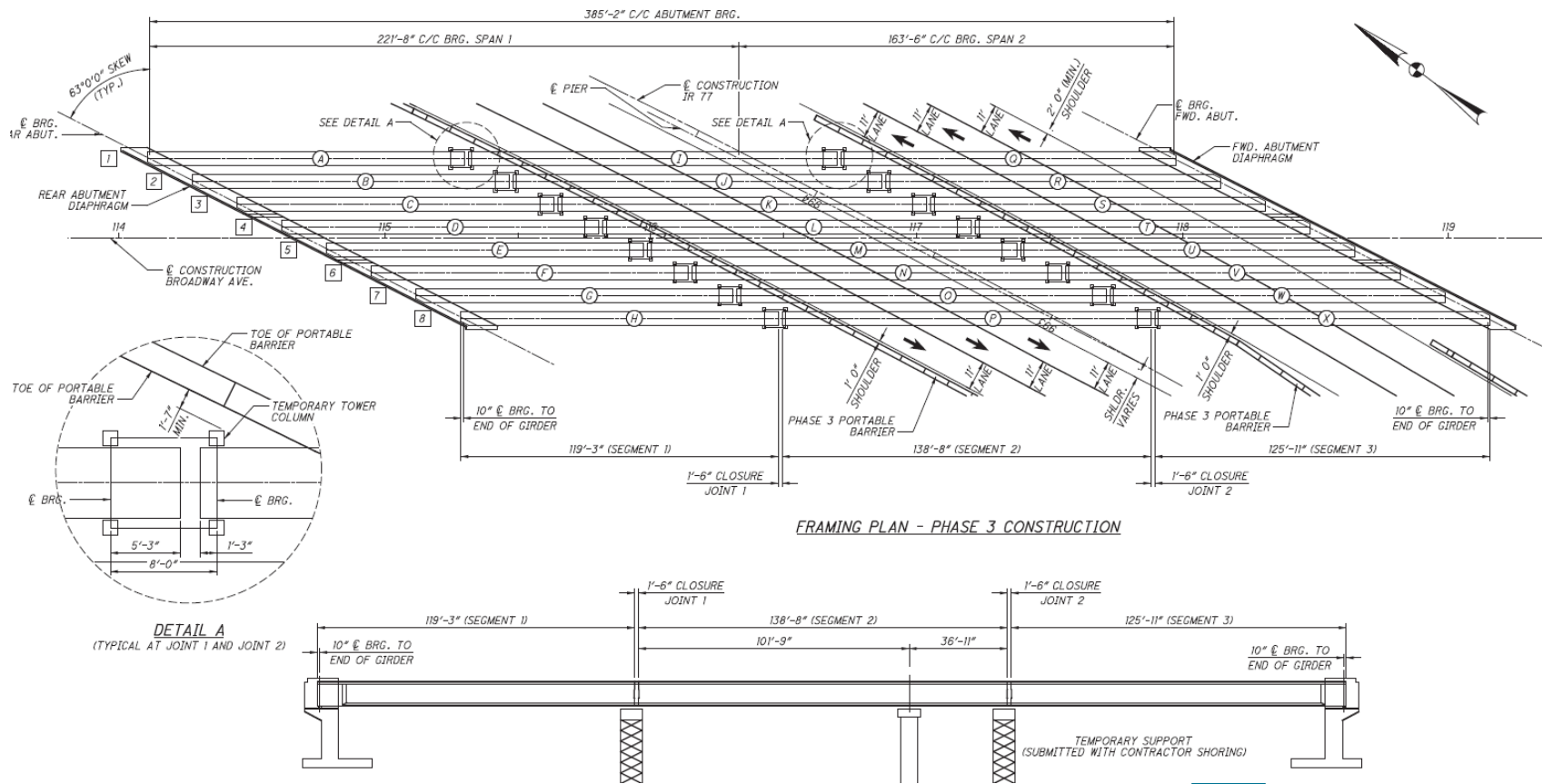
# Spliced Precast Beams

- Shipping
  - Overall Weight
    - End block
  - Axle Weight
    - End block
  - Height
  - Length
  - Stability



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# Spliced Precast Beams





# Spliced Precast Beams



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[illegible]

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# Spliced Precast Beams

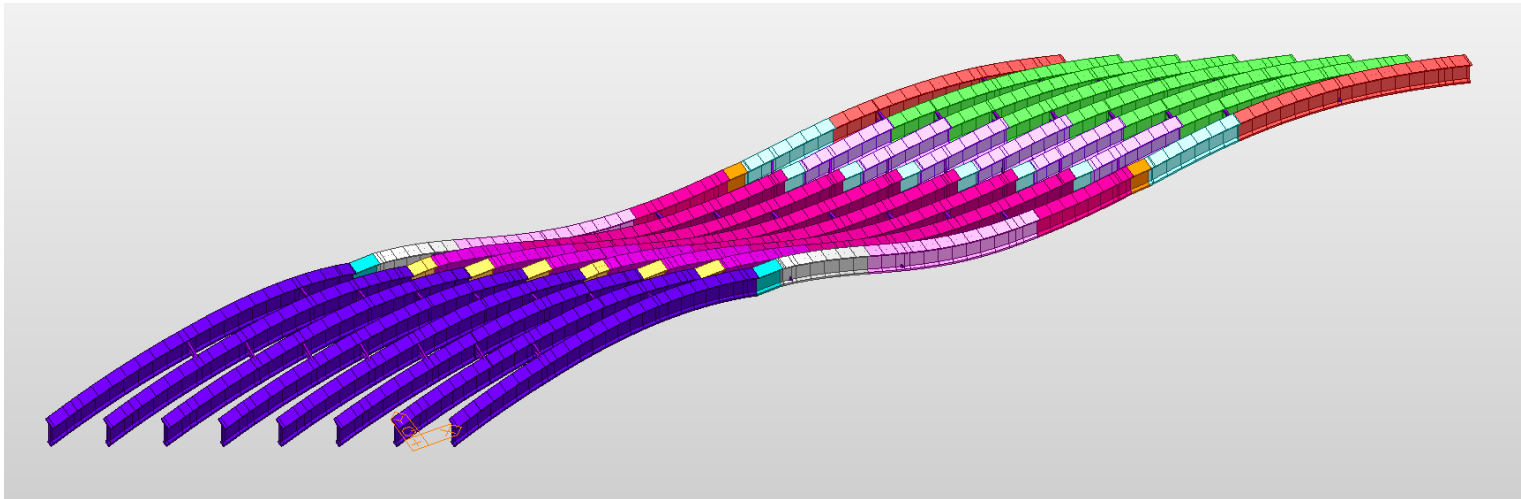
- Segment Weight: 206.89 kip
- Height: 114"
- Length: 119.25 ft. – 138.67 ft
- Reinforced Unit Weight: 130 pcf
- $f'_c = 10$  ksi



# Girder Analysis

## Scope Requirement:

"Refined analysis shall be used to design the new superstructure. Line girder analysis is not permitted."



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# Girder Analysis

## Pre-bid:

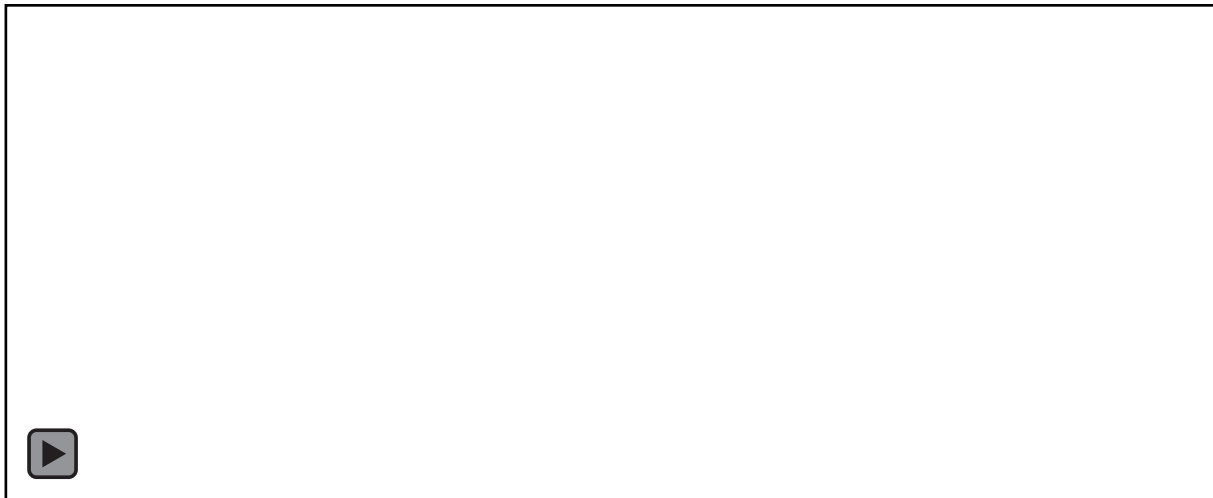
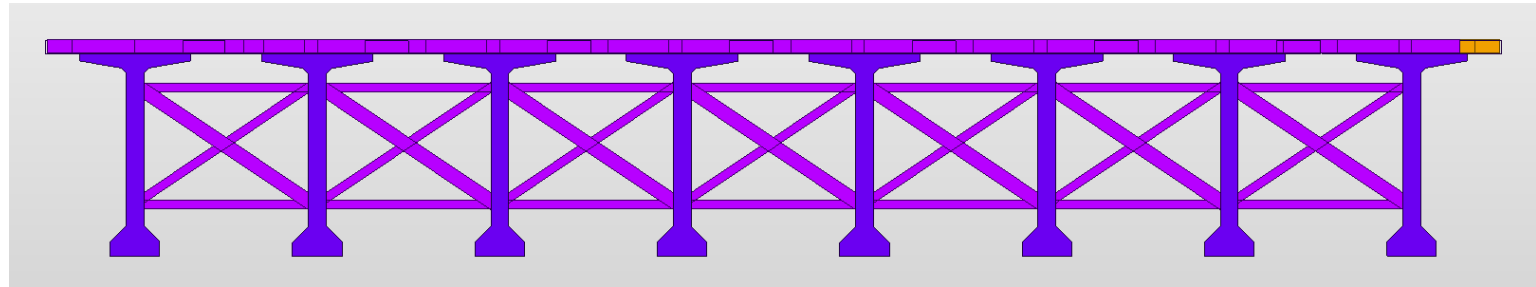
- Line Girder Analysis + Engineering Judgement

## Post-Bid:

- Line Girder Analysis + Refined Inputs
- Refined Analysis to Verify



# Refined Girder Analysis

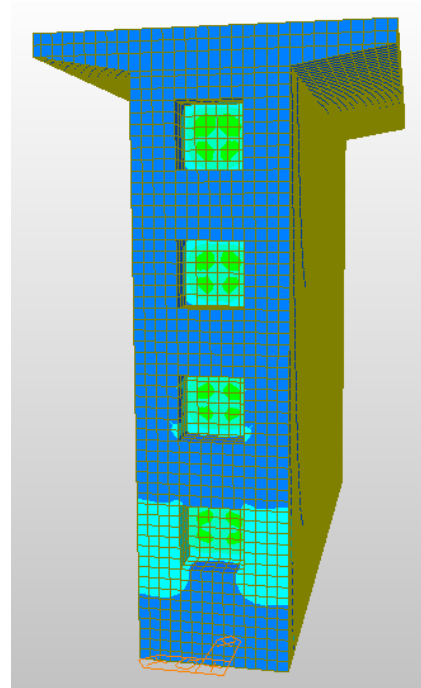


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# End Block Design

- Per AASHTO LRFD 5.10.9.3.1, the general zone may be designed using one of the following three methods:
  - Strut-and-Tie Model
  - Refined Elastic Analysis
  - Approximate Method



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# Load Rating

- Software to be used for load rating of ODOT Bridges (BDM 920)
  - X AASHTO BrR/BrD (Preferred)
  - X Bentley LARS Bridge
  - X WYDOT Brass-Culvert
  - X MDX Software
  - X Descus I
  - ✓ **Midas Civil**
  - ? **PGSplice**





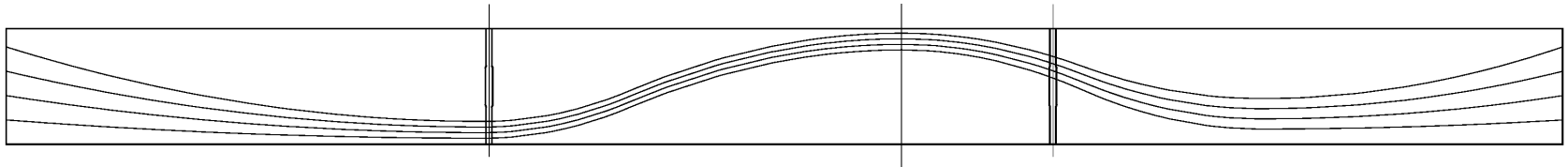
# CONSTRUCTION



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# Fabricator

- Tendon Duct Layout
- Form Modifications



# Fabricator



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# Fabricator



# Erection



8.11.2018



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# Tendon Stressing



# Tendon Stressing



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# Tendon Stressing



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# Open to Traffic



# Questions?

Curtis Wood, Ph.D., P.E.

[cwood@elrobinson.com](mailto:cwood@elrobinson.com)

614-586-0642

Grant Whittaker, P.E.

[gwhittaker@elrobinson.com](mailto:gwhittaker@elrobinson.com)

614-586-0642



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