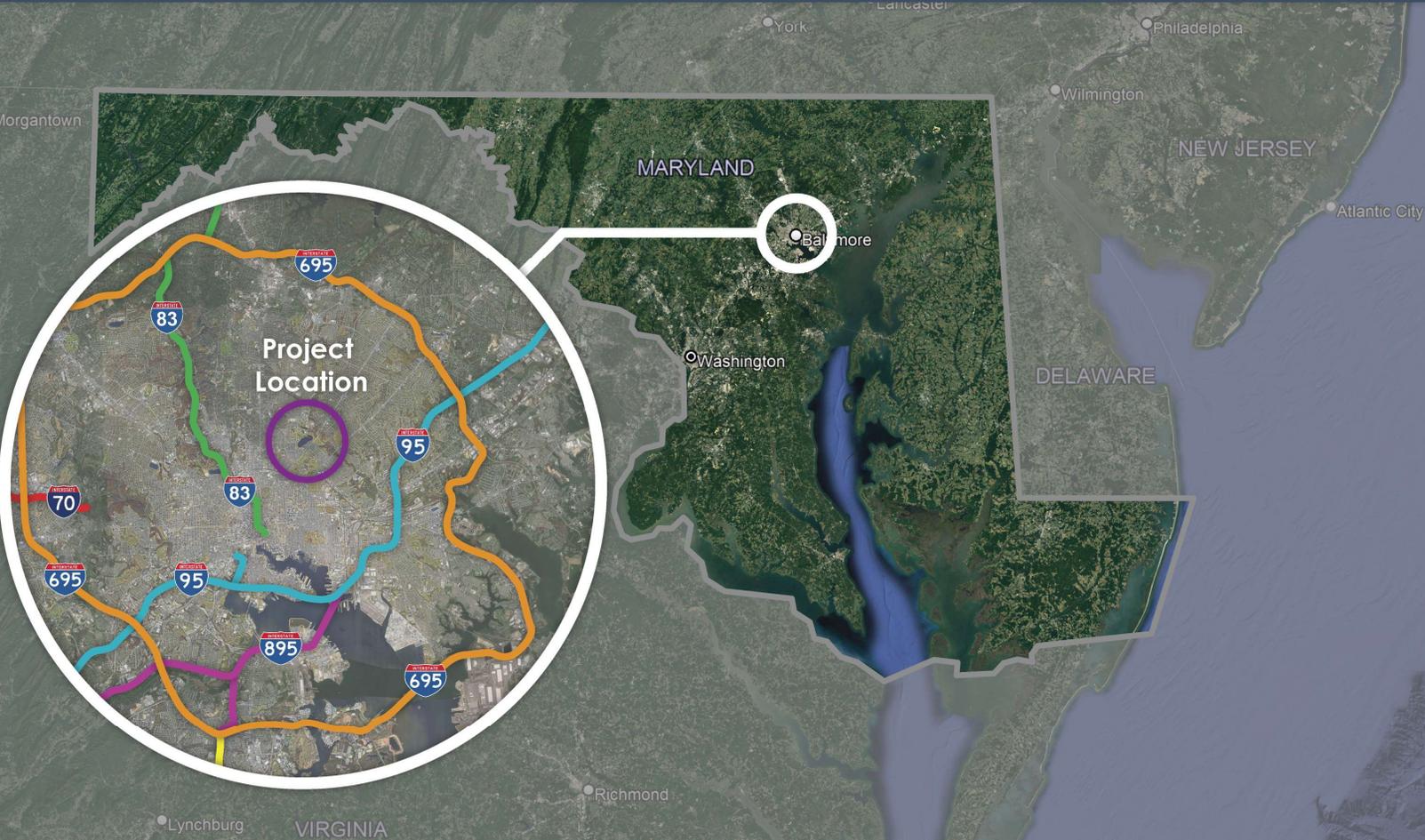


Case Study: Harford Road over Herring Run

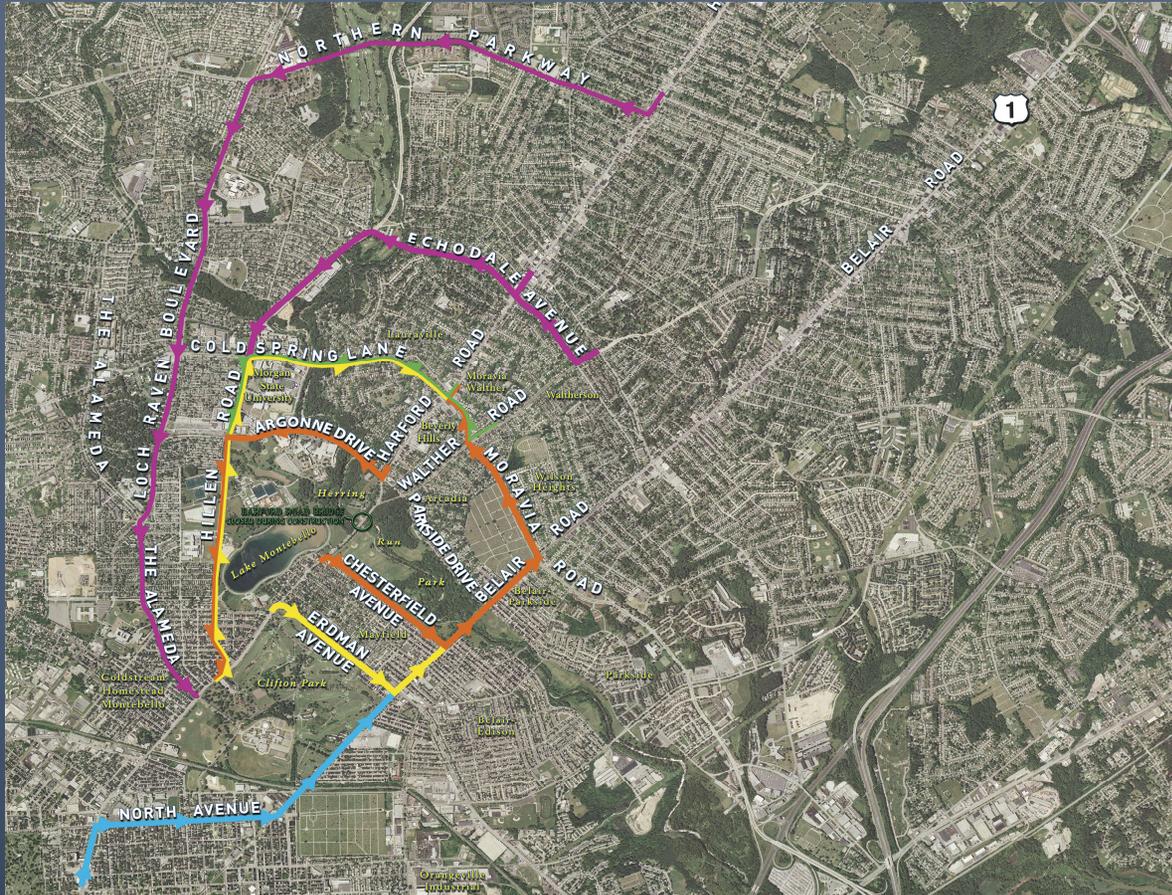
Replacement of Bridge No. BC3212



Project Location



Detour Routes



LEGEND

- SIGNED DETOUR ROUTE
- SIGNED SOUTHBOUND ALTERNATE ROUTE
- SIGNED NORTHBOUND ALTERNATE ROUTE
- SUGGESTED SOUTHBOUND OTHER ROUTE
- SUGGESTED NORTHBOUND OTHER ROUTE

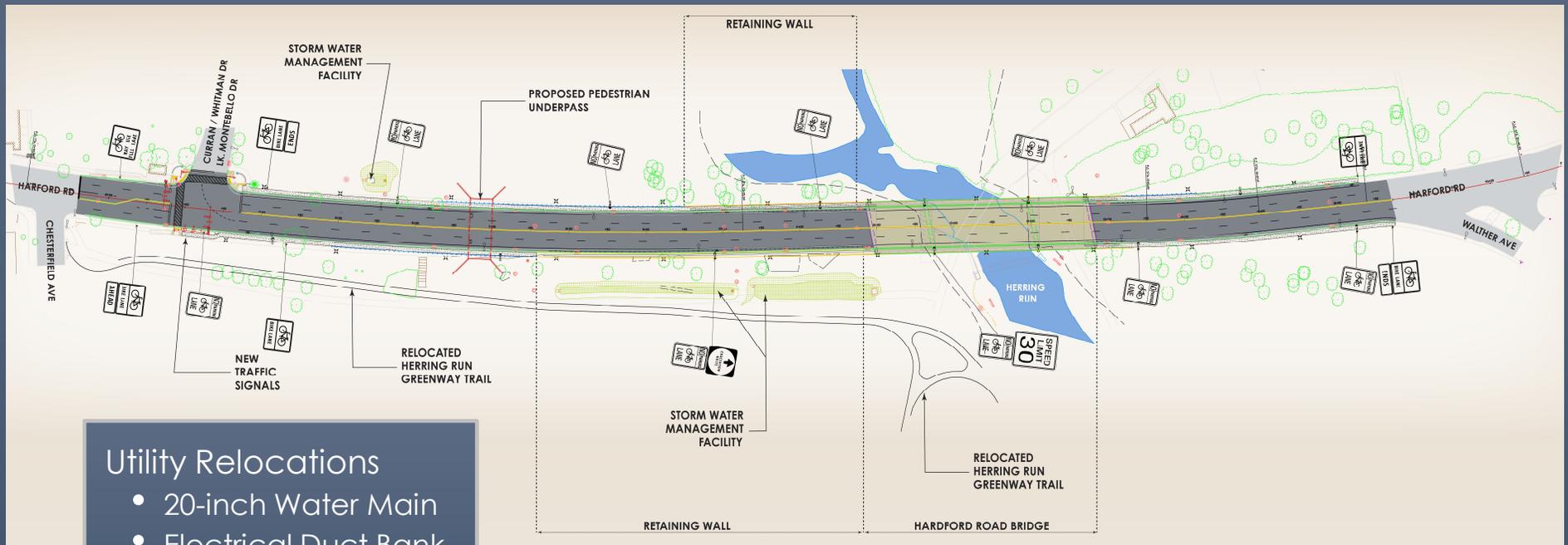
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Project Location



Proposed Project Improvements



Utility Relocations

- 20-inch Water Main
- Electrical Duct Bank
- Telecom Duct Bank
- 8-inch Sanitary Line
- 21-inch Storm Drain

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Harford Road Bridge Built 1911

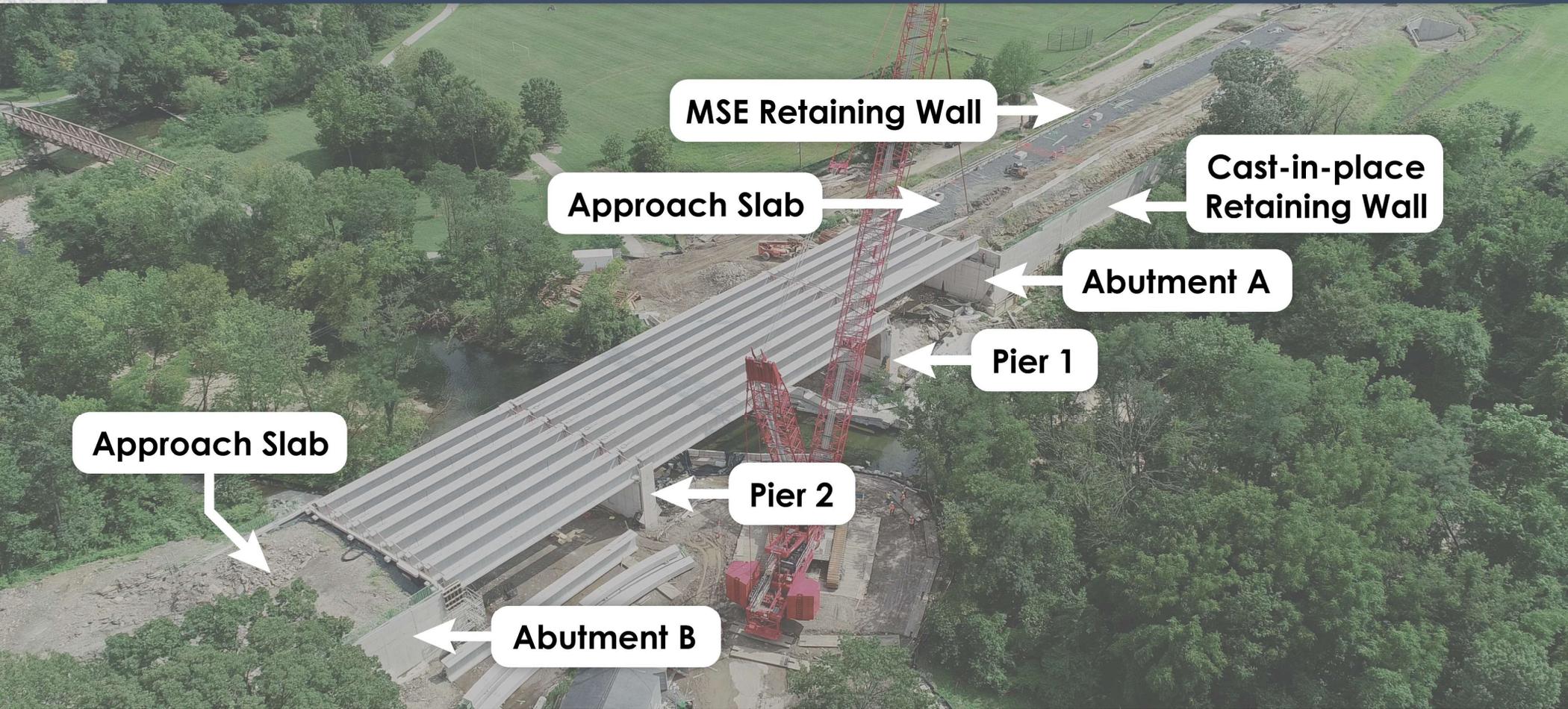
- Maryland Historical Trust
 - Maryland Inventory of Historic Properties No. B-4613
 - Eligible for inclusion in the National Register of Historic Places
 - Direction: replacement bridge shall be as close to the original in appearance as is feasible.



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Prestressed Concrete Girder Bridge



MSE Retaining Wall

Approach Slab

Cast-in-place Retaining Wall

Abutment A

Pier 1

Approach Slab

Pier 2

Abutment B

Concrete Highlights

Structural Cast-in-place Concrete

- Mix No. 3

- Footings
- Abutment stems
- Pier walls
- Retaining wall stems

- Mix No. 6

- Abutment backwalls
- Abutment cheek walls
- Pier cheek walls
- Pier continuity diaphragms
- Bridge deck slab
- Approach slabs
- Moment slabs
- Parapets

- Supplier

- Rowen Concrete, Inc.

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Concrete Highlights

Structural Cast-in-place Concrete



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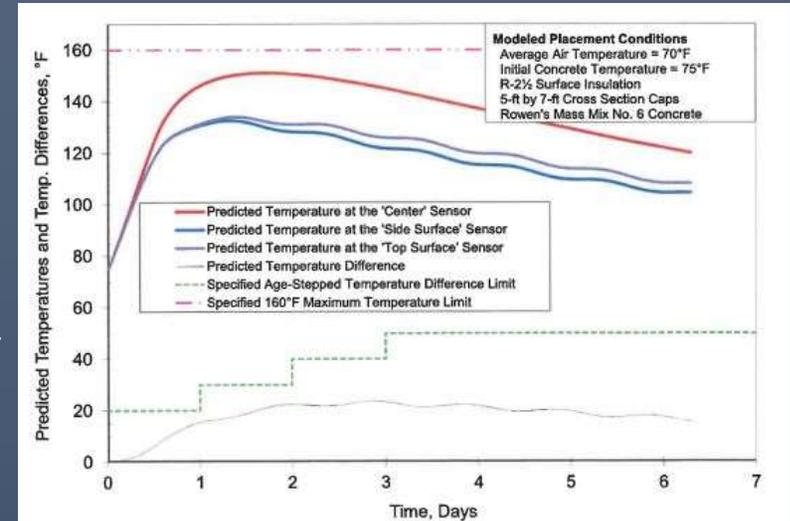
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Concrete Highlights

Mass Concrete

- Applications
 - Footings
 - Abutment walls
 - Pier walls
- Requirements
 - Thermal control plan
 - Max. concrete temperature of 160° F
 - Age-based stepped temperature difference limit
- Controls
 - Thermal modeling included in submittal
 - Insulation on all surfaces
 - Min. 4 temperature sensors
 - Two primary sensors with backup sensors
 - Completion of monitoring

Hours after Placement	Maximum Temperature Differential
0 – 24 hours	20°F
24 – 48 hours	30°F
48 – 72 hours	40°F
>72 hours	50°F



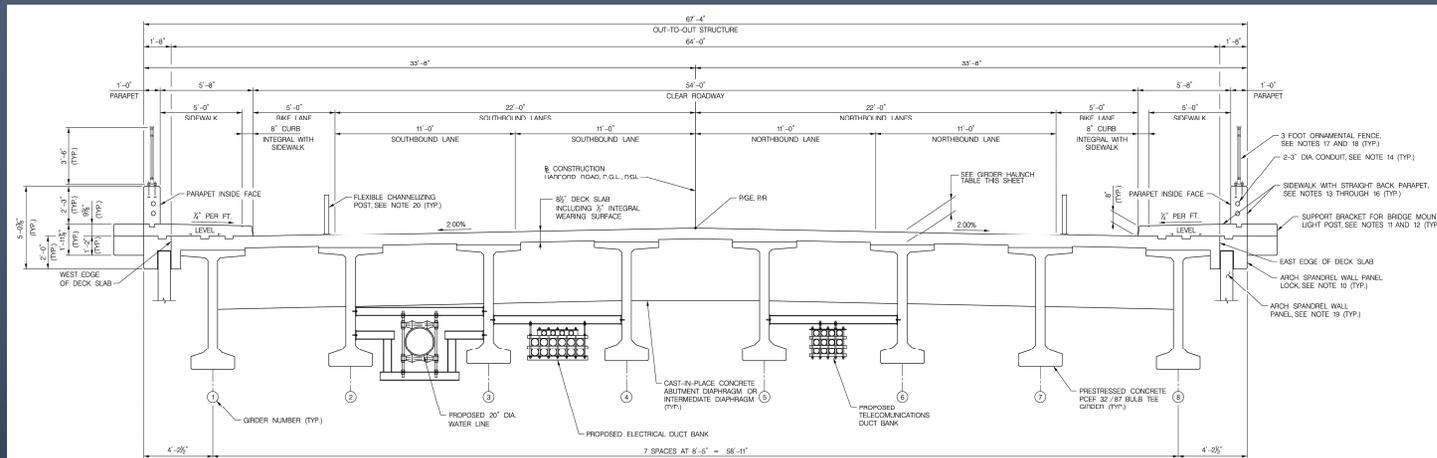
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Concrete Highlights

Precast Prestressed Concrete

- Prestressed Concrete Girders
 - 8 Girder Lines
 - PCEF 32/87 bulb tee girders
 - 133-foot main span
 - 74-foot end spans
 - PennStress fabricated these girders



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Concrete Highlights

Structural Precast Concrete

- Mechanically Stabilized Earth Retaining Wall
 - 415-foot long wall
 - Reinforced Earth designed and fabricated this wall



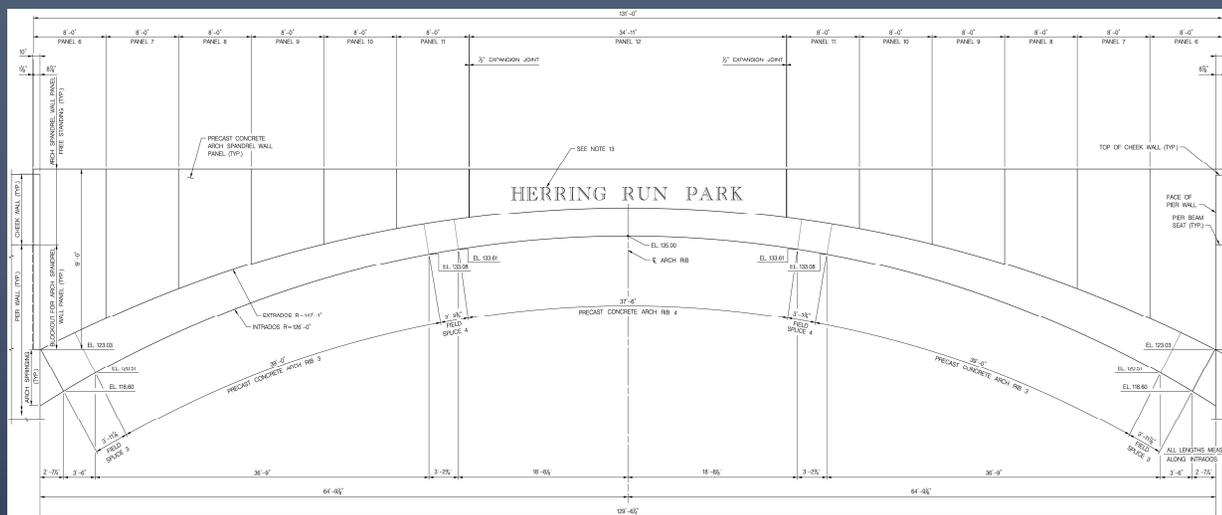
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Concrete Highlights

Architectural Precast Concrete

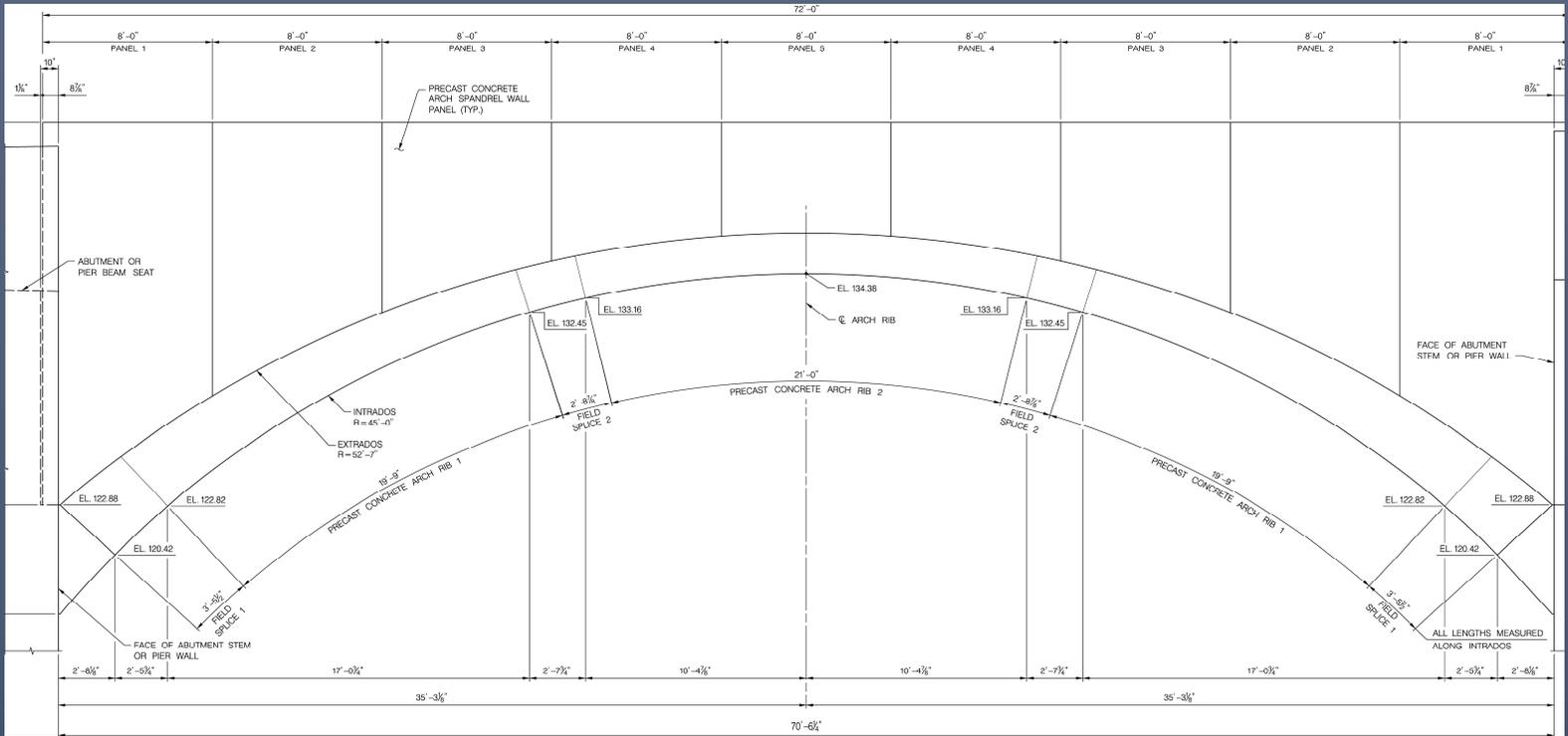
- Precast Concrete Arch Ribs & Spandrel Walls
 - 3-section precast concrete arches
 - Fabricated Structural Steel field erection connections
 - Cast-in-place concrete splices
 - Precast concrete spandrel walls
 - PennStress fabricated these elements



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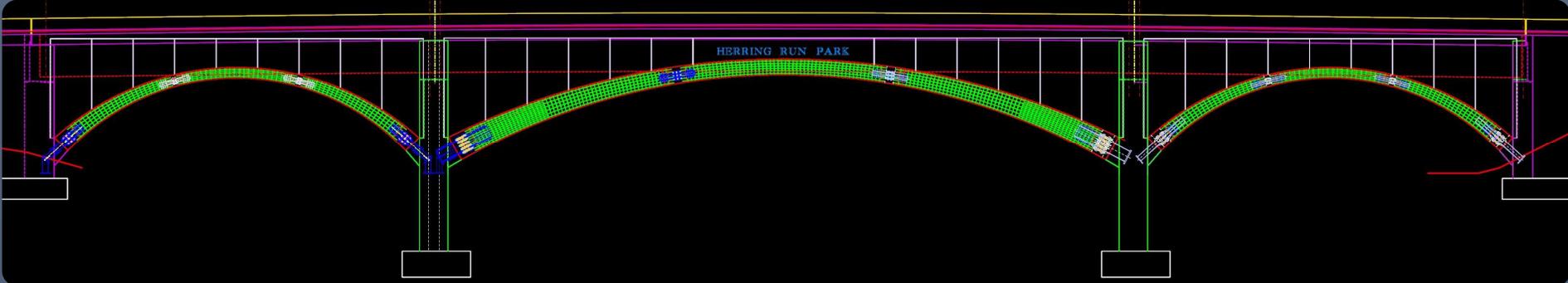
Precast Concrete Arch Rib Construction



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Precast Concrete Arch Rib Construction

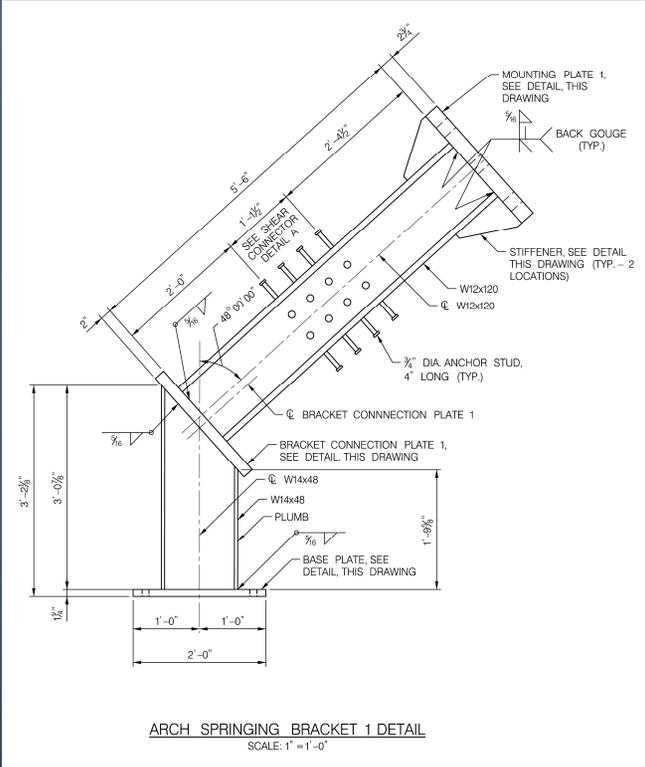


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Precast Concrete Arch Rib Construction

Arch Springing Bracket – Abutment

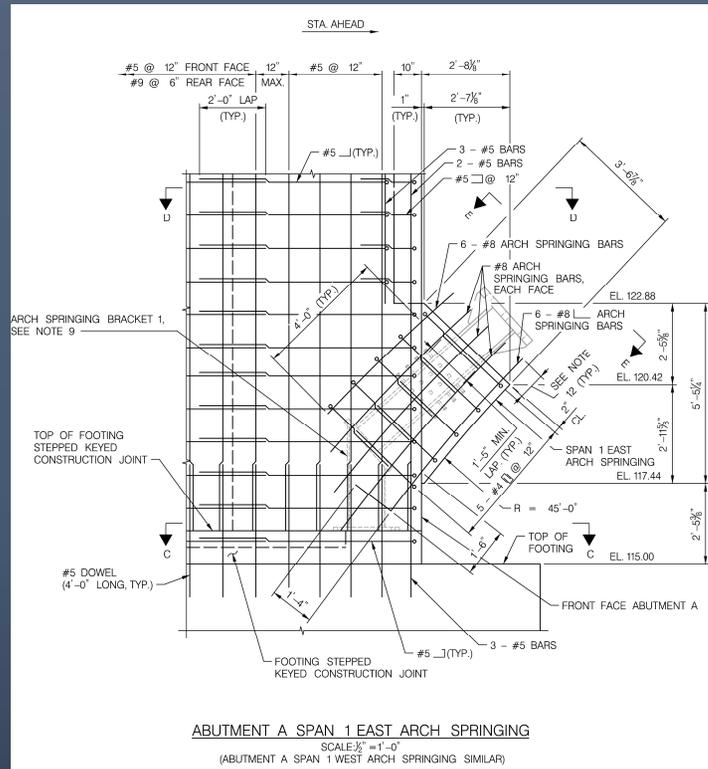


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Cast-in-place Concrete Springing – Abutment



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Cast-in-place Concrete Springing – Abutment

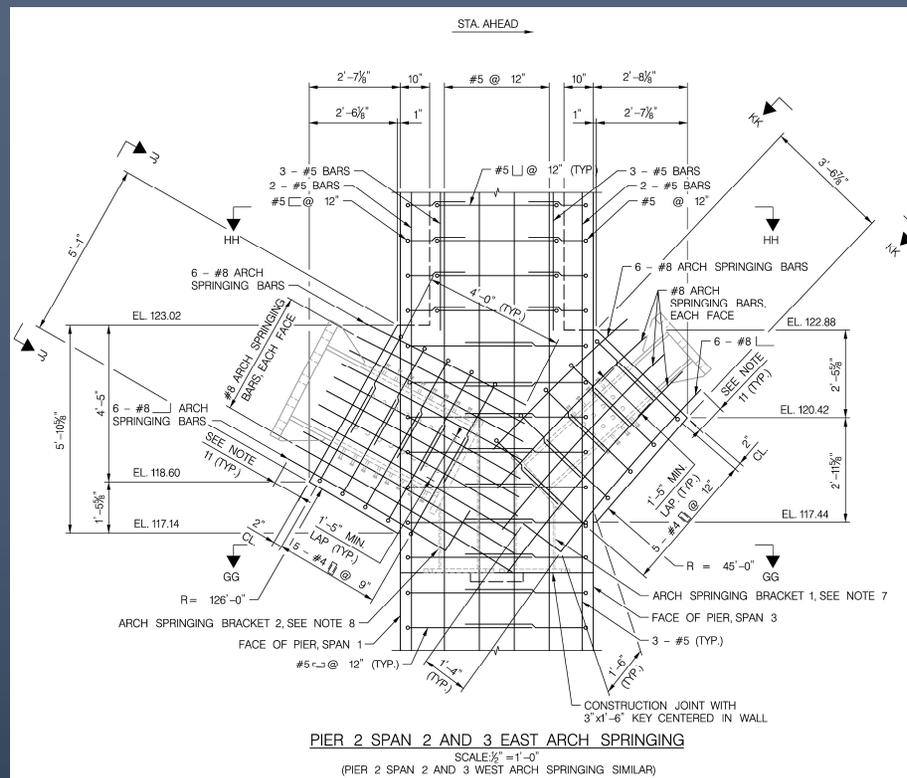


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Precast Concrete Arch Rib Construction

Cast-in-place Concrete Springing – Pier



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Precast Concrete Arch Rib Construction

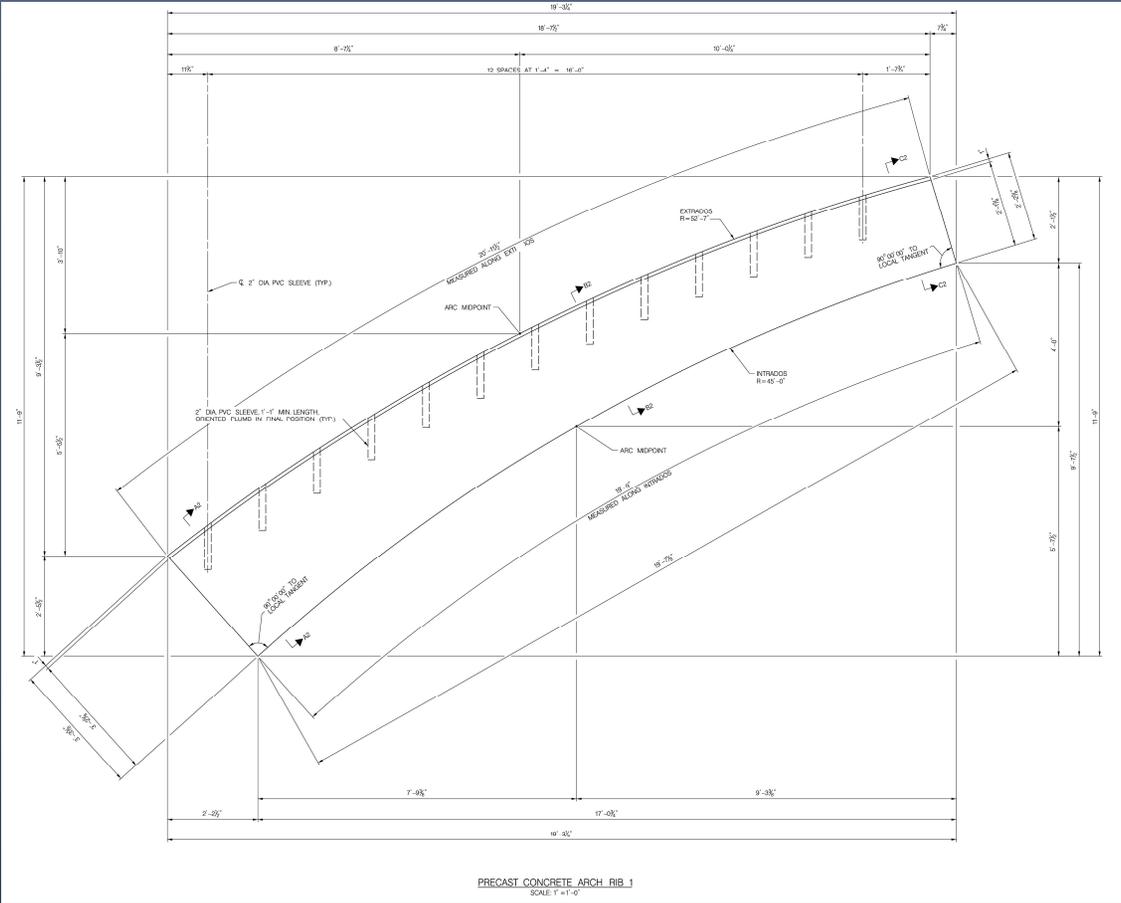
Cast-in-place Concrete Springing – Pier



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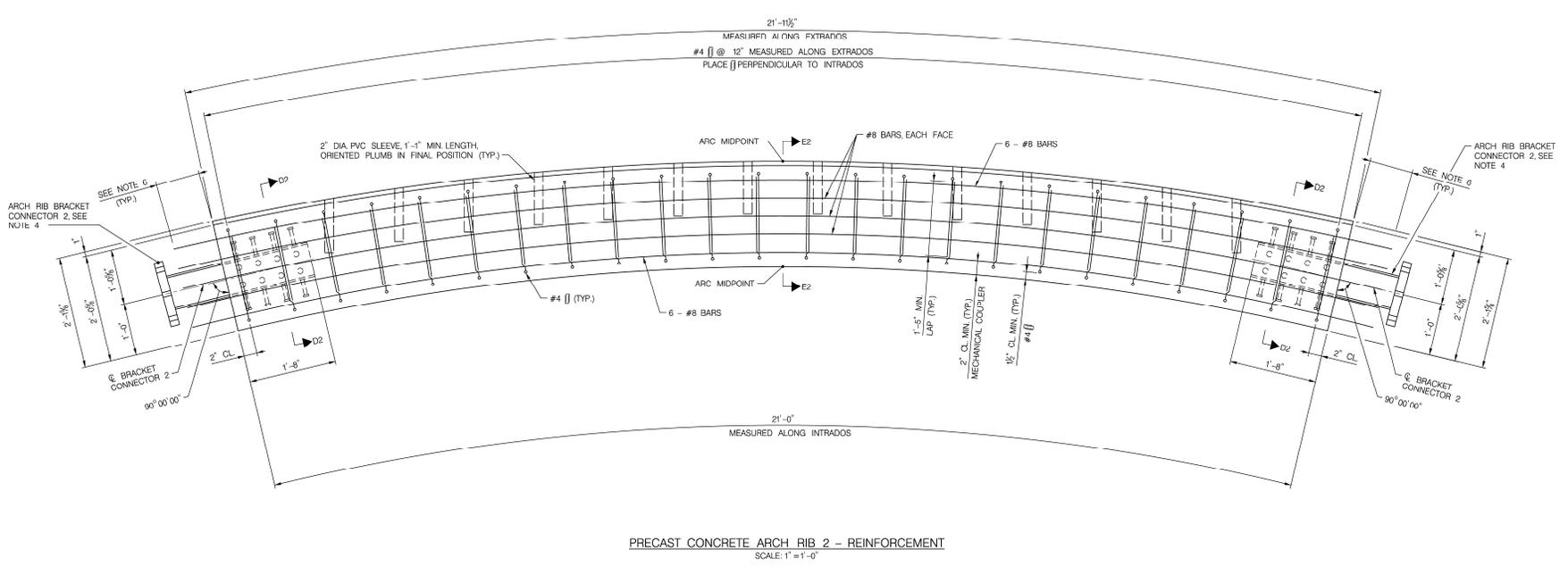
Precast Concrete Arch Rib Construction



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Precast Concrete Arch Rib Construction

Precast Concrete Arch Rib Field Connection

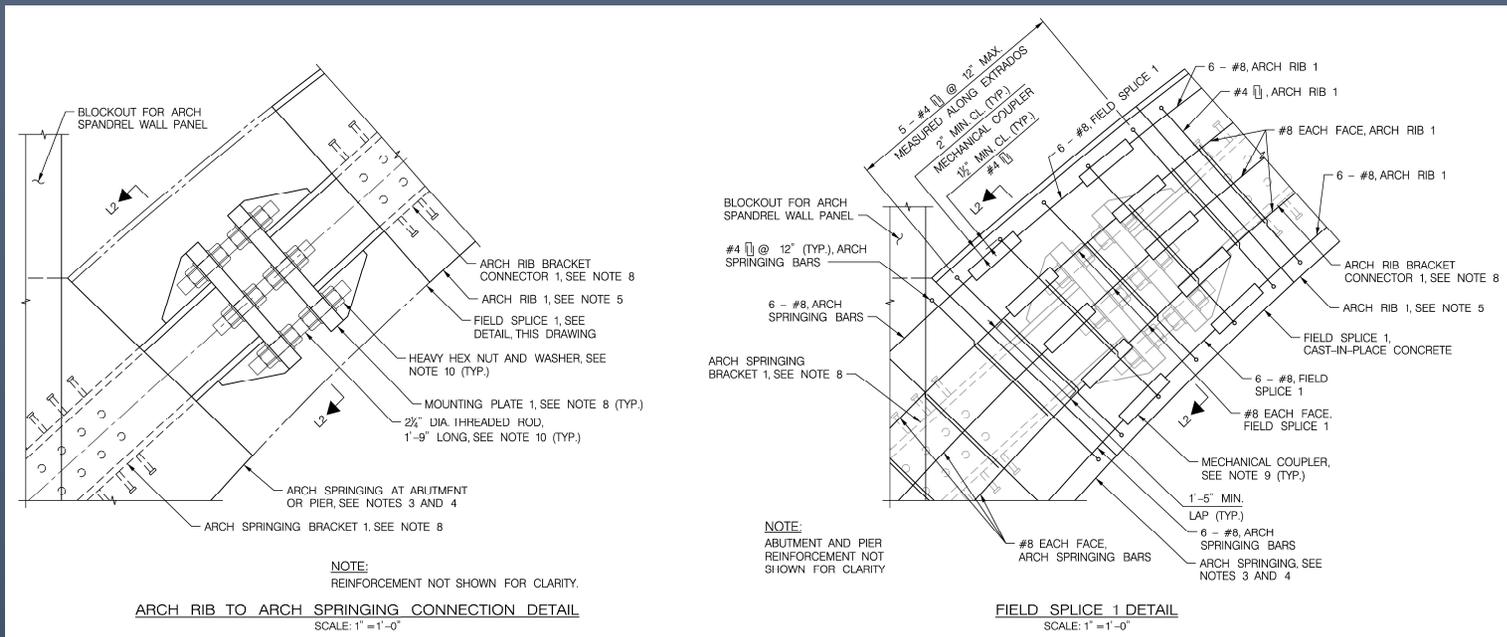


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Precast Concrete Arch Rib Construction

Precast Concrete Arch Rib Field Connection



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Precast Concrete Arch Rib Construction

Cast-in-place Concrete Arch Rib Field Splices

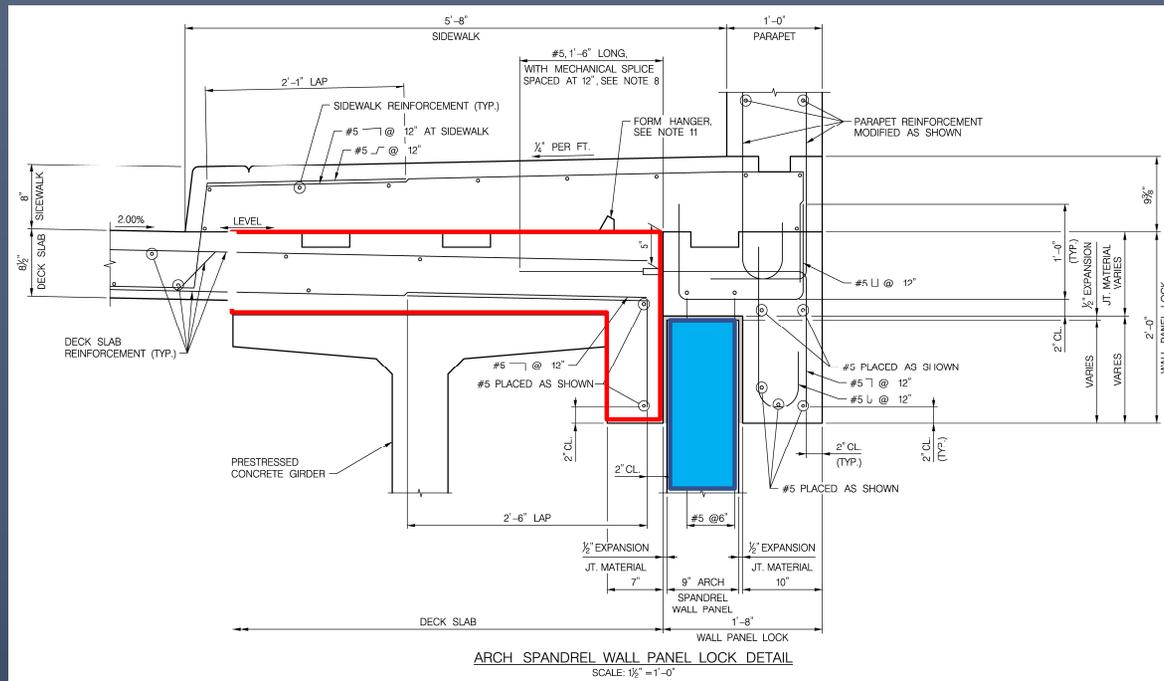


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Precast Concrete Arch Spandrel Wall

Deck Slab Overhang and Arch Spandrel Wall Panel Lock

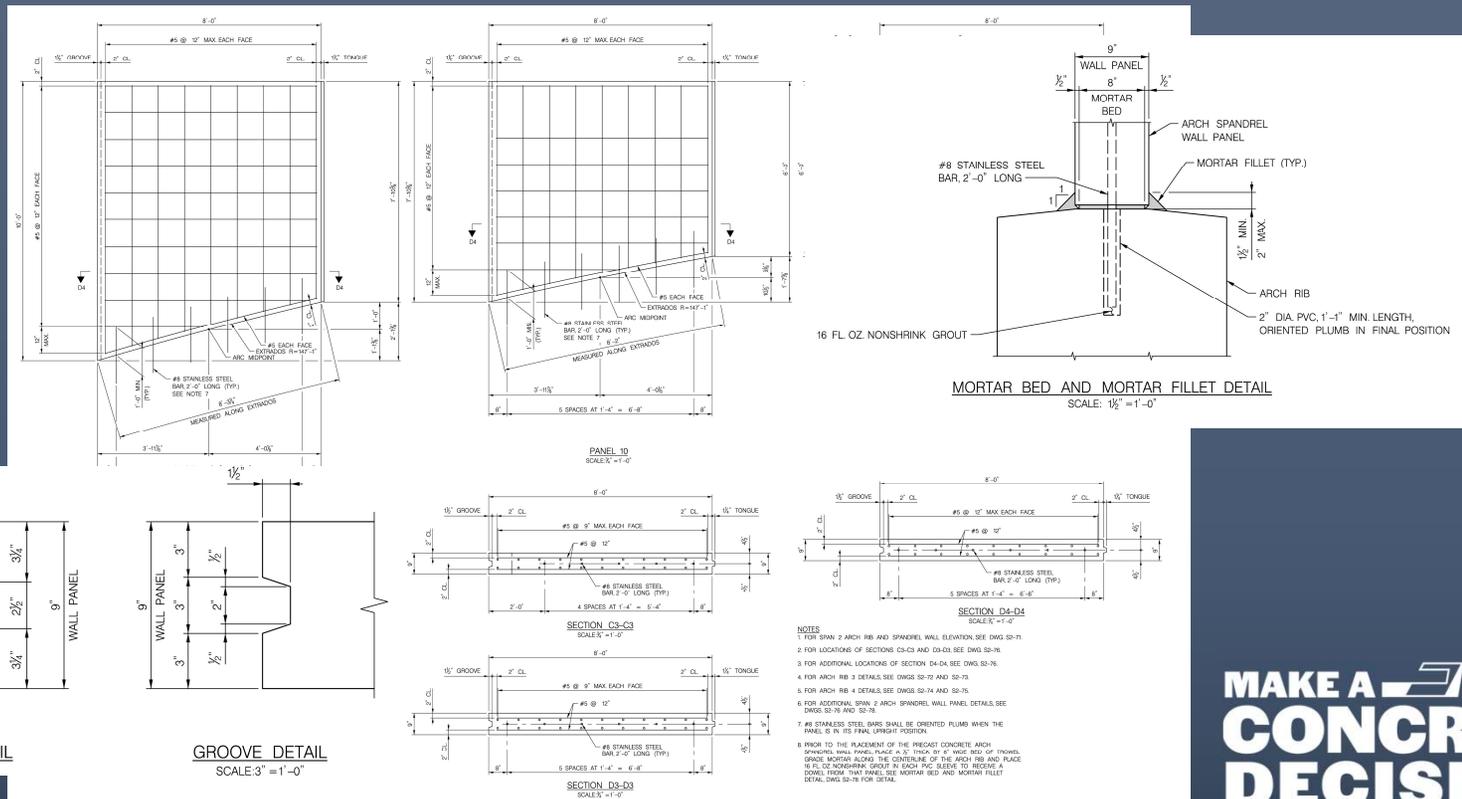


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Precast Concrete Arch Spandrel Wall

Precast Concrete Arch Spandrel Walls



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Precast Concrete Arch Spandrel Wall

Precast Concrete Arch Spandrel Walls

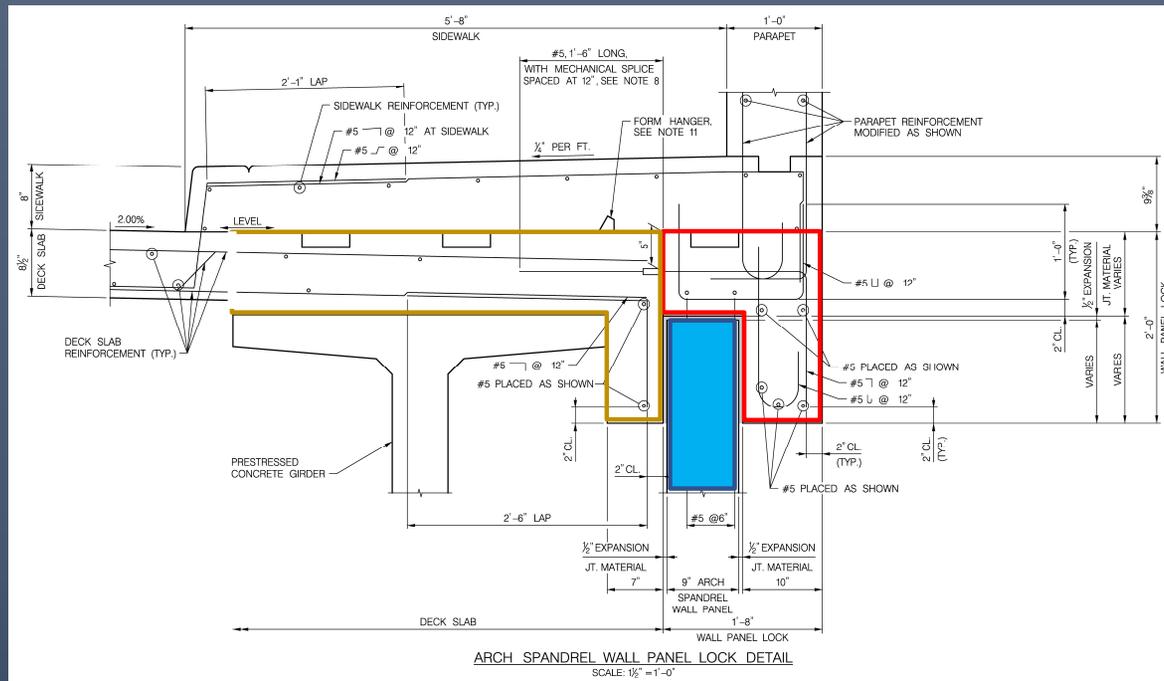


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Precast Concrete Arch Spandrel Wall

Deck Slab Overhang and Arch Spandrel Wall Panel Lock



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Precast Concrete Arch Spandrel Wall

Cast-in-place Concrete Arch Spandrel Wall Panel Lock



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Cast-in-place Concrete Arch Spandrel Wall Panel Lock



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Completed Bridge Construction



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Then and Now



Then



Now

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Harford Road Pedestrian Underpass

Contech Engineered Solutions LLC CON/SPAN i-series



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Case Study: Harford Road over Herring Run

Replacement of Bridge No. BC3212



Thank you for your time!



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