

📍 Orlando, FL

📅 November 7-8, 2024



2024 TRANSPORTATION SYMPOSIUM

Open Bridge Modeler -OBM- Adoption

Klondike Rd. Project

Vickie Young, PE & Brian Martin

Office of Design: Structures & CADD Collaboration



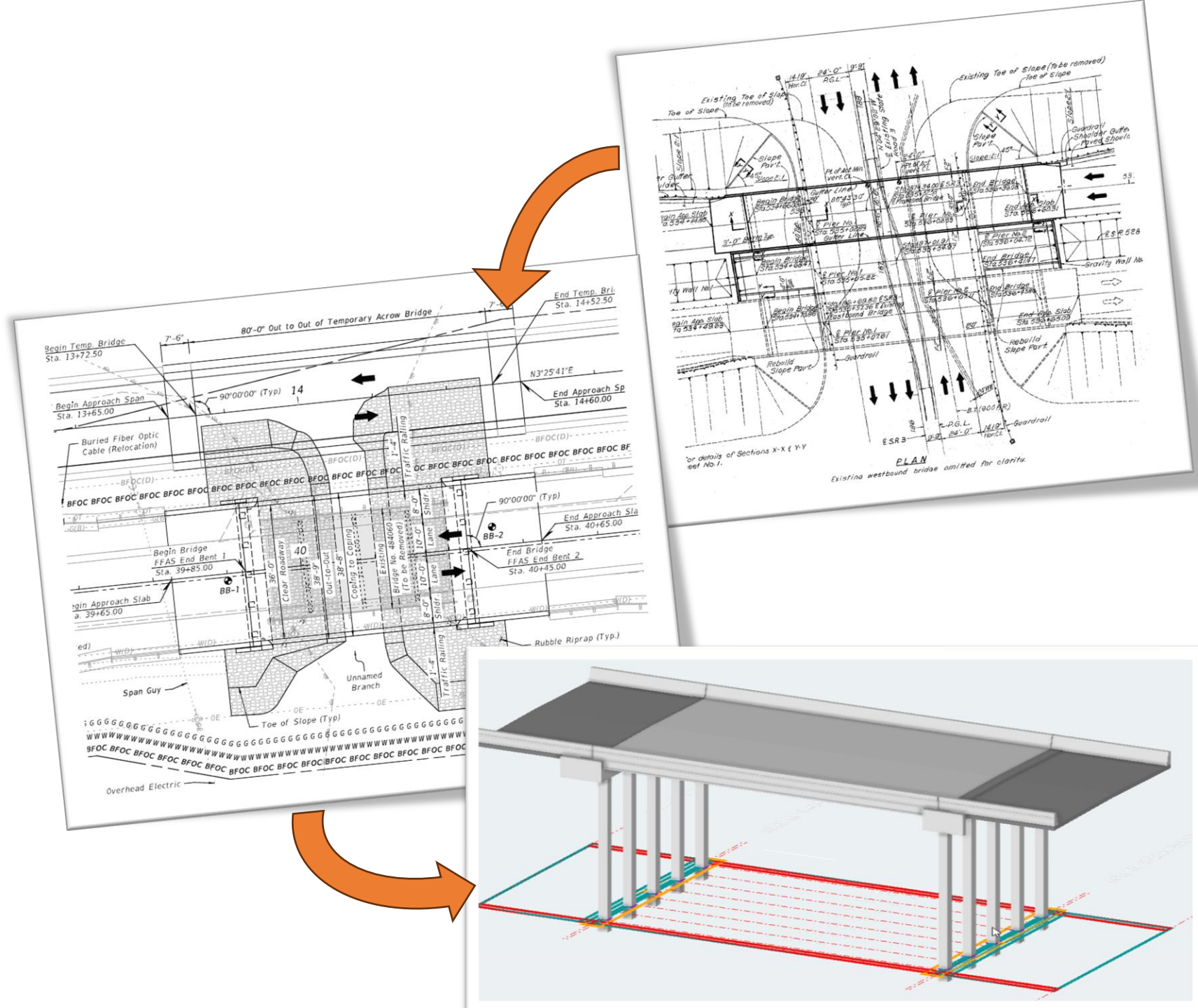
Agenda

Part 1: FDOT's Implementation of OBM

Part 2: In-House Bridge Project to Support OBM Implementation

Part 3: Model Sharing

Part 4: Q&A

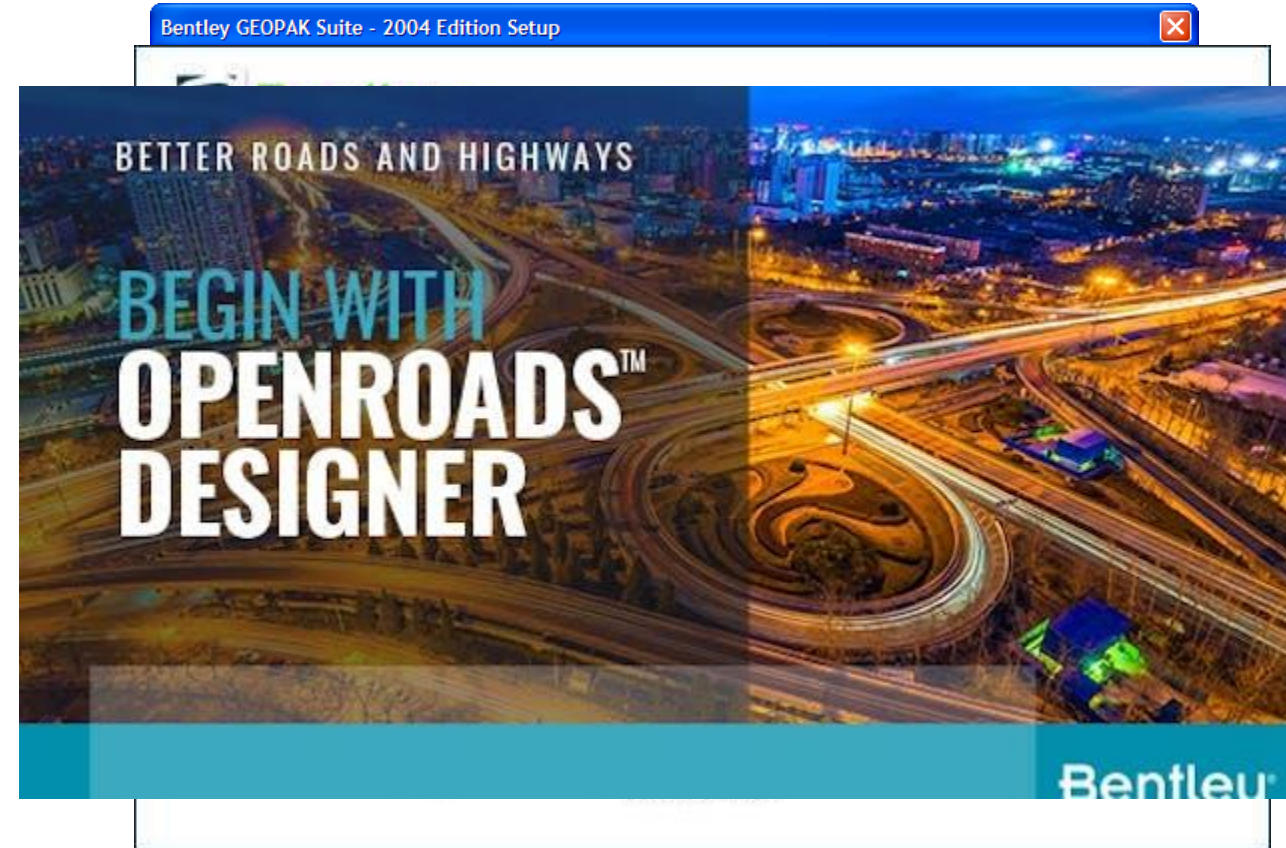


Part 1

FDOT's Implementation of OBM

OpenBridge Modeler Background

- Bentley transitioning to OpenRoads Tech w/SS2 release 2010
- April 2017 OpenRoads Designer
- July 2019 CADD Office released FDOT Connect Workspace
- FDOT Connect Workspace expanded to include resources for OpenBridge Technology



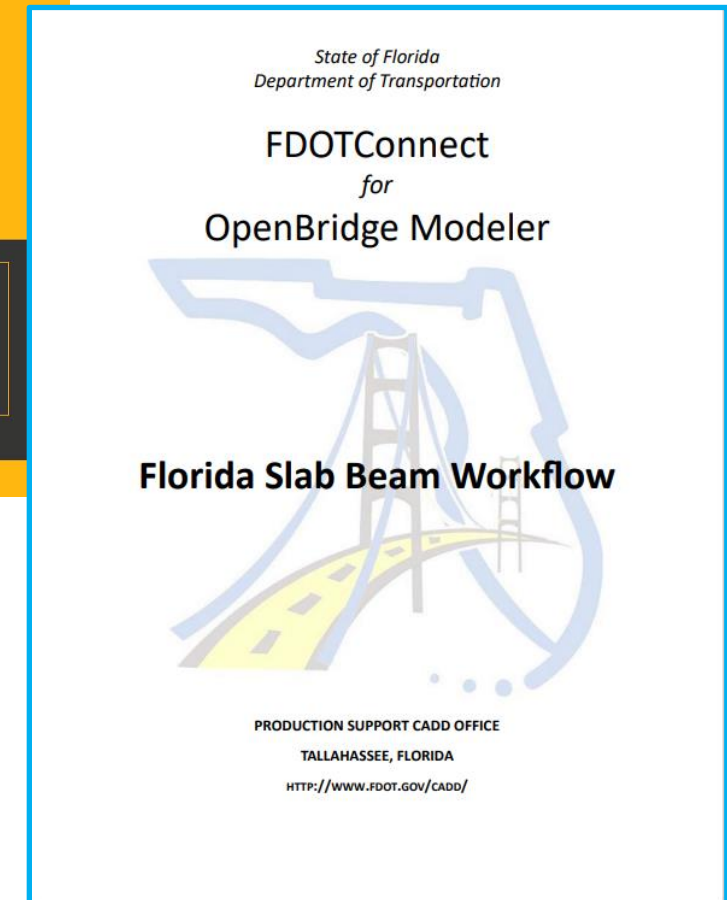
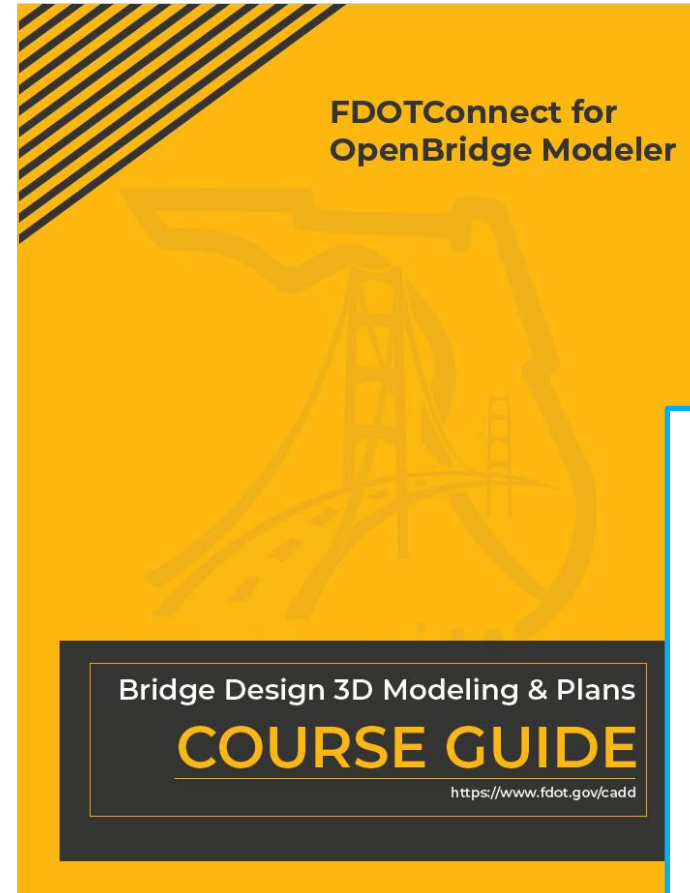
FDOT Connect Workspace Implementation

- July 2020 – first production release
- January 2021 OpenBridge and FDOT Connect Workspace required
- New workspace provided additional tools for Bridge 3D Modeling and Building Information Modeling (BIM)



Manuals/Guides

- CADD Office Website
- Training Guides
- FDOT Connect for OpenBridge Modeler
- Florida Slab Beam Workflow



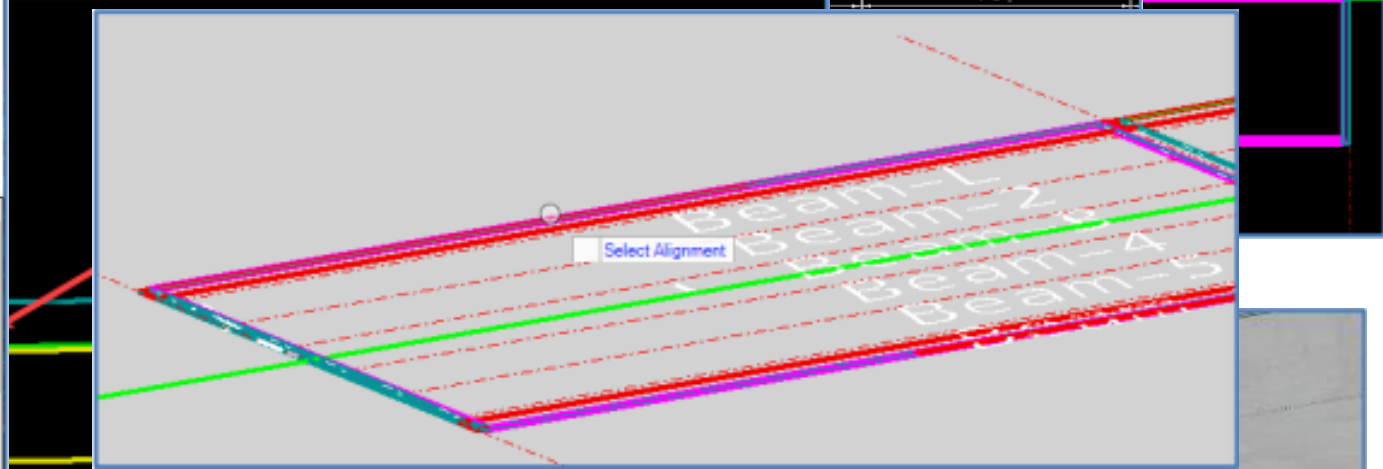
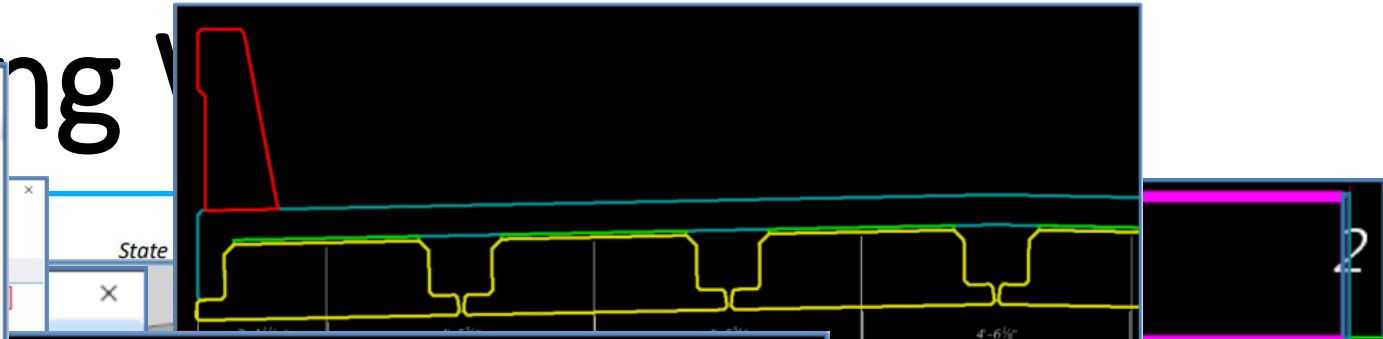
OPM FCD Modeling

- Place Deck
 - Deck
 - Template Name
 - Start Station Offset
 - End Station Offset
 - Horizontal Offset
 - Vertical Offset
 - Add Constraints
 - Chord Tolerance
 - Max Dist Between Secti
 - Analytical Deck
- Deck Breakback
 - Left Start Breakback Dist
 - Right Start Breakback Dist
 - Left End Breakback Dist
 - Right End Breakback Dist
- Material
 - Deck Material
- Build Order
 - Build Order
- Feature
 - Feature Definition
 - Name Prefix

Edit Point Controls

Point Name	Direction	Path
P_0	None	
P_1	None	
P_2	None	
P_6	Vertical	
P_7	None	
P_8	None	
P_9	None	
P_10	None	
P_3	None	
P_11	None	
P_12	None	
P_13	None	
P_14	None	

Select Apply Close



Build Order 1

Feature

Feature Definition Girder

Name Prefix GIRDER 1

Follow Deck Edges

Follow Left Deck Edge

Follow Right Deck Edge

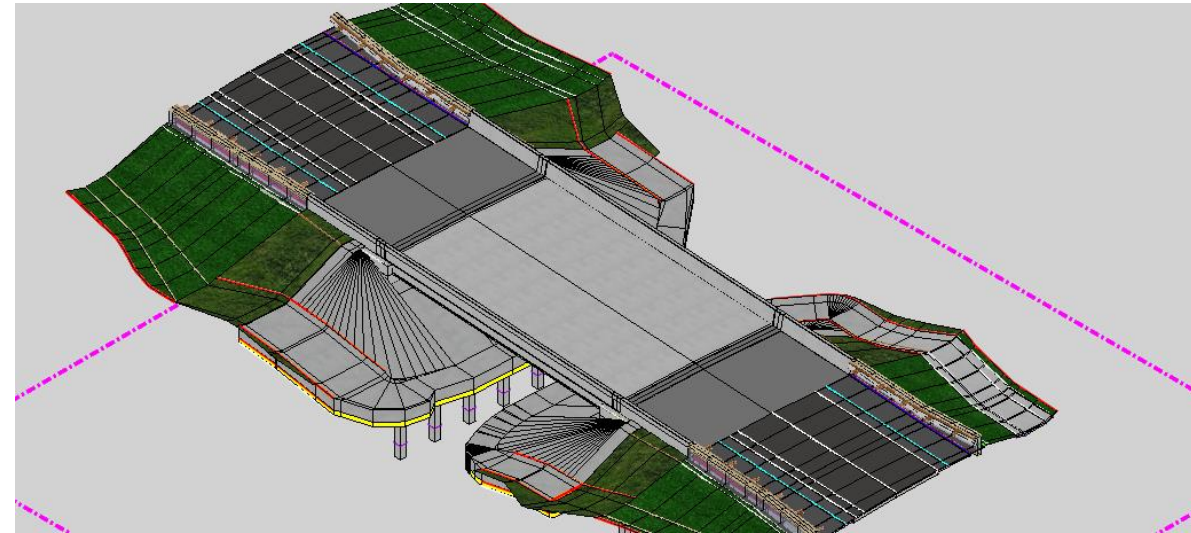
Project Background

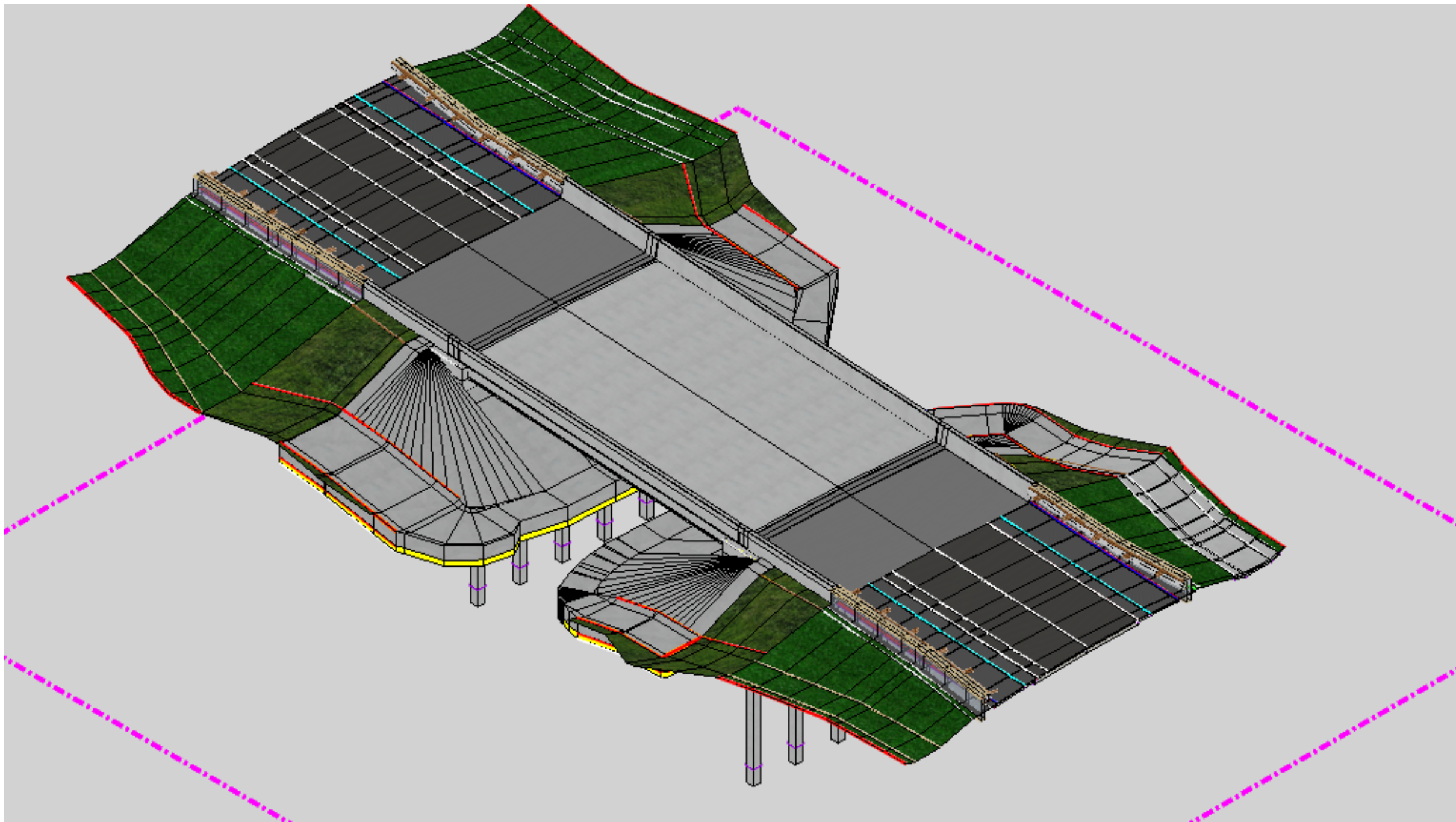
- 2018 Support Model-Centric Bridge Design
- 2020 Evaluating Non-CADD 3D Model Review Tools
- 2022 Support for Piloting BIM and Model-Centric Bridge Design
- 2023 Pilot Project Identified - Klondike



Project Objectives

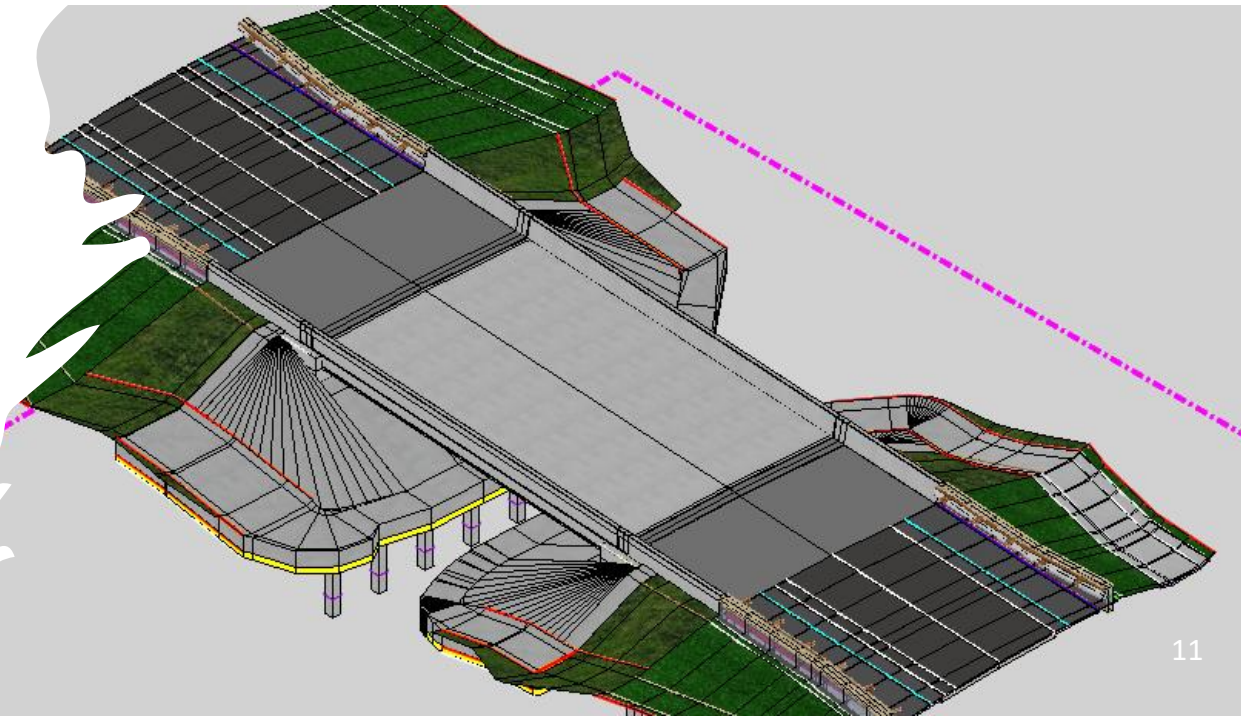
- Develop 3D Model
- Stage Design Reviews of 3D Model
- Publish Cloud-based 2D and 3D Models
- Digital Design Collaboration





Part 2

In-House Bridge Project to Support OBM Implementation



Project Background & Introduction

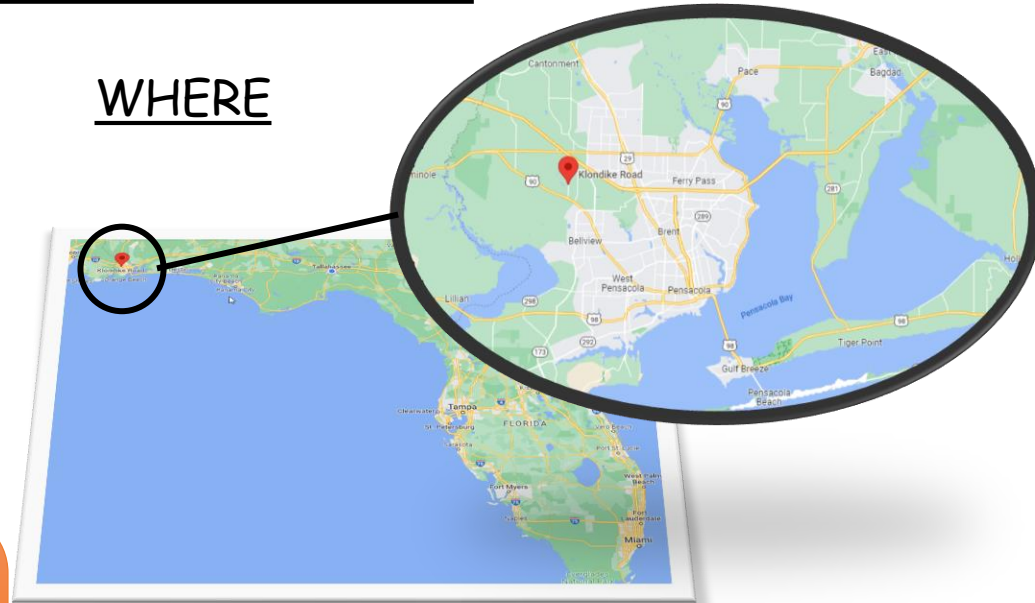
WHAT

District 3 Bridge Replacement Project

WHEN

Kickoff Mtg:
March 2023
Letting: FY26

WHERE



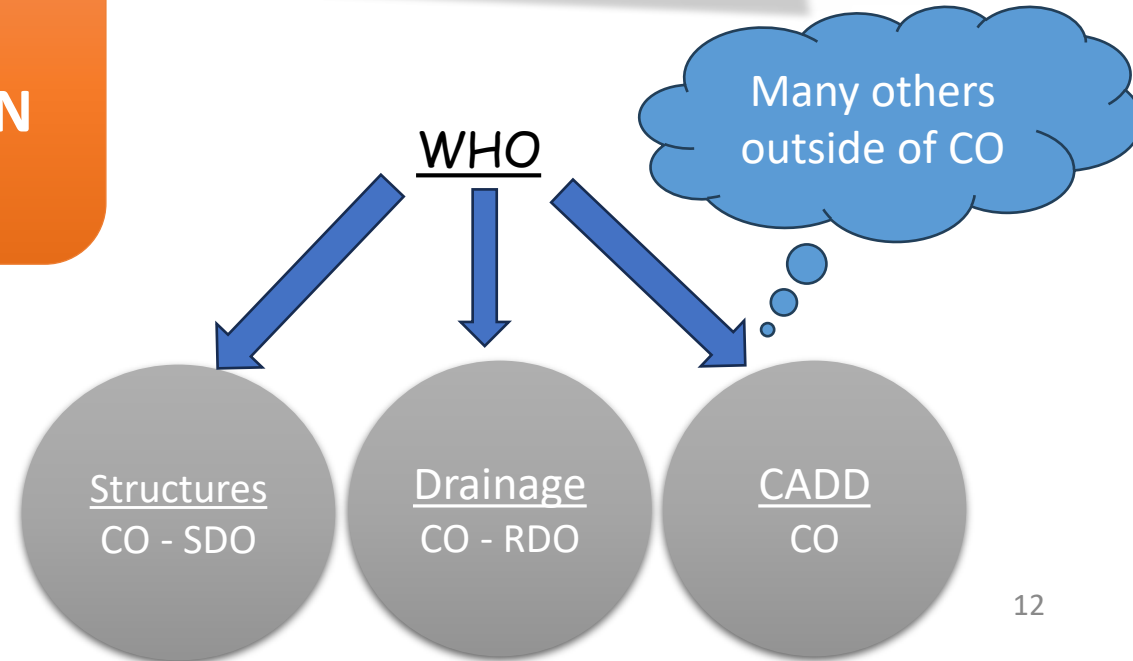
HOW

COLLABORATION

WHY

1. Train internal staff
2. Grow Design Experience
3. Help Support Adoption and/or Implementation
4. If possible → Push Innovation

WHO



Klondike Rd Over Unnamed Branch

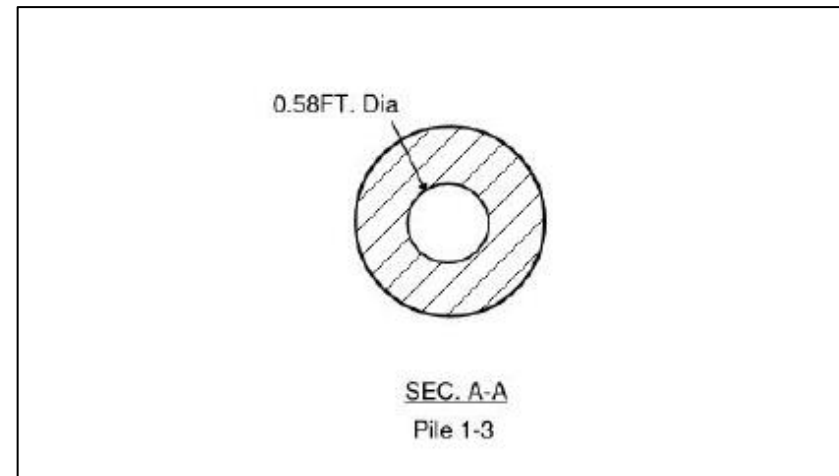
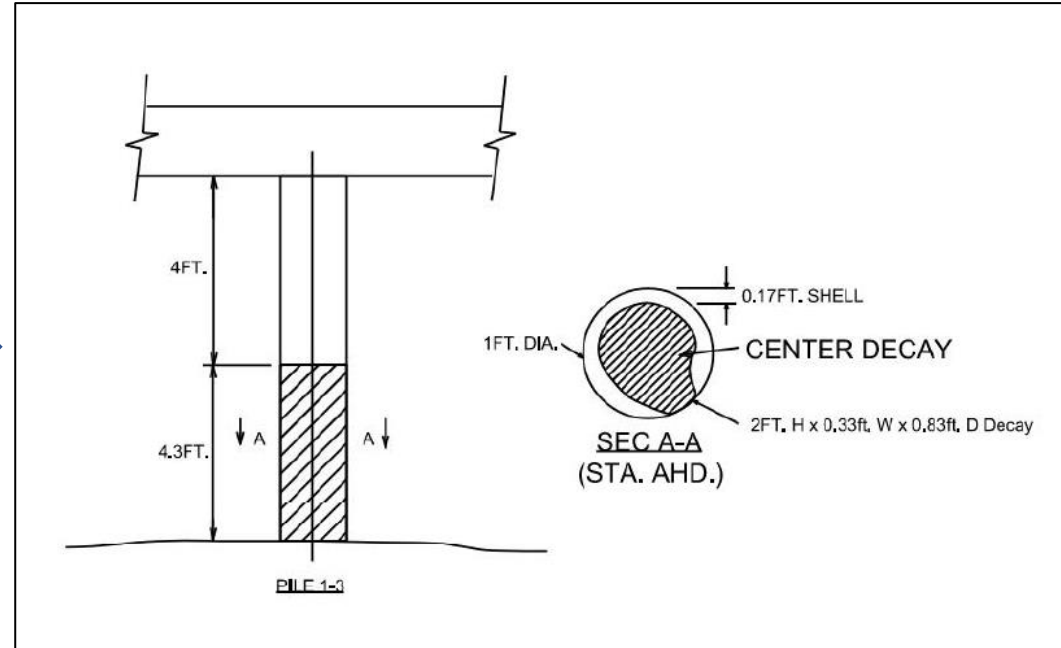
- Escambia County
- Letting Date: January 2026
- Existing Bridge
 - Timber
 - 2 ~ 15-ft spans, Total Length of 30-ft
 - Timber Piles have decayed

	2022 Inspection Report
Substructure	3 – Serious
Superstructure	7 – Good
Deck	6 – Satisfactory
Bridge Posting	23 tons
Classification	Structurally Deficient

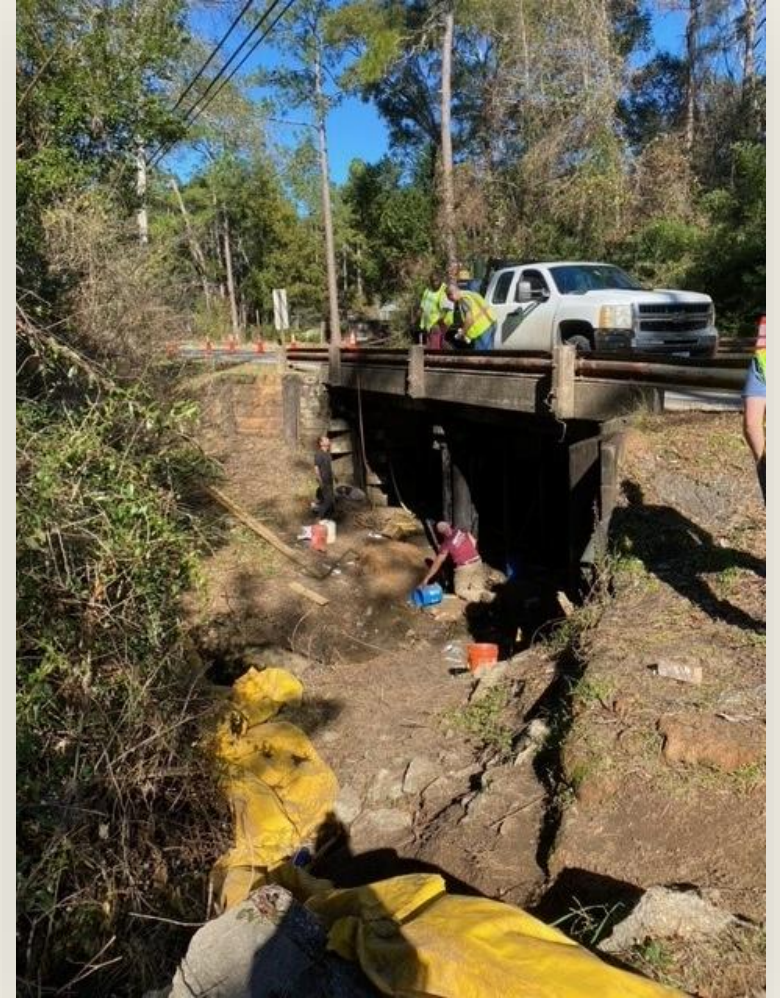


Existing Bridge Images from Google

Klondike Rd Over Unnamed Branch



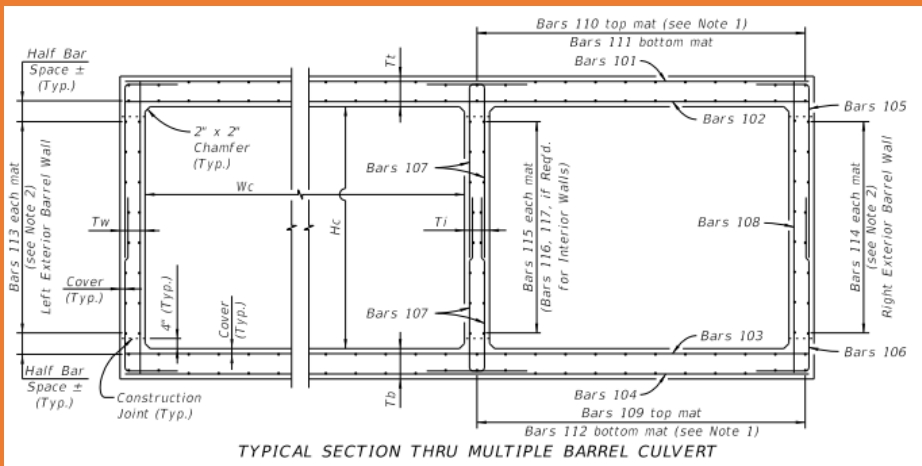
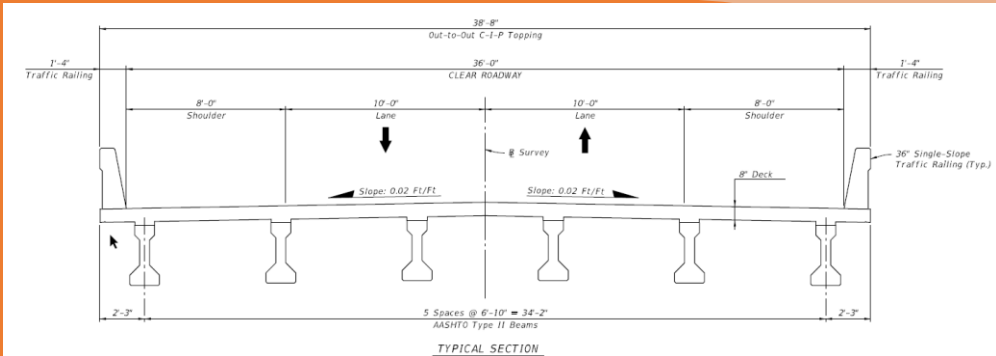
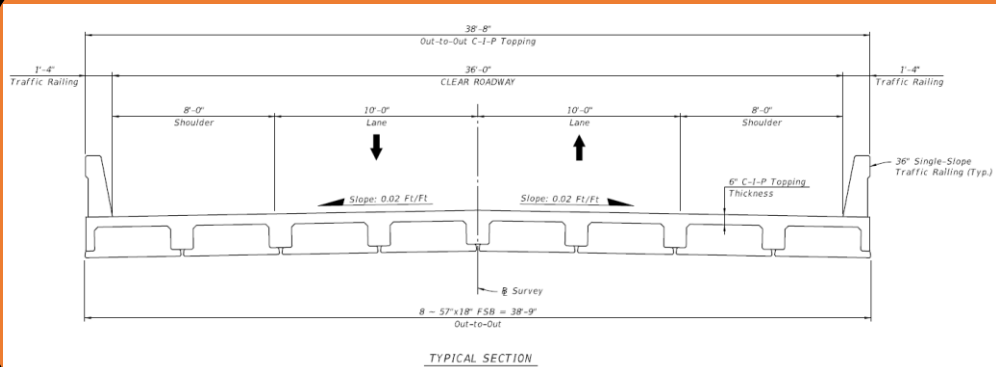
Substructure Repairs in 2023



	2022 Inspection Report	2024 Inspection Report
Substructure	3 – Serious	6 – Satisfactory
Superstructure	7 – Good	7 – Good
Deck	6 – Satisfactory	6 – Satisfactory
Bridge Posting	23 tons	23 tons
Classification	Structurally Deficient	Functionally Obsolete



Bridge Replacement Alternatives Considered



➤ Superstructure

1. AASHTO Type II w/ 8" Conc Deck
2. Florida Slab Beam w/ 6" CIP Topping
3. Box Culvert → Eliminated due to poor soils

➤ Substructure

1. Prestressed Concrete Piles
2. Steel Pipe Piles
3. GRS Abutments → MUST BE ADDRESSED → Eliminated due to poor soils

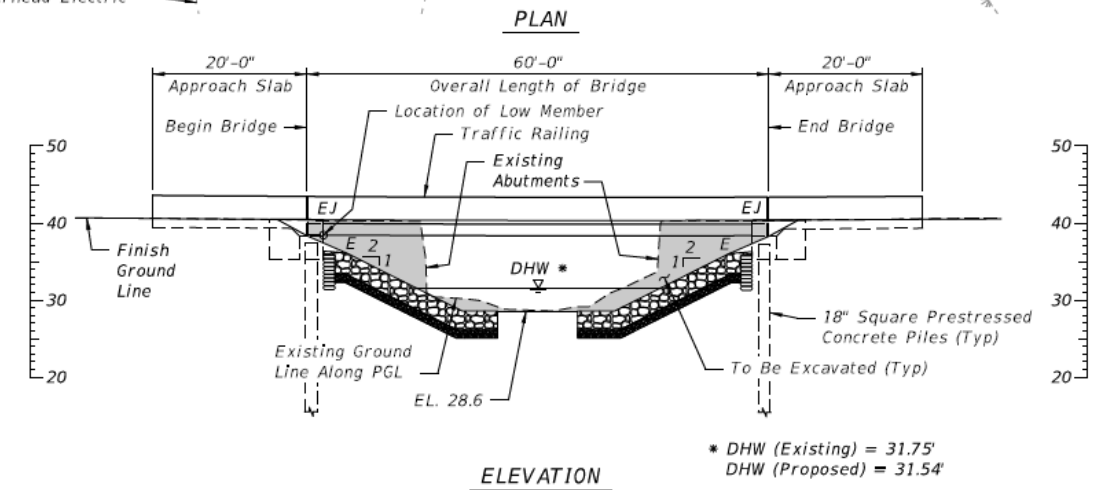
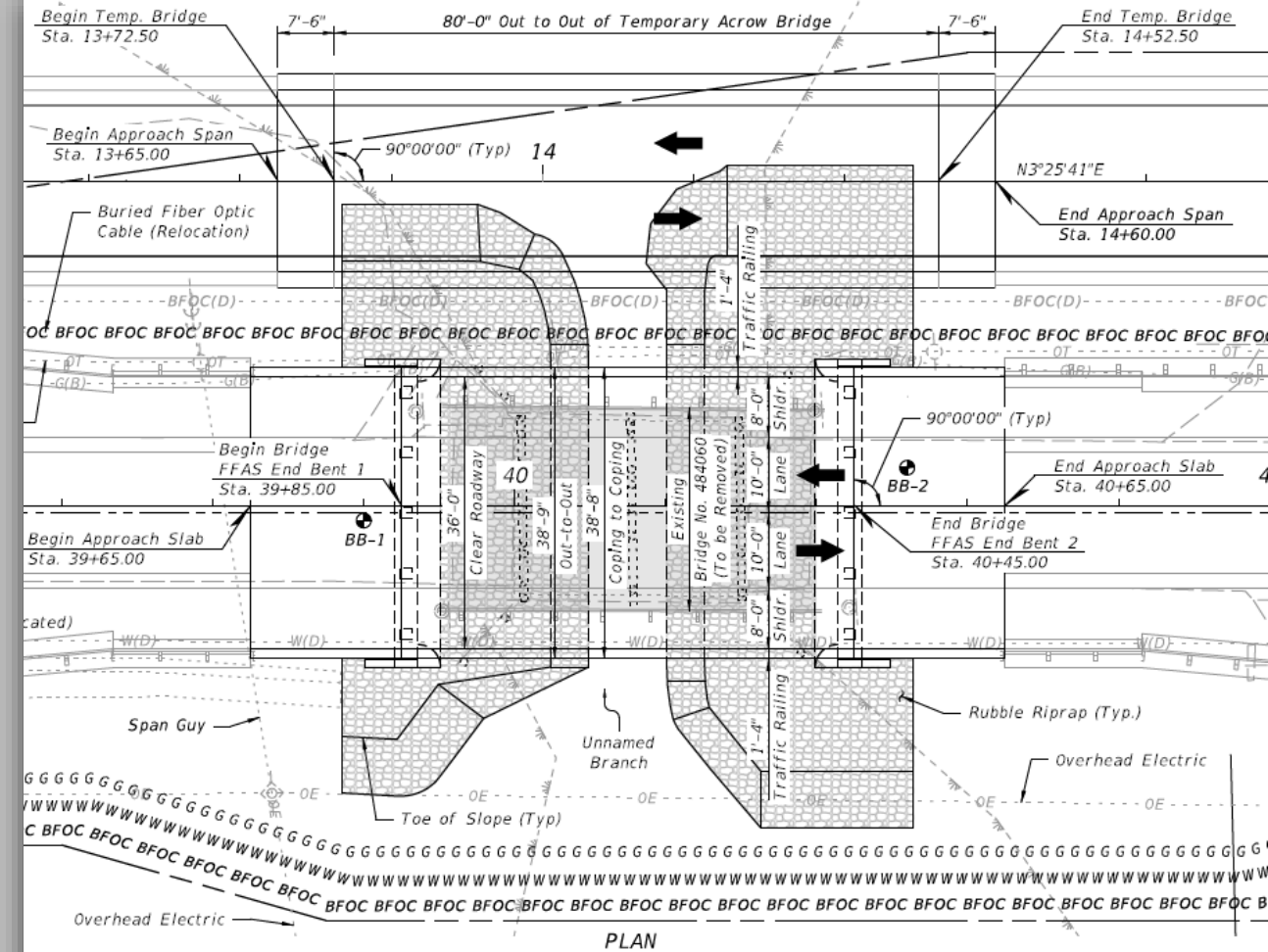
Proposed Bridge Replacement:

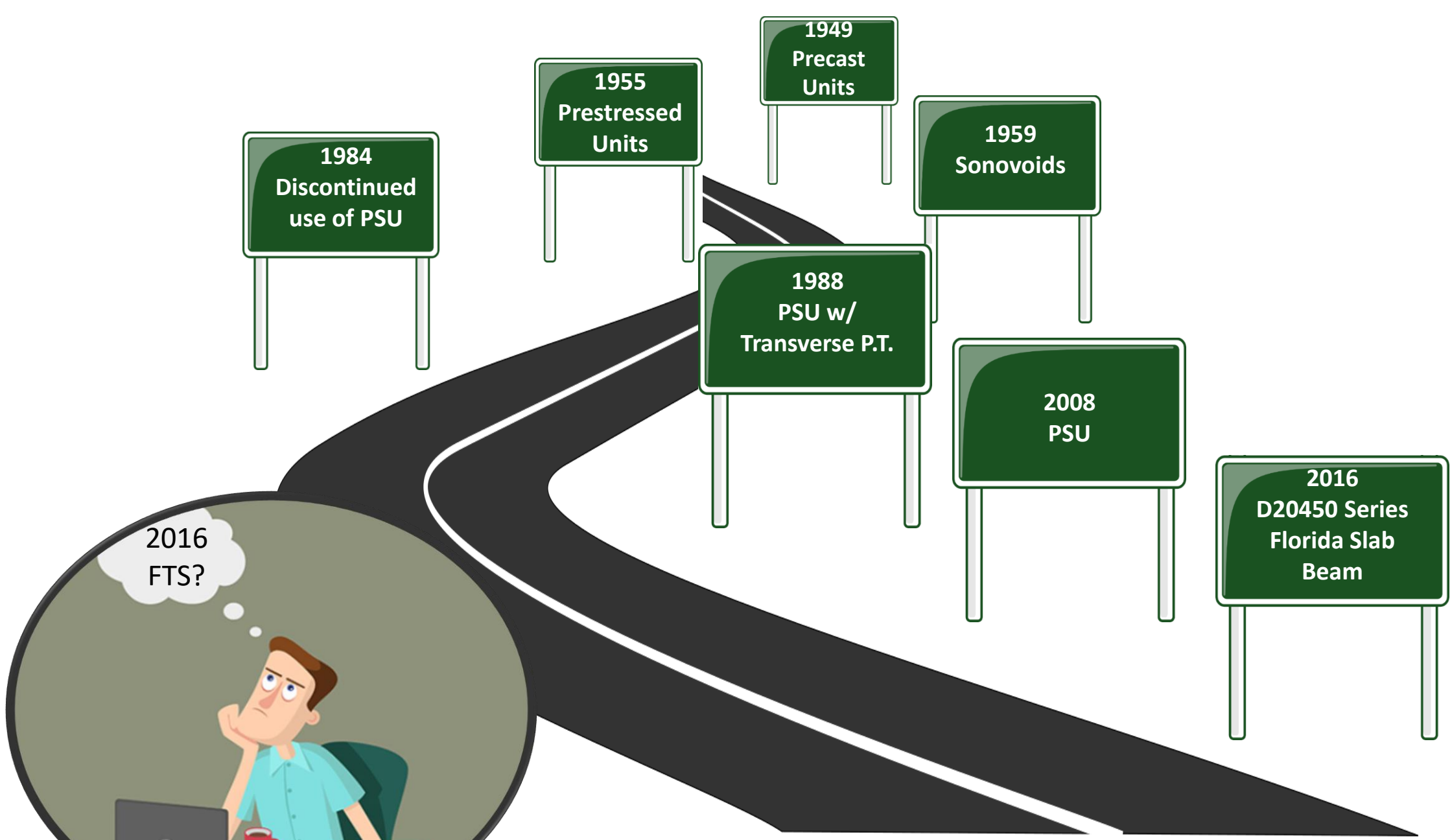
➤ Superstructure

- Florida Slab Beam w/ 6" CIP Topping
- Bridge Width = 38'-8"
 - 2 ~ 10'-0" Lanes & 8'-0" Shoulders
- Bridge Length = 60'-0"
- 20'-0" Approach Slab (DSP)
- Crowned cross slope on CIP Concrete Abutments

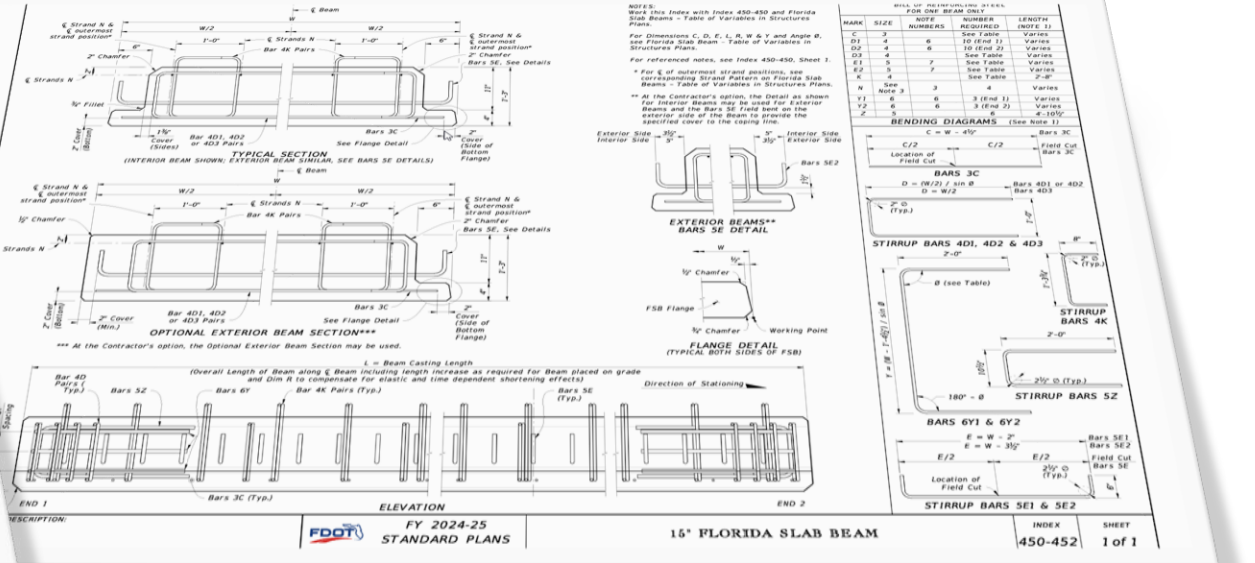
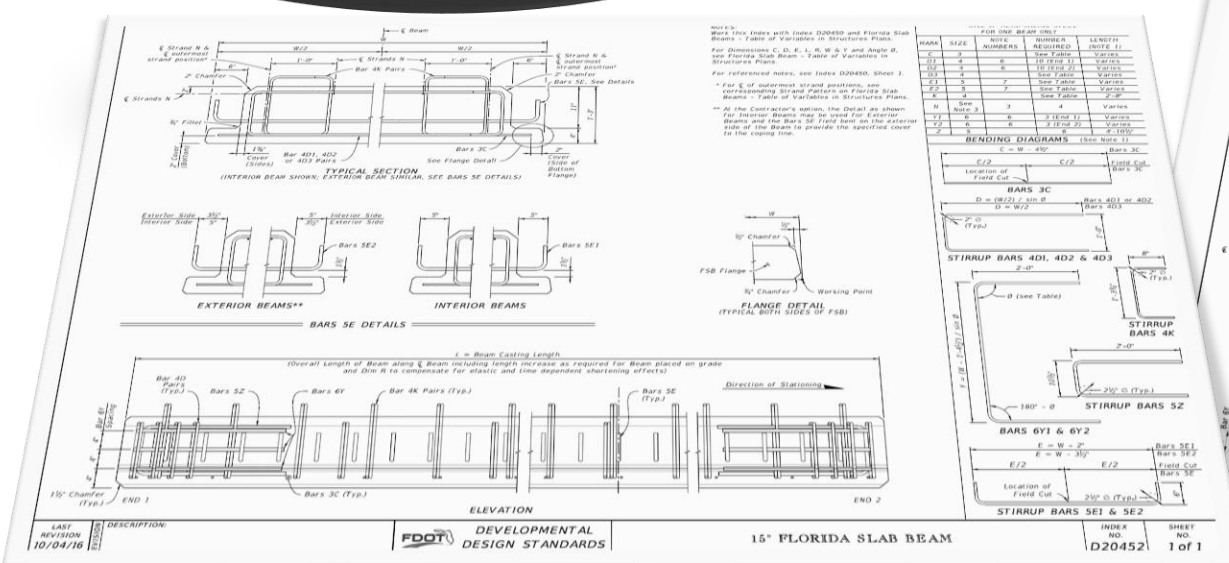
➤ Substructure

- Prestressed Concrete Piles
- Wrap around Rubble Riprap slope protection





Recall the Road to FSBs



2022
Standard Plans
450-450
(No approval requirement)

80+ FSB Projects
Since 2014
Statewide

Where are FSBs
today & where
are we headed?

Next Exit
→
FSBs to OBM

OBM Implementation:

Some Items CO Had to Tackle

1. FSB Workflow in OBM
2. Addressing Bent Cap Cross Slope → Crown
3. Verifying Finished Grade Elevations Output from OBM
4. How to model plain bearing pads
5. Drainage → Riprap and ditch tie-ins

Recall there is
no backwall
w/ FSBs

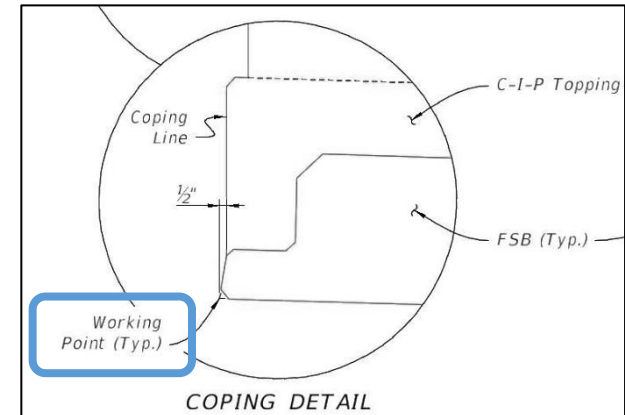
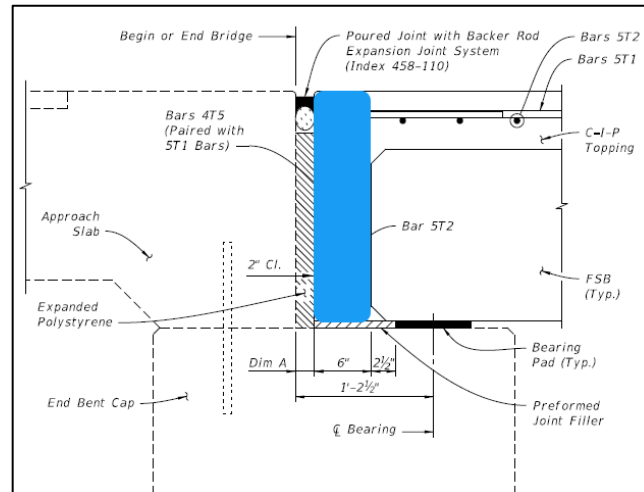
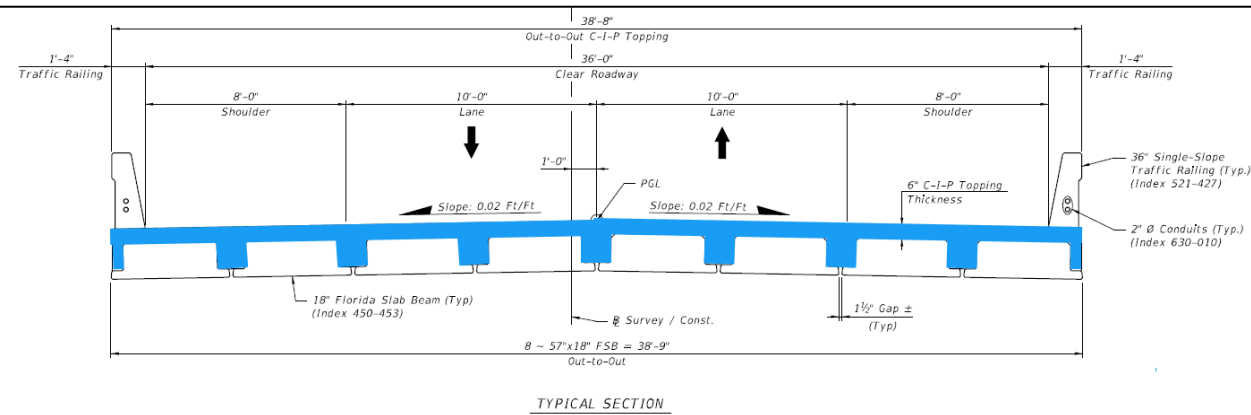


FSB Adoption in Open Bridge Modeler (OBM)

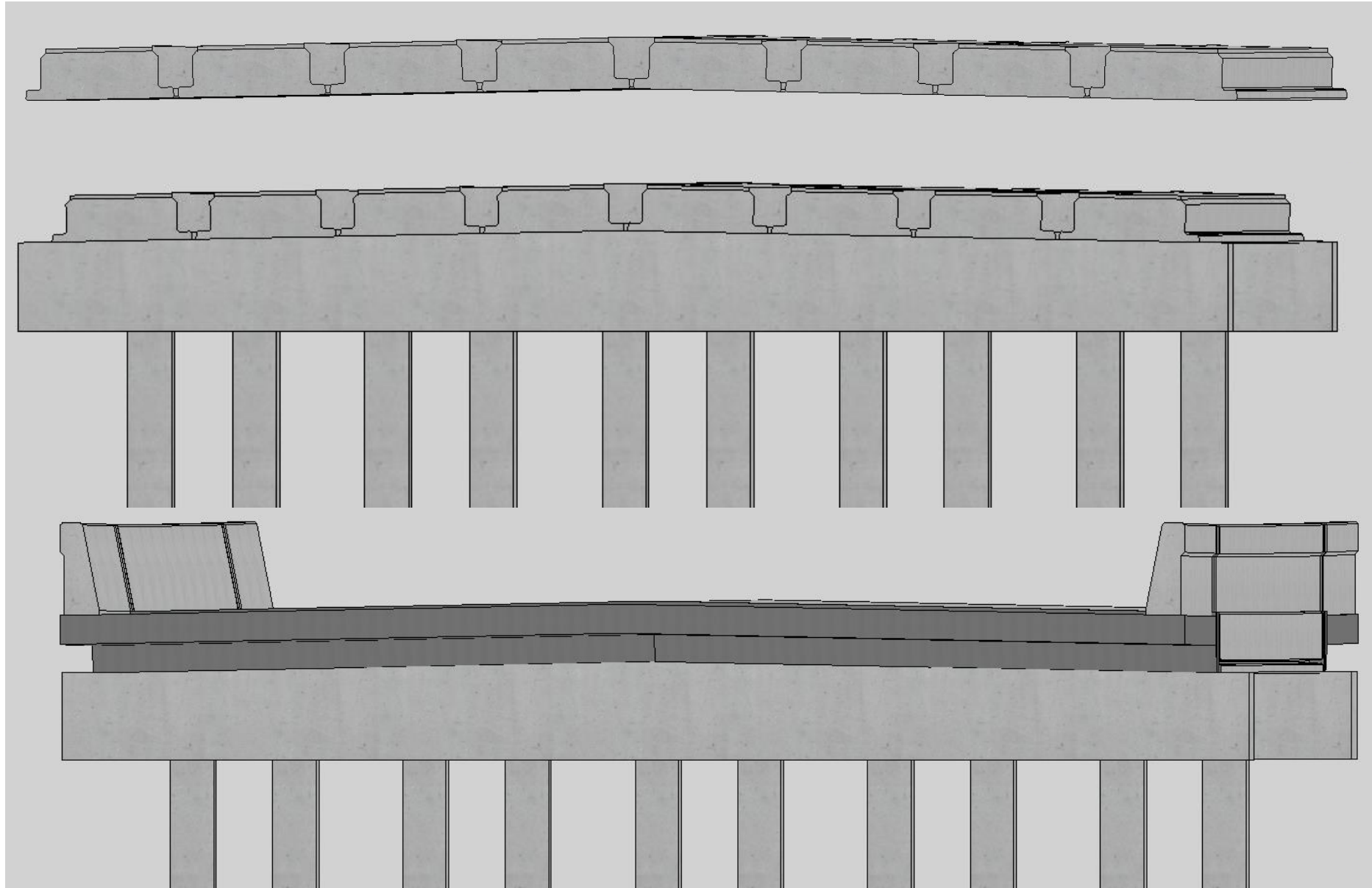
Things that need to be addressed within the OBM **FSB** workflow:

1. Shear Pockets
 - Interior
 - Exterior
2. Cast-in-place topping
3. End Diaphragms
4. Accommodate for chamfers and dimensions
 - Edge of CIP Topping vs. Edge of Beam vs. WP are all different

FSB + OBM =

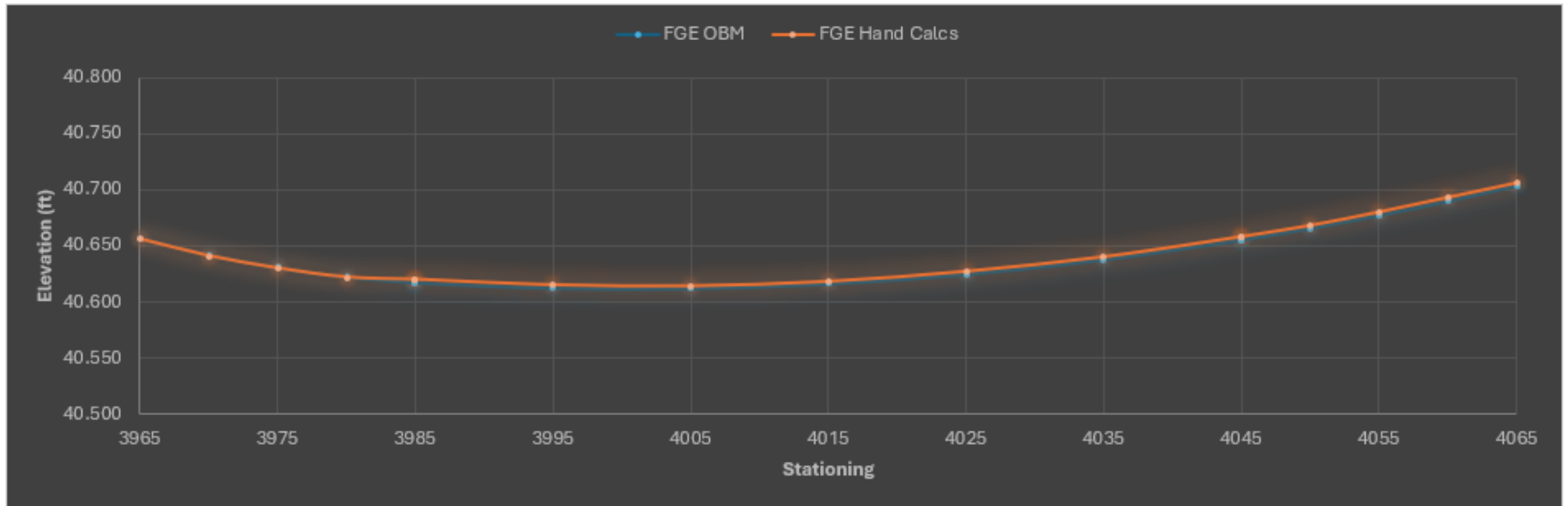


FSB Adoption in Open Bridge Modeler (OBM)



Finish Grade Elevations

- Both “Hand Calculations” and OBM Output
- Built Confidence in the Program Output → Greatest Difference = 1/32”
- Only issue w/ OBM was accounting for the chamfers → Adjust by $\frac{3}{4}$ ” at Left & Right Copings

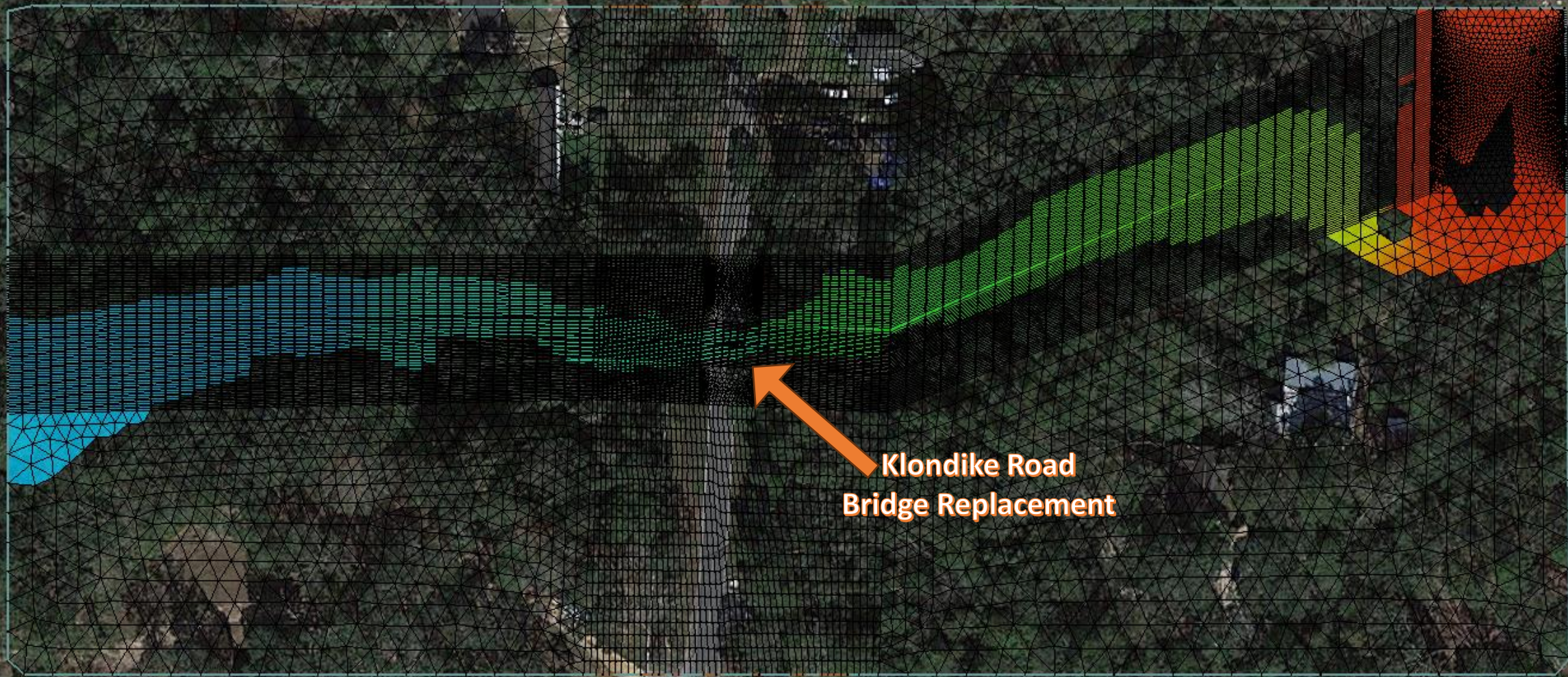




Abutment Cap

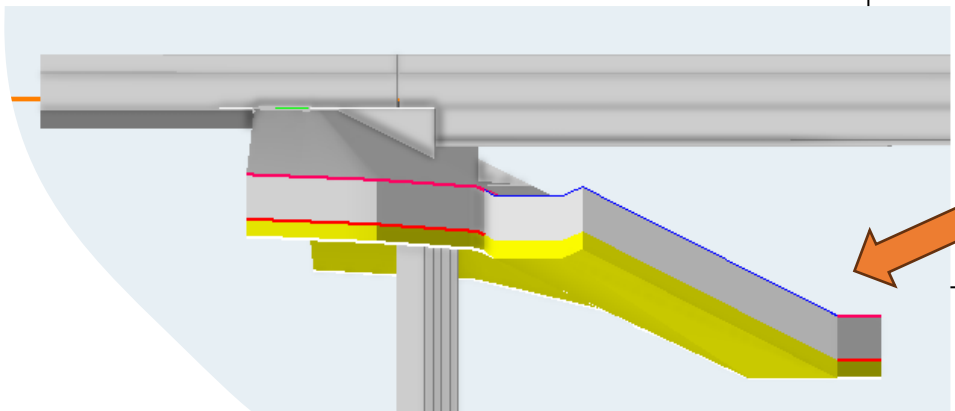
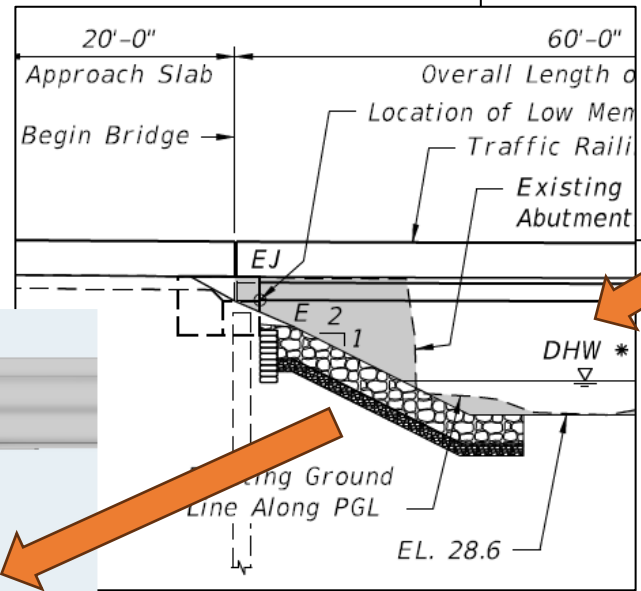
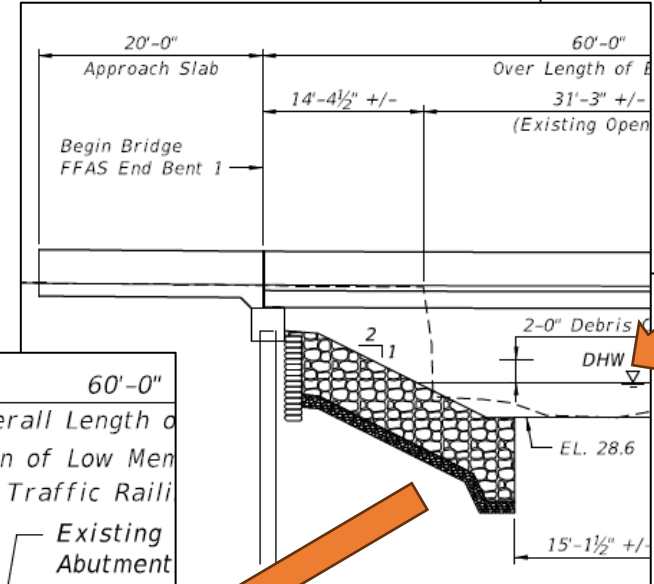
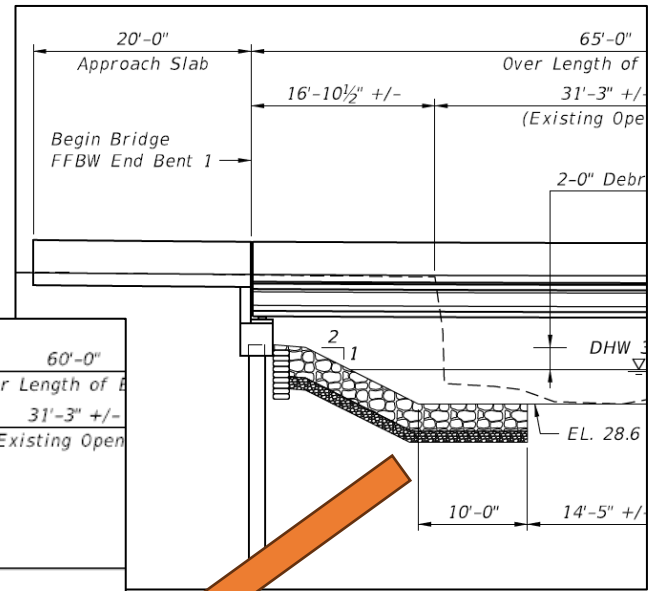
- FSBs do not require a backwall → FIB or Steel Girder Bridges do
- Bent Cap cross slope → Constant or Crown
- Under OBM 10.12 we were unable to model the crowned abutment cap without a backwall.
- As a work around, abutments were modeled as pier to be able to add a crowned cap. However, modeling as a pier the program would not allow bearings to be added.
 - OBM output was not used to determine Substructure Elevation for this Project
- All of these issues were presented to Bentley and the CADD office and have been addressed in **OBM V23** (Current Version).



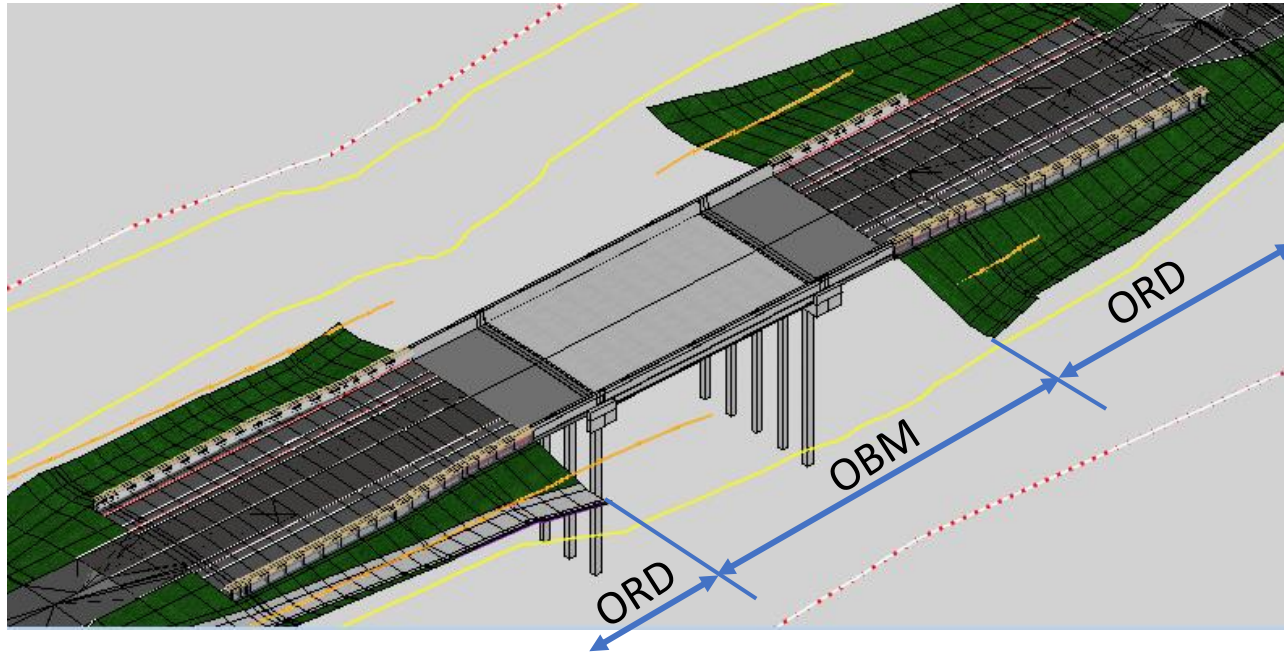


HYDRAULIC MODELING

Holy RIP-Rap

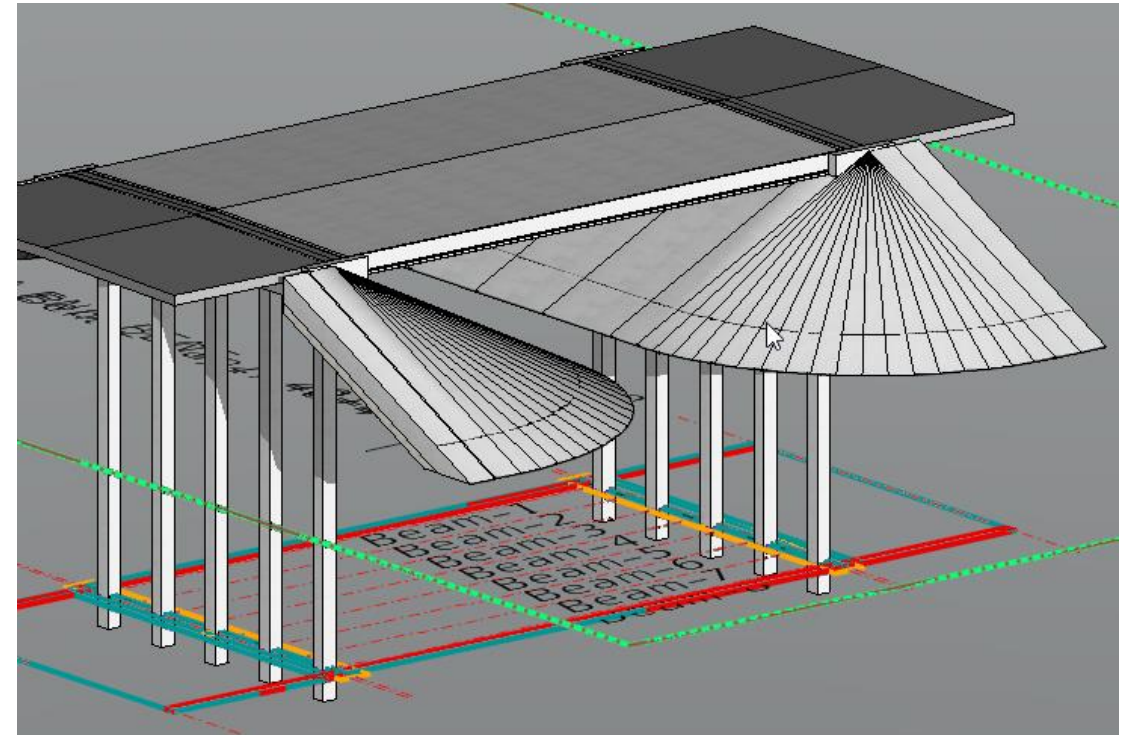


Holy RIP-Rap



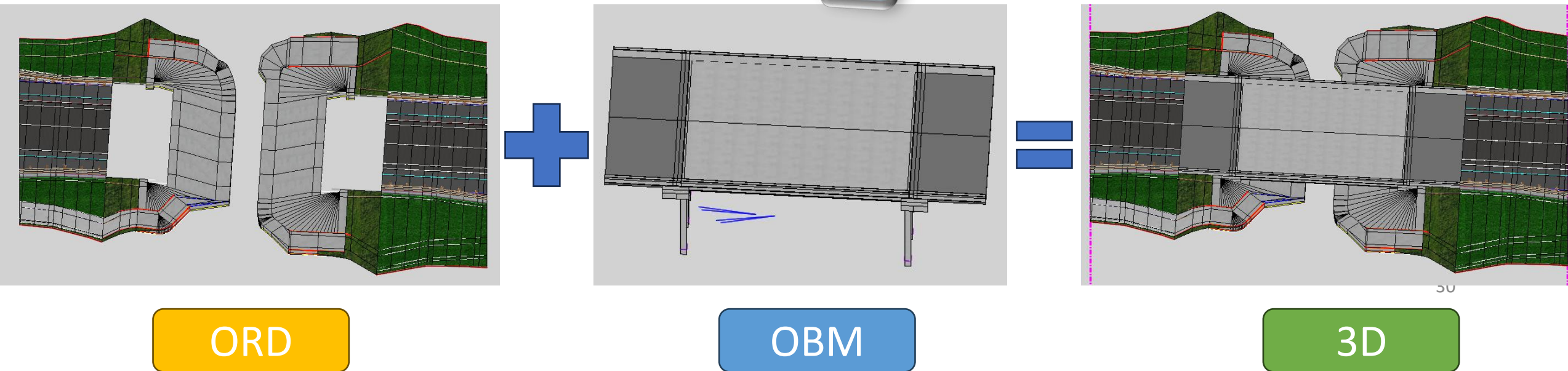
More Items to Tackle:

1. Set the hydraulic opening
2. Maintain vertical clearance
3. How do we model the slope embankments in OBM?
4. Tie it all into ORD and overall model effort

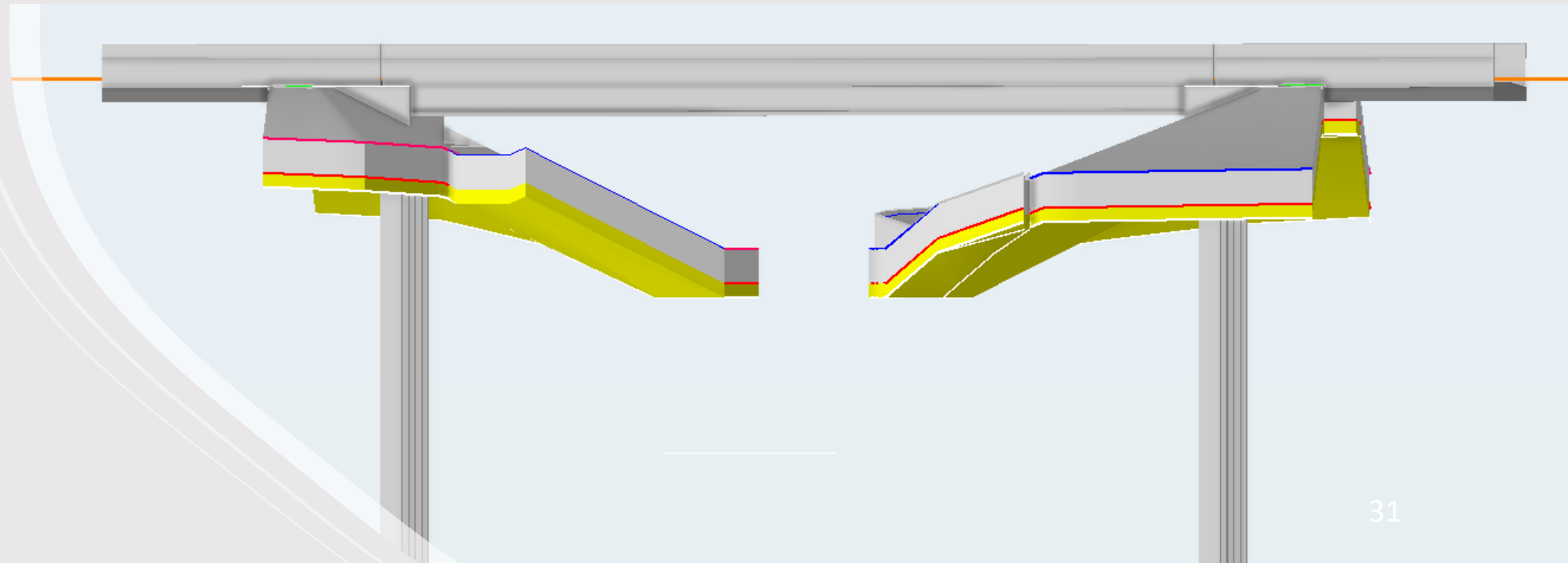
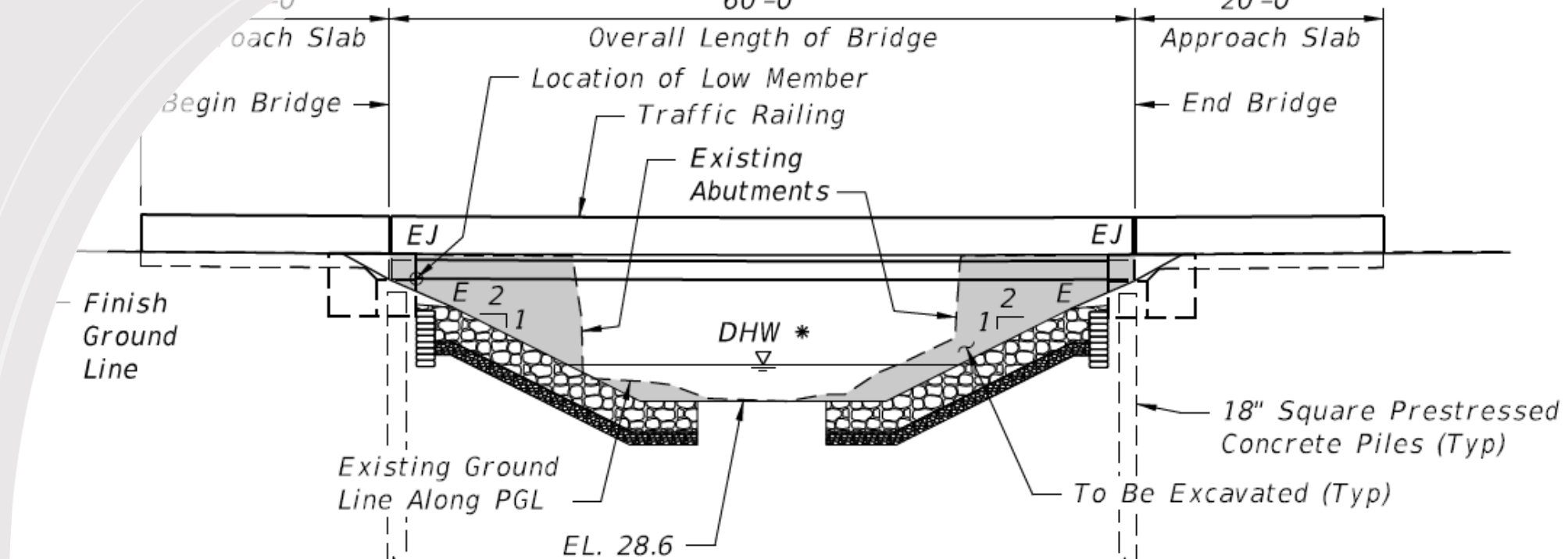


Riprap Cont'd

- Ultimately had to use ORD for our project, mostly because we had to use ORD to create the surface model and tie-in the ditches running along the sides of the bridge into the spillway.
- However, the CADD Office assured us that both ORD and OBM can be used for developing the slope embankments.
- Give it a try and call us with issues.



THE
FINAL IN
2D & 3D



To Conclude Part 2:



CO – Structures with the Drainage Office was able to deliver the required 2D Plans and the informational 3D files to the district on schedule

Able to identify and resolve issues within the OBM Workflow when using a Florida Slab Beam type superstructure

Utilize ORD, OBM and iModel (*up next*) to collaborate between disciplines

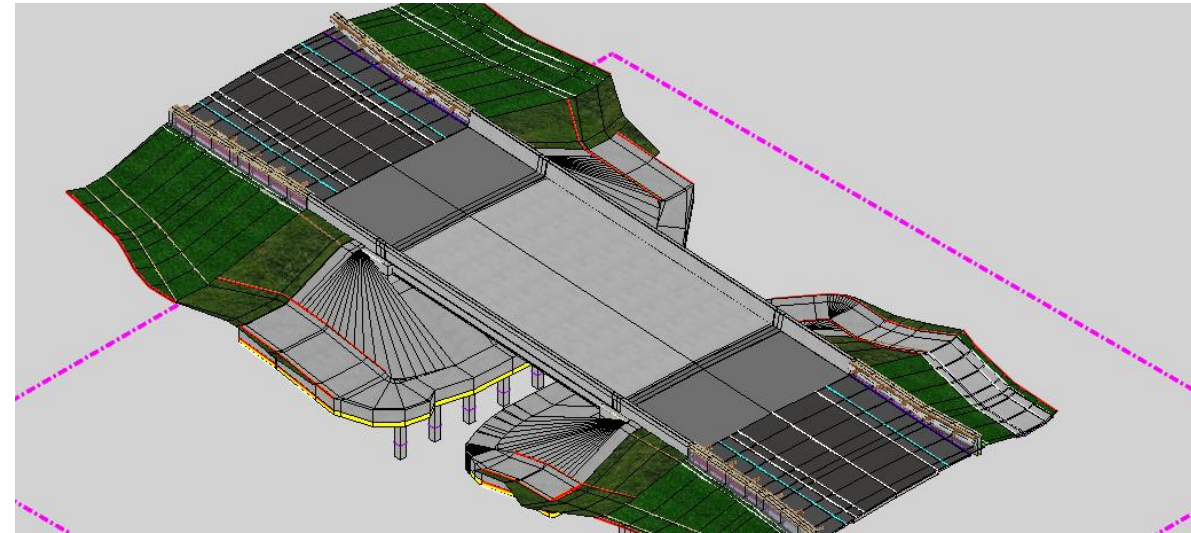
Educate & train staff, make improvements, work collaboratively within CO and our consultant partners.

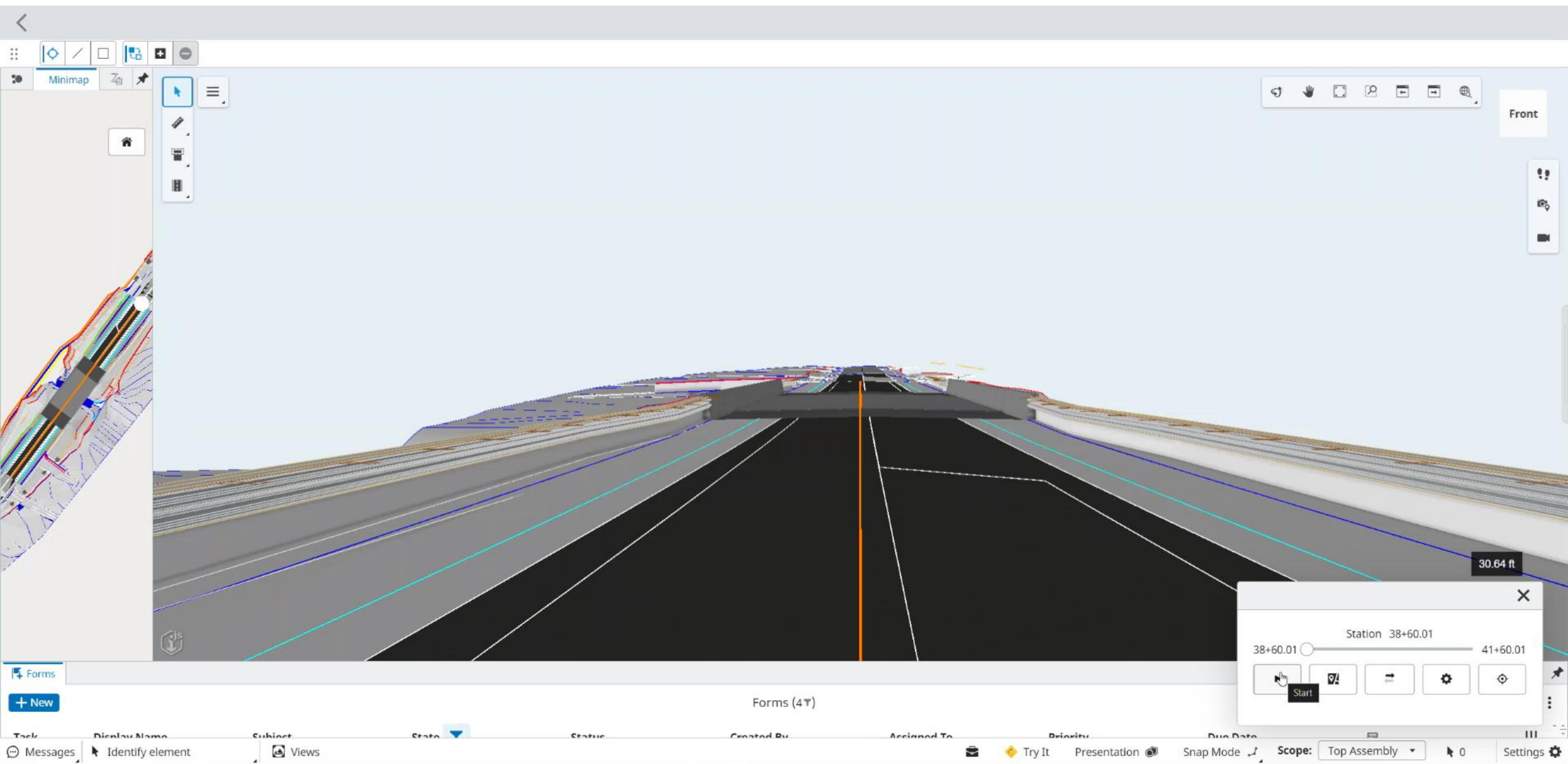
Part 3

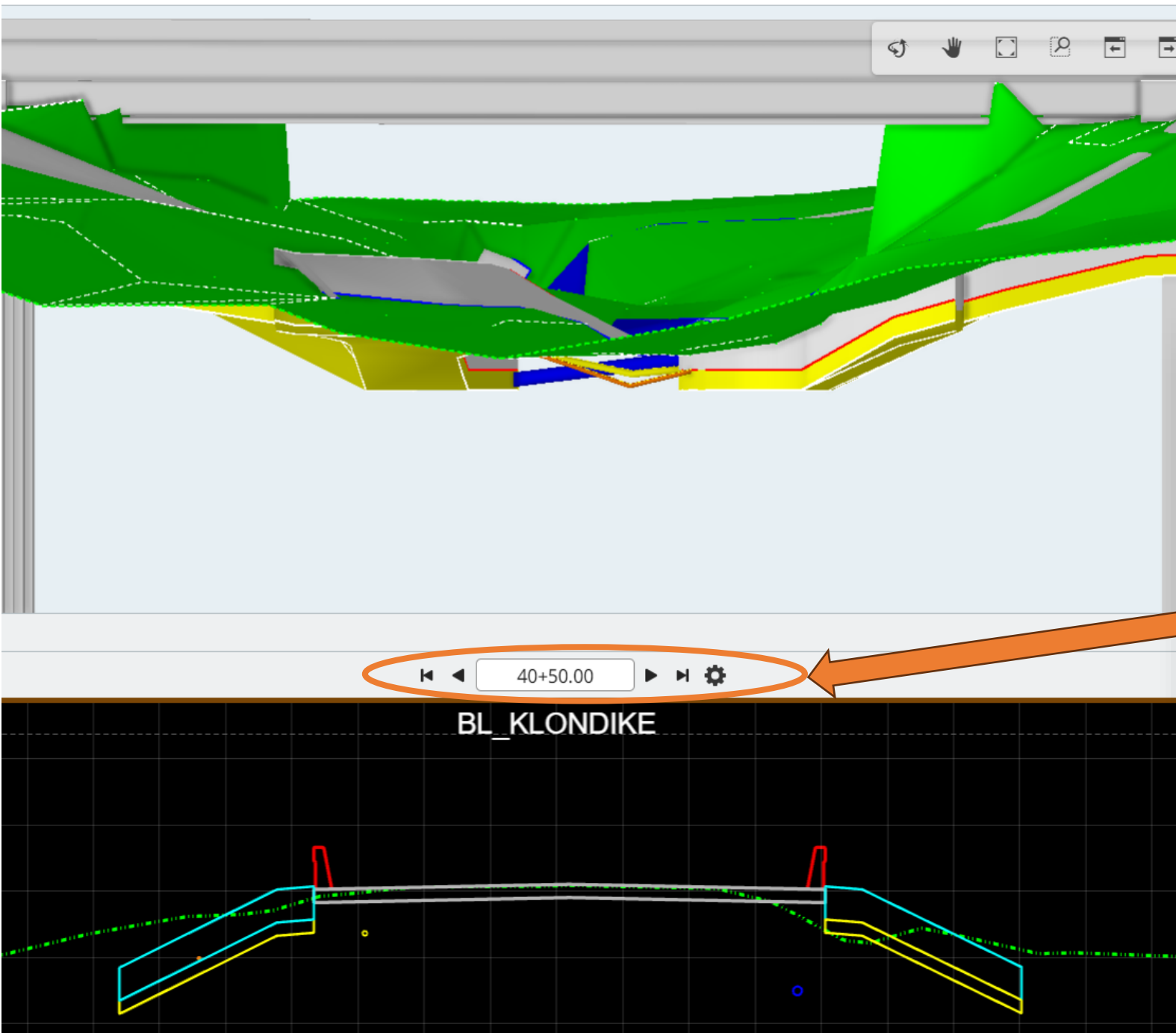
Model Sharing

Project Details

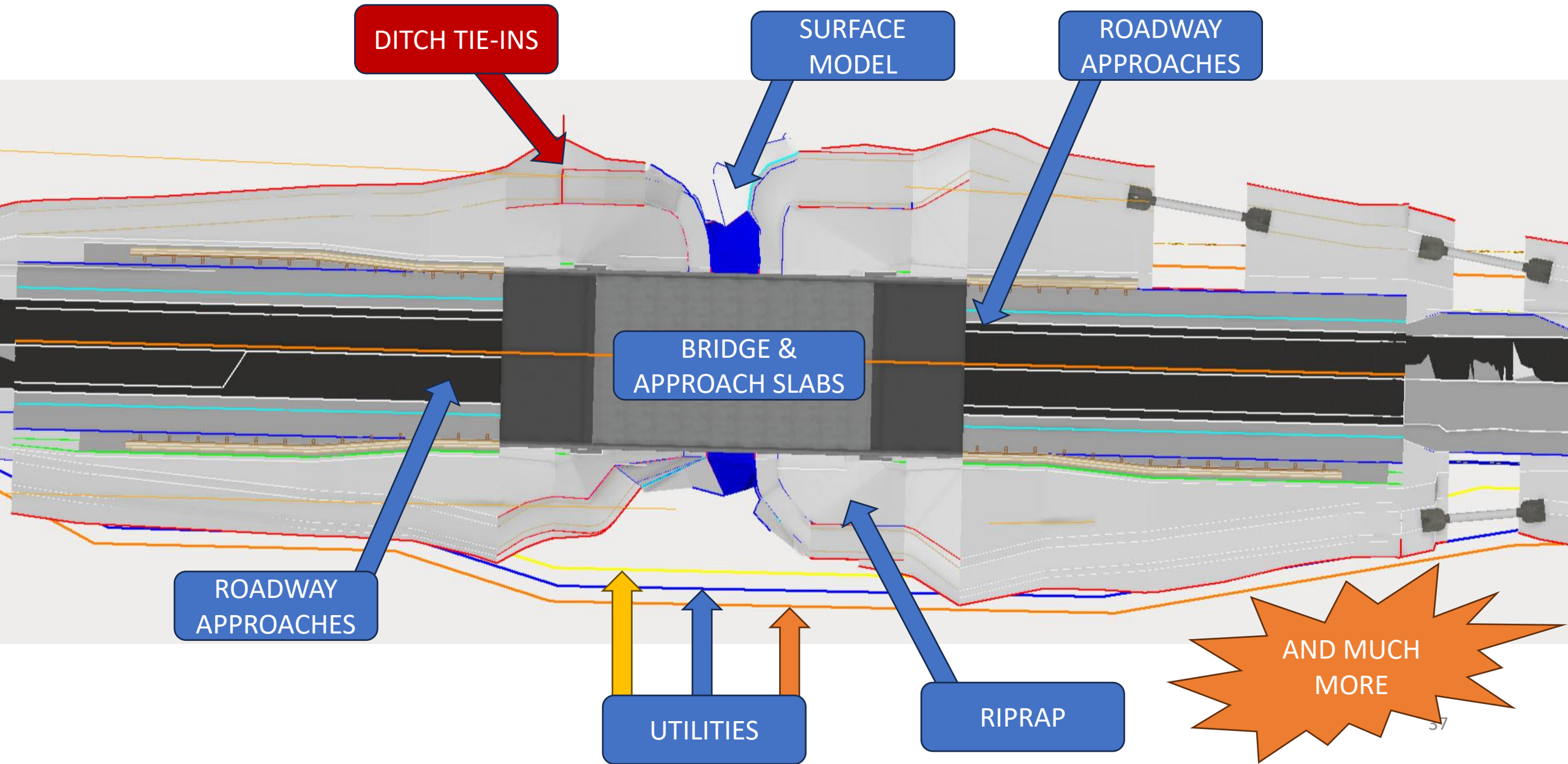
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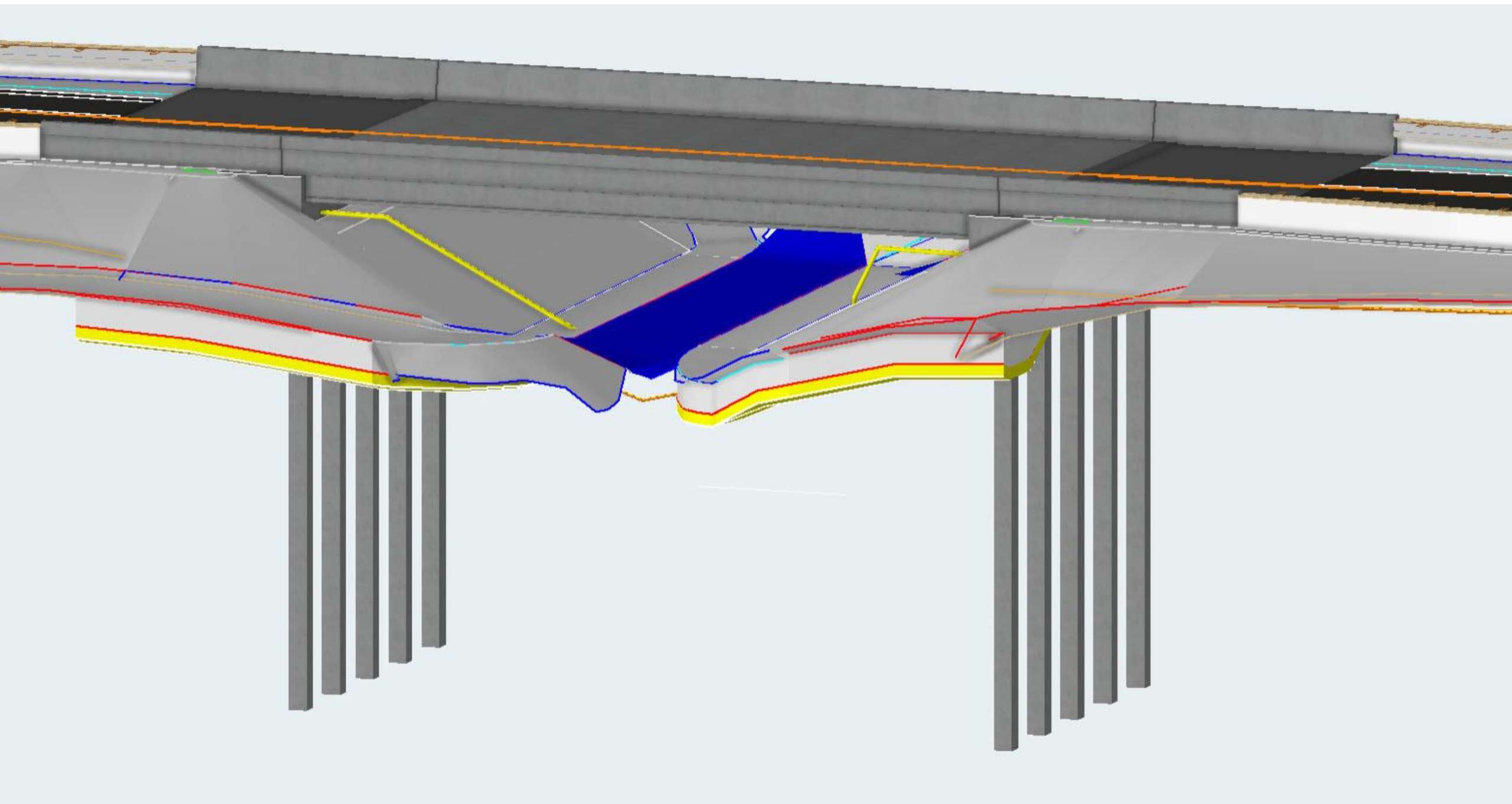


It all comes together...



2024 FDOT Bring Your Kids To Work Day





Contact Info

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FDOT CADD Office

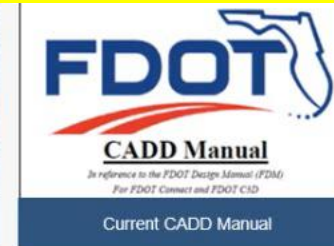
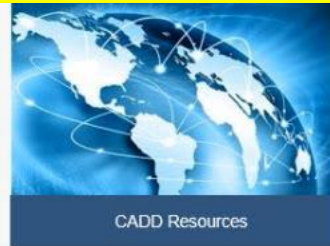
brian.martin@dot.state.fl.us

850-414-4872

WELCOME TO THE CADD OFFICE

Office Manager: Vacant - State CADD Coordinator

Questions?



Safety Message

