

**Chesapeake**  
VIRGINIA



# **Dominion Boulevard Improvements Project Approach & Challenges**

*April 9, 2018*





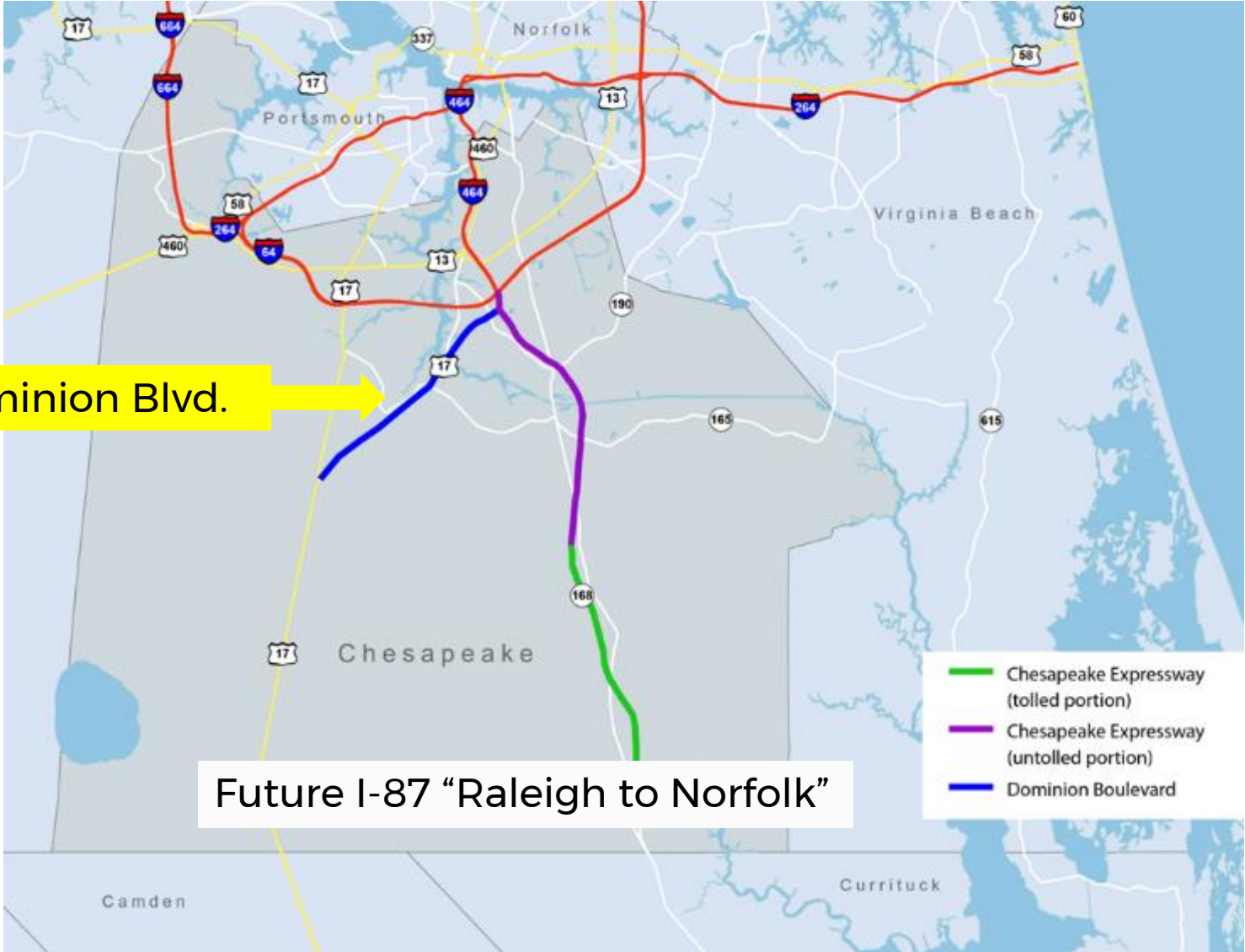
# Dominion Boulevard Improvements

- Conversion of four miles of two lane rural roadway to four lane divided freeway
- Replacement of the “Steel Bridge” with a fixed span
- Three urban interchanges & tie-in to Oak Grove Interchange
- Improvement/realignment of crossing roadways
- Environmental mitigation site
- Open Road Toll Collection system
- \$350M total project cost
- Largest ever Locally Administered VDOT project
- Publicly financed - VTIB loan, bonds, state & federal funds

# Dominion Boulevard Improvements Project Overview

Rte. 17/Dominion Blvd.

Future I-87 "Raleigh to Norfolk"



# Dominion Boulevard Improvements Project Overview



**Both Main Span Bridges over Elizabeth River**



**Elizabeth River Crossing**



**State of the Art Open Road Tolling System**



**Cedar Road Interchange**



**Dominion Lakes Interchange**



**Great Bridge Blvd Interchange**

# Dominion Boulevard Improvements Project Approach and Challenges

- Roadway
- Traffic
- Environmental/Permitting
- Geotechnical
- Structural
- Construction Management

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# Dominion Boulevard Improvements Roadway Challenges

- Narrow corridor
- R/W impacts
  - *Shifted alignment*
  - *Landfill impacts*
  - *Stormwater Management*
- Multiple alternatives
- Tight Interchanges
- Tolling System



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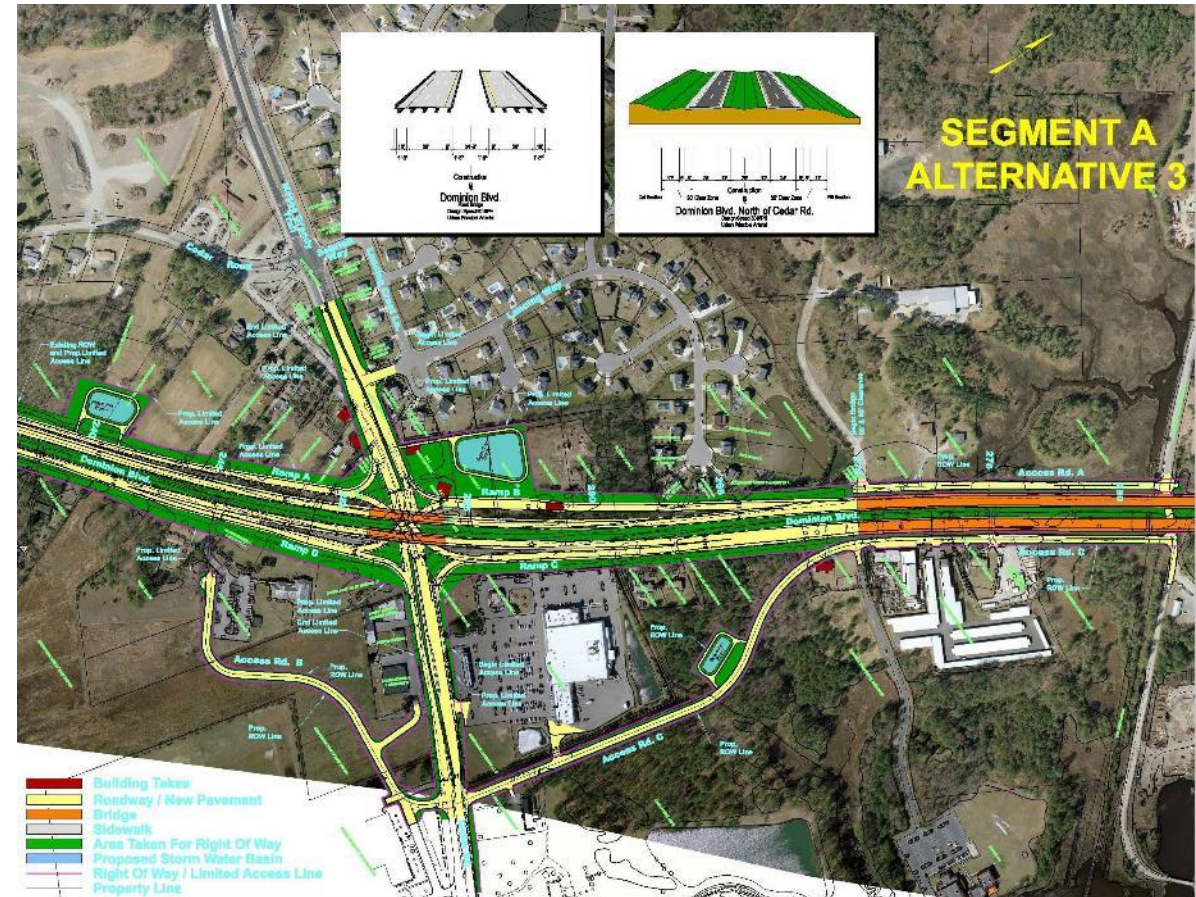
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# Dominion Boulevard Improvements Traffic Challenges

- Traffic Analysis

- *Travel demand modeling (three LRP's)*

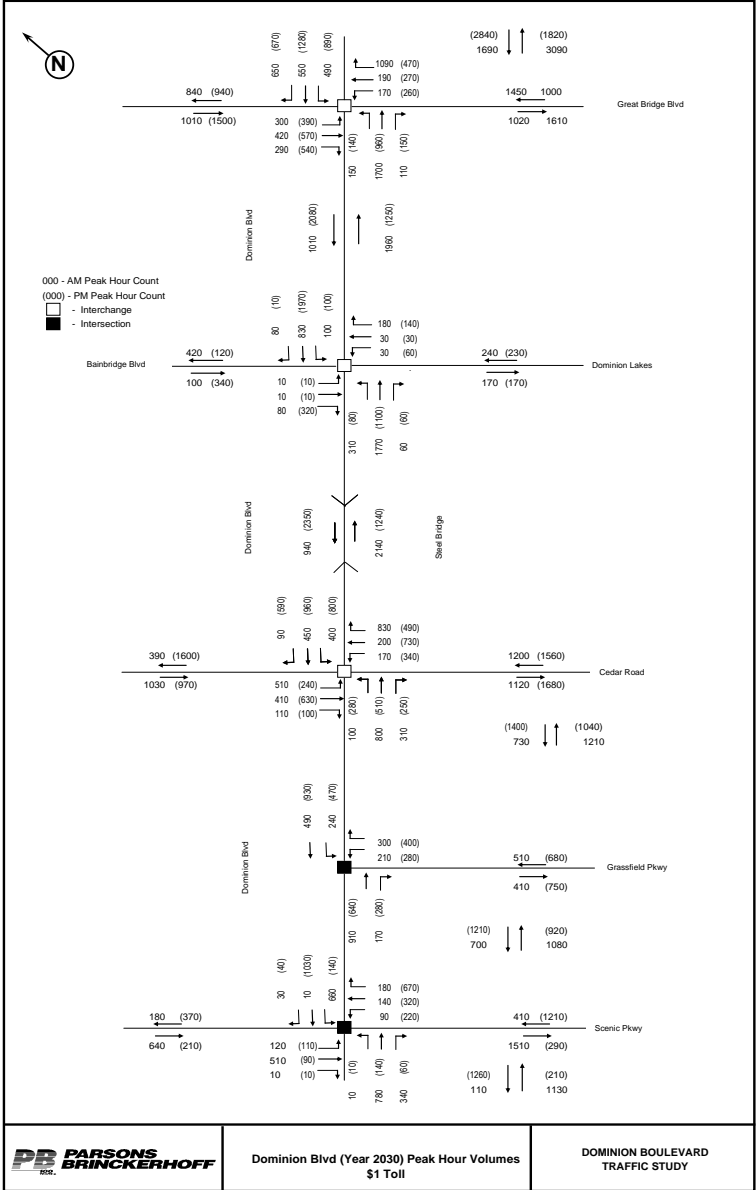
- *Toll elasticity analysis*

- *Operations analyses*

- Extensive MOT

- *Multiple phases*

- *Bainbridge Detour*



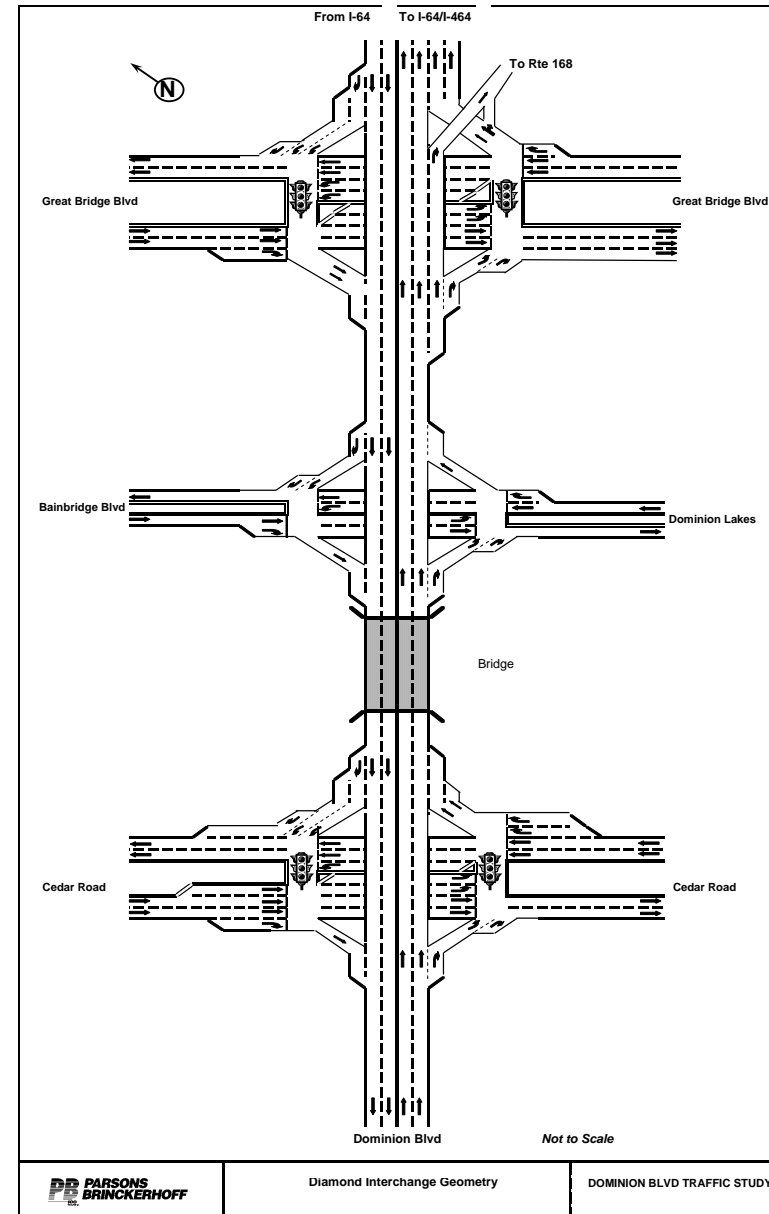
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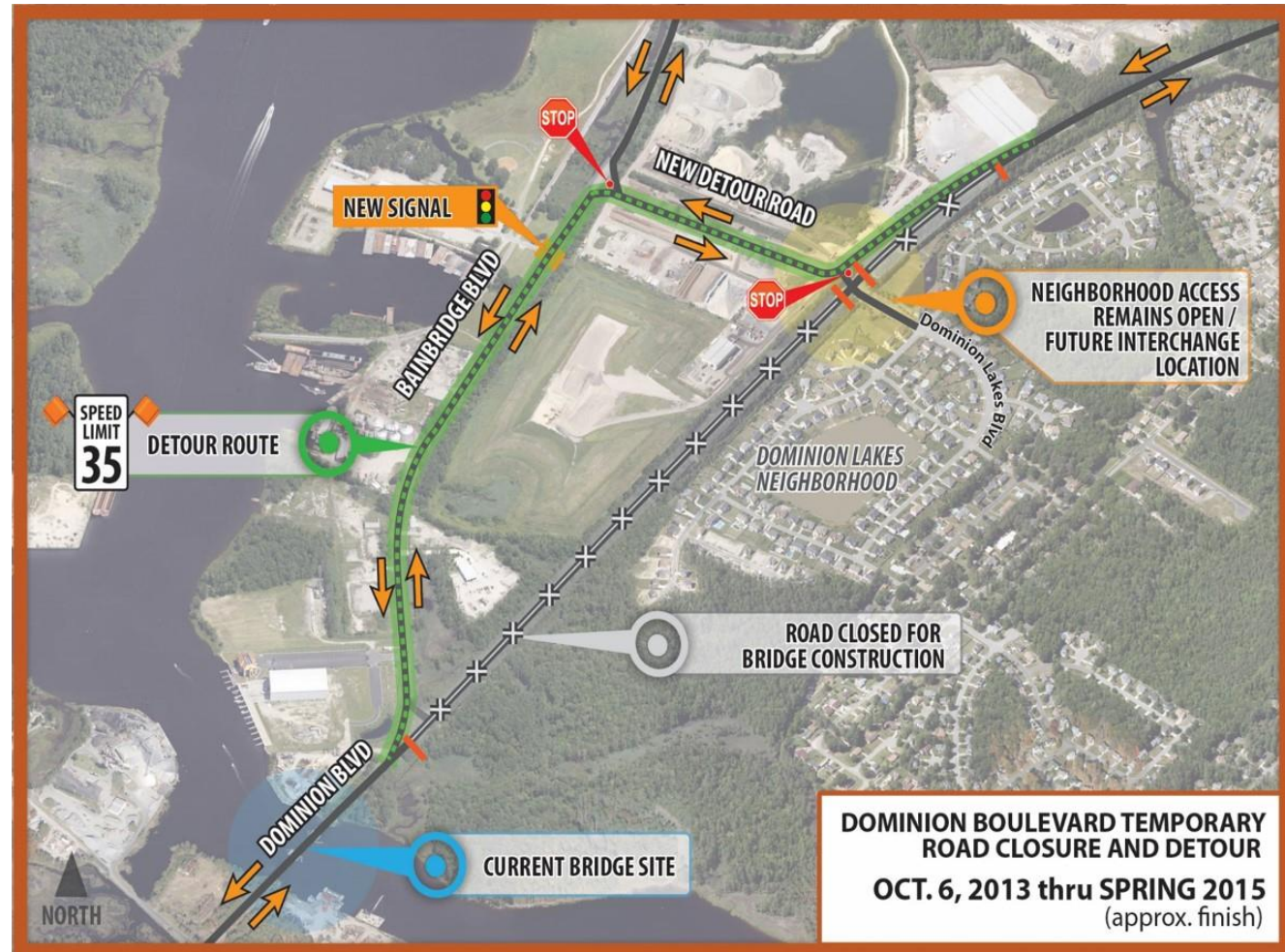
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# Dominion Boulevard Improvements Environmental/Permitting Challenges

- Environmental Assessment
- Wetland impacts
- Wetland mitigation
- Coast Guard permit



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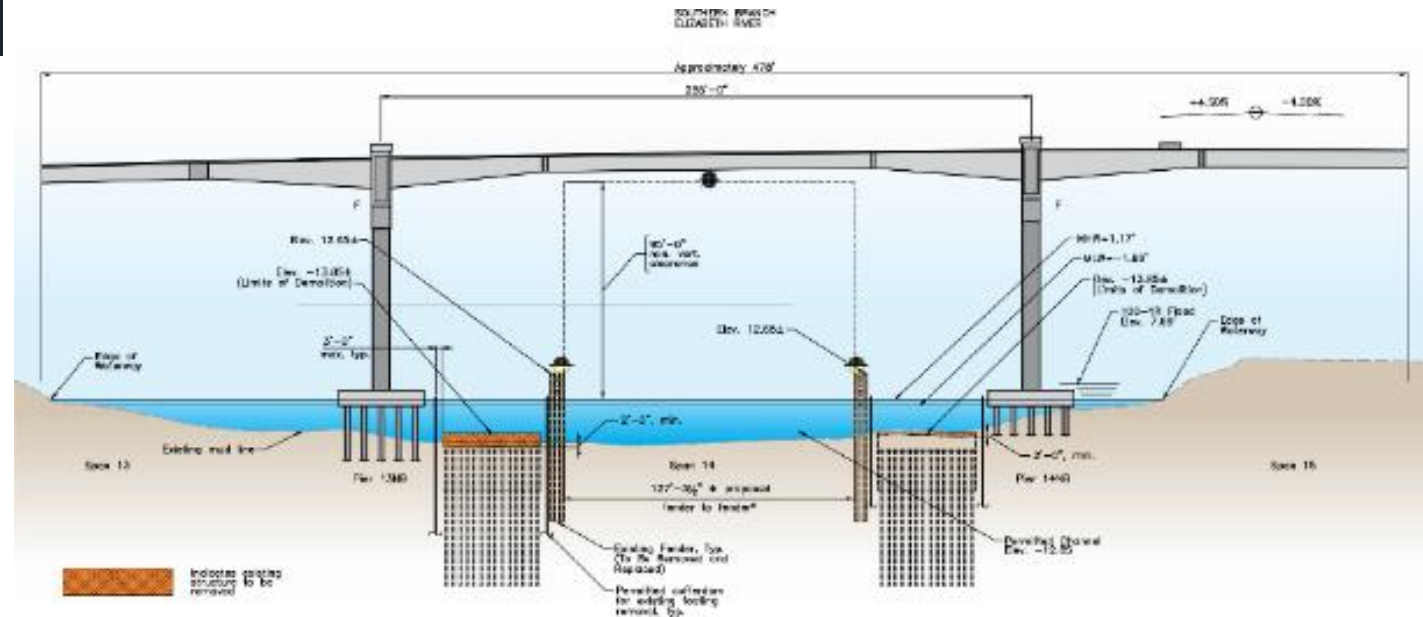
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# Dominion Boulevard Improvements Project Approach and Challenges

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- **Geotechnical**
- Structural
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# Dominion Boulevard Improvements Geotechnical Challenges

- Ground Improvements
  - *Wick drain & surcharge*
  - *Pile supported embankments*
- MSE walls
- Abutment pile driving



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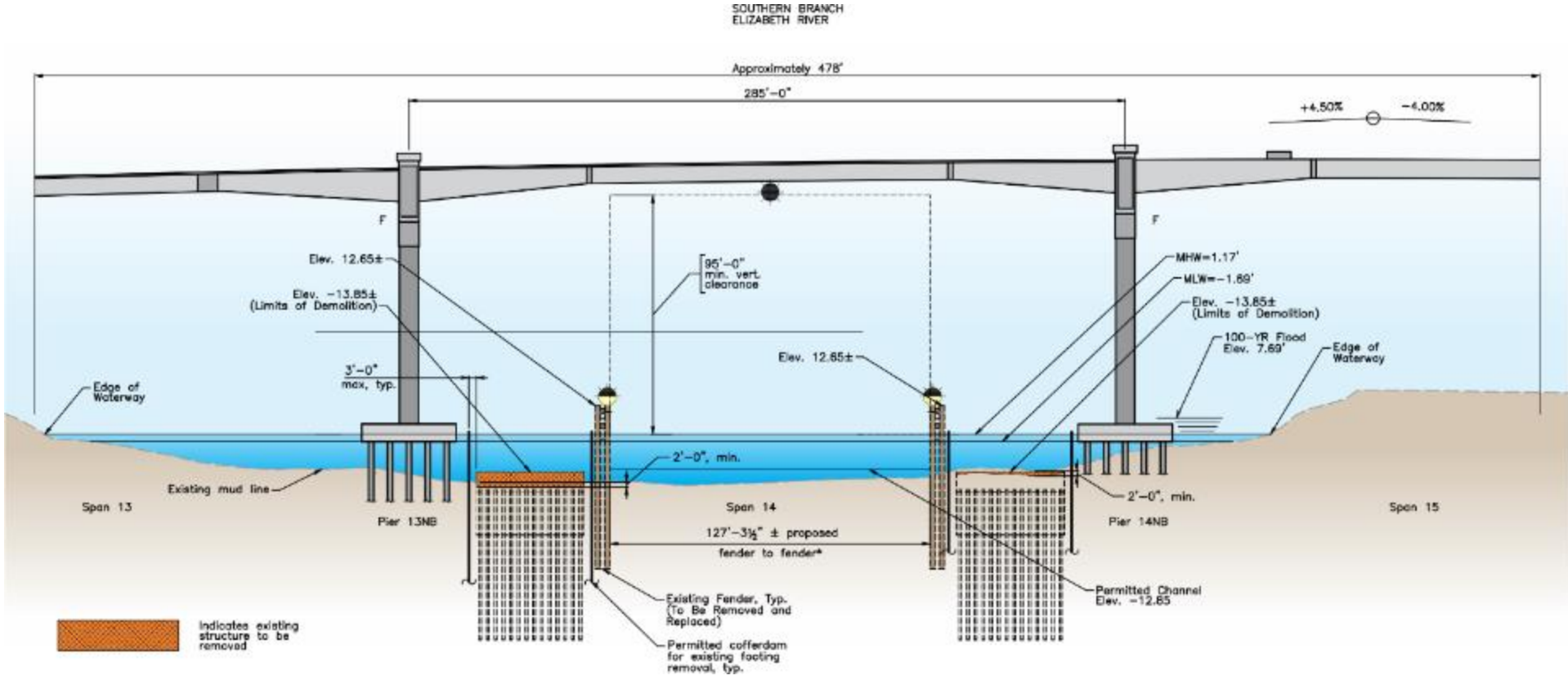
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- Elizabeth River Bridge
  - *Main span length*
  - *Construction Sequence*
- Braided ramp at GBB
- Spliced girder SPUI @ Cedar Rd.
- Post-tensioning



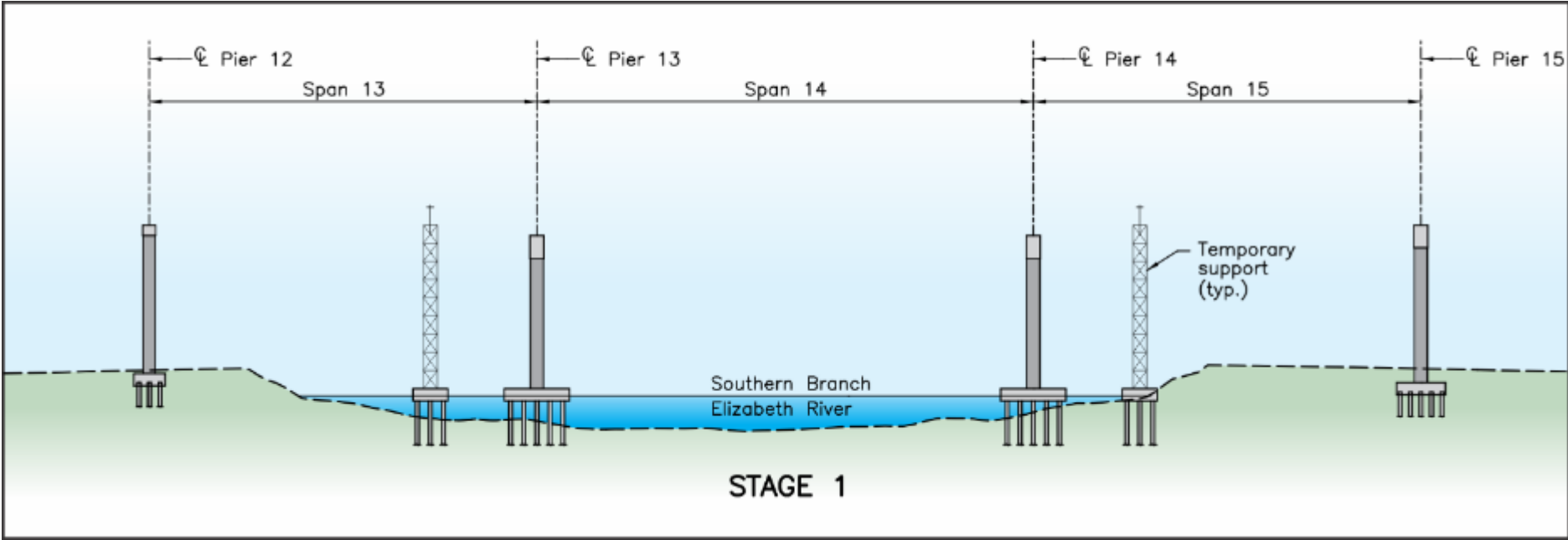
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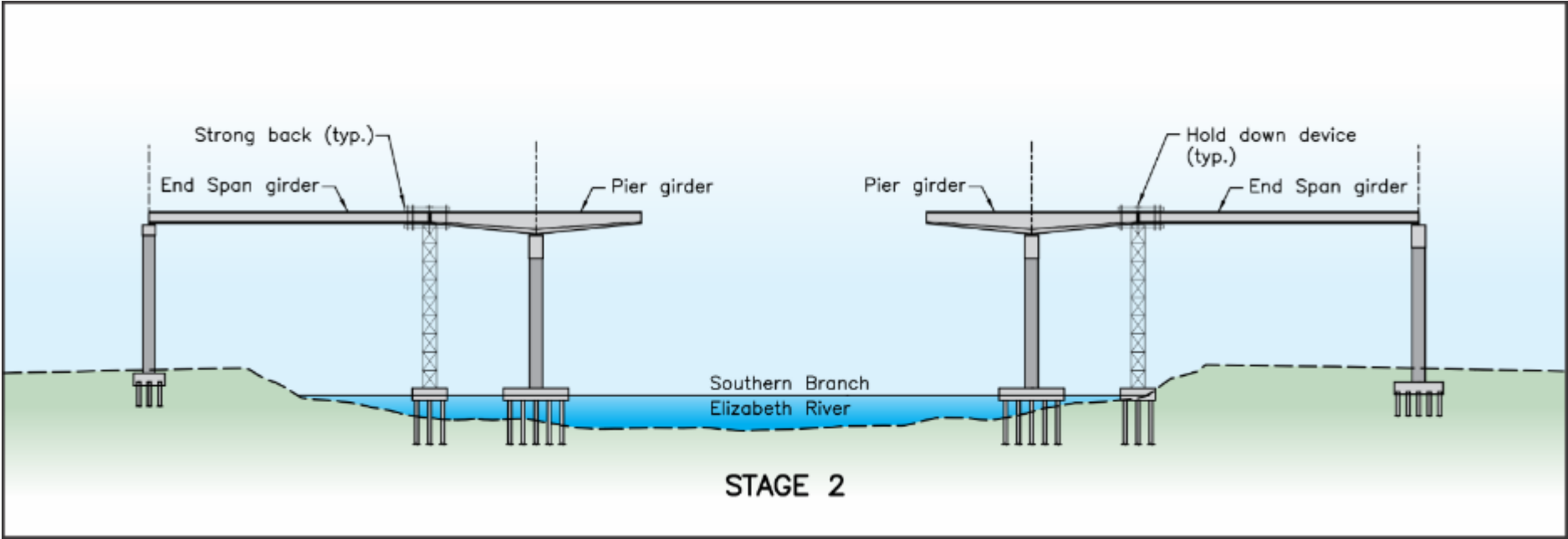
## — Elizabeth River Bridge Construction Sequence



Stage 1: Construct Piers and Temporary Supports

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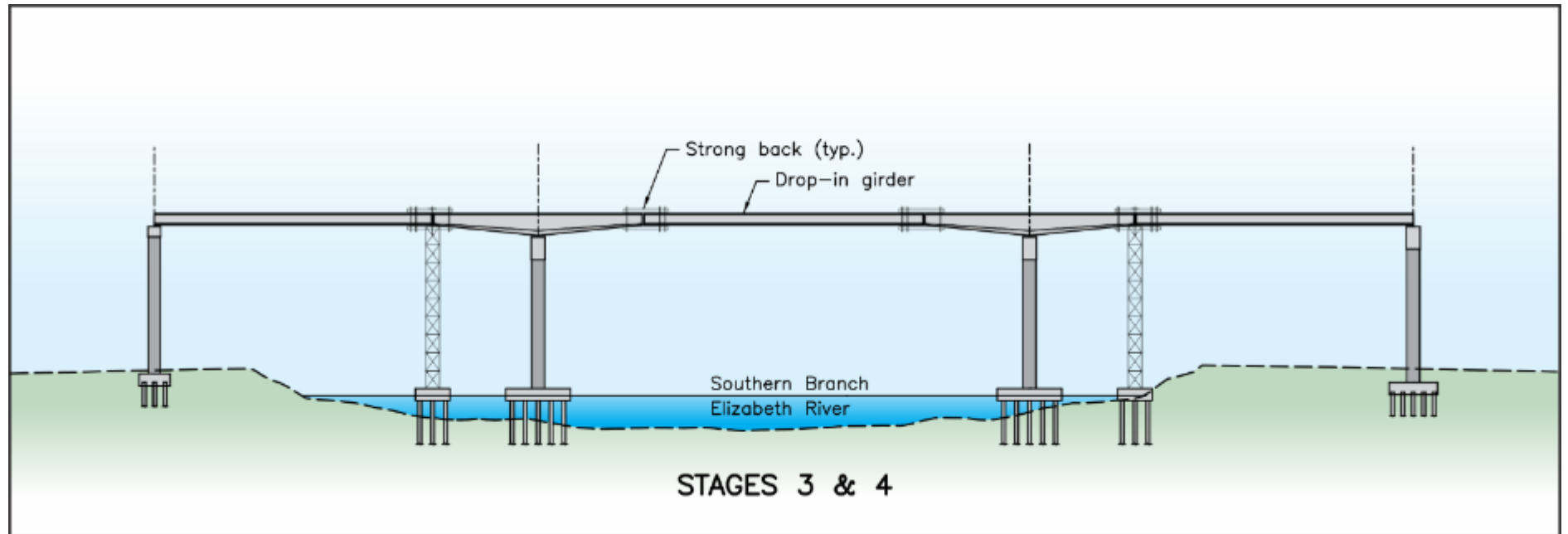
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Stage 2: Erect Pier Segments & End Span Girders

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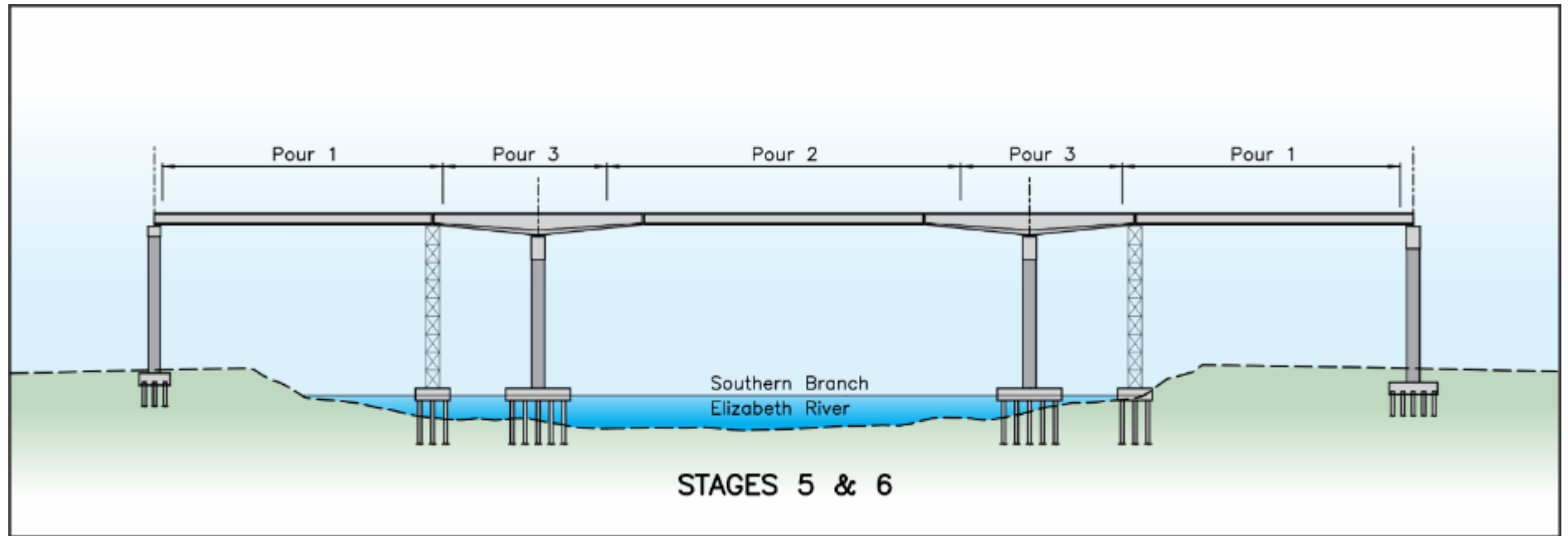


Stage 3: Install Drop-In Segment using Strong Backs, Cast Closures

Stage 4: Stage 1 Post-Tensioning

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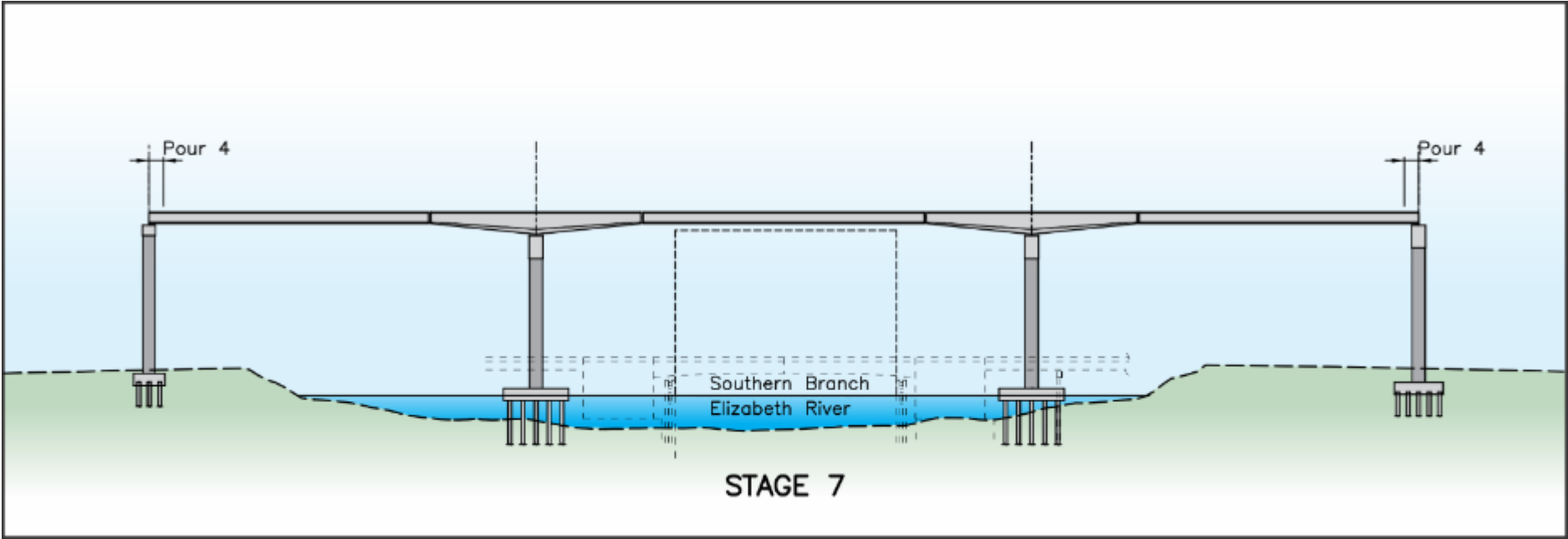


Stage 5: Remove Strongbacks, Cast Deck

Stage 6: Stage 2 Post-Tensioning

# Dominion Boulevard Improvements Structural Challenges

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Stage 7: End Diaphragms, Barriers and Overlay

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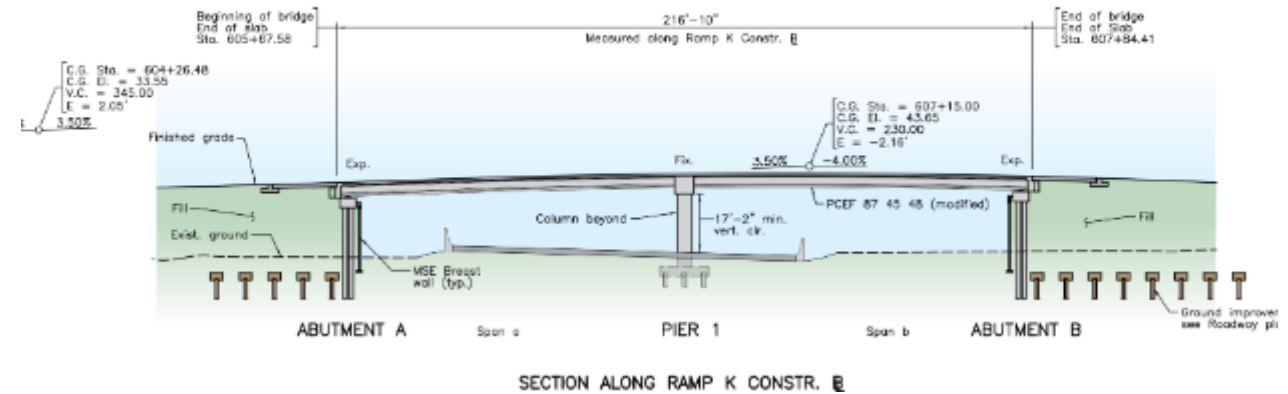
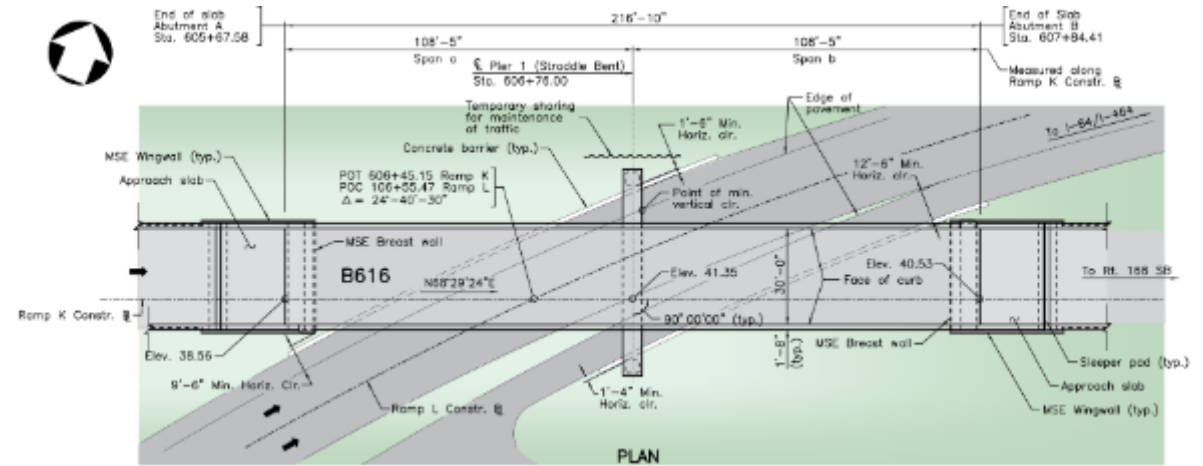
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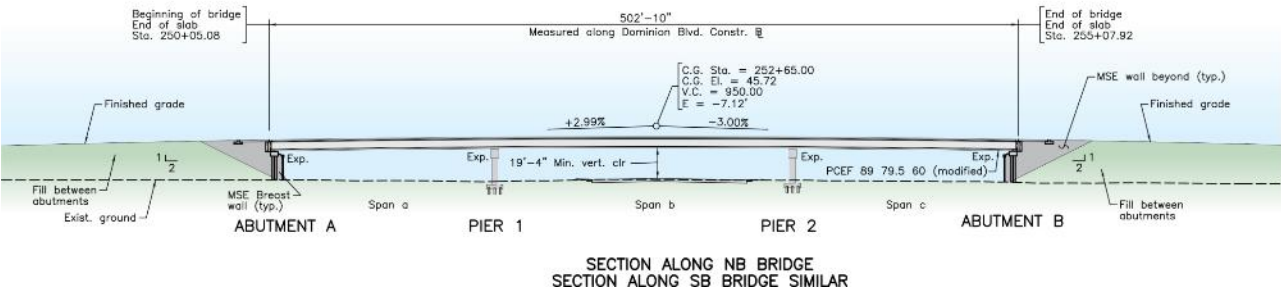
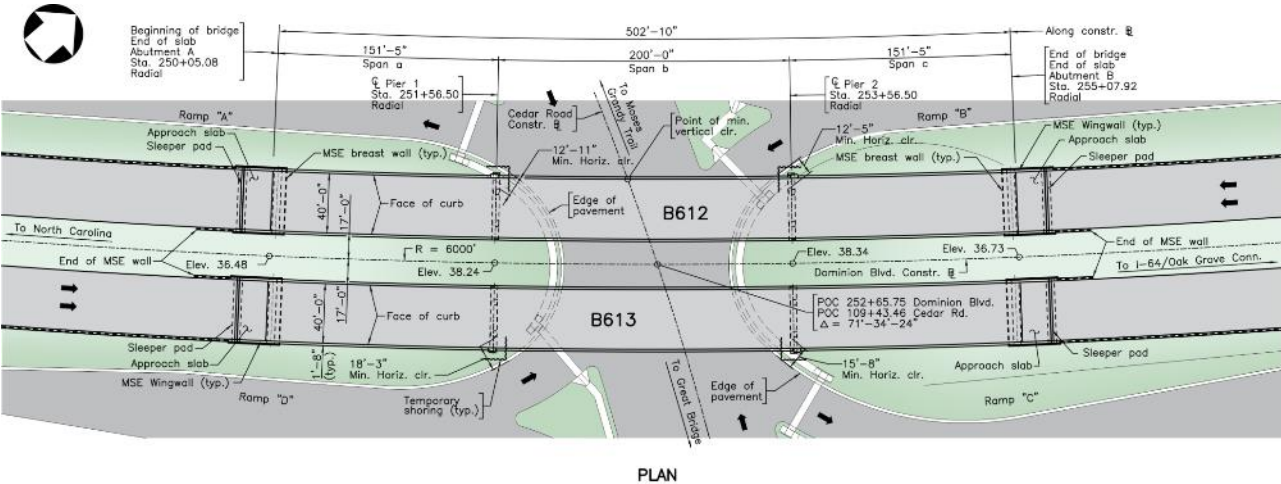
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# Dominion Boulevard Improvements Structural Challenges

- Post-tensioning
  - *FDOT Section 462*
  - *Positive anchorage to duct connection*
  - *Corrugated plastic ducts*
  - *Duct pressure tests*
  - *Pre-packaged grout*
  - *Grouting plan*
  - *Back-up equipment*
  - *Grout monitoring*



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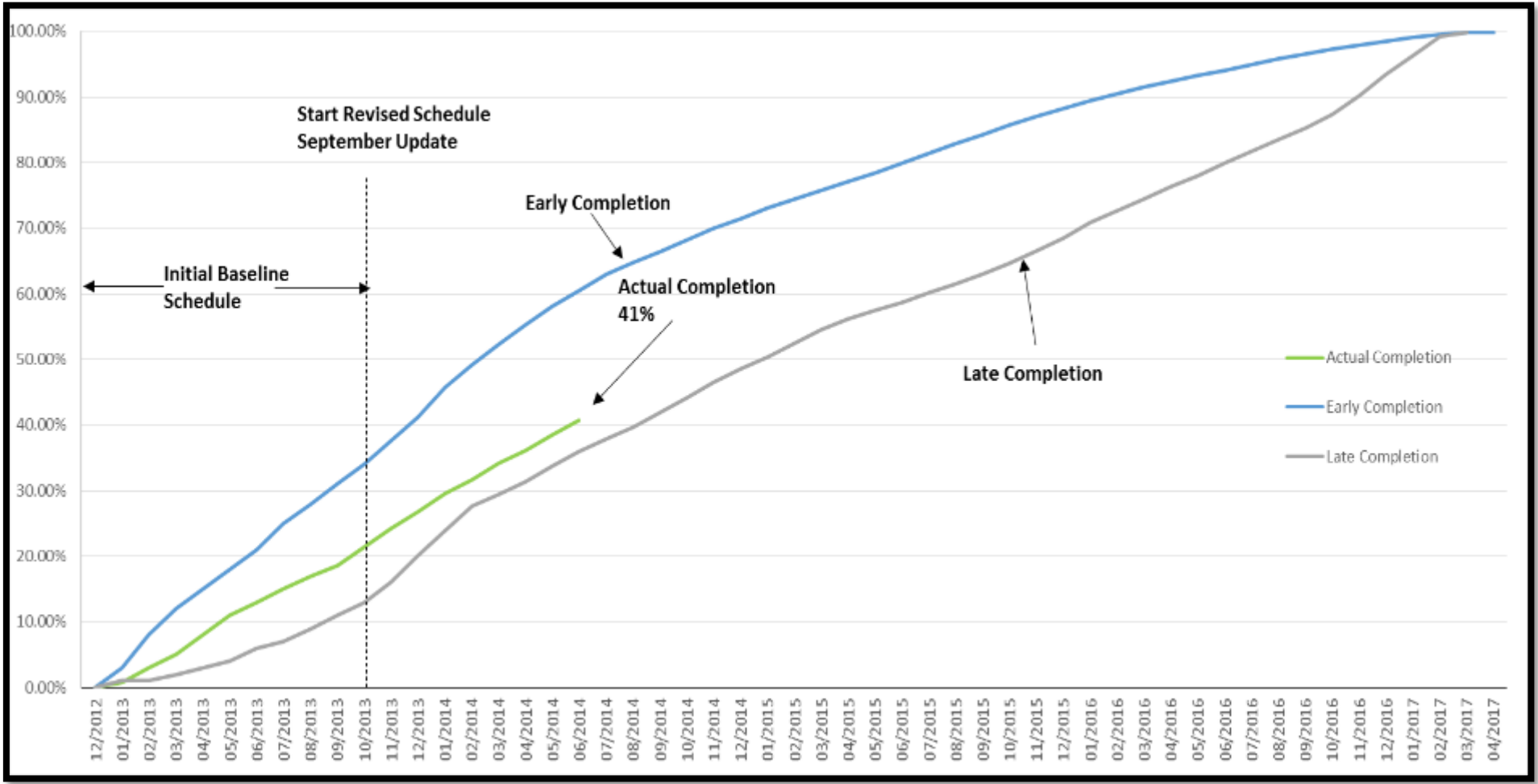
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# Dominion Boulevard Improvements Construction Management Challenges

- Cast-in-Place Concrete: 65,000 CY
- Concrete Piles - 2,500 EA: 28 miles
- Precast Girders - 600 EA : 12 miles
- MSE Walls - 21 EA/245,000 SF: 2 miles
- New Roadway: 18 new lane miles
- Earthwork: 1.6 Million CY
- Vertical Wick Drains: 4.5 Million LF



# Dominion Boulevard Improvements Project Controls



# Dominion Boulevard Improvements

## Technology: Cloud-based project controls system

- Interactive Sharepoint Site
- Instant access to project information
- Enhanced problem solving



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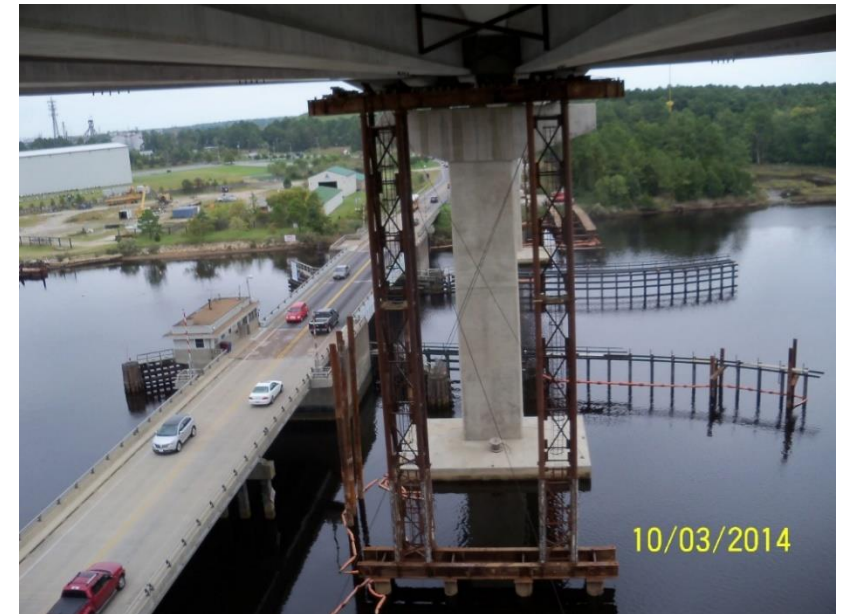
## Technology: Cloud-based project controls system

- Over 600 Submittals
- Over 500 Request-for-Information
- Permission levels – enabled the Contractors to “post” submittals, RFI’s.
- Automatic notifications
- Oversight agencies able to review documents in real time
- “Eliminated the email of files – latest versions always available”

“Nearly 1 million sheets of paper eliminated”

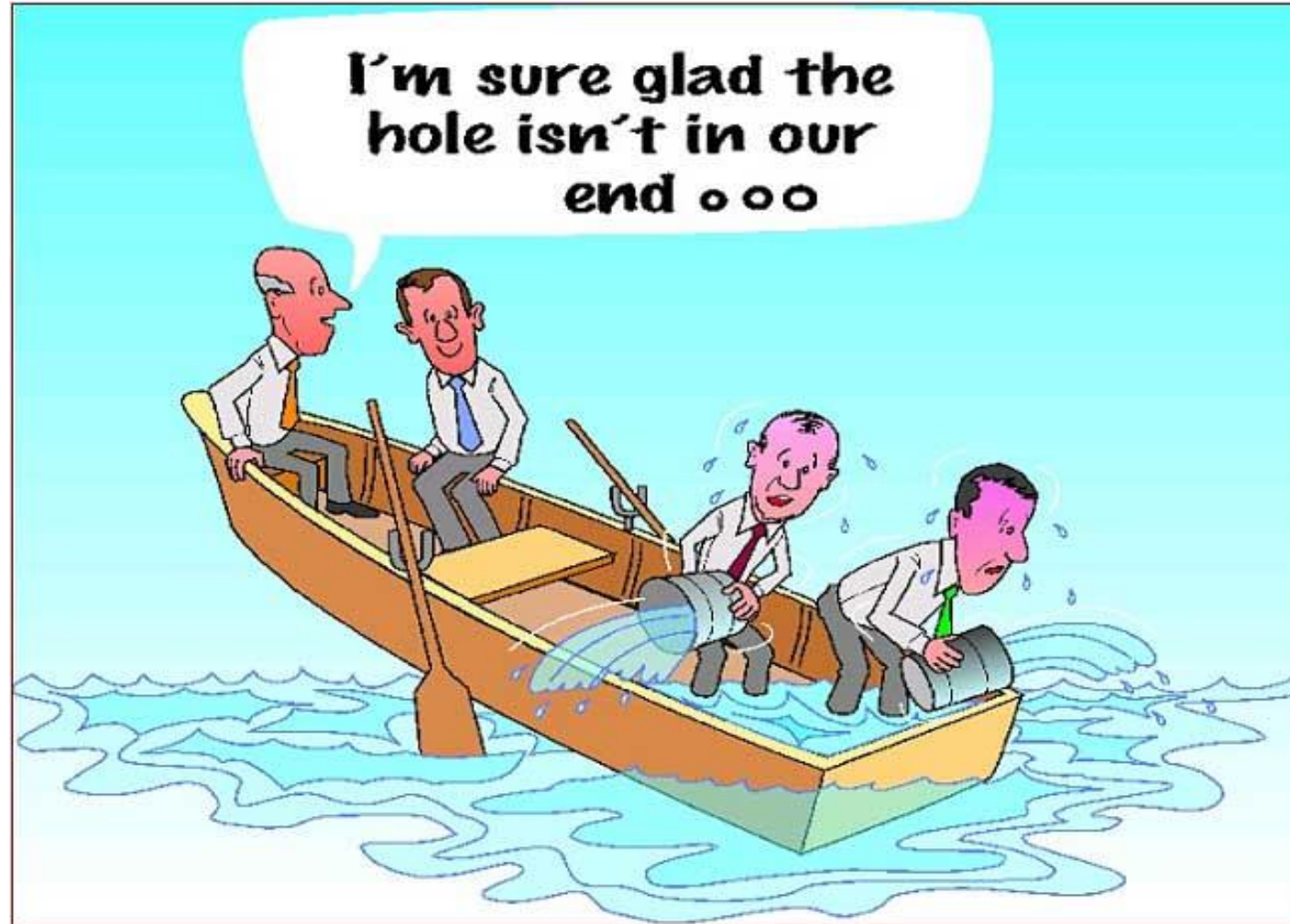
# Dominion Boulevard Improvements Risk Management

- Risk Management Workshop
- Establish Risk Management Register
  - Soil conditions
  - Environmental Impacts
  - Differing Site Conditions
  - Safety
  - MOT, Materials, Phased Construction, Etc.
- Regular review of risks (biweekly / monthly)



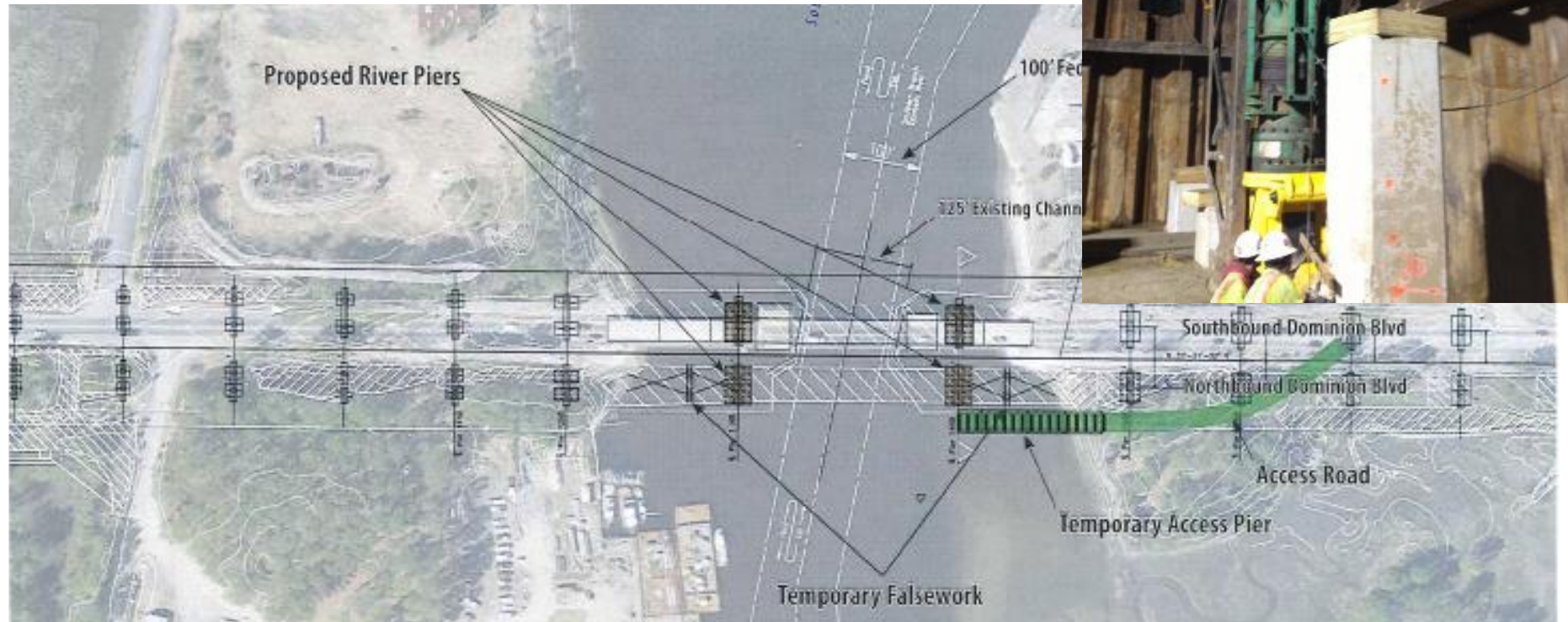
# Dominion Boulevard Improvements Risk Management

**Risks are inherent in construction projects**



# Dominion Boulevard Improvements Risk Management Success Story

- *Pier 14 River Piles (Risk ID 1038)*
  - Unpredictable subsurface soil conditions
  - Potential cost and time impacts
  - Low cost solution with no schedule impacts



# Dominion Boulevard Improvements Implementation of Project Risk Management



# Dominion Boulevard Improvements Before:



55

- Aging 2-lane Draw Bridge (Built in 1962)
- 6,000 Annual Openings

# Dominion Boulevard Improvements After:



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*“Since the completion of the project, there were significant improvements to safety for motorists and pedestrians, and almost a complete elimination of traffic incidents from what used to be regular occurrences.”*

Steve Froncillo,  
City of Chesapeake  
Traffic Engineer

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- 4-Lane, 95 Foot High Fixed Span Bridge
- Uninterrupted Atlantic Intracoastal Waterway Traffic

# Dominion Boulevard Improvements Safety Results



57

***“Over 40 million vehicles passed through the project worksite”***

***Fall protection and work zone safety were significant safety risks.***

- “DBC, Inc. worked 950,000 man-hours without any injuries related to falls or work zone incidents.”***



## Dominion Boulevard Improvements

- Opened in November 2016 – 111 days early
- Under budget – returned \$25M to VTIB
- Carrying 27,000 VPD
- Freeway facility from I-64 to NC State line
- APWA Mid-Atlantic Project of the Year
- ACEC Virginia Grand Award
- **ASHE National Project of the Year**