DESIGN-BUILD OF THE INDIAN RIVER INLET CABLE STAYED BRIDGE

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DelDOT Winter Workshop
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Presentation Overview

- Bridge History
- Design-Build Proposal
- Design Considerations/Challenges
- Bridge Features
- Questions

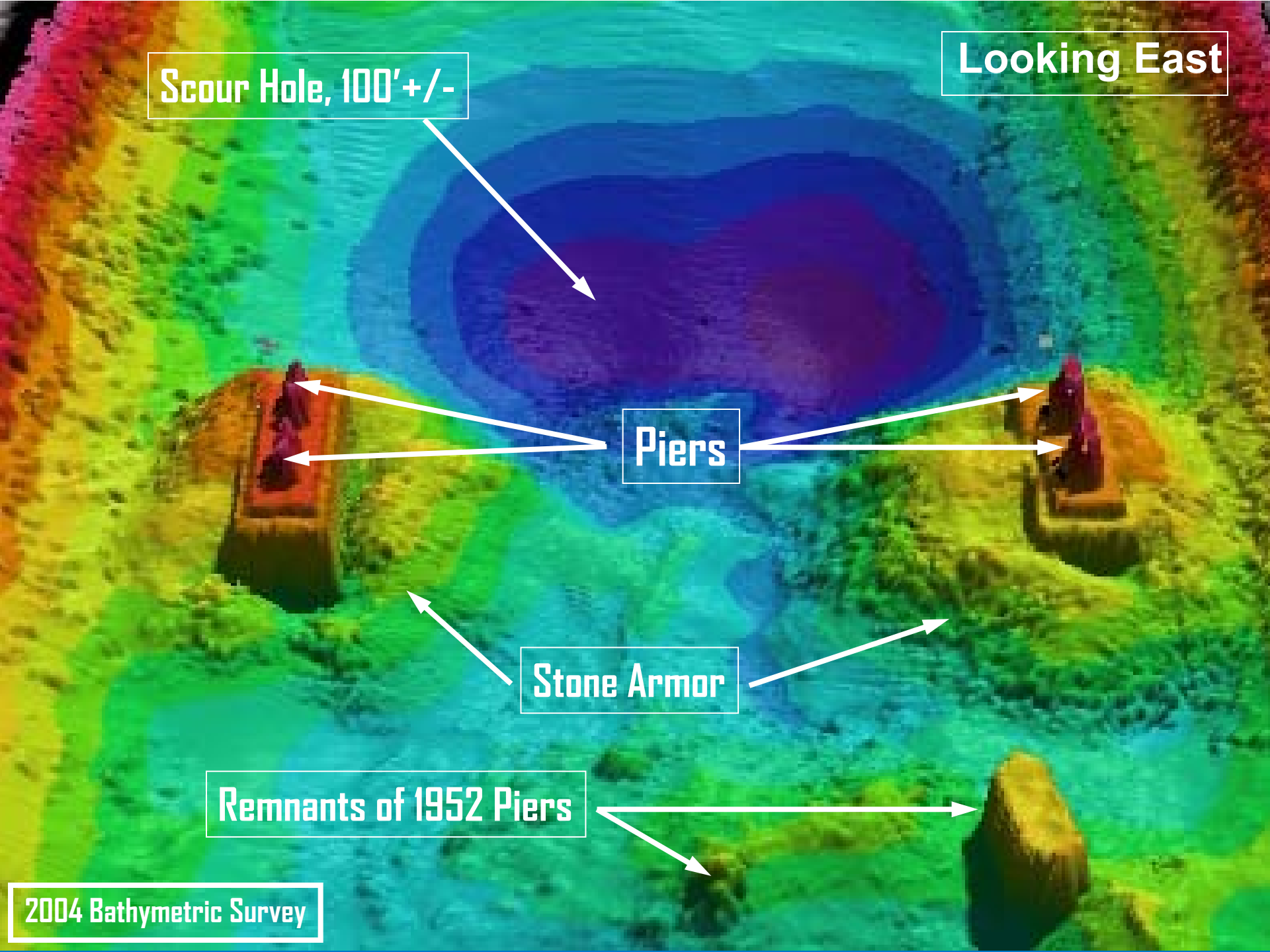
Bridge History

Bridge History (5th Replacement in 75 Years)

1. 1934 Timber bridge – washed away
2. 1938 Concrete and steel swing span, ice flow & extreme tides destroyed
3. 1952 Concrete and steel swing span
4. 1965 Existing steel girder bridge (Widened in 1976)
5. 2008 New Construction Begins

Bridge History

Courtesy of Mr. Jay Erwin Jr


Looking East
Scour Hole, 100'+/-
Piers
Stone Armor
Remnants of 1952 Piers
2004 Bathymetric Survey

Bridge History

Is the Bridge Safe to Drive On?

Bridge History

Design-Build Proposal

Who Are We Getting?

Design-Build Proposal

Who Are We Getting?

Contractor:

SKANSKA

Sub contractors:

- Freyssinet Inc
- Interlock
- Aldridge Electric

Designer:

AECOM

Sub-consultants:

- IBT
- S&ME
- Maunsell
- Urban Engineering
- RWDI

Design/Construction QC:

PB PARSONS BRINCKERHOFF

Sub-consultants:

- NXL

Design-Build Proposal

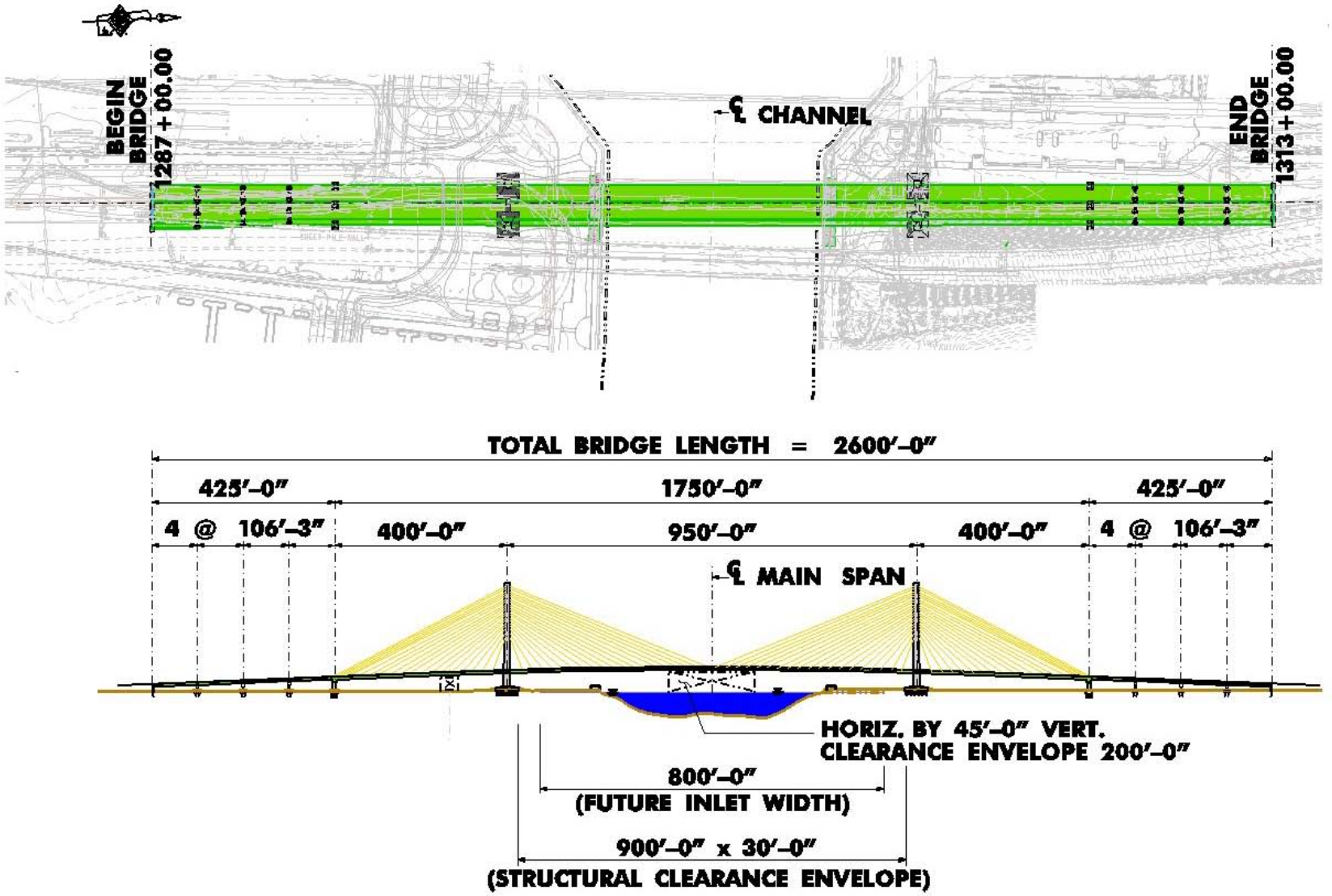
What Are We Getting?

Design-Build Proposal

What Are We Getting?

- Lowest Price Proposal
  - ✓ Just Under $150M budget
- Highest Technical Proposal Score
  - ✓ 3 Excellent Proposals
- Earliest Proposed Completion Date
  - ✓ April 30th, 2011 Open to Traffic (8 months early)

Design-Build Proposal



Design-Build Proposal

Bridge Hydraulics and Scour

Design Considerations

- Bridge Hydraulics and Scour
  - ✓ No foundations in the inlet
  - ✓ Located within Hurricane Zone
  - ✓ Storm surge still estimated 5 feet +/- over F.G.
  - ✓ Coastal Storm Surge Modeling (SWAN)
  - ✓ Coastal Wave Action Modeling (ADCIRC)
  - ✓ 100-YR and 500-YR Return Intervals Considered
  - ✓ 30 ft and 35 ft scour depths estimated in RFP
    - Attempted to minimize risk to Proposers

Design Considerations

Why Design For Scour?

Design Considerations

Design Considerations

Design Considerations

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Wind Analysis

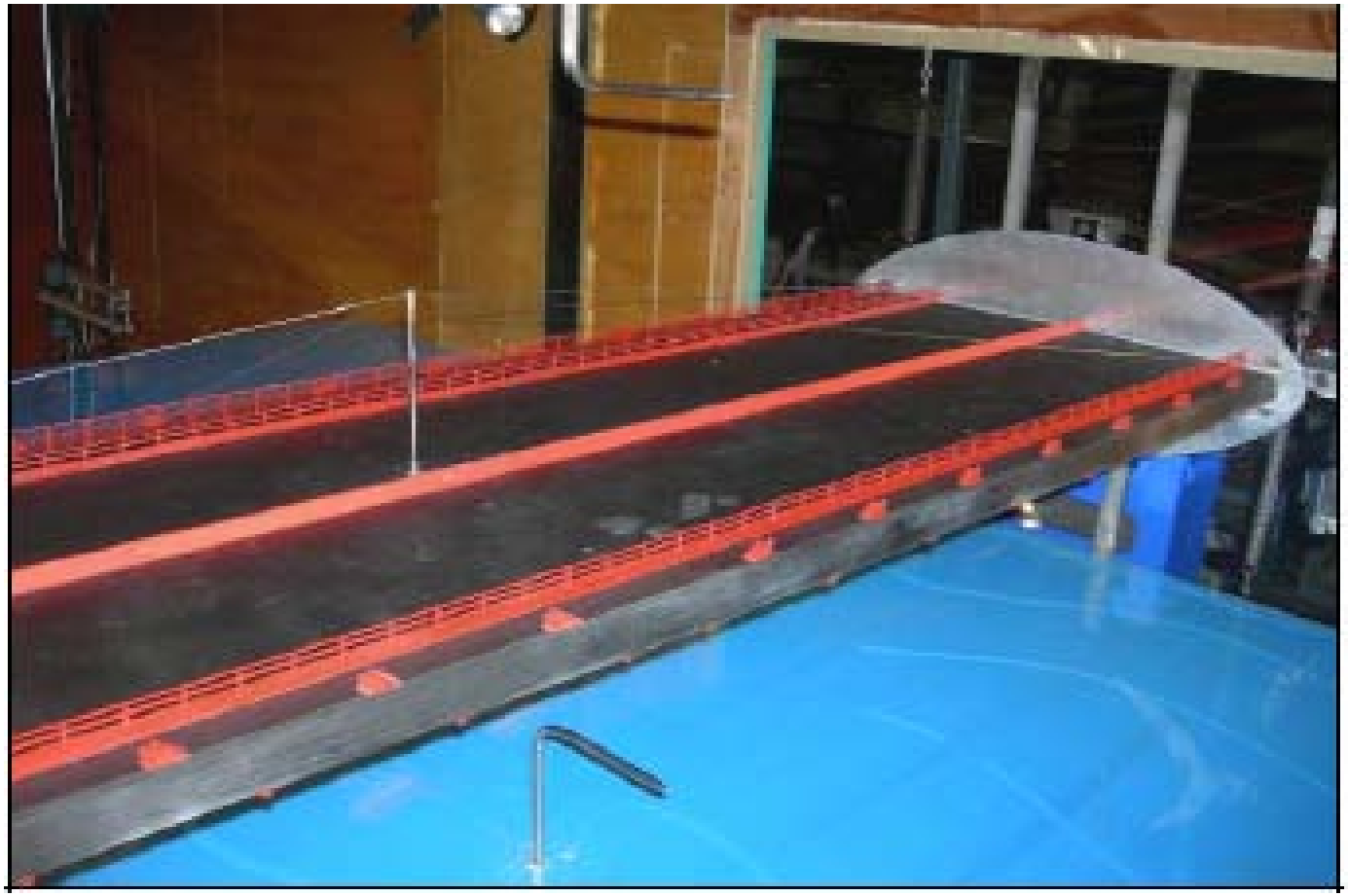
Design Considerations

- Wind Analysis
  - ✓ Site Specific Wind Profile Developed
  - ✓ RWDI Wind Tunnel Testing Just Recently Completed, Over 50% of Pylon Piles Driven
  - ✓ Initial Design Assumptions and Preliminary Results Validated

Wind Speed Applicable for	Return Period	Speed (mph)	Description
Design during construction	25	67	Mean hourly
Design of completed bridge	100	91	Mean hourly
Design of completed bridge LS	2,000	121	Mean hourly
Stability during construction	1,000	124	10-min mean
Stability of completed bridge	10,000	140	10-min mean

Design Considerations

- Wind Analysis - Sectional Model

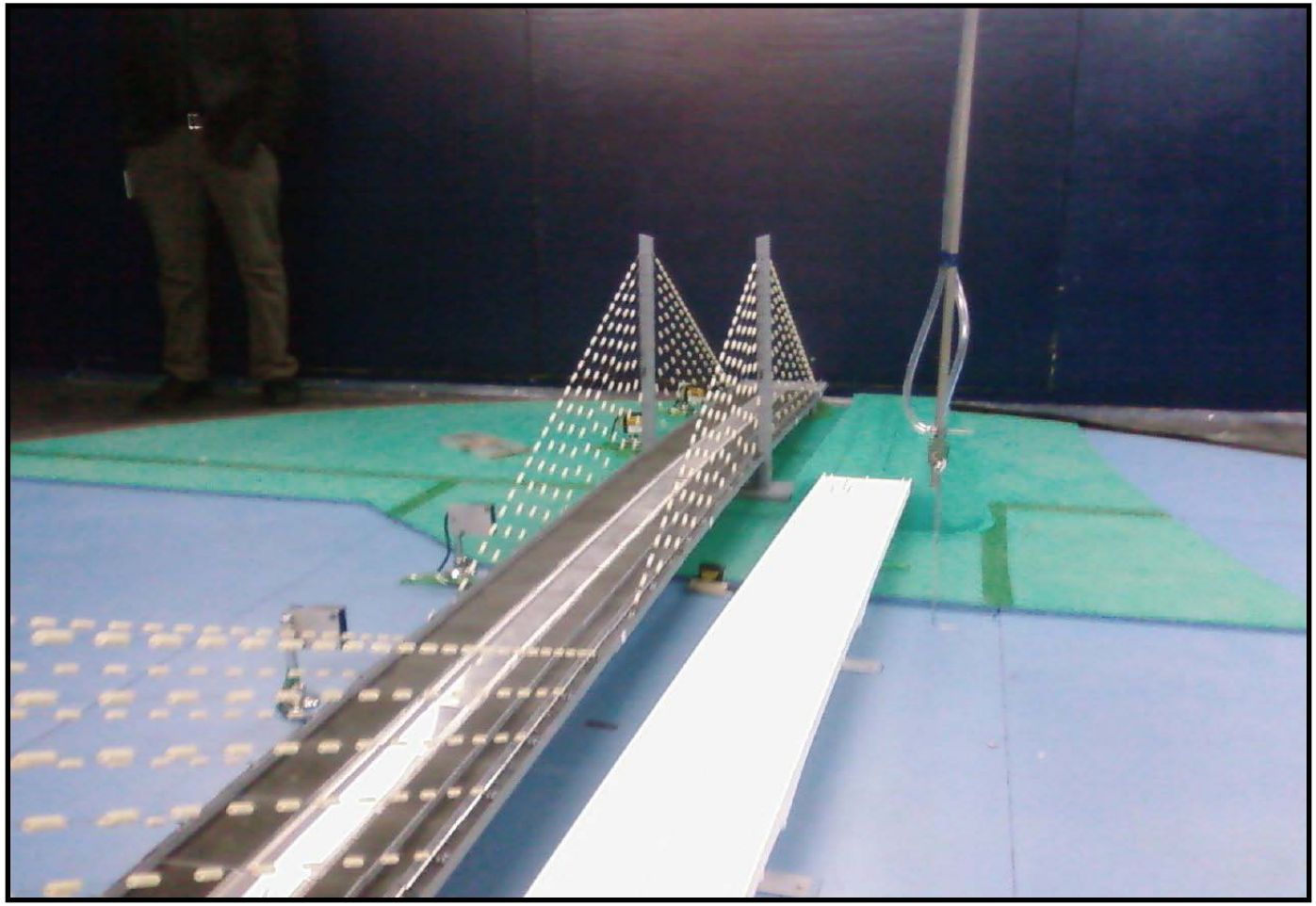


Design Considerations

- Wind Analysis - Aeroelastic Model

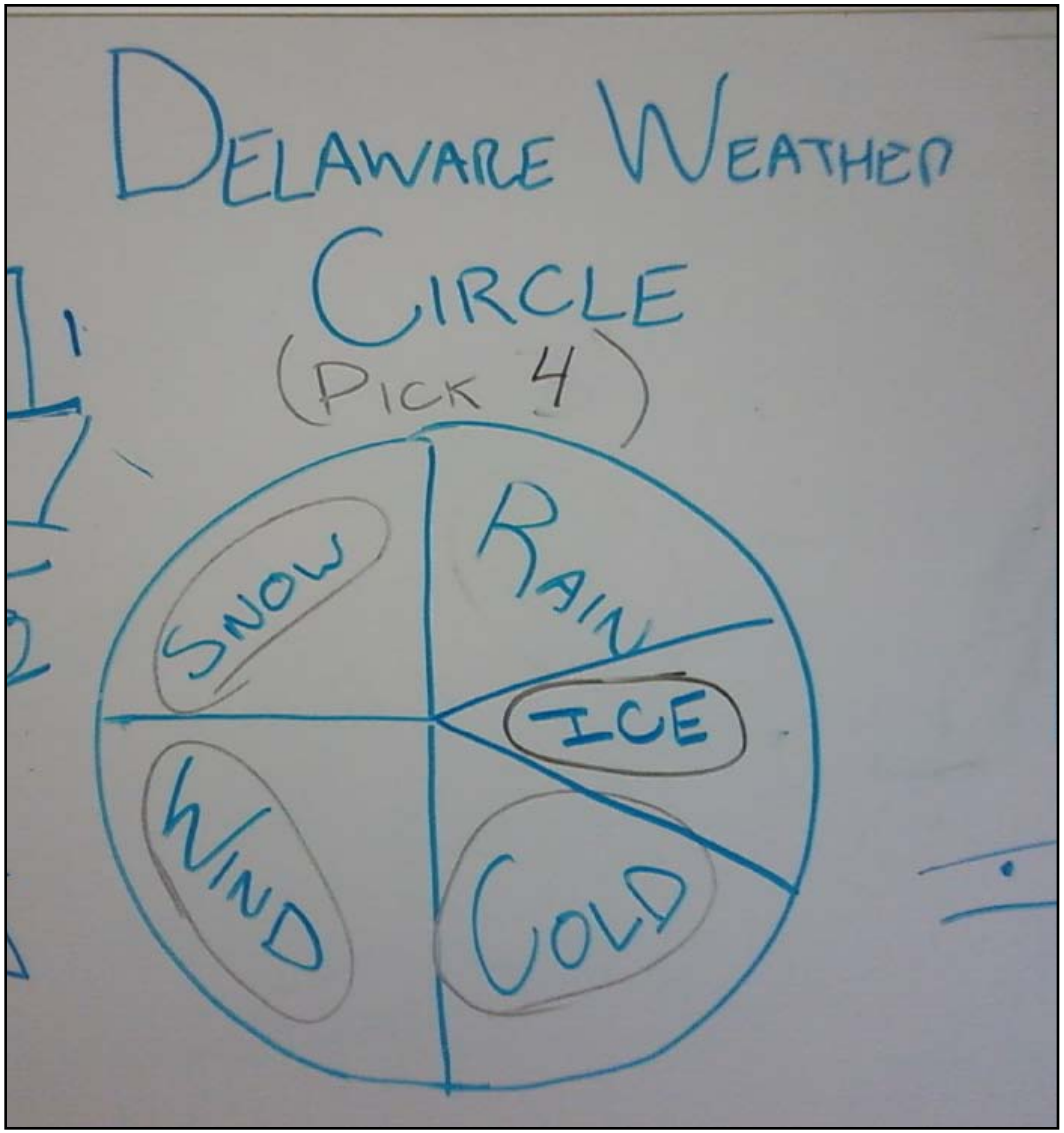
Design Considerations

- Wind Analysis - Aeroelastic Model



Design Considerations

- Wind and Weather



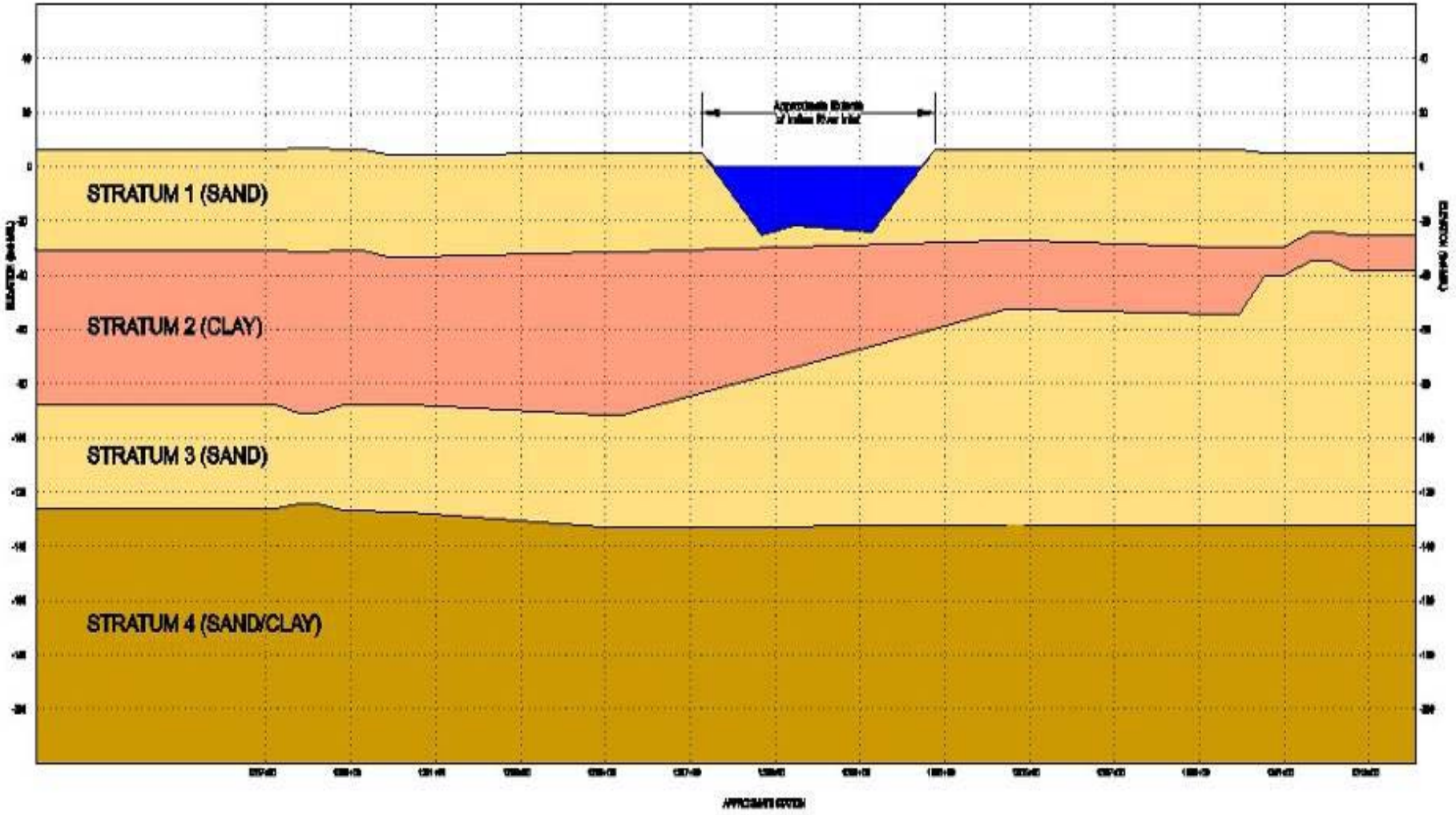
Design Considerations

Design Considerations

Geotechnical

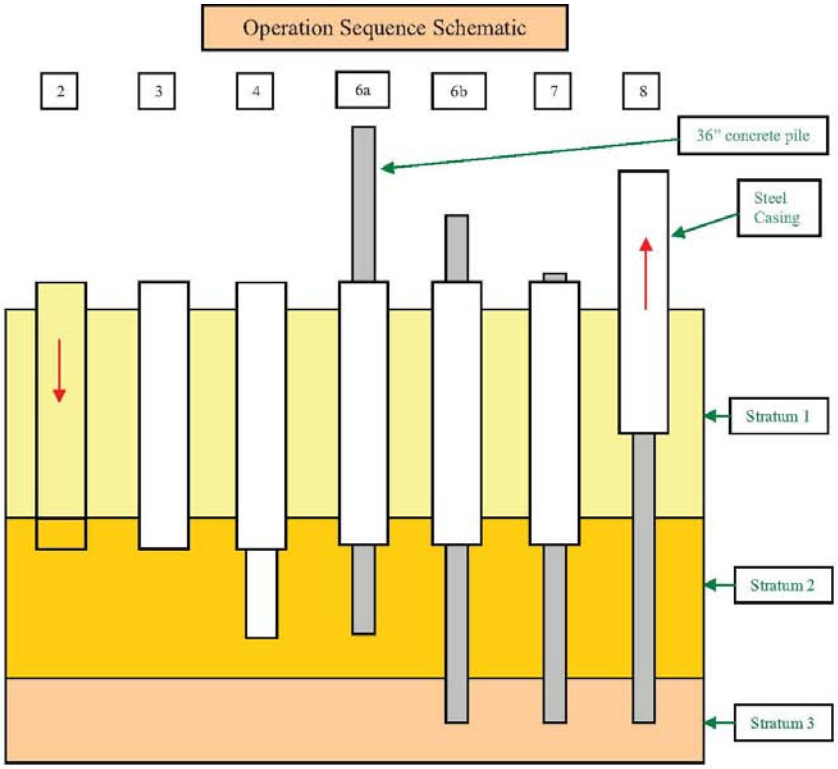
Design Considerations

- Geotechnical – Soil Profile



Design Considerations

- Geotechnical – Pile Installation Method



Summary of Operation Sequence:

1. Excavate to elevation 4'
2. Drive the 54" casing.
3. Auger the casing.
4. Auger to recommended elev.
5. Pump water into hope (if necessary).
6. Set & drive 36" square concrete pile.
7. Cut pile to intended grade.
8. Extract the casing.

Bridge Features

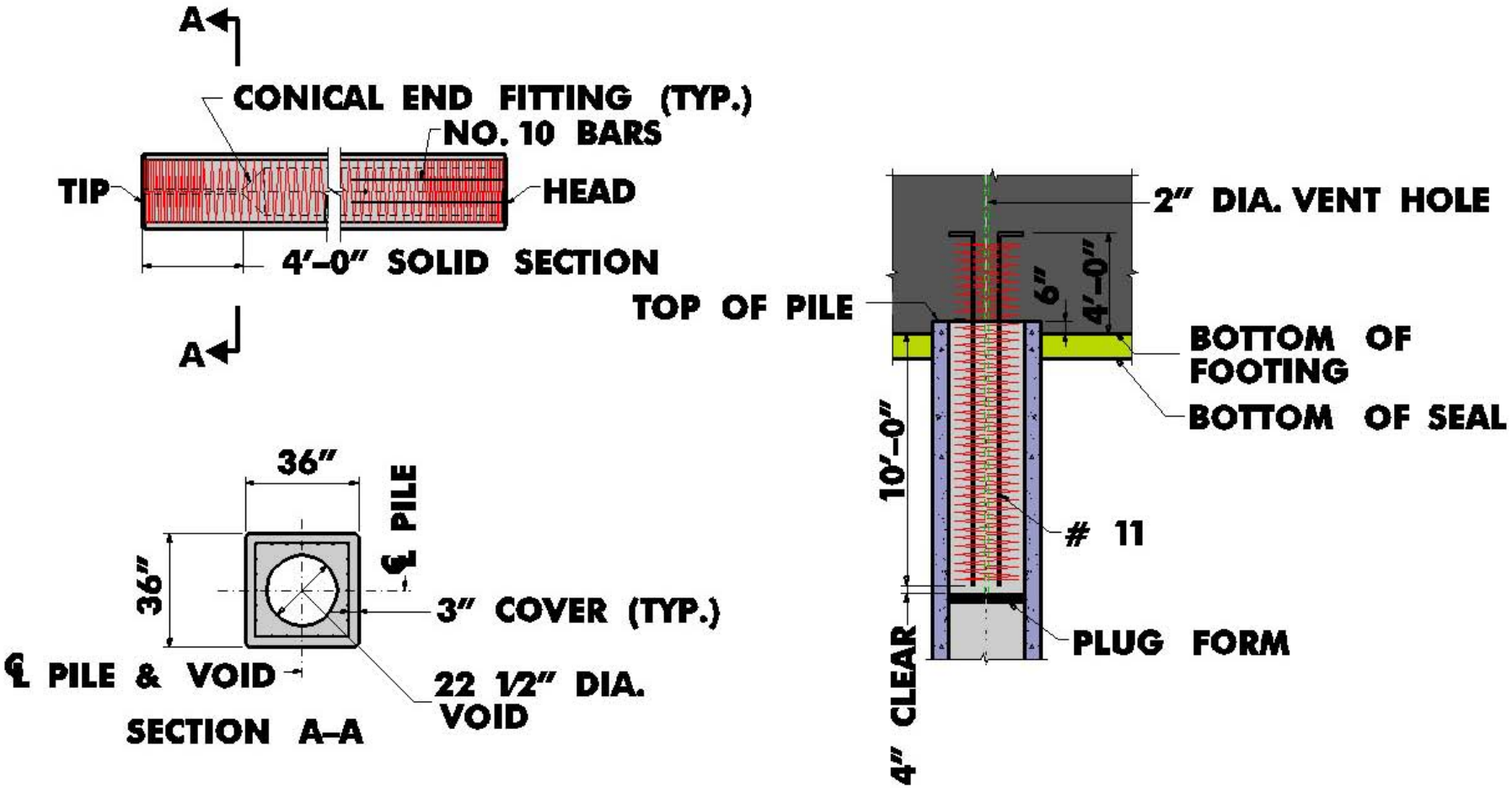
- Piles
- Footings/Substructure
- Pylons
- Falsework
- Superstructure
- Form Traveler
- Cable Stay System

Bridge Features

Pile Details and Pile Driving

Bridge Features

- Pile Details



Bridge Features

Bridge Features

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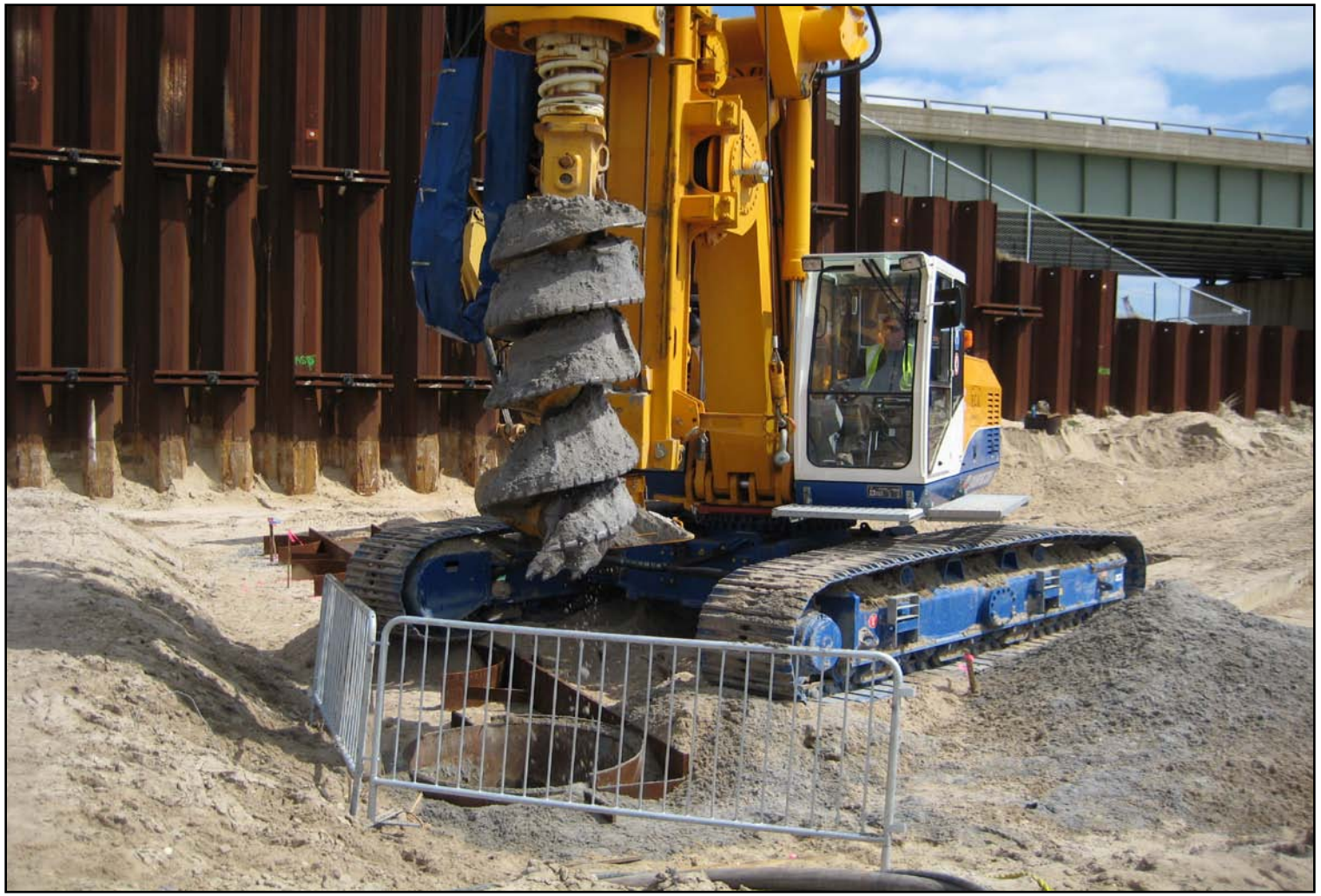

Bridge Features

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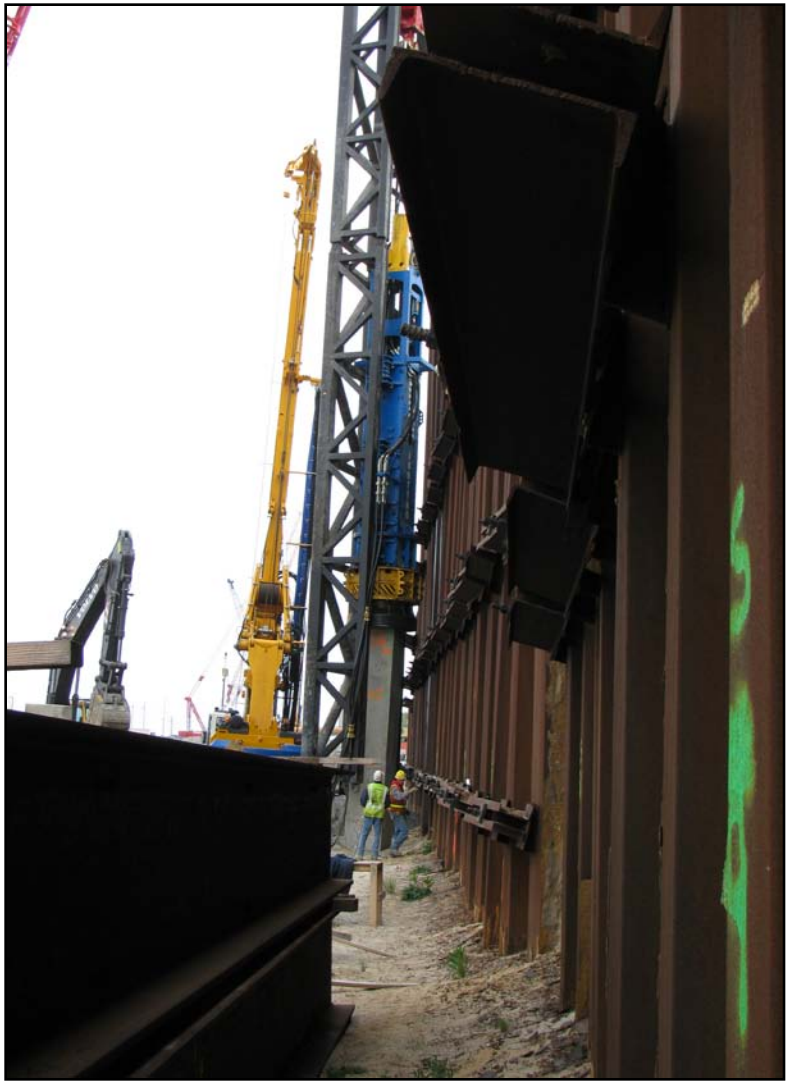

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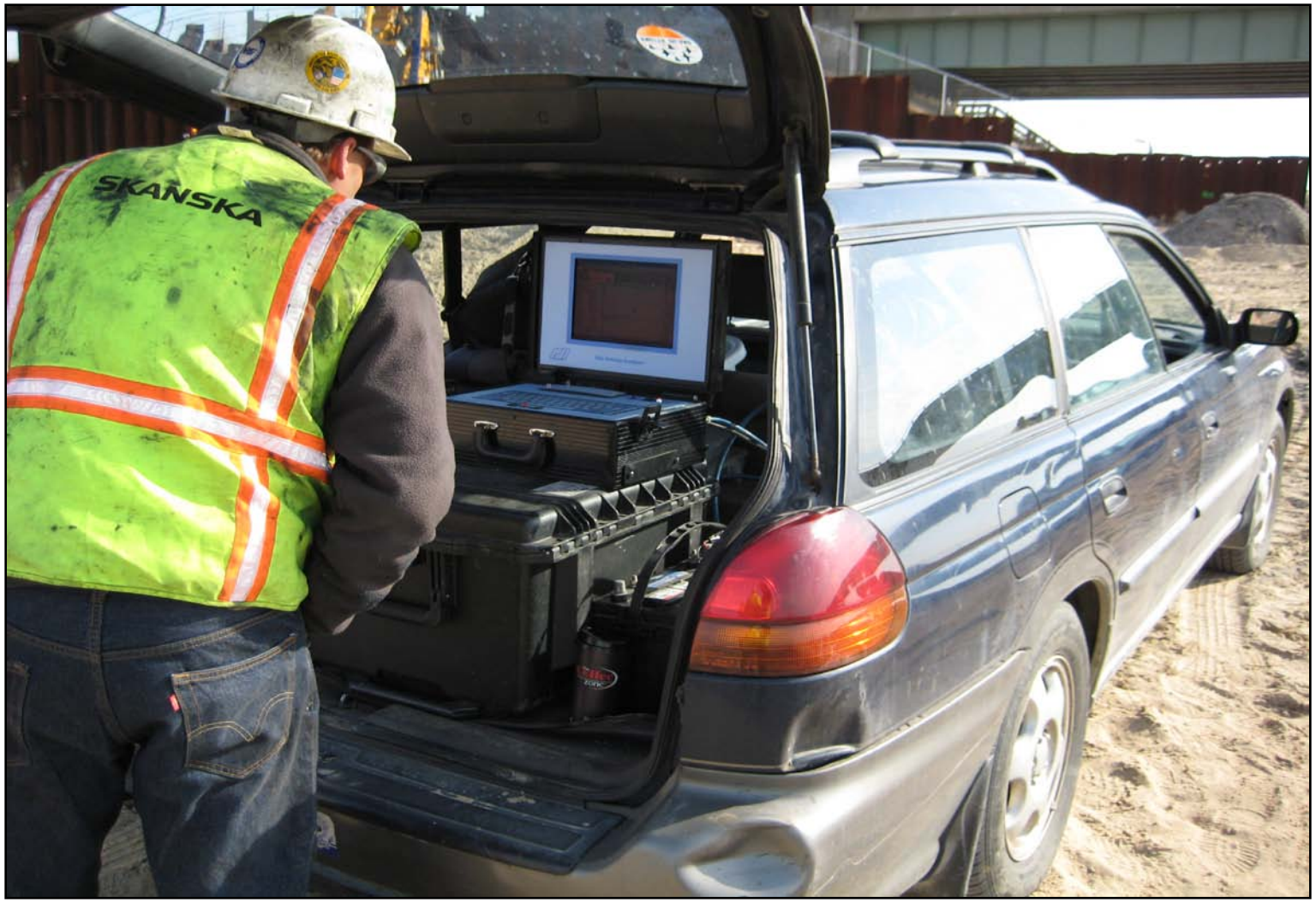

Bridge Features

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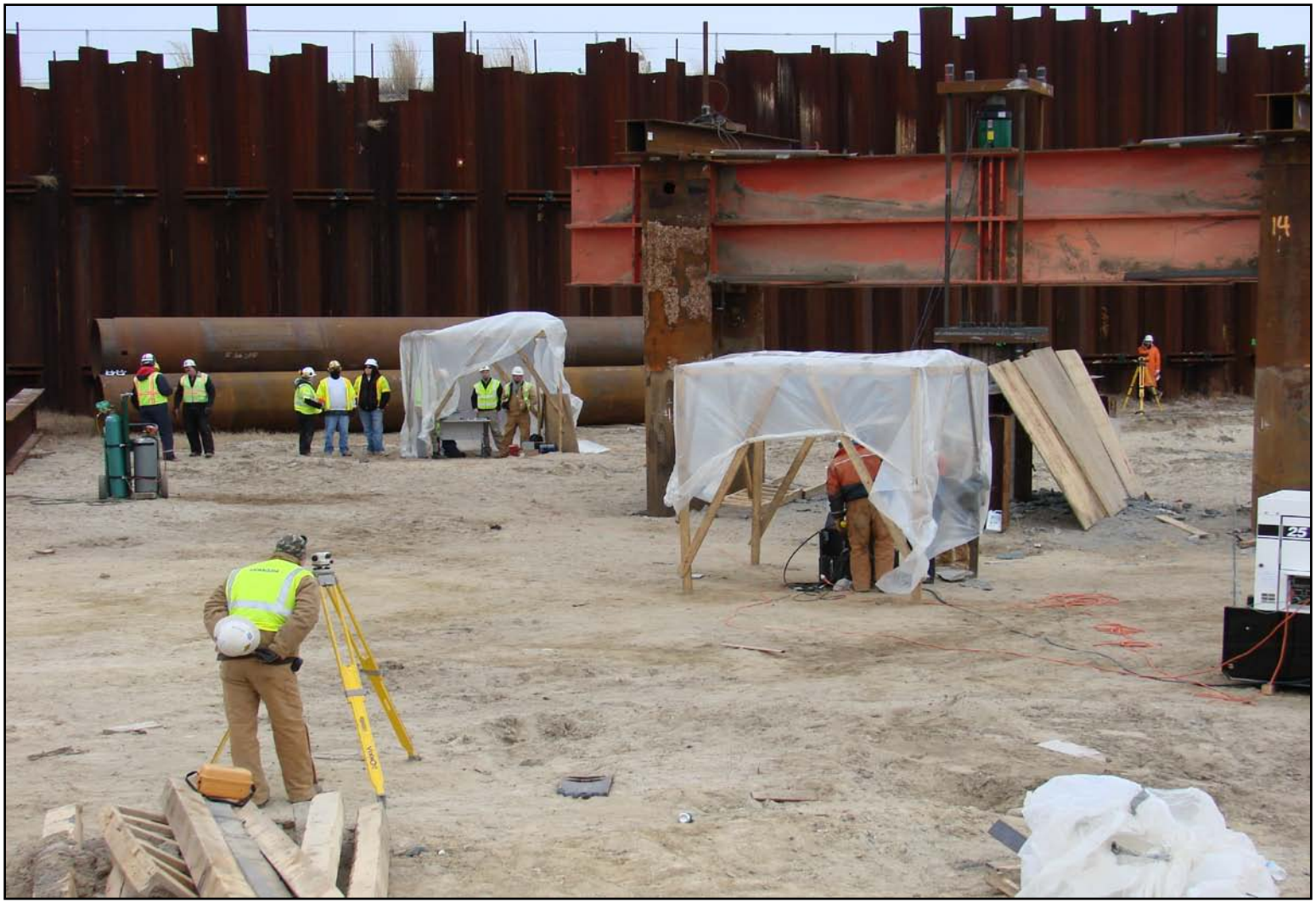

Footings and Substructure

Bridge Features

Bridge Features

Bridge Features

Bridge Features

Bridge Features

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Bridge Features

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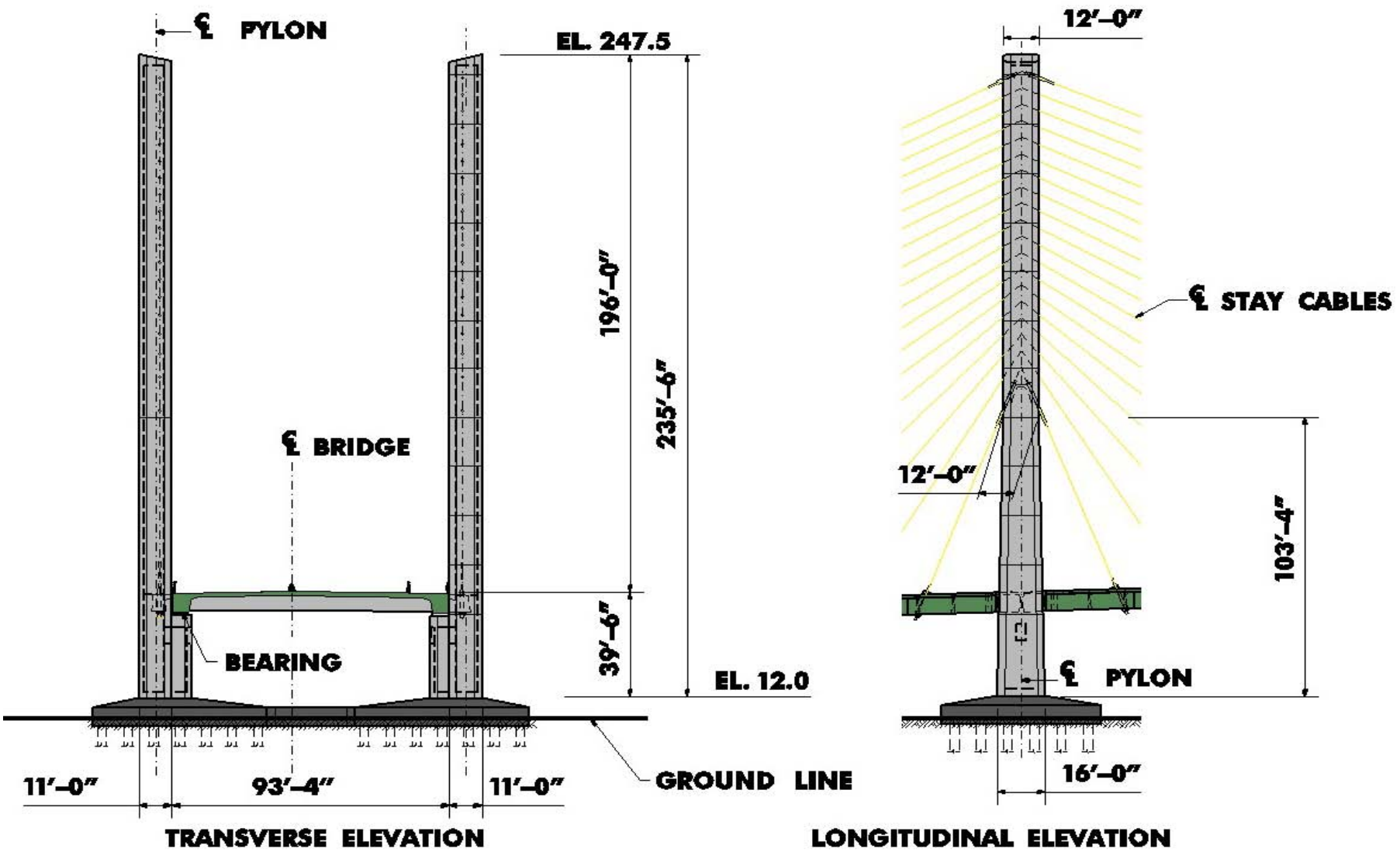
Bridge Features

Pylons

Bridge Features

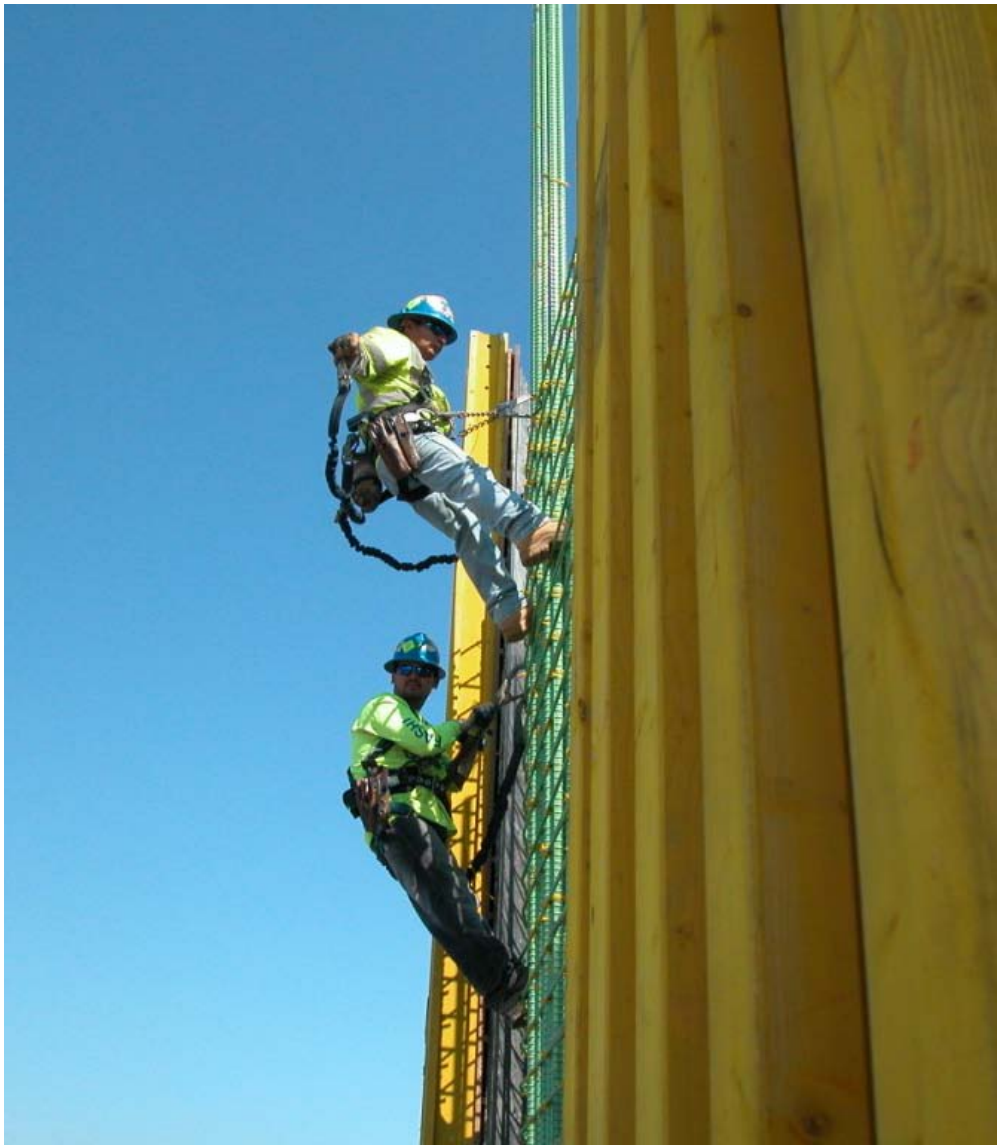


PYLON LAYOUT – CIP OPTION

Bridge Features

Bridge Features

Bridge Features



Bridge Features

Bridge Features

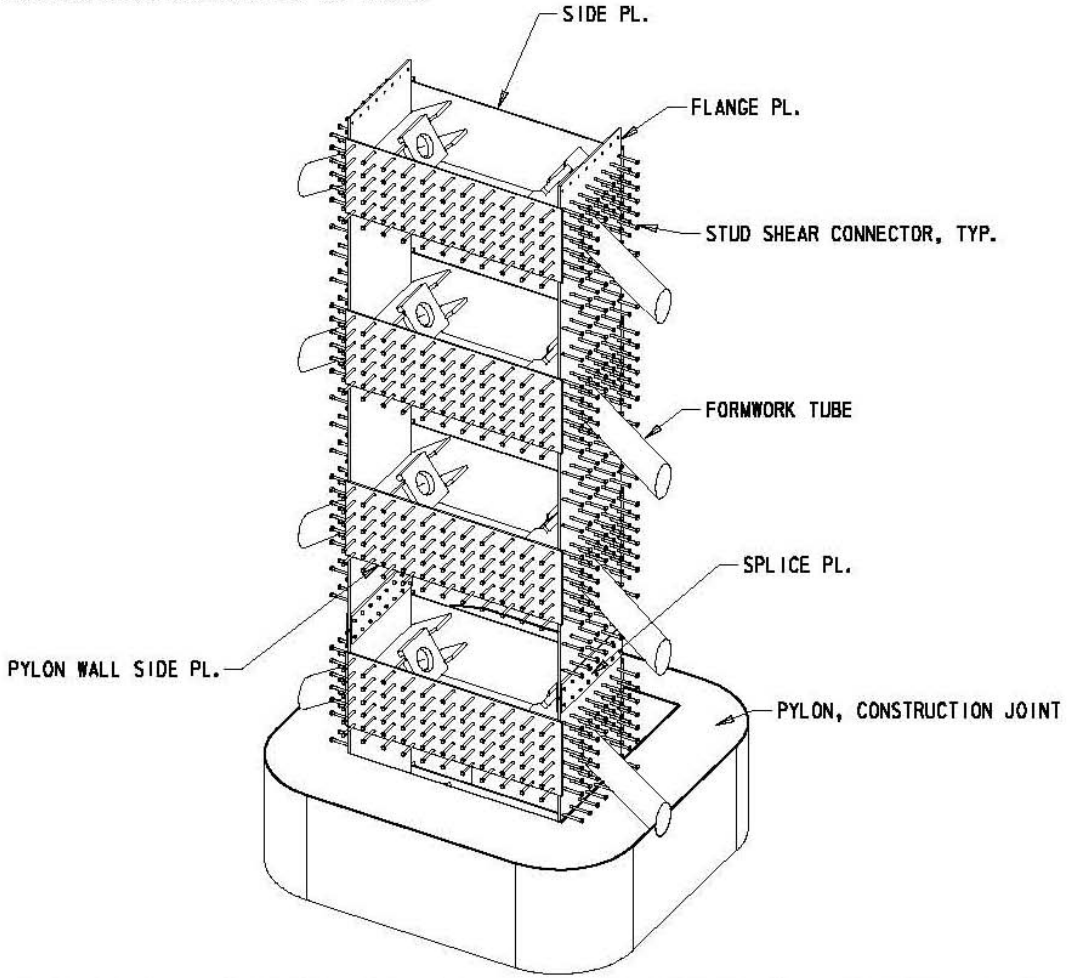
Bridge Features

Bridge Features

Bridge Features

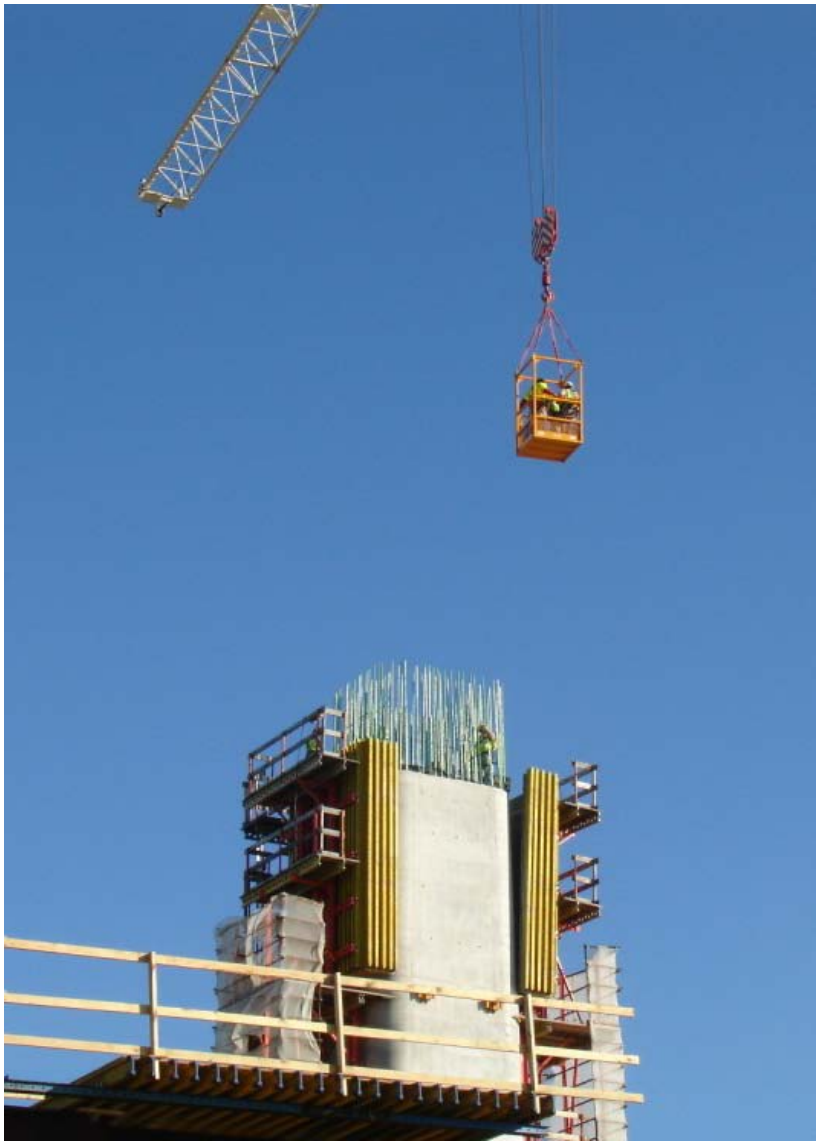
Bridge Features

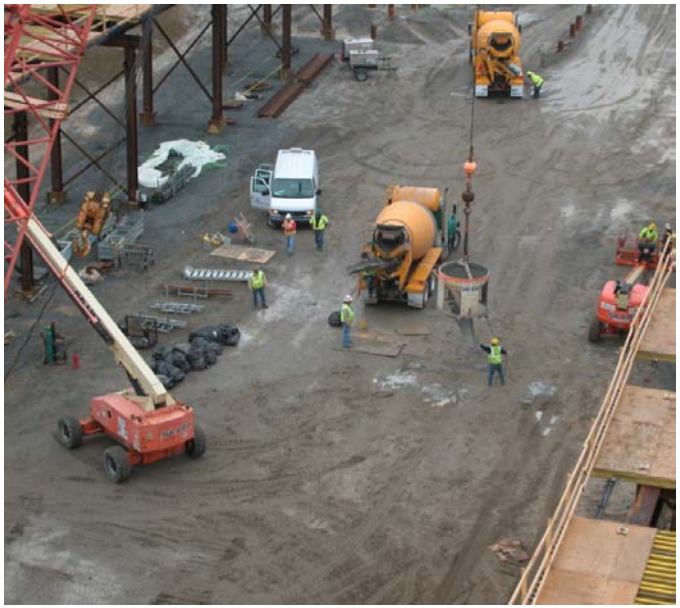
NOTES:
1. ANY BRACING REQUIRED FOR STABILITY DURING TRANSPORTATION AND ERECTION NOT SHOWN.



ANCHOR BOX ASSEMBLY ISOMETRIC VIEW (SHOWING TYPE 2)

Bridge Features





Bridge Features

Bridge Features

Falsework

Bridge Features

Bridge Features

Bridge Features

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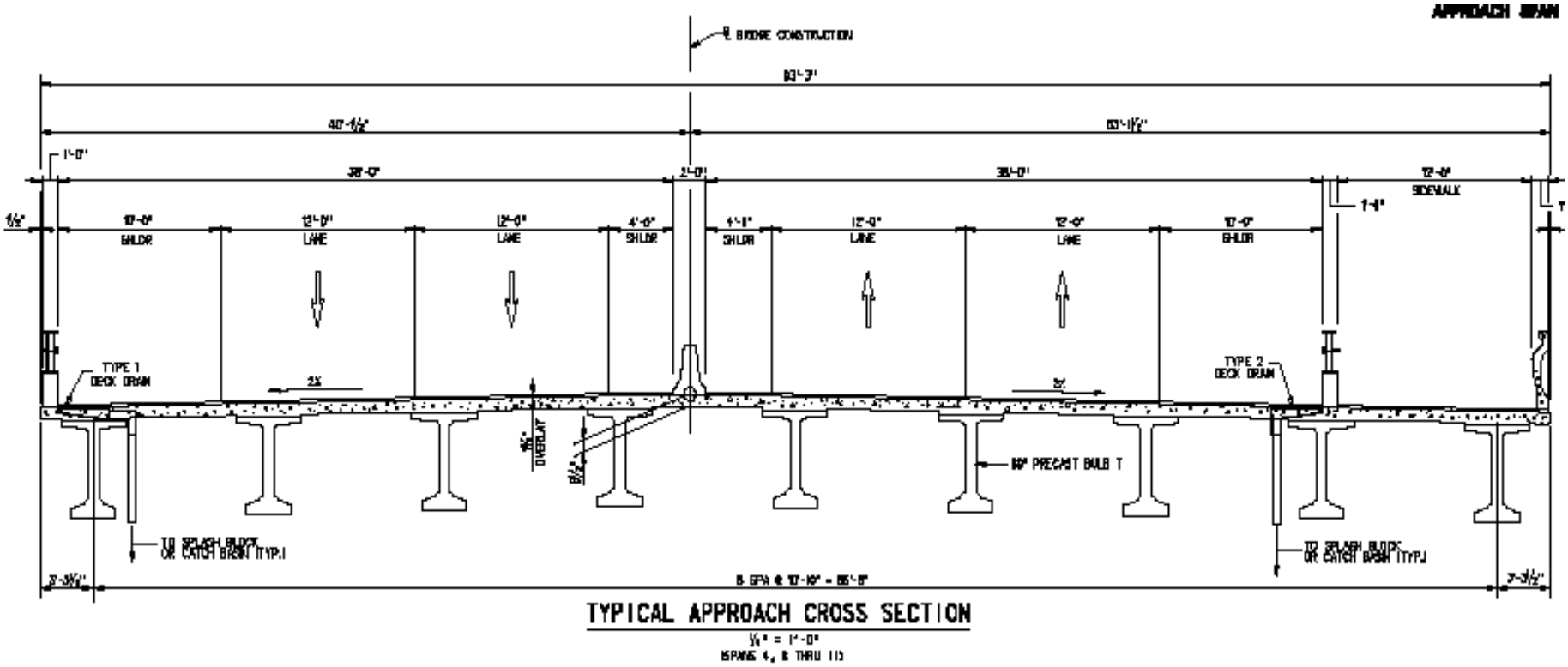
Bridge Features

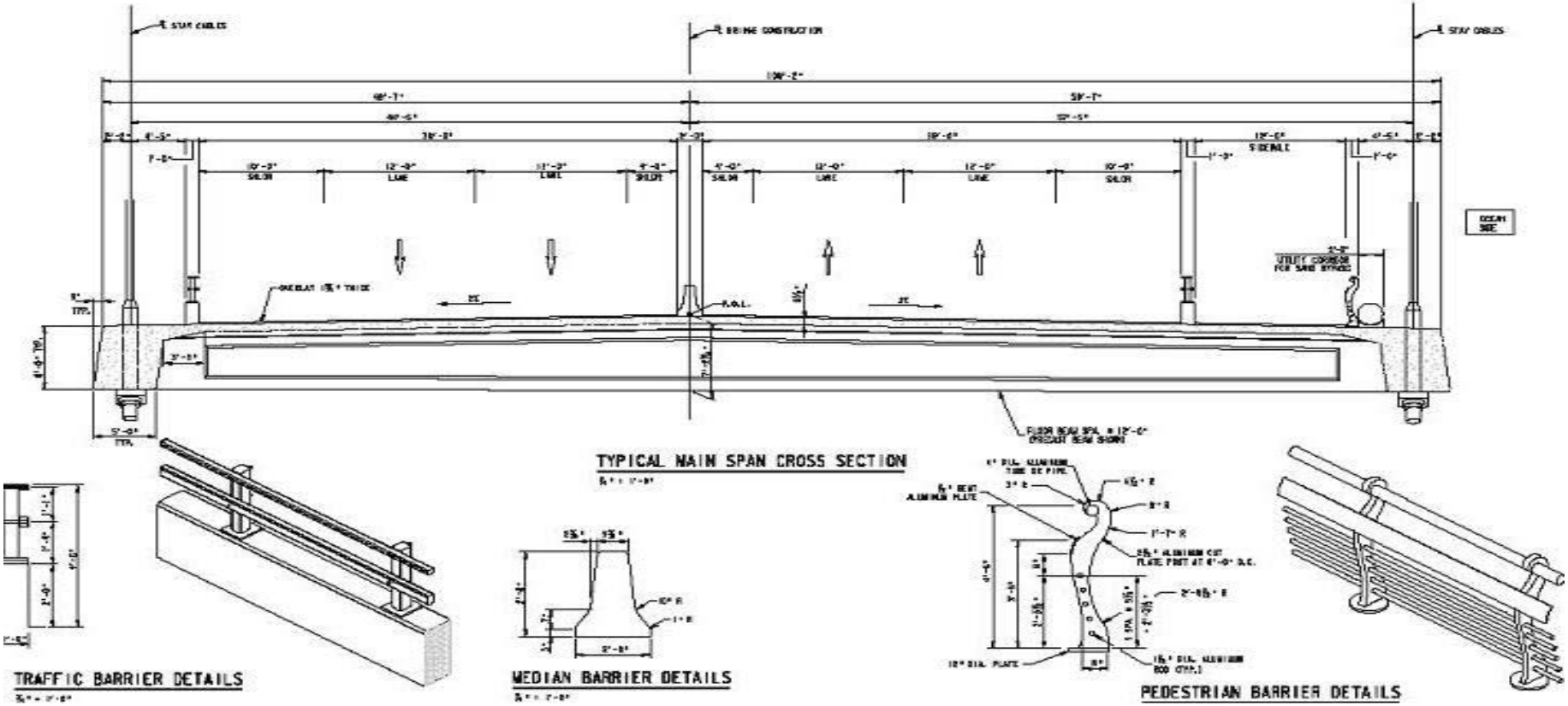
Superstructure

Bridge Features



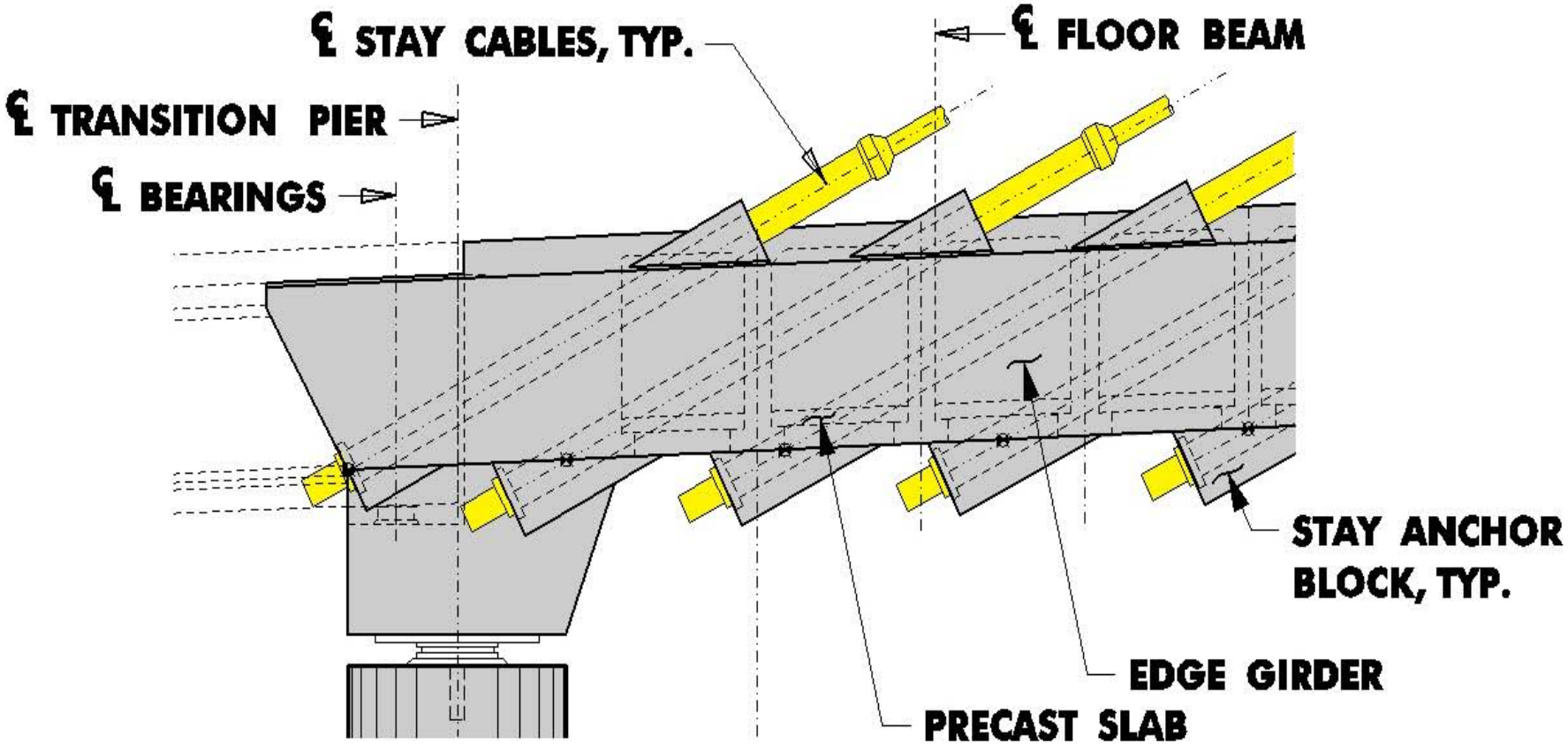
Typical Section for the Approaches
AASHTO 69” Bulb-T Girders

Bridge Features



CIP Concrete Edge Girders & Precast and CIP Transverse Floor Beams

Bridge Features



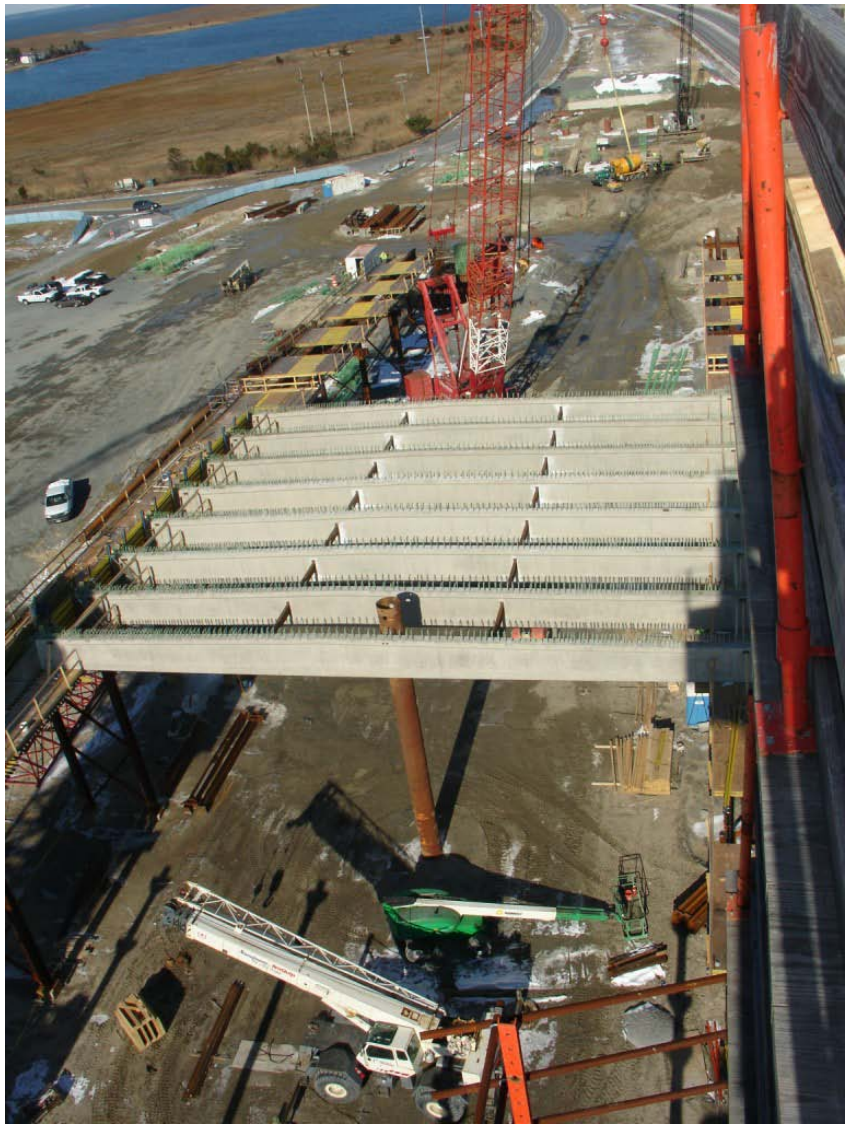
TRANSITION PIER – LONGITUDINAL SECTION

Bridge Features

Bridge Features

Bridge Features

Bridge Features



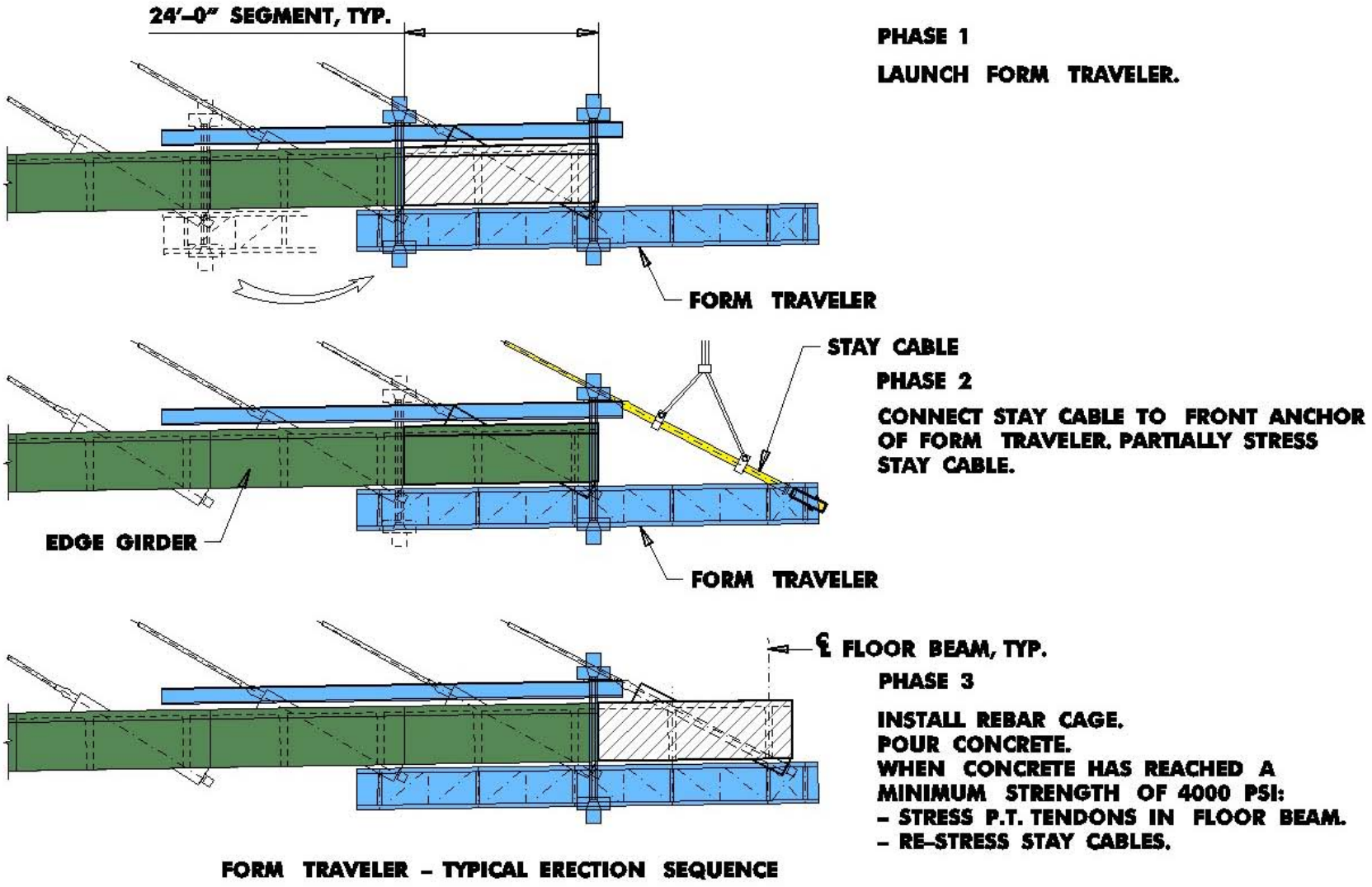
Bridge Features

Bridge Features

Bridge Features

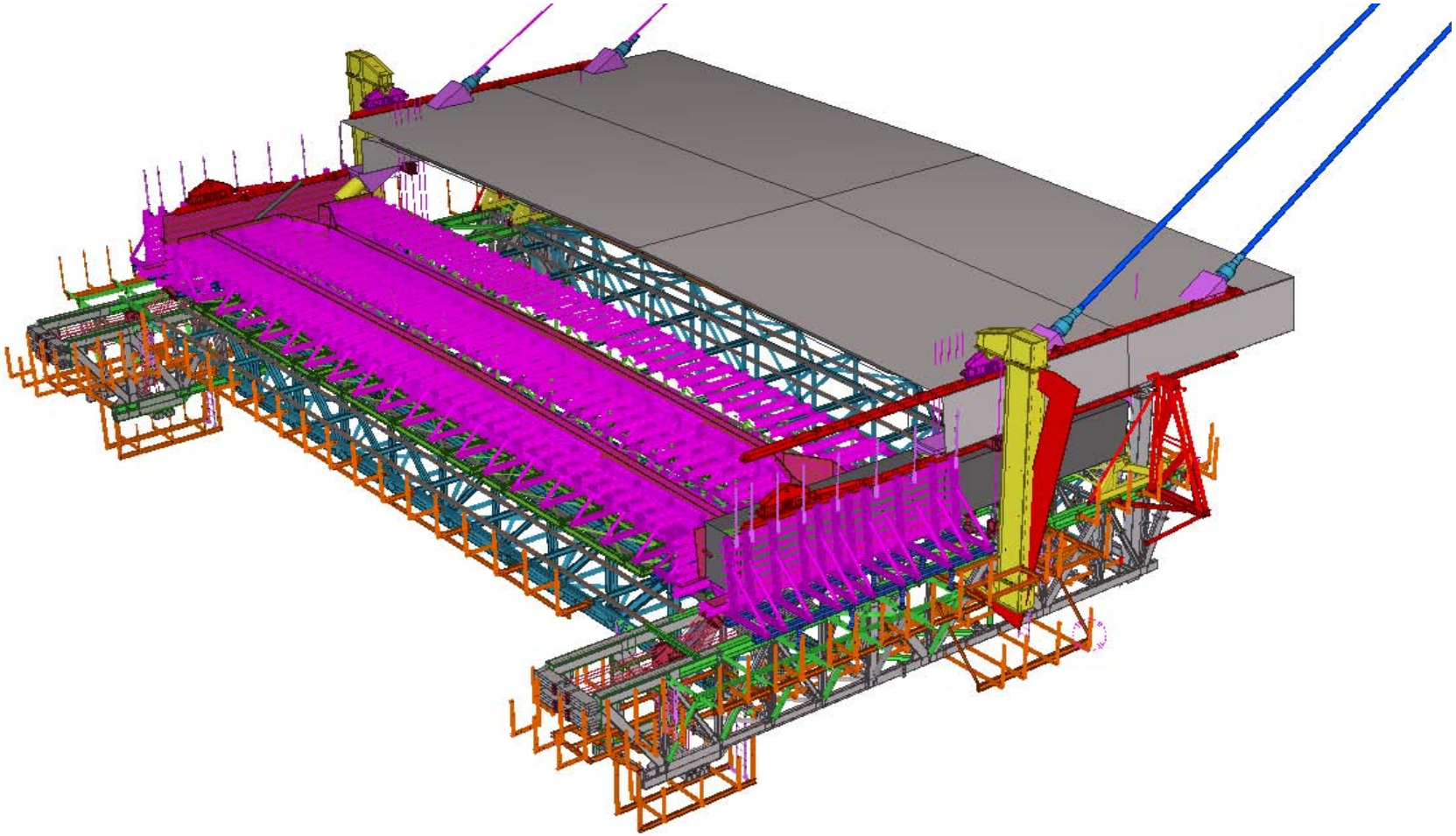
Form Traveler

Bridge Features



FORM TRAVELER – TYPICAL ERECTION SEQUENCE

Bridge Features



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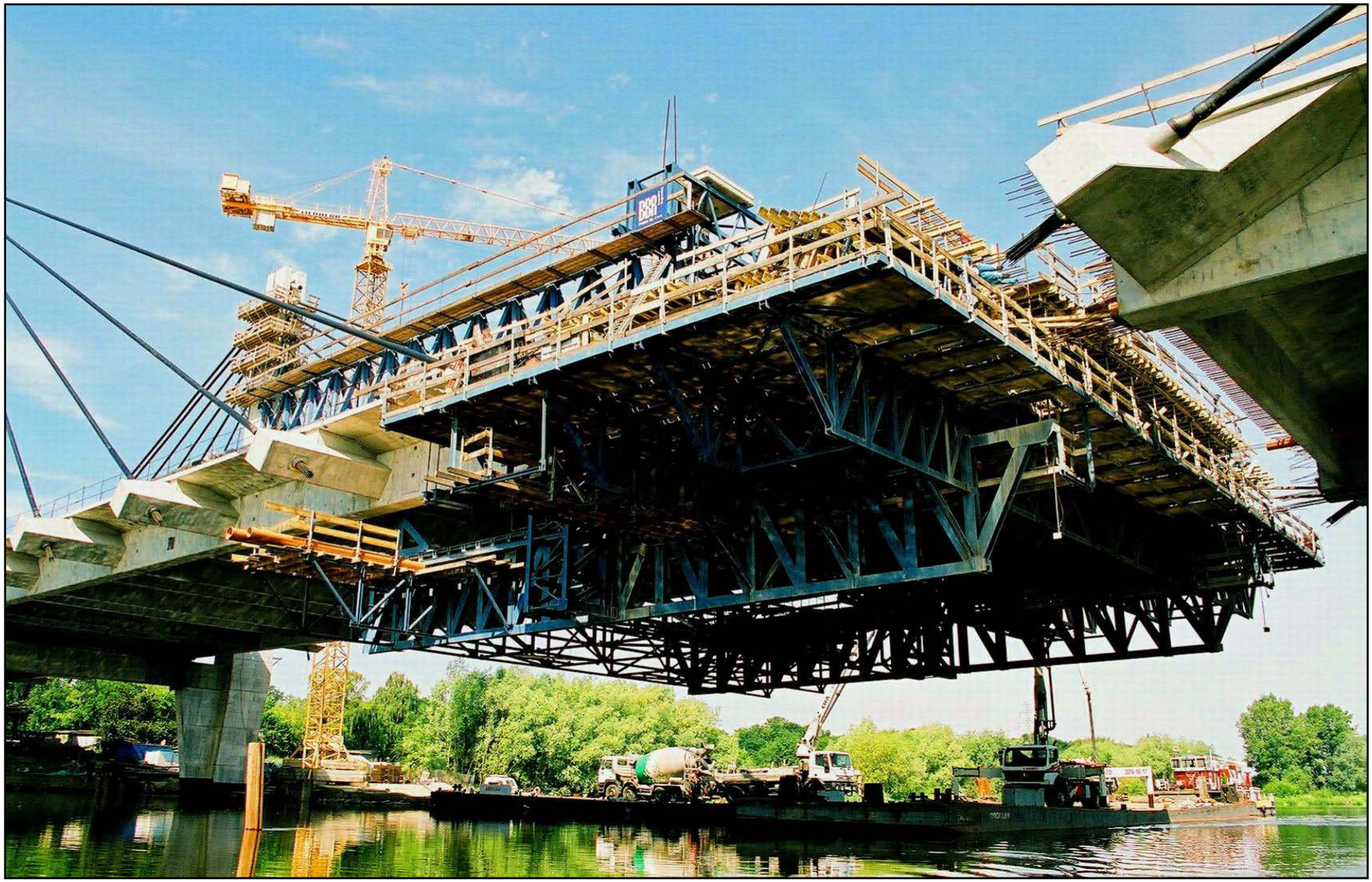
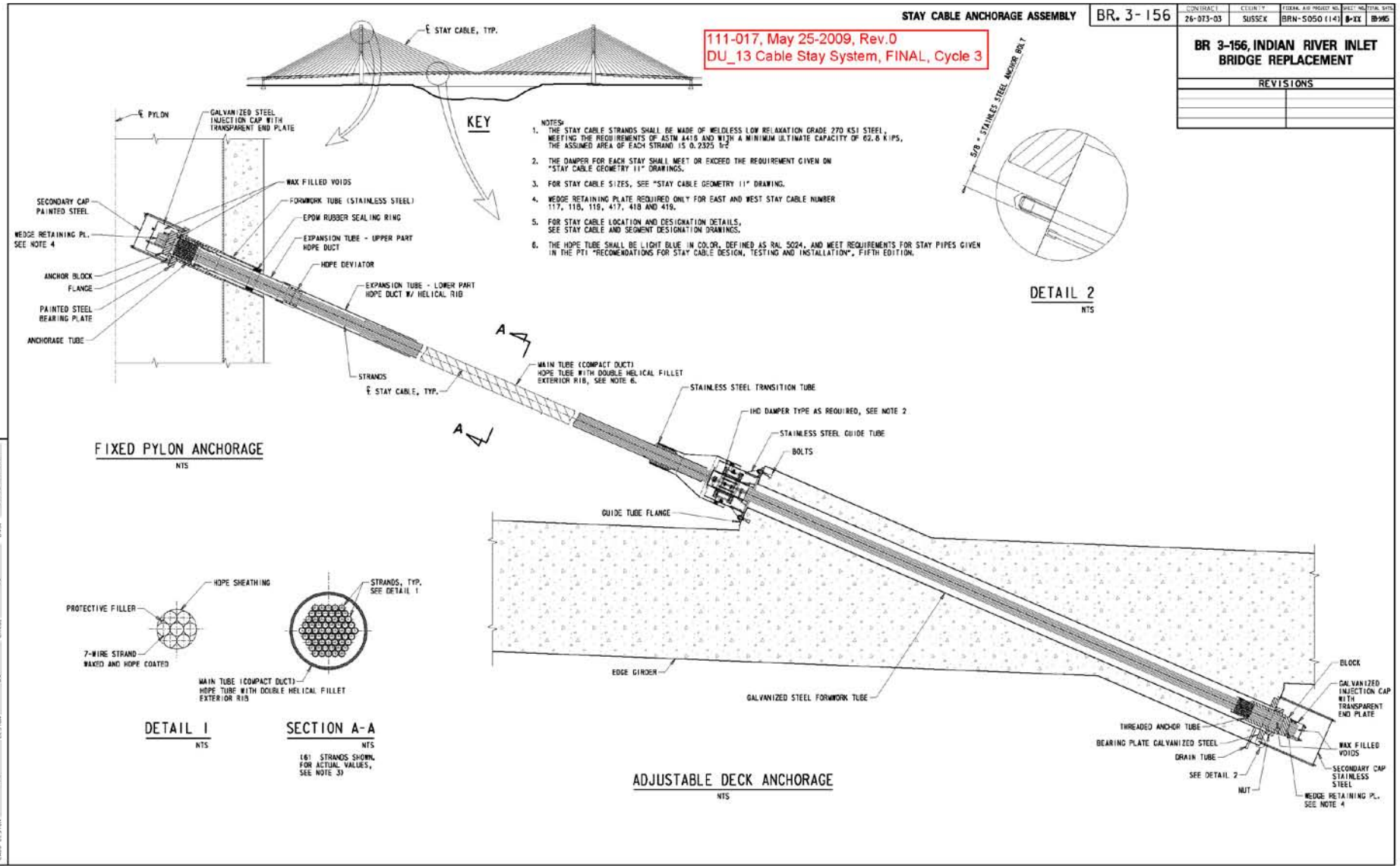


Bridge Features

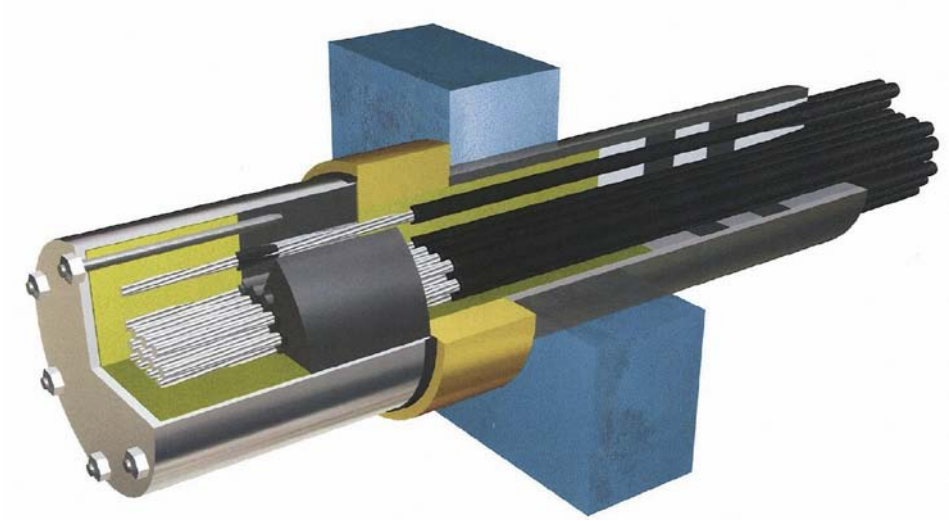
Cable Stay System

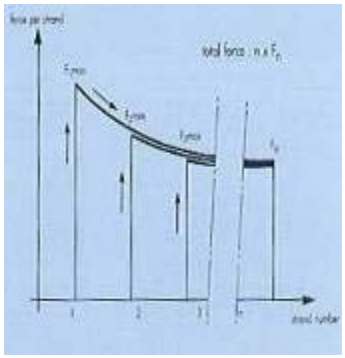
Bridge Features



Bridge Features

- Strands
  - ✓ 0.62” Diameter
  - ✓ Coextruded HDPE Sheathing
  - ✓ Wax Filled
- External HDPE Stay Pipe (Blue)
- Strands are non bonded and parallel
- Strands are individually stressed





Bridge Features

Bridge Features

- Erect stay pipe and master strand

Conclusion

- NTP Issued September 15, 2008
- Design is Approximately 95% Complete
- Construction is Approximately 40% Complete
- Phase II Roadway Work Begins Late Summer 2010
- Traffic on Bridge by Spring 2011
- Project To Be Completed by Summer 2011
- Existing Bridge Demo Late 2011 (Separate Contract)

Questions and Comments?