No Bridge is too Big (or Small)

FABRICATION OF THE BLUE RIDGE PARKWAY OVER I-26 AND LAUREL FORK BRIDGE REPLACEMENT

Jacob Rausch, P.E.
Coastal Precast Systems

CPS PRECAST

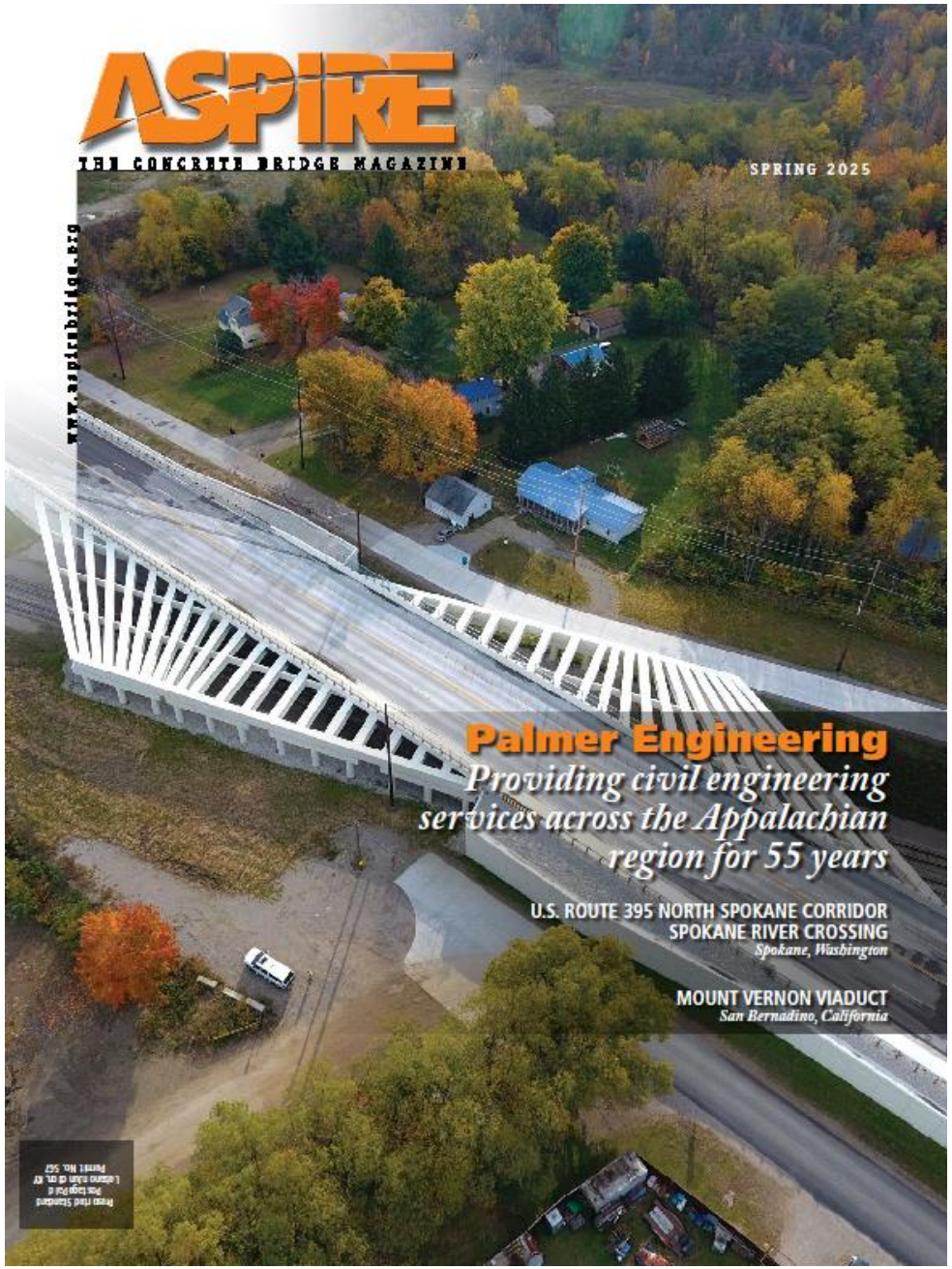
Purpose and Learning Objectives

Purpose

The Webinar provides an educational forum to learn new techniques used in successful projects, lessons learned from development projects, and showcases a case study allowing for discussion of the project.

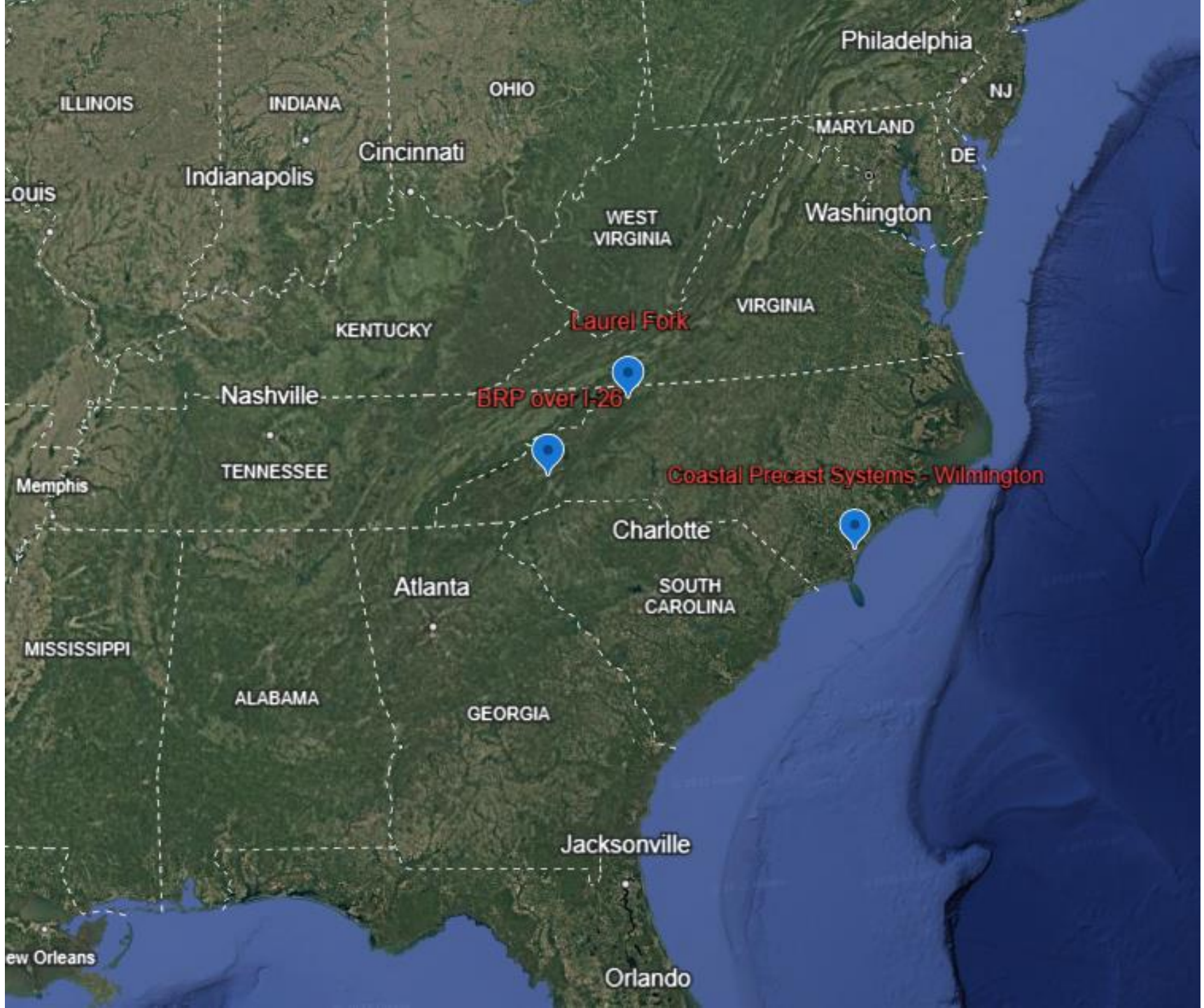
At the end of this presentation you will be able to:

- Understand the precast segment fabrication process
- Understand how certain design/detailing choices impact segment fabrication
- Understand segment delivery in landlocked locations



ASPIRE Spring 2025

Standardization of Segment Shape
Improving the cost-effectiveness of small precast concrete segmental superstructures


Philadelphia
NJ
ILLINOIS
INDIANA
OHIO
MARYLAND
DE
Cincinnati
Indianapolis
LOUIS
WEST
VIRGINIA
Washington
VIRGINIA
KENTUCKY
Laurel Fork
Nashville
BRP over I-26
TENNESSEE
Memphis
Coastal Precast Systems - Wilmington
Charlotte
Atlanta
SOUTH
CAROLINA
MISSISSIPPI
ALABAMA
GEORGIA
Jacksonville
ew Orleans
Orlando

Blue Ridge Parkway over I-26

- Owner: National Park Service
- Design Engineer: FHWA-EFLHD
- EOR: AECOM
- Prime Contactor: Fluor-United JV
- Construction Engineer: COWI North America
- Precaster: Coastal Precast Systems
- Post-Tensioning Contractor: Structural Technologies/VSL

Blue Ridge Parkway
Laurel Fork Bridge Replacement

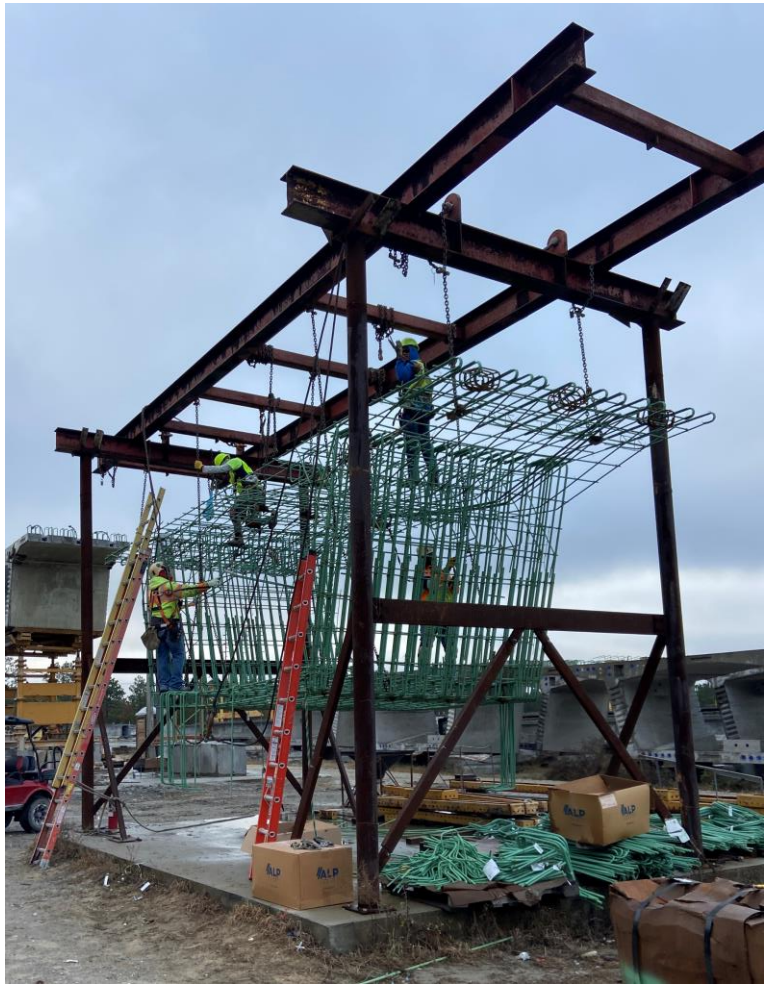
- Owner: National Park Service
- Design Engineer: FHWA-EFLHD
- EOR: COWI North America
- Prime Contractor: Vannoy-Structural Technologies JV
- Construction Engineer: COWI North America
- Precaster: Coastal Precast Systems
- Post-Tensioning Contractor: Structural Technologies/VSL

General Precast Segment Fabrication (Casting Cycle)

Step 1: Pre-assembling rebar cage

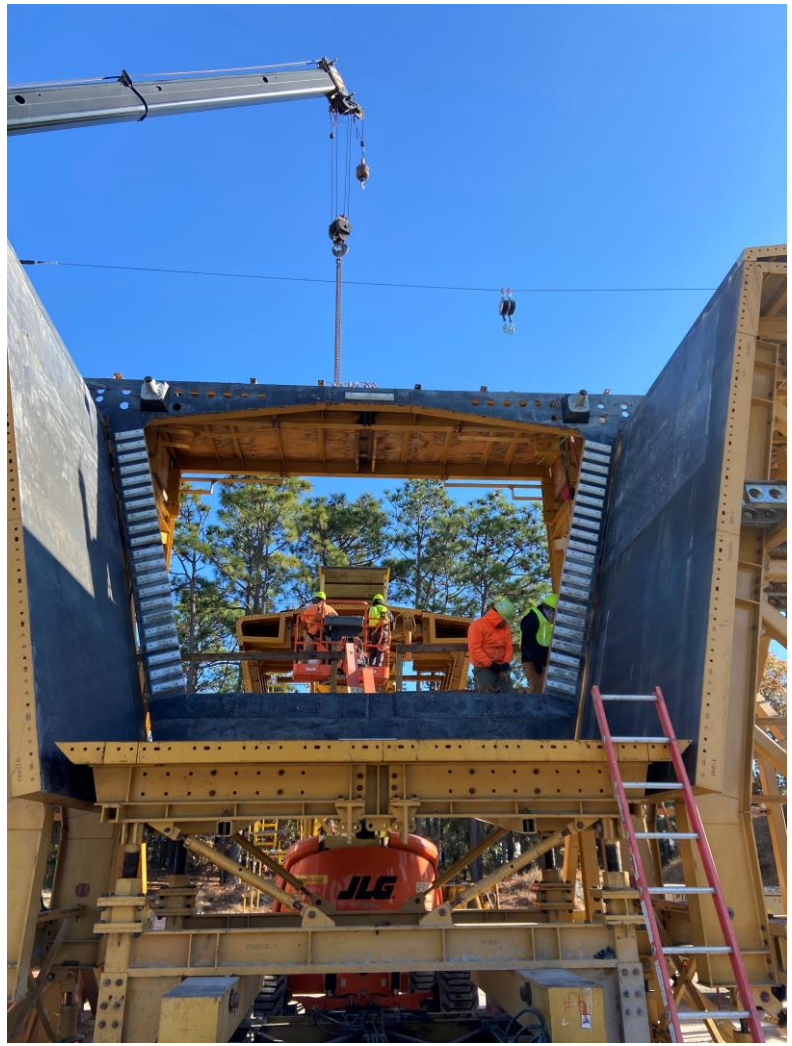
General Precast Segment Fabrication (Casting Cycle)

Step 2: Rebar Ready Rack



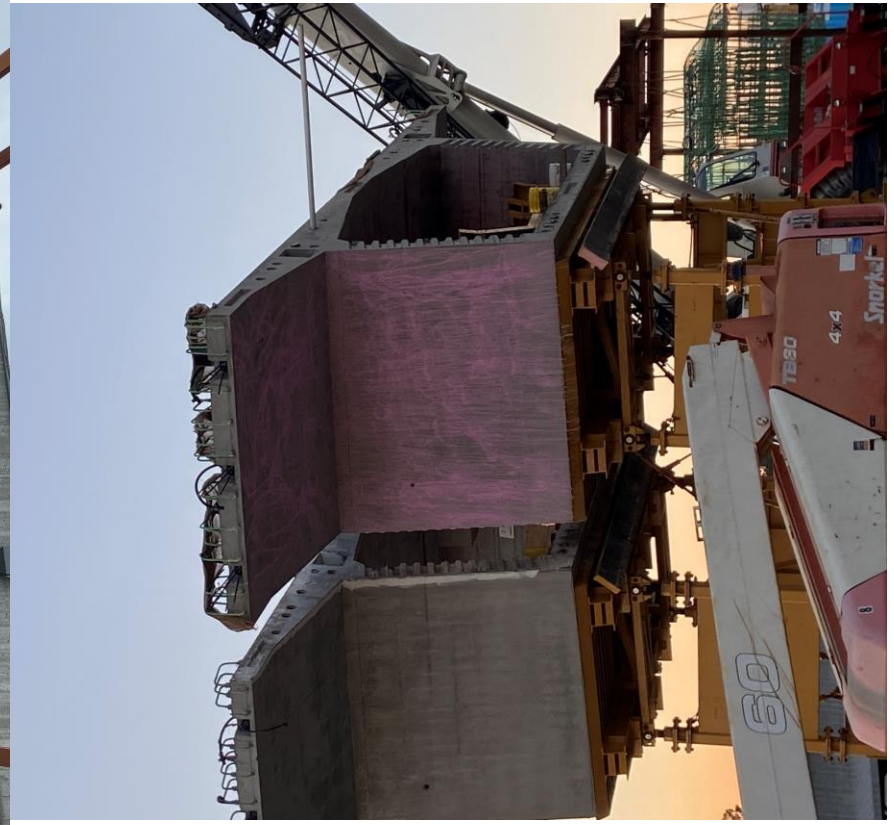
General Precast Segment Fabrication (Casting Cycle)

Step 3: Prepare Formwork



General Precast Segment Fabrication (Casting Cycle)

Step 3: Prepare Formwork – Soffit table change



General Precast Segment Fabrication (Casting Cycle)

Step 4: Place Rebar Cage into Form

General Precast Segment Fabrication (Casting Cycle)

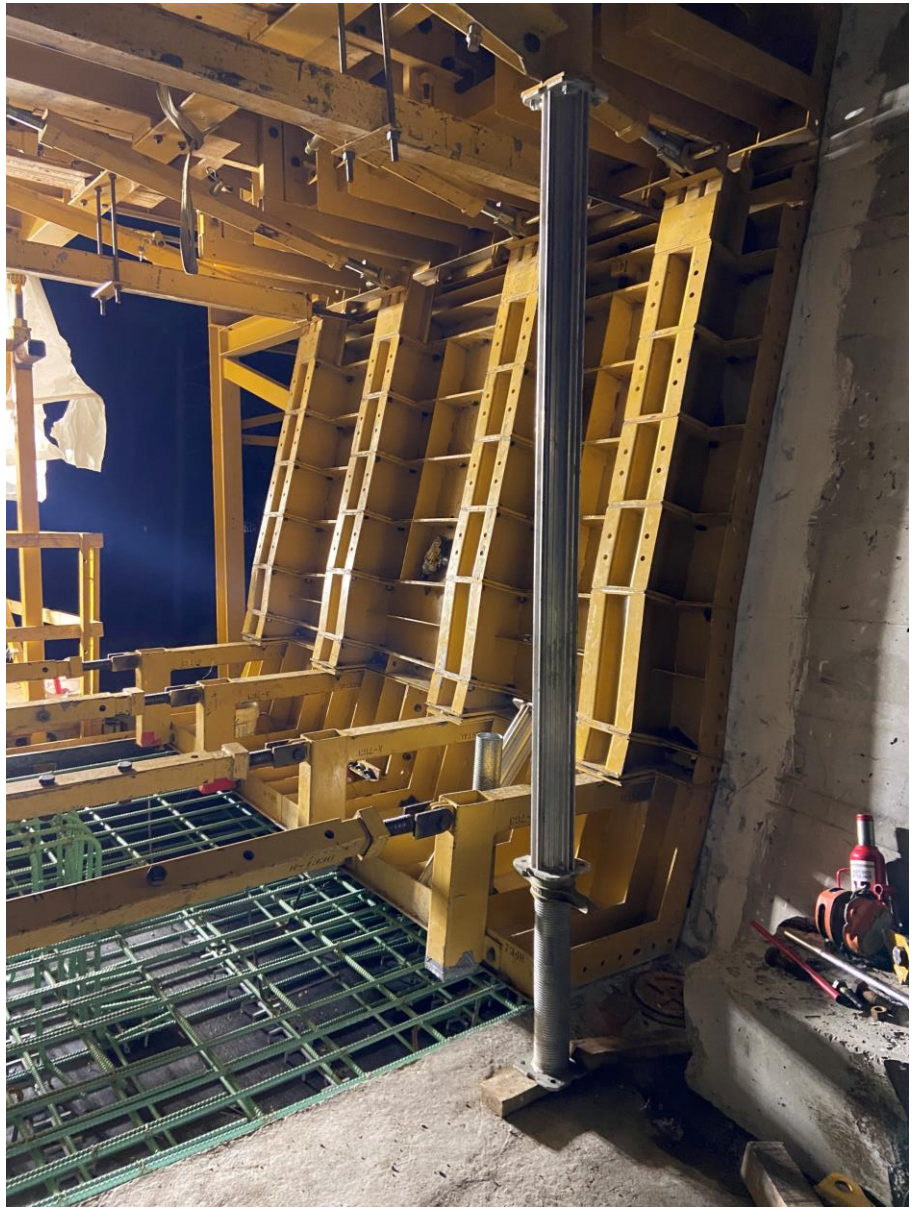
Step 5: Move Matchcast Segment into Position

General Precast Segment Fabrication (Casting Cycle)

Geometry Control of Expansion Segments

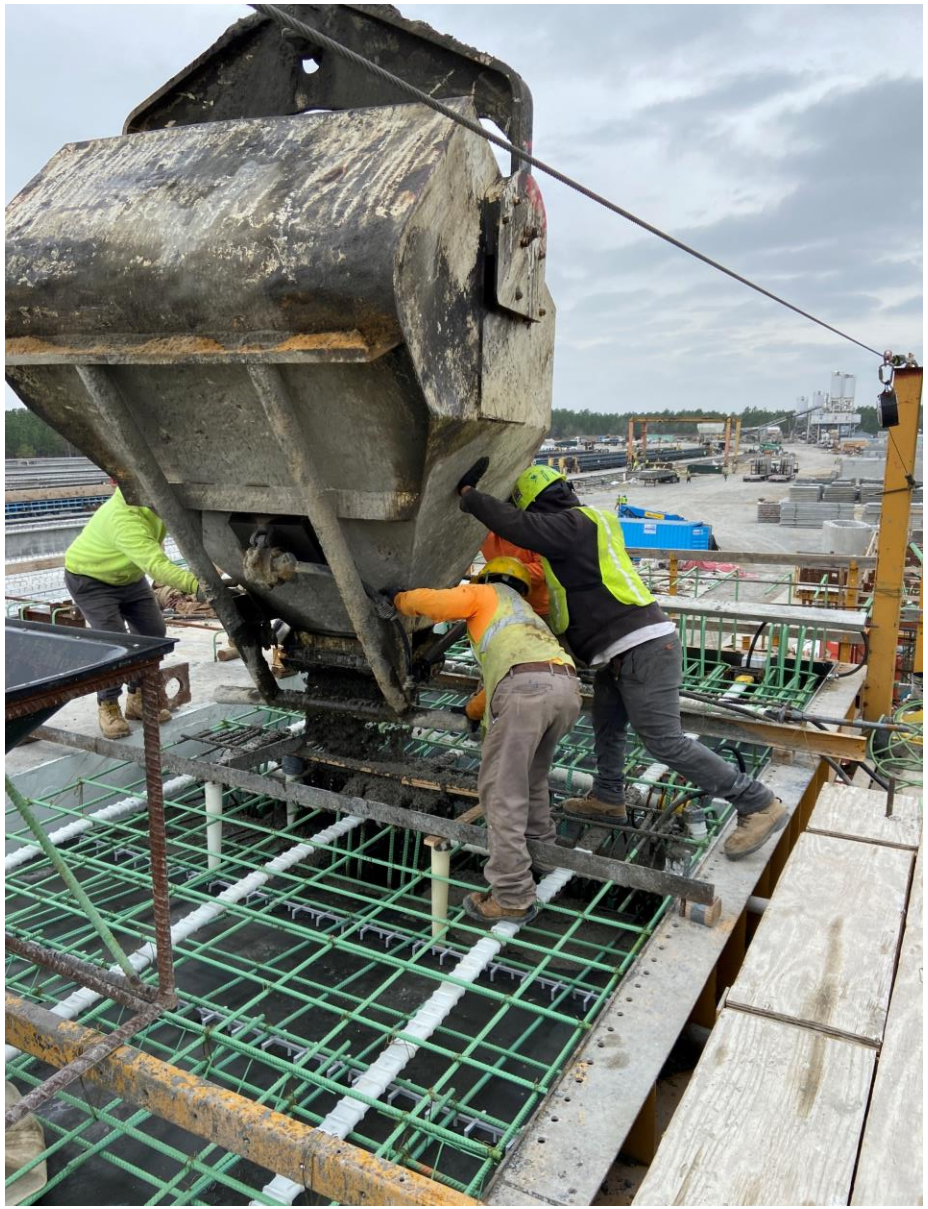
General Precast Segment Fabrication (Casting Cycle)

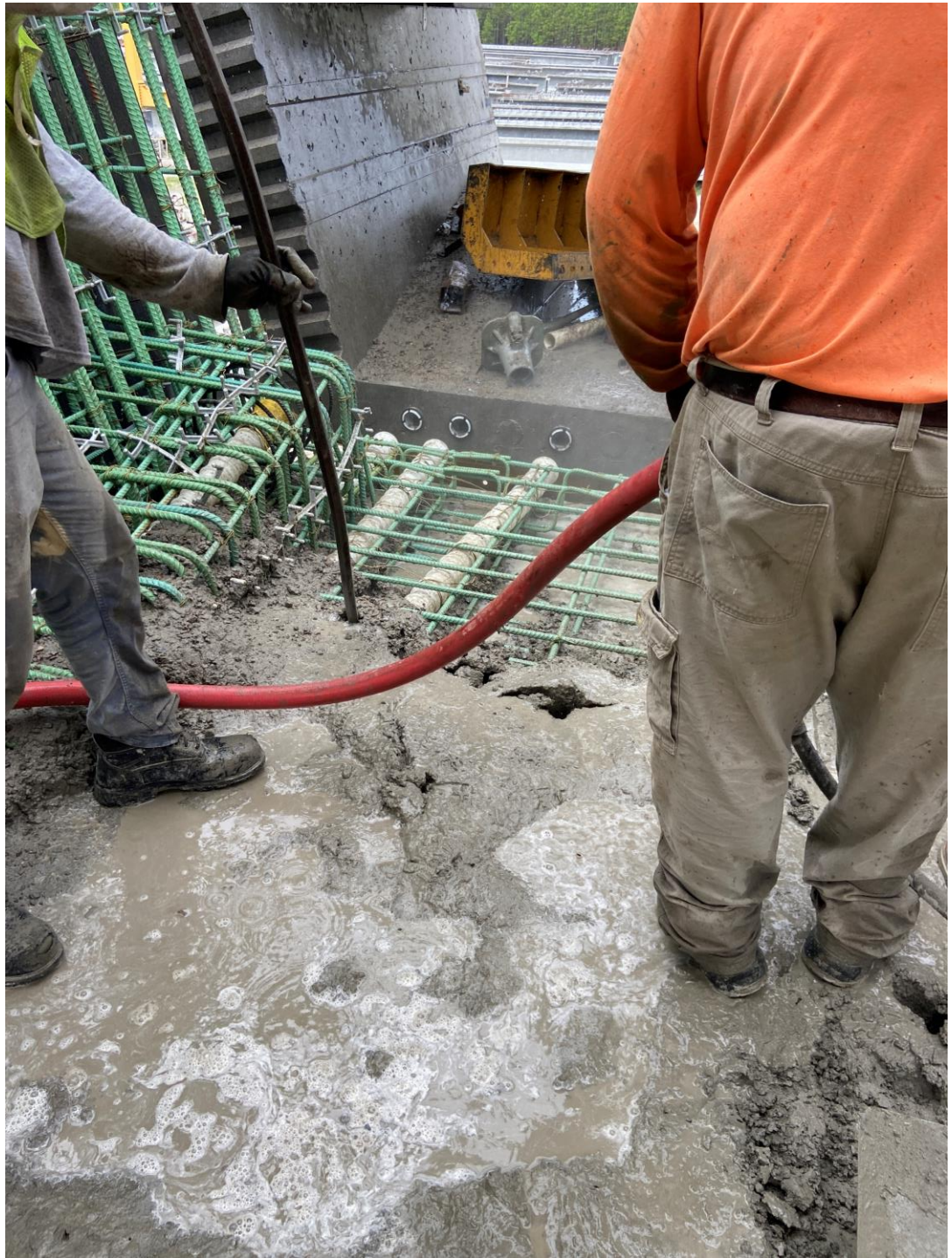
Step 6: Install Core Form



General Precast Segment Fabrication (Casting Cycle)

Step 7: Place Concrete



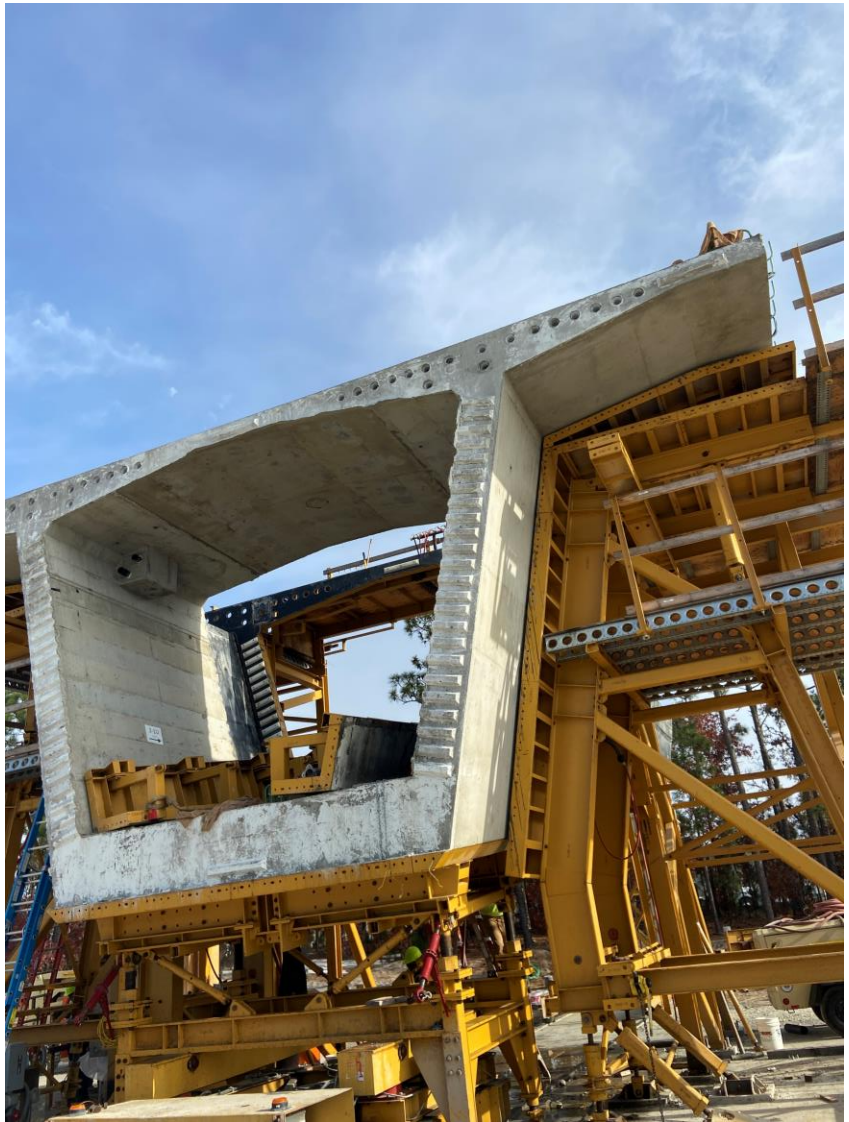


General Precast Segment Fabrication (Casting Cycle)

Step 8: Initial Curing Period

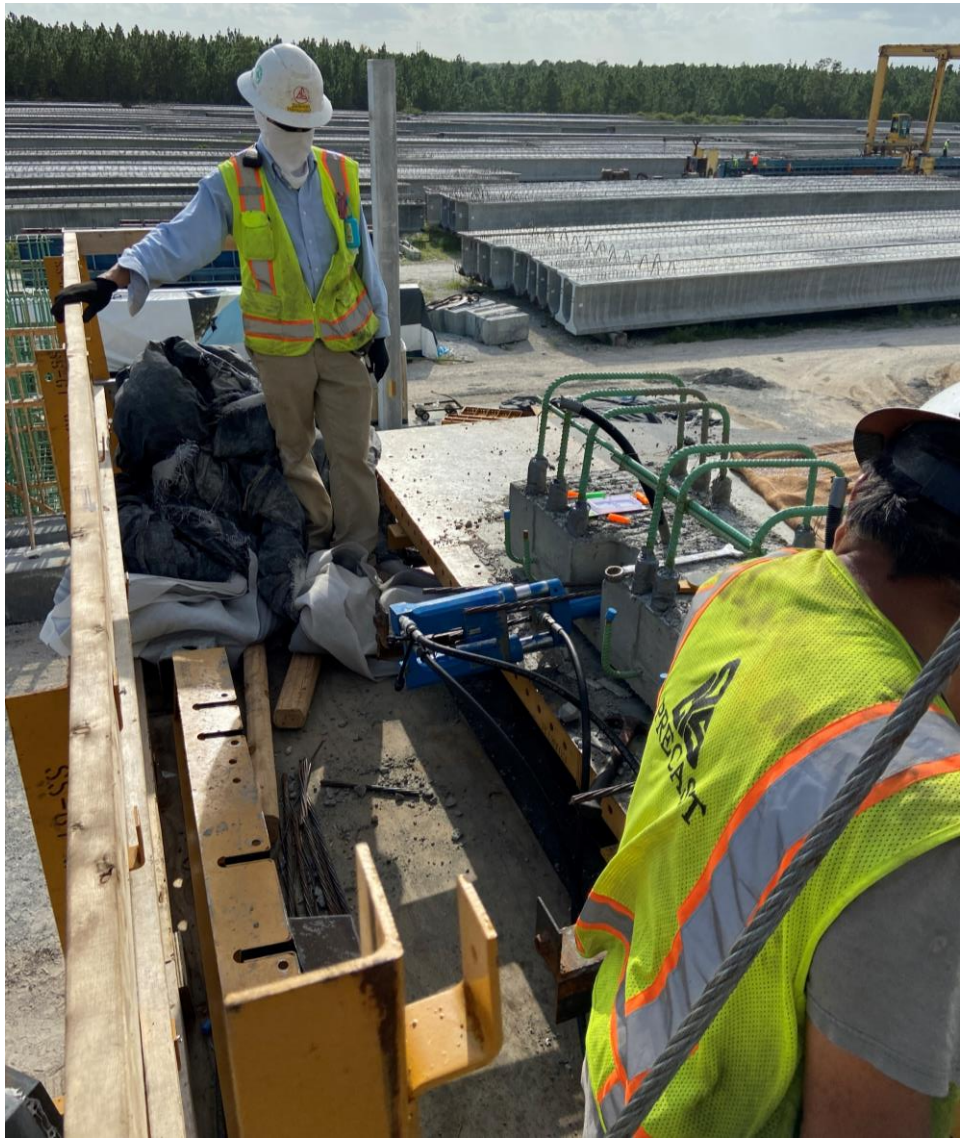
General Precast Segment Fabrication (Casting Cycle)

Step 9: Remove Segments from Form



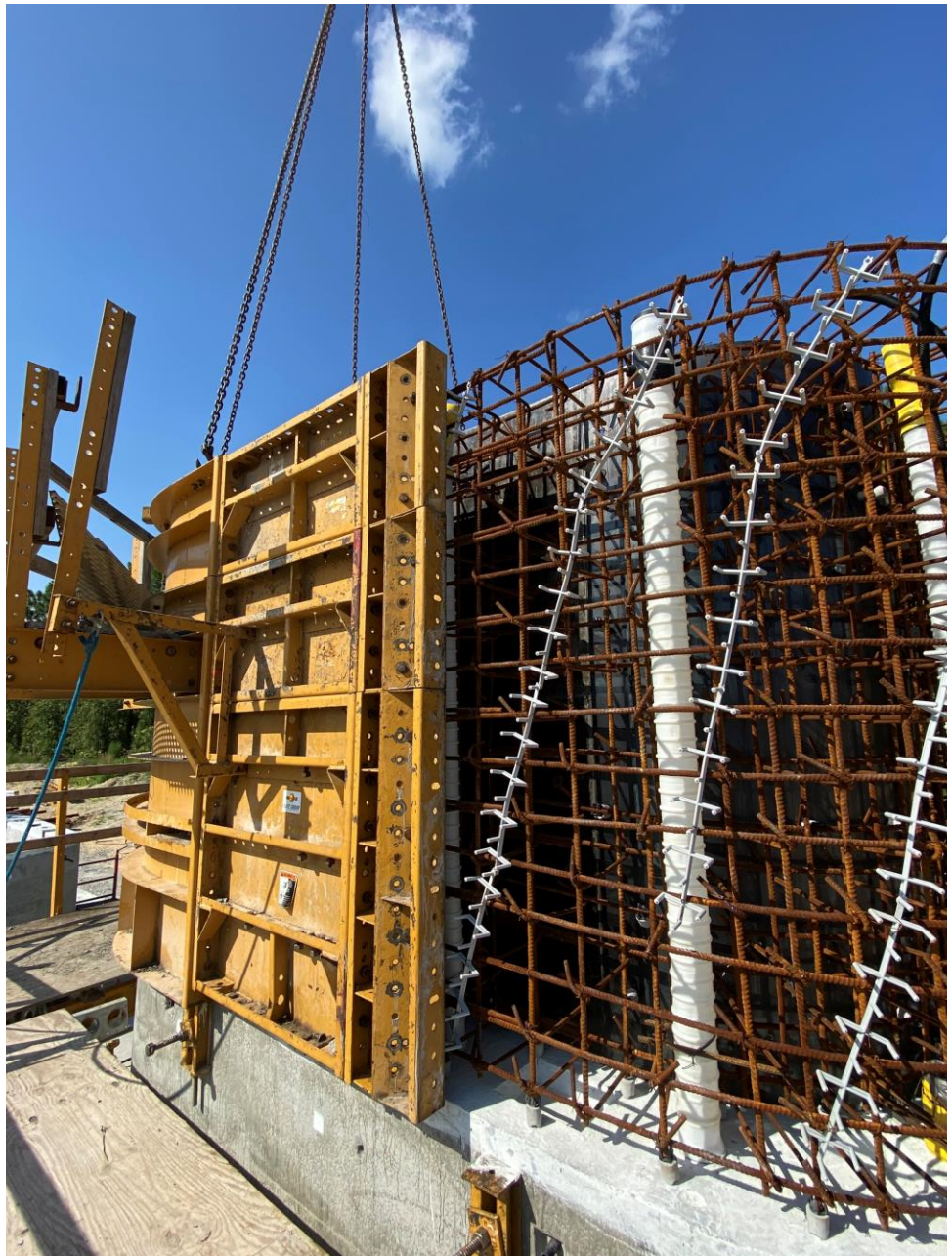
Stressing and Grouting Transverse Tendons

- Performed outside of casting cycle



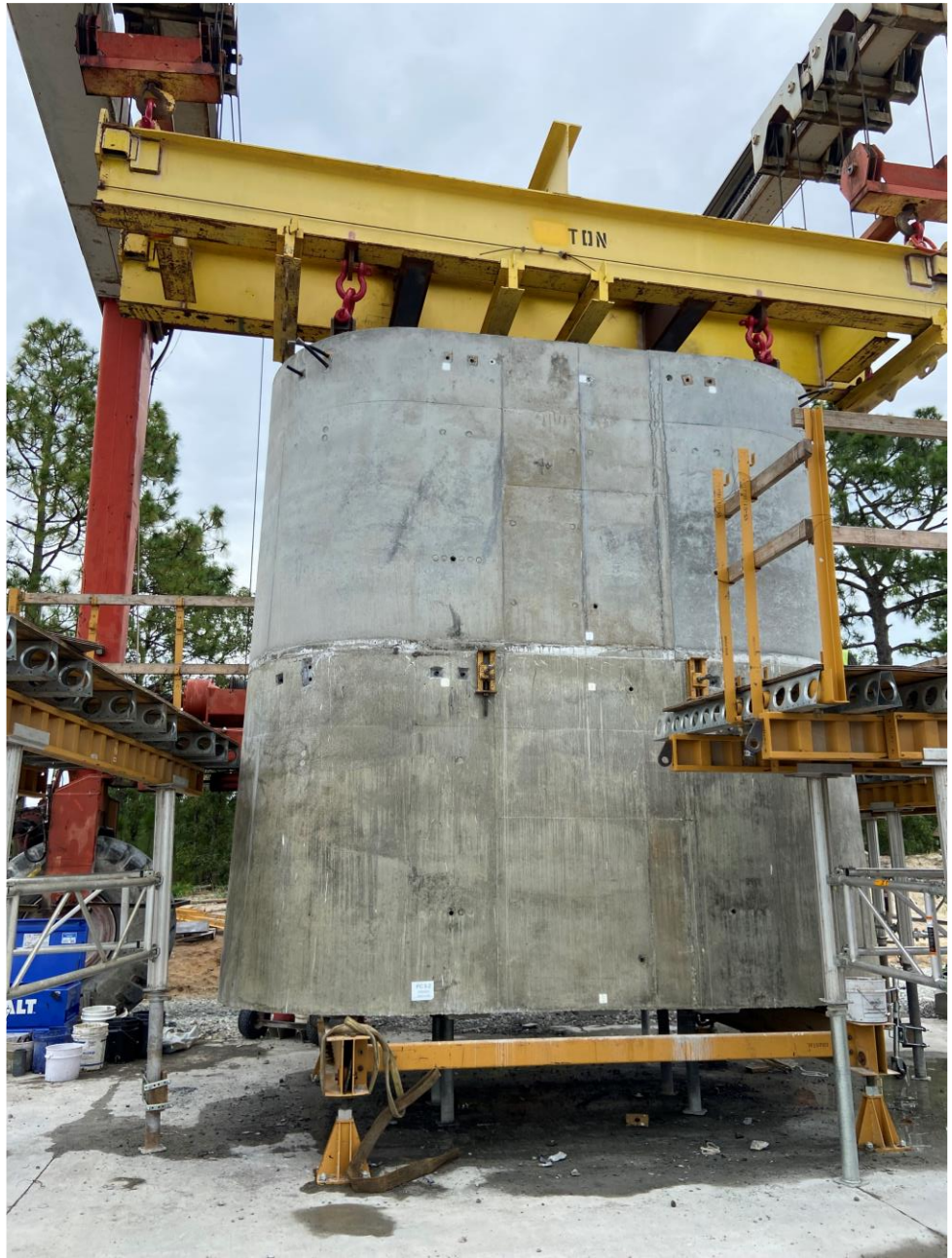
Pier Column Segments

Pier Column Segments

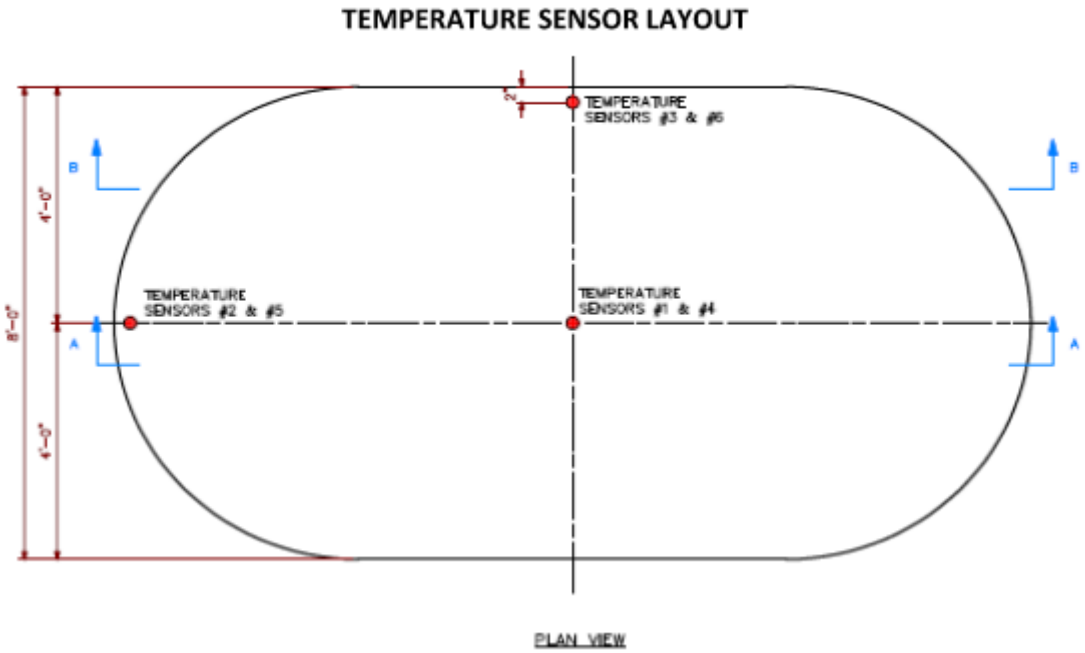


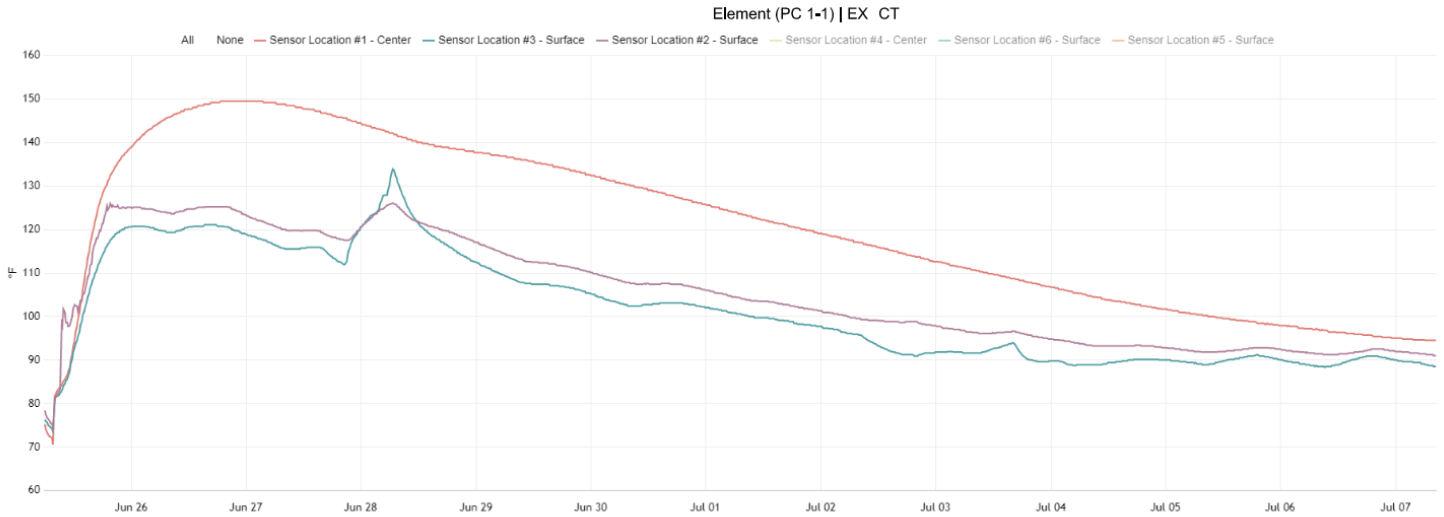
Pier Column Segments

Pier Column Segments



Pier Column Cap Segment





Benefits of Precast

- Optimize total construction schedule
  - Superstructure segments cast during site work and substructure construction
- High level of Quality
  - PCI certified facility
  - High Performance Concrete

Benefits of using an Existing Precast Facility

- Land/Storage Space

Benefits of using an Existing Precast Facility

- Land/Storage Space
- Batch Plant

Benefits of using an Existing Precast Facility

- Land/Storage Space
- Batch Plant
- Existing Equipment

Challenges of using an Existing Precast Facility

- Equipment

Challenges of using an Existing Precast Facility

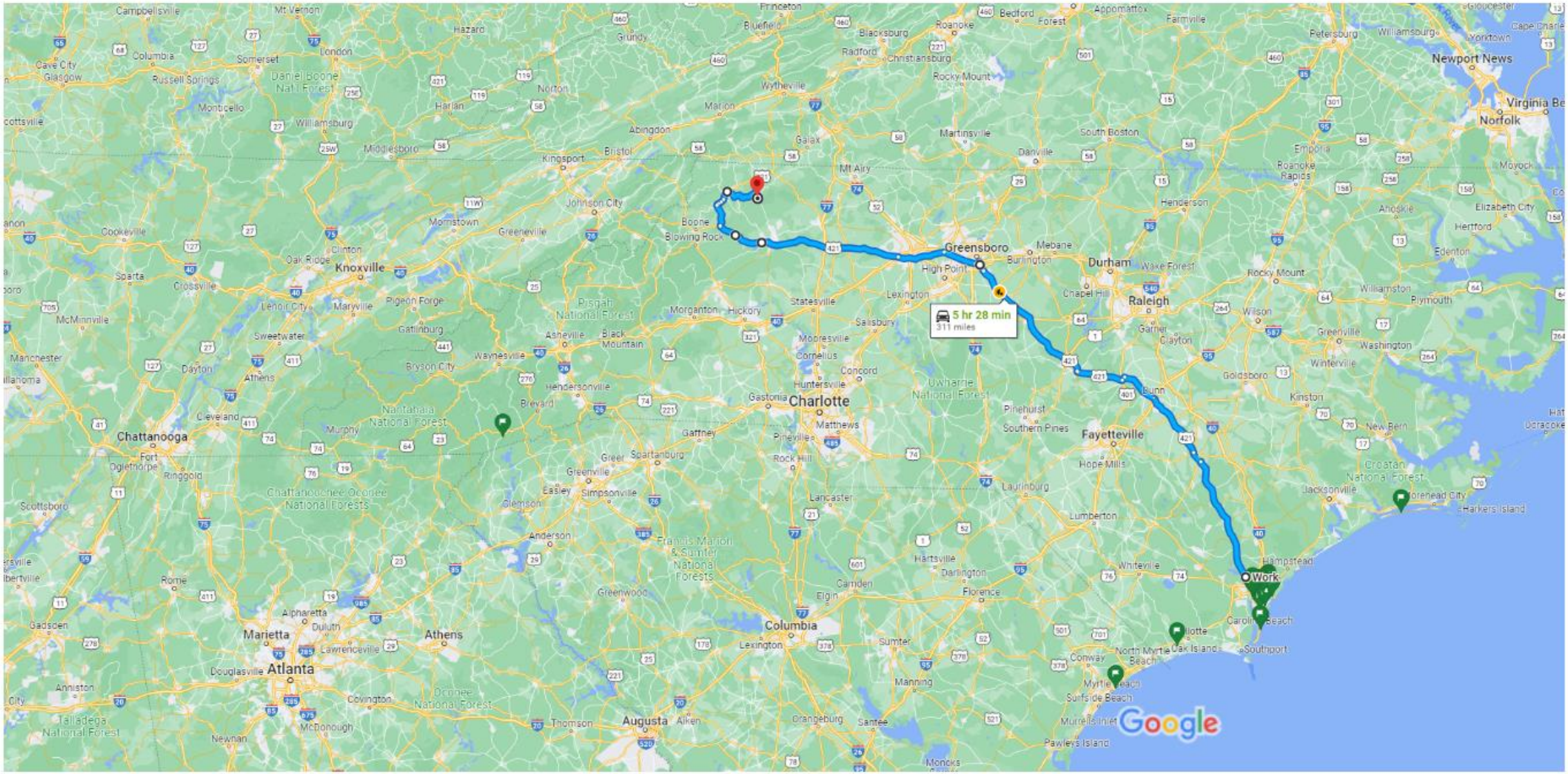
- Equipment
- Segment Delivery

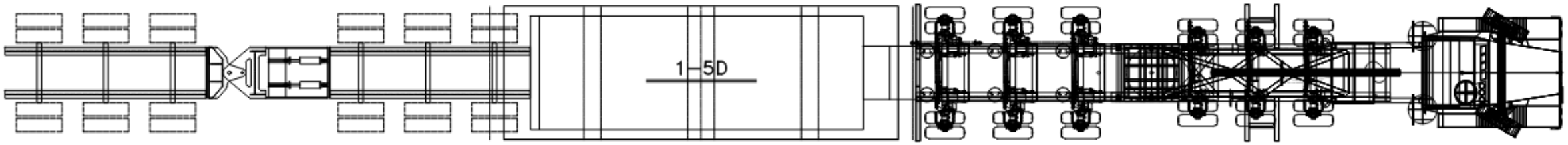
Google Maps

Work (Coastal Precast) to Ashe County, North Carolina 28644

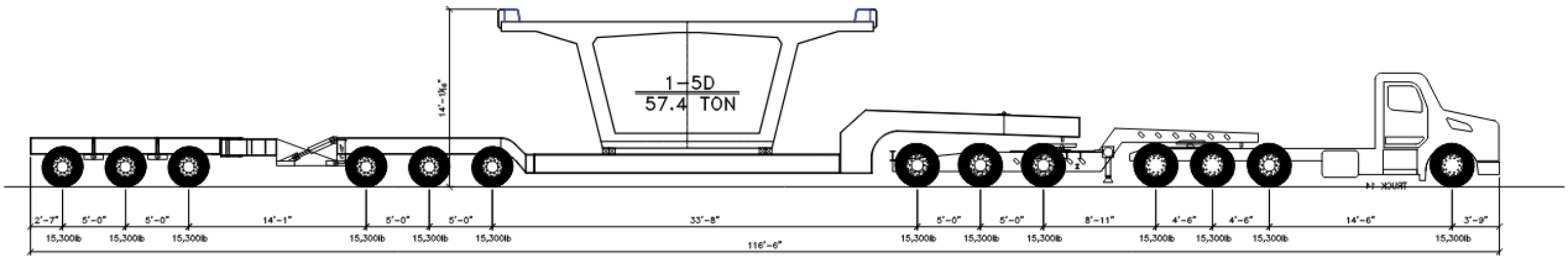
Drive 311 miles, 5 hr 28 min

Laurel Fork Segment Delivery





202302 – LAUREL FORK SEGMENTS
UPRIGHT SEGMENTAL TRUCKING DETAIL
TOTAL WEIGHT = 198,900lbs



- Total length = 116’-6”
- 13 axles
- 8.5% Grade
- Two-lane roads

Delivery Challenges

- Height: 21'-0"
  - 16'-0" concrete
  - 2'-0" projecting rebar
  - 3'-0" trailer

Delivery Challenges

Coupler bars replace projecting rebar

- Height: 19'-'0"
  - 16'-0" concrete
  - 3'-0" trailer

Delivery Challenges

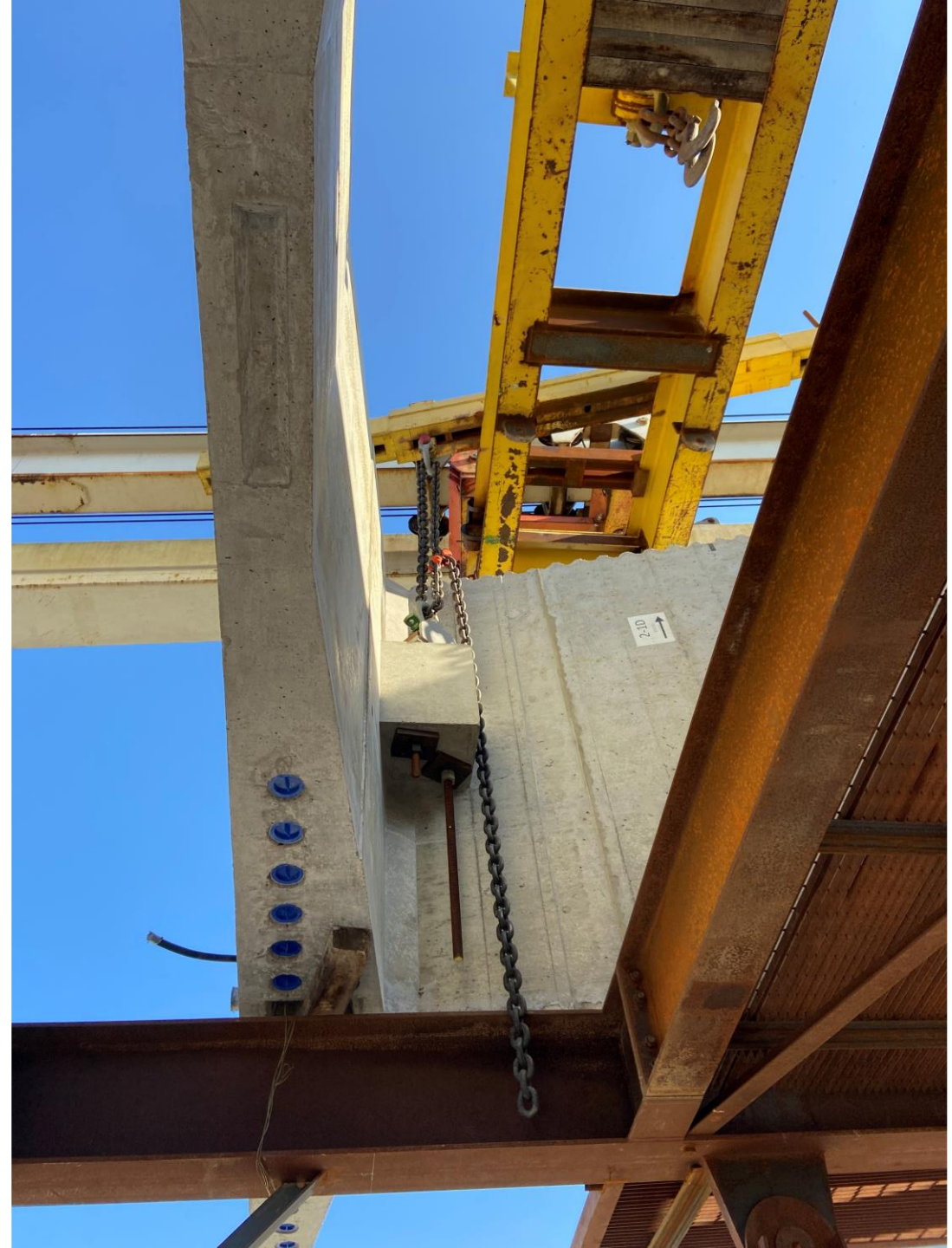
Ship segments on their side

- Height: 13'-'0"
  - 10'-0" concrete
  - 3'-0" trailer

Rotating Segments from Vertical to Horizontal

Rotating Segments from Vertical to Horizontal


SHUTTLELIFT
JLG



Challenges of Small Projects

- Learning Curve

Laurel Fork Pier Segments
- 1st Pier Segment: 11 days
- 2nd Pier Segment: 11 days
- 3rd Pier Segment: 8 days
- 4th Pier Segment: 8 days

I-26 Pier Segments
- 1st Pier Segment: 31 days
- 2nd Pier Segment: 26 days
- 3rd Pier Segment: 7 days
- 4th Pier Segment: 7 days

Challenges of Small Projects

- Learning Curve
- Only 1 form for:
  - Pier Segments

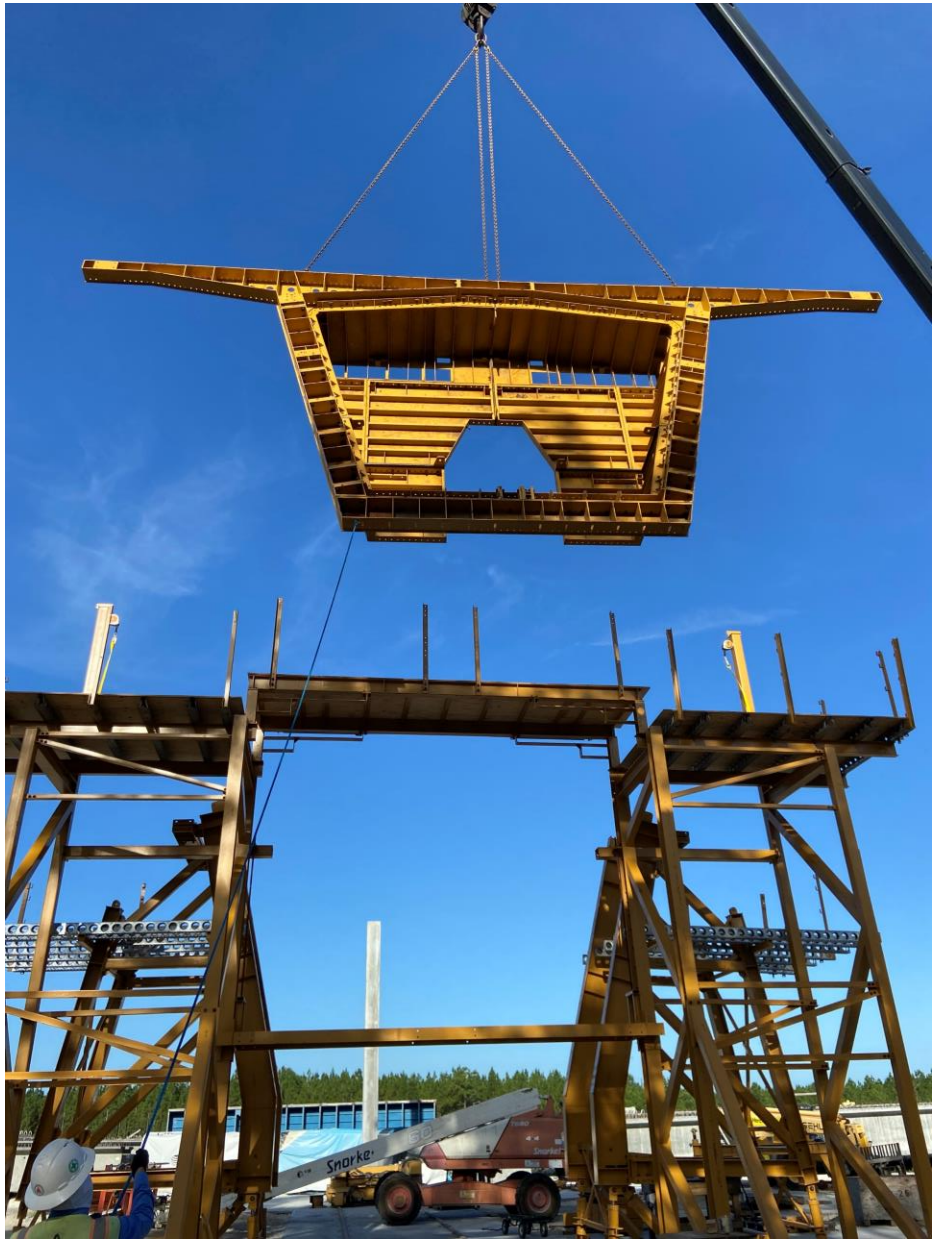
Challenges of Small Projects

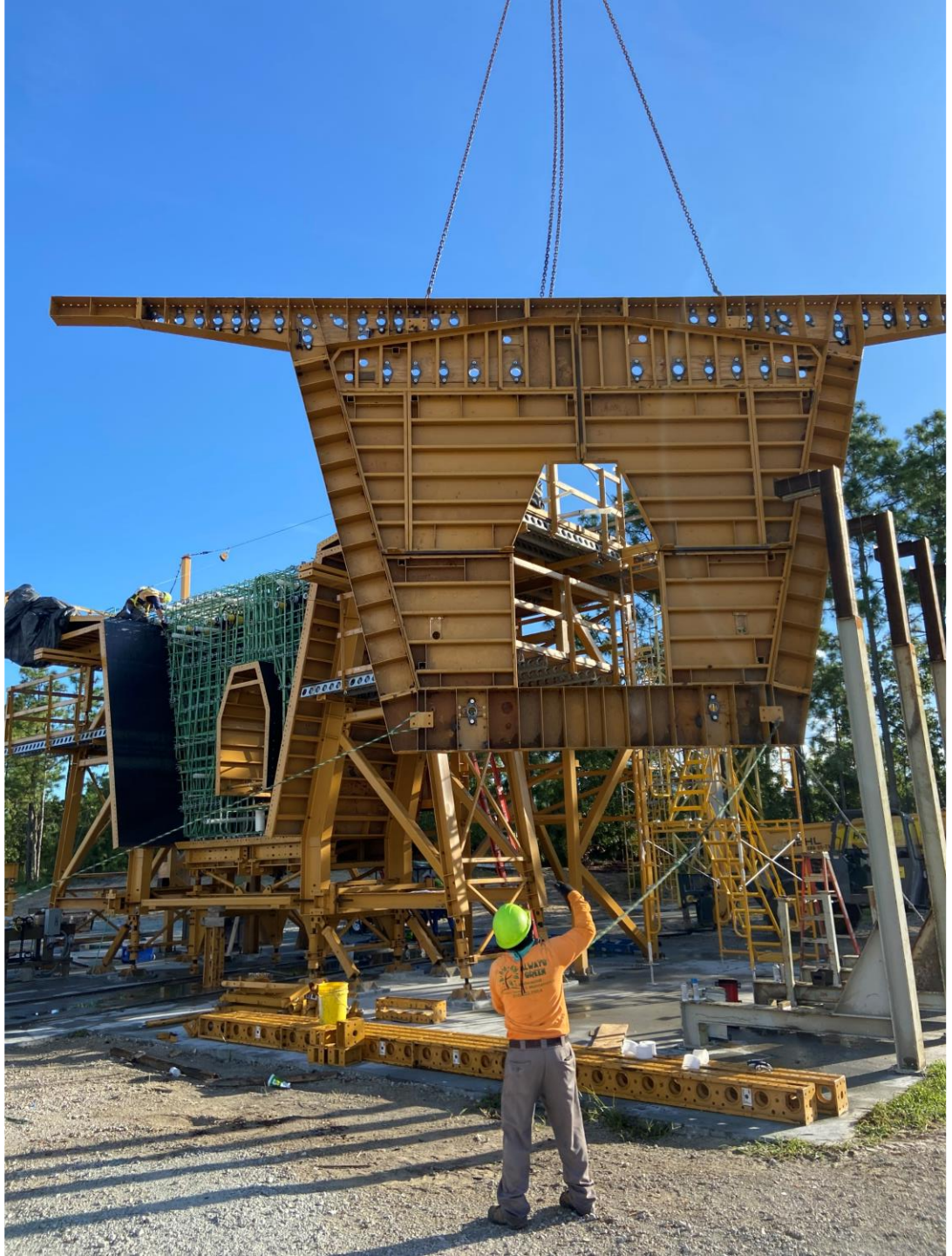
- Learning Curve
- Only 1 form for:
  - Pier Segments
  - Expansion Abutment Segments

Challenges of Small Projects

- Learning Curve
- Only 1 form for:
  - Pier Segments
  - Expansion Abutment Segments
  - Variable Depth Typical Segments

Pier Segment Forms



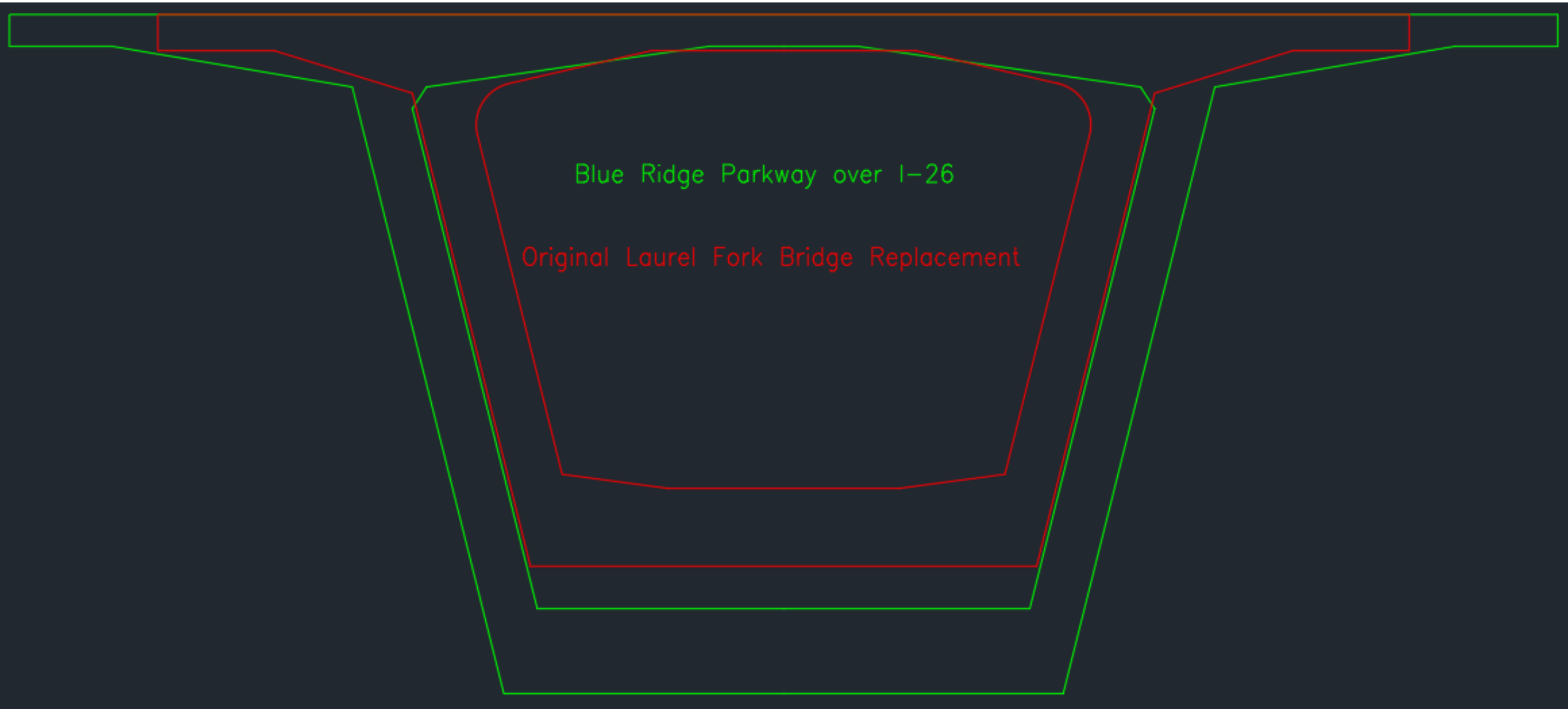


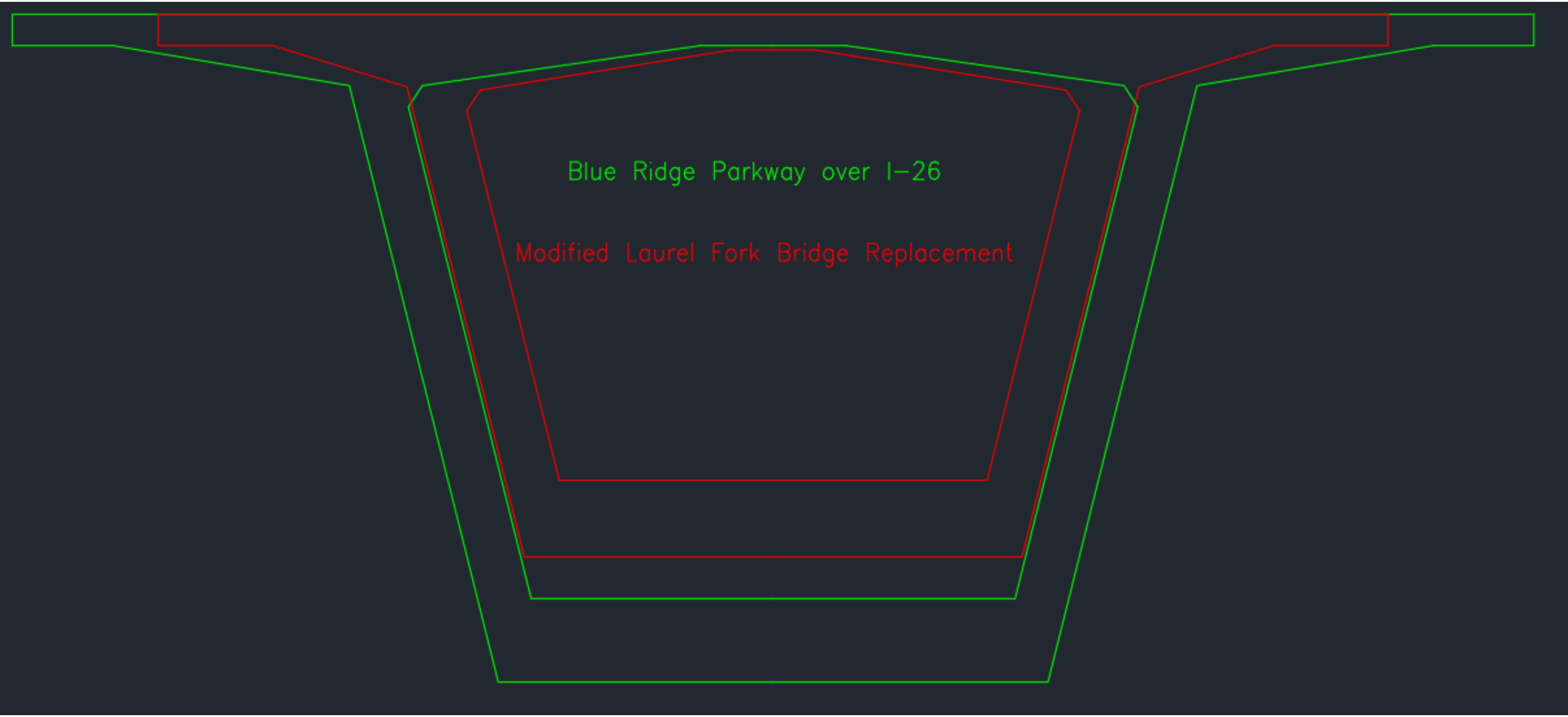
Expansion Abutment Forms

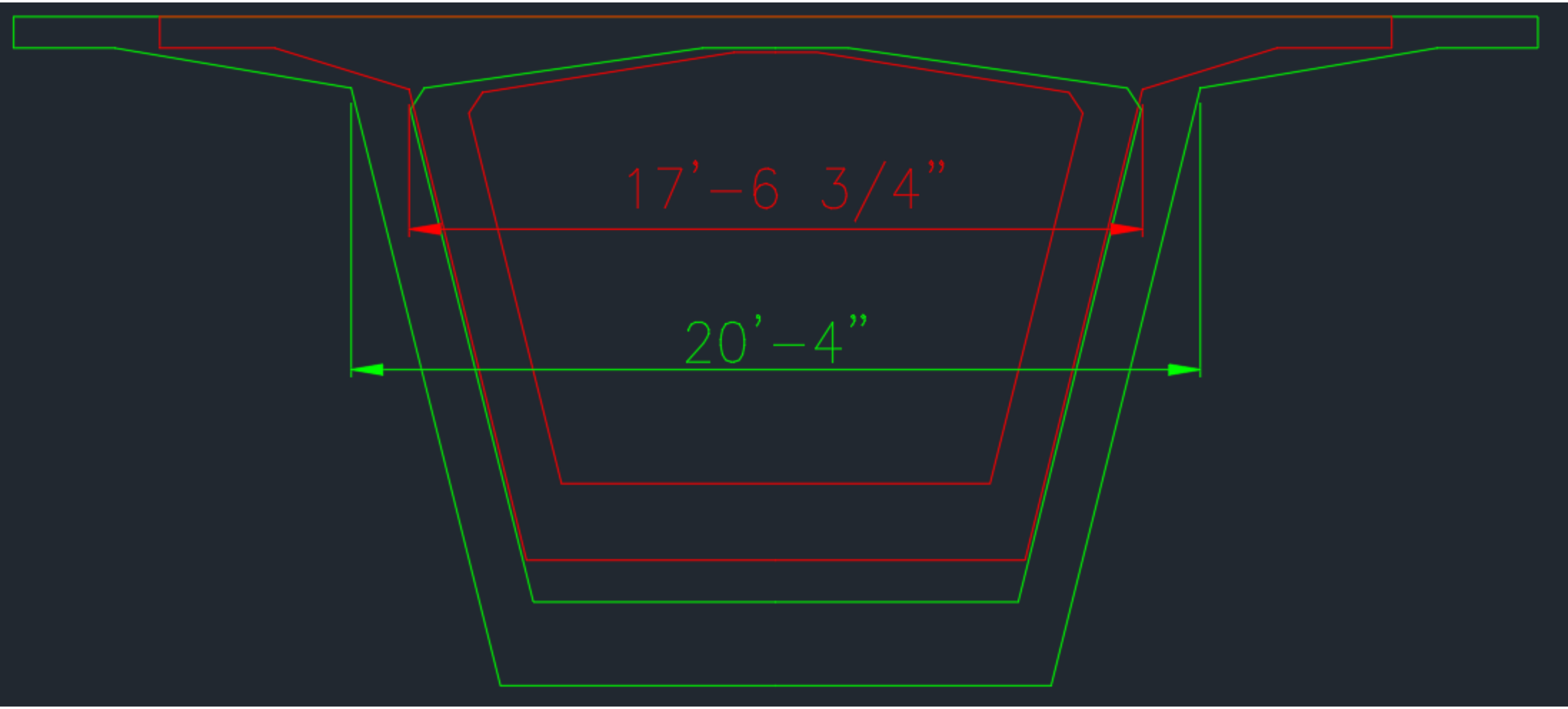
Typical Segment Forms

Form Impact on Schedule

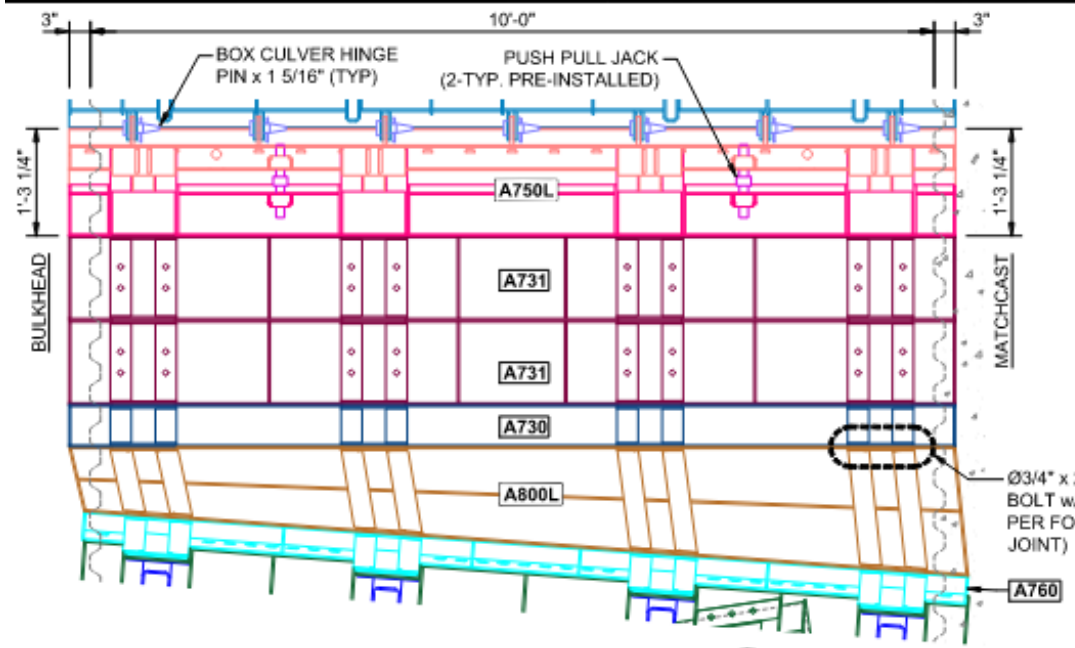
- I-26 Project
  - First Segment Cast: August 2021
  - First Segment Erected: September 2022
  - 85% of segments cast before erection began
- Laurel Fork Project
  - First Segment Cast: June 2023
  - First Segment Erected: June 2024
  - 95% of segments cast before erection began


Blue Ridge Parkway over I-26
Original Laurel Fork Bridge Replacement

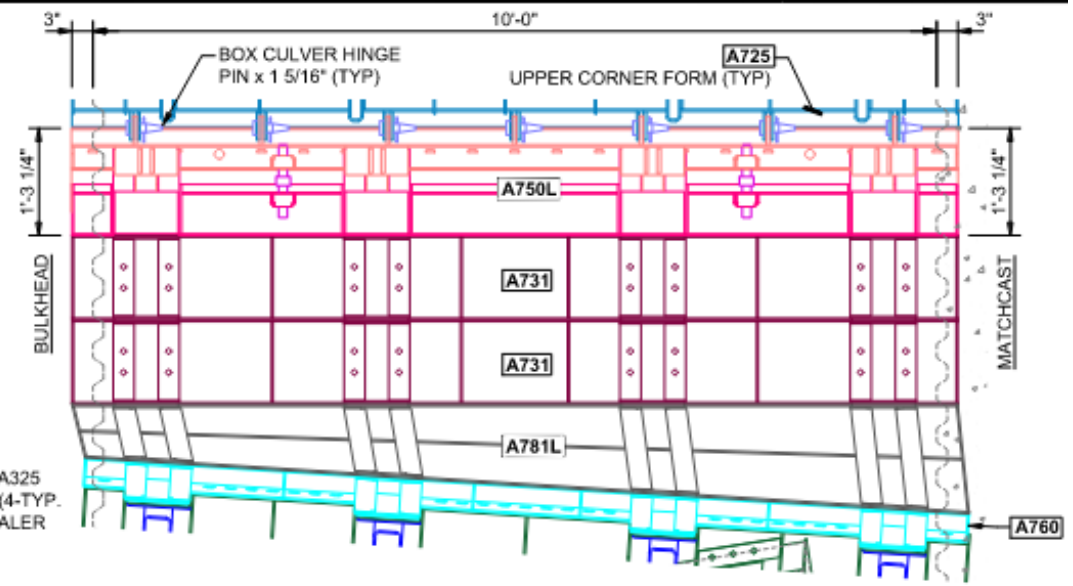

Blue Ridge Parkway over I-26
Modified Laurel Fork Bridge Replacement


17’–6 3/4”
20’–4”


COASTAL
A-47
A-43
COASTAL
A-45

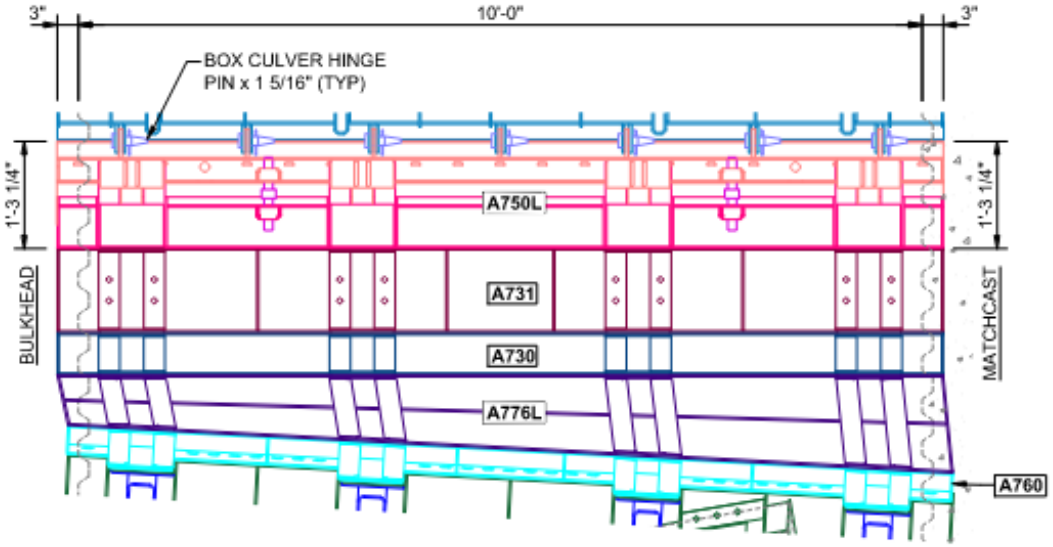


LEFT WEB AT 1-4U, 2-4U, 1-4D, 2-4D D
525|526

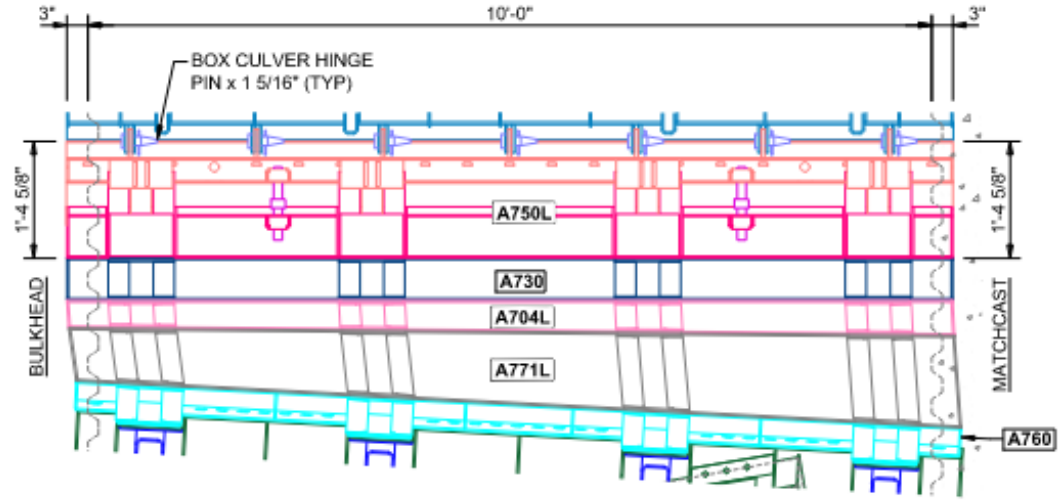


LEFT WEB AT 1-5U, 2-5U, 1-5D, 2-5D E
525|526

NOTE: RIGHT WEB MIRRORS THE LEFT
(REPLACE ANY A###L FORMS WITH
A###R FOR RIGHT WEB)



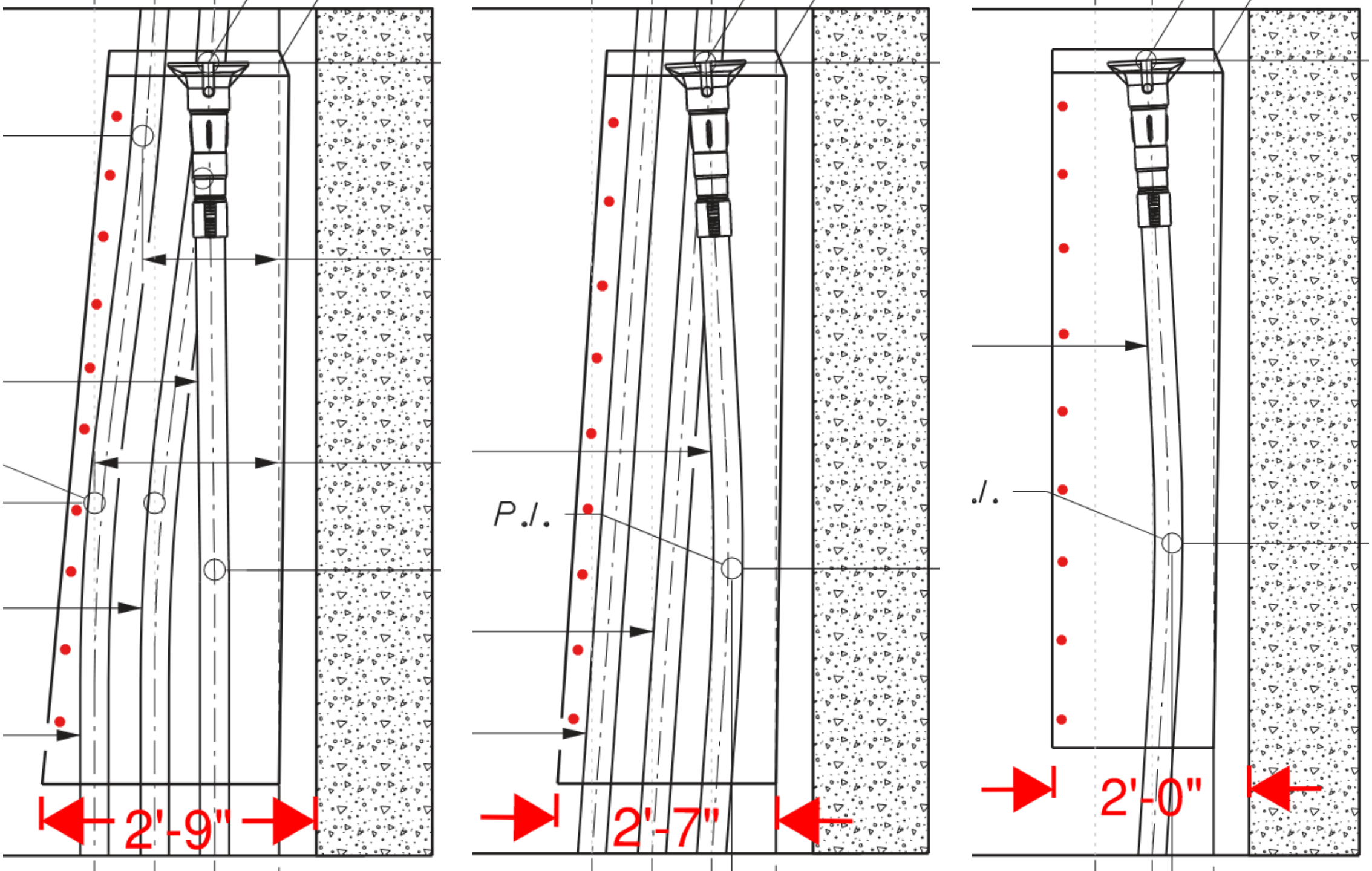
LEFT WEB AT 1-6U, 2-6U, 1-6D, 2-6D F
525|526

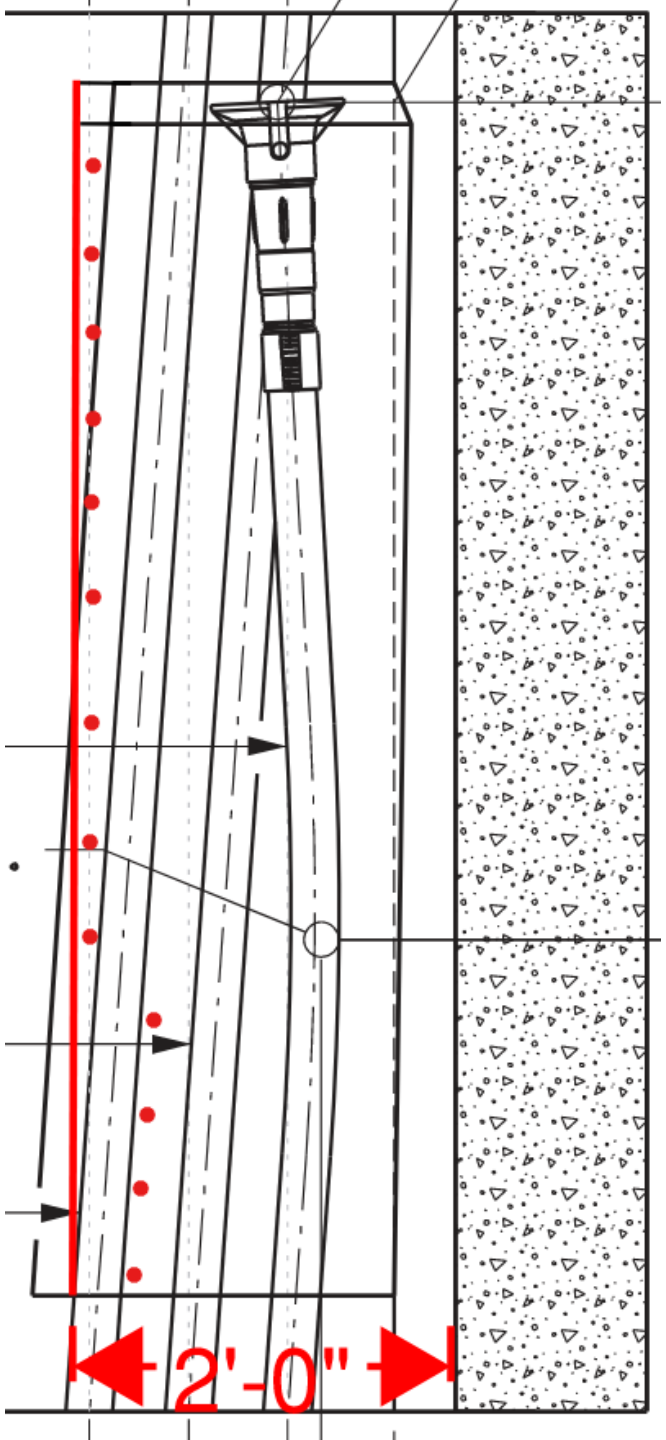


LEFT WEB AT 1-7U, 2-7U, 1-7D, 2-7D G
525|526

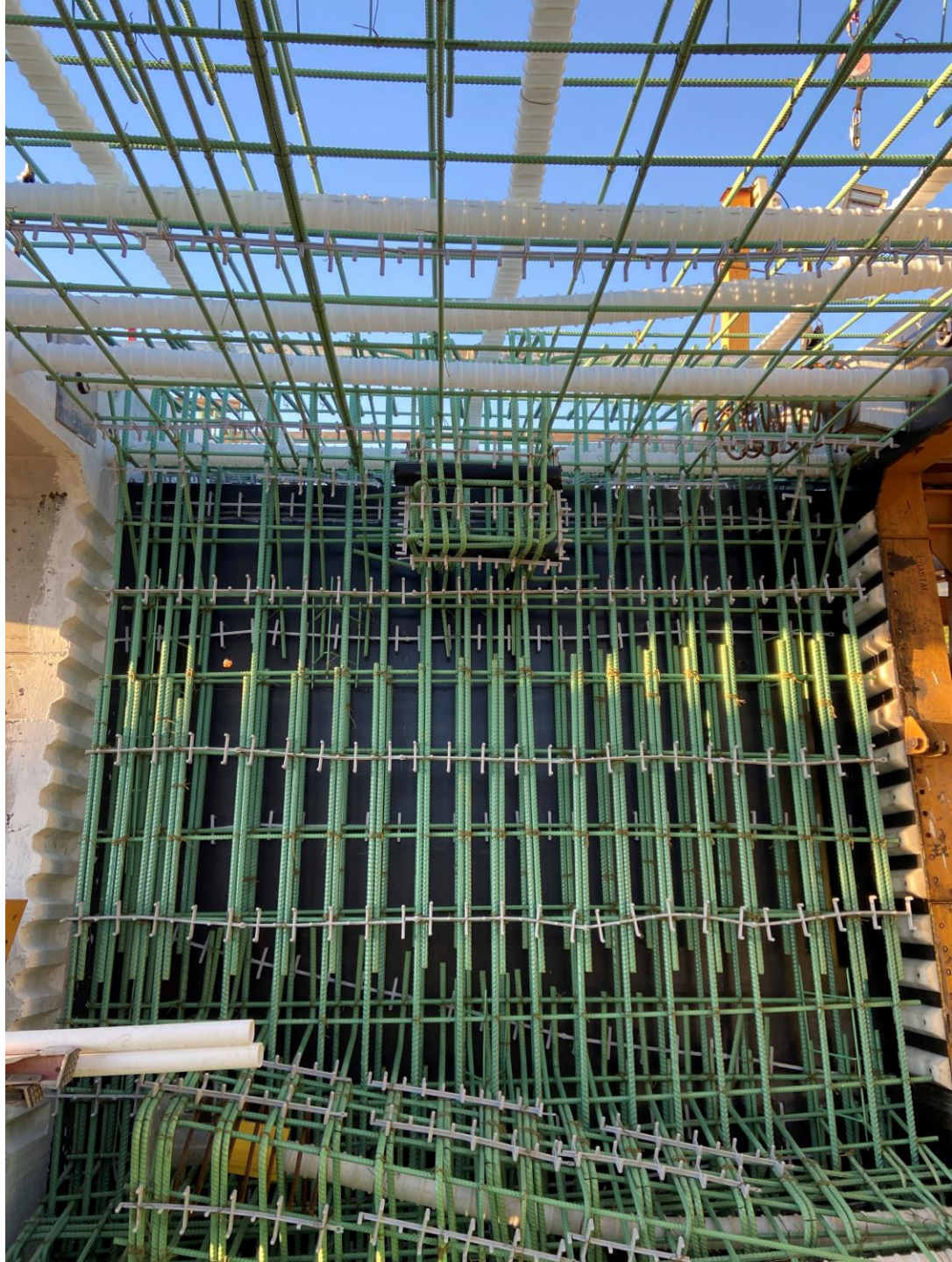
Thoughts on Segment Design and Detailing from a Precaster


LAUREL FORK BRIDGE
DATE CAST:
PIECE MARK:
UPSTATION

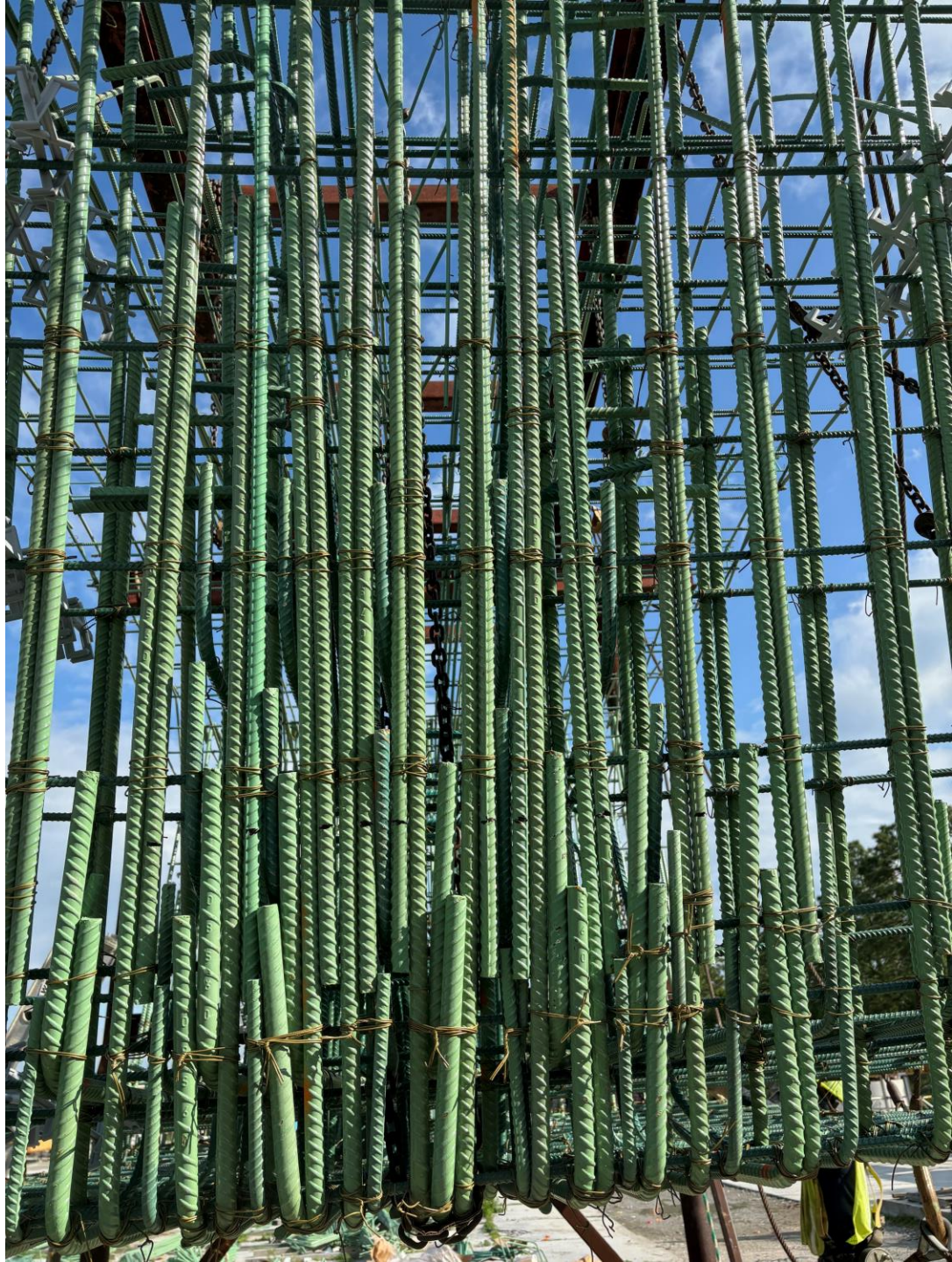

2'-9"
P.I.
2'-7"
.I.
2'-0"


2'-0"

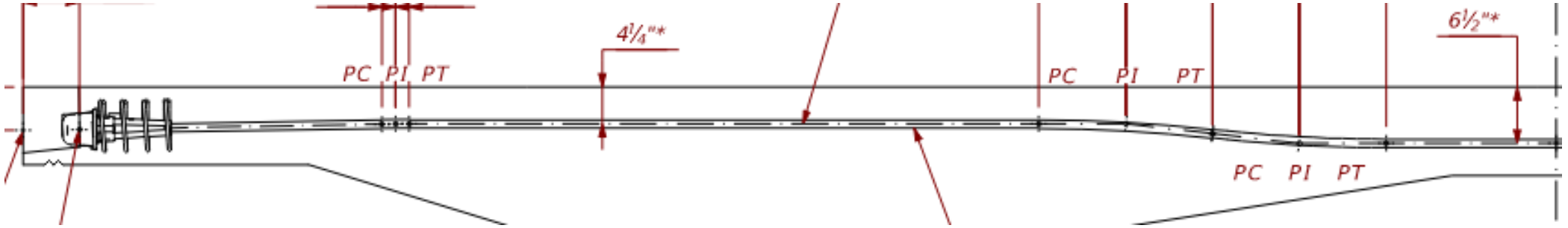
Spliced Webwall Rebar



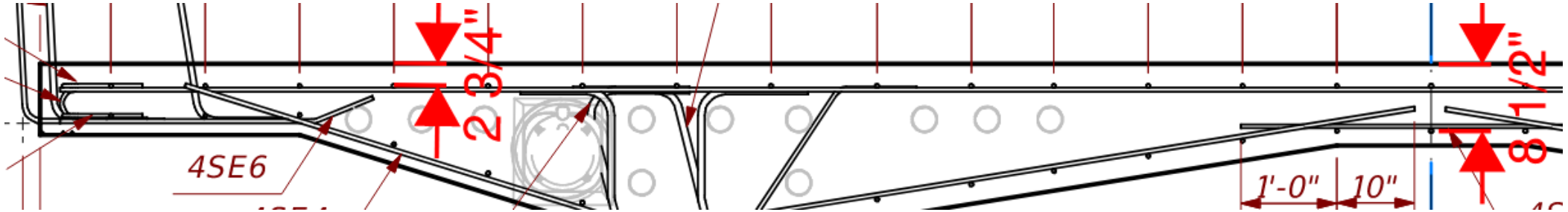
Rebar Congestion



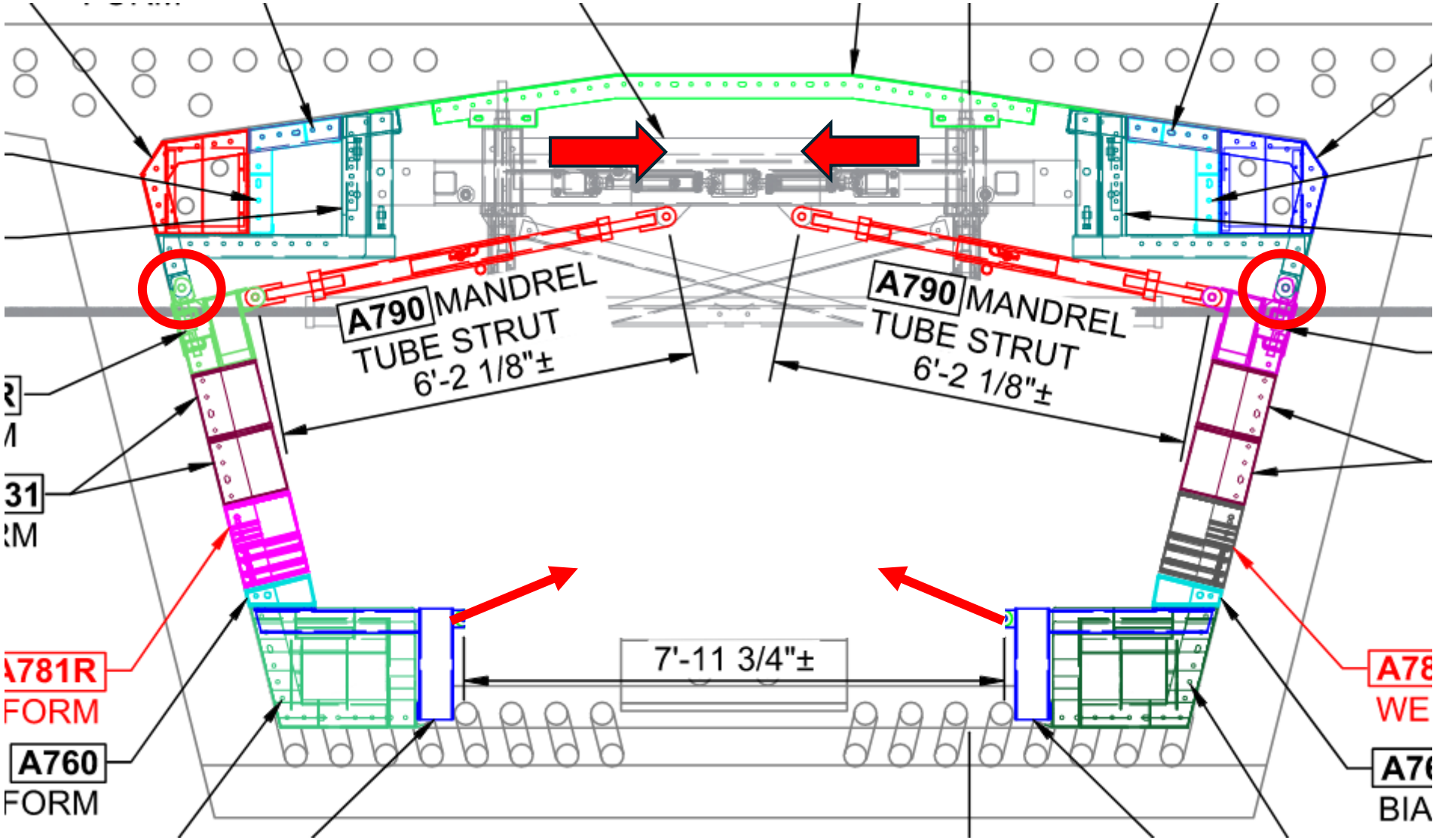
Floating Reinforcement & PT Ducts

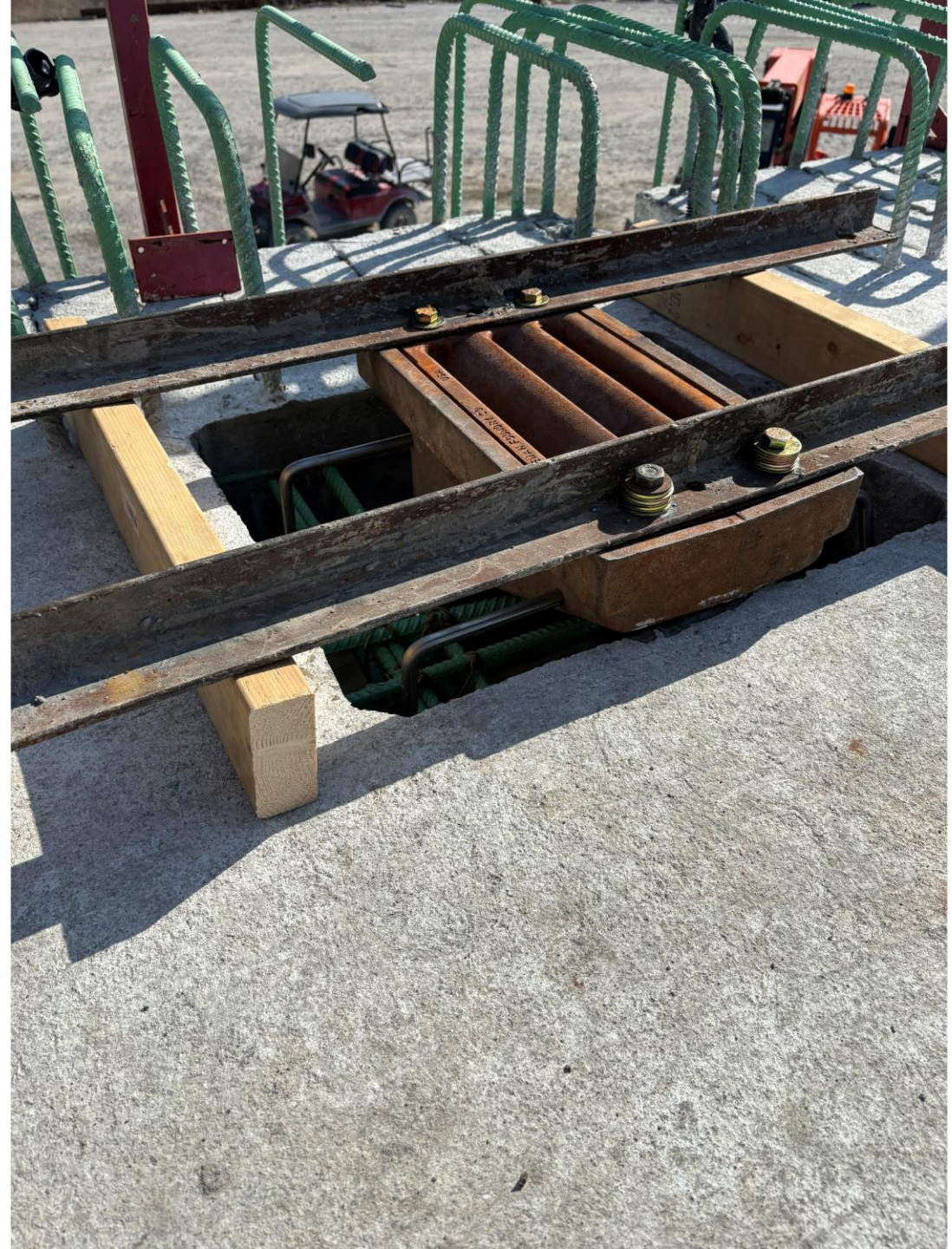


Transverse Post Tensioning



Top Slab Reinforcement


A790 MANDREL
TUBE STRUT
6'-2 1/8"±
A790 MANDREL
TUBE STRUT
6'-2 1/8"±
7'-11 3/4"±
31
781R
FORM
A760
FORM




TOP
OUTER
FACE

Communication

- Forms for I-26 were ordered based on contract drawings

Thank you for your time!

QUESTIONS?

This concludes the educational content of this activity

Jacob Rausch, PE

jrausch@cpsprecast.com

610-451-0709